



## Global toxic assessments possible, but data need harmonising

**Comparative toxic assessments** across regions and countries are needed to minimise human exposure to harmful chemicals associated with consumer products. A new study has developed a US version of the EU Toxic Potential Indicator (TPI) and compared the two models for over 500 chemicals. Differences in results exist, indicating a need for more harmonisation between regulatory thresholds and guidelines.

**Assessments of toxicity** are necessary to reduce exposure to dangerous chemicals and promote safer alternatives in the manufacture of consumer products. The Toxic Potential Indicator (TPI) was developed in Germany to provide a more transparent and easy-to-understand alternative to Life Cycle Analysis (LCA). The TPI uses publicly available environmental, health and safety information and converts it into a score between 1 and 100. It is currently based on regulatory criteria in the EU, but broadening its scope to consider other regional regulation and guidelines could provide a means to compare toxicity globally.

The study developed a version of the TPI based on US regulation. The basic EU TPI requires three pieces of information and the study identified equivalent sources in the US. In the EU TPI the Occupational Exposure Limits (MAKs) represent the human health impact. These regulate the maximum air concentration of a substance allowed in the workplace. For the US equivalent, the study used permissible exposure limits (PELs) which are regulatory values set by the US Occupational Safety and Health Administration for restricting chemical concentrations in the workplace.

The environmental impact in the EU TPI is represented by the German water hazard classifications (WGK). There was no perfect equivalent for the US version in which median effect concentration (EC50) was used. EC50 is the concentration of a pollutant in the environment that produces an adverse effect in 50% of aquatic organisms. Finally the EU TPI uses 'R-phases' to represent other hazard considerations, ranging from flammability to fertility effects. These are also used in the US version.

The study compared the scores from the EU TPI and the US TPI for 578 substances on the US Toxics Release Inventory. This showed differences between the scores from the two models. For example, the EU TPI score was higher for some metals, such as Arsenic and Zinc, whilst the US TPI score was higher than the EU's for other metals, including Copper and Nickel. However, although score values were not always the same, the ranked order of chemicals in terms of toxicity was quite similar.

The researchers investigated whether the discrepancies were caused by missing toxicity information. However, the inconsistency remained when only the 112 substances with complete data were analysed. This suggests the inconsistency originates from differences in the three underlying sources of information used by the respective models. For example, the WGK system used by the EU TPI accounts for toxicity to both mammals and aquatic species, whereas the EC50s used in the US TPI only accounts for toxicity to aquatic species.

The study indicates that the EU TPI can be modified for use in other regions but that more effort is needed to harmonise the information used by the respective models.

**Source:** Lam, C.W., Aguirre, M.P., Schischke, K. *et al.* (2012) International Harmonization of Models for Selecting Less Toxic Chemical Alternatives: Effect of Regulatory Disparities in the United States and Europe. *Integrated Environmental Assessment and Management*. Doi: 10.1002/ieam.1305.

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