Alternatives Assessments for Improved Environmental Outcomes
Thursday, 2:00-2:55 p.m.
Atrium Ballroom

Using Alternatives Assessment Approaches to Inform the Ranking of TRI-Listed Solvent Chemicals

Lauren Brown, Presenter

Chemical alternatives assessments involve analyses and decisions that can be used to assess alternative chemicals when considering chemical substitution. Employing established methods from the field of alternatives assessment we evaluated and ranked TRI- listed solvent chemicals for a spectrum of human health and environmental hazard endpoints. Specifically, we combined guidance from both the U.S. EPA's Design for the Environment Criteria for Alternatives Assessment and Washington State's Quick Chemical Assessment Tool (QCAT). In the pilot phase of our project, we evaluated 10 solvents listed on the TRI and tested the ability to rank these known toxic chemicals against one another. We used publically-available toxicology data found in government databases to classify more than 85 hazard/chemical endpoint combinations as high, medium or low (or in some instances very high or very low). By aggregating chemical-specific hazard profile designations, we were able to differentiate and rank the chemicals. This presentation provides an overview of our method, results and lessons learned along with potential next steps beyond our pilot project. The method provides a framework through which TRI reporters can inform the selection of a safer chemical, even if that chemical is also a TRI-listed chemical.

Additionally, the method and analytical results benefit EPA by synthesizing TRI chemical data in a holistic way that evaluates a multitude of human and environmental health related endpoints.

Using Alternatives Assessment Strategies to Drive the Greening of TRI Releases

Hans Plugge, Presenter

Both Green Chemistry and Alternatives Assessment strategies continue to drive the substitution of existing chemicals of concern with "greener" chemicals, i.e. those with lesser health and environmental effects. Alternatives Assessment and Green Chemistry principles form a continuum. Modern Green Chemistry focuses on de novo synthesis of chemicals based on a probabilistic prediction of effects, whereas alternatives assessment mostly depends on the "library" of existing chemicals with known effects. These two methodologies use data analytics to analyze effects while various strategies are used to continuously reduce data gaps for known and predicted effects. Although some of the early methods were based on hazard assessment principles, science-based risk methodologies are coming to market. Many TRI releases are driven by older

manufacturing and engineering practices – Alternatives Assessment or Green Chemistry engineering practices were sparingly employed. Alternatives assessment is being increasingly used to substitute chemicals of concern with “greener” chemicals. The assessment initially screens for hazards, and only then considers the exposure and risk assessment. The final part of a detailed alternatives assessment would be lifecycle assessment and engineering performance, the latter mostly focused on actual functionality of alternatives. Alternate engineering processes can thus be pre-screened using modern alternatives assessment methodologies. Obviously for a single engineering process alternative many of the screening steps can be skipped, however multiple engineering approaches would benefit from a pre-screening approach. Often just a reduction in releases may not be the “greener” solution if the ecological and health effects from proposed releases are higher. Similarly, processes which would use much higher energy input may not be desirable from a lifecycle assessment point of view. 3E will demonstrate an application of its 3E Green Score methodology which allows for rapid screening of alternative chemicals/products, while also allowing for a further in depth evaluation of “greener” alternatives with regard to exposures, ecological/health effects and lifecycle assessments. Such an optimization strategy would allow for reduction of the effects from environmental releases in a cost effective manner.