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GHS and Household Chemicals

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Chemical Hazard vs Chemical Risk

We use chemicals everyday: additives and preservatives in food preparation, paints used in renovation, fuel for vehicles, detergents for laundry, and medicines for medical treatments. Chemicals have become such essential components of many things that enhance our quality of life.

However, chemicals also pose adverse effects to human and environment health. For example, corrosive chemicals pose immediate adverse effects such as eye and/or skin irritation; while carcinogenic chemicals pose chronic adverse effects such as cancer (if exposure to the carcinogenic chemicals has exceeded the 'allowable exposure limit).

Hence, it is of the utmost importance that we learn to handle chemicals in a proper manner to reduce the risks associated with chemicals.

What is Risk?

It is crucial to define 'risk' before we can adequately reduce and later eliminate the risks associated with the use of chemicals. In general, 'risk' is the probability that harm will result, or in other words, 'risk' is conceptually expressed as a product of two factors, i.e. hazards and exposure.

The definition of risk can be reflected in a simple formula:

Hence in the definition of chemical risk:

- 'hazard' in the formula refers to chemical hazard, or the intrinsic properties of chemicals, such as flammability and toxicity; whereas
- 'exposure' in the formula refers to the amount of the chemical that a person is exposed to.

A very toxic chemical that a person is exposed to will increase the probability of a severe incident happening, meaning that the person is at high risk.

$$\text{Risk} = \text{Hazard} \times \text{Exposure}$$

Globally Harmonised System of Classification and Labeling of Chemicals (GHS)

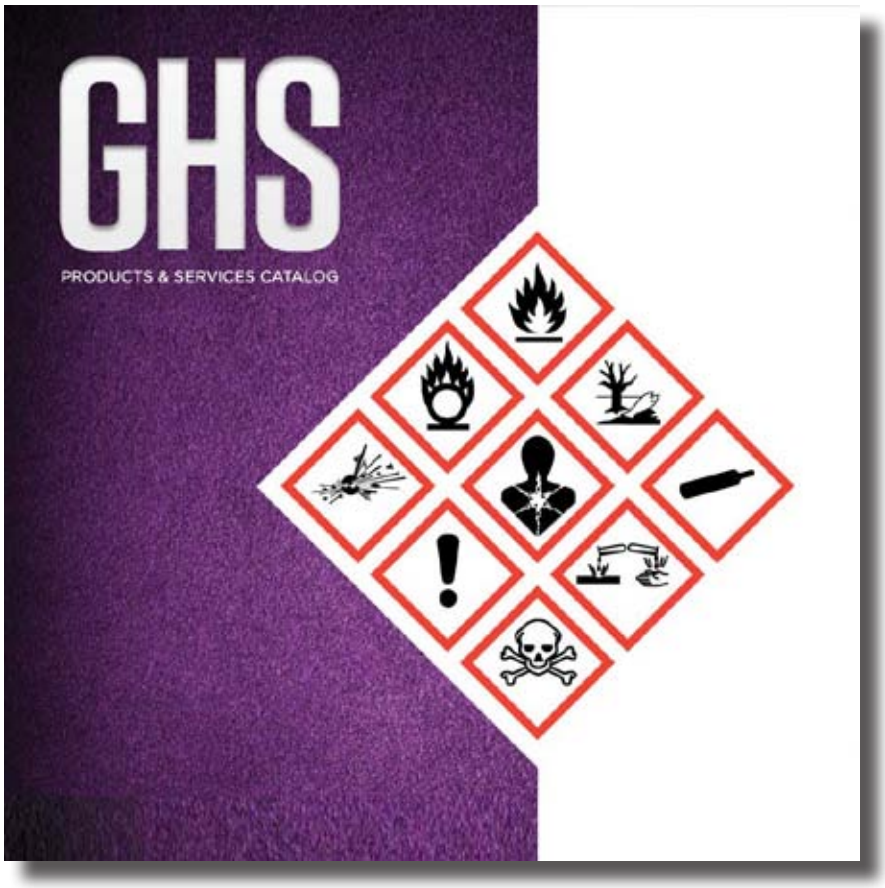
From the formula above it can be deduced that by reducing the intrinsic hazard of a particular chemical or the exposure to the hazard, the risk associated with a particular chemical can reduced. However, because the hazard is intrinsic to a particular chemical, only by replacing a particular hazardous chemical with a less hazardous one, can the hazard be reduced and thus the risk.

The challenge faced by many especially the authorities is how a chemical hazard is defined, or what criteria are used to classify a chemical as 'very toxic' or 'less toxic'. An important question is whether those criteria are consistently applied across borders; globally.

The European Union (EU) conducted a study in 2006 with the purpose of comparing classification criteria used in different countries. The results showed for example: a chemical that was classified as 'harmful' in EU was classified as 'not dangerous' for example in an Asian country. This raised serious concerns on both the classification approach and the health of people in both regions. The different classification was a result of different classification criteria used for the same chemicals.

The problems associated with inconsistencies in chemical classification around the world were raised approximately 20 years ago at the UN Earth Summit in Rio de Janeiro, in 1992. As a commitment to address this issue, representatives from governments at the Summit, agreed to develop a global system for chemical classification and labeling.

With the culmination of more than a decade of work by multidisciplinary experts, a system known as 'Globally Harmonised System of Classification and Labeling of Chemicals (GHS)' was developed by the United Nations Economic and Social Council's Subcommittee of Experts on the GHS (UNSCEGHS). This was endorsed by the United Nations Economic and Social Council (ECOSOC) in July 2003.



"The GHS document, also known as the 'purple book' provides internationally accepted criteria for classifying and labeling hazardous properties of chemicals ..."

The GHS document, also known as the 'purple book', serves two major purposes:

- it provides internationally accepted criteria for classifying and labeling hazardous properties of chemicals; and
- it communicates information about the hazardous properties of chemicals in a comprehensive manner to target audiences.

It is important to emphasize that the criteria used in GHS is hazard-based, not risk-based. It means that GHS classifies and labels chemicals based on their intrinsic hazardous properties, such as carcinogenicity, mutagenicity etc.

Figure 1 and Figure 2 show the examples of GHS pictograms that illustrate intrinsic hazardous properties of chemicals.

Figure 1: GHS pictogram (skull and crossbones) indicating acute oral, dermal, inhalation toxicity.

Figure 2: GHS pictogram (health hazards) indicating carcinogenic, mutagenic and reproductive (CMR) toxicity, specific target organ toxicity (STOT) – single and repeated exposures, and respiratory sensitizer.

GHS and Household Chemicals

The GHS affects various chemical-related sectors, including the consumer sector with regard to household chemicals. When GHS was applied to the classification and labeling of household chemicals, it triggered concerns among industry players. This was purely because industry was in favour of classification based on risk and not hazard. The industry players further explained that exposure to some household chemicals would foreseeably impose low risk to users even if they contain ingredients that are carcinogenic - BUT used under normal circumstances. This means that the household chemicals will not cause cancer to the user under reasonably foreseeable use and handling of the household chemicals.

However, the industries' concerns can be addressed through the recommendations by the GHS guideline which is more applicable to the classification and labeling of those household chemicals that pose chronic health hazards (such as carcinogenicity). GHS system is not applicable to chemicals which pose acute health, physical and environmental hazards.

The GHS guideline also recommends that all household chemicals should be classified according to the GHS and the exemption above (for acute health hazards) should only be applicable to the labeling of household chemicals.

Regrettably not all industries are aware of this, hence a guideline should be developed for the general public and industry players on classification and labeling of household chemicals based on GHS.

During the period the UNSCEGHS was developing the GHS guidelines, they were aware of the implications of GHS on the household chemical sector. They prepared an annex in the 'purple book', known as 'Annex 5 – Consumer Product Labeling Based on the Likelihood of Injury'.

In the Annex 5, three general principles were developed for the labeling of consumer products (retrieved from the 'purple book'):

(i) all chemicals should be classified based on GHS classification criteria. The first step in the process of classifying hazards and communicating information should always be classification of intrinsic hazards based on the GHS criteria for substances and mixtures;

(ii) risk-based labeling in the consumer product sector by (ONLY) competent authorities can be applied to chemicals causing chronic health hazards. All chemicals known to cause acute health, environmental and physical hazards should be labeled based on intrinsic hazards.

The hazard classification should lead directly to labeling of acute health effects, environmental and physical hazards.

The labeling approach that involves risk assessment should only be applied to chronic health hazards, e.g. carcinogenicity, reproductive toxicity, or specific target organ toxicity based on repeated exposure. The only chemicals this approach applies are those in the consumer product sector where consumer exposure is generally limited in terms of quantity and duration;

Store Poisons in a Safe Place....away from Children

(iii) estimates of possible exposures and risks to consumers should be based on conservative, protective assumptions to minimize the possibility of underestimating exposure, OR risk exposure assessments ; Or estimates should be based on data and/or conservative assumptions.

Assessment of the risk and the approach to extrapolating animal data to humans should also involve a conservative margin of safety through establishment of uncertainty factors.

GHS and Malaysian Standards

The GHS implementation in the consumer sector in Malaysia is coordinated by the Ministry of Domestic Trade, Co-operatives and Consumerism (MDTCC). The MDTCC may want to consider the three general principles for the labeling of consumer products stated in the 'purple book' despite the possible challenges that it may be too time consuming to adapt an international document, i.e. the 'purple book', to local guidelines.

However, the good news for Malaysians is that the Department of Standards Malaysia has proactively taken the initiative to develop a Malaysian Standard (MS) based on the 'purple book', i.e the MS 1804: 2008 - Globally Harmonised System (GHS) for Classification and Labeling of Chemicals – Specifications for the Classification, Labeling and Formulation of Safety Data Sheets for Chemical Products'.

The Annex 5 in the 'purple book' has been converted to Annex J in the MS 1804:2008. This means that if Malaysia plans to implement GHS in the consumer sector, MDTCC may adopt MS 1804: 2008 to expedite the process.

MDTCC already has the experience of adopting MS into the legislation framework, i.e. through the adoption of seven MSs in the Consumer Protection (Safety Standards for Toys) Regulations 2009.

Conclusion

The definition for household chemicals is still ambiguous under the Malaysian legislative framework. It is necessary to have a clear definition for household chemicals. Once a clear definition is available, the scope of GHS to regulate household chemicals should be established. This process must involve multi-stakeholder consultation, which is crucial prior to MDTCC's decision on whether or not to adopt MS 1804:2008 as a mandatory standard.

About the Authors

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Dr. Goh Choo Ta is a Senior Lecturer / Research Fellow at the Institute for Environment and Development (LESTARI), National University of Malaysia (Universiti Kebangsaan Malaysia, UKM). He received his PhD (Environment and Development) on the study related to Globally Harmonised System of Classification and Labelling of Chemicals (GHS) from UKM. In November 2010, Dr. Goh was appointed by Malaysia Ministry of International Trade and Industry (MITI) as National GHS Project Coordinator for the GHS project entitled 'Training and Capacity Building for the Implementation of the GHS in Malaysia' facilitated by United Nations Institute for Training and Research (UNITAR). Meanwhile, Dr. Goh was also appointed by Malaysia Ministry of Domestic Trade, Cooperative and Consumerism (MDTCC) as a consultant to lead the project entitled 'GHS Comprehensibility Testing and Situation and Gap Analysis Study for Consumer'.

Prof. Dr. Mazlin Bin Mokhtar

Professor Dr. Mazlin bin Mokhtar is a Professor of Environmental Chemistry at Universiti Kebangsaan Malaysia (UKM) and he is the Director of the Institute for Environment and Development (LESTARI), UKM since August 2005. He is also a Member of UKM Senate; Fellow of The Malaysian Institute of Chemistry (FMIC); Life Member, & Former Secretary (1995-2005), Malaysian Society of Analytical Sciences (ANALIS); Life Member, & former Executive Committee (2005-2009), Malaysian Water Partnership (MyWP) that is linked to the Global Water Partnership (GWP), Sweden; Former Country Manager (2005-2008) of MyCapNet (Malaysian Capacity Building for Integrated Water Resources Management, IWRM) that is linked to International Cap Net headquartered in Pretoria-South Africa (prior in IHE Delft, Holland); and Chairman of the Langat River Basin Research Group affiliated with UNESCO-HELP network, based in Paris involving more than 90 river basins from more than 65 countries. Professor Mazlin was Founder & Chairman of MyNICHE (Malaysian Network for Integrated Management of Chemicals and Hazardous Substances for Environment & Development) since 2005. He is a Member, National Steering Committee for UNDP Small Grants Programme, Malaysia; Member, Panel of Judges for Ford Malaysia Environmental and Conservation Grant Awards, and Member of Petronas Panel of Judges on Environment and Sustainability. Prof Mazlin is also a Member and resource person of the National Coordinating Committee for GHS Malaysia (NCCGHS chaired by Ministry of International Trade and Industry, MITI), and he collaborates with United Nations Institute for Training and Research (UNITAR), Switzerland to carry out study related to GHS at ASEAN and national levels. Prof Mazlin's research group project on Chemicals Management System for Malaysia under sponsorship of Ministry of Higher Education Malaysia was awarded the best for the category of social sciences and humanities for the FRGS cycle of 1/2006-2008 at the national level.