The Impact of US Adoption of the UN Globally Harmonized System on the Use of In Vitro Methods for Ocular and Dermal Irritation and Corrosion

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Abstract

Endorsed by the United Nations in 2013, the UN Globally Harmonized System for classification and labelling of chemicals is intended to harmonize hazardous material classification and labeling criteria throughout the world for human health and eco-toxicity endpoints. While GHS was designed to correlate with existing classification systems and the European Union, Canada, and the United States have committed in principle to adopting GHS in place of their own national classification systems, differences among classification systems have delayed adoption of GHS by various agencies. Harmonization with GHS impacts classification, the replacement, reduction, and refinement of animals in testing since in vivo methods for skin and eye irritation have been, and are currently being validated according to GHS classification. This poster compares US EPA, UN OCHA and GHS classifications for skin and eye irritation as they relate to validated in vitro methods for skin and eye irritation and discusses methods to harmonize these classification systems. The methods include: The Bovine Cornea Opacity and Permeability test method, the Isolated Chicken Eye test method, the CytoSenser Microphysiometer test method, and the Fluoromax Leakage test method for eye irritation, and Reconstructed Human Epidermis and barrier models for skin irritation. Widespread adoption of GHS will help speed harmonized adoption of existing and new in vitro methods for relevant endpoints.

Harmonization of Labeling Schemes

The primary objective of hazard classification and communication systems is to provide information to protect human health and the environment. Hazard classifications are also used to inform users of chemicals so that measures can be taken to minimize risk. Because of differences in use and exposure, hazard classification systems have historically varied with little or no consistency within and between different countries. Inconsistencies arising from these differences can lead to confusion regarding potential hazards and safe use of chemicals.

Through the United States’ discussions regarding the international harmonization of classification and labelling of chemicals began in the early 1990’s as part of the United Nations Environment Program’s Development (UNEP) became involved in the project in the early 1990’s resulting in the development of the Harmonized Global System for the Classification of Hazardous Substances and Pesticides in the Environment (GHS). In 1997, the and Jordan (1997) and the engine oil testing parameters for skin irritation. This presentation focuses on differences between US EPA, OSHA, and GHS classification and labeling schemes.

Table 1: GHS Categories for Skin Corrosion/Irritation

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>US EPA Categories</th>
<th>UN OCHA Categories</th>
<th>OSHA Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Severe</td>
<td>Category I</td>
<td>Class I</td>
<td>Class A</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>Category II</td>
<td>Class II</td>
<td>Class B</td>
</tr>
<tr>
<td>3</td>
<td>Mild</td>
<td>Category III</td>
<td>Class III</td>
<td>Category C</td>
</tr>
<tr>
<td>4</td>
<td>Minor</td>
<td>Category IV</td>
<td>Class IV</td>
<td>Category D</td>
</tr>
</tbody>
</table>

Effect on human health protection of adopting GHS in the US

OSHA classification is consistent with GHS—no effect. What information changes of EPA were to adopt GHS?

1. Difference between Category II (P153 – 7) and Category III (P12 – 5)
2. Differences between GHS Category II (E253 – 4 – 4) and EPA HRIPT (P12 – 7)

Would these changes be significant regarding protection?

Dermal and Eye Corrosion and Irritation Testing: Historical animal-based testing

The standardization of acute eye and skin irritation is included in international regulatory requirements for testing of chemicals because of the possibility of exposure during the production, transport, marketing, and disposal of products. In 1989, OECD first published Test Guidelines for acute dermal and eye corrosion and irritation (1,2). These test methods are quite painful, and the results are not strongly correlated with effects in humans; therefore, alternative methods are being developed to replace the use of animals for these endpoints.

Given the staged manner in which alternative test methods have been developed and validated over time and the desire to use additional physical-chemical or other existing information to avoid animal tests, staged testing strategies have been recommended (Figure A and B).