

A New Language for Toxicologists: Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

What Do You Know about GHS?

*Comments prepared on behalf of the Society of Toxicology
by members of the Occupational and Public Health Specialty Section*

Introduction

The United Nations has issued a system for the classification and labelling of chemicals known as the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). This system is currently being adopted by countries around the world. The Occupational and Public Health Specialty Section (OPHSS) supports the GHS initiative and the concept of a globally standardized classification system for chemicals. However, we see challenges for the toxicologist and have concerns about the use of toxicology information in this system. The purpose of this document is to describe our rationale for supporting GHS as well as to communicate the potential challenges and concerns of this system pertaining to the field of toxicology. The challenges and concerns are as follows (and are explained more fully in the document):

- The available toxicology data used for classification may vary in quality and consistency between countries and companies.
- There is no rating system recommended for evaluating the quality of the toxicology data.
- The knowledge of individuals determining hazard classifications may vary widely.

As a result of these concerns, the greatest issue for GHS is the inevitability of disharmony of classification despite the fact that similar criteria for classification will be utilized and the stated purpose of the system is to harmonize globally. In other words, different classification outcomes for the same chemical may occur from country to country or from one manufacturer to another in spite of consistent criteria prescribed in the GHS. For these reasons, we encourage data sharing among manufacturers, the utilization of a rating system to identify high quality studies, and that individuals trained in hazard assessment perform the classification determination.

Background

At the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, it was determined that a harmonized system for classification and labelling of chemicals was required. The intent of this system was to provide a foundation for classification and labelling of chemicals that takes into account the extensive global trade in chemicals and the need for the development of national programs to deal with the safe use, transport, and disposal of chemicals. Therefore, through the cooperation of the International Labour Organization

(ILO), Organization for Economic Cooperation and Development (OECD), expert stakeholders, and the United Nations, the Globally Harmonized System of Classification and Labelling (GHS) was developed over more than a decade as an internationally agreed upon system to address the classification of chemicals, labels, and safety data sheets. The GHS is anticipated to 1) provide an internationally comprehensible system for hazard communication, 2) provide a recognized framework for countries without existing systems for hazard classification and labelling, 3) reduce the need for testing and evaluation of chemicals, and 4) facilitate international trade in chemicals.

The United Nations published in 2005 a comprehensive iteration of the current GHS standard (1st Revision of the “Purple Book”) (1). Although the GHS document provides guidance about acceptable classification paradigms and testing methodologies, it is not always prescriptive about how to reach the desired endpoint and as such is performance-based. For example, the testing methodologies to determine an outcome may be several, yet appropriate; however, the chosen test is at the discretion of the manufacturer or other relevant party.

Ultimately, the intention behind the GHS is to have one set of global criteria and hazard communication tools for the supply, use, and transport of chemicals. The intended target audiences of the GHS are those involved in the manufacture, supply, and distribution of chemical products, including workers, emergency responders, and consumers. Although the GHS is not legally binding globally, it is internationally recognized and implementation activities have begun in various countries. The 21 nations participating in the Asia Pacific Economic Cooperation (APEC) agreed on a target date of 2008 for implementation. However, there are some regions or countries that have already adopted the system using draft guidance (e.g., New Zealand and Japan), and the system will be adopted in a phased-in approach with the implementation of the new European Union (EU) regulation, REACH (Regulation, Evaluation, Authorization of Chemicals).

Challenges for Toxicologists

The challenges for toxicologists in implementing the GHS are likely to be familiar and similar to those experienced with existing global hazard characterization and hazard communication systems, such as:

- Data availability
- Data quality and reliability
- Data generation versus animal welfare
- Professional awareness and judgment

Implementation of the GHS will likely require significant or additional toxicology resource commitments by chemical producers, in part because the GHS provides much more specific data driven criteria for defining health hazards than those systems that support current hazard classification and labelling programs. Chemical manufacturers will be responsible for gathering and evaluating all relevant data on chemicals and mixtures that they produce or import as a basis for making GHS classification decisions. Therefore, the dependence on high quality and consistent data is paramount to the success of such a harmonized system.

Data Availability

In the case of existing as well as new products, there will be a need for improved access to available toxicity data. This poses a variety of challenges related to mechanisms for identifying, accessing, and evaluating data, not the least of which is confidentiality. Although much of the data relevant to the GHS criteria can be found in the published literature, transparent processes for sharing available data along the chain of commerce, particularly for complex and proprietary formulations, remain a challenge.

On the other hand, the programs to address commodity chemicals, such as EPA's High-Production Volume (HPV) Challenge Program and the OECD Screening Information Data Set (SIDS) Program have made significant progress in the critical review of and transparency of data. Similar programs would aid classification decisions and increase the consistency of those classifications to support the GHS. However, professional judgment may be required with increased transparency of information as numerous studies may be produced for the same endpoint. For example, it is not uncommon that the same endpoint (e.g. flashpoint, toxicity) will have different results between reporting companies and expert judgment will be needed to identify the best information to determine the proper classification. Additionally, as another example, different flash points and toxicities are often noted for substances that are assigned one CAS number but are complex substances of variable composition. The EU offers a system of explanatory and guiding notes called the "Notas" (2), which enables a substance with one CAS number to be classified in different ways depending on its properties and/or processing. It is important that such existing solutions are utilized by toxicologists and legislative bodies, and if appropriate, are applied consistently during country and regional implementation of GHS. Such solutions should be considered so that toxicologists or knowledge experts are not forced to make uninformed choices or perform additional research when further testing (especially that which utilizes animals) is not necessary.

Data Quality and Reliability

Understanding the quality and reliability of hazard characterization information is a challenge even in the current hazard communication programs and will certainly continue to be a challenge with the GHS. This is particularly difficult when the underlying data are not available and have not been critically peer reviewed. For example, some of the most widely available sources (e.g., the Registry of Toxic Effects of Chemical Substances [RTECS®]) present only selected data without critical review. Therefore, the reliability of such information should be assessed by the producer, the manufacturer, or the end user prior to establishing the classification and label for a substance or preparation. Similarly, classifications provided through the supply chain (e.g., on supplier MSDSs) without access to the underlying data is another example of this challenge.

It is not clear if countries including the US will address or acknowledge the need for data quality and reliability standards, as they consider implementation of the GHS. Thus, recognition of widely available data sources that achieve high standards of data quality would be a helpful tool. Organizations such as the Society for Chemical Hazard Communication

(<http://www.schc.org/schcnewsite/home.php>) have compiled lists of reference sources commonly used in preparing MSDSs. However, data development and reporting are dynamic processes and management of ever-changing reporting tools in a regulatory context is a challenge. Currently there is no recognized list of data sources. For example, a list of information sources included as advisory information in the original US OSHA Hazard Communication Standard, Appendix C, was removed in 1996 with the recognition that the lists were outdated. Establishment of a rating system such as the Klimisch rating system (3) utilized in the HPV program to rank data quality and relevance could be a potential solution to ensure the use of consistent and high-quality data when establishing hazard classifications and labels according to the GHS.

Data Generation versus Animal Welfare

GHS will certainly prompt consideration of whether additional data would improve classification decisions. A balance between the data demands of the new GHS approach and the concern for justifiable use of animals in testing poses yet another challenge. The importance of making maximum possible use of existing data is obvious. However, this also raises the interesting dilemma about whether or not to redo testing that was conducted previously using non-GHS prescribed testing protocols. The Code of Ethics of the Society of Toxicology states that each member shall observe the spirit as well as the letter of the law, regulations, and ethical standards with regard to the welfare of humans and animals involved in any experimental procedures.

Professional Awareness and Judgment

Scientists from all disciplines, including academia, industry, or government, should be aware of the GHS and utilize the criteria in their assessments and communications of chemical hazards even for non-traditional hazard communication efforts. Consistent use of the criteria and interpretation of data with respect to select endpoints by toxicology experts is critical to the success of the GHS and provides for scientific soundness of this hazard communication system. Furthermore, scientists in both the public and private sectors should utilize the criteria when applying terminology to chemicals if we are to “speak the same language” and reduce confusion amongst the public and ourselves about chemical hazards.

Although the classification criteria are prescriptive in the GHS, numerous data sources and testing methods are often available for any given endpoint and therefore requiring an evaluation of the data and a possible weight-of-evidence determination. This highlights the importance of incorporating professional toxicology judgment and experience into the hazard characterization and classification process of the GHS, which the US OSHA acknowledged in the Hazard Communication Standard. Variability in data quality and differences in study methodology also require the expert judgment of professionals for the proper evaluation and utilization of this information in making classification determinations. For these reasons, the implementation of GHS is likely to require the use of more toxicologists or other professionals who are trained to properly evaluate data and perform complex hazard assessment techniques.

Inevitably, there will be differences in data interpretation even between trained professionals and regulatory agencies around the world. Some countries/regions are assigning classifications to chemicals, while others, like US OSHA, will allow classification determinations to be made by

chemical manufacturers. A challenge for toxicologists will be to understand and address these differences created by varying approaches and determinations around the world.

Finally, it is important for scientists to be aware of the implementation process of the GHS and the different timelines for implementation in different regions of the world. For example, some countries have already imposed the GHS labelling requirements, while the US is still in the planning stages for GHS implementation. An awareness of various countries' timetables for implementation will help to reduce the likely confusion due to differences in classifications as a result of varying schedules for implementation.

Summary

Toxicologists may encounter a variety of challenges with the implementation of the GHS system related to the availability, quality, generation, and interpretation of hazard data. Because of differences in the availability and evaluation of information, it is inevitable that toxicologists will encounter differing classification outcomes for a given chemical. However, that does not mean that the GHS should not be supported. On the contrary, a globally harmonized system for the classification of chemicals is an important step toward creating consistent communications about the hazards of chemicals used around the world. In order for successful implementation of the GHS, efforts should be placed on the sharing of hazard information, the utilization of a system to evaluate the quality of data, and using individuals trained in hazard assessments for classification determinations. In a broader sense, toxicologists should be aware of the GHS system and utilize the classification criteria in order to achieve consistency in communication efforts with the public and within the scientific community.

References

1. United Nations Economic Commission for Europe. (2005) Globally Harmonized System of Classification and Labelling of Chemicals (GHS). "The Purple Book", First revised edition, New York and Geneva: ISBN 92-1-116927-5.
2. European Commission. (2001) Directive 2001/59/EC of 6 August 2001 Adapting to Technical Progress for the 28th time Council Directive 67/548/EEC on the Approximation of the Laws, Regulations and Administrative Provisions Relating to the Classification, Packaging and Labelling of Dangerous Substances, Official Journal of the European Communities, No. L225, 21 August 2001.
3. Klimisch, HJ, Andreae E, and Tillmann, U. (1997) A systematic approach for evaluating the quality of experimental and ectotoxicological data. *Regulatory Toxicology and Pharmacology* 25:1-5.