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Part IX

Environmental Protection Agency

Twenty-Eighth Report of the Interagency Testing Committee; Notice

ENVIRONMENTAL PROTECTION AGENCY

[OPTS-41035; FRL 3937-4]

Twenty-Eighth Report of the Interagency Testing Committee to the Administrator; Receipt of Report and Request for Comments Regarding Priority List of Chemicals

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: The Interagency Testing Committee (ITC), established under section 4(e) of the Toxic Substances Control Act (TSCA), transmitted its Twenty-Eighth Report to the Administrator of EPA on May 31, 1991. As noted in this Report, which is included with this notice, the Committee revised the Priority Testing List by designating 6 chemicals and recommending 3 chemicals and 11 chemical groups. The six designated chemicals are: acetone, *n*-butanol, dimethyl terephthalate, di-(2-ethylhexyl) adipate, isobutyl alcohol, and thiophenol. There are no recommended with intent-to-designate chemicals. The three recommended chemicals are: allyl alcohol, 2,4-dichlorophenol, and *m*-dinitro-benzene. The 11 recommended chemical groups are: aldehyde hydrates, alkoxysilanes, alkynes, cyanoacrylates, hydrazines, isothiocyanates, methyl ethylene glycol ethers, nitroalcohols, oxiranes, propylene glycol ethers and esters, and phosphoniums.

The ITC has not removed any chemicals from the Priority List as a result of EPA actions.

EPA invites interested persons to submit written comments on the Report. EPA is not holding a Focus Meeting for these chemicals and will proceed immediately to rulemaking. EPA is taking this action because the designated chemicals have a statutory deadline and require a response by EPA within 1 year.

DATES: Written comments should be submitted by September 18, 1991.

ADDRESSES: Send written submissions to: TSCA Public Docket Office (TS-793), Office of Toxic Substances, Environmental Protection Agency, Rm. NE- G004, 401 M St., SW., Washington, DC 20460. All submissions should bear the document control number (OPTS-41035).

The public record supporting this action, including comments, is available for public inspection in Rm. NE-G004 at the address noted above from 8 a.m. to noon and 1 p.m. to 4 p.m., Monday through Friday, except legal holidays.

FOR FURTHER INFORMATION CONTACT: David Kling, Acting Director, Environmental Assistance Division (TS-799), Office of Toxic Substances, Environmental Protection Agency, 401 M St., SW., Rm. E-543B, Washington, DC 20460, (202) 554-1404, TDD (202) 554-0551.

SUPPLEMENTARY INFORMATION: EPA has received the TSCA Interagency Testing Committee's Report to the Administrator.

I. Background

TSCA (Pub. L. 94-469, 90 Stat. 2003 *et seq*; 15 U.S.C. 2601 *et seq.*) authorizes the Administrator of EPA to promulgate regulations under section 4(a) requiring testing of chemicals and groups in order to develop data relevant to determining the risks that such chemicals and groups may present to health or the environment. Section 4(e) of TSCA established the Interagency Testing Committee to recommend chemicals and groups to the Administrator of EPA for priority testing consideration. Section 4(e) directs the ITC to revise the TSCA section 4(e) Priority Testing List at least every 6 months. The ITC's most recent revisions to this List are included in the Committee's Twenty-Eighth Report. The Report was received by the Administrator on May 31, 1991, and is included in this Notice. The Report adds 9 chemicals and 11 groups of chemicals to the TSCA section 4(e) Priority Testing List.

II. Written and Oral Comments and Public Meetings

EPA invites interested persons to submit detailed comments on the ITC's new recommendations. The Agency is interested in receiving information concerning additional or ongoing health and safety studies on the subject chemicals as well as information relating to the human and environmental exposure to these chemicals.

A notice will be published at a later date in the **Federal Register** adding most of the substances recommended in the ITC's Twenty-Seventh and Twenty-Eighth Report to the TSCA section 8(d) Health and Safety Data Reporting Rule (40 CFR part 716), which requires the reporting of unpublished health and safety studies on the listed chemicals. The delay in publishing this notice is necessary because of the requirement to complete the economic analysis on a large number of chemicals. That notice will also add most of the chemicals to the TSCA section 8(a) Preliminary Assessment Information Rule (40 CFR part 712). The section 8(a) rule requires the reporting of production volume, exposure, and release information on the listed chemicals.

III. Status of List

The ITC's Twenty-Eighth Report notes the addition of chemicals and chemical groups to the Priority Testing List. The current List contains 6 designated chemicals, 3 recommended chemicals, and 11 recommended chemical groups.

Authority: 15 U.S.C. 2603.

Dated: July 24, 1991.

Charles M. Auer,

Director, Existing Chemical Assessment Division, Office of Toxic Substance.

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Twenty-Eighth Report of the Interagency Testing Committee to the Administrator, Environmental Protection Agency

Summary. The U.S. Congress created the Interagency Testing Committee (ITC) under the Toxic Substances Control Act (TSCA) to recommend TSCA regulable chemicals and chemical groups to the Administrator of the U.S. Environmental Protection Agency (EPA) for Priority Testing consideration and to facilitate coordination of chemical testing sponsored or required by U.S. Government organizations represented on the Committee. Congress directed the Committee to: (1) Organize their recommendations as the Priority Testing List, (2) revise the Priority Testing List at least every 6 months and (3) transmit these revisions to the EPA Administrator for publication in the Federal Register

As a result of its deliberations during this reporting period (9/28/90 to 5/15/91), the Committee is revising the TSCA section 4(e) Priority Testing List by designating 6 chemicals and recommending 3 chemicals and 11 chemical groups. The Committee's computerized, substructure-based chemical selection processes were used to identify the chemicals in groups that are likely to satisfy multiple data needs of Member Agencies and others. During this reporting period, the Committee (1) considered available information on over 40 chemicals and over 30 chemical groups, (2) discussed information on Committee activities at the American Society for Testing and Material's First Symposium on Environmental Toxicology and Risk Assessment, (3) submitted comments to EPA's proposed multi-substance rules for neurotoxicity and developmental/reproductive toxicity, (4) met with the Synthetic Organic Chemical Manufactures Association and the Chemical Manufactures Association to discuss completed, ongoing and planned testing of chemical groups recommended in the 26th Report, (5) solicited voluntary use exposure and release information that is unlikely to be submitted in response to the TSCA Section 8(a) rule that is promulgated for any chemical or chemical group recommended for testing by the ITC, (6) solicited voluntary physical and chemical property information for any chemicals in chemical groups recommended for testing since the Committee's 24th Report, (7) published unambiguous tables (requested by Congress) of the 123 chemicals and 38 chemical groups on or removed from the Priority Testing List, (8) referred a chemical to the EPA, FDA or NTP for health effects testing and (9) deferred over 800 chemicals from testing consideration.

Chemicals or chemical groups (entries) on the Priority Testing List are designated, recommended with intent-to-designate or recommended by the Committee. Designations were created by the U.S. Congress when they drafted TSCA. Recommendations with intent-to-designate were established by the Committee in their 17th Report (50 FR 47603; November 19, 1985). Recommendations were established by the Committee in their 11th Report (47 FR 54626; December 3, 1982). Revisions to the Priority Testing List are presented, together with the types of testing recommended, in Table 1. The footnote letters following Table 1 acknowledge the Committee's efforts to comprehensively examine ongoing testing-related activities and available information previously submitted under TSCA.

TABLE 1.—REVISIONS TO THE SECTION 4(E) PRIORITY TESTING LIST

Group	CAS No.	Chemical	Action	Date	Recommended Tests
IRIS	67-64-1	Acetone[1,2]	Designated	5/91	Chemical fate: None. Health effects: Reproductive effects. Ecological effects: None.
IRIS	71-36-3	*n*-Butanol[2]	Designated	5/91	Chemical fate: None. Health effects: Reproductive effects. Ecological effects: None.
IRIS	78-83-1	Isobutanol[2]	Designated	5/91	Chemical fate: None. Health effects: Oral and inhalation pharmacokinetics, reproductive effects, developmental toxicity, and oncogenicity. Ecological effects: None.
IRIS	103-23-1	Di-(2-ethylhexyl)adipate[2]	Designated	5/91	Chemical fate: Physical and chemical properties, river die-away and sediment biodegradation. Health effects: Reproductive effects, developmental toxicity and neurotoxicity. Ecological effects: Aquatic invertebrate and fish chronic toxicity.
IRIS	108-98-5	Thiophenol[2]	Designated	5/91	Chemical fate: Aerobic biodegradation, photolysis screening, and volatilization. Health effects: Pharmacokinetics, reproductive effects, developmental toxicity, neurotoxicity, mutagenicity and oncogenicity. Ecological effects: Algal toxicity, aquatic invertebrate and fish acute and chronic toxicity.
IRIS	120-61-6	Dimethyl terephthalate	Designated	5/91	Chemical fate: River die-away biodegradation. Health effects: Reproductive effects, developmental toxicity and neurotoxicity. Ecological effects: Algal toxicity, aquatic invertebrate and fish acute and chronic toxicity.
IHIS	99-65-0	*m*-Dinitro-benzene[2]	Recommended	5/91	Chemical fate: None. Health effects: Subchronic toxicity, reproductive effects, developmental toxicity and neurotoxicity.

TABLE 1.—REVISIONS TO THE SECTION 4(E) PRIORITY TESTING LIST—Continued

Group	CAS No.	Chemical	Action	Date	Recommended Tests
					Ecological effects: None.
IRIS	107-18-6	Allyl alcohol[2]	Recommended	5/91	Chemical fate: None. Health effects: Subchronic toxicity, pharmacokinetics, reproductive effects, developmental toxicity and neurotoxicity. Ecological effects: Algal toxicity, acute and chronic aquatic invertebrate and fish toxicity.
IRIS	120-83-2	2,4-Dichlorophenol[1,3]	Recommended	5/91	Chemical fate: None. Health effects: Neurotoxicity and immunotoxicity. Ecological effects: None.
Alkynes			Recommended	5/91	Chemical fate: Physical and chemical properties and biodegradation rate screening. Health effects: None. Ecological effects: None.
Nitralcohols			Recommended	5/91	Chemical fate: Physical and chemical properties and biodegradation rate screening. Health effects: None. Ecological effects: None.
Phosphoniums			Recommended	5/91	Chemical fate: Physical and chemical properties and biodegradation rate screening. Health effects: None. Ecological effects: None.
Hydrazines			Recommended	5/91	Chemical fate: None. Health effects: None. Ecological effects: Algal toxicity, aquatic invertebrate and fish acute and chronic toxicity.
Oxiranes			Recommended	5/91	Chemical fate: None. Health effects: None. Ecological effects: Algal toxicity, aquatic invertebrate acute and chronic toxicity and fish chronic toxicity.
Alkoxysilanes			Recommended	5/91	Chemical fate: None. Health effects: None. Ecological effects: Algal toxicity, aquatic invertebrate and fish acute and chronic toxicity.
Aldehyde hydrates			Recommended	5/91	Chemical fate: None. Health effects: None. Ecological effects: Algal toxicity, aquatic invertebrate and fish acute and chronic toxicity.
Propylene glycol ethers and esters			Recommended	5/91	Chemical fate: None. Health effects: Developmental toxicity and reproductive effects. Ecological effects: None.
Methyl ethylene glycol ethers			Recommended	5/91	Chemical fate: None. Health effects: Developmental toxicity and reproductive effects. Ecological effects: None.
Isothiocyanates			Recommended	5/91	Chemical fate: Persistence. Health effects: None. Ecological effects: None.
Cyanoacrylates			Recommended	5/91	Chemical fate: Physical and chemical properties. Health effects: None. Ecological effects: None.

[1] Superfund Amendments and Reauthorization Act (SARA) section 110.
[2] Emergency Planning and Community Right-to-Know Act (EPCRA) section 313.
[3] Clean Air Act Amendments, section 301.
[4] Toxic Substances Control Act (TSCA) section 8(a) Preliminary Assessment Information Rule (PAIR).
[5] TSCA section 8(d) Health and Safety Data Reporting Rule.

Listed below are the individual chemicals for the chemical groups in Table 1. Chemical nos. 1 through 19 are alkynes, chemical nos. 20 through 23 are nitroalcohols, chemical nos. 24 through 28 are phosphoniums, chemical nos. 29 through 63 are hydrazines, chemical nos. 64 through 111 are oxiranes, chemical nos. 112 through 148 are alkoxysilanes, chemical nos. 149 through 186 are propylene glycol ethers and esters, chemical nos. 187 through 196 are methyl ethylene glycol ethers, chemical nos. 197 and 198 are isothiocyanates, chemical nos. 199 through 209 are cyanoacrylates, and chemicals nos. 210 and 211 are aldehyde hydrates.

No.	Chemical Name	CAS No.	Notes
1.	1-Propyne	74-99-7	
2.	1-Pentyn-3-ol, 3-methyl-	77-75-8	
3.	4-Octyne-3,6-diol, 3,6-dimethyl-	78-66-0	
4.	1-Butyne	107-00-6	
5.	2-Propyn-1-ol	107-19-7	
6.	1-Hexyn-3-ol, 3,5-dimethyl-	107-54-0	
7.	2-Butyne-1,4-diol	110-65-6	
8.	3-Butyn-2-ol, 2-methyl-	115-19-5	
9.	5-Decyne-4,7-diol, 2,4,7,9-tetramethyl-	126-86-3	
10.	3-Hexyne-2,5-diol, 2,5-dimethyl-	142-30-3	
11.	1-Buten-3-yne	689-97-4	
12.	Peroxide, (1,1,4,4-tetramethyl-2-butyne- 1,4-diyl)bis (1,1-dimethylethyl)	1068-27-5	
13.	Ethanol, 2,2'-[2-butyne-1,4- diylbis(oxy)]bis-	1606-85-5	
14.	3-Hexyne-2,5-diol	3031-66-1	
15.	Ethanol, 2-(2-propynyloxy)-	3973-18-0	
16.	1-Octyn-3-ol, 4-ethyl-	5877-42-9	
17.	7-Tetradecyne-6,9-diol, 5,10-diethyl-	25430-52-8	
18.	1-Propanesulfonic acid, 3,3'-[2-butyne- 1,4-diylbis(oxy)]bis 2-hydroxy-	40456-31-3	
19.	2-Propyne-1-sulfonic acid, sodium salt	55947-46-1	
20.	1-Propanol, 2-methyl-2-nitro-	76-39-1	
21.	1,3-Propanediol, 2-methyl-2-nitro-	77-49-6	
22.	1,3-Propanediol, 2-hydroxymethyl-2-nitro-	126-11-4	
23.	1,3-Propanediol, 2-ethyl-2-nitro-	597-09-1	
24.	Phosphonium, tetrakis(hydroxymethyl)-, chloride	124-64-1	
25.	Phosphonium, triphenyl(phenylmethyl)-,chloride	1100-88-5	
26.	Phosphonium, ethyltriphenyl-, iodide	4736-60-1	
27.	Phosphonium, ethyltriphenyl-, acetate	35835-94-0	
28.	Phosphonium, tetrakis(hydroxymethyl)-,sulfate(2:1) (salt)	55566-30-8	
29.	Hydrazine, 1,1-dimethyl-	57-14-7	b,g
30.	Hydrazine, phenyl monohydrochloride	59-88-1	
31.	Hydrazine, methyl-	60-34-4	b,g
32.	Benzenesulfonic acid, hydrazide	80-17-1	
33.	Benzenesulfonic acid, 4,4'-oxybis-,dihydrazide	80-51-3	
34.	Tetrazole-5-thione, 1,2-dihydro-1-phenyl-5*H*-	86-93-1	
35.	3-Pyrazolidinone, 1-phenyl-	92-43-3	
36.	Hydrazine, phenyl-	100-63-0	
37.	1-tetrazene-1-carboximidic acid, 4-(Aminomethyl)-, 2-nitrosohydrazide	109-27-3	
38.	1,2-Hydrazinedicarboxamide	110-21-4	
39.	Hydrazine, 1,2-diphenyl-	122-66-7	a,b,d,g
40.	1,2-Hydrazinedicarbothioamide	142-46-1	
41.	Hydrazine	302-01-2	a,b,g
42.	Carbonic dihydrazide	497-18-7	
43.	Hydrazinecarboxamide, monohydrochloride	563-41-7	e
44.	Hydrazinecarboximidamide, monohydrochloride	1937-19-5	
45.	Carbonothioic dihydrazide	2231-57-4	
46.	Carbonic acid, compd. with hydrazinecarboximidamide (1:1)	2582-30-1	
47.	1,3-Benzenedicarboxylic acid, dihydrazide	2760-98-7	
48.	Hydrazine, (2,4,6-trichlorophenyl)-	5329-12-4	
49.	Hydrazine dihydrochloride	5341-61-7	
50.	Hydrazinecarboxylic acid, methyl ester	6294-89-9	
51.	Hydrazinecarbothioamide, *N*-methyl-	6610-29-3	
52.	Hydrazine, monoacetate	7335-65-1	
53.	Hydrazine, (1,1-dimethylethyl)-, monohydrochloride	7400-27-3	
54.	Hydrazine monohydrate	7803-57-8	
55.	Hydrazine sulfate (1:1)	10034-93-2	b
56.	Benzenesulfonic acid, 4-methyl-, 2- (aminocarbonyl)hydrazide	10396-10-8	
57.	Hydrazine sulfate (2:1)	13464-80-7	
58.	Hydrazinecarbodithioic acid, compd. with hydrazine (1:1)	20469-71-0	
59.	Benzenepropanoic acid, 3,5-bis(1,1- dimethylethyl)-4-hydroxy-, hydrazide	32687-77-7	
60.	Benzenepropanoic acid, 3,5-bis(1,1- dimethylethyl)-4-hydroxy-, 2-3-3,5- bis(1,1-dimethylethyl)-4-hydroxyphenyl- 1-oxo	32687-78-8	
61.	1,2,4-Triazin-5(2*H*)-one, 4-amino-6-(1,1- dimethylethyl)3,4-dihydro-3-thioxo-	33509-43-2	
62.	Hydrazine, (2-chloro-4,6- dimethylphenyl)-, hydrochloride	63134-30-5	
63.	1,2-Hydrazinedisulfonic acid, 1-(4-nitrophenyl)-, dipotassium salt	63467-74-3	
64.	Oxirane	75-21-8	a,b,c,d
65.	Oxirane, methyl-	75-56-9	b,c,d
66.	2,4-Methano-2*H*-indeno[1,2-b:5,6-b']bisoxirene, octahydro-	81-21-0	c
67.	Oxirane, phenyl-	96-09-3	b,c
68.	Oxirane, 2,2'-[1,3-phenylenebis(oxymethylene)]bis-	101-90-6	c,d
69.	7-Oxabicyclo 4.1.0 heptane, 3-ethenyl-	106-86-5	
70.	7-Oxabicyclo 4.1.0 heptane, 3-oxiranyl-	106-87-6	c
71.	Oxirane, ethyl-	106-88-7	b,c,d
72.	Oxirane, (chloromethyl)-	106-89-8	b,c,d
73.	2-Propenoic acid, 2-methyl-,oxiranylmethyl ester	106-91-2	c,d
74.	Oxirane, [(2-propenyloxy)methyl] -	106-92-3	c,d
75.	Oxirane, (phenoxymethyl)-	122-60-1	c,d
76.	Spiro[6,10-(epoxymethano)-10*H*-cyclopenta[a]phenanthrene	163-77-9	
77.	7-Oxabicyclo[4.1.0]heptane	286-20-4	c
78.	Oxirane, trifluoro(trifluoromethyl)-	428-59-1	d,f
79.	Oxiranemethanol	556-52-5	c,d
80.	Oxirane, 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxy- methylene)]bis-	1675-54-3	d
81.	3-Oxatricyclo[4.1.1.02,4]octane, 2,7,7- trimethyl-	1686-14-2	
82.	Oxirane, [(2-methylphenoxy)methyl]-	2210-79-9	d

No.	Chemical Name	CAS No.	Notes
83.	Oxirane, 2,2'-[oxybis(methylene)]bis-	2238-07-5	c,d
84.	7-Oxabicyclo[4.1.0]heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0] hept-3- ylmethyl ester	2386-87-0	
85.	Oxirane, 2,2'-[1,4- butanediylbis(oxymethylene)]bis-	2425-79-8	c,d
86.	Oxirane, (butoxymethyl)-	2426-08-6	c,d
87.	1,3,5-Triazine-2,4,6(1*H*,3*H*,5*H*)-trione, 1,3,5-tris(oxiranylmethyl)-	2451-62-9	
88.	Oxirane, [(2-ethylhexyl)oxy methyl]-	2461-15-6	d
89.	Oxirane, [(dodecyloxy)methyl]-	2461-18-9	c,d
90.	Silane, trimethoxy[3- (oxiranylmethoxy)propyl]-	2530-83-8	c,d
91.	Oxirane, [4-(1,1-dimethylethyl)phenoxy methyl]-	3101-60-8	c,d
92.	Hexanedioic acid, bis(7-oxabicyclo[4.1.0]hept-3-ylmethyl) ester	3130-19-6	
93.	Spiro 1,3-dioxane-5,3'-[7-oxabicyclo[4.1.0]heptane], 2-(7-oxabicyclo[4.1.0]hept-3-yl)-	3388-03-2	
94.	Silane, trimethoxy[2-(7- oxabicyclo[4.1.0]hept-3-yl)ethyl]-	3388-04-3	
95.	Oxiranemethanamine, *N*-[4- (oxiranylmethoxy)phenyl]-*N*-(oxiranylmethyl)-	5026-74-4	d
96.	1,2-Cyclohexanedicarboxylic acid, bis(oxiranylmethyl) ester	5493-45-8	d
97.	Oxirane, 2,2',2''-[1-propanyl-3-ylidenetris(4,1-phenyleneoxy-methylene)]tris-	6130-72-9	
98.	Oxirane, tetradecyl-	7320-37-8	c,d
99.	Oxirane, 2,2',2'',2'''-[1,2-ethanediylidenetetrakis(4,1- phenyleneoxymethylene)]tetrakis-	7328-97-4	d
100.	Oxirane, [(1,1-dimethylethoxy)methyl]-	7665-72-7	d
101.	Cyclohexane, 1,4-bis[(2,3- epoxypropoxy)methyl]-	14228-73-0	d
102.	2,4-Imidazolidinedione, 5-ethyl-5-methyl-1,3-bis(oxiranylmethyl)-	15336-82-0	
103.	Oxirane, 2,2'-[(2,2-dimethyl-1,3- propanediyl)bis(oxymethylene)]bis-	17557-23-2	d
104.	Oxirane, [(methylphenoxy)methyl]-	26447-14-3	c,d
105.	Neodecanoic acid, oxiranylmethyl ester	26761-45-5	c,d
106.	Oxirane, 2,2'-[methylenebis(2,1-phenyleneoxymethylene)]bis-	54208-63-8	d
107.	Oxiraneoctanoic acid, 3-octyl-, ammonium salt	61792-39-0	
108.	7-Oxabicyclo[4.1.0]heptane-3-carboxylic acid, 2-ethylhexyl ester	62256-00-2	
109.	Oxirane, 2,2'-[[[2-(oxiranylmethoxy)phenyl]methylene] bis(4,1-phenyleneoxymethylene)]bis-	67786-03-2	
110.	Oxiranoctanoic acid, 3-octyl-, 1-methyl- 1,2-ethanediyl ester	67860-05-3	
111.	Oxirane, 2,2-dimethyl-3-(3-methyl-2,4- pentadienyl)-	69103-20-4	
112.	Silane, ethenyltriethoxy-	78-08-0	
113.	Silicic acid (*H4SiO4*), tetraethyl ester	78-10-4	
114.	Silicic acid (*H4SiO4*), tetrakis(2- ethylbutyl) ester	78-13-7	
115.	Silicic acid (*H4SiO4*), tetramethyl ester	681-84-5	
116.	Silicic acid (*H4SiO4*), tetrapropyl ester	682-01-9	
117.	Silane, triethoxyphenyl-	780-69-8	
118.	1-Propanamine, 3-(triethoxysilyl)-	919-30-2	
119.	Propanenitrile, 3-(triethoxysilyl)-	919-31-3	
120.	2,5,7,10-Tetraoxa-6-silaundecane, 6- ethenyl-6-(2-methoxyethoxy)-	1067-53-4	
121.	2-Oxa-7,10-diaza-3-silatridecan-13-oic acid, 3,3-dimethoxy-, methyl ester	1067-66-9	
122.	Silane, trimethoxymethyl-	1185-55-3	
123.	1,2-Ethanediamine, *N*-[3- (trimethoxysilyl)propyl]-	1760-24-3	
124.	Silane, triethoxymethyl-	2031-67-6	
125.	2-Propenoic acid, 2-methyl-, 3- (trimethoxysilyl)propyl ester	2530-85-0	c
126.	Silane, (3-chloropropyl)trimethoxy-	2530-87-2	
127.	Silane, ethenyltrimethoxy-	2768-02-7	
128.	Silane, triethoxyoctyl-	2943-75-1	
129.	Silane, trimethoxyphenyl-	2996-92-1	
130.	1-Propanamine, 3-(diethoxymethylsilyl)-	3179-76-8	
131.	Silanetriol, ethenyl-, triacetate	4130-08-9	
132.	Silanetriol, methyl-, triacetate	4253-34-3	
133.	1-Propanethiol, 3-(trimethoxysilyl)-	4420-74-0	
134.	Silicic acid (*H4SiO4*), tetrakis(1- methylpropyl) ester	5089-76-9	
135.	Silane, dimethoxydiphenyl-	6843-66-9	
136.	Acetic acid, dianhydride with silicic acid (*H4SiO4*) bis(1,1-dimethylethyl) ester	13170-23-5	
137.	1-Propanamine, 3-(trimethoxysilyl)-	13822-56-5	
138.	Silanetriol, ethyl-, triacetate	17689-77-9	
139.	Carbamic acid, [3- (triethoxysilyl)propyl]-, ethyl ester	17945-05-0	
140.	Silane, trimethoxy(2-methylpropyl)-	18395-30-7	
141.	Silicic acid (*H4SiO4*), tetra-2-methyl-1- pentyl ester	18765-32-7	
142.	Urea, [3-(triethoxysilyl)propyl]-	23779-32-0	
143.	1,3,5-Triazine-2,4,6(1*H*,3*H*,5H)-trione, 1,3,5-tris[3-(trimethoxysilyl)propyl]-	26115-70-8	
144.	Silane, dimethylbis(octadecyloxy)-	29043-70-7	
145.	1,2-Ethanediamine, *N*-[(4-ethenylphenyl)methyl]-N'-[3-(trimethoxysilyl)propyl]-, monohydrochloride	33401-49-9	
146.	1,2-Ethanediamine, *N*-(2-aminoethyl)-N'- [3-(trimethoxysilyl)propyl]-	35141-30-1	
147.	3,16-Dioxa-8,9,10,11-tetrathia-4,15- disilaoctadecane, 4,4,15,15-tetraethoxy-	40372-72-3	
148.	1,2-Ethanediamine,*N*-(phenylmethyl)-N'-[3-(trimethoxysilyl)propyl]-, monohydrochloride	42965-91-3	
149.	1,2-Propanediol	57-55-6	
150.	9-Octadecenoic acid (*Z*)-, 1-methyl-1,2- ethanediyl ester	105-62-4	
151.	2-Propanol, 1-methoxy-	107-98-2	c,d
152.	2-Propanol, 1-methoxy-, acetate	108-65-6	
153.	2-Propanol, 1,1'-oxybis-	110-98-5	
154.	2-Propanol, 1,1'-[(1- methylethylidene)bis(4,1-phenylene- oxy)]bis-	116-37-0	
155.	2-Propanol, 1-(2-butoxyethoxy)-	124-16-3	c,d
156.	2-Propanol, 1-phenoxy-	770-35-4	
157.	2-Propenoic acid, 2-methyl-, 2- hydroxypropyl ester	923-26-2	
158.	Octadecanoic acid, monoester with 1,2- propanediol	1323-39-3	
159.	9-Octadecenoic acid (*Z*)-, monoester with 1,2-propanediol	1330-80-9	
160.	2-Propanol, 1-propoxy-	1569-01-3	
161.	1,2,4-Butanetriol	3068-00-6	
162.	1-Propanol, 2-phenoxy-	4169-04-4	
163.	2-Propanol, 1-butoxy-	5131-66-8	c,d
164.	1,2-Propanediol, dibenzoate	19224-26-1	

No.	Chemical Name	CAS No.	Notes
165.	2-Propanol, 1-(2-methoxy-1- methylethoxy)-	20324-32-7	
166.	2-Propanol, 1-(2-methylpropoxy)-	23436-19-3	
167.	Propanol, [(1-methyl-1,2- ethanediyl)bis(oxy)]bis-	24800-44-0	
168.	Propanol, oxybis-	25265-71-8	
169.	Propanol, [2-(2- methoxymethylethoxy)methylethoxy]-	25498-49-1	c,d
170.	2-Propenoic acid, monoester with 1,2- propanediol	25584-83-2	c
171.	Propanol, oxybis-, dibenzoate	27138-31-4	
172.	Dodecanoic acid, monoester with 1,2- propanediol	27194-74-7	
173.	2-Propenoic acid, 2-methyl-, monoester with 1,2-propanediol	27813-02-1	
174.	1-Propanol, methoxy-	28677-93-2	
175.	1,2-Propanediol, mono isopropyl ether	29387-84-6	
176.	2-Propanol, 1-(2-butoxy-1-methylethoxy)-	29911-28-2	
177.	Nonanoic acid, 1-methyl-1,2-ethanediyl ester	41395-83-9	
178.	2-Propanoic acid, (1-methyl-1,2- ethanediyl)bis[oxy(methyl-2,1- ethanediyl)]ester	42978-66-5	
179.	2-Propanol, 1-ethoxy-	52125-53-8	
180.	Butanedioic acid, (tetrapropenyl)-, monoester with 1,2-propanediol	52305-09-6	
181.	2-Propanol, 1-(1-methoxyethoxy), acetate	54839-25-7	
182.	2-Propanol, 1-(1,1-dimethylethoxy)-	57018-52-7	
183.	Isooctadecanoic acid, monoester with 1,2-propanediol	68171-38-0	
184.	1-Propanol, 2-(1-methylethoxy)-, acetate	73238-55-8	
185.	Propanol, 1 (or 2)-2- methoxymethylethoxy, acetate	88917-22-0	
186.	Propanol, 1 (or 2) ethoxy acetate	98516-30-4	
187.	2,5,8,11,14-Pentaoxapentadecane	143-24-8	
188.	Ethanol, 2-methoxy-, carbamate	1616-88-2	
189.	2-Propenoic acid, 2-methoxyethyl ester	3121-61-7	
190.	Carbamic acid, bis(hydroxymethyl)-, 2- methoxyethyl ester	10143-22-3	
191.	2,5,8,11-Tetraoxatridecan-13-ol	23783-42-8	
192.	Propanenitrile, 3-(2-methoxyethoxy)-	35633-50-2	
193.	1-Propanamine, 3-(2-methoxyethoxy)-	54303-31-0	
194.	1*H*-Naphth[2,3-f]isoindole-1,3,5,10(2*H*)-tetrone, 4,11-diamino-2-[3-(2-methoxyethoxy)propyl]-	65059-45-2	
195.	Propanamide, *N*-[2-[(2-chloro-4,6-dinitrophenyl)azo]-5-(ethylamino)-4-(2-methoxyethoxy)phenyl]-	67846-62-2	
196.	Acetamide, *N*-[2-[(2-chloro-4,6-dinitrophenyl)azo]-5-(ethylamino)-4-(2-methoxyethoxy)phenyl]-	68957-67-5	
197.	1-Propene, 3-isothiocyanato-	57-06-7	
198.	Benzene, isothiocyanato-	103-72-0	
199.	2-Propenoic acid, 2-cyano-, methyl ester	137-05-3	
200.	2-Propenoic acid, 2-cyano-, isobutyl ester	1069-55-2	
201.	2-Propenoic acid, 2-cyano-3,3-diphenyl-, 2-ethylhexyl ester	6197-30-4	
202.	2-Propenoic acid, 2-cyano-, butyl ester	6606-65-1	
203.	2-Propenoic acid, 2-cyano-, ethyl ester	7085-85-0	
204.	2-Propenoic acid, 2-cyano-, 2-propenyl ester	7324-02-9	
205.	2-Propenoic acid, 2-cyano-, 1- methylethyl ester	10586-17-1	
206.	2-Propenoic acid, 2-cyano-, ethyoxy ethyl ester	21982-43-4	
207.	2-Propenoic acid, 2-cyano-, 2,2,2- trifluoromethyl ester	23023-91-8	
208.	2-Propenoic acid, 2-cyano-, 2- methyoxyethyl ester	27816-23-5	
209.	Ethanaminium, 2-[[2-cyano-3-[4-(diethylamino)phenyl]-1-oxo-2- propenyl]oxy]-*N,N,N*-trimethyl-, chloride	64992-16-1	
210.	1,1-Ethanediol, 2,2,2-trichloro-	302-17-0	
211.	Glyoxal trimeric dihydrate	4405-13-4	

Notes:

a Superfund Amendments and Reauthorization Act (SARA) section 110.

b. Emergency Planning and Community Right-to-Know Act (EPCRA) section 313.

c. Toxic Substances Control Act (TSCA) section 8(a) Preliminary Assessment Information Rule (PAIR).

d. TSCA section 8(d) Health and Safety Data Reporting Rule.

e. TSCA section 8(a) Comprehensive Assessment Information Rule.

f. TSCA section 8(a) chemical specific rule.

g. Clean Air Act Amendments, section 301.

TSCA Interagency Testing Committee

Statutory Member Agencies and Their Representatives

Council on Environmental Quality
None

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Raimundo Prat

Environmental Protection Agency
Letitia Tahan, member
Vincent Nabholtz, alternate

National Cancer Institute
Susan Sieber, member
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National Institute for Environmental Health Sciences
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Notes: Appointed on February 7, 1991.

The Committee acknowledges and is grateful for the assistance and support given by the staff of Syracuse Research Corp. (technical support contractor) and personnel of the EPA Office of Toxic Substances.

Chapter 1--Introduction

1.1 *Background.* The U.S. Congress created the Interagency Testing Committee (ITC) in 1976 to screen, select and recommend chemicals and chemical groups for priority health effects, chemical fate, and ecological effects testing consideration. Congress provided the ITC with statutory authority for screening, selecting and recommending chemicals and a list of factors that must be considered during chemical screening. Congress directed the Committee (which consists of 8 statutory and 10 liaison Members from U.S. Government organizations) to consider these statutory factors, including quantities manufactured or released, numbers of individuals exposed, duration of exposure, extent of human exposure, structural relationships to known toxic substances, toxicity data, reliability of test data to predict hazard and availability of testing facilities when screening chemicals or chemical groups for consideration. Congress also directed the Committee to give priority attention to those chemicals or chemical groups known to cause or suspected of causing cancer, gene mutations or birth defects. The Committee selects and recommends chemicals or chemical groups that may: (1) Present an unreasonable risk of injury to health or the environment, (2) reasonably be anticipated to enter the environment in substantial quantities or (3) involve significant or substantial human exposure.

Congress also created the ITC to facilitate coordination of chemical testing sponsored or required by U.S. Government organizations and to enhance information exchange to promote cost-effective use of U.S. Government chemical testing resources by recommending testing of chemicals or chemical groups that are likely to satisfy multiple data needs of Member Agencies and others. The Committee's statutory responsibilities are described in section 4(e) of the Toxic Substances Control Act (TSCA; Pub. L. 94–469, 90 Stat. 2003 et seq., 15 U.S.C. 2601 et seq.).

The Committee prepares a list (the Priority Testing List) of chemicals or chemical groups recommended for testing (by the chemical's manufacturers), transmits the Priority Testing List to the Administrator of the U.S. Environmental Protection Agency (EPA) and determines the order in which the EPA Administrator shall implement the testing recommendations under TSCA section 4(a) by designating those chemicals, from among its recommendations, to which the Administrator should respond within 12 months. Congress directed the Committee to revise the Priority Testing List at least every 6 months and required the EPA Administrator to publish the Committee's Reports in the **Federal Register.**

1.2 *Committee's previous reports.* Twenty-seven previous Reports to the EPA Administrator have been issued by the Committee and published in the **Federal Register.** In these 27 Reports, the Committee has recommended testing for 114 chemicals and 27 chemical groups. Chemical groups consist of one or more chemicals, isomers, congeners, mixtures, and so on that have a common substructure, use, testing information deficiency, exposure scenario, etc., and for which there is one common testing recommendation, e.g., aldehydes recommended for ecological effects testing in the 27th Report. Chemicals can be members of chemical groups, but each is counted as a single chemical if their testing recommendations are different, e.g., the 5 chloroalkyl phosphates recommended in the 23rd Report.

1.3 *Committee's activities during this reporting period.* Between September 28, 1990 and May 15, 1991 the Committee processed chemicals that were likely to satisfy multiple data needs of Member Agencies and others, evaluated chemicals by using the Committee's computerized, substructure-based, chemical selection processes and examined lists of ongoing activities related to reducing testing information deficiencies for commercial chemicals.

1.3.a *Chemical and chemical group selections.* The Committee designated 6 chemicals and recommended 3 chemicals and 11 chemical groups for testing (Table 1). Six IRIS chemicals were designated, because there were sufficient concerns and uncertainties (related to substantial production volumes and potential exposures and releases) to request that the EPA Administrator implement the testing recommendations within 12 months of the date of the 28th Report. Three IRIS chemicals were recommended, because the Committee wants to review the TSCA section 8(a) and 8(d) information and any use exposure and release information as well as any physical chemical property information that is voluntarily submitted, before deciding whether to designate these chemicals for testing. Data submitted or developed in response to designations and recommendations of IRIS chemicals are likely to satisfy some of multiple data needs of numerous U.S. Government organizations represented on the Committee. Three groups (alkynes, nitroalcohols and phosphoniums) were recommended for minimum physical and chemical property testing and biodegradation rate screening tests because of concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use, and the potential for persistence in the environment. Data submitted or developed in response to recommendations of chemical groups for minimum physical chemical property testing or biodegradation rate screening tests are likely to satisfy some of multiple data needs of the EPA, the Department of Transportation (DOT), the Department of Interior (DOI) and State and local governments involved with assessing the impact of chemical releases to the environment. Three groups (hydrazines, oxiranes and alkoxysilanes) were recommended for ecological effects tests because of concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use, and for potential to cause adverse ecological effects. Aldehyde hydrates were recommended for ecological effects testing to complete the Committee's recommendation process for aldehydes and their hydrates. Data submitted or developed in response to recommendations of minimum ecological effects testing are likely to satisfy some of multiple data needs of the EPA, DOT, DOI and State and local governments involved with assessing the impact of chemical releases to the environment. Propylene glycol ethers and esters and methyl ethylene glycol ethers were recommended because Congress directed the Committee to give priority attention to chemical groups suspected of causing birth defects. Data submitted or developed in response to these recommendations are likely to satisfy some of multiple data needs of the Consumer Product Safety Commission (CPSC), the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA) and others. Isothiocyanates were recommended for persistence testing to complete the Committee's recommendation process for

isocyanates and isothiocyanates. Cyanoacrylates were recommended for physical and chemical property testing because they are chemicals with commercially important bonding applications and there are insufficient publicly-available data to reasonably determine or predict physical and chemical properties. Data submitted or developed in response to these recommendations are likely to satisfy some of multiple data needs of EPA, DOT, the National Cancer Institute, the National Toxicology Program and others. These recommendations are consistent with the Committee's comprehensive approach of using their computerized processes to: (1) identify chemicals in substructure-based groups in need of screening tests, (2) review recently requested production and exposure data and non-public health and safety studies, (3) meet with interested groups to identify commercially-important chemicals that need to be tested (4) withdraw chemicals or tests to avoid unnecessary or duplicative testing, (5) characterize testing information deficiencies identified by Member Agencies, etc. and (6) integrate available information into a consolidated testing program likely to serve multiple users.

There are numerous advantages associated with nominating chemicals to the Committee. These were described in detail in chapter 1.3.a of the 27th Report (56FR9534, March 6, 1991). Further information about nominating chemicals or chemical groups to the Committee can be obtained by calling the Committee's Executive Director at area code 202/ 382–3820 or the Committee's Executive Assistant at area code 202/ 382–3825.

1.3.b *Comprehensive information processing.* During this reporting period, several For Your Information (FYI), TSCA section 8(d) and 8(e) documents were reviewed. These documents are stored on microfiche in the TSCA Public Docket Office, Office of Toxic Substances, Environmental Protection Agency, Room G–004 NE Mall, 401 M Street, S.W., Washington, D.C. 20460. These microfiched documents are also available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (1–800–336–4700), and from Chemical Information Systems, Inc., 7215 York Road, Baltimore, Maryland 21212 (1–800–CIS–USER). The Committee referenced several of these documents in Chapter 2 of this report and readers are referred to the above addresses to obtain further information. Interested parties can also obtain, from the EPA address, copies of publicly-available reports, letters and published references supporting recommendations of chemicals in this report.

The Committee continues to comprehensively search available domestic and international lists of ongoing activities related to reducing testing information deficiencies on chemicals under review. Efforts to conduct these searches identified chemicals listed in other statutes, e.g., chemicals listed in Title III of the 1990 amendments of the Clean Air Act. The Committee has recommended over 60 chemicals and chemical groups listed in this statute. These recommendations have resulted in the submission of: 1) substantive TSCA section 8(a) production, exposure and release information, 2) hundreds of non-public TSCA section 8(d) studies and 3) numerous TSCA section 4(a) and (d) studies that were conducted as a result of the EPA's implementation of the Committee's testing recommendations. The Committee continues to review information on chemicals listed in this and other relevant statutes. Efforts to conduct searches also identified chemicals for which TSCA information-gathering activities are ongoing (see Table 1 footnotes). The Committee makes the results of these searches publicly available by referencing TSCA submissions in Reports to the EPA Administrator or making tables and references of these submissions available in the public dockets supporting a Report to the EPA Administrator.

During this reporting period, the Committee considered available information on over 40 chemicals and over 30 chemical groups. The Committee designated 6 chemicals and recommended 3 chemicals and 11 chemical groups to the section 4(e) Priority Testing List. Review of the remaining chemicals and chemical groups is ongoing.

1.3.c *Information dissemination.* To emphasize the Committee's efforts to promote public understanding of the ITC's functions and purposes, the Committee is listing some of the Committee-related activities that occurred during this reporting period. On April 14, 1991, the Executive Director presented a keynote speech at the American Society for Testing and Material's First Symposium on Environmental Toxicology and Risk Assessment. On May 3, 1991, the Executive Director submitted comments to EPA's proposed multi-substance rules for neurotoxicity and developmental/ reproductive toxicity. Comments supported the development of these rules, listed chemicals and chemical groups (contained in these rules) that were previously recommended and designated by the ITC, identified additional information that EPA could consider during promulgation of final rules and offered to share requested or voluntarily submitted information received in response to chemicals of common concern.

To facilitate coordination of chemical testing and to promote conservation of chemical testing resources, Committee Members (from Agencies likely to use data resulting from ITC's chemical group recommendations) and the Executive Director met with the Synthetic Organic Chemical Manufactures Association and the Chemical Manufactures Association to discuss completed, ongoing and planned testing of chemical groups recommended in the 26th Report.

To promote a comprehensive evaluation of recent exposure information, the Committee is soliciting voluntary use exposure and release information that is unlikely to be submitted in response to the TSCA Section 8(a) rule that is promulgated for any chemical or chemical group recommended for testing. In this 28th Report, the Committee is soliciting voluntary use exposure and release information for imidazolium quaternary ammonium compounds and ethoxylated quaternary ammonium compounds (22nd Report), chloroalkyl phosphates (23rd Report), brominated flame retardants (25th Report), isocyanates, brominated flame retardants and alkyl phosphates (26th Report), aldehydes, sulfones and substantially produced chemicals in need of subchronic tests (27th Report) as well as the 3 chemicals and 11 chemical groups recommended for testing and listed in Table 1 of this Report.

To promote a comprehensive evaluation of recent physical and chemical property information, the Committee is soliciting voluntary submission of this information for any chemicals in chemical groups recommended for testing since the Committee's 24th Report. The Committee is soliciting voluntary submissions, because under 40 CFR 716.50, TSCA Section 8(d) studies of physical and chemical properties must be submitted only if they are performed for the purpose of determining the environmental or biological fate of a substance, and only if they investigated water solubility, adsorption/desorption on particulate surfaces, vapor pressure, octanol/water partition coefficient, density, dissociation constant, etc. The

Committee recognizes that before chemicals are manufactured, many physical and chemical properties are measured (including those mentioned above, but also including flash point, melting point, boiling point, etc.), but not for the purpose of determining the environmental or biological fate of a substance. Member Agencies often need these physical and chemical properties that would not be developed as part of an environmental or biological fate assessment.

The Committee hopes that a voluntary approach for use exposure data and physical chemical property information will prove more efficient than pursuing notice-and-comment rulemaking under a TSCA section 8(a) Comprehensive Assessment Information Rule.

In response to requests (made during the Executive Director's June 20, 1990 Congressional testimony) to clarify the number of chemicals and chemical groups recommended for testing by the ITC, the Committee is publishing two tables in this 28th Report listing 123 chemicals and 38 chemical groups that have been recommended for testing since 1977.

1.3.d *Referrals.* Rationales for not recommending health effects testing of chloral are provided in the ITC's 27th Report. Chloral and chloral hydrate were sequentially reviewed. An identical rationale supports not recommending chloral hydrate for health effects testing, i.e., Committee review of TSCA section 8(d) studies to avoid duplicative and unnecessary testing and review of TSCA section 8(a) submitted information as well as any use exposure and release and physical chemical property information that is voluntarily submitted, before deciding whether to designate the chemical for testing. In the interim, the Committee is referring chloral hydrate to the EPA, the FDA and the NTP for health effects testing consideration.

1.3.e *Deferrals.* To promote public understanding of the total number of chemicals that the Committee processes, the Committee is listing over 800 chemicals in 6 chemical groups that are being deferred from further consideration at this time because the chemicals were not reported to the EPA or the U.S. International Trade Commission as being recently produced. In addition the Committee is also deferring methyl isothiocyanate (CAS No. 556–61–6), because of uncertainties related to testing under TSCA and phosgene (CAS No. 75–44–5), because of concerns related to the inability to properly design inhalation toxicity studies. Deferred and other chemicals are recycled through the Committee's computerized processes to identify chemicals whose production volumes have substantially changed. On the following list of deferrals, chemicals nos. 1 through 243 are alkynes, chemicals nos. 244–269 are phosphonium compounds, chemicals nos. 270–410 are oxiranes, chemicals nos. 411 through 678 are alkoxysilanes, chemicals nos. 679 through 716 are isothiocyanates, and chemicals nos. 717 through 830 are hydrazines.

No.	Chemical Name	CAS No.
1.	19-Norpregna-1,3,5(10)-trien-20-yne-3,17-diol, (17.alpha.)-	57-63-6
2.	Ethyne	74-86-2
3.	Cyclohexanol, 1-ethynyl-	78-27-3
4.	2-Butyne-1,4-diamine, *N,N,N',N'*-tetraethyl-	105-18-0
5.	2-Penten-4-yn-1-ol, 3-methyl-	105-29-3
6.	1-Hexyn-3-ol	105-31-7
7.	1-Propyne, 3-bromo-	106-96-7
8.	3-Hexyn-2-ol	109-50-2
9.	2-Octynoic acid, methyl ester	111-12-6
10.	2-Butyne-1,4-diamine, *N,N,N',N'*-tetramethyl-	111-53-5
11.	2-Nonynoic acid, methyl ester	111-80-8
12.	2-Butyne-1,4-diamine, *N,N'*-diethyl-	112-22-1
13.	Cyclohexanol, 1-ethynyl-, carbamate	126-52-3
14.	Benzenemethanol, .alpha.-ethynyl-.alpha.-methyl-	127-66-2
15.	2-Butynedioic acid	142-45-0
16.	1,3-Butadiyne	460-12-8
17.	2-Propynoic acid	471-25-0
18.	Benzene, 1,1'-(1,2-ethynediyl)bis-	501-65-5
19.	2-Butyne	503-17-3
20.	Benzene, ethynyl-	536-74-3
21.	2-Butynediamide	543-21-5
22.	2-Butynoic acid	590-93-2
23.	1-Propyne, 3-chloro-	624-65-7
24.	2-Propynal	624-67-9
25.	1-Pentyne	627-19-0
26.	1,5-Hexadiyne	628-16-0
27.	1-Heptyne	628-71-7
28.	1-Octyne	629-05-0
29.	1-Hexadecyne	629-74-3
30.	Carbon monoxide	630-08-0
31.	2-Propynoic acid, 3-phenyl-	637-44-5
32.	2-Butyne, 1,1,1,4,4,4-hexafluoro-	692-50-2
33.	1-Hexyne	693-02-7
34.	2-Butynedioic acid, dimethyl ester	762-42-5
35.	1-Decyne	764-93-2
36.	1-Dodecyne	765-03-7
37.	1-Tetradecyne	765-10-6
38.	1-Pentadecyne	765-13-9
39.	1-Octyn-3-ol	818-72-4
40.	2-Butyne, 1,4-dichloro-	821-10-3
41.	1,7-Octadiyne	871-84-1
42.	7-Octyn-1-ol	871-91-0
43.	Benzene, 1,1'-(1,3-butadiyne-1,4-diyl)bis-	886-66-8
44.	3-Hexyn-1-ol	1002-28-4
45.	5-Decyne-4,7-diol	1070-40-2
46.	1-Butyne, 3-chloro-3-methyl-	1111-97-3
47.	2-Butyne-1,4-diol, diacetate	1573-17-7

No.	Chemical Name	CAS No.
48.	3-Penten-1-yne, 3-methyl-	1574-33-0
49.	1-Pentyne, 3-methylene-	1574-34-1
50.	2-Butyn-1-ol, 4-(2-hydroxypropoxy)-	1606-79-7
51.	2-Propanol, 1,1'-(2-butynylenedioxy)bis 3-chloro-	1606-83-3
52.	1,9-Decadiyne	1720-38-3
53.	2-Propyn-1-ol, 3-iodo-	1725-82-2
54.	2-Propyn-1-ol, propionate	1932-92-9
55.	1-Pentyn-3-ol, 3-methyl-1-phenyl-	1966-65-0
56.	3-Butyn-2-ol	2028-63-9
57.	2-Butyne, 1,4-dibromo-	2219-66-1
58.	1-Undecyne	2243-98-3
59.	1,6-Heptadiyne	2396-63-6
60.	1,8-Nonadiyne	2396-65-8
61.	2-Propyn-1-amine	2450-71-7
62.	10-Undecyn-1-ol	2774-84-7
63.	1-Buten-3-yne, 1-methoxy-	2798-73-4
64.	3-Hexen-1-yne, (*E*)-	2807-09-2
65.	3-Butyn-2-amine, 2-methyl-	2978-58-7
66.	Benzene, 1-ethynyl-3-nitro-	3034-94-4
67.	Carbamic acid, (3-chlorophenyl)-, 4-hydroxy-2-butynyl ester	3159-28-2
68.	1-Nonyne	3452-09-3
69.	Hydroperoxide, (1,1,4,4-tetramethyl-2-butyne-1,4-diyl)bis-	3491-36-9
70.	2-Propyn-1-amine, *N,N*-diethyl-	4079-69-9
71.	1,10-Undecadiyne	4117-15-1
72.	Cyclohexanol, 1-ethynyl-, acetate	5240-32-4
73.	Cyclohexanol, 1-ethynyl-, propanoate	5445-76-1
74.	2-Pentyn-1-ol	6261-22-9
75.	2-Propyn-1-amine, *N,N*-dimethyl-	7223-38-3
76.	2-Nonynoic acid, ethyl ester	10031-92-2
77.	Anthracene, 9,10-bis(phenylethynyl)-	10075-85-1
78.	3-Pentyn-1-ol	10229-10-4
79.	2-Undecynoic acid, ethyl ester	10519-17-2
80.	2-Octynoic acid, ethyl ester	10519-20-7
81.	2-Nonynal, dimethyl acetal	13257-44-8
82.	7-Octyn-1-ol, acetate	13860-68-9
83.	2-Propenoic acid, 2-methyl-, 2-propynyl ester	13861-22-8
84.	1-Pentyne, 5-chloro-	14267-92-6
85.	9,10-Anthracenediol, 9,10-dihydro-9,10-bis(phenylethynyl)-	14825-85-5
86.	3-Octyn-1-ol	14916-80-4
87.	2-Propanol, 1,3-bis(2-propynyloxy)-	16169-22-5
88.	7-Dodecyn-1-ol, acetate	16504-87-3
89.	2*H*-Pyran, tetrahydro-2-(7-octynyloxy)-	16695-31-1
90.	2*H*-Pyran, 2-(7-dodecynyloxy)tetrahydro-	16695-32-2
91.	3-Decyne, 10-chloro-	18295-64-2
92.	1-Propyne, 3-(1-ethoxyethoxy)-	18669-04-0
93.	Naphthacene, 5,12-bis(phenylethynyl)-	18826-29-4
94.	2*H*-Pyran, tetrahydro-2-(9-tetradecynyloxy)-	19754-59-7
95.	5-Hexyn-3-ol	19780-84-8
96.	1,11-Dodecadiyne	20521-44-2
97.	1-Butyne, 3-chloro-	21020-24-6
98.	2-Pentyne, 1-chloro-	22592-15-0
99.	1-Octyn-3-ol, 3-methyl-	23580-51-0
100.	1-Octyne, 8-chloro-	24088-97-9
101.	6-Nonen-1-yn-3-ol, 3,7-dimethyl-	24173-47-5
102.	2*H*-Pyran-2-one, tetrahydro-6-(2-pentynyl)-	25448-66-2
103.	1-Tridecyne	26186-02-7
104.	8-Dodecyn-1-ol, acetate	26906-26-3
105.	1-Undecyne, 11-chloro-	29043-93-4
106.	6-Octen-1-yn-3-ol, 3,7-dimethyl-	29171-20-8
107.	6-Octen-1-yn-3-ol, 3,7-dimethyl-, acetate	29171-21-9
108.	Cyclohexanamine, 1-ethynyl-	30389-18-5
109.	6-Octen-1-yne, 3-(1-ethoxyethoxy)-3,7-dimethyl-	31180-77-5
110.	5,12-Naphthacenediol, 5,12-dihydro-5,12-bis(phenylethynyl)-	31559-43-0
111.	2,4-Hexadiyne-1,6-diol, bis(4-methylbenzenesulfonate)	32527-15-4
112.	3-Butyn-2-ol, 2-methyl-4-(3-nitrophenyl)-	33432-52-9
113.	1-Butyne, 4,4-dimethoxy-	33639-45-1
114.	11-Tetradecyn-1-ol	33925-73-4
115.	Cholest-5-en-3-ol (3.beta.)-, 2-propynyl carbonate	33985-07-8
116.	5-Dodecyne, 1-chloro-	35087-20-8
117.	7-Octadecyne, 2-methyl-	35354-38-2
118.	Cyclohexanol, 1-ethynyl-2-(1-methylpropyl)-, acetate	37172-05-7
119.	Cyclohexanol, 1-ethynyl-2-(1-methylpropyl)-	37172-89-7
120.	9-Tricosyne	39487-08-6
121.	4-Octyn-3-ol, 3-methyl-6-methylene-	40454-29-3
122.	2-Butyn-1-ol, 4-[(tetrahydro-3-thienyl)oxy]-, *S,S*-dioxide	40456-28-8
123.	Anthracene, 1-chloro-9,10-bis(phenylethynyl)-	41105-35-5
124.	7-Hexadecyne, 1,1-dimethoxy-	41862-85-5
125.	7-Dodecyn-1-ol	41862-94-6
126.	5-Dodecyne, 12-chloro-	42513-36-0
127.	12-Tetradecen-9-yn-1-ol, (*E*)-	42521-44-8
128.	2*H*-Pyran, 2-(9-dodecynyloxy)tetrahydro-	50816-21-2
129.	2*H*-Pyran, 2-(5-decynyloxy)tetrahydro-	51852-45-0

No.	Chemical Name	CAS No.
130.	2*H*-Pyran, tetrahydro-2-(10-undecynyloxy)-	51953-88-9
131.	11-Hexadecen-7-yn-1-ol, acetate, (*E*)-	53042-78-7
132.	11-Hexadecen-7-yn-1-ol, acetate, (*Z*)-	53042-80-1
133.	1,5-Decadiyne	53963-03-4
134.	5-Decen-1-yne, (*E*)-	53963-07-8
135.	Benzenamine, 3-ethynyl-	54060-30-9
136.	6,10-Dodecadien-1-yn-3-ol, 3,7,11-trimethyl-	54325-12-1
137.	5-Decyne, 1-chloro-	54377-34-3
138.	2*H*-Pyran, tetrahydro-2-(11-tetradecen-9-ynyloxy)-, (*E*)-	54664-77-6
139.	6-Heneicosyn-11-one	54844-69-8
140.	6-Heneicosyn-11-ol	54844-70-1
141.	Carbamic acid, butyl-, 3-iodo-2-propynyl ester	55406-53-6
142.	Cyclopentanone, 2-(2-pentynyl)-	57026-62-7
143.	5,9-Hexadecadiyne, 16-chloro-	58444-07-8
144.	5-Nonen-3-yne, 9-bromo-, (*E*)-	58763-65-8
145.	5-Dodecen-3-yne, 12-(1-ethoxyethoxy)-, (*E*)-	58763-67-0
146.	7-Dodecen-9-yn-1-ol, (*E*)-	58763-68-1
147.	9-Tetradecyn-1-ol	60037-69-6
148.	1-Pentyne, 5-(1-ethoxyethoxy)-	61565-19-3
149.	2-Hexyn-1-ol, 6-(1-ethoxyethoxy)-	61565-20-6
150.	4-Tridecen-7-yne, 1-(1-ethoxyethoxy)-, (*E*)-	61565-23-9
151.	4-Tridecen-7-yn-1-ol, (*E*)-	61565-24-0
152.	7,11-Hexadecadiyn-1-ol, acetate	62103-12-2
153.	6-Octen-4-yn-3-ol, 3,6-dimethyl-	62851-70-1
154.	1-Butyne, 4-chloro-3-methyl-	63150-17-4
155.	2*H*-Pyran, 2-(8-dodecynyloxy)tetrahydro-	64604-68-8
156.	6-Octen-1-yn-3-ol, 3,7-dimethyl-, propanoate	65416-30-0
157.	2*H*-Pyran, tetrahydro-2-(13-octadecen-3-ynyloxy)-, (*Z*)-	67616-77-7
158.	2-Propenoic acid, 2-methyl-, 2-butyne-1,4-diyl ester	67905-43-5
159.	6-Dodecyne-5,8-diol, 2,5,8,11-tetramethyl-	68227-33-8
160.	5-Decyn-1-ol	68274-97-5
161.	2-Pentyne, 1-(1-ethoxyethoxy)-	68480-09-1
162.	Cyclopentanecarboxylic acid, 2-oxo-1-(2-pentynyl)-, methyl ester	68480-23-9
163.	2-Nonynoic acid, 3-hexenyl ester, (*Z*)-	68480-29-5
164.	2*H*-Pyran, tetrahydro-2-(12-tetradecen-9-ynyloxy)-, (*E*)-	68516-29-0
165.	11-Tetradecen-9-yn-1-ol, (*E*)-	68516-32-5
166.	14-Nonacosyne	68516-35-8
167.	2-Octynoic acid, 3-methylbutyl ester	68555-60-2
168.	2-Octynoic acid, 3-hexenyl ester, (*Z*)-	68698-58-8
169.	1,3-Dioxepin, 5,6-didehydro-2-hexyl-4,7-dihydro-	68797-69-3
170.	Cyclohexane, (ethynyloxy)-	68877-57-6
171.	3-Butyn-2-ol, 4-(3-aminophenyl)-2-methyl-	69088-96-6
172.	5-Hexadecen-9-yne, 16-chloro-, (*E*)-	70682-66-5
173.	2*H*-Pyran, tetrahydro-2-(11-tetradecynyloxy)-	71084-06-5
174.	2*H*-Pyran, 2-(11-dodecynyloxy)tetrahydro-	71084-07-6
175.	9-Dodecyn-1-ol	71084-08-7
176.	7-Pentadecyne, 1-chloro-13-methyl-	71317-61-8
177.	3-Tridecyne, 13-chloro-	71317-62-9
178.	5-Tridecyne, 13-chloro-	71317-63-0
179.	5-Hexadecyne, 16,16-dimethoxy-	71317-64-1
180.	3-Decyn-1-ol, 10-chloro-	71317-65-2
181.	3,5-Pentadecadiyne, 15-chloro-	71317-68-5
182.	6-Pentadecyne, 1-chloro-	71317-69-6
183.	7-Pentadecyne, 15-chloro-	71317-70-9
184.	1-Undecyne, 11-bromo-	71317-72-1
185.	3-Nonyne, 8,8-dimethoxy-	71317-76-5
186.	2*H*-Pyran, tetrahydro-2-(12-tetradecen-9-ynyloxy)-	71317-77-6
187.	5-Hexadecyne, 16,16-diethoxy-	71393-93-6
188.	2*H*-Pyran, tetrahydro-2-[(3,13-tetradecadiynyl)oxy]-	71393-94-7
189.	5-Tetradecyne, 14,14-dimethoxy-	71393-97-0
190.	5-Tetradecyne, 14,14-diethoxy-	71393-98-1
191.	3-Octadecen-13-yn-1-ol, acetate, (*E*)-	71393-99-2
192.	12-Tetradecen-9-yn-1-ol, acetate, (*E*)-	71394-01-9
193.	1-Octyne, 1-bromo-8-chloro-	71487-12-2
194.	1-Undecyne, 1-bromo-11-chloro-	71487-13-3
195.	7-Hexadecyne, 16,16-diethoxy-	71487-14-4
196.	7-Hexadecyne, 16,16-dimethoxy-	71487-15-5
197.	2*H*-Pyran, tetrahydro-2-(3-tetradecen-13-ynyloxy)-, (*E*)-	71566-58-0
198.	5-Pentadecyne, 15-chloro-	71566-60-4
199.	3-Tetradecyne, 14,14-dimethoxy-	71566-61-5
200.	1-Nonyne, 7-methyl-	71566-65-9
201.	8-Hexadecyne, 1,1-dimethoxy-14-methyl-	71566-66-0
202.	8-Hexadecyne, 1,1-diethoxy-14-methyl-	71566-67-1
203.	3-Tetradecyne, 14,14-diethoxy-	71598-29-3
204.	2*H*-Pyran, tetrahydro-2-(3,13-octadecadiynyloxy)-	71673-25-1
205.	3,13-Octadecadiyn-1-ol, acetate	71673-26-2
206.	2*H*-Pyran, 2-[(10-chloro-3-decynyl)oxy]tetrahydro-	71673-29-5
207.	3,5-Dodecadiyne, 12-chloro-	71673-30-8
208.	3,5-Hexadecadiyne, 16,16-diethoxy-	71673-31-9
209.	1,11-Hexadecadiyne	71673-32-0
210.	2*H*-Pyran, 2-(11,13-hexadecadiynyloxy)tetrahydro-	71673-33-1
211.	13-Octadecen-3-yn-1-ol, acetate, (*Z*)-	71832-74-1

No.	Chemical Name	CAS No.
212.	1-Hexen-5-yne, 2-bromo-	72121-84-7
213.	1-Dodecyn-3-ol, 3-methyl-, acetate	72152-85-3
214.	Propanoic acid, 2-methyl-, 1-ethynylcyclohexyl ester	72230-92-3
215.	2-Nonynoic acid, 2-propenyl ester	72939-63-0
216.	Propionitrile, 3-[(1,1-dimethyl-2-propynyl)oxy]-	15496-08-9
217.	2-Butynedioic acid, monopotassium salt	928-04-1
218.	Silane, ethynyltrimethyl-	1066-54-2
219.	Carbonic acid, decynyl methyl ester	1322-34-5
220.	2-Propyn-1-ol, 3-(trimethylsilyl)-	5272-36-6
221.	Silane, trimethyl(2-propynyloxy)-	5582-62-7
222.	Silane, triethoxyethynyl-	5700-28-7
223.	Cyclopentanol, 1,1'-(1,3-butadiyne-1,4-diyl)bis-	7179-09-1
224.	2-Propenoic acid, 2-propynyl ester	10477-47-1
225.	Silane, trimethyl-2-propynyl-	13361-64-3
226.	Silane, 1,2-ethynediylbis[trimethyl-	14630-40-1
227.	Cyclopentanol, 1-ethynyl-	17356-19-3
228.	Silane, 1,2-ethynediylbis[chlorodimethyl-	18156-91-7
229.	Hexyne	26856-30-4
230.	1-Propyne-1-sulfonic acid, sodium salt	28672-98-2
231.	Benzene, diethynyl-	30700-96-0
232.	1-Propanesulfonic acid, 2-hydroxy-3-[(4-hydroxy-2-butynyl)oxy]-,monosodium salt	35193-14-7
233.	Methanesulfonic acid, trifluoro-, 2-propynyl ester	41029-46-3
234.	Silane, (7-dodecen-9-ynyloxy)trimethyl-, (*E*)-	58763-69-2
235.	9,10-Anthracenediol, 9,10-dihydro-9,10-bis(phenylethynyl)-, di-lithium salt	67845-99-2
236.	1-Propanesulfonic acid, 2-hydroxy-3-[(3-hydroxy-1-propynyl)oxy]-,monosodium salt	67874-61-7
237.	1-Propanesulfonic acid, 3,3-[2-butyne-1,4-diylbis(oxy)]bis[2-hydroxy-], disodium salt	67874-62-8
238.	Magnesium, bromo[8-[(tetrahydro-2*H*-pyran-2-yl)oxy]-1-octynyl]-	68516-36-9
239.	1,4-Benzenedimethanol, .alpha.,.alpha.,.alpha.',.alpha.'-tetra-methyl-, compd. with (1,1,4,4-tetramethyl-2-butyne-1,4-diy	70833-41-9
240.	Benzeneacetic acid, 2-propynyl ester	72928-39-3
241.	2-Octynoic acid, 2-propenyl ester	73157-43-4
242.	Silane, tris[(1,1-dimethyl-2-propynyl)oxy]methyl-	83817-71-4
243.	2-Nonynoic acid, 2-methylpropyl ester	84282-44-0
244.	Phosphonium, tetrakis(hydroxymethyl)-, chloride	124-64-1
245.	Phosphonium, [3-methyl-5-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2,4-pentadienyl]triphenyl-,sulfate (1:1)	751-83-7
246.	Phosphonium, ethyltriphenyl-, chloride	896-33-3
247.	Phosphonium, [1,4-phenylenebis(methylene)]bis[triphenyl-, dichloride	1519-47-7
248.	Phosphonium, triphenyl(3-phenyl-2-propenyl)-, chloride	1530-35-4
249.	Phosphonium, tributyl-2-propenyl-, chloride	1530-48-9
250.	Phosphonium, methyltriphenyl-, bromide	1779-49-3
251.	Phosphonium, tetrabutyl-, chloride	2304-30-5
252.	Phosphonium, tetrabutyl-, bromide	3115-68-2
253.	Phosphonium, tetrakis(hydroxymethyl)-, acetate (salt)	7580-37-2
254.	Phosphonium, 1,2-ethanediylbis[tris(2-cyanoethyl)-, dibromide	10310-38-0
255.	Phosphonium, tributylhexadecyl-, bromide	14937-45-2
256.	Phosphonium, triphenyl(phenylmethyl)-	15853-35-7
257.	Phosphonium, tetrabutyl-	15853-37-9
258.	Phosphonium, (2-ethoxy-2-oxoethyl)triphenyl-, chloride	17577-28-5
259.	Phosphonium, tetrabutyl-, acetate, monoacetate	17786-43-5
260.	Phosphonium, tetrakis(hydroxymethyl)-, phosphate (3:1) (salt)	22031-17-0
261.	Phosphonium, ethyltriphenyl-	39895-79-9
262.	Phosphonium, [3-methyl-5-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2,4-pentadienyl]triphenyl-	47739-07-1
263.	Phosphonium, tetrakis(hydroxymethyl)-, ethanedioate (2:1) (salt)	52221-67-7
264.	Phosphonium, ethyltrioctyl-, bromide	56022-37-8
265.	Phosphonium, tetrabutyl-, salt with 1,3-dimethyl 5-sulfo-1,3-benzenedicarboxylate (1:1)	59514-43-1
266.	Phosphonium, nonyltriphenyl-, bromide	60902-45-6
267.	Phosphonium, [(2-methylphenyl)methyl]triphenyl-, chloride	63368-36-5
268.	Phosphonium, triphenyl(phenylmethyl)-, (T-4)-tetrachlorocadmate(2-) (2:1)	68214-25-5
269.	Phosphonium, (4-nitrophenyl)triphenyl-, chloride	72796-90-8
270.	Oxiranecarboxylic acid, 3-methyl-3-phenyl-, ethyl ester	77-83-8
271.	7-Oxabicyclo 4.1.0 heptane, 1-methyl-4-(2-methyloxiranyl)-	96-08-2
272.	Oxiraneoctanoic acid, 3-octyl-, butyl ester	106-83-2
273.	Oxiraneoctanoic acid, 3-octyl-, octyl ester	106-84-3
274.	2-Propenoic acid, oxiranylmethyl ester	106-90-1
275.	Oxiranecarboxylic acid, 3-phenyl-, ethyl ester	121-39-1
276.	Disiloxane, 1,1,3,3-tetramethyl-1,3-bis[3-(oxiranylmethoxy)propyl]-	126-80-7
277.	Oxiraneoctanoic acid, 3-octyl-, 2-ethylhexyl ester	141-38-8
278.	6-Oxabicyclo 3.1.0 hexane	285-67-6
279.	Oxirane, 2,2-dimethyl-	558-30-5
280.	Oxirane, tetrafluoro-	694-17-7
281.	Oxirane, ethenyl-	930-22-3
282.	Oxirane, (methoxymethyl)-	930-37-0
283.	5-Oxatricyclo 8.2.0.04,6 dodecane, 4,12,12-trimethyl-9-methylene-,1R-(1R*,4R*,6R*,10S*) -	1139-30-6
284.	7-Oxabicyclo 4.1.0 heptane, 1-methyl-4-(1-methylethenyl)-	1195-92-2
285.	5-Oxatricyclo 8.2.0.04,6 dodecane, 4,9,12,12-tetramethyl-	1209-61-6
286.	2,2-Bioxirane	1464-53-5
287.	Oxiranepentanol, .gamma.,3,3-trimethyl-	1564-98-3
288.	Oxiranemethanamine, *N*-(oxiranylmethyl)-*N*-phenyl-	2095-06-9
289.	Oxirane, 2,2-[1,2-ethanediylbis(oxymethylene)]bis-	2224-15-9
290.	6-Oxabicyclo 3.1.0 hexane, 2,2-oxybis-	2386-90-5
291.	Oxirane, octyl-	2404-44-6
292.	Oxirane, 2,2-[1,4-phenylenebis(oxymethylene)]bis-	2425-01-6
293.	Oxirane, decyl-	2855-19-8

No.	Chemical Name	CAS No.
294.	3-Oxatricyclo 3.2.1.02,4 octane, 6-ethenyl-	2886-87-5
295.	Silane, diethoxymethyl[3-(oxiranylmethoxy)propyl]-	2897-60-1
296.	Oxiranemethanaminium, *N,N,N*-trimethyl-, chloride	3033-77-0
297.	Oxirane, 2,2-((1-methylethylidene)bis((2,6-dibromo-4,1-phenylene)-oxymethylene))bis-	3072-84-2
298.	Oxirane, (2,2,2-trichloroethyl)-	3083-25-8
299.	Oxirane, (bromomethyl)-	3132-64-7
300.	Benzenemethanol, 5-[1-methyl-1-[4-(oxiranylmethoxy)phenyl]ethyl]-2-(oxiranylmethoxy)-	3188-83-8
301.	Oxirane, dodecyl-	3234-28-4
302.	Oxirane, 2,3-dimethyl-	3266-23-7
303.	Oxirane, [(octyloxy)methyl]-	3385-66-8
304.	Oxiranedodecanoic acid, 3-octyl-, cis-	3420-36-8
305.	Oxirane, [(docycloxy)methyl]-	3497-06-1
306.	2-Propanol, 1,3-bis(oxiranylmethoxy)-	3568-29-4
307.	Oxirane, (ethoxymethyl)-	4016-11-9
308.	Oxirane, (1-methylethoxy)methyl -	4016-14-2
309.	1-Oxaspiro 2.5 oct-5-ene, 2,2,6-trimethyl-	4584-23-0
310.	Oxirane, tetramethyl-	5076-20-0
311.	Oxirane, (4-nitrophenoxy)methyl -	5255-75-4
312.	1H-Isoindole-1,3(2H)-dione, 2-(oxiranylmethyl)-	5455-98-1
313.	Oxirane, ((hexyloxy)methyl)-	5926-90-9
314.	Propane, 1,2-epoxy-3-(p-nonylphenoxy)-	6178-32-1
315.	Spiro bicyclo 3.1.1 heptane-2,2-oxirane , 6,6-dimethyl-	6931-54-0
316.	1,2-Benzenedicarboxylic acid, bis(oxiranylmethyl) ester	7195-45-1
317.	Oxirane, hexadecyl-	7390-81-0
318.	Trisiloxane, 1,1,1,3,5,5,5-heptamethyl-3-[3-(oxiranylmethoxy)-propyl]-	7422-52-8
319.	Oxirane, 2,2',2''-[1,2,3-propanetriyltris(oxymethylene)]tris-	13236-02-7
320.	Oxirane, 2,2'-(oxiranylmethoxy)-1,3-phenylene bis(methylene) bis-	13561-08-5
321.	2*H*-2a,7-Methanoazulene 5,8-b oxirene, octahydro-3,6,6,7a-tetra-methyl-, 1a*S*-(1a.alpha.,2a.beta.,3.alpha.,5a.alpha.,7.b.	13567-39-0
322.	13-Oxabicyclo 10.1.0 trideca-4,8-diene, 1,5,9-trimethyl-	13786-79-3
323.	13-Oxabicyclo 10.1.0 trideca-4,8-diene, 2,6,10-trimethyl-	14840-89-2
324.	2,4-Imidazolidinedione, 5,5-dimethyl-1,3-bis(oxiranylmethyl)-	15336-81-9
325.	Oxirane, (hexadecyloxy)methyl -	15965-99-8
326.	Oxirane, (octadecyloxy)methyl -	16245-97-9
327.	Oxiranecarboxylic acid, 3-(4-methoxyphenyl)-, ethyl ester	16546-01-3
328.	Silane, ethoxydimethyl[3-(oxiranylmethoxy)propyl]-	17963-04-1
329.	Oxirane, tridecyl-	18633-25-5
330.	Oxirane, (2,4-dibromophenoxy)methyl -	20217-01-0
331.	Cedrane, 8,15-epoxy-	22037-88-3
332.	Oxirane, pentadecyl-	22092-38-2
333.	Oxirane, [(2,6-dibromo-4-methylphenoxy)methyl]-	22421-59-6
334.	2,5-Methano-2*H*-indeno[1,2-b]oxirenol, octahydro-	26616-34-2
335.	4a,7-Methano-4aH-naphth 1,8a-b oxirene, octahydro-4,4,8,8-tetra-methyl-,1aR-(1a.alpha.,4a.alpha.,7.alpha.,8aS*) -	26619-69-2
336.	3-Oxatricyclo 5.1.0.02,4 octane, 5,8,8-trimethyl-	27867-36-3
337.	Oxiranemethanamine, *N,N*-(methylenedi-4,1-phenylene)bis *N*-(oxiranylmethyl)-	28768-32-3
338.	Oxirane, 2,2-dimethyl-3-(3-methylene-4-pentenyl)-	29414-55-9
339.	Cedrane, 8,9-epoxide-	29597-36-2
340.	Oxirane, 2-decyl-3-(5-methylhexyl)-, cis-	29804-22-6
341.	2,4-Imidazolidinedione, 5,5-dimethyl-3-[2-(oxiranylmethoxy)propyl]-1-(oxiranylmethyl)-	32568-89-1
342.	Oxirane, (1,2-dibromopropoxy)methyl -	35243-89-1
343.	3-Cyclohexene-1-carboxaldehyde, 4-[2-(3,3-dimethyloxiranyl)ethyl]-	37677-09-1
344.	3-Cyclohexene-1-carboxaldehyde, 3-[2-(3,3-dimethyloxiranyl)ethyl]-	37677-10-4
345.	2,4-Imidazolidinedione, 3,3'-[2-(oxiranylmethoxy)-1,3-propanediyl]-bis 5,5-dimethyl-1-(oxiranylmethyl)-	38304-52-8
346.	1H,4H-3a,8a-Epoxy-4,7-methanoazulene, hexahydro-1,4,10,10-tetra-methyl-, (1.alpha.,3a.beta.,4.alpha.,7.alpha.,8a.beta.)	38337-32-5
347.	Oxirane, (2,2,3,3,4,4,5,5,6,6,7,7,7-tridecafluoroheptyl)-	38565-52-5
348.	Oxirane, (tetradecyloxy)methyl -	38954-75-5
349.	Oxirane, 2,2'-[methylenebis(phenyleneoxymethylene)]bis-	39817-09-9
350.	Oxiranemethanamine, *N*-(2-methylphenyl)-*N*-(oxiranylmethyl)-	40027-50-7
351.	Oxirane, (5-methoxy-1,5-dimethylhexyl)-	40454-19-1
352.	Spiro 1,4-methanoazulene-9,2'-oxirane , decahydro-4,8,8-trimethyl-	41530-82-9
353.	Oxiranepropanol, .alpha.-ethenyl-.alpha.,3,3-trimethyl-, acetate	41610-76-8
354.	Oxirane, 2,2'-[oxybis[(methyl-2,1-ethanediyl)oxymethylene]]bis-	41638-13-5
355.	Spiro 1,4-methanonapthalene-2(1H),2'-oxirane , 3,4,4a,5,8,8a-hexa-hydro-3',6-dimethyl-	41723-98-2
356.	2-Propenoic acid, 2-methyl-, (2-methyloxiranyl)methyl ester	41768-20-1
357.	Spiro 1,4-methanonaphthalene-2(1H),2'-oxirane , 3,4,4a,5,8,8a-hexahydro-3',7-dimethyl-	41816-03-9
358.	Oxiranecarboxylic acid, 3-(4-methoxyphenyl)-, methyl ester	42245-42-1
359.	Oxirane, 2,3-bis(chloromethyl)-, trans-	45467-40-1
360.	Oxirane, 2,3-bis(chloromethyl)-, cis-	50703-46-3
361.	4a,7-Ethano-4aH-naphth 1,8a-b oxirene, octahydro-4,4,7-trimethyl-	51115-88-9
362.	Oxiranecarboxylic acid, 3-(4-methylphenyl)-, ethyl ester	52788-71-3
363.	Phenol, 2-methoxy-4-(oxiranylmethyl)-	53940-49-1
364.	Oxirane, (9-octadecenyloxy)methyl -, (*Z*)-	60501-41-9
365.	Oxirane, 4-(1-methyl-1-phenylethyl)phenoxy methyl -	61578-04-9
366.	Oxiranemethanaminium, *N,N*-dimethyl-*N*-[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]-, chloride	62351-05-7
367.	3-Heptanone, 4-methyl-6-oxiranyl-	63324-22-1
368.	1,3-Benzenedimethanamine, *N,N,N',N'*-tetrakis(oxiranylmethyl)-	63738-22-7
369.	Oxiranecarboxylic acid, 3-(4,8-dimethyl-7-nonenyl)-3-methyl-	65416-34-4
370.	Oxiranecarboxylic acid, 3-methyl-3-octyl-	65416-35-5
371.	Oxiranecarboxylic acid, 3-methyl-3-(4-methyl-3-pentenyl)-	65416-36-6
372.	1,3-Cyclohexanedimethanamine, *N,N,N',N'*-tetrakis(oxiranylmethyl-)-	65992-66-7
373.	Oxiraneethanol, 3-ethyl-	67663-02-9
374.	1H,4H-3a,8a-Epoxy-4,7-methanoazulene, hexahydro-1,4,10,10-tetramethyl-	67710-71-8
375.	Oxirane, heptadecyl-	67860-04-2

No.	Chemical Name	CAS No.
376.	Oxiranecarboxylic acid, 3-methyl-3-[2-(2,6,6-trimethyl-2-cyclo-hexen-1-yl)ethenyl]-, methyl ester	67905-40-2
377.	2*H*-4,7a-Ethanonaphth 1,2-b oxirene, octahydro-3a,4,7b-trimethyl-	67919-67-9
378.	4a,7-Methano-4aH-naphth 1,8a-b oxirene, octahydro-4,4,8,8-tetramethyl-	67999-56-8
379.	Oxirane, (1,3-dimethylbutoxy)methyl -	68134-06-5
380.	Oxirane, (6-methylheptyl)oxy methyl -	68134-07-6
381.	Pyridinium, 2-amino-1-(oxiranylmethyl)-, chloride	68258-96-8
382.	Titanium, tris[10-(3-hexyloxiranyl)-9-decenoato-O1](2-propanolato)-,(T-4)-	68443-39-0
383.	Titanium, tris(3-octyloxiraneoctanoato-O.alpha.)(2-propanolato)-,(T-4)-	68443-40-3
384.	2,4-Imidazolidinedione, 5-ethyl-5-(2-methylbutyl)-1,3-bis(oxiranyl-methyl)-	68444-05-3
385.	Oxirane, 2,2,2-[propylidynetris(4,1-phenyleneoxymethylene)]tris-	68517-02-2
386.	Titanium, [hydroxyacetato(2-)-O1,O2[(isooctadecanoato-O)]11-[3-(2-pentenyl)oxiranyl]-9-undecenoato-O1]-	68739-04-8
387.	Titanium, tris[8-[2-(2,5-octadienyl)oxiranyl]octanoato-O1](2-propanolato)-, (T-4)-	68784-86-1
388.	Titanium, tris[11-[2-(2-pentenyl)oxiranyl]-9-undecenoato-O1](2-propanolato)-, (T-4)-	68797-79-5
389.	3H-Naphth 1,8a-b oxiren-7-ol, octahydro-4,4,7-trimethyl-	68845-01-2
390.	Oxiranecarboxylic acid, 2-phenylethyl ester	68892-14-8
391.	Oxiranecarboxylic acid, 3-(2-hydroxyphenyl)-, ethyl ester	68922-02-1
392.	Cyclopropa 5,6 naphth 1,8a-b oxirene, decahydro-1,7,7,7b-tetra-methyl-, 1R-(1.alpha.,3a.beta.,4aR*,6a.alpha.,7a.alpha.	68926-75-0
393.	Oxirane, 2,2,2-[1,2,6-hexanetriyltris(oxymethylene)]tris-	68959-23-9
394.	2-Furanaminium, tetrahydro-*N,N*-dimethyl-*N*-(oxiranylmethyl)-,chloride	68959-27-3
395.	Titanium, tris[3-(2-octenyl)oxiraneoctanoato-O.alpha.](2-propanolato)-, (T-4)-	69089-43-6
396.	Titanium, (hydroxyacetato-O1,O2)(isooctadecanoato-O)(3-octyl-oxiraneoctanoato-O.alpha.)-	69103-13-5
397.	Titanium, (hydroxyacetato-O1,O2)(isooctadecanoato-O)[3-(2,5-octa-dienyl)oxiraneoctanoato-O.alpha.]-	69103-14-6
398.	Titanium, [14-(3-ethyloxiranyl)-9,12-tetradecadienoato-O1](hydroxy-acetato-O1,O2)(isooctadecanoato-O)-	69103-15-7
399.	Tetrasiloxane, 1,1,1,3,5,7,7,7-octamethyl-3,5-bis[3-(oxiranyl-methoxy)propyl]-	69155-42-6
400.	2-Propenoic acid, 2-methyl-, telomer with tert-dodecanethiol, methyl2-methyl-2-propenoate and oxiranylmethyl 2-methyl-2	70161-56-7
401.	Oxirane, 2,2- (1-methylethylidene)bis 4,1-phenyleneoxy 1-(butoxy-methyl)-2,1-ethanediyl oxymethylene bis-	71033-08-4
402.	Anthra[2,3-b]oxirene-3,8-dione, 1a,2,2a,8a,9,9a-hexahydro-1a-methyl-	71173-51-8
403.	Anthra[2,3-b]oxirene-3,8-dione, 1a,2,9,9a-tetrahydro-1a-methyl-	71173-53-0
404.	7-Oxabicyclo 4.1.0 heptane-3-methanol, .alpha.,.alpha.,6-trimethyl-	71242-69-8
405.	Silane, (3-chloropropyl)dimethoxy[3-(oxiranylmethoxy)propyl]-	71808-64-5
406.	Oxiranecarboxylic acid, 3-bicyclo 2.2.1 hept-5-en-2-yl-3-methyl-,methyl ester	72175-33-8
407.	Oxirane, 2-methyl-3-tridecyl-	72302-10-4
408.	Oxirane, 2,2'-[(1-methylethylidene)bis]4,1-phenyleneoxy-3,1-propanediyloxy-4,1-phenylene(1-methylethylidene)-4,1-phenyleneoxymethylene]]bis-	72319-24-5
409.	Oxirane, [(2,4-dibromo-5-methylphenoxy)methyl]-	72727-69-6
410.	Oxirane, [(2,4-dibromo-6-methylphenoxy)methyl]-	75150-13-9
411.	Silane, triethoxyethyl-	78-07-9
412.	Silane, diethoxydimethyl-	78-62-6
413.	Silicic acid (H4SiO4), tetrakis(2-ethylhexyl) ester	115-82-2
414.	Silicic acid (H6Si2O7), hexakis(2-ethylbutyl) ester	126-51-2
415.	Silane, dimethoxymethyl(3,3,3-trifluoropropyl)-	358-67-8
416.	Silane, trimethoxy(3,3,3-trifluoropropyl)-	429-60-7
417.	Phosphonic acid, [2-(triethoxysilyl)ethyl]-, diethyl ester	757-44-8
418.	Silane, diethoxymethylphenyl-	775-56-4
419.	Silane, chlorodimethoxymethyl-	994-07-0
420.	Silane, triethoxy-	998-30-1
421.	Silane, trimethyl(4-nitrophenoxy)-	1014-66-0
422.	Silane, trimethoxypropyl-	1067-25-0
423.	Silicic acid (H4SiO4), tetra-2-propenyl ester	1067-43-2
424.	Butanenitrile, 4-(triethoxysilyl)-	1067-47-6
425.	Silane, butyltrimethoxy-	1067-57-8
426.	Silane, dimethoxydimethyl-	1112-39-6
427.	Silicic acid (H4SiO4), tetraphenyl ester	1174-72-7
428.	Silane, ethoxytriphenyl-	1516-80-9
429.	Silane, trimethylphenoxy-	1529-17-5
430.	Silane, ethoxydimethylphenyl-	1825-58-7
431.	Silane, methoxytrimethyl-	1825-61-2
432.	Silane, ethoxytrimethyl-	1825-62-3
433.	Silane, trimethylpropoxy-	1825-63-4
434.	Silane, chloromethoxydimethyl-	1825-68-9
435.	Silane, trimethyl[(1-methylethenyl)oxy]-	1833-53-0
436.	Silane, [[(3.beta.)-cholest-5-en-3-yl]oxy]trimethyl-	1856-05-9
437.	Silicic acid (H4SiO4), tetrakis(1-methylethyl) ester	1992-48-9
438.	Silane, diethoxymethyl-	2031-62-1
439.	Silicic acid (H4SiO4), tetrakis(2-methoxyethyl) ester	2157-45-1
440.	Silane, (chloromethyl)diethoxymethyl-	2212-10-4
441.	Silanamine, 1,1,1-triethoxy-	2325-41-9
442.	Propanenitrile, 3-(trimethoxysilyl)-	2526-62-7
443.	1-Propanamine, *N,N*-dimethyl-3-(trimethoxysilyl)-	2530-86-1
444.	Silane, triethoxy(phenylmethyl)-	2549-99-7
445.	Silane, triethoxypropyl-	2550-02-9
446.	Silane, triethoxy-2-propenyl-	2550-04-1
447.	Silane, trimethoxy-2-propenyl-	2551-83-9
448.	Silane, diethoxydiphenyl-	2553-19-7
449.	Silane, triethoxypentyl-	2761-24-2
450.	Silane, diethoxymethyl[3-(oxiranylmethoxy)propyl]-	2897-60-1
451.	Silane, dimethoxymethylphenyl-	3027-21-2
452.	Benzenamine, *N*-[3-(trimethoxysilyl)propyl]-	3068-76-6
453.	Silane, hexyltrimethoxy-	3069-19-0
454.	1-Propanamine, *N*-methyl-3-(trimethoxysilyl)-	3069-25-8
455.	2-Butenedioic acid (*Z*)-, bis[3-(trimethoxysilyl)propyl] ester	3090-21-9
456.	2-Butenedioic acid (*E*)-, bis[3-(trimethoxysilyl)propyl] ester	3371-62-8

No.	Chemical Name	CAS No.
457.	2,8,9-Trioxa-5-aza-1-silabicyclo[3.3.3]undecane, 1-ethoxy-	3463-21-6
458.	Silane, [(1,1-dimethylethyl)dioxy]trimethyl-	3965-63-7
459.	Silicic acid (H4SiO4), tetrakis(phenylmethyl) ester	4424-00-4
460.	Silicic acid (H4Si2O7), hexa-sec-butyl ester	4444-59-1
461.	Silicic acid (H8Si3O10), octaethyl ester	4521-94-2
462.	Silane, chlorotriethoxy-	4667-99-6
463.	Silicic acid (H4SiO4), tetrabutyl ester	4766-57-8
464.	Silicic acid (H12Si5O16), dodecaethyl ester	4935-68-6
465.	Silane, diethoxydiethyl-	5021-93-2
466.	Silane, (3-chloropropyl)triethoxy-	5089-70-3
467.	Silane, ethyltrimethoxy-	5314-55-6
468.	Silane, ethenylethoxydimethyl-	5356-83-2
469.	Silane, ethenyldiethoxymethyl-	5507-44-8
470.	Silane, methyltripropoxy-	5581-66-8
471.	Silane, trimethyl(2-propynyloxy)-	5582-62-7
472.	Silane, triethoxyethynyl-	5700-28-7
473.	1,4-Butanediamine, 2-[(trimethoxysilyl)methyl]-	6037-49-6
474.	1-Propanamine, *N*-methyl-3-(triethoxysilyl)-	6044-50-4
475.	Silane, (ethenyloxy)trimethyl-	6213-94-1
476.	Silicic acid (H4SiO4), tetrapentyl ester	6382-12-3
477.	Silane, (1-cyclohexen-1-yloxy)trimethyl-	6651-36-1
478.	Silicic acid (H4SiO4), tetrakis(2-aminoethyl) ester	7057-73-0
479.	Ethanol, 2,2'-[[3-(triethoxysilyl)propyl]imino]bis-	7538-44-5
480.	Ethanethiol, 2-(trimethoxysilyl)-	7538-45-6
481.	Silane, tris(2-chloroethoxy)-	10138-79-1
482.	Silicic acid, methyl ester	12002-26-5
483.	Acetic acid, dianhydride with silicic acid (H4SiO4) diethyl ester	13170-18-8
484.	Acetic acid, trianhydride with silicic acid (H4SiO4) tert-butyl ester	13170-22-4
485.	1-Propanamine, 3-(triethoxysilyl)-*N*-[3-(triethoxysilyl)propyl]-	13497-18-2
486.	Silane, (chloromethyl)ethoxydimethyl-	13508-53-7
487.	Silane, trimethyl[(1-phenylethenyl)oxy]-	13735-81-4
488.	1-Propanethiol, 3-(triethoxysilyl)-	14814-09-6
489.	Silane, ethoxydimethyl-	14857-34-2
490.	Silane, tris[(1,1-dimethylethyl)dioxy]ethenyl-	15188-09-7
491.	Silane, (chloromethyl)triethoxy-	15267-95-5
492.	Silane, (3-isocyanatopropyl)trimethoxy-	15396-00-6
493.	Silicic acid (H4SiO4), tetracyclohexyl ester	15717-29-0
494.	Silicic acid (H4SiO4), tetrakis(2-methylphenyl) ester	16714-40-2
495.	Silicic acid (H4SiO4), tetrakis(3-methylphenyl) ester	16714-54-8
496.	Silane, ethenyldimethoxymethyl-	16753-62-1
497.	Silane, dimethoxymethyl-	16881-77-9
498.	Silane, ethoxydimethyl(phenylmethyl)-	17151-27-8
499.	Silicic acid (H4SiO4), tetrakis(2-hydroxyethyl) ester	17622-94-5
500.	Silane, methoxytripropyl-	17841-46-2
501.	Silane, (4-bromophenoxy)trimethyl-	17878-44-3
502.	2,5,7,10-Tetraoxa-6-silaundecane, 6-(2-methoxyethoxy)-6-phenyl-	17903-05-8
503.	Acetic acid, dianhydride with silicic acid (H4SiO4) dipropyl ester	17906-69-3
504.	Silane, tris(pentyloxy)-	17907-97-0
505.	Propanenitrile, 2-(triethoxysilyl)-	17932-62-6
506.	Silane, ethenylethoxydiphenyl-	17933-85-6
507.	Silane, ethoxydimethyl[3-(oxiranylmethoxy)propyl]-	17963-04-1
508.	Silane, triethoxy(2-methylpropyl)-	17980-47-1
509.	2,5,7,10-Tetraoxa-6-silaundecane, 6-(2-methoxyethoxy)-6-methyl-	17980-64-2
510.	Silane, ethenyltris(1-methylethoxy)-	18023-33-1
511.	Silane, triethoxy(1,4,5,6,7,7-hexachlorobicyclo[2.2.1]hept-5-en-2-yl)-	18052-83-0
512.	Silane, chlorotris(1-methylpropoxy)-	18105-63-0
513.	Silane, bis(2-chloroethoxy)dimethyl-	18141-42-9
514.	Silane, trimethyl(2-propenyloxy)-	18146-00-4
515.	Silane, bis(2-chloroethoxy)methyl-	18147-17-6
516.	Silicic acid (H4SiO4), di-tert-butyl diethyl ester	18151-86-5
517.	Silane, diethoxy-	18165-68-9
518.	Silicic acid (H4SiO4), tris(1-methylpropyl) ester	18166-44-4
519.	Silane, (3-chloropropyl)dimethoxymethyl-	18171-19-2
520.	Ethanethiol, 2-(triethoxysilyl)-	18236-15-2
521.	Silane, (2-chloroethyl)triethoxy-	18279-67-9
522.	Silane, diethoxymethyl-2-propenyl-	18388-45-9
523.	Silane, dichlorobis(1,1-dimethylethoxy)-	18395-80-7
524.	Silane, bicyclo[2.2.1]hept-5-en-2-yltriethoxy-	18401-43-9
525.	2,7-Dioxa-3,6-disilaoctane, 3,3,6,6-tetramethoxy-	18406-41-2
526.	Silicic acid (H4SiO4), tetrakis(2-ethoxyethyl) ester	18407-94-8
527.	Benzenamine, *N,N*-dimethyl-4-(triethoxysilyl)-	18418-79-6
528.	Silane, dodecyltriethoxy-	18536-91-9
529.	Phosphine, diphenyl[2-(triethoxysilyl)ethyl]-	18586-39-5
530.	Silane, ethenyltriphenoxy-	18666-65-4
531.	Silane, trimethyl(octadecyloxy)-	18748-98-6
532.	Silicic acid (H4SiO4), tetrakis(2-butoxyethyl) ester	18765-38-3
533.	Silicic acid (H14Si6O19), tetradecaethyl ester	18768-59-7
534.	Menthol, tetraester with silicic acid (H4SiO4)	18888-09-0
535.	Silane, trimethyl(1-propenyloxy)-	19879-97-1
536.	Silane, (1-butenyloxy)trimethyl-, (*Z*)-	19980-22-4
537.	Silane, (1-butenyloxy)trimethyl-, (*E*)-	19980-23-5
538.	Silane, (1-cyclopenten-1-yloxy)trimethyl-	19980-43-9

No.	Chemical Name	CAS No.
539.	Silane, dichloromethyl[3-[1,2,2,2-tetrafluoro-1-(trifluoromethyl-)-ethoxy]propyl]-	20006-68-2
540.	1-Aza-2-silacyclopentane, 2,2-diethoxy-1-(trimethylsilyl)-	21297-72-3
541.	Silane, (4-chlorophenyl)triethoxy-	21700-74-3
542.	Butanoic acid, 4-(triethoxysilyl)-, trimethylsilyl ester	23416-06-0
543.	Silane, [(1,1-dimethyl-2-propenyl)oxy]dimethyl-	23483-22-9
544.	Urea, [2-[[3-(trimethoxysilyl)propyl]amino]ethyl]-	23779-33-1
545.	Silane, [4-(chloromethyl)phenyl]trimethoxy-	24413-04-5
546.	Silicic acid (H4SiO4), tetrakis[2-(2-methoxyethoxy)ethyl] ester	24685-89-0
547.	Silane, triethoxy(3-isocyanatopropyl)-	24801-88-5
548.	Silane, [(10-bromodecyl)oxy]trimethyl-	26306-02-5
549.	2-Propen-1-amine, *N,N*-bis[(triethoxysilyl)methyl]-	26868-19-9
550.	Silicic acid (H4SiO4), tetrakis(methylphenyl) ester	26952-29-4
551.	1-Octadecanaminium, *N,N*-dimethyl-*N*-[3-(trimethoxysilyl)propyl]-, chloride	27668-52-6
552.	Ethanamine, 2-(2,8,9-trioxa-5-aza-1-silabicyclo[3.3.3]undec-1-yloxy)-*N,N*-bis[[2-(2,8,9-trioxa-5-aza-1-silabicyclo]3.3.3]	29167-65-5
553.	Benzenesulfonyl azide, [2-(trimethoxysilyl)ethyl]-	29385-30-6
554.	1H-Pyrrole-2,5-dione, 1-[3-(triethoxysilyl)propyl]-	29602-11-7
555.	2-Propen-1-amine, *N*-[3-(trimethoxysilyl)propyl]-	31024-46-1
556.	Morpholine, 4-[3-(trimethoxysilyl)propyl]-	31024-54-1
557.	1-Butanamine, *N*-[3-(trimethoxysilyl)propyl]-	31024-56-3
558.	1-Propanaminium,*N,N,N*-dimethyl-*N*-[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]-3-(trimethoxysilyl)-, chloride	31681-13-7
559.	1,2-Ethanediamine,*N*-[(ethenylphenyl)methyl]-*N'*-[3-(trimethoxysilyl)-propyl]-,monohydrochloride	34937-00-3
560.	1-Propanamine, *N,N*-dimethyl-3-(trimethoxysilyl)-, acetate	35141-35-6
561.	1-Propanaminium, *N,N,N*-trimethyl-3-(trimethoxysilyl)-, chloride	35141-36-7
562.	Silicic acid, 2-ethoxyethyl ester	37338-04-8
563.	Silicic acid (H4SiO4), tetraethyl ester, polymer with 1,2-ethanediol	38742-72-2
564.	1-Propanamine, *N,N*-diethyl-3-(trimethoxysilyl)-	41051-80-3
565.	1-Tetradecanaminium, *N,N*-dimethyl-*N*-[3-(trimethoxysilyl)propyl]-,chloride	41591-87-1
566.	Silane, [2-[2-(chloromethyl)phenyl]ethyl]trimethoxy-	42861-95-0
567.	Silane, trimethoxy(2-phenylethyl)-	49539-88-0
568.	Silane, trimethoxy-7-octenyl-	52217-57-9
569.	Benzenamine, 4-[3-(trimethoxysilyl)propoxy]-	55648-29-8
570.	2-Propanol, 1,1-[[3-(triethoxysilyl)propyl]imino]bis[3-chloro-	56709-05-8
571.	Silane, dichloro(2-methoxyethyl)methyl-	58066-88-9
572.	1H-Imidazole, 4,5-dihydro-1-[3-(triethoxysilyl)propyl]-	58068-97-6
573.	Carbamimidothioic acid, 3-(trimethoxysilyl)propyl ester, monohydrochloride	58505-58-1
574.	Silane, (7-dodecen-9-ynyloxy)trimethyl-, (*E*)-	58763-69-2
575.	Silane, [(3-methoxy-1-methylene-2-propenyl)oxy]trimethyl-	59414-23-2
576.	Silane, dodecyldiethoxymethyl-	60317-40-0
577.	Benzamide, 4-nitro-*N*-[3-(triethoxysilyl)propyl]-	60871-86-5
578.	1-Octanesulfonamide,*N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-*N*-[3-(trimethoxysilyl)propyl]-	61660-12-6
579.	Silicic acid (H4SiO4), tetrakis(1,1-dimethylpentyl) ester	63449-47-8
580.	Silanamine, 1-methoxy-	64051-31-6
581.	1,2-Ethanediamine, *N*-[3-(trimethoxysilyl)propyl]-, monohydro-chloride	64339-13-5
582.	Silanol, bis(1,1-dimethylethoxy)ethenyl-, acetate	64426-39-7
583.	Silanediol, (1,1-dimethylethoxy)ethenyl-, diacetate	64426-40-0
584.	Ethanethiol, 2,2'-thiobis-,polymer with ethenylethoxydimethyl-silane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane, .alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] &2-propen-1-ol.	66564-49-6
585.	Ethanethiol, 2,2-oxybis-,polymer with ethenylethoxydimethylsilane,.alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane,.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] &2-propen-1-ol.	66564-50-9
586.	2-Propen-1-ol, polymer with ethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane,.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-54-3
587.	2-Propen-1-ol, polymer with dimethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane,.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-55-4
588.	2-Propen-1-ol, polymer with 1,1'-(diisocyanatomethylene)bis[benzene], ethoxydimethylsilane,.alpha.-hydro-.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-56-5
589.	Ethanethiol, 2,2'-thiobis-,polymer with ethenyldiethoxymethylsilane,.alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane, .alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] &2-propen-1-ol.	66564-57-6
590.	Ethanethiol, 2,2'-oxybis-,polymer with 1,1'-(diisocyanatomethylene)bis[benzene], ethenylethoxydimethylsilane,.alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-58-7
591.	Ethanethiol, 2,2'-thiobis-,polymer with 1,1'-(diisocyanatomethylene)bis[benzene], ethenylethoxydimethylsilane,.alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-59-8
592.	Ethanethiol, 2,2'-oxybis-, polymer with ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane,.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] &2-propen-1-ol.	66564-60-1
593.	Ethanethiol, 2,2'-[1,2-ethanediylbis(oxy)]bis-, polymer with ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane,.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-61-2
594.	2-Propen-1-ol, polymer with 1,1'-(diisocyanatomethylene)bis-[benzene], dimethoxymethylsilane,.alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-65-6
595.	Ethanethiol, 2,2'-oxybis-, polymer with ethenylethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis[4-isocyanatocyclohexane],.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-66-7
596.	Ethanethiol, 2,2'-oxybis-, polymer with ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis[4-isocyanatocyclohexane],.alpha.-alpha'-.alpha".-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-67-8

No.	Chemical Name	CAS No.
597.	Ethanethiol, 2,2'-[1,2-ethanediylbis(oxy)]bis-, polymer with ethenylethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis[4-isocyanatocyclohexane], .alpha.-alpha.'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-68-9
598.	Ethanethiol, 2,2'-[1,2-ethanediylbis(oxy)]bis-, polymer with ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis[4-isocyanatocyclohexane], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] &2-propen-1-ol.	66564-69-0
599.	Ethanethiol, 2,2'-thiobis-, polymer with ethenylethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis[4-isocyanatocyclohexane], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-70-3
600.	Ethanethiol, 2,2'-thiobis-, polymer with ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis[4-isocyanatocyclohexane], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-71-4
601.	Ethanethiol, 2,2'-oxybis-, polymer with 1,1'-(diisocyanatomethylene)bis[benzene], ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)],.alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-72-5
602.	Ethanethiol, 2,2'-thiobis-, polymer with 1,1'-(diisocyanatomethylene)bis[benzene], ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-75-8
603.	2-Propen-1-ol, polymer with ethoxydimothylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis [4-isocyanatocyclohexane], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-79-2
604.	2-Propen-1-ol, polymer with dimethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 1,1'-methylenebis [4-isocyanatocyclohexane], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-80-5
605.	Ethanethiol, 2,2'-oxybis-, polymer with 1,3-diisocyanatomethylbenzene, ethenylethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-81-6
606.	2-Propen-1-ol, polymer with 1,3-diisocyanatomethylbenzene,ethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-85-0
607.	2-Propen-1-ol, polymer with 1,3-diisocyanatomethylbenzene, dimethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]].	66564-86-1
608.	Ethanethiol, 2,2'-thiobis-, polymer with 1,3-diisocyanatomethyl-benzene, ethenylethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-87-2
609.	Ethanethiol, 2,2'-[1,2-ethanediylbis(oxy)]bis-, polymer with 1,3-diisocyanatomethylbenzene, ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-88-3
610.	Ethanethiol, 2,2'-oxybis-, polymer with 1,3-diisocyanatomethylbenzene, ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66564-89-4
611.	Ethanethiol, 2,2'-thiobis-, polymer with 1,3-diisocyanatomethylbenzene, ethenyldiethoxymethylsilane, .alpha.-hydro-.omega.-hydroxypoly(oxy-1,4-butanediyl).	66591-91-1
612.	Ethanethiol, 2,2'-[1,2-ethanediylbis(oxy)]bis-, polymer with ethenyl-ethoxydimethylsilane, .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)], 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane, .alpha.-alpha'-.alpha''.-1,2,3-propenetriyltris[.omega.-hydroxypolyloxy(meth-1,2-ethanediyl)]] & 2-propen-1-ol.	66634-82-0
613.	Silane, [2-(3-cyclohexen-1-yl)ethyl]trimethoxy-	67592-36-3
614.	1-Propanamine, *N*-(phenylmethylene)-3-(trimethoxysilyl)-	67674-55-9
615.	1-Propanamine, *N,N*-dimethyl-3-(trimethoxysilyl)-, hydrochloride	67674-56-0
616.	.beta.-Alanine, *N*-[3-(triethoxysilyl)propyl]-	67674-57-1
617.	Dodecanamide, *N*-[2-[[3-(trimethoxysilyl)propyl]amino]ethyl]-,monohydrochloride	67674-58-2
618.	Octadecanamide, *N*-[2-[[3-(trimethoxysilyl)propyl]amino]ethyl]-,monohydrochloride	67674-59-3
619.	1-Propanamine, *N*-(1-phenylethylidene)-3-(triethoxysilyl)-	67674-60-6
620.	Silane, diethoxymethyloctadecyl-	67859-75-0
621.	Ethanaminium, *N,N,N*-trimethyl-2-oxo-2-[[3-(triethoxysilyl)propyl]amino]-, iodide	67874-63-9
622.	Silane, diethenyldiethoxy-	67892-60-8
623.	Silane, tetrakis(cyclononyloxy)-	67939-80-4
624.	1,2-Ethanediamine, *N*-[(ethenylphenyl)methyl]-*N*'-[3-(trimethoxysilyl)propyl]-	68092-72-8
625.	Silane, [2-[3(or 4)-(chloromethyl)phenyl]ethyl]trimethoxy-	68128-25-6
626.	2-Oxa-7,10-diaza-3-silaundecan-11-ol, 7,10-bis(hydroxymethyl)-3,3-dimethoxy-	68140-42-1
627.	Silicic acid (H4SiO4), ethyl trihexadecyl ester	68171-54-0
628.	1-Heptanesulfonamide, *N*-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-*N*-[3-(trimethoxysilyl)propyl]-	68239-75-8
629.	Silanamine, 1-(1,1-dimethylethoxy)-1,1-dimethyl-*N*-(1-methylethyl)-	68310-81-6
630.	Benzenesulfonyl azide, 4-[2-(trimethoxysilyl)ethyl]-	68479-60-7
631.	Carbamic acid, [3-(triethoxysilyl)propyl]-, 5-methyl-2-(1-methyl-ethyl)cyclohexyl ester	68479-61-8
632.	Silane, trimethyl(9,11-tetradecadienyloxy)-, (*E,Z*)-	68516-30-3
633.	Urea, *N,N''-(methylphenylene)bis[N'-[3-(triethoxysilyl)propyl]]*-	68845-12-5
634.	1,2-Ethanediamine, *N,N'-bis[3-(trimethoxysilyl)propyl]*-	68845-16-9
635.	Silane, [(4-undecyl-1-cyclopentene-1,2-diyl)bis(oxy)]bis[trimethyl-	68892-10-4
636.	1-Decanaminium, *N*-decyl-*N*-methyl-*N*-[3-(trimethoxysilyl)propyl]-,chloride	68959-20-6
637.	Urea, *N*-(1-phenylethyl)-*N*'-[3-(triethoxysilyl)propyl]-	68959-21-7
638.	1-Propanamine, *N*-(phenylmethylene)-3-(triethoxysilyl)-	69227-26-5
639.	Silane, (2-bromo-2-methyl-1-methylenepropoxy)trimethyl-	69278-36-0
640.	Silane, triethenylethoxy-	70693-58-0
641.	Silane, diethoxymethoxy(2-methylpropyl)-	70776-21-5
642.	Silane, ethoxydimethoxy(2-methylpropyl)-	70776-22-6
643.	Silicic acid (H4SiO4), tris(1-methylpropyl) 4-methyl-2,4,6,6-tetrakis(1-methylpropoxy)cyclotrisiloxan-2-yl ester	70776-64-6
644.	1-Propanamine, 3-(triethoxysilyl)-, compd. with methyloxiranepolymer with oxirane ether with 1,2,3-propanetriol (3:1) tris(hydrogenbutanedioate).	70850-96-3
645.	Silane, diethoxymethyl(2-phenylpropyl)-	70851-46-6
646.	Silane, dimethoxymethyloctadecyl-	70851-50-2
647.	1H-Imidazole, 1-[3-(trimethoxysilyl)propyl]-	70851-51-3
648.	Benzenesulfonyl azide, 3-[[[2-[[3-(trimethoxysilyl)propyl]amino]-ethyl]amino]carbonyl]-	70851-53-5
649.	9H-Carbazole, 9-[2-(trimethoxysilyl)ethyl]-	70851-54-6
650.	Benzenemethanamine, 3(or 4)-[2-(trimethoxysilyl)ethyl]-	70865-19-9
651.	1-Propanesulfonic acid, 2-hydroxy-3-[3-(trihydroxysilyl)propoxy]-	70869-38-4
652.	1-Naphthalenesulfonamide, 5-(dimethylamino)-*N*-[3-(triethoxysilyl)-propyl]-	70880-05-6

No.	Chemical Name	CAS No.
653.	Octadecanoic acid, trianhydride with silicic acid (H4SiO4) monopropyl ester	70880-06-7
654.	1-Propanesulfonic acid, 3-(trihydroxysilyl)-	70942-24-4
655.	1-Propanesulfonic acid, 3-(trihydroxysilyl)-, monosodium salt	70942-25-5
656.	1-Propanesulfonic acid, 3-(trihydroxysilyl)-, monopotassium salt	70942-26-6
657.	Silicic acid (H4SiO4), 1,3-dimethyl-1,3-disiloxanediylidenedodecakis(1-methylpropyl) ester	70969-50-5
658.	Silicic acid (H4SiO4), tris(1-methylpropyl) 2,4,4,6,6-pentakis(1-methylpropoxy)cyclotrisiloxan-2-yl ester	70969-51-6
659.	Silicic acid (H4SiO4), tris(1-methylpropyl) 2-methyl-4,4,6,6-tetrakis(1-methylpropoxy)cyclotrisiloxan-2-yl ester	70969-53-8
660.	1-Propanesulfonic acid, 3-(trihydroxysilyl)-, potassium sodium salt	71463-77-9
661.	1-Propanesulfonic acid, 2-hydroxy-3-[3-(trihydroxysilyl)propoxy]-,sodium salt	71487-07-5
662.	1-Propanesulfonic acid, 3-[3-(dihydroxymethoxysilyl)propoxy]-2-hydroxy-, sodium salt	71487-19-9
663.	Benzenamine, 3-[3-(trimethoxysilyl)propoxy]-	71550-66-8
664.	Silane, trimethoxy[3-[2-(1-propenyl)phenoxy]propyl]-	71550-67-9
665.	2,4-Imidazolidinedione, 5,5-dimethyl-3-[3-(trimethoxysilyl)propyl]-	71550-68-0
666.	Silane, (3-chloropropyl)dimethoxy[3-(oxiranylmethoxy)propyl]-	71808-64-5
667.	Silane, methoxydimethyloctadecyl-	71808-65-6
668.	Imidodicarbonic acid, [2-[carboxy[3-(trimethoxysilyl)propyl]amino]-ethyl]-, trisodium salt	71808-67-8
669.	Silane, [3-(2,4-cyclopentadien-1-yl)propyl]trimethoxy-	71808-68-9
670.	Imidazole, [2-(triethoxysilyl)ethyl]-	72264-84-7
671.	Phenol, 3-[1-methyl-2-(triethoxysilyl)ethoxy]-	72391-25-4
672.	2,5-Pyrrolidinedione, 1-[3-[3-(trimethoxysilyl)propoxy]phenyl]-	73003-82-4
673.	Nonanamide, *N*-[16,16-bis(2-methoxyethoxy)-17,20-dioxa-3,6,9,12-tetraaza-16-silaheneicos-1-yl]-, monohydrochloride	73545-23-0
674.	1,2-Ethanediamine, *N*-[[[2-(trimethoxysilyl)ethyl]phenyl]methyl]-	74113-77-2
675.	Silicic acid, 1-methylethyl 1-methylpropyl ester	77699-50-4
676.	Silane, tris[(1,1-dimethyl-2-propynyl)oxy]methyl-	83817-71-4
677.	2,9,11,13-Tetraazanonadecanethioic acid, 19-isocyanato-11-(6-isocyanatohexyl)-10,12-dioxo-, *S*-[3-(trimethoxysilyl)propyl	85702-90-5
678.	2,5,7,10-Tetraoxa-6-silaundecane, 6-ethenyl-6-(2-methoxy-1-methylethoxy)-4,8-dimethyl-	96195-81-2
679.	Benzene, 1-fluoro-3-isothiocyanato-	404-72-8
680.	Propane, 1-isothiocyanato-3-(methylthio)-	505-79-3
681.	Ethane, isothiocyanato-	542-85-8
682.	Naphthalene, 1-isothiocyanato-	551-06-4
683.	Propane, 2-isothiocyanato-2-methyl-	590-42-1
684.	Butane, 1-isothiocyanato-	592-82-5
685.	Benzene, (isothiocyanatomethyl)-	622-78-6
686.	Cyclohexane, isothiocyanato-	1122-82-3
687.	Benzene, 1-fluoro-4-isothiocyanato-	1544-68-9
688.	Phenol, 4-isothiocyanato-	2131-60-4
689.	Benzene, 1-isothiocyanato-4-nitro-	2131-61-5
690.	Benzene, (2-isothiocyanatoethyl)-	2257-09-2
691.	Benzonitrile, 4-isothiocyanato-	2719-32-6
692.	Octadecane, 1-isothiocyanato-	2877-26-1
693.	Acetamide, *N*-(3-isothiocyanatophenyl)-	3137-83-5
694.	Spiro isobenzofuran-1(3*H*),9'- 9*H* xanthen -3-one, 3',6'-dihydroxy-5-isothiocyanato-	3326-32-7
695.	Benzene, 1-isothiocyanato-3-nitro-	3529-82-6
696.	Benzene, 1,4-diisothiocyanato-	4044-65-9
697.	Heptane, 1-isothiocyanato-	4426-83-9
698.	Phosphor(isothiocyanatidic) acid, diphenyl ester	5401-14-9
699.	Acridine, 9-isothiocyanato-	7620-46-4
700.	Benzenamine, 4-[2-(4-isothiocyanatophenyl)ethenyl]-	17816-11-4
701.	Fluoran, 3',6'-bis(dimethylamino)-5-isothiocyanato-	20746-54-7
702.	Decane, 1-isothiocyanato-	24540-94-1
703.	Benzene, 1-fluoro-2-isothiocyanato-	38985-64-7
704.	1,3-Benzenedicarboxylic acid, 5-isothiocyanato-, dimethyl ester	72076-50-7
705.	4,7-Methano-1H-indene, octahydro-5-isothiocyanato-,(3a.alpha.,4.alpha.,5.alpha.,7.alpha.,7a.alpha.)-	72403-62-4
706.	4,7-Methano-1H-indene, 3a,4,5,6,7,7a-hexahydro-6-isothiocyanato-,(3a.alpha.,4.alpha.,6.alpha.,7.alpha.,7a.alpha.)-	72403-63-5
707.	Silane, isothiocyanatotrimethyl-	2290-65-5
708.	Silane, tetraisothiocyanato-	6544-02-1
709.	Silane, diisothiocyanatodimethyl-	13125-51-4
710.	Benzenesulfonic acid, 4-isothiocyanato-, sodium salt	17614-69-6
711.	Spiro[isobenzofuran-1(3H),9'-[9H]xanthen]-3-one, 3',6'-dihydroxy-5(or 6)-isothiocyanato-	27072-45-3
712.	1,5-Naphthalenedisulfonic acid, 3-isothiocyanato-, disodium salt	35888-63-2
713.	Xanthylium, 9-[2-carboxy-5(or 6)-isothiocyanatophenyl]-3,6-bis(di-ethylamino)-, chloride	36877-69-7
714.	Benzenesulfonic acid, 5-(acetylamino)-2-[2-(4-isothiocyanato-2-sulfophenyl)ethenyl]-, disodium salt	51023-76-8
715.	Spiro[isobenzofuran-1(3H),9'-[9H]xanthen]-3-one, 3',6'-dihydroxy-5-isothiocyanato-, hydrochloride	63469-13-6
716.	Spiro[isobenzofuran-1(3H),9'-[9H]xanthen]-3-one, 3',6'-bis(diethylamino)-5(or 6)-isothiocyanato-	69856-09-3
717.	Hydrazinecarboxamide	57-56-7
718.	Diazenecarbothioic acid, phenyl-, 2-phenylhydrazide	60-10-6
719.	Hydrazinecarboximidamide	79-17-4
720.	Hydrazinecarbothioamide	79-19-6
721.	Hydrazine, (4-nitrophenyl)-	100-16-3
722.	Hydrazinecarboxamide, 2-phenyl-	103-03-7
723.	Ethanol, 2-hydrazino-	109-84-2
724.	Benzenesulfonic acid, 2,5-dichloro-4-hydrazino-	118-89-8
725.	Hydrazine, (2,4-dinitrophenyl)-	119-26-6
726.	Hydrazine, (2,5-dichlorophenyl)-	305-15-7
727.	Hydrazine, 1,2-dimethyl-, dihydrochloride	306-37-6
728.	Ethanedioic acid, bis(cyclohexylidenehydrazide)	370-81-0
729.	Hydrazinecarbothioamide, 2-(1,2-dihydro-2-oxo-3H-indol-3-ylidene)-	487-16-1
730.	Hydrazine, 1,1-diphenyl-, monohydrochloride	530-47-2
731.	Benzoic acid, hydrazide	613-94-5
732.	Hydrazine, 1,2-bis(2-methylphenyl)-	617-22-1
733.	Hydrazine, 1-methyl-1-phenyl-, sulfate (2:1)	618-26-8
734.	Hydrazine, 1-methyl-1-phenyl-	618-40-6

No.	Chemical Name	CAS No.
735.	Benzoic acid, 3-nitro-, hydrazide	618-94-0
736.	Benzoic acid, 4-hydrazino-	619-67-0
737.	Carbonothioic dihydrazide, 2,2'-diphenyl-	622-03-7
738.	Hydrazine, (4-bromophenyl)-, monohydrochloride	622-88-8
739.	Hydrazine, ethyl-	624-80-6
740.	Hydrazinecarboxaldehyde	624-84-0
741.	1,2-Hydrazinedicarboxaldehyde	628-36-4
742.	Benzoic acid, 4-nitro-, hydrazide	636-97-5
743.	Hydrazine, (4-nitrophenyl)-, monohydrochloride	636-99-7
744.	Hydrazine, (4-methylphenyl)-, monohydrochloride	637-60-5
745.	Hydrazinecarbothioamide, 2-phenyl-	645-48-7
746.	Hydrazine, 1,2-bis(2-chlorophenyl)-	782-74-1
747.	Hydrazine, 1,2-bis(2-methoxyphenyl)-	787-77-9
748.	Benzoic acid, 2-benzoylhydrazide	787-84-8
749.	Hydrazinecarboxylic acid, 1,1-dimethylethyl ester	870-46-2
750.	Decanedioic acid, dihydrazide	925-83-7
751.	Benzoic acid, 2-hydroxy-, hydrazide	936-02-7
752.	Benzoic acid, 2-hydroxy-3,5-dinitro-, hydrazide	955-07-7
753.	Hydrazinecarboximidamide, sulfate (2:1)	996-19-0
754.	Ethanedioic acid, dihydrazide	996-98-5
755.	2-Pyridinecarboximidic acid, hydrazide	1005-02-3
756.	2-Pyridinecarboximidic acid, 4-phenyl-, hydrazide	1019-80-3
757	Acetic acid, hydrazide	1068-57-1
758.	2(3H)-Benzothiazolone, 3-methyl-, hydrazone	1128-67-2
759.	Benzoic acid, 2-benzoyl-1,2-dimethylhydrazide	1226-43-3
760.	Benzenesulfonic acid, 4-methyl-, hydrazide	1576-35-8
761.	Hydrazine, 1,1-diphenyl-2-(2,4,6-trinitrophenyl)-	1707-75-1
762.	Hydrazinecarbothioamide, *N,2-diphenyl-*	1768-59-8
763.	Benzoic acid, 2-amino-, hydrazide	1904-58-1
764.	Hydrazine, 1-naphthalenyl-, monohydrochloride	2243-56-3
765.	Benzenesulfonic acid, 4-bromo-, hydrazide	2297-64-5
766.	Hydrazinecarbothioamide, 1-formyl-	2302-84-3
767.	Acetic acid, 2-(4-nitrophenyl)hydrazide	2719-13-3
768.	Acetic acid, 2-acetylhydrazide	3148-73-0
769.	Benzoic acid, 2-hydroxy-, (2-hydroxyphenyl)methylene hydrazide	3232-36-8
770.	Carbonohydrazonic dihydrazide, mononitrate	4000-16-2
771.	1,2-Hydrazinedicarboxylic acid, diethyl ester	4114-28-7
772.	Hydrazinecarboxylic acid, ethyl ester	4114-31-2
773.	1,3-Benzenedisulfonic acid, dihydrazide	4547-70-0
774.	2(1H)-Pyridinone, hydrazone	4930-98-7
775.	Hydrazinecarbothioamide, 2- 2-(hydroxyimino)-1-methylpropylidene	5012-80-6
776.	Carbonohydrazonic dihydrazide, monohydrochloride	5329-29-3
777.	Hydrazinecarboxylic acid, phenylmethyl ester	5331-43-1
778.	2-Naphthalenecarboxylic acid, 3-hydroxy-, hydrazide	5341-58-2
779.	Hydrazinecarbothioamide, *N*-phenyl-	5351-69-9
780.	Hydrazinecarbothioamide, 2-(1,3-benzodioxol-5-ylmethylene)-	5351-85-9
781.	Hydrazine, 1-phenyl-1-(phenylmethyl)-, monohydrochloride	5705-15-7
782.	Hydrazine, cyclohexyl-	6498-34-6
783.	Acetic acid, 2-(4-aminophenyl)hydrazide	6596-74-3
784.	Hydrazine, ethyl-, ethanedioate (1:1)	6629-60-3
785.	Hydrazinecarboxaldehyde, 2-(4-nitrophenyl)-	6632-39-9
786.	Benzenediazonium, 4- (2,6-dichloro-4-nitrophenyl)azo -2,5-di-methoxy-	6709-58-6
787.	L-Tyrosine, hydrazide	7662-51-3
788.	Hydrazinecarboximidamide, mononitrate	10308-82-4
789.	Hydrazinecarbothioamide, *N*-ethyl-	13431-34-0
790.	Hydrazine, (4-chlorophenyl)-, sulfate (2:1)	14581-21-6
791.	Benzenediazonium, 2,5-dichloro-	15470-55-0
792.	Hydrazine, (1-methylethyl)-, monohydrochloride	16726-41-3
793.	Benzoic acid, 2-hydroxy-3,5-dinitro-, (5-nitro-2-furanyl)methylenehydrazide	16915-70-1
794.	Hydrazine, (3,4-dimethoxyphenyl)-, hydrochloride	20329-82-2
795.	1,4-Benzenedicarboxylic acid, monomethyl ester, 2- 4-(methoxycarbonyl)benzoyl hydrazide	24090-79-1
796.	Benzoic acid, 4-hydrazino-, monohydrochloride	24589-77-3
797.	Hydrazine, (1,1-dimethylpropyl)-, monohydrochloride	25544-81-4
798.	2(1H)-Naphthalenone, thiocarbohydrazone	27766-21-8
799.	Hexanedioic acid, bis(2-acetylhydrazide)	34375-39-8
800.	Carbonimidic dihydrazide, hydrochloride	38360-74-6
801.	Hydrazinecarboxaldehyde, 2-(4-methylphenyl)-	38577-24-1
802.	1-Naphthalenesulfonic acid, 6-diazo-5,6-dihydro-5-oxo-, 2-methoxyethyl ester	42372-33-8
803.	Benzenediazonium, 5-chloro-2-(4-chlorophenoxy)-	46813-44-9
804.	Benzoic acid, 2-amino-, (2-hydroxy-1-naphthalenyl)methylene hydrazide	50886-62-9
805.	Propanoic acid, 2,2-dimethyl-, 2- (methylamino)thioxomethyl hydrazide	51672-22-1
806.	Benzoic acid, 2-hydrazino-, monohydrochloride	52356-01-1
807.	Hydrazine, (2-chloro-4,6-dimethylphenyl)-	55034-69-0
808.	2-Naphthalenecarboxylic acid, 2-(2-naphthalenylcarbonyl)hydrazide	56149-12-3
809.	2-Naphthalenecarboxylic acid, 3-methoxy-, 2- (3-methoxy-2-naphthalenyl)carbonyl hydrazide	58698-34-3
810.	Quinoline, 3-hydrazino-, dihydrochloride	61621-35-0
811.	Hydrazine, (2,4,6-trichlorophenyl)-, sulfate	63133-79-9
812.	Acetic acid, 2- 4- 2- 2,4-bis(1,1-dimethylpropyl)phenoxy -5-nitrobenzoyl amino phenyl hydrazide	63134-31-6
813.	Acetic acid, 2- 4-[[5-amino-2-[2,4-bis(1,1-dimethylpropyl)phenoxybenzoyl]amino]phenyl]hydrazide	63134-32-7
814.	Thiourea, *N*-[4-(2-formylhydrazino)phenyl]-N'-phenyl-	63148-78-7
815.	Dodecanedioic acid, bis 2-(2-hydroxybenzoyl)hydrazide	63245-38-5
816.	Hydrazinecarboxaldehyde, 2-(4-aminophenyl)-	63402-26-6

No.	Chemical Name	CAS No.
817.	Benzoic acid, (2-ethylhexylidene)hydrazide	63451-38-7
818.	Benzoic acid, (2-methylpropylidene)hydrazide	63494-84-8
819.	1,4-Benzenedicarboxylic acid, monomethyl ester, 2-(1-oxo-3-phenyl-2-propenyl)hydrazide	64033-96-1
820.	Benzoic acid, 2-hydroxy-, 2-(1-oxo-3-phenyl-2-propenyl)hydrazide	64078-75-7
821.	Methanesulfonamide, N-[2-(4-hydrazinophenyl)ethyl]-, sulfate (2:1)	65665-49-8
822.	Hydrazinecarboximidamide, N(or 2)-[(2-hydroxyphenyl)methylene]-	67763-12-6
823.	Dodecanoic acid, 2-(aminothioxomethyl)-1-(1-oxododecyl)hydrazide	68516-83-6
824.	Hydrazine, 1,2-bis(2,4,6-trinitrophenyl)-	68683-32-9
825.	Benzoic acid, 4-(1,1-dimethylethyl)-, (2-hydroxy-1-naphthalenyl)-methylene hydrazide	68758-85-0
826.	Hydrazine, 1,1-dimethyl-2-(phenylmethyl)-, monohydrochloride	68957-34-6
827.	Benzenediazonium, 2,5-dichloro-4-sulfo-, hydroxide, inner salt	69121-21-7
828.	Hydrazine, [4-(phenylsulfonyl)phenyl]-	70714-83-9
829.	1-Naphthalenesulfonic acid, 6-diazo-5,6-dihydro-5-oxo-, 2-(2-methoxyethoxy)ethyl ester	71550-36-2
830.	Diazenecarbothioic acid, [1,1'-biphenyl]-4-yl-, 2-[1,1'-biphenyl]-4-ylhydrazide	73507-47-8

1.3.f *Removals.* No chemicals were removed from the Priority Testing List as a result of recent (within the past year) EPA responses to Committee recommendations. However, the Committee is providing a complete list of 92 chemicals and 18 chemical groups that have been recommended and removed from the Priority Testing List since the ITC's 1st Report in October 1977 (Table 2). Reasons for removing chemicals from the Priority Testing List as well as the reference for the original Committee designation or recommendation are contained in the FR citations listed in Table 2. The Report numbers for the original Committee designation or recommendation are listed in Table 2. Reports have been consistently published every 6 months since October 1977, e.g., the 10th Report was published in May 1982.

TABLE 2.—REMOVALS FROM THE TSCA SECTION 4(E) PRIORITY TESTING LIST

Report No.	Chemical/Group	FR Citation	Publication Date
1	Alkyl epoxides	49 FR 449	January 4,1984
1	Alkyl phthalates	46 FR 53775	October 30,1981
1	Chlorinated benzenes (mono and di-health)	45 FR 48524	July 18, 1980
1	Chlorinated benzenes (mono and di-environmental)	49 FR 1760	January 13,1984
1	Chlorinated paraffins	47 FR 1017	January 8,1982
1	Chloromethane	45 FR 48524	July 18, 1980
1	Cresols	48 FR 31812	July 11, 1983
1	Hexachloro-1,3-butadiene	47 FR 58029	December 29,1982
1	Nitrobenzene	46 FR 30300	June 5, 1981
1	Toluene	47 FR 56391	December 16,1982
1	Xylenes	47 FR 56392	December 16,1982
2	1,1,1-Trichloroethane	46 FR 30300	June 5, 1981
2	Acrylamide (health)	45 FR 48510	July 18, 1980
2	Acrylamide (environmental)	48 FR 725	January 6,1983
2	Aryl phosphates	48 FR 57452	December 29,1983
2	Chlorinated naphthalenes	46 FR 54491	November 2,1981
2	Dichloromethane	46 FR 30300	June 5, 1981
2	Halogenated alkyl epoxides	48 FR 57695	December 30,1983
2	Polychlorinated terphenyls	46 FR 54482	November 2,1981
2	Pyridine	47 FR 58031	December 29,1982
3	1,2-Dichloropropane	49 FR 899	January 6,1984
3	Chlorinated benzenes (tri,tetra and penta-health)	45 FR 48524	July 18, 1980
3	Chlorinated benzenes (tri,tetra and penta-environmental)	49 FR 1760	January 13,1984
3	Glycidols	48 FR 57562	December 30,1983
4	4,4'-Methylenedianiline	48 FR 31806	July 11, 1983
4	Acetonitrile	47 FR 58020	December 29,1982
4	Aniline and bromo-, chloro-or nitroanilines	49 FR 108	January 3,1984
4	Antimony metal	48 FR 717	January 6,1983
4	Antimony sulfide	48 FR 717	January 6,1983
4	Antimony trioxide	48 FR 717	January 6,1983
4	Cyclohexanone	49 FR 136	January 3,1984

TABLE 2.—REMOVALS FROM THE TSCA SECTION 4(E) PRIORITY TESTING LIST—Continued

Report No.	Chemical/Group	FR Citation	Publication Date
4	Hexachlorocyclopentadiene	47 FR 58023	December 29,1982
4	Isophorone	48 FR 727	January 6,1983
4	Mesityl oxide	48 FR 30699	July 5, 1983
4	Methyl ethyl ketone	47 FR 50025	December 29,1982
4	Methyl isobutyl ketone	47 FR 58025	December 29,1982
5	Benzidine-, o-dianisidine and o-tolidine based dyes	46 FR 55004	November 5,1981
5	Hydroquinone	49 FR 438	January 4,1984
5	Quinone	49 FR 456	January 4,1984
6	Phenylenediamines	47 FR 973	January 8,1982
7	Alkyltins	47 FR 5456	February 5,1982
7	Butyl benzyl phthalate	46 FR 53775	October 30,1981
7	Butyl glycolyl butylphthalate	46 FR 54487	November 2,1981
7	Fluoroalkenes	46 FR 53704	October 30,1981
8	2-Chlorotoluene	47 FR 3596	January 26,1982
8	Diethylenetriamine	47 FR 18386	April 29, 1982
8	Hexachloroethane	47 FR 18175	April 28, 1982
9	4-Chlorobenzotrifluoride	47 FR 50555	November 8,1982
9	Chlorendic acid	47 FR 44878	October 12,1982
9	Tris(2-chloroethyl) phosphite	47 FR 49466	November 1,1982
10	1,2,4-Trimethylbenzene	48 FR 23088	May 23, 1983
10	Biphenyl	48 FR 23080	May 23, 1983
10	Ethyltoluene	48 FR 23088	May 23, 1983
10	Formamide	48 FR 23098	May 23, 1983
11	1,3-Dioxolane	48 FR 51839	November 14,1983
11	4-(1,1,3,3-Tetramethylbutyl)phenol	48 FR 51971	November 15,1983
11	Bis(2-ethylhexyl)terephthalate	48 FR 51845	November 14,1983
11	Carbofuran intermediates	50 FR 29761	July 22, 1985
11	Dibutyltin bis(isooctylmaleate)	48 FR 51361	November 8,1983
11	Dibutyltin bis(isooctylmercaptoacetate)	48 FR 51361	November 8,1983
11	Dibutyltin bis(laurelmercaptide)	48 FR 51361	November 8,1983
11	Dibutyltin dilaurate	48 FR 51361	November 8,1983
11	Dimethyltin bis(isooctylmercaptoacetate)	48 FR 51361	November 8,1983
11	Monobutyltin tris(isooctylmercaptoacetate)	48 FR 51361	November 8,1983
11	Monomethyltin tris(isooctylmercaptoacetate)	48 FR 51361	November 8,1983
11	Tris(2-ethylhexyl)trimellitate	48 FR 51824	November 14,1983
12	2-Phenoxyethanol	49 FR 21407	May 21, 1984
12	Calcium naphthenate	49 FR 21411	May 21, 1984
12	Cobalt naphthenate	49 FR 21411	May 21, 1984
12	Lead naphthenate	49 FR 21411	May 21, 1984
12	Methylolurea	49 FR 21371	May 21, 1984
13	1,2,3,4,7,7-Hexachloronorbornadiene	49 FR 45654	November 19,1984
13	Diethyleneglycol butyl etheracetate	49 FR 45606	November 19,1984
13	Ethylene bis(oxyethylene)diacetate	49 FR 45651	November 19,1984
13	Oleylamine	49 FR 45610	November 19,1984
14	1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane	50 FR 19460	May 8, 1985
14	2-Ethylhexanoic acid	50 FR 20678	May 17, 1985
14	3,4-Dichlorobenzotrifluoride	52 FR 23547	June 23, 1987
14	Bisphenol A	50 FR 20691	May 17, 1985
14	Diisopropylbiphenyl	50 FR 18920	May 3, 1985
14	Isopropylbiphenyl	50 FR 18920	May 3, 1985
15	9,10-Anthraquinone	50 FR 46090	November 6,1985
15	Chloroprene	50 FR 29761	August 26,1985

TABLE 2.—REMOVALS FROM THE TSCA SECTION 4(E) PRIORITY TESTING LIST—Continued

Report No.	Chemical/Group	FR Citation	Publication Date
15	Cumene	50 FR 46104	November 6,1985
15	2-Mercaptobenzothiazole	50 FR 46121	November 6,1985
15	Octamethylcyclotetrasiloxane	50 FR 45123	October 30,1985
15	Pentabromoethylbenzene	50 FR 46785	November 13,1985
15	Sodium *N*-methyl-*N*-oleoyltaurine	50 FR 46178	November 6,1985
16	Methylcyclopentane	51 FR 17854	May 15, 1986
16	Tetrabromobisphenol A	51 FR 17872	May 15, 1986
16	Triethylene glycol monobutylether	51 FR 27883	May 15, 1986
16	Triethylene glycol monoethylether	51 FR 27883	May 15, 1986
16	Triethylene glycol monomethylether	51 FR 27883	May 15, 1986
17	Diisodecyl phenyl phosphite	54 FR 8112	February 24,1989
18	2,6-Di-tert-butylphenol	52 FR 23862	June 25, 1987
18	Cyclohexane	52 FR 19096	May 20, 1987
19	Methylethyl ketoxime	53 FR 35838	September 15,1988
19	Tributylphosphate	52 FR 43346	November 12,1987
19	Disperse blue dye 79 (bromoethoxy substituted)	54 FR 48102	November 21,1989
20	Disperse blue dye (chloroethoxy substituted)	54 FR 48102	November 21,1989
20	Disperse blue dye (chloromethoxy substituted)	54 FR 48102	November 21,1989
20	Disperse blue dye 79:1 (bromomethoxy substituted)	54 FR 48102	November 21,1989
20	Ethylbenzene	53 FR 46262	November 16,1988
20	Isopropanol	53 FR 8638	March 16, 1988
20	Methyl tert-butyl ether	53 FR 10391	March 31, 1988
21	Acid blue 40	53 FR 18196	May 20, 1988
21	Acid blue 45	53 FR 18196	May 20, 1988
21	Acid form of Acid blue 40	53 FR 18196	May 20, 1988
21	Acid form of Acid blue 45	53 FR 18196	May 20, 1988
21	Disperse blue 56	53 FR 18196	May 20, 1988
21	Disperse red 60	53 FR 18196	May 20, 1988
22	1,6-Hexamethylenediisocyanate	54 FR 21240	May 17, 1989
23	Crotonaldehyde	54 FR 47062	November 9,1989

1.4 *The TSCA section 4(e) Priority Testing List.* Section 4(e)(1)(B) of TSCA directs the Committee to: "* * * make such revisions in the [priority] list as it determines to be necessary and * * * transmit them to the Administrator together with the Committee's reasons for the revisions.> Under this authority, the Committee is revising the Priority Testing List by designating 6 chemicals and recommending 3 chemicals and 11 chemical groups. These revisions are listed in Table 1.

The Priority Testing List (Table 3) includes designated, recommended with intent-to-designate and recommended chemicals. Individual chemicals in Priority Testing List chemical groups are listed in Table 1 or the paragraph following Table 1 of this and previous Reports with appropriate notes that minimize ambiguities related to TSCA section 8(a) and 8(d) reporting requirements. Tables 2 (Removals from the Priority Testing List) and 3 (the Priority Testing List) list the 123 chemicals and 38 chemical groups that have been recommended or designated for testing since the Committee's 1st Report in October 1977. Table 3 reads as follows:

TABLE 3.—THE TSCA SECTION 4(E) PRIORITY TESTING LIST

Date	Entry	Action
May 1988	Ethoxylated quaternary ammonium compounds	Recommended
May 1988	Imidazolium quaternary ammonium compounds	Recommended
November 1988	Tetrakis(2-chloroethyl)ethylenediphosphate	Recommended with intent-to-designate
November 1988	Tris(1,3-dichloro-2-propyl)phosphate	Recommended with intent-to-designate
November 1988	Tris(1-chloro-2-propyl) phosphate	Recommended with intent-to-designate
November 1988	Tris(2-chloro-1-propyl) phosphate	Recommended with intent-to-designate

TABLE 3.—THE TSCA SECTION 4(E) PRIORITY TESTING LIST—Continued

Date	Entry	Action
November 1988	Tris(2-chloroethyl)-phosphate	Recommended with intent-to-designate
November 1988	Butyraldehyde	Recommended
November 1988	1,2-Bis(2,4,6-tribromophenoxy)-ethane	Designated
November 1988	Decabromodiphenyl ether	Designated
November 1988	Hexabromocyclododecane	Designated
November 1988	Octabromodiphenyl ether	Designated
November 1988	Pentabromodiphenyl ether	Designated
November 1988	Brominated flame retardants	Recommended
May 1990	Isocyanates	Recommended with intent-to-designte
May 1990	Brominated flame retardants	Recommended
May 1990	Alkyl phosphates	Recommended
November 1990	Vinylcyclohexene	Designated
November 1990	Sodium cyanide	Designated
November 1990	Acrylic acid	Designated
November 1990	Acetophenone	Designated
November 1990	Phenol	Designated
November 1990	*N,N*-Dimethylaniline	Designated
November 1990	Ethylacetate	Designated
November 1990	2,6-Dimethylphenol	Designated
November 1990	Aldehydes	Recommended with intent-to-designate
November 1990	2,4-Dinitrophenol	Recommended
November 1990	3,4-Dimethylphenol	Recommended
November 1990	*N*-phenyl-1-naphthylamine	Recommended
November 1990	Sulfones	Recommended
November 1990	Substantially produced chemicals in need of subchronic tests	Recommended
May 1991	Acetone	Designated
May 1991	*n*-Butanol	Designated
May 1991	Isobutanol	Designated
May 1991	Di-(2-ethylhexyl)adipate	Designated
May 1991	Dimethyl terephthalate	Designated
May 1991	Thiophenol	Designated
May 1991	m-Dinitrobenzene	Recommended
May 1991	Allyl alcohol	Recommended
May 1991	2,4-Dichlorophenol	Recommended
May 1991	Alkynes	Recommended
May 1991	Nitroalcohols	Recommended
May 1991	Phosphoniums	Recommended
May 1991	Hydrazines	Recommended
May 1991	Oxiranes	Recommended
May 1991	Alkoxysilanes	Recommended
May 1991	Aldehyde hydrates	Recommended
May 1991	Propylene glycol ethers and esters	Recommended
May 1991	Methyl ethylene glycol ethers	Recommended
May 1991	Isothiocyanates	Recommended
May 1991	Cyanoacrylates	Recommended

Chapter 2--Recommendations of the Committee

2.1 *Chemicals recommended for priority consideration by the EPA Administrator.* As provided by section 4(e)(1)(B) of TSCA, the Committee is revising the Priority Testing List by designating six chemicals and recommending three chemicals and eleven chemical groups (see Table 1). The recommendation of these chemicals is made after considering the factors identified in section 4(e)(1)(A) and other relevant information, such as the chemical testing information deficiencies of Member Agencies.

2.2 *Designated chemicals—2.2.a. IRIS chemicals— Introduction.* The Committee reviewed a subset of chemicals that are listed on the EPA's Integrated Risk Information System

(IRIS). IRIS is an electronic database, prepared and maintained by EPA, that contains health risk and EPA regulatory information on chemical substances. IRIS was developed for EPA staff in response to a growing demand for consistent risk information on chemical substances for use in decisionmaking and regulatory activities. Although IRIS was designed for EPA staff, it is also accessible to state and local environmental health agencies, private citizens, libraries and organizations through Dialcom, Inc.'s Electronic Mail telecommunications system. For more information contact IRIS User Support in EPA's Environmental Criteria and Assessment Office, Cincinnati, Ohio (513/569–7254 or FTS 684–7254).

The EPA's Reference Concentration (RfC)/Reference Dose (RfD) Workgroup asked the ITC to designate or recommend inhalation(RfC) or oral(RfD) testing of IRIS chemicals to provide data to develop or improve RfC or RfD values. An RfC or RfD value is an estimate of how much of a chemical people can inhale or ingest daily without experiencing deleterious effects during part or all of their lifetime.

The Committee-activated comprehensive networking and information exchange processes were used to facilitate communication and coordination of chemical testing. The Committee considered unpublished studies in Member Agency's files and past, present and future Member Agency activities. The Committee discussed studies conducted by NTP and EPA's Health Effects Research Laboratory and Environmental Research Laboratories, studies sponsored by NIOSH, studies used by OSHA and CPSC, studies submitted under TSCA as well as studies in FDA's files. The Committee learned about ongoing international activities, about ATSDR's data research needs, about EPA's Toxics Release Inventory (TRI) information, about Health Hazard Evaluations and Hazard Evaluation and Technical Assistance Reports, walk-through surveys, etc., conducted by NIOSH, uses considered by the FDA, activities under other statutes, and so on. As part of the Committee's efforts to comprehensively consider testing information deficiencies, the Committee reviewed available information on physical/chemical properties and persistence as well as ecological effects and identified a number of chemical fate and aquatic toxicity testing information deficiencies. EPA's Neurobehavioral Toxicology Branch also reviewed these chemicals for potential neurotoxicology concerns and the Committee identified neurotoxicity testing deficiencies.

For 36 IRIS chemicals, the Committee has completed partial (21) or comprehensive (15) assessments of available health effects, chemical fate and ecological effects information. As a result of these assessments, the Committee designated six chemicals and recommended three chemicals for testing (see Table 1). Three chemicals were recommended, because the Committee wants to review the TSCA section 8(a) and 8(d) information and any use exposure and release or physical chemical property information that is voluntarily submitted, before deciding whether to designate these chemicals for testing. The Committee has considered, but is not recommending health effects or chemical fate testing at this time for four IRIS chemicals (aldehydes - chloral, furfural, benzaldehyde and acrolein) that were recommended for ecological effects testing in the 27th Report, because it wants to review the submitted TSCA section 8(d) studies to avoid duplicative and unnecessary testing and to review the TSCA section 8(a) submitted information as well as any use exposure and release or physical chemical property information that is voluntarily submitted, before deciding whether to designate these chemicals for testing. The Committee is returning 2 chemicals to the EPA because the Committee's review identified health effects data that appear to be sufficient to reduce the uncertainty associated with risk assessments (cyclohexane, CAS No. 110–82–7 and chloroprene, CAS No. 126–99–8). Both of these chemicals were previously recommended for testing by the ITC; EPA's implementation of the Committee's testing recommendations and testing by NTP provided sufficient health effects data. None of the IRIS chemicals that were designated or recommended for testing in this 28th Report were listed in Title III of the 1990 amendments of the Clean Air Act. The Committee is continuing to review information on numerous IRIS chemicals, including 21 that are listed in the Clean Air Act. One of these 21 chemicals, phosgene (CAS No. 75–44–5) was deferred in this Report (see Chapter 1.3.e).

During the review of dimethyl terephthalate, the Committee evaluated the testing information deficiencies associated with terephthalic acid (CAS No. 100–21–0), because there are several facilities that have capabilities of producing over a billion pounds of dimethyl terephthalate or terephthalic acid per annum. The Committee reviewed exposure information, the December 10, 1990 Notice of Final Rulemaking delisting terephthalic acid from the Toxic Release Inventory (TRI), the documentation supporting that delisting, the available data that EPA cited in their recently proposed developmental toxicity and reproductive effects testing rule, as well as a considerable volume of publicly-available information on chemical fate, ecological effects and health effects of terephthalic acid. Based on this review the Committee is not recommending terephthalic acid for chemical fate, ecological effects or health effects testing at this time. The Committee shares EPA's concern about the potential of terephthalic acid to cause adverse reproductive effects and is soliciting voluntary submission of studies related to terephthalic acid's developmental toxicity potential, because there were no publicly-available developmental toxicity studies.

Summary of recommended studies. Recommended studies are summarized in Table 1.

Acetone (CAS No. 67–64–1).

Physical and Chemical Information

The Committee has information on the measured physical chemical properties of acetone, including melting point (-94.7 °C; Ref. 12, Riddick 1986), boiling point (56.07 °C; Ref. 12, Riddick 1986), log octanol/water partition coefficient (-0.24; Ref. 6, Hansch and Leo 1985), water solubility (miscible; Ref. 12, Riddick 1986), vapor pressure (231.5 mm Hg @25 °C; Ref. 2, Boublik et al. 1984), and Henry's Law constant (3.88E–5 atm-m3/mole @25 °C; Ref. 15, Snider and Dawson 1985).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee reviewed available exposure information including the data EPA cited in their recently proposed neurotoxicity testing rule (Ref. 21, U.S. EPA 1991). In addition, the Committee has reviewed other supporting information listed below. In 1989, 1.145 billion kilograms of acetone were produced at 11 facilities in the United States (Ref. 22, USITC 1990). There were 13 facilities that manufactured acetone in the U.S. in 1990 (Ref. 16, SRI 1990). Acetone has the following uses: in the manufacture of methyl methacrylate, methacrylic acid and higher methacrylates 40 percent; solvent uses 20 percent; Bisphenol-A 13

percent; methyl isobutyl ketone and methyl isobutyl carbinol 10 percent; drug and pharmaceutical applications 6 percent; miscellaneous chemical uses 5 percent; exports 6 percent (Ref. 3, CMR 1990). Solvent and miscellaneous uses of acetone include paint, varnish and lacquer solvent; cellulose acetate, especially as spinning solvent; to clean and dry parts of precision equipment; solvent for potassium iodide and permanganate; delusterant for cellulose acetate fibers; specification testing of vulcanized rubber products (Ref. 13, Sax and Lewis 1987).

B. *Evidence for exposure—Human exposure.* The Committee reviewed available human exposure information including the use of acetone in a variety of commercial and consumer applications that may lead to worker and consumer exposure, which EPA cited in their recently proposed neurotoxicity testing rule (Ref. 21, U.S. EPA 1991). OSHA's proposed and final rule Permissible Exposure Limit (PEL) of 750 ppm and STEL of 1,000 ppm for acetone was established from the NIOSH recommended limit, which was based on several industrial and human studies indicating irritation and central nervous system effects resulting from exposure to acetone at concentrations below 1,000 ppm (Ref. 20, U.S. EPA 1989). The National Occupational Exposure Survey (NOES) conducted during 1981–83 by NIOSH reported that 1,510,107 workers (466,647 females) were potentially exposed to acetone. Of these workers, 69 percent were potentially exposed during the use of trade name products containing acetone (Ref. 10, NIOSH 1989). In a pilot study of personal air samples of persons living in urban New Jersey, acetone was qualitatively detected in 8 of 8 samples indicating possible human exposure in ambient urban air (Ref. 23, Wallace et al. 1984).

C. *Environmental exposure.* The Committee reviewed available environmental exposure information including the data that EPA cited in their recently proposed neurotoxicity testing rule (Ref. 21, U.S. EPA 1991). According to TRI, 191,111,104 lbs of acetone were released to air, 2,030,623 lbs were released to water, 293,397 lbs were released to land, 14,528,002 lbs were released to publicly owned treatment works (POTWs) in 1987 (Ref. 18, TRI 1990). Acetone was found in 10 drinking water supplies in 10 different cities in the United States in 1974–1975; of these drinking water supplies, it was detected at a concentration of 1.0 ppb in one supply (Ref. 19, U.S. EPA 1975). It was found at concentrations ranging from 1-4 ppb in 3 of 8 surface water sampling sites in the Lake Michigan basin (Ref. 5, Ewing et al. 1977; Ref. 7, Konasewich et al. 1978).

According to the 1987 update of the National Ambient Volatile Organic Compounds Data Base, which includes data from 1970–1980, acetone may be present at low concentrations in ambient air at a daily average concentration of 6.93 ppbv and a median concentration of 0.93 ppbv (Ref. 14, Shah and Heyerdahl 1988). Acetone has been detected at an average concentration of 1147 ppb in 3 test runs in municipal wastewater and 29 ppb in POTW secondary effluent (Ref. 1, Bhattacharya et al. 1990). Acetone has been detected in smoke from burning wood, automobile exhaust, and particle board (Ref. 9, Lipari et al. 1984; Ref. 17, Tichenor and Mason 1988; Ref. 24, Westerholm et al. 1988).

I. Chemical Fate Information

The need for chemical fate testing of acetone was considered by the Committee and is not recommended at this time.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for acetone because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

The Committee reviewed available reproductive effects data. A mild toxic effect on spermatogenesis (depressed caudal and epididymal weights, decreased sperm motility, and increased incidence of malformed sperm) was seen in male mice administered 50,000 ppm in drinking water for 13 weeks (Ref. 11, NTP 1990). In a reproductive effects screening test, no maternal toxicity was noted in pregnant female mice administered 3500 mg/kg/day of acetone by gavage on gestation days 6 through 15, but the treated groups showed decreased reproductive index, increased gestation length, reduced birth weights, decreased neonatal survival, and increased neonatal weight (Ref. 4, EHRT 1989). Available studies indicate that acetone is a potential reproductive toxicant, but are insufficient to characterize the reproductive effects of acetone because only one dose was tested and only one generation was studied.

The Committee reviewed available neurotoxicity data including evidence of depressed neurological function resulting from inhalation exposure to humans, rats and mice that EPA cited in their recently proposed neurotoxicity testing rule (Ref. 21, U.S. EPA 1991). In addition to studies reviewed by EPA, the Committee reviewed a study in which rats administered 5% (w/w) acetone in drinking water for 6 weeks showed decreased nerve conduction velocity during week 6, but not earlier in the treatment period (Ref. 8, Ladefoged et al. 1989). Available studies indicate that acetone is a potential neurotoxicant, are insufficient to comprehensively characterize the neurotoxic effects because tests were conducted only with males or one test dose, and limited endpoints were examined.

The Committee recommends reproductive effects testing because there are potentially substantial exposures, and because there are insufficient data to reasonably determine or predict these effects of acetone. The Committee is not recommending neurotoxicity testing because this testing recommendation was implemented when EPA promulgated their recently proposed neurotoxicity testing rule (Ref. 21, U.S. EPA 1991).

III. Ecological Effects Information

The need for ecological effects testing of acetone was considered by the Committee and is not recommended at this time.

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n-Butanol (CAS No. 71–36–3).

Physical and Chemical Information

The Committee has information on the measured physical chemical properties of *n*-butanol, including melting point (-89.5 C; Ref. 28, Weast 1985), boiling point (117.2 °C; Ref. 28, Weast 1985), log octanol/water partition coefficient (0.88; Ref. 10, Hansch and Leo 1985), water solubility (74,000 mg/L @25 °C; Ref. 30, Yalkowsky 1987), vapor pressure (7.054 mm Hg @25 °C; Ref. 7, Daubert and Danner 1985), and Henry's Law constant (5.57E-6 atm-m^3/mole @25 °C; Ref. 15, Mackay and Yeun 1983).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee reviewed available exposure information including the data EPA cited in their recently proposed neurotoxicity testing rule (Ref. 25, U.S. EPA 1991). In addition, the Committee has reviewed other supporting information listed below. In 1989, 7.941 billion kilograms of *n*-butanol were produced at 8 facilities in the United States (Ref. 26, USITC 1990). There were 6 facilities that manufactured *n*-butanol in the U.S. in 1990 (Ref. 21, SRI 1990). *n*-Butanol has the following uses: butyl acrylate and methacrylate 30 percent; glycol ethers 25 percent; exports 16 percent; direct solvent use 11 percent; butyl acetate 10 percent; plasticizers 4 percent; amino resins 1 percent; butylamines 1 percent; miscellaneous 2 percent (Ref. 6, CMR 1990). Solvent and miscellaneous uses of *n*-butanol include solvent for resins and coatings, dyeing assistant, hydraulic fluids, detergent formulations, and dehydrating agent (by azeotropic distillation) (Ref. 19, Sax and Lewis 1987).

B. *Evidence for exposure—Human exposure.* The Committee reviewed available human exposure information including the use of *n*-butanol in a variety of commercial and consumer applications that may lead to worker and consumer exposure, which EPA cited in their recently proposed neurotoxicity testing rule (Ref. 25, U.S. EPA 1991). OSHA's proposed and final rule PEL is a 50-ppm ceiling, with a skin notation because data in beagle dogs suggests that dermal contact with *n*-butanol may result in a combined dose rather than that obtained by inhalation alone (Ref. 24, U.S. EPA 1989). The NOES conducted during 1981–83 by NIOSH reported that 794,284 workers (115,385 females) were potentially exposed to *n*-butanol. Of these workers 96 percent were potentially exposed during the use of trade name products containing this compound (Ref. 17, NIOSH 1989). In a pilot study of human mother's milk taken from 4 urban areas, *n*-butanol was qualitatively detected in 3 of 12 samples (Ref. 18, Pellizzari et al. 1982). This compound was detected in 1 of 12 homes tested in Canada in November-December, 1986 at a concentration of 37 $\mu g/m^3$; however, it was not detected in air outside the homes (Ref. 5, Chan et al. 1990). *n*-Butanol is contained in several foods which may lead to human exposure. For example, *n*-butanol has been qualitatively detected in cheese, fried bacon, and Kogyoku apples (Ref. 8, Dumont and Adda 1978; Ref. 11, Ho et al. 1983; Ref. 29, Yajima et al. 1984). It has been detected at concentrations ranging from 32–145 ppb in dried beans and at mean concentrations of 53 ppb, 89 ppb, and 32 ppb from dried beans,

split peas, and lentils, respectively (Ref. 13, Lovegren et al. 1979).

C. *Environmental exposure.* The Committee reviewed available environmental exposure information including the data that EPA cited in their recently proposed neurotoxicity testing rule (Ref. 25, U.S. EPA 1991). According to TRI, 33,623,834 lbs of *n*-butanol were released to air, 211,200 lbs were released to water, 485,530 lbs were released to land, 2,612,252 lbs were released to POTWs in 1987 (Ref. 22, TRI 1990). In 1988, TRI indicates that 36,145,132 lbs were released to air, 127,610 lbs were released to water, 174,513 lbs were released to land; and 4,503,465 lbs were released to POTWs (Ref. 22, TRI 1990). *n*-Butanol has been qualitatively detected in drinking water from 5 of 15 samples from 5 of 7 cities (Ref. 14, Lucas et al. 1984) and one sample of drinking water of persons living in urban New Jersey in July-December, 1980 (Ref. 27, Wallace et al. 1984). According to the 1987 update of the National Ambient Volatile Organic Compounds Data Base, which includes data from 1970–1980, *n*-butanol may be present at low concentrations in ambient air at a daily average concentration of 0.545 ppbv, and a median concentration of 0.074 ppbv (Ref. 20, Shah and Heyerdahl 1988). *n*-Butanol was detected in a river highly polluted from leather industries utilizing steam distillation separation and vacuum distillation at concentrations of 87 ppb and 318 ppb, respectively (Ref. 31, Yasuhara et al. 1981). It has been detected in air at a Swiss water treatment facility (Ref. 9, Hangartner 1979). *n*-Butanol has been found in industrial effluent from inorganic chemical manufacture, a petrochemical industry, and pulp mill effluent (Ref. 2, Bursey and Pellizzari 1982; Ref. 4, Carlberg et al. 1986; Ref. 12, Keith 1974).

I. Chemical Fate Information

The need for chemical fate testing of *n*-butanol was considered by the Committee and is not recommended at this time.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for *n*-butanol because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

The Committee reviewed available reproductive effects data. *n*-Butanol has been shown to reduce fertility of male rats (2 of 17 matings produced litters) exposed by inhalation to 7000 ppm for 6 weeks (Ref. 1, Brightwell et al. 1988), and exposure for 6 hours/day for 7 days to 50 ppm led to decreased levels of testosterone (Ref. 3, Cameron et al. 1985). Similar exposure to 6000 ppm had no observable effect on fertility (Ref. 16, Nelson et al. 1989). Available studies indicate that *n*-butanol is a potential reproductive system toxicant, but are inadequate to comprehensively characterize the reproductive effects because only males have been tested, and 2-generation studies are lacking.

The Committee reviewed available neurotoxicity data including evidence of depressed neurological function resulting from oral exposure to rats and mice that EPA cited in their recently proposed neurotoxicity testing rule (Ref. 25, U.S. EPA 1991). In addition to studies reviewed by EPA, the Committee reviewed other data (summarized below) that support the need to conduct neurotoxicity testing. In a general toxicity study, cage-side observations included treatment-related ataxia and hypoactivity during the last 6 weeks of treatment among rats administered 500 mg/kg/day *n*-butanol for 13 weeks by gavage (Ref. 23, U.S. EPA 1986). When male rats were exposed by inhalation to 6000 ppm, differences were seen among their offspring in a few behavioral (4 out of 78) and neurochemical (4 out of 64) measures, but no discernable pattern of effects was apparent (Ref. 16, Nelson et al. 1989). Available studies indicate that *n*-butanol has neurotoxic potential, but are inadequate to comprehensively characterize the neurotoxic effects because only males were tested or exposure durations were insufficient, and limited endpoints were examined.

The Committee recommends reproductive effects testing because there are potentially substantial exposures, and because there are insufficient data to reasonably determine or predict these effects of *n*-butanol on these systems. The Committee is not recommending neurotoxicity testing because this testing recommendation was implemented when EPA promulgated their recently proposed neurotoxicity testing rule (Ref. 21, U.S. EPA 1991).

III. Ecological Effects Information

The need for ecological effects testing of *n*-butanol was considered by the Committee and is not recommended at this time.

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Isobutanol (CAS No. 78–83–1).

Physical and Chemical Information

The Committee has information on the measured physical chemical properties of isobutanol, including melting point (-108 °C; Ref. 15 Riddick 1986), boiling point (107.886 °C; Ref. 15 Riddick 1986), log octanol/water partition coefficient (0.76; Ref. 9, Hansch and Leo 1985), water solubility (85,000 mg/L @25 °C; Ref. 25, Valvani et al. 1981), vapor pressure (10.45 mm Hg @25 °C; Ref. 3, Daubert and Danner 1985), and Henry's Law constant (1.18 X 10E-5 atm-m^3/mole @25 °C; Ref. 10, Hine and Mookerjee 1975).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee reviewed available exposure information including the data EPA cited in their recently proposed neurotoxicity testing rule (Ref. 23, U.S. EPA 1991). The Committee has reviewed other supporting information listed below. In 1989, 61.443 million kilograms of isobutanol were produced at 6 facilities in the United States (Ref. 24, USITC 1990). There were 5 facilities that manufactured isobutanol in the U.S. in 1990 (Ref. 18, SRI 1990). Isobutanol is used in organic synthesis, as a latent solvent in paints and lacquers, as an intermediate for amino coating resins, as a substitute for *n*-butanol, in paint removers, fluorometric determinations, liquid chromatography and fruit flavor concentrates (Ref. 17, Sax and Lewis 1987).

B. *Evidence for exposure—Human exposure.* The Committee reviewed available human exposure information including the use of isobutanol in a variety of commercial and consumer applications that may lead to worker and consumer exposure, which EPA cited in their recently proposed neurotoxicity testing rule (Ref. 23, U.S. EPA 1991). OSHA's revised final rule PEL is a 50 ppm 8–hour TWA (formerly a PEL of 100 ppm 8–hour TWA) for isobutanol which is expected to reduce the risk of skin irritation associated with exposure to concentrations above the revised PEL (Ref. 22, U.S. EPA 1989). The NOES survey conducted during 1981–83 by NIOSH reported that 192,949 workers (28,581 females) were potentially exposed to isobutanol. Of these workers, 95 percent were potentially exposed during the use of trade name products containing this compound (Ref. 14, NIOSH 1989). Isobutanol is contained in several foods which may lead to human exposure. For example, isobutanol has been qualitatively detected in cheese, Kogyoku apples, headspace volatiles of tree-ripened peaches, and volatile compounds from fried chicken (Ref. 5, Dumont and Adda 1978; Ref. 19, Takeoka et al. 1988; Ref. 22, Tang et al. 1983; Ref. 26, Yajima et al. 1984). It has been detected at concentrations ranging from 22–300 ppb in dried beans and at mean concentrations of 72 ppb, 140 ppb, and 100 ppb from dried beans, split peas, and lentils, respectively (Ref. 13, Lovegren et al. 1979).

C. *Environmental exposure.* The Committee reviewed available environmental exposure information including the data that EPA cited in their recently proposed neurotoxicity testing rule (Ref. 23, U.S. EPA 1991). Isobutanol was found in air with similar composition to urban and suburban air from the southern Black Forest, W. Germany in 1983–1984 (Ref. 11, Juttner 1986) and it was found in indoor air from 4 of 6 homes in Northern Italy at concentrations ranging from 1,300–20,000 ppb (Ref. 4, Debortoli et al. 1986). Isobutanol was detected in a river highly polluted from leather industries utilizing steam distillation separation and vacuum distillation at concentrations of 142 ppb and 685 ppb, respectively (Ref. 27, Yasuhara et al. 1981). It was detected in leachate from a 1–year old experimental landfill at a concentration of 300 ppm (Ref. 1, Burrows and Rowe 1975), air at a Swiss water treatment plant (Ref. 8, Hangartner 1979) and air inside grain fermentation units in a whiskey distillery (Ref. 2, Carter and Linsky 1974).

I. Chemical Fate Information

The need for chemical fate testing of isobutanol was considered by the Committee and is not recommended at this time.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for isobutanol because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

The Committee reviewed available pharmacokinetic data which are limited to oral studies with small or unreported numbers of rabbits administered isobutanol by gavage (Ref. 12, Kamil et al. 1953; Ref. 16, Saito 1975). Available studies are insufficient to characterize the pharmacokinetics of isobutanol because only small numbers of animals

were tested, and pharmacokinetic endpoints have not been quantified.

No studies were located in the publicly-available literature regarding reproductive or developmental effects of isobutanol.

No neurotoxicological studies of isobutanol with humans or animals were located by the EPA, as indicated in their recently proposed neurotoxicity testing rule (Ref. 23, U.S. EPA 1991). However, the Committee reviewed a general toxicity study in which cage-side observations included a low incidence of hypoactivity and ataxia among groups of rats exposed to 1000 mg/kg/day for 13 weeks (Ref. 21, U.S.EPA 1986). This study indicates that isobutanol is a potential neurotoxicant, but is insufficient to comprehensively characterize its neurotoxic effects because neurologic endpoints were examined.

The Committee reviewed available oncogenicity data. Oral administration of isobutanol led to carcinomas and myeloid leukemia in 3/19 rats, and subcutaneous injection led to malignancies in 8/24 rats (carcinomas, sarcomas, and one mesothelioma) (Ref. 6, Gibel et al. 1974; Ref. 7, Gibel et al. 1975). These studies indicate that isobutanol is a potential carcinogen, but are inadequate to characterize the oncogenic effects because of the low numbers of test animals exposed to only one dose level for each route of exposure, and because of uncertainties as to whether both sexes were tested.

The Committee recommends pharmacokinetics testing by oral and inhalation routes of exposure, reproductive effects, developmental toxicity and oncogenicity testing because there are potentially substantial exposures, and because there are insufficient data to reasonably determine or predict these effects of isobutanol. The Committee is not recommending neurotoxicity testing because this testing recommendation was implemented when EPA promulgated their recently proposed neurotoxicity testing rule (Ref. 21, U.S. EPA 1991).

III. Ecological Effects Information

The need for ecological effects testing of isobutanol was considered by the Committee and is not recommended at this time.

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Di-(2-ethylhexyl) adipate (CAS No. 103–23–1).

Physical and Chemical Information

The Committee has limited information on measured physical chemical properties of di-(2-ethylhexyl) adipate including, melting point (-67.8 °C; Ref. 16, Weast et al. 1985) and boiling point (417 °C; Ref. 9; Sax and Lewis 1987).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee reviewed available exposure information. In 1989, 48.9 million pounds of di-(2-ethylhexyl) adipate were produced at 12 facilities in the United States (Ref. 15, USITC 1990). There were 11 facilities that manufactured di-(2-ethylhexyl) adipate in the U.S. in 1990 (Ref. 13, SRI 1990). Di-(2-ethyl-hexyl) adipate is used as a plasticizer, commonly blended with general purpose plasticizers, such as DOP and DIOP in processing polyvinyl

and other polymers, as a solvent, and in aircraft lubes (Ref. 9, Sax and Lewis 1987).

B. *Evidence for exposure—Human exposure.* The Committee reviewed available human exposure information including the use of di-(2-ethylhexyl) adipate in commercial and consumer applications that may lead to worker and consumer exposure. The NOES conducted during 1981-83 by NIOSH reported that 8,162 workers (2,618 females) were potentially exposed to di-(2-ethylhexyl) adipate. Of these workers, 65 percent were potentially exposed during the use of trade name products containing this compound (Ref. 7, NIOSH 1989). An OSHA PEL does not exist for di-(2-ethylhexyl) adipate. The migration of di-(2-ethylhexyl) adipate from PVC cling-film plastic rap was measured when this compound was detected at concentrations of 41 ppm, 246 ppm, 226 ppm, and 362 ppm in a sandwich stored at 5 °C for 24 hr, cheese stored at 5 °C for 5 days, cake stored at 5 °C for 5 days, and in a microwaved dicuit, respectively (Ref. 3, Gilbert et al. 1988). Di-(2-ethylhexyl) adipate has been detected in drinking water supplies. For example, it was detected a New Orleans drinking water supply at a concentration 0.10 ppb (Ref. 6, Keith et al. 1976) and in finished drinking water from a water treatment plant at a concentration of 0.002 ppb (Ref. 4, Hites 1979).

C. *Environmental exposure.* The Committee reviewed available environmental exposure information. According to TRI, 111,953 lbs of di-(2-ethylhexyl) adipate were released to air, 4,784 lbs were released to water, 500 lbs were released to land, 35,876 lbs were released to POTWs in 1987 (Ref. 14, TRI 1990). In 1988, TRI indicates that 73,117 lbs were released to air, 10,290 lbs were released to water, 1,200 lbs were released to land, and 25,569 lbs were released POTWs (Ref. 14, TRI 1990). Di-(2-ethylhexyl) adipate has been qualitatively detected in fly ash from coal and refuse combustion (Ref. 5, Junk and Ford 1980). Di-(2-ethylhexyl) adipate has been found in Delaware river water in the vicinity of Philadelphia, PA at concentrations ranging from 0.02–0.3 ppb (Ref. 4, Hites 1979; Ref. 10, Sheldon and Hites 1978; Ref. 11, Sheldon and Hites 1979). This compound has been detected in particulate matter in indoor air from an office building at a concentration of 2 ng/m³ (Ref. 17, Weschler and Sheilds 1986). Di-(2-ethylhexyl) adipate has been detected at concentrations of 2,000 ppb in effluent from one chemical plant, 90 ppb in effluent from several industries, and 10 ppb in effluent from a sewage treatment plant receiving the above effluents (Ref. 4, Hites 1979).

I. Chemical Fate Information

Available data on biodegradation indicate that this compound has the potential to biodegrade under aerobic conditions (Ref. 8, Saeger et al. 1976). These experiments were performed at concentrations exceeding di-(2-ethylhexyl) adipate's estimated water solubility. The rate and importance of the biodegradation of di-(2-ethylhexyl) adipate under environmental conditions cannot be ascertained. As a result of its release to aquatic systems and its ikelihood to adsorb to sediment, the Committee recommends di-(2-ethylhexyl) adipate for sediment and river die-away biodegradation studies because there are insufficient data to reasonably determine or predict its persistence in the environment. The Committee also recommends physical and chemical property testing because there are insufficient data to reasonably determine or predict the physical and chemical properties of di-(2-ethylhexyl) adipate.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for di-(2-ethylhexyl) adipate because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

No studies were located in the available literature regarding reproductive effects of di-(2-ethylhexyl) adipate. The Committee reviewed developmental toxicity data, which is limited to one study with pregnant rats that were administered the test substance at doses up to 9.2 g/kg by intraperitoneal injection on gestation days 5, 10, and 15 (Ref. 12, Singh et al. 1973). Reduced fetal weight was noted in the 4.5 and 9.0 g/kg groups. This study indicates that di-(2-ethylhexyl) adipate is a potential developmental toxicant, but the data are inadequate to characterize its developmental effects because tests involving natural routes of exposure are lacking.

The Committee reviewed available neurotoxicity data. Rats treated intragastrically with up to 6 g/kg/day for 6 months showed impaired motor function (Ref. 1, Andreeva 1972). This study indicates that di-(2-ethylhexyl)adipate is a potential neurotoxicant, but the data are inadequate to characterize its neurotoxic effects because the number and sex of test animals is unknown, and only limited neurologic endpoints were examined.

The Committee recommends reproductive effects, developmental toxicity, and neurotoxicity testing because there are potentially substantial exposures and there are insufficient data to reasonably determine or predict these effects of di-(2-ethylhexyl)adipate.

III. Ecological Effects Information

The Committee has reviewed available ecological effects data. Limited acute toxicity tests have been conducted with 3 species of fish (Ref. 2, Felder et al. 1986). Available studies are insufficient to characterize the ecological effects of di-(2-ethylhexyl)adipate because aquatic invertebrate chronic toxicity tests did not report results of any reproductive effects testing and there are no fish chronic toxicity studies.

The Committee recommends aquatic invertebrate and fish chronic toxicity testing because there are insufficient data to reasonably determine or predict ecological effects and there are potentially substantial environmental releases.

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Thiophenol (CAS No. 108–98–5).

Physical and Chemical Information

The Committee has information on the measured physical chemical properties of thiophenol including, melting point (-14.8 °C; Ref. 14, Weast et al. 1985), boiling point (168.7 °C; Ref. 14, Weast et al. 1985), log octanol/water partition coefficient (2.52; Ref. 5, Hansch and Leo 1985), water solubility (836 mg/L @25 °C; Ref. 6, Hine and Mookerjee 1975), vapor pressure (1.93 mm Hg @25 °C; Ref. 3, Chao et al. 1983), and dissociation constant (6.615; Ref. 11, Serjeant and Dempsey 1979).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee reviewed available exposure information. In 1977, between 2 and 20 million pounds of thiophenol were produced at 3 facilities in the United States (Ref. 13, TSCAPP 1991). There was one facility that manufactured thiophenol in the U.S. in 1990 (Ref. 12, SRI 1990). Information on current production volumes is CBI, but production is substantial. Thiophenol is used as a chemical intermediate for pesticides, pharmaceuticals, dyestuffs, hydraulic fluids, and other compounds (Ref. 4, Chemcyclopedia 91 1990).

B. *Evidence for exposure—Human exposure.* The Committee reviewed available human exposure information including the use of thiophenol in a variety of commercial and consumer applications that may lead to worker and consumer exposure. The NOES conducted during 1981–83 by NIOSH reported that 879 workers (187 females) were potentially exposed to thiophenol. Of these workers, 100 percent were potentially exposed during the use of actual products containing this compound (Ref. 10, NIOSH 1989). An OSHA PEL does not exist for thiophenol.

C. *Environmental exposure.* Thiophenol was detected at a concentration of 13 μg/L in effluent extract from petroleum refining (Ref. 2 Bursey and Pellizzari 1982).

I. Chemical Fate Information

An extensive search of available literature identified only a single screening study on the biodegradation of thiophenol under aerobic conditions. It was found that this compound was not removed from solution when incubated with an activated sludge seed (Ref. 8, Lutin et al. 1965). The concentration of thiophenol in this experiment, 500 mg/L, is not typical of what would be expected in the environment and this high concentration may have been toxic to microorganisms. Although volatilization of neutral thiophenol from water to the atmosphere can be reasonably predicted from an estimated Henry's Law constant (Ref. 9, Lyman 1982), its dissociation constant, 6.615 (Ref. 11, Serjeant and Dempsey 1979), indicates that it will be significantly ionized under environmental conditions. Therefore, its rate of volatilization from water cannot be reasonably predicted. No data could be located on the importance of direct photochemical degradation of thiophenol in the environment. The Committee recommends aerobic biodegradation, volatilization and photolysis testing because there are insufficient data to reasonably determine or predict persistence of thiophenol.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for thiophenol because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

No studies were located regarding the oral or inhalation pharmacokinetics, reproductive effects, developmental toxicity, neurotoxicity, or oncogenicity of thiophenol. The Committee reviewed a *Salmonella*/microsome plate test for mutagenicity, this test indicates that thiophenol is a potential mutagen, but inadequate because of a high cytotoxicity at all test dose levels (Ref. 7, Lavoie et al. 1979).

The Committee recommends pharmacokinetics testing by oral and inhalation routes of exposure, reproductive effects, developmental toxicity, neurotoxicity, mutagenicity, and oncogenicity testing because there are potentially substantial exposures, and because there are insufficient data to reasonably determine or predict these effects of thiophenol.

III. Ecological Effects Information

The Committee reviewed the available ecological effects data, which are limited to one acute study with 3 species of fish (Ref. 1, Applegate et al. 1957). This study is insufficient to characterize acute fish toxicity because of the inadequate exposure duration, low number of test animals, and exposure to only one concentration of test material.

The Committee recommends algal toxicity, aquatic invertebrate and fish acute and chronic toxicity testing because there are potentially substantial exposures, and because there are insufficient data to reasonably determine or predict these effects of thiophenol.

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Dimethyl terephthalate (CAS No. 120–61–6).

Physical and Chemical Information

The Committee has information on measured physical chemical properties of dimethyl terephthalate including, melting point (140–142 °C; Ref. 1, Aldrich 1988), boiling point (288 °C; Ref. 15, Windholz 1983), log octanol/water partition coefficient (2.25; Ref. 4, Hansch and Leo 1985), and vapor pressure (0.010 mm Hg @25 °C; Ref. 3, Daubert and Danner 1985).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee reviewed available exposure information. In 1989, 3,822,973 million kilograms of dimethyl terephthalate were produced at 3 facilities in the United States (Ref. 14, USITC 1990). There were 5 facilities that manufactured dimethyl terephthalate in the U.S. in 1990 (Ref. 13, SRI 1990). Dimethyl terephthalate is used in polyester resins for film, fiber, bottle and plastic applications, especially polyethylene terephthalate, in coatings, as a chemical intermediate, and in the production of urethanes (Ref. 2, Chemcyclopedia 1990; Ref. 10, Sax and Lewis 1987). Many products containing dimethyl terephthalate are utilized by consumers. The Committee is concerned with the potential for exposure to dimethyl terephthalate because of its high production volume, potential for release, and presence in commercial and consumer products.

B. *Evidence for exposure—Human exposure.* The Committee reviewed available human exposure information including the use of dimethyl terephthalate in a variety of commercial and consumer applications that may lead to worker and consumer exposure. The NOES conducted during 1981–83 by NIOSH reported that 2,467 workers (204 females) were potentially exposed to dimethyl terephthalate. Of these workers, 100 percent were potentially exposed during the use of actual products containing this compound (Ref. 9, NIOSH 1989). An OSHA PEL does not exist for dimethyl terephthalate.

C. *Environmental exposure.* Dimethyl terephthalate has been qualitatively detected in forest air 1 m above a 45 year old spruce forest (Ref. 5, Helmig et al. 1989). It has been detected at a concentration of 0.6 ppb in Delaware river water near industrialized urban areas (Ref. 11, Sheldon and Hites 1978). Dimethyl terephthalate has been qualitatively detected in Advanced Waste Treatment concentrates (Ref. 8, Lucas 1984).

I. Chemical Fate Information

Studies on the biodegradation of dimethyl terephthalate using either soil samples or microorganisms isolated from soil indicate that this compound has the potential to biodegrade in the environment (Ref. 7, Kurane et al. 1977; Ref. 12, Slizen et al. 1985). The rate of dimethyl terephthalate biodegradation in the environment, however, cannot be determined from the available information. The Committee recommends river die-away biodegradation testing because there are insufficient data to reasonably determine or predict persistence of dimethyl terephthalate.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for dimethyl terephthalate because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

The Committee reviewed available reproductive effects data. A single generation reproduction study with Long-Evans hooded rats in which males were fed up to 1.0 percent in the diet for 115 days prior to mating, and females fed for 6 days prior to mating and continuously through weaning of the offspring, revealed no adverse effects on libido, pregnancy, gestation, litter size or survival of offspring from birth through weaning (Ref. 6, Krasavage et al. 1973). The available study is insufficient to characterize the reproductive effects of dimethyl terephthalate because only one dose was tested for a single generation.

Data regarding developmental toxicity and neurotoxicity were not located in the publicly-available literature.

The Committee recommends reproductive effects, developmental toxicity, and neurotoxicity testing because there are potentially substantial exposures, and because there are insufficient data to reasonably determine or predict these effects of dimethyl terephthalate.

III. Ecological Effects Information

No studies were located in the publicly-available literature regrding the ecological effects of dimethyl terephthalate. The Committee recommends algal toxicity testing, aquatic invertebrate and fish acute and chronic toxicity testing, because there are potential substantial environmental releases of dimethyl terephthalate, and because there are no data to determine or predict ecological effects.

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2.3 *Recommended with intent-to-designate chemicals*. None.

2.4 *Recommended chemicals*. Three IRIS chemicals and 11 chemical groups were recommended for testing. Three IRIS chemicals were recommended because the Committee wanted to review TSCA section 8 (a) and 8(d) submissions and any voluntarily submitted use, exposure or release and physical chemical property information before deciding whether the chemicals should be designated for testing. Three groups (alkynes, nitroalcohols and phosphoniums) were recommended for minimum physical and chemical property testing and biodegradation rate screening tests because of concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use, and the potential for persistence in the environment. Structure-biodegradation relationships (SBRs) are frequently used to predict the relative rate of biodegradation and the possible pathways of degradation. For these chemical groups there were insufficient data to develop SBRs and to reasonably predict chemical biodegradability. Three groups (hydrazines, oxiranes and alkoxysilanes) were recommended for ecological effects tests because of concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use, and for potential to cause adverse ecological effects. Structure-activity relationships (SARs) are frequently used to predict the toxic potential of chemicals to cause adverse effects. For these chemical groups there were insufficient data to develop SARs and to reasonably predict potential to cause adverse ecological effects. Aldehyde hydrates were recommended for ecological effects testing to complete the Committee's recommendation process for aldehydes and their hydrates. Propylene glycol ethers and esters and methyl ethylene glycol ethers were recommended because Congress directed the Committee to give priority attention to chemical groups suspected of causing birth defects. Isothiocyanates were recommended for persistence testing to complete the Committee's recommendation process for isocyanates and structurally-related chemicals. Cyanoacrylates were recommended for physical and chemical property testing because they are chemicals with commercially important bonding applications and there are insufficient publicly-available data to reasonably determine or predict physical and chemical properties.

2.4.a. *IRIS Chemicals*.

m-Dinitrobenzene (CAS No. 99–65–0).

Physical and Chemical Information

The Committee has information on the measured physical chemical properties of *m*-dinitro-benzene including, melting point (89–90 °C; Ref. 22, Windholz 1983), boiling point (300–303 °C; Ref. 22, Windholz 1983), log octanol/water partition coefficient (1.49; Ref. 7, Hansch and Leo 1985), and water solubility (533 mg/L @25 °C; Ref. 19, Spanggord et al. 1980).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release*. The Committee reviewed available exposure information. In 1977, 1 facility listed site limited production of *m*-dinitrobenzene (Ref. 21, TSCAPP 1991). Information on current production volumes is CBI, but production is substantial. It is used as an intermediate for *m*-phenylenediamine, as a possible TNT replacement, and as a cathodic material in batteries (Ref. 10, Howard et al. 1976).

B. *Evidence for exposure—Human exposure*. The Committee reviewed available human exposure information including the use of *m*-dinitrobenzene in commercial and consumer applications which may lead to worker and consumer exposure. The NOES conducted during 1981–83 by NIOSH reported that 2,489 workers (1,914 females) were potentially exposed to *m*-dinitrobenzene. Of these workers, 22 percent were potentially exposed during the use of trade name products containing this compound (Ref. 15, NIOSH 1989). An OSHA PEL does not exist for *m*-dinitrobenzene.

C. *Environmental exposure*. The Committee reviewed available environmental exposure information. *m*-Dinitrobenzene has been detected at a concentration of 27 ng/m³ in ambient air in the vicinity of industrial sources in Geismer, LA (Ref. 16, Pellizzari 1978). It has been detected at a concentration of 62 μg/mL waste in one of four sample extracts from incineration test sites (Ref. 11, James et al. 1984). *m*-Dinitrobenzene was found in condensate water effluent generated in the manufacture of TNT at concentrations ranging from 0.20–8.5 mg/L (Ref. 19, Spanggord et al. 1982).

I. Chemical Fate Information

The need for chemical fate testing of *m*-dinitrobenzene was considered by the Committee and is not recommended at this time.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for *m*-dinitrobenzene because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

Developmental toxicity studies were not located in the available literature. The Committee has reviewed available reproductive effects data. Studies clearly indicate that *m*-dinitrobenzene is a potent testicular toxicant in the rat when administered by the oral route (Ref. 1, Blackburn 1988; Ref. 3, Cody et al. 1981; Ref. 4, Evenson et al. 1989a; Ref. 5, Evenson et al. 1989b; Ref. 6, Foster 1989; Ref. 8, Hess et al. 1988; Ref. 9, Holloway et al. 1990; Ref. 12, Linder et al. 1986; Ref. 13, Linder et al. 1988; Ref. 14, Linder et al. 1990; Ref. 18, Rehnberg et al. 1988). Single gavage doses of 15 mg/kg and higher led to dose-related effects on sertoli cell lactate and pyruvate production, testicular weight, and fertility. No treatment-related effects were noted on female rats administered up to 20 ppm for 16 weeks or up to 200 ppm for 8 weeks in drinking water (Ref. 3, Cody et al. 1981). Available studies indicate that *m*-dinitrobenzene is a potential reproductive toxicant, but are insufficient to characterize the reproductive effects of *m*-dinitrobenzene because effects on offspring were not tested.

The Committee reviewed available neurotoxicity data. Standard neurotoxicity tests of *m*-dinitrobenzene

were not located. Ataxia and brain stem lesions were found in germ-free male rats administered single oral doses of 25 mg/kg, and the same results occurred in conventional rats, but only after 5 days of repeated dosing (Ref. 17, Philbert et al. 1987). Available studies indicate that *m*-dinitrobenzene is a potential neurotoxicant, but are insufficient to characterize the neurotoxic effects because only males have been tested, and only limited endpoints were examined.

The Committee reviewed available subchronic toxicity data. Tests with rats administered *m*-dinitrobenzene in drinking water for 16 weeks found increased splenic weights in the 8 ppm groups, and in the 20 ppm groups, decreased body weight gain was seen in females, testicular effects in males, and hematology alterations in both sexes (Ref. 2, Christian et al. 1976; Ref. 3, Cody et al. 1981). Available studies indicate that *m*-dinitrobenzene potentially produces systemic toxic effects, but are insufficient to characterize the subchronic effects of *m*-dinitrobenzene because data are available for only one route of exposure and one species.

The Committee recommends reproductive effects, developmental toxicity, neurotoxicity, and subchronic toxicity testing because there are potentially substantial exposures to *m*-dinitrobenzene, and because there are insufficient data to reasonably determine or predict these effects.

III. Ecological Effects Information

The need for ecological effects testing of *m*-dinitrobenzene was considered by the Committee and is not recommended at this time.

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Allyl alcohol (CAS No. 107–18–6).

Physical and Chemical Information

The Committee has information on the measured physical chemical properties of allyl alcohol including, melting point (-129 °C; Ref. 1, Aldrich 1988), boiling point (96–98 °C; Ref. 1, Aldrich 1988), log octanol/water partition coefficient (0.17; Ref. 10, Hansch and Leo 1985), water solubility (miscible @25 °C; Ref. 25, Yalkowsky et al. 1989), vapor pressure (26.1 mm Hg @25 °C; Ref. 4, Daubert and Danner 1985), and Henry's Law constant (4.99E-6 atm-m3/mole @25 °C; Ref. 11 Hine and Mookerjee 1975).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release*. The Committee reviewed available exposure information. In 1977, between 21 and 110 million pounds of allyl alcohol were produced at 4 different facilities in the United States (Ref. 23, TSCAPP 1991). There were 2 facilities that manufactured allyl alcohol in the U.S. in 1990 (Ref. 22, SRI 1990). Information on current production volumes is CBI, but production is substantial. It is used in resins and plasticizers, as an intermediate for pharmaceuticals and other organic synthesis, manufacture of glycerol, and acrolein, military poison, and herbicide (Ref. 20, Sax and Lewis 1987).

B. *Evidence for exposure—Human exposure*. The Committee reviewed available human exposure information including the use of allyl alcohol in a variety of commercial and consumer applications that may lead to worker and consumer exposure. OSHA's revised final rule PEL of 2 ppm 8–hour TWA, 4 ppm 15–minute STEL, and skin notation was established based on

human data considering the effects of sensory irritation and disturbed vision from exposure to allyl alcohol at concentrations higher than the revised PEL (Ref. 24, U.S.EPA 1989). The NOES conducted during 1981–83 by NIOSH reported that 1,019 workers (157 females) were potentially exposed to allyl alcohol. Of these workers, 100 percent were potentially exposed during the use of actual products containing this compound (Ref. 16, NIOSH 1989). Allyl alcohol has been detected in the breaths from 2 (1 smoker) of 8 male volunteers in a study of human respiratory gas (Ref. 3, Conkle et al. 1975).

C. *Environmental exposure.* Allyl alcohol is reported to be released as emissions from gasoline engines (Ref. 9, Hampton et al. 1982).

I. Chemical Fate Information

The need for chemical fate testing of allyl alcohol was considered by the Committee and is not recommended at this time.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for allyl alcohol because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

The Committee reviewed available pharmacokinetics data, which are limited to metabolic conversion studies with rats administered allyl alcohol by subcutaneous or intravenous injection (Ref. 13, Kaye 1973; Ref. 14, Kaye and Young 1972; Ref. 15, Kodama and Wine 1958), and one *in vitro* study with rat liver microsomal and cytosol preparations (Ref. 17, Patel et al. 1980a; Ref. 18, Patel et al. 1980b; Ref. 19, Patel et al. 1983). Available studies are insufficient to characterize the pharmacokinetics of allyl alcohol because there are insufficient quantitative data on absorption, distribution, and excretion of allyl alcohol.

No studies regarding reproductive effects or standard developmental toxicity were located in the publicly-available literature. A study in which male rats were dosed for 33 weeks with up to 5.1 mg/kg/day by gavage and mated on weeks 1, 11, 21, and 30 was reviewed (Ref. 12, Jenkinson and Anderson 1990). No effects were noted on fetal development. This study is inadequate for characterizing developmental toxicity because only males were tested, and standard developmental toxicity tests were not conducted.

No data regarding the neurotoxic potential of allyl alcohol were located. The Committee has reviewed available subchronic toxicity data. Rats administered 4.8 mg/kg/day for 15 weeks in drinking water showed impaired renal function, and females administered 6.9 mg/kg/day developed increased relative liver and kidney weights (Ref. 2, Carpanini et al. 1978). These data were supported by a rat oral study (Ref. 7, Dunlap et al. 1958). A rat inhalation study with exposures up to 150 ppm for 7 hours/day, 5 days/week for 90 days showed increased relative weights and lesions in kidneys and lungs (Ref. 6, Dunlap and Hine 1955; Ref. 7, Dunlap et al. 1958). These studies indicate that allyl alcohol is a systemic toxicant, but are insufficient to comprehensively characterize systemic effects because they are limited to tests with one species.

The Committee recommends pharmacokinetic, 2-generation reproductive effects, developmental toxicity, neurotoxicity, and subchronic toxicity testing because there are potentially substantial exposures, and because there are insufficient data to reasonably determine or predict these effects of allyl alcohol.

III. Ecological Effects Information

The Committee reviewed available ecological effects data. The 12-day LC50 for clam larvae (Mercenaria mercenaria) exposed in seawater was <2.5 mg/L, indicating a high sensitivity to allyl alcohol (Ref. 5, Davis and Hidu 1969). Static acute tests identified LC50 values of 1.28 mg/L for rainbow trout (Oncorhynchus mykiss) (Ref. 21, Schneider 1979), and 0.32 mg/L for fathead minnows (Pimephales promelas) (Ref. 8, Ewell et al. 1986).

The Committee recommends algal toxicity, aquatic invertebrate acute and chronic, and fish chronic toxicity testing because there are potentially substantial releases, and because there are insufficient data to reasonably determine or predict these effects of allyl alcohol.

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2,4-Dichlorophenol (CAS No. 120–83–2).

Physical and Chemical Information

The Committee has information on the measured physical chemical properties of 2,4-dichlorophenol including, melting point (42–43 °C; Ref. 1, Aldrich 1988), boiling point (209–210 °C; Ref. 1, Aldrich 1988), log octanol/water partition coefficient (2.92; Ref. 7, Hansch and Leo 1985), water solubility (4,500 mg/L @20 °C; Ref. 19, Yalkowsky et al. 1989), vapor pressure (0.067 mm Hg @25 °C; Ref. 3, Bidleman and Renberg 1985), and dissociation constant (7.892; Ref. 14, Serjeant and Dempsey 1979).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee reviewed available exposure information. In 1978, 26.482 million pounds of 2,4-dichlorophenol were produced at 3 facilities in the United States (Ref. 18, USITC 1979). There was one facility that manufactured 2,4-dichlorophenol in the U.S. in 1990 (Ref. 16, SRI 1990). Information on current production volumes is CBI, but production is substantial. 2,4-Dichlorophenol is used in the manufacture of the pesticide 2,4-D and in organic synthesis (Ref. 6, Freiter 1979; Ref. 12, Sax and Lewis 1987).

B. *Evidence for exposure—Human exposure.* The Committee reviewed available human exposure information including the use of 2,4-dichlorophenol in a variety of commercial and consumer applications that may lead to worker and consumer exposure. The NOES conducted during 1981–83 by NIOSH reported that 63 workers (23 females) were potentially exposed to 2,4-dichlorophenol. Of these workers, 100 percent were potentially exposed during the use of actual products containing this compound (Ref. 10, NIOSH 1989). An OSHA PEL does not exist for 2,4-dichlorophenol.

C. *Environmental exposure.* The Committee reviewed available environmental exposure information. According to TRI, 1,403 lbs of 2,4-dichlorophenol were released to air, 107 lbs were released to water, 2 lbs were released to land, 6 lbs were released to POTWs in 1987 (Ref. 17, TRI 1990). In 1988, TRI indicates that 2,321 lbs were released to air, 250 lbs were released to water, and 12,000 lbs were released to land (Ref. 17, TRI 1990). 2,4-Dichlorophenol has been detected in several drinking water supplies. For example, it was detected at a mean concentration of 0.18 ppb in 56 of 108 samples in the National Organic Monitoring Survey (Ref. 13, Scow et al. 1982). 2,4-Dichlorophenol has been detected at concentrations ranging from 9–17 ppb in drinking water from 3 of 6 Canadian cities; however, it was not detected in raw water supplies from which these drinking waters were derived (Ref. 15, Sithole et al. 1986). 2,4-Dichlorophenol was detected in 6 of 10 samples from 2 monitoring wells at a creosote waste site at concentrations ranging from 3.2–54.4 ppb (Ref. 2, Bedient et al. 1984). In an analysis of ambient urban air during 7 rain episodes, 2,4-dichlorophenol was detected at concentrations ranging from 0.60–2.3 ng/m3 (Ref. 9, Leuenberger et al. 1985). 2,4-Dichlorophenol has been detected in several samples taken from industrial effluent; for example, it has been detected in effluent extract from the organic/plastics, pesticide, organic chemicals, and the pulp and paper industries (Ref. 4, Bursey and Pellizzari 1982).

I. Chemical Fate Information

The need for chemical fate testing of 2,4-dichlorophenol was considered by the Committee and is not recommended at this time.

II. Health Effects Information

EPA's RfC/RfD Workgroup requested that the ITC review health effects testing for 2,4-dichlorophenol because there is a low confidence in the RfD value and no RfC value. The Committee reviewed recent publicly-available health effects studies and recommended testing based on insufficient studies that could increase the confidence in the RfD value.

No studies were located in the publicly-available literature regarding neurotoxicity. The Committee has reviewed available immunotoxicity data. Female rats exposed to an author-estimated dose of 3.0 mg/kg/day of 2,4-dichlorophenol in drinking water from weaning age through breeding at 90 days, parturition, and weaning of pups, showed decreased delayed hypersensitivity response, along with increased serum antibody levels (Ref. 5, Exon and Koller 1985). These data suggest the immune system is sensitive to 2,4-dichlorophenol; no effects were seen on other systems, including reproductive, at this dose level or a higher dose of 30 mg/kg/day. Further, a subchronic oral dietary toxicity study with rats found no adverse effects from 90–day exposure to 2500 ppm (Ref. 11, NTP 1989), and a limited oral dietary study with mice found no adverse effects from doses of 100 mg/kg/day, while reduced relative liver weights and SGOT levels were noted in the 230 mg/kg/day group (Ref. 8, Kobayashi et al. 1972). This immunotoxicity study indicates that 2,4-dichlorophenol potentially produces immune system effects, but is insufficient to comprehensively characterize these effects because limited immunologic endpoints were examined.

The Committee recommends neurotoxicity and immunotoxicity testing because there are potentially substantial exposures, and because there are insufficient data to determine or predict the effects of 2,4-dichlorophenol on these systems.

III. Ecological Effects Information

The need for ecological effects testing of 2,4-dichlorophenol was considered by the Committee and is not recommended at this time.

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b. Alkynes

The Committee recommends alkynes for physical chemical property and biodegradation rate screening tests. The Committee's recommendation is based on concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use and potential for persistence.

Annual production volumes of the alkynes exceed 100 million pounds. Occupational exposure estimates, available for 10 alkynes, indicate that almost 60,000 workers are potentially exposed to alkynes at over 3,000 facilities involved in their production, formulation, and use (Ref 17, NIOSH, 1990). Uncertainties associated with occupational exposures are unclear since there are no publicly-available exposure estimates for 9 alkynes recommended for testing. OSHA occupational exposure standards exist for 2 alkynes. Alkynes are used as chemical intermediates, fuels and in specialty formulations, many of which have the potential for occupational exposures or environmental releases. Uncertainties associated with environmental releases are unclear since none of the alkynes are on the TRI and there are no publicly-available effluent monitoring data for most alkynes. The Committee recognizes that one alkyne, 3-butyn-2-ol,2-methyl (CAS#115–19–5) is among the 53 chemicals in the Organization for Economic Cooperation and Development's (OECD) Screening Information Data Sets (SIDS) phase one voluntary testing program. Submission of reliable data or data development through the OECD SIDS program could change the Committee's testing recommendations for this alkyne. The Committee hopes that manufacturers, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this Report) and that information submitted voluntarily will clarify uncertainties associated with use, exposures and releases. The Committee recognizes that as a result of this recommendation, the uncertainties related to exposure and release of alkynes may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee recommends alkynes for biodegradation screening rate tests to identify commercially important alkynes that are likely to persist in the environment. The Committee is aware that one alkyne has been tested for biodegradation; moderate to slow biodegradation was reported. The Committee has not considered health or ecological effects of alkynes at this time, because they want to have an opportunity to review all of the non-public health and ecological effects data as well as chemical fate data, submitted under TSCA section 8(d) and to meet with any interested groups before determining which alkynes should be tested. Submitted information is likely to be considered by a number of government agencies including EPA, DOT, DOI, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the 19 alkynes listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee has limited information on measured physical and chemical properties for the alkynes listed in the paragraph following Table 1: 10 melting points, 14 boiling points, 1 log octanol/water partition coefficient, 11 water solubilities), 4 vapor pressures, and 2 Henry's Law constants (see Ref. 2, Aldrich 1988; Ref. 3, Boublik et al. 1984; Ref. 7, Daubert and Danner 1989; Ref. 8, Dean 1985; Ref. 10, Grafje 1985; Ref. 11, Hansch and Leo 1985; Ref. 12, Hine and Mookerjee 1975; Ref. 13, Hort 1978; Ref. 15, McAuliffe 1966; Ref. 18, Riddick 1986; Ref. 21, Sheppard and Mageli 1982).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the alkynes listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. Actual production volumes are CBI.

Alkynes are mainly acetylene derived chemicals (Ref. 10, Grafje 1985; Ref. 13, Hort 1978). Alkynes are used in a number of applications including specialty fuels, as chemical intermediates, in the manufacture of Vitamin A, in metal pickling and plating operations, as antifoaming wetting agents, in developer compounds, pesticide wettable powders, electroplating baths, as a volatile wetting agent for paper coatings, in floor polishes, glass cleaning formulations, coatings, inks, fountain solutions, oil-well acidizing compositions, mild steel treatments to prevent hydrogen embrittlement, in the preparation of the miticide Omite and sulfadiazine, in the manufacture of butanediol, butenediol, ethers, and ethylene oxide, in the production of the wild oat herbicide

carbyne (Barban), in the manufacture of fragrance and flavor chemicals, in peroxide ester catalysts, in the manufacture of neoprene, and as a polymerization initiator (Ref. 5, Chemcyclopedia 1990; Ref. 10, Grafje 1985; Ref. 13, Hort 1978; Ref. 19, Sax and Lewis 1987; Ref. 21, Sheppard and Mageli 1982).

B. *Evidence for exposure—Human exposure.* The NOES conducted during 1981–83 by NIOSH reported that 119 workers were potentially exposed to propyne; 144 to 3,6-dimethyl-4-octyne-3,6-diol; 38,869 to 2-propyn-1-ol; 8,142 to 3,5-dimethyl-1-hexyn-3-ol; 4,170 to 2-butyne-1,4-diol; 441 to 2-methyl-3-butyn-2-ol; 4,574 to 2,4,7,9-tetramethyl-5-decyne-4,7-diol; 64 to 1-buten-3-yne; 2,089 to 2,2-[2-butyne-1,4-diylbis(oxy)]bisethanol; and 1,467 to 3,3-[2-butyne-1,4-diylbis(o- xy)]bis[2-hydroxy-1-propanesulfonic acid] (Ref. 17, NIOSH 1989).

C. *Environmental exposure.* 2-Butyne-1,4-diol has been identified in wastewater extract from the organics and plastics industry at a concentration of 5304 mg/L and 2-methyl-3-butyn-2-ol has been detected in wastewater extract from the electronics industry at a concentration of 7648 mg/L (Ref. 4, Bursey and Pellizzari 1982). Tetramethyl-decynediol (possibly 2,4,7,9-tetramethyl-5-decyne-4,7-diol) was detected 5 times at concentrations from 0.5–22 μg/L in the effluent of publicly owned treatment works in New Jersey (Ref. 6, Clark et al. 1991). Propyne has been detected in ambient air samples taken in the central business district of Los Angeles, CA at concentrations ranging from 0–6 ppb (Ref. 16, Neligan 1962). Propyne has been quantitatively detected in 50 urban air samples and 26 source dominated samples (Ref. 20, Shah and Heyerdahl 1988).

I. Chemical Fate Information

In a soil biodegradation study, 2-propyn-1-ol was moderately degraded; half-lives of 12.6 and 13.0 days were determined in a slightly basic sandy loam soil and in an acidic soil, respectively, with initial concentrations of 980 and 930 mg/kg-soil, respectively (Ref. 14, Loehr 1989). In an aerobic aqueous laboratory screening test with sewage inoculum, 2-propyn-1-ol exhibited slow biodegradation (2 percent BOD theoretical) during a 5–day BOD test (Ref. 9, Dore et al. 1975).

Alkynes are recommended for physical and chemical property and biodegradation rate screening tests because they are produced in substantial quantities, there are uncertainties related to environmental releases and subsequent exposures to aquatic organisms, there are data for four alkynes that suggest that effluent concentrations may exceed concentrations that are acutely toxic to fish, and there are insufficient data to reasonably determine or predict physical and chemical properties and biodegradation rates.

II. Health Effects Information

The need for health effects testing was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

There are few toxicity data indicating that fish may be acutely sensitive to some alkynes [e.g., LC50 = 1.5–50 mg/L for 2-propyn-1-ol and 2-butyne-1,4-diol and 660–3300 mg/L for 2-methyl-3-butyn-2-ol and 3-methyl-1-pentyne-3-ol (Ref. 1, AQUIRE 1991)]. The need for ecological effects testing was not considered by the Committee and is not recommended at this time.

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c. Nitroalcohols

The Committee recommends nitroalcohols for physical chemical property and biodegradation rate screening tests. The Committee's recommendation is based on concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use, and potential for persistence.

Annual production volumes of the nitroalcohols are CBI, but are large. Occupational exposure estimates, available for one nitroalcohol, indicate that over 20,000 workers are potentially exposed to the chemical at over 700 facilities involved in production, formulation, and use (Ref. 2, NIOSH, 1989). Uncertainties associated with occupational exposures are unclear since there are no publicly-available

exposure estimates. No OSHA occupational exposure standards exist for nitroalcohols. Nitroalcohols are used as chemical intermediates, in automobile tires, photographic products, chemical toilets, embalming fluids, cutting oil emulsions, nonprotein glues, and sizings, all of which have the potential for occupational exposures or environmental releases. Uncertainties associated with environmental releases are unclear since none of the nitroalcohols are on the TRI and there are no publicly-available effluent monitoring data. The Committee hopes that manufactures, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this Report) and that information submitted voluntarily will clarify uncertainties associated with use exposures and releases. The Committee recognizes that as a result of this recommendation, the uncertainties related to exposure and release of nitroalcohols may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending nitroalcohols for physical/chemical property and biodegradation rate screening tests to identify commercially important nitroalcohols that are likely to persist in the environment. There is no publicly available information on nitroalcohol biodegradation. The Committee has not considered health or ecological effects of nitroalcohols at this time, because they want to have an opportunity to review all of the non-public health and ecological effects data as well as chemical fate data, submitted under TSCA section 8(d) and to meet with any interested groups before determining which nitroalcohols should be tested. Submitted information is likely to be considered by a number of government agencies including EPA, DOT, DOI, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the four nitroalcohols listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee only has measured water solubility data for nitroalcohols listed in the paragraph following Table 1 (Ref. 1, Dewey and Bollmeier 1981).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the nitroalcohols listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. Actual production volumes are CBI. Nitroalcohols are used as chemical intermediates sources of formaldehyde for cross-linking of polymers, to form polyester and polyurethane products, in automobile tires as an adhesion agent, in photographic products as hardening agents and stabilizers, to control odors in chemical toilets, as preservatives, in embalming fluids, as a bactericide and slimicide for aqueous systems, in cutting oil emulsions, industrial water systems, drilling muds, nonprotein glues, and sizings (Ref. 1, Dewey and Bollmeier 1981; Ref. 3, Sax and Lewis 1987; Ref. 4, Trotz and Pitts 1981; Ref. 5, Windholz 1983).

B. *Evidence for exposure.* The NOES conducted during 1981–83 by NIOSH reported that 20,044 workers were potentially exposed to 2-hydroxymethyl-2-nitro-1,3-propanediol (Ref. 2, NIOSH 1989).

I. Chemical Fate Information

Except for the water solubility data, the Committee has no experimental chemical fate information on the nitroalcohols listed in the paragraph following Table 1. Nitroalcohols are recommended for physical and chemical property and biodegradation rate screening tests because they are produced in substantial quantities, there are uncertainties related to environmental releases, and there are insufficient data to reasonably determine or predict physical and chemical properties and biodegradation rates.

II. Health Effects Information

The need for health effects testing was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

The need for ecological effects testing was not considered by the Committee and is not recommended at this time.

References

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d. Phosphonium compounds

The Committee recommends phosphonium compounds for physical chemical property and biodegradation rate screening tests. The Committee's recommendation is based on concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use, and the potential for persistence.

Annual production volumes of the phosphonium compounds are CBI, but are large. Occupational exposure estimates, available for one phosphonium, indicate that over 4,000 workers are potentially exposed at facilities involved in their production, formulation, and use (Ref. 5, NIOSH, 1989). Uncertainties associated with occupational exposures are unclear since there are no publicly-available exposure estimates for the phosphonium compounds recommended for testing. No OSHA occupational exposure standards exist for the phosphonium compounds. Phosphonium compounds are used as phase transfer catalysts, catalysts for thermosets, and flame retardants for cotton finishes, many of which have the potential for occupational exposures or environmental releases. Uncertainties associated with environmental releases are unclear since none of the phosphonium compounds are on the TRI and there are no publicly-available effluent monitoring data for most phosphonium com- pounds. The Committee hopes that manufactures, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this Report) and that information submitted voluntarily will clarify uncertainties associated with use exposures and releases. The Committee recognizes that as a result of this recommendation, the uncertainties related to exposure and release of

phosphonium compounds may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending phosphonium compounds for physical chemical property and biodegradation rate screening tests to identify commercially important phosphonium compounds that are likely to persist in the environment. The Committee has not considered health or ecological effects of phosphonium compounds at this time, because they want to have an opportunity to review all of the non-public health and ecological effects data as well as chemical fate data, submitted under TSCA section 8(d) and to meet with any interested groups before determining which phosphonium compounds should be tested. Submitted information is likely to be considered by a number of government agencies including EPA, DOT, DOI, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the five phosphonium compounds listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee has one measured melting point for the phosphonium compounds listed in the paragraph following Table 1. (Ref. 1, Aldrich 1988).

Rationale for Recommendation

A. *Exposure Information---Production/use/disposal/exposure/release.* The Committee believes that the phosphonium compounds listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. Actual production volumes are CBI.

Phosphonium compounds are used in a number of applications including phase transfer catalysts, catalysts for thermosets, and flame retardants for cotton finishes such as military goods, industrial protective clothing, curtains, and children's sleepwear (Ref. 1, Aldrich 1988; Ref. 3, Chemcyclopedia 1990; Ref. 4, Drake 1980; Ref. 7, Weil 1980). For two phosphonium compounds no publicly-available use information was located (CAS numbers 35835-94-0 and 124-64-1).

B. *Evidence for exposure.* The NOES conducted during 1981-83 by NIOSH reported that 4,388 workers were potentially exposed to benzyltriphenylphosphonium chloride (Ref. 5, NIOSH 1989).

I. Chemical Fate Information

The Committee has almost no experimental chemical fate information on the phosphonium compounds listed in the paragraph following Table 1. Phosphonium compounds are recommended for physical and chemical property and biodegradation rate screening tests because they are produced in substantial quantities, there are uncertainties related to environmental releases, and there are insufficient data to reasonably determine or predict physical and chemical properties and biodegradation rates.

II. Health Effects Information

The Committee is aware that 2 phosphonium compounds have been tested in both a 13-week prechronic test and a 2-year bioassay (Ref. 6, NTP, 1987). These compounds caused hepatocellular necrosis, thyroid and adrenal gland lesions, and neurotoxicity in rats and mice, but no evidence of carcinogenicity or mutagenicity in Salmonella typhimurium, mouse lymphoma L5178Y cells and Chinese hamster ovary cells. The need for health effects testing was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

There are no available aquatic toxicity data for the phosphonium compounds listed in Table 1 (Ref. 2, AQUIRE, 1991). The need for ecological effects testing was not considered by the Committee and is not recommended at this time.

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e. Hydrazines

The Committee recommends hydrazines for ecological effects testing. The Committee's recommendation is based on concerns and uncertainties related to production, use, persistence, potential exposures and releases from production, processing and use, and the potential for causing ecological effects.

Annual production volumes of hydrazines exceed 10 million pounds. Occupational exposure estimates, available for 14 hydrazines, indicate that over 154,000 workers are potentially exposed to hydrazines at over 11,000 facilities involved in their production, formulation, and use. Uncertainties associated with occupational exposure are unclear since there are no publicly-available exposure estimates for 21 hydrazines recommended for testing. OSHA occupational exposure standards exist for 4 hydrazines. Hydrazines are used as synthetic intermediates, fuels, and as additives or reagents in specialty applications, many of which have the potential for occupational exposures or environmental releases. Uncertainties associated with the uses of the individual hydrazines are also unclear since use information is available for only 12 hydrazines. Uncertainties associated with environmental exposure are unclear since only 4 of the hydrazines are on the TRI and there is very little publicly-available effluent monitoring data for hydrazines. The Committee hopes that manufacturers, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this report) and that information submitted voluntarily will clarify uncertainties associated with use, exposures, and releases. The Committee recognizes that as a result of this recommendation, uncertainties related to exposure and release of hydrazines may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary

information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending hydrazines for ecological effects testing to identify commercially important hydrazines that are likely to cause adverse ecological effects. The Committee is aware that 5 hydrazines have been tested for ecological effects; high to moderate toxicity was reported. The need for chemical fate and health effects testing of hydrazines were not considered by the Committee and is not recommended at this time, because they want to have an opportunity to review all of the non-public chemical fate and health effects data as well as the ecological effects data submitted under TSCA section 8(d) and to meet with any interested groups before determining which hydrazines should be tested. The Committee, however, is aware that some hydrazines are carcinogenic, mutagenic, teratogenic, and acutely toxic to livers, lungs and other organs of animals. The Committee recognizes that hydrazine, methylhydrazine, 1,1-dimethylhydrazine and 1,2-diphenylhydrazine are listed on the 1990 Clean Air Act Amendments; any recommendations of comparative oral and inhalation pharmacokinetics, subchronic inhalation testing, etc. to facilitate EPA's Reference Concentration (RfC) Workgroup's ability to establish RfC values will occur after the Committee has reviewed the non-public health and safety studies that will be submitted under TSCA section 8(d). The Committee also recognizes that there are uncertainties related to the commercial production of methylhydrazine and 1,2-diphenylhydrazine; TSCA 8(a) submissions submitted in response to this Report will be used to evaluate production volumes of these chemicals. In addition, the Committee is aware that some hydrazines may persist for weeks; however, few data are available. Submitted information is likely to be considered by a number of government agencies including EPA, DOT, DOI, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the hydrazines listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee has limited information on measured physical and chemical properties for the hydrazines listed in the paragraph following Table 1: 7 boiling points, 6 log octanol/water partition coefficients, 17 melting points, 5 pKa values, and 4 vapor pressures (Ref. 1, Aldrich 1988; Ref. 4, Boublik et al. 1984; Ref. 5, Braun and Zirrolli 1983; Ref. 6, Daubert and Danner 1989; Ref. 12, Hansch and Leo 1985; Ref. 22, Perrin 1965; Ref. 23, Raphaelian 1966; Ref. 25, Schiessl 1980; Ref. 33, Windholz et al. 1983).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the hydrazines listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. Actual production volumes are CBI.

The major use of hydrazine, accounting for approximately 60 percent of its production, is as a synthetic intermediate. Hydrazines are used in water treatment, for the protection of steel boilers, as rocket fuel, reducing agents, polymer blowing agents, as synthetic intermediates for dyestuffs, pharmaceuticals, antipyrine, and nitron (a stabilizer for explosives), and as a non-staining high contrast photographic developer (Ref. 24, Sax and Lewis 1987; Ref. 25, Schiessl 1980; Ref. 26, Schirmann 1989; Ref. 33, Windholz et al. 1983). For several hydrazines, no publicly-available use information was located (CAS numbers 86-93-1, 109-27-3, 110-21-4, 142-46-1, 563-41-7, 1937-19-5, 2231-57-4, 2582-30-1, 2760-98-7, 5329-12-4, 6294-89-9, 6610-29-3, 7335-65-1, 7400-27-3, 10396-10-8, 13464-80-7, 20469-71-0, 32687-78-8, 33509-43-2, 63134-30-5 and 63467-74-3).

B. *Evidence for exposure—Human exposure.* The NOES conducted during 1981–1983 by NIOSH estimates that 59,675 workers were potentially exposed to hydrazine; 38,882 to 1-phenyl-3-pyrazolidinone; 26,304 to 1,2-dihydro-1-phenyl-5H-tetrazole-5-thione; 14,621 to hydrazine monohydrate; 2,815 to hydrazinecarboxamide monohydrochloride; 2,197 to 1,1-dimethylhydrazine; 2,120 to hydrazine dihydrochloride; 1,822 to carbonic dihydrazide; 1,494 to 4,4'-oxybis-benzenesulfonic acid dihydrazide; 1,473 to methylhydrazine; 977 to 1,2-diphenylhydrazine; 910 to hydrazine sulfate (1:1); 645 to phenylhydrazine hydrochloride; and 212 to phenylhydrazine (Ref. 19, NIOSH 1990). The concentration of hydrazine and 1,1-dimethylhydrazine in personal air samples at a propellant production facility was 0.22–1.6 ppm and 0.23–4.61 ppm, respectively (Ref. 29, Stone 1978).

C. *Environmental exposure.* According to the TRI, 356,172 pounds of hydrazine sulfate (2:1), 30,217 pounds of hydrazine, 4,333 pounds of 1,1-dimethylhydrazine, and 2,928 pounds of methylhydrazine were released to the environment in 1988 (Ref. 30, TRI 1990). Atmospheric emissions of hydrazine have been associated with the following industrial operations: finishing plants, wood products, inorganic pigments, industrial inorganic chemicals, pharmaceutical preparations, cyclic crudes and intermediates, agricultural chemicals, chemical preparations, fabricated metal parts, internal combustion engines, residential lighting fixtures manufacture, electronic components and accessories, semiconductors and related devices, guided missiles and space vehicles, and photographic equipment and supplies (Ref. 21, Pacific Environmental Services, Inc. 1987). Similarly, atmospheric emission of 1,1-dimethylhydrazine have been associated with industrial organic chemicals, chemical preparations and petroleum refining (Ref. 21, Pacific Environmental Services, Inc. 1987).

I. Chemical Fate Information

Except for a search of readily available information relating to the persistence of hydrazines in aquatic systems, the need for chemical fate testing of hydrazines was not considered by the Committee and is not recommended at this time. There is considerable uncertainty concerning the persistence of simple hydrazines (i.e., hydrazines and methyl substituted hydrazines) in aquatic systems; reported half-lives in water range from less than 1 day to approximately 14 days (Ref. 3, Banerjee et al. 1978; Ref. 5, Braun and Zirrolli 1983; Ref. 16, MacNaughton 1979; Ref. 20, Ou and Street 1987; Ref. 27, Slonim and Gisclard 1976). More highly substituted hydrazines, such as phenylhydrazine, appear to be resistent to degradation in water (Ref. 15, Kondo et al. 1988; Ref. 17, Malaney 1960). The Committee is aware that 1,2-diphenylhydrazine oxidizes rapidly in water to form azobenzene and that there are no direct sampling methods for environmental samples (Ref. 2, ATSDR 1989). While these factors make it difficult to assess the importance of 1,2-diphenylhydrazine in the environment, where continuous sources of 1,2-diphenylhydrazine are present, organisms will be exposed to a steady state concentration of both 1,2-diphenylhydrazine and azobenzene.

II. Health Effects Information

The Committee recognizes that the NIOSH criteria document for hydrazines identifies hydrazines as carcinogenic, mutagenic, teratogenic, and acutely toxic to the liver, lungs, and other organs of animals (Ref. 18, NIOSH 1978). The need for health effects testing of hydrazines was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

Available acute aquatic toxicity data, for 5 hydrazines (hydrazine, 1,1-dimethylhydrazine, methylhydrazine, and hydrazine monohydrate), indicate that each is highly toxic to at least one species of freshwater fish, invertebrates, or algae, and moderately toxic to other test species (LC50s range from 0.04 to 34.0 mg/L) (Ref. 7, Fisher et al. 1978; Ref. 8, Fisher et al. 1980; Ref. 9, Fisher et al. 1980; Ref. 11, Greenhouse 1977; Ref. 14, Hunt et al. 1981; Ref. 28, Slonim 1977; Ref. 31, Velte 1984). Concentrations of hydrazine, methylhydrazine, or 1,1-dimethylhydrazine in excess of 10 mg/L were teratogenic to embryos of Xenopus laevis (clawed toad) (Ref. 10, Greenhouse 1976). Data further indicate that saltwater fish and invertebrates are equally sensitive to certain hydrazines (Ref. 13, Harrah 1977; Ref. 32, Wendler and Norris, 1985).

Hydrazines are recommended for ecological effects tests because they are produced in substantial quantities, there are uncertainties related to environmental releases and subsequent exposures to aquatic organisms, there are data indicating some hydrazines are highly toxic to aquatic organisms, and there are insufficient data to reasonably determine or predict ecological effects.

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f. Oxiranes

The Committee recommends oxiranes for ecological effects testing. The Committee's recommendation is based on concerns and uncertainties related to production, use, persistence, potential exposures and releases from production, processing and use, and the potential for causing ecological effects. Oxirane,

methyl oxirane and ethyl oxirane were designated for testing by the Committee in their 1st Report (Ref. 11, CEQ 1977); a number of oxiranes (listed as glycidyl ethers) were either designated by the Committee in their 3rd Report (Ref. 63, U.S. EPA 1978) or listed by EPA in their Advanced Notice of Proposed Rule Making for health effects testing (Ref. 65, U.S. EPA 1983). There is also one oxirane (glycidyl ether) that was not listed in the Committee's 3rd Report or by the EPA (CAS No. 6130-72-9, oxirane, 2,2,2-[1-propanyl-3-ylidenetris(4,1-phenyleneoxymethylene)] tetrakis). A brief examination of TSCA 8(d) ecological effects test submissions received in response to the health effects testing recommendations for these previously-recommended oxiranes suggested that they contained insufficient data to alleviate the ecological effects testing recommendations made in this ITC Report. Since ecological effects testing was not recommended for these previously-recommended oxiranes, they are being recommended for ecological effects testing at this time.

Annual production volumes of the oxiranes exceed 1 billion pounds. Occupational exposure estimates, available for 21 oxiranes, indicate that over 700,000 workers are potentially exposed to oxiranes at more than 26,000 facilities involved in their production, formulation and use (Ref. 43, NIOSH, 1989). Uncertainties associated with occupational exposure are unclear since there are no publicly-available exposure estimates for 27 oxiranes recommended for testing. OSHA occupational exposure standards exist for 8 oxiranes. Oxiranes are used as synthetic intermediates, in epoxy resins, and in a wide range of specialty applications, most of which have the potential for occupational exposures or environmental releases. Uncertainties associated with environmental exposure are unclear since only 5 oxiranes are on the TRI and there are no quantitative publicly-available effluent monitoring data available for oxiranes. The Committee hopes that manufacturers, processors, and users will respond to the voluntary solicitation for use, exposure/release data (described in Chapter 1 of this report) and that information submitted voluntarily will clarify uncertainties associated with use exposures and releases. The Committee recognizes that as a result of this recommendation, uncertainties related to exposure and release of oxiranes may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending oxiranes for ecological effects testing to identify commercially important oxiranes that are likely to cause adverse ecological effects. The Committee is aware that some oxiranes have been tested for ecological effects; high to low toxicity was reported. The need for chemical fate or health effects testing of oxiranes was not considered by the Committee and is not recommended at this time, because they want to have an opportunity to review all of the non-public chemical fate and health effects data as well as the ecological effects data submitted under TSCA section 8(d) and to meet with any interested groups before determining which oxiranes should be tested. The Committee, however, is aware that some oxiranes are carcinogenic, mutagenic, have reproductive, developmental, and neurological effects, and severely damage lungs, liver, and kidneys. Submitted information is likely to be considered by a number of government agencies including EPA, DOT, DOI, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the 48 oxiranes listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee has limited information on measured physical and chemical properties for oxiranes listed in the paragraph following Table 1: 20 boiling points, 1 Henry's Law constant, 6 log octanol/water partition coefficients, 10 melting points, 16 vapor pressures, and 10 water solubilities (Ref. 2, Aldrich 1988; Ref. 3, Aldrich 1990; Ref. 4, Bogyo et al. 1980; Ref. 5, Boublik et al. 1984; Ref. 12, Ciba-Geigy Corporation 1981; Ref. 13, Ciba-Geigy Corporation 1983; Ref. 14, Ciba-Geigy Corporation 1983; Ref. 20, Conway et al. 1983; Ref. 22, Daubert and Danner 1989; Ref. 23, Dow Chemical Company 1976; Ref. 28, Dow Corning Corporation 1983; Ref. 33, E.I. DuPont de Nemours & Company 1983; Ref. 35, Hansch and Leo 1985; Ref. 36, Hine 1958; Ref. 38, Lapkin 1965; Ref. 42, NIOSH 1978; Ref. 44, Osborn and Scott 1980; Ref. 45, Parker et al. 1978; Ref. 46, Resnick 1980; Ref. 47, Riesser 1979; Ref. 48, Sax and Lewis 1987; Ref. 49, Schultze 1965; Ref. 58, Sienel et al. 1987; Ref. 68, Windholz et al. 1983).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the oxiranes listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. In 1989, 2.282 billion kilograms of oxirane were produced at 13 facilities in the United States (Ref. 67, USITC 1990). Actual production volumes of other oxiranes are CBI.

Oxiranes are an important group of industrial chemical intermediates. In 1990, oxirane was used in the production of ethylene glycol, 59 percent; nonionic surfactants, 13 percent; ethanolamines, 8 percent; glycol ethers, 6 percent; diethylene glycol, 6 percent; triethylene glycol, 2 percent; and miscellaneous uses (including polyethylene glycol production, urethane polyols production and exports), 6 percent (Ref. 18, CMR 1990). Other miscellaneous uses of oxirane include fumigant for spices, tobacco, furs, bedding, etc., a food and cosmetic sterilant, and in hospital sterilization (Ref. 4, Bogyo et al. 1980; Ref. 10, Cawse et al. 1980; Ref. 37, Howard et al. 1990). In 1990, methyl oxirane was used in the production of urethane polyether polyols, 60 percent (75 percent flexible foams, 15 percent rigid foams, and 10 percent for non-foam uses); propylene glycol, 20 percent; glycol ethers, 3 percent; miscellaneous uses (including the production of industrial polyglycols, surfactants and isopropanolamines), 5 percent; and exports, 12 percent (Ref. 19, CMR 1990a). Other oxiranes are used as intermediates and reactive diluents for epoxy resins, an intermediate for various polymers, stabilizers for chlorinated solvents, in the production of glycerol, unmodified epoxy resins, elastomers, to prepare acyl fluorides, fluoroketones, and fluorinated heterocycles, as sources of difluorocarbene for the synthesis of numerous cyclic and acyclic compounds, and products such as glycidyl ethers, epichlorohydrin-polyamide resins, and alkyl glycerol ether sulfonate salts (Ref. 46, Resnick 1980; Ref. 58, Sienel et al. 1987). For several oxiranes, no publicly-available use information was located (CAS numbers 81-21-0, 106-86-5, 106-87-6, 106-92-3, 122-60-1, 163-77-9, 286-20-4, 1686-14-2, 2386-87-0, 2425-79-8, 2426-08-6, 2451-62-9, 2461-15-6, 2530-83-8, 3130-19-6, 3388-03-2, 3388-04-3, 6130-72-9, 7320-37-8, 15336-82-0, 26447-

14–3, 26761–45–5, 61792–39–0, 62256–00–2 and 67860–05–3).

B. *Evidence for exposure—Human exposure.* The NOES conducted during 1981–1983 by NIOSH estimates that 238,209 workers were potentially exposed to methyl oxirane; 193,907 to ethyl oxirane; 56,052 to trimethoxy[3-(oxiranylmethoxy)propyl] silane; 50,130 to oxirane; 45,741 to (butoxymethyl) oxirane; 35,614 to (chloromethyl) oxirane; 23,811 to 2,2-[(1-methylethylidene)bis-(4,1-phenyleneoxymethylene)]bis oxirane; 14,725 to 7-oxabicyclo[4.1.0]heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-ylmethyl ester; 11721 to [(2-ethylhexyl)oxy methyl] oxirane; 7,745 to trimethoxy[2-(7-oxabicyclo[4.1.0]hept-3-yl)ethyl] silane; 7,177 to (phenoxymethyl) oxirane; 4492 to [(methylphenoxy)methyl] oxirane; 4,260 to 7-oxabicyclo[4.1.0]heptane, 3-oxiranyl-; 3,167 to oxiranemethanol; 2,874 to 7-oxabicyclo[4.1.0]heptane; 2,751 to 2,2-[(2,2-dimethyl-1,3-propanediyl)bis(oxymethylene)]bis oxirane; 1,856 to 2,2-[1,3-phenylenebis-(oxymethylene)]bis oxirane; 1,433 to [(2-methylphenoxy)methyl] oxirane; 458 to phenyl oxirane; 413 to [(2-propenyloxy)methyl] oxirane; and 154 to [(1,1-dimethylethoxy)methyl] oxirane (Ref. 43, NIOSH 1989). Although its use as a sterilant is small, a high percentage of worker exposure results from the use of oxirane as a sterilant. OSHA estimates that the number of workers exposed to oxirane in various industries are: 3,676 during production and synthesis, 62,370 directly (25,000 indirectly) in sterilization at health care facilities, 14,000 directly (116,900 indirectly) in sterilization of medical products, and 160 during spice sterilization (Ref. 64, U.S. EPA 1983). In addition, some exposure survey results were: hospital sterilization chamber operators - 2.5 ppm TWA and medical products manufacturers 0.1–2 ppm 8 hr TWA (Ref. 64, U.S. EPA 1983).

C. *Environmental exposure.* According to the TRI, 4,702,454 pounds of oxirane, 4,200,883 pounds of methyl oxirane, 2,314 pounds of phenyl oxirane, 95,446 pounds of ethyl oxirane, and 474,052 pounds of (chloromethyl)oxirane were released to the environment in 1988 (Ref. 59, TRI 1990). Release to the environment is primarily associated with the production and use of oxiranes as chemical intermediates. Oxirane and methyl oxirane have been qualitatively detected in effluent from a chemical production facility in Brandenburg, KY in February, 1974, (chloromethyl)oxirane was qualitatively detected in industry effluent in Louisville, KY, and phenyl oxirane was found in effluent from the latex industry in Louisville, KY in March, 1974 and effluent from chemical production facilities in Collierville, TN, Louisville, KY and Memphis, TN in 1974 (Ref. 50, Shakelford and Keith 1976). 7-Oxa-bicyclo[4.1.0]heptane has been identified in 2 of 17 drinking water concentrates in the United States (Ref. 39, Lucas 1984).

I. Chemical Fate Information

Except for a search of readily available information relating to the persistence of oxiranes in aquatic systems, the need for chemical fate testing of oxiranes was not considered by the Committee and is not recommended at this time. The search for persistence data revealed that for many of the low molecular weight oxiranes, hydrolysis half-lives range from 4.4 days to 28 days, with an average of 14 days (Ref. 40, Mabey and Mill 1978). Higher molecular weight oxiranes would be expected to have longer hydrolysis half-lives.

II. Health Effects Information

Except for a search of a readily available information on oxiranes, which indicated that they may be carcinogenic, mutagenic, have reproductive, developmental, and neurological effects, and severely damage lungs, liver, and kidneys (Ref. 42, NIOSH 1978; Ref. 66, U.S. EPA, 1985), the need for health effects testing was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

Available ecological effects data for 11 oxiranes indicate that acute aquatic toxicity LC_{50} values range of 3.5 to 349 mg/L. These include: oxirane (Ref. 60, Union Carbide Corporation 1983), methyl oxirane (Ref. 21, Crews 1974; Ref. 51, Shell Oil Company 1982a; Ref. 56, Shell Oil Company 1987), phenyl oxirane (Ref. 34, Geyer et al. 1985), (chloromethyl) oxirane (Ref. 1, Alabaster 1969; Ref. 6, Bringmann & Kuhn 1977; Ref. 7, Bringmann & Kuhn 1978; Ref. 8, Bringmann & Kuhn 1980a; Ref. 9, Bringmann & Kuhn 1980b; Ref. 15, Ciba Geigy Corporation 1984; Ref. 24, Dow Chemical Company 1982; Ref. 25, Dow Chemical Company 1987a; Ref. 26, Dow Chemical Company 1987b; Ref. 27, Dow Chemical Company 1987c; Ref. 41, Mayes et al. 1983; Ref. 51, Shell Oil Company 1982a), trifluoro(trifluoromethyl)oxirane (Ref. 29, E.I. Dupont de Nemours & Company, Inc. 1982a; Ref. 30, E.I. Dupont de Nemours & Company, Inc. 1982b; Ref. 31, E.I. Dupont de Nemours & Company, Inc. 1982c; Ref. 32, E.I. Dupont de Nemours & Company, Inc. 1982d;), 2,2-1,4-butanediylbis(oxymethylene) bisoxirane (Ref. 16, Ciba Geigy Corporation 1989a), (butoxymethyl) oxirane (Ref. 52, Shell Oil Company 1982c; Ref. 55, Shell Oil Company 1985; Ref. 59, Shell Oil Company 1990), (2-ethylhexyl) oxy methyloxirane (Ref. 51, Shell Oil Company 1982a; Ref. 53, Shell Oil Company 1982d), trimethoxy[3-(oxiranylmethoxy)propyl]-silane (Ref. 61, Union Carbide Corporation 1988; Ref. 62, Union Carbide Corporation 1989), (methylphenoxy)methyl-oxirane (Ref. 17, Ciba Geigy Corporation 1989b), and neodecanoic acid, oxiranylmethyl ester (Ref. 54, Shell Oil Company 1984).

Oxiranes are recommended for ecological effects tests because they are produced in substantial quantities, there are uncertainties related to environmental releases and subsequent exposures to aquatic organisms, and there are insufficient data to reasonably determine or predict ecological effects.

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g. Alkoxysilanes

The Committee recommends alkoxysilanes for ecological effects testing. The Committee's recommendation is based on concerns and uncertainties related to production, use, persistence, potential exposures and releases from production, processing and use, and the potential for causing ecological effects.

Annual production volumes of the alkoxysilanes exceed 10 million pounds. Occupational exposure estimates, available for 14 alkoxysilanes, indicate that 500,000 workers are potentially exposed to alkoxysilanes at almost 30,000 facilities involved in their production, formulation, and use (Ref. 5, NIOSH, 1989). Uncertainties associated with occupational exposure are unclear since there are no publicly-available exposure estimates for 25 alkoxysilanes recommended for testing. OSHA occupational exposure standards exist for only one of the alkoxysilanes. Alkoxysilanes are used as synthetic reagents, in polymers, and in many specialty applications, many of which have the potential for occupational exposures or environmental releases. Uncertainties associated with the uses of the individual alkoxysilanes are also unclear since use information is available for only 13 alkoxysilanes. Uncertainties associated with environmental exposure are unclear since none of the alkoxysilanes are on the TRI and there are no publicly-available effluent monitoring data.

The Committee hopes that manufacturers, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this report) and that information submitted voluntarily will clarify uncertainties associated with use, exposures, and releases. The Committee recognizes that as a result of this recommendation, uncertainties related to exposure and release of alkoxysilanes may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending alkoxysilanes for ecological effects to identify commercially important alkoxysilanes that are likely to cause adverse ecological effects. The Committee is aware that one alkoxysilane has been tested for ecological effects; moderate toxicity was reported. The need for chemical fate and health effects testing of alkoxysilanes was not considered by the Committee and is not recommended at this time, because they want to have an opportunity to review all of the non-public chemical fate and health effects data as well as well as the ecological effects data submitted under TSCA section 8(d) and to meet with any interested groups before determining which alkoxysilanes should be tested. Submitted information is likely to be considered by a number of government agencies including EPA, DOT, DOI, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the 37 alkoxysilanes listed in the paragraph following Table 1 are summarized in Table 1. Two alkoxysilanes that also have an oxirane substructure are listed in the paragraph following Table 1. They are only listed with the oxiranes (numbers 90 and 94) to avoid duplicate listing. One alkoxysilane (number 120) also has a methyl ethylene glycol substructure; it is also only listed with the alkoxysilanes to avoid duplicate listing.

Physical and Chemical Information

The Committee has limited information on measured physical/chemical properties for the alkoxysilanes listed in the paragraph following Table 1: 9 boiling points, 4 melting points, and 2 vapor pressures (Ref. 1, Arkles 1982; Ref. 3, Boublik et al. 1984; Ref. 6, Ohe 1976). Some alkoxysilanes, particularly the lower molecular weight compounds (i.e., tetraethoxysilane (CAS No. 78-10-4) and tetramethoxysilane (CAS No. 681-84-5)) are expected to be susceptible to chemical hydrolysis whereas more highly branched alkoxysilanes are not (Ref. 1, Arkles 1982). Furthermore, the order of reactivity is expected to be: R3SiOR < R2Si(OR)2 < RSi(OR)3 < Si(OR)4 (Ref. 2, Baant and Chvalovsk 1965).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the alkoxysilanes listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. Actual production volumes are CBI.

Alkoxysilanes are used in binders in foundry-mold sands for thin-shell castings, in binders for refractories, as resins, in coatings, in the preparation of specialty glasses for fiber optics and solar materials as well as low heat glasses, in the preparation of abrasion-resistant coatings for plastics and dielectric coatings for high temperature

electronic components, in the production of water repellents for protective and consolidating coatings for masonry and other applications, as cross linking agents, in coatings for liquid chromatography, and in thermal exchange applications such as solar panels (Ref. 1, Arkles 1982). For several alkoxysilanes, no publicly-available use information was located (CAS numbers 78–08–0, 919–30–2, 919–31–3, 1067–53–4, 1067–66–9, 1760–24–3, 2530–83–8, 2530–85–0, 2530–87–2, 2768–02–7, 3179–76–8, 3388–04–3, 4130–08–9, 4420–74–0, 5089–76–9, 6843–66–9, 3170–23–5, 13822–56–5, 17945–05–0, 18395–30–7, 18765–32–7, 23779–32–0, 26115–70–8, 29043–70–7, 33401–49–9, 35141–30–1, 40372–72–3 and 42965–91–3).

B. *Evidence for exposure—Human exposure.* The NOES conducted during 1981–1983 by NIOSH estimates that 5,270 workers were potentially exposed to ethenyltriethoxysilane; 1,298 to tetraethoxysilane; 19,175 to bis(1,1-dimethylethoxy)silyleneacetate (CAS No. 13170–23–5); 6,506 to phenyltriethoxysilane; 25,344 to 3-(triethoxysilyl)-1-propanamine (CAS No. 919–30–2); 3,358 to 6-ethenyl-6-(2-methoxyethoxy)-2,5,7,10-tetraoxa-6-silaundecane; 30,328 to methyltrimethoxysilane; 29,372 to *N*-(3-(trimethoxysilyl)propyl)-1,2-ethanediamine (CAS No. 1760–24–3); 3,474 to methyltriethoxysilane; 27,494 to methacryloxypropyltrimethoxysilane (CAS No. 2530–85–0); 7,744 to 3,4-epoxycyclohexylethyltrimethoxysilane (CAS No. 3388–04–3); 59,282 to methyltriacetoxysilane; 81 to 3-(trimethoxysilyl)-1-propanethiol (CAS No. 4420–74–0); and 8,172 to ethyltriacetoxysilane (Ref. 5, NIOSH 1989).

C. *Environmental exposure.* Information was not readily available.

I. Chemical Fate Information

The need for chemical fate testing of alkoxysilanes was not considered by the Committee and is not recommended at this time.

II. Health Effects Information

The need for health effects testing of alkoxysilanes was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

Available aquatic toxicity data for one alkoxysilane (ethenylsilanetriol triacetate) (Ref. 4, Dow Corning Corp., 1986) indicate that it is moderately toxic to some aquatic organisms (LC_{50} = 23 to <100 mg/L).

Alkoxysilanes are recommended for ecological effects tests because they are produced in substantial quantities, there are uncertainties related to environmental releases and subsequent exposures to aquatic organisms, and there are insufficient data to reasonably determine or predict ecological effects.

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h. Aldehyde hydrates

Summary of recommended studies. Testing recommendations for the two aldehyde hydrates listed in the paragraph following Table 1 are summarized in Table 1.

Rationale for Recommendation

In the 27th Report, the aldehydes were recommended for ecological effects testing. The Committee recognizes that certain aldehydes (i.e., ethanedial and trichloroacetaldehyde) react with water to form hydrates that these aldehydes are commercially important and that they should be tested for aquatic toxicity. For this reason, and for those enumerated in the recommendation of aldehydes in the 27th Report, the Committee is recommending aldehyde hydrates for ecological effects testing.

I. Chemical Fate Information

The need for chemical fate testing of aldehyde hydrates was not considered by the Committee and is not recommended at this time.

II. Health Effects Information

The need for health effects testing of aldehyde hydrates was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

The Committee recommends ecological effects testing because there are insufficient data to reasonably determine or predict ecological effects.

i. Propylene Glycol Ethers and Esters.

The Committee is recommending propylene glycol ethers and esters for developmental and reproductive toxicity testing, because these chemicals are being manufactured and used to replace the ethylene glycol ethers and esters that do cause adverse reproductive and developmental effects. The Committee's recommendation is based on concerns and uncertainties related to production, use, persistence, potential exposures and releases from production, processing and use, and the potential for causing adverse health effects.

The Committee recognizes that glycol ethers are listed on the 1990 Clean Air Act Amendments; any inhalation testing recommendations to facilitate EPA's Reference Concentration (RfC) Workgroup's ability to establish RfC values will occur after the Committee has reviewed the non-public health and safety studies that will be submitted under TSCA section 8(d). The Committee also recognizes that the potential ability of propylene glycol ethers and esters to adversely affect reproductive systems may not be limited to mammals; any recommendations for fish partial or complete life cycle tests also will occur after the Committee has reviewed the non-public health and safety studies for the propylene glycol ethers and esters. The Committee recognizes that one propylene glycol ether, propanol,[(1-methyl,1,2-ethanediyl)bis(oxy)]bis (CAS 24800–44–0) is among the 53 chemicals in the Organization for Economic Cooperation and Development's (OECD) Screening Information Data Sets (SIDS) phase one voluntary testing program. Submission of reliable data or data development through the voluntary OECD SIDS program could change the Committee's testing recommendations for this propylene glycol ether. The Committee recognizes that NTP may test 1-methoxy-2-propanol and 1-(1,1-dimethylethoxy)-2-propanol (CAS numbers 107–98–2 and 57018–52–7) and that oxybispropanol (CAS number 25265–71–8) is being tested in prechronic toxicity studies. The Committee continues to work with the NTP to manage complimentary chemical testing programs.

Annual production volumes of the propylene glycol ethers and esters exceed 3 billion pounds. OSHA occupational exposure estimates, available for 13 propylene glycol ethers and esters, indicate that 3 million workers are potentially exposed to propylene glycol ethers and esters at more than 160,000 facilities involved in their production, formulation and use (Ref. 23, NIOSH, 1990). Uncertainties associated with occupational exposure are unclear since there are no publicly-available exposure estimates for 25 propylene glycol ethers and esters recommended for testing. Occupational exposure standards exist for one of the propylene glycol ethers and esters. Propylene glycol ethers and esters are used as solvents in numerous applications including solvents for fats, oils, waxes, acrylics, dyes, inks, and stains, in antifreeze solutions, coolants in refrigeration systems, plasticizers, hydraulic fluids, cutting oils, industrial soaps, surfactants, and deicing fluids used at airports, all of which have the potential for occupational exposures or environmental releases. Uncertainties associated with environmental exposure exist; none of the propylene glycol ethers and esters are on the TRI and there are few quantitative publicly-available monitoring data available for propylene glycol ethers and esters. The Committee hopes that manufacturers, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this report) and that information submitted voluntarily will clarify uncertainties associated with use, exposures, and releases. The Committee recognizes that as a result of this recommendation, the uncertainties related to exposure and release of propylene glycol ethers and esters may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending propylene glycol ethers and esters for health effects testing to identify commercially important propylene glycol ethers and esters that are likely to cause adverse health effects. The need for chemical fate or ecological effects testing was not considered by and is not recommended for testing by the Committee at this time, because Committee Members want to have an opportunity to review all of the non-public chemical fate and ecological effects data as well as the health effects data submitted under TSCA section 8(d) and to meet with any interested groups before determining which propylene glycol ethers and esters should be tested. Submitted information is likely to be considered by a number of government agencies including CPSC, EPA, NIOSH, OSHA, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of Recommended studies. Testing recommendations for the 38 propylene glycol ethers and esters listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee has limited information on measured physical chemical properties for the propylene glycol ethers and esters listed in the paragraph following Table 1: 7 boiling points, 1 Henry's Law constant, 2 log octanol/water partition coefficients, 4 melting points, 5 vapor pressures, and 3 water solubilities (Ref. 1, Aldrich 1990; Ref. 2, Brown et al. 1980; Ref. 3, Butz et al. 1982; Ref. 7, Daubert and Danner 1989; Ref. 8, Dow Chemical Company 1981; Ref. 14, Hansch and Leo 1985; Ref. 24, Sax and Lewis 1987).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the propylene glycol ethers and esters listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. For example, 1,2-propanediol and oxybis-propanol have current annual domestic production capacities of 935 million pounds and 98 million pounds, respectively (Ref. 25, SRI 1990). In 1989, five U.S. facilities produced 805,121,200 pounds of 1,2-propanediol and six facilities produced 1,868,992 pounds of octadecanoic acid monoester with 1,2-propanediol (Ref. 27, USITC 1990). In 1977, many of the chemicals were produced in quantities between 200,000 and 1,180,220,000 lbs per year (Ref 27, TSCAPP 1991). Ethoxy-1(or 2)-propanol acetate, 1(or 2)-2-methoxymethylethoxy propanol acetate, 2-(1-methyl-ethoxy)-1-propanol acetate, 1-ethoxy-2-propanol and 1,2-propanediol mono isopropyl ether do not appear in the TSCA inventory; however, the Committee has reason to believe that they are commercially produced in significant quantities (Ref. 4, Chemical Industry Notes 1991). Actual production volumes of the remaining propylene glycol ethers and esters are CBI.

Propylene glycol ethers and esters are used in a wide variety of industrial applications. These include their use as solvents (for fats, oils, waxes, resins, gums, cellulose acetate, acrylics, dyes, inks, stains, and in organic synthesis), in antifreeze solutions, and as reagents in synthetic processes, antioxidants, hydroscopic agents, bactericide, coolants in refrigeration systems, plasticizers, hydraulic fluids, textiles, dyes, lubricants, cutting oils, industrial soaps, surfactants, and deicing fluids used at airports. They also find use as solvents for flavoring extracts, perfumes, colors, and soft-drink syrups, and in foods as wetting agents, humectants, emulsifiers, feed additives, anticaking agents, preservatives and thickeners and they are used in cleansing creams, sun tan lotions, and lipsticks (Ref. 2, Brown et al. 1980; Ref. 3, Butz et al. 1982; Ref. 5, CMR 1990; Ref. 6, CMR 1990; Ref. 17, Isacoff 1979; Ref. 16, Jones 1976; Ref. 20, Kirk and Dempsey 1982; Ref. 22, Luck and Lipinski 1988; Ref. 24, Sax and Lewis 1987; Ref. 29, Windholz et al. 1983). For several propylene glycol ethers and esters, no publicly-available use information was located (CAS numbers 105-62-4, 108-65-6, 116-37-0, 923-26-2, 20324-32-7, 23436-19-3, 24800-44-0, 25498-49-1, 25584-83-2, 27813-02-1, 41395-83-9, 42978-66-5, 52305-09-6, 68171-38-0, 98516-30-4, and 88917-22-0)

B. *Evidence for exposure—Human exposure.* The NOES conducted during 1981-1983 by NIOSH estimates that 1,748,454 workers were potentially exposed to 1,2-propanediol; 303,895 to 2-propanol-1-methoxy acetate; 302,945 to 1-methoxy-2-propanol; 218,354 to oxybis-propanol; 130,409 to 2-(2-methoxymethylethoxy)methylethoxy propanol; 74,637 to (1-methyl-1,2-ethanediyl)bis(oxy) bis-propanol; 73,203 to propanol oxybis-dibenzoate; 61,597 to 2-methyl-2-propenoic acid monoester with 1,2-propanediol; 13,646 to octadecanoic acid monoester with 1,2-propanediol; 8,352 to 1-(2-methylpropoxy)-2-propanol; 5,575 to 1-(2-butoxyethoxy)-2-propanol; 5,167 to 1-(2-methoxy-1-methylethoxy)-2-propanol; 4,307 to nonanoic acid 1-methyl-1,2-ethanediyl ester; 3,110 to 1-propoxy-2-propanol; 2,961 to 1,1'-oxybis-2-propanol; 883 to (1-methyl-1,2-ethanediyl)bisoxy(methyl-2,1-ethanediyl) ester; and 51 to 2-propenoic acid monoester with 1,2-propanediol (Ref. 23, NIOSH 1990).

Evidence for exposure of the general population is found in a study in which 1-methyl-1 2-ethanediyl bis(oxy)bis-

propanol was qualitatively identified in one of eight personal air samples taken in New Jersey and North Carolina, 1980 (Ref. 28, Wallace et al. 1984). 2-(2-Methoxymethylethoxy)- methylethoxy propanol, oxybis-propanol, 1-methyl-1,2-ethanediyl bis(oxy)bis-propanol, 1-(2-methoxy-1-methylethoxy)-2-propanol 1-propoxy-2-propanol, 1,1'-oxybis-2-propanol and 1-methoxy-2-propanol have been qualitatively detected in U.S. drinking water supplies (Ref. 21, Lucas 1984).

C. *Environmental exposure.* 1,1'-Oxybis-2-propanol was qualitatively identified in groundwater samples obtained near a municipal solid waste landfill 1972–73 (Ref. 10, Dunlap et al. 1976; Ref. 111 Dunlap et al. 1976).

I. Chemical Fate Information

The need for chemical fate testing was not considered by the Committee and is not recommended at this time.

II. Health Effects Information

Inhalation teratology studies with rats and rabbits exposed to maximum concentrations of 3000 ppm 1-methoxy-2-propanol caused fetotoxicity in high-dose rats (increased incidence of delayed sternebral ossification), and no evidence of teratogenicity in either species (Ref. 9, Dow Chemical Company 1989). An inhalation reproduction study with rats produced no testicular effects in males exposed to maximum concentrations of 600 ppm 1-methoxy-2-propanol for 10 days and no reproductive or developmental effects in pregnant rats exposed to the same concentrations on gestation days 6 through 17 (Ref. 16, Imperial Chemical Industries 1989).

Oral exposure of pregnant mice on gestation days 8 through 12 to 10,000 mg/kg/day of 1,2-propanediol caused no reproductive or developmental effects (Ref. 19, Kavlock et al. 1987). Exposure to 1,2-propanediol at levels up to 5 percent in the drinking water produced no adverse effects on fertility and reproduction in adult or second generation male or female CD–1 mice (Ref. 13, Gulati et al. 1985). In a one dose (250 mg/kg/day by gavage) rat teratology screening study of 2-propenoic acid-(1-methyl-1,2-ethanediyl)bisoxy(methyl-2,1-ethanediyl), no maternal toxicity, or any effects on reproduction or development were reported (Ref. 15, Hazleton Laboratories 1987). Dermal application of up to 100 mg/kg/day of 1-butoxy-2-propanol to pregnant rabbits on gestation days 7 through 18 produced no maternal effects, embryo- or fetotoxicity (Ref. 12, Gibson et al. 1989).

No relevant data have been located for the following propylene glycol ethers and esters: 1-methyl-1,2-ethanediyl bis(oxy)bis-propanol; oxybis-propanol; 2-(2-methoxymethylethoxy)methylethoxy propanol; 2-propenoic acid monoester with 1,2-propanediol; propanol oxybis-dibenzoate; dodecanoic acid monoester with 1,2-propanediol; 2-methyl-2-propenoic acid monoester with 1,2-propanediol; methoxy-1-propanol; 1,2-propanediol mono isopropyl ether; 1-(2-butoxy-1-methylethoxy)-2-propanol; 1-ethoxy-2-propanol; tetrapropenylbutanedioic acid monoester with 1;2-propanediol; 1-(1-methyl- ethoxy)-2-propanol acetate; 1-(1,1-dimethylethoxy)-2-propanol; propanol, 1(or 2)-2-methoxymethyl-ethoxy acetate and ethoxy-1(or 2)-propanol acetate.

Propylene glycol ethers and esters are recommended for health effects testing because they are produced in substantial quantities, there are uncertainties related to environmental releases and subsequent exposures to humans, there are data indicating some glycol ethers and esters produce reproductive and developmental effects and there are insufficient data to reasonably determine or predict the health effects of the propylene glycol ethers and esters. The Committee recommends developmental toxicity and reproductive effects testing of propylene glycol ethers and esters for which there are no adequate data; these are listed in the paragraph following Table 1. In addition, both developmental toxicity and reproductive effects testing is recommended for 2-propenoic acid-(1-methyl-1,2-ethanediyl)bisoxy(methyl-2,1-ethanediyl) and 1-butoxy-2-propanol because existing data are inadequate. The Committee recognizes there are adequate existing developmental toxicity data for 1-methoxy-2-propanol, but recommends reproductive effects testing. The Committee recognizes there are adequate existing developmental toxicity and reproductive effects data on mice for 1,2-propanediol, but recommends developmental testing in a second mammalian species.

III. Ecological Effects Information

The need for ecological effects testing was not considered by the Committee and is not recommended at this time.

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j. Methyl ethylene glycol ethers

The Committee is recommending methyl ethylene glycol ethers for developmental and reproductive toxicity testing. The Committee's recommendation is based on concerns and uncertainties related to production, use, persistence, potential exposures and releases from production, processing and use, and the potential for causing adverse health effects. The Committee is not recommending triethylene glycol monomethyl ether in its list of methyl ethylene glycol ethers, because it was designated for health effects testing on May 2, 1985 as one of three triethylene glycol ethers and EPA published a consent order for health effects testing on April 3, 1989.

The Committee recognizes that glycol ethers are listed on the 1990 Clean Air Act Amendments; any recommendations of comparative oral and inhalation pharmacokinetics, subchronic inhalation testing, etc. to facilitate EPA's Reference Concentration RfC) Workgroup's ability to establish RfC values will occur after the Committee has reviewed the non-public health and safety studies that will be submitted under TSCA section 8(d). The Committee also recognizes that the potential ability of methyl ethylene glycol ethers to adversely affect reproductive systems may not be limited to mammals; any recommendations for fish partial or complete life cycle tests also will occur after the Committee has reviewed the non-public health and safety studies for the methyl ethylene glycol ethers.

Annual production volumes of the methyl ethylene glycol ethers exceed 2 billion pounds. Occupational exposure estimates, available for 2 methyl ethylene glycol ethers, indicate that over 4,500 workers are potentially exposed to methyl ethylene glycol ethers at more than 20 facilities involved in their production, formulation and use (Ref. 21, NIOSH, 1989). Uncertainties associated with occupational exposure are unclear since there are no publicly-available exposure estimates for 9 methyl ethylene glycol ethers recommended for testing. No OSHA occupational exposure standards exist for methyl ethylene glycol ethers. Methyl ethylene glycol ethers are used as solvents in numerous applications including paints and inks and in hydraulic fluids, all of which have the potential for occupational exposures or environmental releases. Uncertainties associated with environmental exposure are unclear since none of the methyl ethylene glycol ethers are on the TRI and there are few quantitative publicly-available monitoring data for methyl ethylene glycol ethers. The Committee hopes that manufacturers, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this report) and that information submitted voluntarily will clarify uncertainties associated with use, exposures, and releases. The Committee recognizes that as a result of this recommendation, the uncertainties related to exposure and release of methyl ethylene glycol ethers may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending methyl ethylene glycol ethers for health effects testing to identify commercially important methyl ethylene glycol ethers that are likely to cause adverse health effects. The need for chemical fate or ecological effects testing was not considered by and is not recommended for testing by the Committee at this time, because they want to have an opportunity to review all of the non-public chemical fate and ecological effects data as well as the health effects data submitted under TSCA section 8(d) and to meet with any interested groups before determining which methyl ethylene glycol ethers should be tested. Submitted information is likely to be considered by a number of government agencies including CPSC, EPA, NIOSH, OSHA and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the 10 methyl ethylene glycol ethers listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee has very limited information on measured physical chemical properties for the methyl ethylene glycol ethers listed in the paragraph following Table 1: 2 melting points, 2 boiling points, and 1 water solubility value (Ref. 1, Brown et al. 1980; Ref. 24, Windholz et al. 1983).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the methyl ethylene glycol ethers listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. Actual production volumes are CBI.

Methyl ethylene glycol ethers are used mainly as solvents. Large volumes of these compounds may be used industrially as solvents for resins in surface coatings, inks, and adhesives; as ingredients in hydraulic brake fluids; as dye solvents in textile and leather applications; as coupling solvents in a variety of chemical specialties, as intermediates in the production of plasticizers and other solvents; and as a copolymer in the rubber industry (Ref. 6, Chemcyclopedia 1986; Ref. 7, Dow

Chemical Company 1981; Ref. 23, Vail 1979). For several methyl ethylene glycols ethers, no publicly-available use information was located (CAS No. 1067-53-4, 1616-88-2, 10143-22-3, 23783-42-8, 35633-50-2, 54303-31-0, 65059-45-2 and 68957-67-5).

B. *Evidence for exposure—Human exposure.* The NOES conducted during 1981-1983 by NIOSH estimates that 1,220 workers were exposed to ethylene glycol monomethyl ether acrylate; and 3,361 to 6-ethenyl-6-(2-methoxyethoxy)-2,5,7,10-tetraoxa-6-silaundecane (Ref. 21, NIOSH 1989).

C. *Environmental exposure.* In a study of the waste disposal site "Valley of the Drums" in Louisville, KY, tetraethylene glycol dimethyl ether was detected in surface run-off and in the settling basin at concentrations of 27 and 3.7 ppm, respectively (Ref. 22, Stonebraker and Smith 1980).

I. Chemical Fate Information

The need for chemical fate testing was not considered by the Committee and is not recommended at this time.

II. Health Effects Information

The Committee is aware that there are extensive data demonstrating that ethylene glycol monomethyl ether is both a developmental and testicular toxicant in laboratory animals (Ref. 12, Hardin 1989). The ultimate toxic agent is methoxyacetic acid (Ref. 1, Brown et al. 1980; Ref. 2, Brown et al. 1984; Ref. 11, Foster et al. 1983; Ref. 16, Miller et al. 1982; Ref. 17, Miller et al. 1983) which is produced when ethylene glycol monomethyl ether is metabolically oxidized to methoxyacetaldehyde by alcohol dehydrogenase and subsequently to the acid by aldehyde dehydrogenase (Ref. 16, Miller et al. 1982; Ref. 17, Miller et al. 1983). The Committee believes that the methyl ethylene glycol ethers listed in the paragraph following Table 1 may be metabolically cleaved to ethylene glycol monomethyl ether, which will then be oxidized to methoxyacetic acid.

The antifertility action of ethylene glycol monomethyl ether (EGME) is well documented in studies with mice and rats. Oral administration of 250 mg/kg/day, 5 days/week, for 5 weeks produced testicular atrophy in mice (Ref. 18, Nagano et al. 1979), as did inhalation exposure of rats to 300 ppm for 6 hours/day, 5 days/week, for 2 weeks (Ref. 13, Lee et al. 1989) and similar exposures of rats and mice to 1000 ppm EGME, 6 hours/day for 9 days over an 11-day period (Ref. 15, Miller et al. 1981).

Several additional methyl ethylene glycol ethers are known to adversely affect reproduction (via testicular function). Testicular atrophy was observed in: 1) mice orally administered 500 mg/kg/day ethylene glycol monomethyl ether acetate (EGMEA), 5 days/week, for 5 weeks (Ref. 18, Nagano et al. 1979), 2) mice similarly administered 62.5 mg/kg EGMEA (Ref. 19, Nagano et al. 1984), 3) mice orally administered 250 mg/kg/day ethylene glycol dimethyl ether (EGDME), 5 days/week for 5 weeks (Ref. 19, Nagano et al. 1984), 4) rats orally administered 684 mg/kg/day diethylene glycol dimethyl ether (DGDME) for 18 days (Ref. 5, Cheever et al. 1989), 5) rats orally administered 1/2 of the LD50 (value not reported) of diethylene glycol monomethyl ether (DEGME), 5 days/week, for 6 weeks (Ref. 9, Eastman Kodak Company 1981), 6) rats administered single oral doses of 1500 mg/kg/day 1,2-benzene dicarboxcylic acid, bis (2-methoxy ethyl) ester (DMEP) (Ref. 4, Cassidy et al. 1983), and 7) rats exposed by inhalation to 110 ppm DGDME for 6 hours/day, 5 days/week, for 2 weeks (Ref. 13, Lee et al. 1989). Increased frequencies of abnormally formed sperm were seen in mice following vapor exposure to 500 ppm EGME, 7 hours/day, for 5 days (Ref. 14, McGregor 1981) and in rats following single oral doses of 1500 mg/kg/day DMEP (Ref. 4, Cassidy et al. 1983).

Studies of several methyl ethylene glycol ethers demonstrated developmental toxicity in mice, rats and rabbits. Oral administration of 125 mg/kg/day EGME to pregnant mice on gestation days 7 through 14 caused decreased fetal body weight, and 250 mg/kg/day decreased the number of live fetuses/litter; dose-related increased incidence of gross and skeletal anomalies were noted at 31.25 mg/kg/day and higher. Oral administration of 350 mg/kg/day EGDME to mice on gestation days 7 to 10 increased gross and skeletal malformations (Ref. 19, Nagano et al. 1984). Inhalation exposure of pregnant rats to 50 ppm EGME or 200 ppm EGMEA for 7 hours/day on gestation days 7 through 15 caused reduced fetal weights, and skeletal and cardiovascular defects (Ref. 20, Nelson et al. 1984). Inhalation exposure of rat dams to 25 to 400 ppm DGDME for 6 hours/day, on gestation days 7 through 16, led to dose-related decreased fetal body weight and increased skeletal abnormalities (Ref. 10, E.I. Dupont de Nemours & Company 1988). Dermal application of 50 to 750 mg/kg/day DEGME to pregnant New Zealand white rabbits on gestation days 6 through 18 produced dose-related skeletal defects, and increased embryonic resorptions in the 750 mg/kg/day group (Ref. 8, Dow Chemical Company 1989). Single intraperitoneal injections of 2.49 ml/kg bw of DMEP into pregnant rats resulted in fetal deaths when injected on gestation days 8 or 10; when injected on gestation days 12 or 14, most fetuses remained viable but showed increased incidence of abnormalities in the kidney and bladder (Ref. 3, Campbell et al. 1984).

Methyl ethylene glycol ethers are recommended for health effects tests because they are produced in substantial quantities, there are uncertainties related to environmental releases and subsequent exposures to humans, there are data indicating some methyl ethylene glycol ethers produce reproductive and developmental effects, and there are insufficient data to reasonably determine or predict the health effects of the other methyl ethylene glycol ethers. Developmental toxicity and reproductive effects tests are recommended only for the methyl ethylene glycol ethers that do not have adequate test data; these are listed in the paragraph following Table 1.

III. Ecological Effects Information

The need for ecological effects testing was not considered by the Committee and is not recommended at this time.

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k. Isothiocyanates

In the 26th ITC Report, isocyanates were recommended for testing because there were insufficient data to reasonably determine or predict physical and chemical properties and persistence (55 FR 23050, June 5, 1990). Isothiocyanates are structurally and chemically related to isocyanates and there are no readily-available data on persistence.

The Committee's recommendation is based on a number of concerns and uncertainties related to potential exposures and releases from production, processing and use. For these reasons, and for those enumerated for isocyanates in the 26th Report, the Committee is recommending persistence testing for isothiocyanates. The need for health and ecological effects testing of the isothiocyanates was not considered by the Committee and is not recommended at this time, because they want to have an opportunity to review all of the non-public health and ecological effects data submitted under TSCA section 8d) and to meet with any interested groups before determining which isothiocyanates should be tested.

Summary of Recommended Studies. Testing recommendations for the two isothiocyanates listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

A search for measured physical and chemical property data for the isothiocyanates revealed the following information:

Allyl isothiocyanate, also known as allyl isosulfocyanate and mustard oil, is a colorless or pale yellow, very pungent liquid with an irritating odor and an acrid taste (Ref. 6, Windholz et al. 1983). It has a melting point of −80° C (Ref. 3, Dean 1985), a boiling point of 152° C (Ref. 4, Sax and Lewis 1987), a vapor pressure of 3.70 mm Hg at 20° C (Ref. 2, Boublik et al. 1984) and a water solubility of 2000 mg/L at 20° C (Ref. 7, Yalkowsky 1989).

Phenyl isothiocyanate, also known as thiocarbanil and phenyl mustard oil, is a pale yellow or colorless liquid with a penetrating and irritating odor (Ref. 6, Windholz et al. 1983). It has a melting point of −21° C (Ref. 6, Windholz et al. 1983), a boiling point of 221° C (Ref. 6, Windholz et al. 1983), a vapor pressure of 1.5 mm Hg at 25° C (Ref. 2, Boublik et al. 1984) and a water solubility of 89.9 mg/L at 20° C (Ref. 7, Yalkowsky 1989).

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the isothiocyanates listed in the paragraph following Table 1 are commercially available, and that they are produced in substantial quantities; actual volumes are CBI.

Allyl isothiocyanate occurs naturally in mustard oil and horseradish (Ref. 1, Bauer et al. 1988; Ref 5, Shipe and Olentine 1988). Due to its unique odor and taste, allyl isothiocyanate is prepared synthetically in large quantities as a flavor and fragrance (Ref. 1, Bauer et al. 1988). It is also used in ointments and mustard plasters (Ref. 4, Sax and Lewis 1987). Phenyl isothiocyanate is used in medicine and in organic synthesis (Ref. 4, Sax and Lewis 1987).

I. Chemical Fate Information

The Committee has no experimental data on the chemical fate of isothiocyanates. The Committee believes that hydrolysis may be the most important process influencing the fate of isothiocyanates and is recommending persistence testing because there are insufficient data to reasonably determine or predict the chemical fate of isothiocyanates.

II. Health Effects Information

The need for health effects testing was not considered by the Committee and is not recommended at this time.

III. Ecological Effects Information

The need for ecological effects testing was not considered by the Committee and is not recommended at this time.

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I. Cyanoacrylates

The Committee is recommending cyanoacrylates for physical and chemical property testing. The Committee's recommendation is based on concerns and uncertainties related to production and use, potential exposures and releases from production, processing and use.

Annual production volumes of the cyanoacrylates exceed 1 million pounds. Occupational exposure estimates, available for one cyanoacrylate, indicate that over 51,000 workers are potentially exposed at over 1400 facilities involved in its production, formulation, and use (Ref. 1, NIOSH, 1989). Uncertainties associated with occupational exposures are unclear since there are no publicly-available exposure estimates for 10 of the cyanoacrylates recommended for testing. OSHA occupational exposure standards exist for one cyanoacrylate. The cyanoacrylates are used for fast bonding in numerous applications, all of which have the potential for occupational exposures or environmental releases. Uncertainties associated with environmental releases are unclear since none of the cyanoacrylates are on the TRI and there are no publicly-available effluent monitoring data for any of the cyanoacrylates. The Committee hopes that manufactures, processors, and users will respond to the voluntary solicitation for use, exposure, and release data (described in Chapter 1 of this Report) and that information submitted voluntarily will clarify uncertainties associated with use, exposures, and releases. The Committee recognizes that as a result of this recommendation, the uncertainties related to exposure and release of cyanoacrylates may be clarified after the Committee's review of the data obtained from the automatic 8(a) and 8(d) rules along with any other voluntary information submitted as a result of the request made in Chapter 1 of this report.

The Committee is recommending cyanoacrylates for physical and chemical property testing to identify commercially important cyanoacrylates that need a minimum amount of physical and chemical property data. The Committee has not considered health or ecological effects of cyanoacrylates at this time, because they want to have an opportunity to review all of the non-public health and ecological effects data as well as chemical fate data, submitted under TSCA section 8(d) and to meet with any interested groups before determining which cyanoacrylates should be tested. Submitted information is likely to be considered by a number of government agencies including EPA, CPSC, NCI, NIOSH, OSHA, and State and local governments involved with assessing the impact of chemical releases to the environment. The Committee makes non-CBI information available to the OECD and other international organizations to promote information exchange and to conserve chemical testing resources.

Summary of recommended studies. Testing recommendations for the 11 cyanoacrylates listed in the paragraph following Table 1 are summarized in Table 1.

Physical and Chemical Information

The Committee has very limited information on measured physical and chemical properties for the cyanoacrylates listed in the paragraph following Table 1: 7 boiling points, and 4 vapor pressures (Ref. 2, Ohara et al. 1985; Ref. 4, Sax and Lewis 1987)

Rationale for Recommendation

A. *Exposure Information—Production/use/disposal/exposure/release.* The Committee believes that the cyanoacrylates listed in the paragraph following Table 1 are commercially available, and that many are produced in substantial quantities. Actual production volumes are CBI.

Cyanoacrylates are used for fast bonding applications, in dentistry, textile finishes and sizes, copolymers for viscosity index improvers, mounting jewelry, and in tissue adhesives in surgery (Ref. 2, Ohara et al. 1985; Ref. 4, Sax and Lewis 1987, Ref. 6, Windholz et al. 1983).

I. Chemical Fate Information

Except for those listed above, the Committee has no information on measured physical and chemical properties for the cyanoacrylates listed in the paragraph following Table 1.

Cyanoacrylates are recommended for physical and chemical property tests because they are produced in substantial quantities, there are uncertainties related to occupational and consumer exposures or environmental release, and there are insufficient data to reasonably determine or predict physical and chemical properties.

II. Health Effects Information

Except for a search of readily available literature, the need for health effects testing was not considered by the Committee and is not recommended at this time. The search revealed that five cyanoacrylates are mutagenic to bacteria; rats exposed by implantation to one cyanoacrylate developed sarcomas, and rats exposed to a cyanoacrylate had a 1–hour inhalation LC_{50} of <4129 ppm (Ref. 3, RTECS 1991; Ref. 5, Toxline 1991).

III. Ecological Effects Information

The need for ecological effects testing was not considered by the Committee and is not recommended at this time.

References

(1) NIOSH (National Institute for Occupational Safety and Health). National Occupational Exposure Survey (NOES) (1989).

(2) Ohara, T., Sato, T., Shimizu, N., Prescher, G., Schwind, H., Weiberg, O., Martin, K. "Acrylic acid and derivatives." In: *Ullmann's Encyclopedia of Industrial Chemistry*. 5th Edition. Gerhartz, W., and Yamamoto, Y.S., Eds. Deerfield Beach, FL: VCH Publishers. A1: 161–176. (1985).

(3) RTECS (Registry of Toxic Effects of Toxic Substances). On-line data base. (1991).

(4) Sax, N.I., and Lewis, R.J. *Hawley's Condensed Chemical Dictionary*. 11th edition. New York, NY: Van Nostrand Reinhold Company. pp. 40, 864, 903, 905, 907 (1987).

(5) Toxline. On-line data base. (1991).

(6) Windholz, M., Budavari, S., Blumetti, R.F., and Otterbein, E.S. *The Merck Index*. 10th edition. Rahway, NJ: Merck & Co., Inc. pp. 201, 824 (1983).

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