



GC³ Green Chemistry &
Commerce Council

Tools for Chemical Assessment and Safer Design Summary Paper

The tools subgroup was one of three formed following the Innovators Roundtable held at Darden in November, 2005. The group's focus was identifying and compiling a database of tools and information sources for chemical toxicity and chemicals assessment. Initial discussions highlighted that there were numerous approaches being used to address industry sector and company specific objectives. It was also recognized that numerous databases, tools, and methodologies were available, and a readily accessible listing of these resources was considered a productive first step. The group decided to focus efforts on creating a tool box of existing tools and toxicity/ hazard databases, assessing strengths, weaknesses, and ease of use, and developing some recommendations for appropriate tools for various uses. There was also discussion of tabulating safe chemistry performance criteria by industry sector and attempting to harmonize criteria for selecting green or preferred alternatives. In the subsequent months, the group activity focused in three related areas;

- Compile an inventory of tools, databases, etc. for characterizing the hazards of chemicals;
- Develop an integrated solution that links to multiple databases to summarize available data on a pre- defined list of hazard endpoints by chemical; and
- Develop guidance for screening alternatives for the preferred solution.

Dave Long, SC Johnson took the lead in compiling the database of databases and tools. A list of resources used by team members was compiled. Because the utility of a reference was dependent on the user objectives (or problem being addressed), each item was described briefly, assessed for ease of use (or expertise requirements imposed on the user), and catalogued by potential use. The resources were grouped into the following categories - environmental/ chemical properties; chemical properties/ toxicity/ safety; chronic toxicity; multiple databases; and modeling programs. The list was compiled in an Excel spreadsheet with links to the source (except for fee-based resources) and is attached for review and comment.

John Frazier, Nike took the lead in developing the integrated solution for hazard assessment. The vision is a software front- end that queries multiple databases to compile available hazard data for 18 different hazard endpoints, e.g. acute toxicity, eye irritant or corrosion, carcinogenicity, etc. Each company or user would be able to select appropriate end points relevant to their specific situation and define their own criteria for preferred chemicals. Thus, everyone would have access to the same underlying hazard data, but would be able to apply company or sector-specific criteria for green chemicals. Nike has demonstrated the technical feasibility of the integrated tool, but is still working to resolve legal and contractual issues. This would be a subscription- based service. A presentation summarizing the Nike efforts is attached.

Work on the guidance for chemical assessments was centered on the Clean Production Action's green screen for safer chemicals. The green screen focuses on hazards, based on the premise that hazard elimination is more effective than reducing exposures. Threshold values were established

for 17 hazards lumped under environmental fate, eco- toxicity, human health, and physical/ chemical properties. Decision rules were established to rate alternatives against four benchmarks: avoid- chemical of high concern, use but search for safer substitutes, use but still opportunity for improvement, and prefer- safer chemical. A final report on a study evaluating flame retardants for tv enclosures is available. The methodology was also applied in a case study evaluating alternative adhesives in an aerospace electronics application. The case study was constrained to using only information available from product MSDSs to simulate designers faced with choosing a preferred adhesive. The study demonstrated that significant expert judgment was required in for this relatively simple problem, indicating that design teams would need technical support in applying a green screen type chemical assessment methodology. A presentation summarizing the case study is attached.

References:

Compilation and characterization of tools- D. Long, SC Johnson

Considered chemistry focus – J. Frazier, Nike

The Green Screen for Safer Chemicals: Evaluating Flame Retardants for TV Enclosures, available at: <http://www.cleanproduction.org/library/Green%20Screen%20Report.pdf>.

Case study- Evaluating alternative adhesives.