

# EPAct/V2/E-89: Assessing the Effect of Five Gasoline Properties on Exhaust Emissions from Light-Duty Vehicles Certified to Tier 2 Standards

Final Report on Program Design and  
Data Collection

## Appendix H Fuel Blending Experiment to Characterize Carryover Effects

Assessment and Standards Division  
Office of Transportation and Air Quality  
U.S. Environmental Protection Agency

National Renewable Energy Laboratory  
U.S. Department of Energy

Coordinating Research Council

### NOTICE

*This technical report does not necessarily represent final EPA decisions or positions. It is intended to present technical analysis of issues using data that are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments.*

## Investigation of Fuel Carryover Effects on Distillation Parameters

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PROPERTY	UNIT	Fuel Pair A		Fuel Pair B		Fuel Pair C		Fuel Pair D		Fuel Pair E	
		Fuel 1	Fuel 2	Fuel 1	Fuel 27	Fuel 1	Fuel 6	Fuel 2	Fuel 21	Fuel 27	Fuel 21
Ethanol Content	vol. %	10	0	10	15	10	10	0	20	15	20
T50	°F	150	240	150	220	150	190	240	160	220	160
T90	°F	300	340	300	340	300	340	340	300	340	300
DVPE	psi	10.0	10.0	10.0	6.65	10.0	6.65	10.0	6.65	6.65	6.65
Aromatics	vol. %	15	15	15	15	15	15	15	40	15	40

### Test Fuel Sets

EtOH	Test Fuel	Fuel Set A		RVP		T50		T90	
		Components	Target	Meas.	Target	Meas.	Target	Meas.	
10 0	1	100	0	10	9.93	150	149.8	300	297.2
	2	0	100	10	10.22	240	237.9	340	339
	A3	5	95		10.64		236		338.8
	A4	95	5		10.05		150.6		301.7
10 15	1	100	0	10	9.93	150	149.8	300	297.2
	27	0	100	6.65	6.87	220	221.7	340	339.3
	B3	5	95		7.01		216.1		339.2
	B4	95	5		9.81		150.9		301.9
10 10	1	100	0	10	9.93	150	149.8	300	297.2
	6	0	100	6.65	7.21	190	189.4	340	340.3
	C3	5	95		7.23		186		339.2
	C4	95	5		9.72		150.4		301.7
0 20	2	100	0	10	10.22	240	237.9	340	339
	21	0	100	6.65	6.98	160	168.8	300	304.8
	D3	5	95		7.27		169.2		305.9
	D4	95	5		10.75		235.8		336.4
15 20	27	100	0	6.65	6.87	220	221.7	340	339.3
	21	0	100	6.65	6.98	160	168.8	300	304.8
	E3	5	95		6.95		168.6		305.2
	E4	95	5		6.83		217.8		338.9

### Scope of Work:

- ▶ Obtain samples of fuels 1,2,6,21 and 27  
Sample sizes (~2X needed volume):  
Fuel 1: 1 gal  
Fuel 2: 1/2 gal  
Fuel 6: 1 qt  
Fuel 21: 1/2 gal  
Fuel 27: 1/2 gal
- ▶ Follow EPA Act Fuel Sampling Procedure
- ▶ Blend fuels A3, A4, B3, B4, C3, C4, D3, D4, E3 and E4
- ▶ Perform D86 test on the fuels of each set in the course of a single day
  - Use exclusively OptiDist equipment
  - Use the same distillation still for all tests
- ▶ Note: The same fuel need not be tested twice on a given day, if it belongs to two different fuel sets which are being tested on that day