Sustainable Human Resource Development in logistics services for ASEAN Member States

Dangerous Goods Handling

Basic Understanding about GHS

(Globally Harmonized System of Classification and Labelling of Chemicals)

Mr. Chalermsak Karnchanawarin

GHS (Globally Harmonized Systemof Classification and Labelling of Chemicals)

Objectives:

- This chapter will explain additional knowledge concerning the **Globally Harmonized System of Classification and Labelling of Chemicals (GHS)**, a newly implemented system by United Nations.
- The **detailed explanation about GHS** including its **Objective, Basic Principles, Key Elements** will be explained.
- **GHS Hazard Classification** system which classify chemicals into 3 major hazards (physical/health/environmental hazards) will be discussed.

GHS (Globally Harmonized Systemof Classification and Labelling of Chemicals)

Objectives:

- **GHS Hazard Communication** will be highlighted in terms of both requirements on Labels and Safety Data Sheet (SDS).
- This chapter will also guide how the **GHS will be applied together with the UN DG labels** on packaging of chemicals as well as dangerous goods in terms of both single and combination packaging.
- The concept of **Chemical Risk Assessment and Management** will be further elaborated how GHS will be concerned in the future.

GHS (Globally Harmonized Systemof Classification and Labelling of Chemicals)

Presentation Outline:

- Why to implement GHS?
- What is GHS? / Objective of GHS
- GHS – The Purple Book
- The Scope of GHS
- Basic Principles of GHS
- Key Elements of GHS
- Hazard Classification under GHS (Physical/Health/Environmental Hazards)
- Building Block Approach under GHS

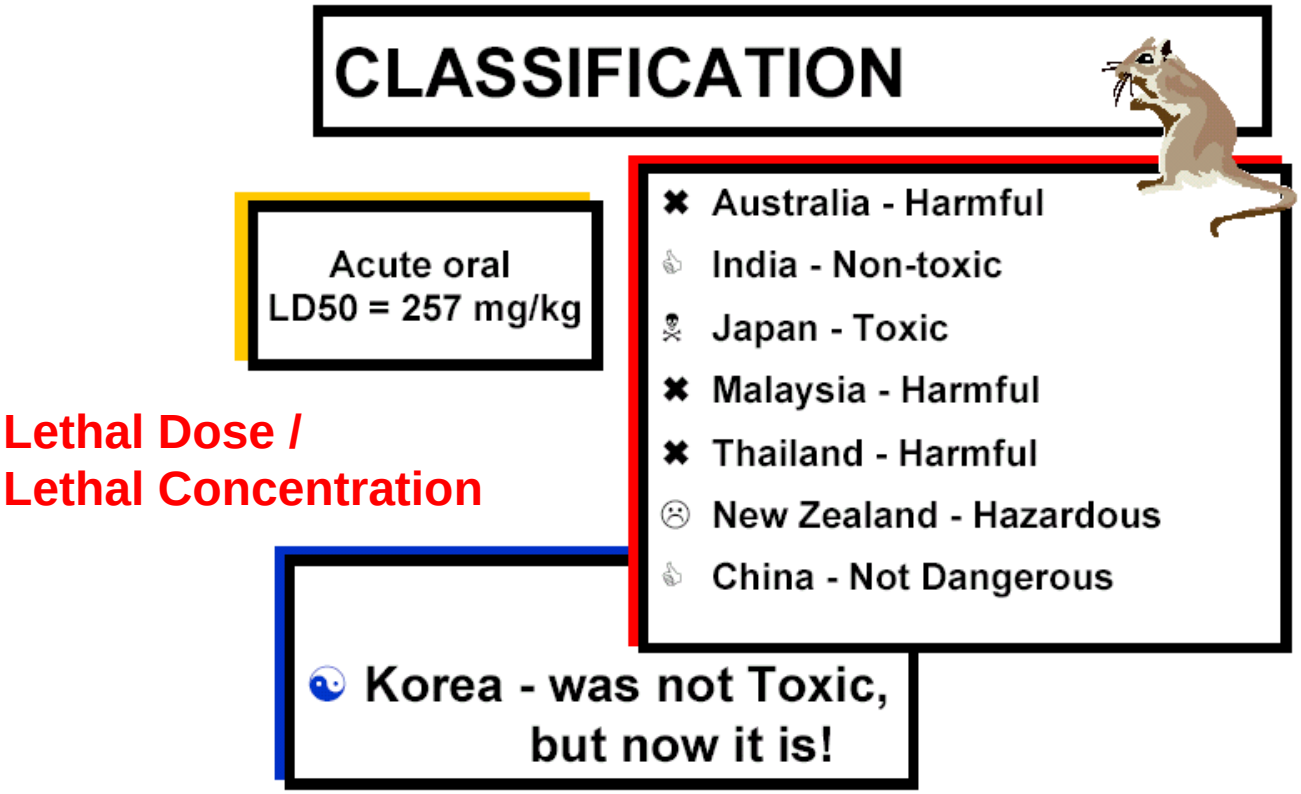
GHS (Globally Harmonized Systemof Classification and Labelling of Chemicals)

Presentation Outline:

- Hazard Communication under GHS
  - GHS Labels
  - GHS Safety Data Sheet (SDS)
- Basic Concept about Risk Assessment
- Risk Assessment vs Risk Management
- Hazard Based vs Risk Based System
- Exposure Assessment
- GHS as a baseline of Chemical Management

Why to implement GHS?

Different Hazard Classification



Lethal Dose / Lethal Concentration

Why to implement GHS?

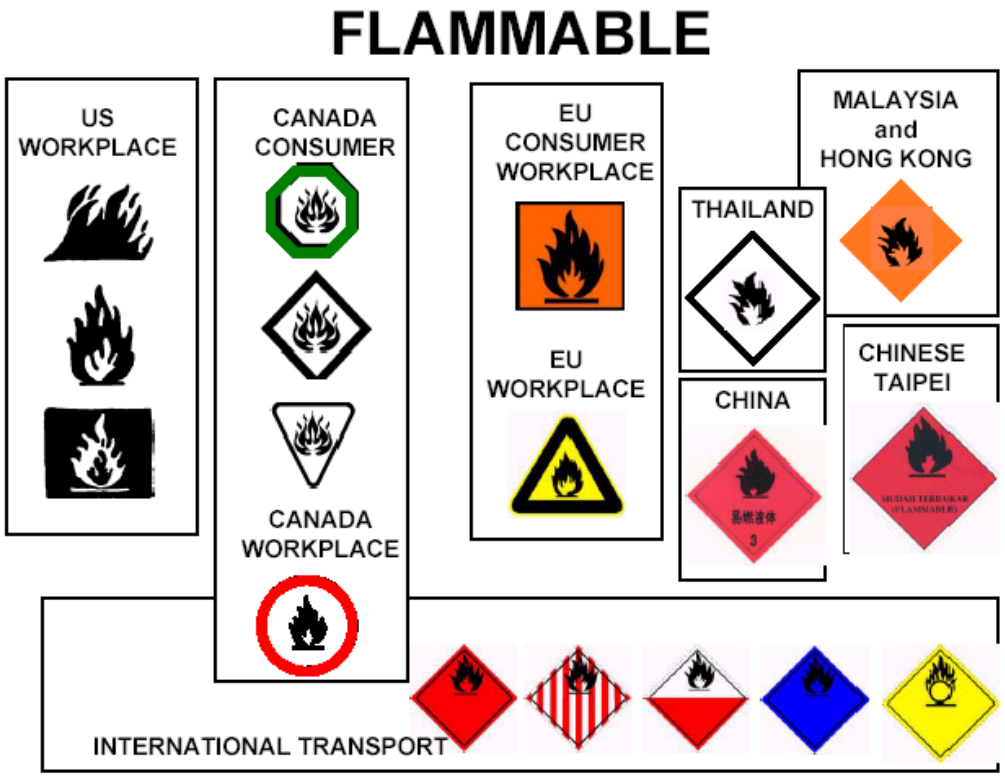
Different Hazard Classification

Differences of Acute toxicity (oral) categories

Criteria [mg/kg]	5	25	50	200	300	500	2,000	5,000
GHS categories	1	2	3	4			5	
EU R-phrase	R28 T^+ Very toxic		R25 T Toxic			R22 Xn Harmful		
U.S.A	Very toxic			Toxic		Harm ful		
Japan	Toxic			Deleteri ous				
UNTDG 6.1 Toxic substances	Very serious risk PG I		Serious Risk PG II	Low Risk PG III		Low Risk PG III		

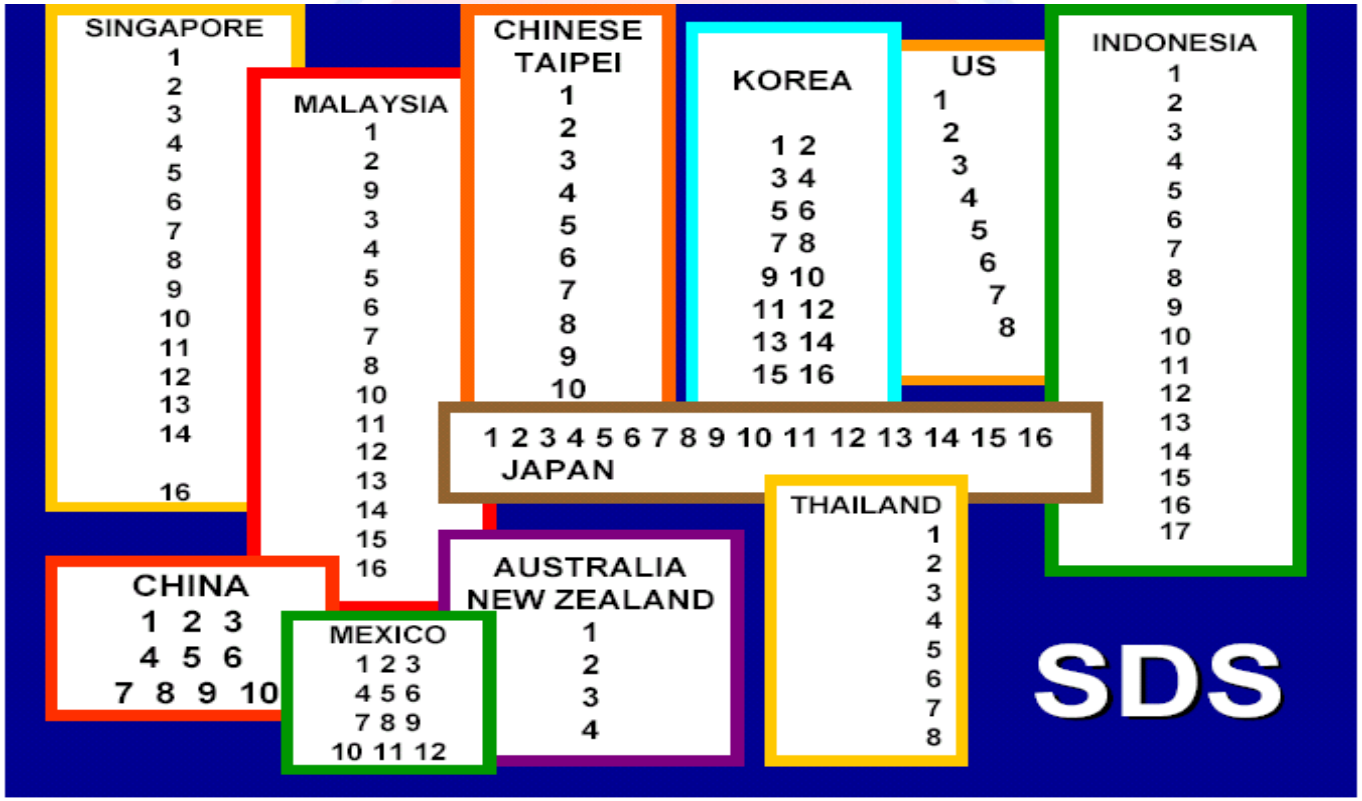
Why to implement GHS?

Different Hazard Communication



Why to implement GHS?

Different Hazard Communication



What is GHS?

A common and coherent approach

- To define and classify hazards
- To communicate information on labels and Safety Data Sheets (SDS)

Objective of GHS

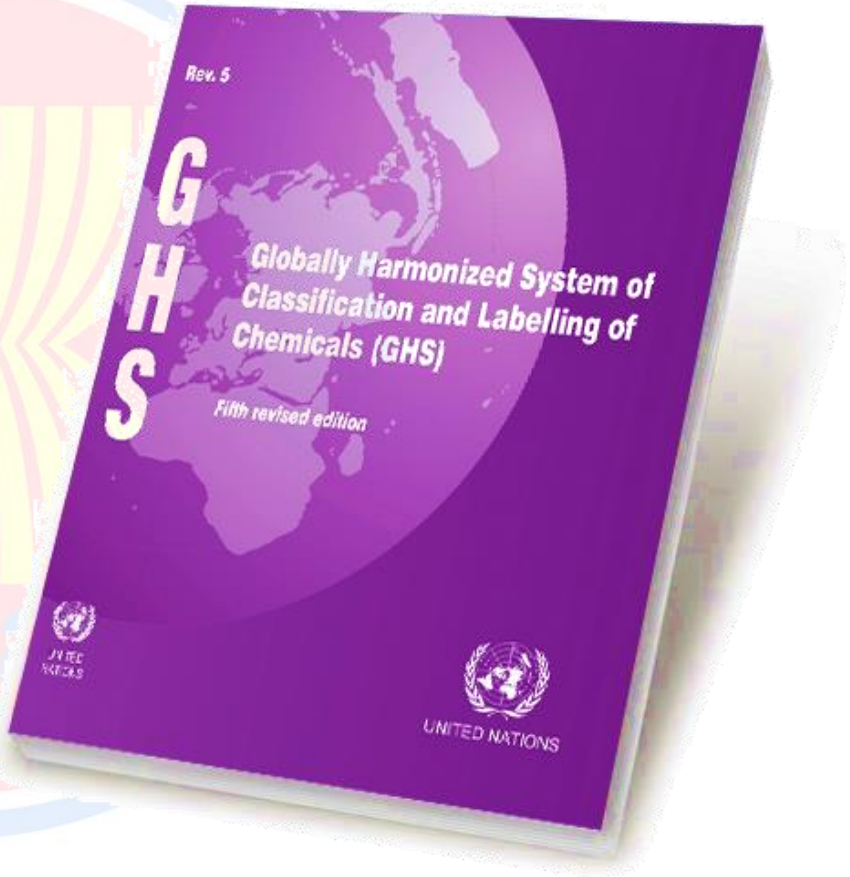
- To enhance the protection of human health and the environment.

GHS – The Purple Book

Globally Harmonized System
of Classification and Labelling
of Chemicals

GHS

"5th Revised Edition"
Issued year: 2013



The Scope of GHS

- Covers all hazardous chemical substances, dilute solutions and mixtures
- Pharmaceuticals, food additives, cosmetics and pesticide residues in food
  - **Not be covered at the point of intake**
  - **Will be covered where workers may be exposed and in transport**

Basic Principles of GHS

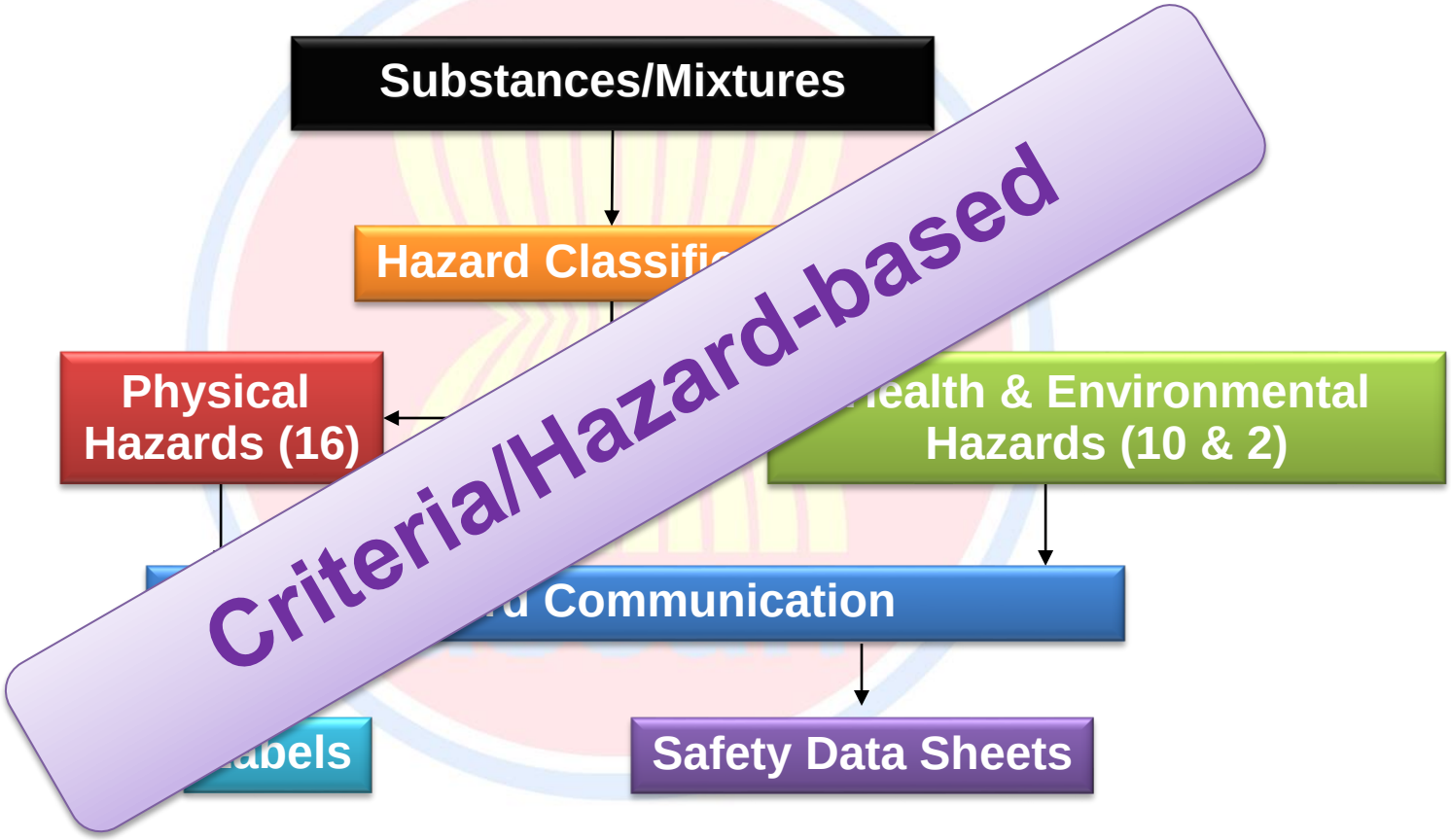
1. Hazard Classification

- **1.1 Physical Hazards** -> Hazard Classes x 16 -> Hazard Category
- **1.2 Health Hazards** -> Hazard Classes x 10
- **1.3 Environmental Hazards** -> Hazard Classes x 2

2. Hazard Communication

- **2.1 Labels** - Pictograms / Signal Words / Hazard Statements / Precautionary Statement
- **2.2 SDS** Section 2<->3

Key Elements of GHS



Hazard Classification under GHS (3rd Revised Edition)

2. Physical Hazards	GHS Recommendation Hazard Classes						
2.1 Explosives	Unstable Explosives	Division 1.1	Division 1.2	Division 1.3	Division 1.4	Division 1.5	Division 1.6
2.2 Flammable gases	Category 1	Category 2					
2.3 Flammable aerosols	Category 1	Category 2					
2.4 Oxidizing gases	Category 1						
2.5 Gases under pressure	Compressed gas	Liquefied gas	Refigerated liquefied gas	Dissolved gas			
2.6 Flammable liquids	Category 1	Category 2	Category 3	Category 4			
2.7 Flammable solids	Category 1	Category 2					
2.8 Self-reactive substances and mixtures	Type A	Type B	Type C	Type D	Type E	Type F	Type G
2.9 Pyrophoric liquids	Category 1						
2.10 Pyrophoric solids	Category 1						
2.11 Self-heating substances and mixtures	Category 1	Category 2					
2.12 Substances and mixtures which in contact with water emits flammable gases	Category 1	Category 2	Category 3				
2.13 Oxidizing liquids	Category 1	Category 2	Category 3				
2.14 Oxidizing solids	Category 1	Category 2	Category 3				
2.15 Organic peroxides	Type A	Type B	Type C	Type D	Type E	Type F	Type G
2.16 Corrosive to metals	Category 1						

Hazard Classification under GHS (3rd Revised Edition)

3. Health Hazards	GHS Recommendation Hazard Classes				
3.1 Acute Toxicity	Category 1	Category 2	Category 3	Category 4	Category 5
3.2 Skin Corrosion/Irritation	Category 1A	Category 1B	Category 1C	Category 2	Category 3
3.3 Serious eye damage/eye irritation	Category 1	Category 2A	Category 2B		
3.4 Respiratory or skin sensitization	Category 1	Category 1A	Category 1B		
3.5 Germ cell mutagenicity	Category 1A	Category 1B	Category 2		
3.6 Carcinogenicity	Category 1A	Category 1B	Category 2		
3.7 Reproductive toxicity	Category 1A	Category 1B	Category 2	Addtl Category (affects via lactation)	
3.8 Specific target organ toxicity - Single exposure)	Category 1	Category 2	Category 3		
3.9 Specific target organ toxicity - Repeated exposure)	Category 1	Category 2			
3.10 Aspiration hazard	Category 1	Category 2			

4. Environmental Hazards	GHS Recommendation Hazard Classes				
4.1 Hazardous to the aquatic environment - Acute toxicity	Category 1	Category 2	Category 3		
- Chronic toxicity	Category 1	Category 2	Category 3	Category 4	
4.2 Hazardous to the ozone layer	Category 1				

Building Block Approach under GHS

- Countries are free to determine which of the ***building blocks*** will be applied in different parts of their systems.
  - **Hazard Classes** are building blocks
  - Within hazard classes, each **hazard category** can be seen as a building block:-
    - The classification criteria **(cut-off values/concentration limits)** for adopted hazard categories should not be altered.
    - When a hazard category is adopted, all the categories for higher hazard levels in that class must be adopted.

Building Block Approach under GHS

Hazard class	Hazard category	GHS		E U	USA	Japan	MY	SG	VN	TH	ID	AU
		3rd Rev. ed.	4th Rev. ed	CLP Reg.	Rev. HCS	JIS Z 7253	DOSH	SS 586	MoIT Circ.	MOI Notice	MOI Guide	WHSR
1. Explosive	Unstable explosive	O	O	O	O	O	O	O	O	O	O	O
	Div.1.1	O	O	O	O	O	O	O	O	O	O	O
	Div.1.2	O	O	O	O	O	O	O	O	O	O	O
	Div.1.3	O	O	O	O	O	O	O	O	O	O	O
	Div.1.4	O	O	O	O	O	O	O	O	O	O	O
	Div.1.5	O	O	O	O	O	O	O	O	O	O	O
2.Flammable gases (including chemical unstable gases)	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	X
	Cat. A		O			O						
	Cat. B		O			O						
3. Aerosols	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3		O			O						
4 Oxidizing gases	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
5. Oxidizing gases	Compressed gas	O	O	O	O	O	O	O	O	O	O	O
	Liquefied gas	O	O	O	O	O	O	O	O	O	O	O
	Refrigerated liquefied gas	O	O	O	O	O	O	O	O	O	O	O
	Dissolved gas	O	O	O	O	O	O	O	O	O	O	O
6 Flammable liquids	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3	O	O	O	O	O	O	O	O	O	O	O
	Cat. 4	O	O	X	O	O	X	X	O	O	O	O
7 Flammable solids	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O

Building Block Approach under GHS

Hazard class	Hazard category	GHS		E U	USA	Japan	MY	SG	VN	TH	ID	AU
		3rd Rev. ed.	4th Rev. ed	CLP Reg.	Rev. HCS	JIS Z 7253	DOSH	SS 586	MoIT Circ.	MOI Notice	MOI Guide	WHSR
8 Self-reactive substances and mixtures	Type A	O	O	O	O	O	O	O	O	O	O	O
	Type B	O	O	O	O	O	O	O	O	O	O	O
	Type C&D	O	O	O	O	O	O	O	O	O	O	O
	Type E&F	O	O	O	O	O	O	O	O	O	O	O
	Type G	O	O	O	O	O	O	O	O	O	O	O
9 Pyrophoric liquids	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
10 Pyrophoric solids	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
11 Self-heating substances and mixtures	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
12. Substances and mixtures which, in contact with water, emit flammable gases	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3	O	O	O	O	O	O	O	O	O	O	O
13 Oxidizing liquids	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3	O	O	O	O	O	O	O	O	O	O	O
14 Oxidizing solids	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3	O	O	O	O	O	O	O	O	O	O	O
15 Organic peroxides	Type A	O	O	O	O	O	O	O	O	O	O	O
	Type B	O	O	O	O	O	O	O	O	O	O	O
	Type C&D	O	O	O	O	O	O	O	O	O	O	O
	Type E&F	O	O	O	O	O	O	O	O	O	O	O
	Type G	O	O	O	O	O	O	O	O	O	O	O
16 Corrosive to metals	Cat. 1	O	O	O	O	O	O	O	O	O	O	O

Building Block Approach under GHS

Hazard class	Hazard category	GHS		E U	USA	Japan	MY	SG	VN	TH	ID	AU
		3rd Rev. ed.	4th Rev. ed	CLP Reg.	Rev. HCS	JIS Z 7253	DOSH	SS 586	MoIT Circ.	MOI Notice	MOI Guide	WHSR
1 Acute toxicity	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3	O	O	O	O	O	O	O	O	O	O	O
	Cat. 4	O	O	O	O	O	O	O	O	O	O	O
	Cat. 5	O	O	x	x	x	x	x	O	O	O	x
2 Skin corrosion / irritation	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3	O	O	x	x	x	x	x	O	O	O	x
3 Serious eye damage /eye irritation	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2A	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2B	O	O			O		O	O	O	O	x
4 Respiratory sensitization Serious eye damage /eye irritation	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 1A	O	O	O	O	O				O		O
	Cat. 1B	O	O	O	O	O				O		O
5 Germ cell mutagenicity	Cat. 1A	O	O	O	O	O	O	O	O	O	O	O
	Cat. 1B	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
6 Carcinogenicity	Cat. 1A	O	O	O	O	O	O	O	O	O	O	O
	Cat. 1B	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
7 Reproductive toxicity	Cat. 1A	O	O	O	O	O	O	O	O	O	O	O
	Cat. 1B	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Add, Cat.	O	O	O	O	O	O	O	O	O	O	O

Building Block Approach under GHS

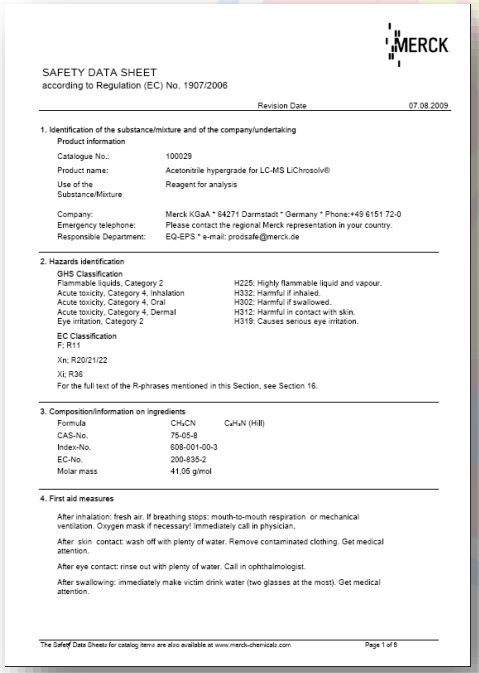
Hazard class	Hazard category	GHS		E U	USA	Japan	MY	SG	VN	TH	ID	AU
		3rd Rev. ed.	4th Rev. ed	CLP Reg.	Rev. HCS	JIS Z 7253	DOSH	SS 586	MoIT Circ.	MOI Notice	MOI Guide	WHSR
8 Specific target organ toxicity (single exposure)	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
	Cat. 3	O	O	O	O	O	O	O	O*	O	O	O
9 Specific target organ toxicity (repeated exposure)	Cat. 1	O	O	O	O	O	O	O	O	O	O	O
	Cat. 2	O	O	O	O	O	O	O	O	O	O	O
10 Aspiration hazard	Cat. 1	O	O	O	O	O	O	O	O*	O	O	O
	Cat. 2	O	O	X	X	X	X	X	O*	O	O	X

Hazard class	Hazard category	GHS		E U	USA	Japan	MY	SG	VN	TH	ID	AU
		3rd Rev. ed.	4th Rev. ed	CLP Reg.	Rev. HCS	JIS Z 7253	DOSH	SS 586	MoIT Circ.	MOI Notice	MOI Guide	WHSR
Hazardous to the aquatic environment - acute hazard	Cat. 1	O	O	O		O	O	O	O	O	O	
	Cat. 2	O	O	X		O	X	X	O	O	O	
	Cat. 3	O	O	X		O	X	X	O	O	O	
Hazardous to the aquatic Environment - long-term hazard	Cat. 1	O	O	O		O	O	O	O	O	O	
	Cat. 2	O	O	O		O	O	O	O	O	O	
	Cat. 3	O	O	O		O	O	X	O	O	O	
	Cat. 4	O	O	O		O	O	X	O	O	O	
Hazardous to the ozone layer	Cat. 1	O	O	O		O	O			O		

Source: Hiroshi Sano, Japan Chemical Database Ltd.

Hazard Communication under GHS

1. Labels


MERCK

SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

Revision Date 07.08.2009

1. Identification of the substance/mixture and of the company/undertaking
Product information
Catalogue No.: 100029
Product name: Acetonitrile hypergrade for LC-MS LiChrosolv®
Use of the Substance/Mixture: Reagent for analysis
Company: Merck KGaA * 64271 Darmstadt * Germany * Phone:+49 6151 72-0
Emergency telephone: Please contact the regional Merck representation in your country.
Responsible Department: EQ-EPS * e-mail: prodsafe@merck.de

2. Hazards identification
GHS Classification
Flammable liquids, Category 2 — H225: Highly flammable liquid and vapour.
Acute toxicity, Category 4, Inhalation — H332: Harmful if inhaled.
Acute toxicity, Category 4, Oral — H302: Harmful if swallowed.
Acute toxicity, Category 4, Dermal — H312: Harmful in contact with skin.
Eye irritation, Category 2 — H319: Causes serious eye irritation.
EC Classification
F; R11
Xn; R20/21/22
Xi; R36
For the full text of the R-phrases mentioned in this Section, see Section 16.

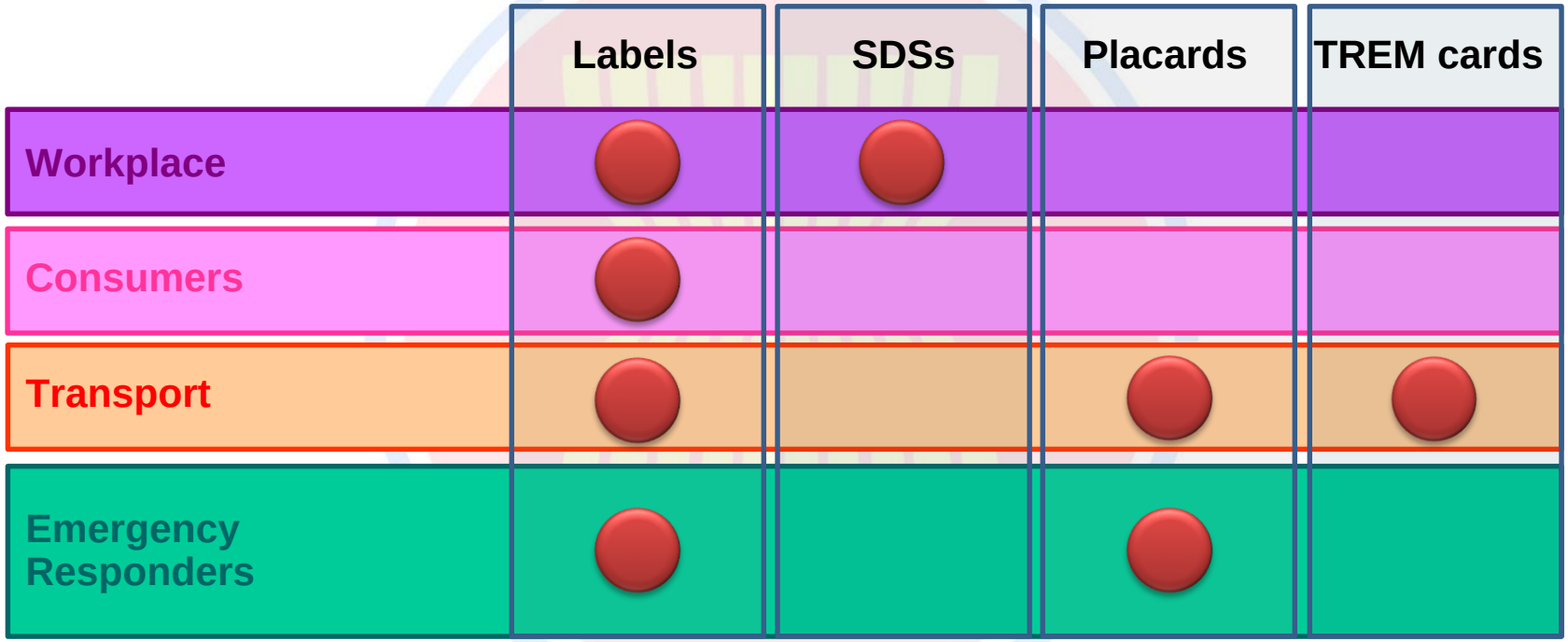
3. Composition/information on ingredients
Formula CH3CN C2H3N (Hill)
CAS-No. 75-05-8
Index-No. 608-001-00-3
EC-No. 200-835-2
Molar mass 41.05 g/mol

4. First aid measures
After inhalation: fresh air. If breathing stops: mouth-to-mouth respiration or mechanical ventilation. Oxygen mask if necessary! Immediately call in physician.
After skin contact: wash off with plenty of water. Remove contaminated clothing. Get medical attention.
After eye contact: rinse out with plenty of water. Call in ophthalmologist.
After swallowing: immediately make victim drink water (two glasses at the most). Get medical attention.

The Safety Data Sheets for catalog items are also available at www.merck-chemicals.com Page 1 of 8

2. Safety Data Sheets (SDS)

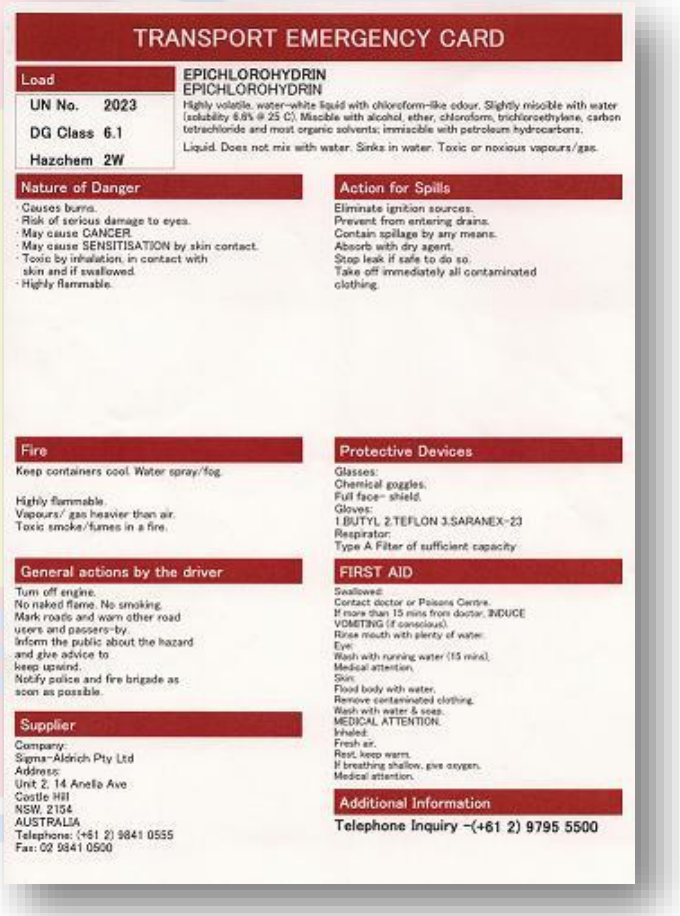
Hazard Communication – Target Audience



Remark: Use of SDSs in Transport & Emergency sectors are needed in case of emergency case and when technical knowledge may be required.

Hazard Communication under GHS

TREM Card (Transport Emergency Card)



TRANSPORT EMERGENCY CARD

Load

EPICHLOROHYDRIN
EPICHLOROHYDRIN

UN No. 2023
DG Class 6.1
Hazchem 2W

Highly volatile, water-white liquid with chloroform-like odour. Slightly miscible with water (solubility 6.6% @ 25 C). Miscible with alcohol, ether, chloroform, trichloroethylene, carbon tetrachloride and most organic solvents; immiscible with petroleum hydrocarbons.

Liquid. Does not mix with water. Sinks in water. Toxic or noxious vapours/gas.

Nature of Danger

- Causes burns.
- Risk of serious damage to eyes.
- May cause CANCER.
- May cause SENSITISATION by skin contact.
- Toxic by inhalation, in contact with skin and if swallowed.
- Highly flammable.

Action for Spills

Eliminate ignition sources.
Prevent from entering drains.
Contain spillage by any means.
Absorb with dry agent.
Stop leak if safe to do so.
Take off immediately all contaminated clothing.

Fire

Keep containers cool. Water spray/fog.

Highly flammable.
Vapours/ gas heavier than air.
Toxic smoke/fumes in a fire.

Protective Devices

Glasses:
Chemical goggles.
Full face- shield.
Gloves:
1.BUTYL 2.TEFLON 3.SARANEX-23
Respirator:
Type A Filter of sufficient capacity

General actions by the driver

Turn off engine.
No naked flame. No smoking.
Mark roads and warn other road users and passers-by.
Inform the public about the hazard and give advice to keep upwind.
Notify police and fire brigade as soon as possible.

FIRST AID

Swallowed:
Contact doctor or Poisons Centre.
If more than 15 mins from doctor, INDUCE VOMITING (if conscious).
Rinse mouth with plenty of water.
Eye:
Wash with running water (15 mins).
Medical attention.
Skin:
Flood body with water.
Remove contaminated clothing.
Wash with water & soap.
MEDICAL ATTENTION.
Inhaled:
Fresh air.
Rest, keep warm.
If breathing shallow, give oxygen.
Medical attention.

Supplier

Company:
Sigma-Aldrich Pty Ltd
Address:
Unit 2, 14 Anella Ave
Castle Hill
NSW, 2154
AUSTRALIA
Telephone: (+61 2) 9841 0555
Fax: 02 9841 0500

Additional Information

Telephone Inquiry -(+61 2) 9795 5500

Hazard Communication under GHS

Elements of GHS Labels

- Pictograms
- Signal Words
- Hazard Statements
- Precautionary Statements
- Product Identifier
- Supplier Identification
- Supplemental Information

Hazard Communication under GHS

Example of GHS Label

Methanol 14kg	**Methyl Alcohol** CH3OH=32.04 CAS No. 65-56-1 UN No. 1230	Product identifier
		Pictogram
DANGER		Signal word
Hazard statements: ·Highly flammable liquid and vapor ·May be harmful if swallowed ·Cause serious eye irritation ·May damage fertility or the unborn child ·Causes damage to organs (central nervous system, visual organ, systemic toxicity) ·May cause respiratory irritation ·May cause drowsiness and dizziness ·Cause damage to organs (central nervous system, visual organ) through prolonged or repeated exposure		Hazard statements
Precautionary statements: ·Do not handle until all safety precautions have been read and understood. ·Keep container tightly closed. ·Keep away from heat/sparks/open flame – No smoking. ·Wear protective gloves and eye/face protection. ·Do not eat, drink or smoke when using this product. ·Use only outdoors or in well ventilated area. ·Wash thoroughly after handling.		Precautionary statements
United Nations Co., Ltd. 1-1, Peace Ave., Geneva Switzerland Tel. 41 22 917 00 00 Fax. 41 22 917 00 00		Supplier identification

Hazard Communication under GHS

Example of Label Elements – Acute Toxicity (Oral)

	Category 1	Category 2	Category 3	Category 4	Category 5
1. Pictograms					No Symbol
2. Signal words	Danger	Danger	Danger	Warning	Warning
3. Hazard Statements	Fatal if swallowed	Fatal if swallowed	Toxic if swallowed	Harmful if Swallowed	May be harmful if swallowed

Hazard Communication under GHS

GHS Symbols

Flame	Flame over circle	Exploding bomb	Corrosion
			

Gas cylinder	Skull & crossbones	Exclamation mark	Health hazard	Environmental hazard
				

Hazard Communication – GHS Pictograms

- Explosives
- Self-reactive substances (Type A, B)
- Organic peroxides (Type A,B)

- Flammable substances
- Self-reactive substances (Type B, C&D, E&F)
- Pyrophoric substances
- Self-heating substances
- Organic peroxides

- Oxidizing gases
- Oxidizing liquids
- Oxidizing solids

- Gases under pressure

- Corrosive to metal
- Skin corrosion
- Serious eye damage

- Sensitization (Respiratory)
- Mutagenicity
- Carcinogenicity
- Reproductive toxicity
- Target organ toxicity
- Aspiration hazard

- Acute toxicity (Severe)

- Acute toxicity
- Skin irritation
- Eye irritation
- Sensitization (dermal)
- Target organ toxicity
- Ozone depleting substances

- Environmental toxicity

Remark: Competent authority may choose to use a black border for domestic use

Hazard Communication – UNTDG Labels

CLASS 1: EXPLOSIVES

Division 1.1, 1.2 and 1.3 | Division 1.4 | Division 1.5 | Division 1.6

CLASS 2: GASES

Division 2.1 Flammable gases | Division 2.2 Non-flammable, non-toxic gases | Division 2.3 Toxic gases

CLASS 3: FLAMMABLE LIQUIDS

CLASS 4: FLAMMABLE SOLIDS

Division 4.1 Flammable solids | Division 4.2 Substances liable to spontaneous combustion | Division 4.3 Substances which in contact with water emit flammable gases

CLASS 5: OXIDIZING SUBSTANCES AND ORGANIC PEROXIDES

Division 5.1 Oxidizing substances | Division 5.2 Organic peroxides

CLASS 6: TOXIC AND INFECTIOUS SUBSTANCES

Division 6.1 Toxic substances | Division 6.2 Infectious substances

CLASS 7: RADIOACTIVE MATERIALS

CLASS 8: CORROSIVE SUBSTANCES

CLASS 9: MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

Hazard Communication under GHS

Signal Words

("Danger" or "Warning")

- Used to emphasize hazard and to discriminate between hazard categories (level of hazards)
- e.g. Acute toxicity category 1, 2, 3 will require "Danger", category 4 will require "Warning"

Hazard Communication under GHS

Hazard Statements

- A single harmonized hazard statement for each hazard category within each hazard class

	e.g. Flammable liquid	e.g. Acute Toxicity (Oral)
Category 1	H224: Extremely flammable liquid & vapor	H300: Fatal if swallowed
Category 2	H225: Highly flammable liquid & vapor	H300: Fatal if swallowed
Category 3	H226: Flammable liquid & vapor	H301: Toxic if swallowed
Category 4	H227: Combustible liquid	H302: Harmful if swallowed
Category 5		H303: Maybe harmful if swallowed

Hazard Communication under GHS

Hazard Statements

Under 2007 version, H-Code is used to signify the hazard statements.

- 2 – Physical hazards
- 3 – Health hazards
- 4 – Environmental hazards

Hazard Communication under GHS

Precautionary Statements

- GHS label should include appropriate precautionary information
- Precautionary statements are divided into five types:
  (see: GHS Annex 3)

1. General / 2. Prevention / 3. Response / 4. Storage / 5. Disposal

- Consideration should be given to select precautionary statements for each target audience (general public or industrial worker).

Hazard Communication under GHS

Precautionary Statements

ACUTE TOXICITY - ORAL
(CHAPTER 3.1)

Symbol
Skull and crossbones

Hazard category	Signal word	Hazard statement
3	Danger	H301 Toxic if swallowed

Precautionary statements			
Prevention	**Response**	**Storage**	**Disposal**
P264 **Wash … thoroughly after handling.** … Manufacturer/supplier or the competent authority to specify parts of the body to be washed after handling. P270 **Do not eat, drink or smoke when using this product.**	P301 + P310 **IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.** P321 **Specific treatment (see ... on this label)** ... Reference to supplemental first aid instruction. - *if immediate administration of antidote is required.* P330 **Rinse mouth.**	P405 **Store locked up.**	P501 **Dispose of contents/container to...** ... in accordance with local/regional/national/international regulations (to be specified).

Hazard Communication under GHS

Precautionary Statements

European Union (COUNCIL DIRECTIVE 92/58/EEC of 24 June 1992)

Hazard Communication under GHS

Product Identifier

- **Substances**

  Chemical identity (name as determined by IUPAC, ISO, CAS or technical name)

- **Mixtures**

  Chemical identities of all ingredients contributing to acute toxicity, skin or eye corrosion, mutagenicity, carcinogenicity, reproductive toxicity, skin or respiratory sensitization, or target organ toxicity

- **UN Proper Shipping Name & UN No. also to be used**

  when substances or mixtures are covered by UNTDG

Hazard Communication under GHS

Supplier Identification

- The name address & telephone should be provided on the label

Supplemental Information

- Information on labels not harmonized under GHS but are important may be placed on the labels.
- Competent authority determines if additional information are needed
- Supplier may choose to add supplemental information on their own initiatives

Hazard Communication under GHS

Other points to consider

❖ Declaration of Ingredients

Competent authorities should establish appropriate mechanism for **C**onfidential **B**usiness **I**nformation **(CBI)** protection. CBI will not be harmonized under GHS.

❖ Common Practices under CBI

- Declaration of ingredients in **percentage range**
- Not declaration the **CAS Number** of specific substances
- Declaration as **CBI substances**

Hazard Communication under GHS

Precedence for allocation of symbols & signal words

Skin/Eye irritation

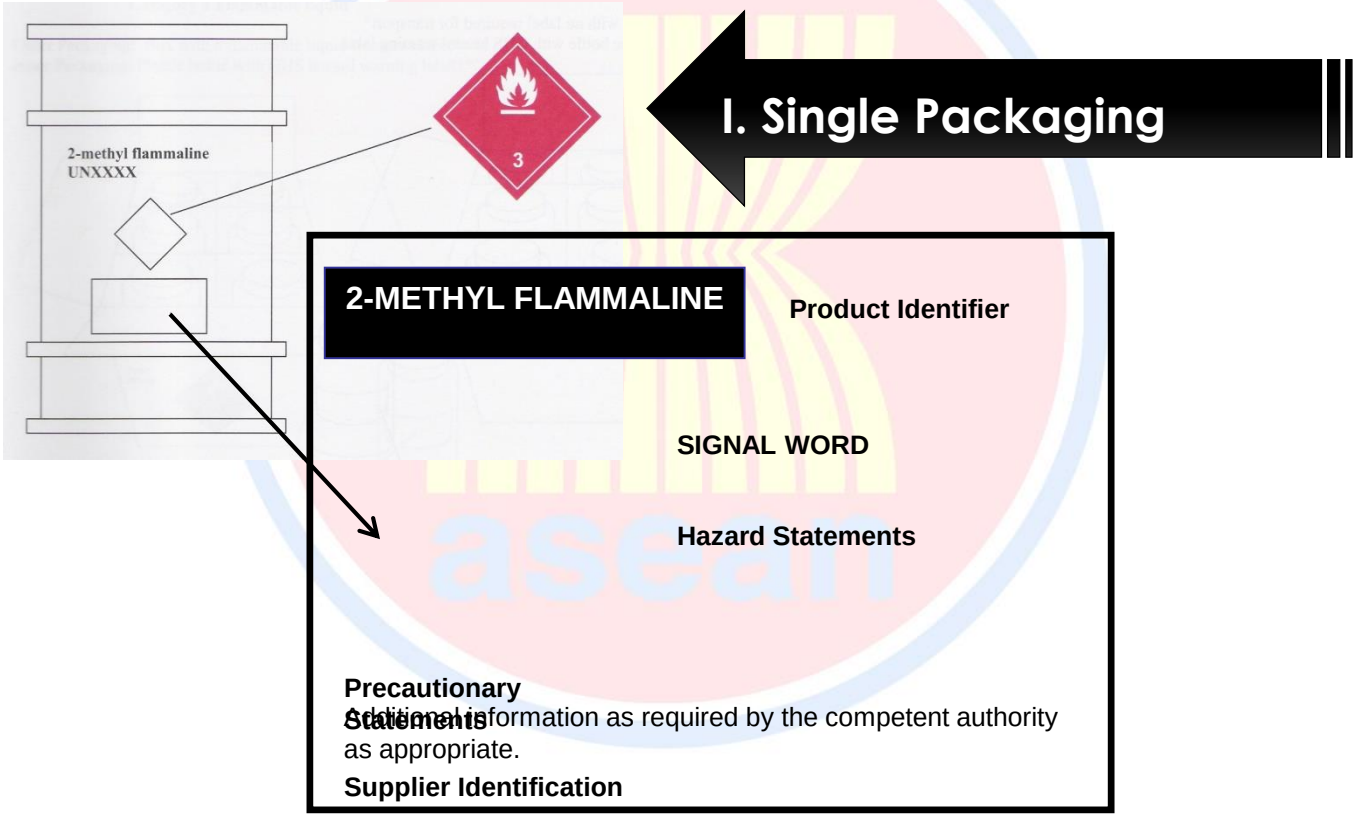
Respiratory sensitization

Skin Sensitization, Skin/Eye Irritation

DANGER > WARNING

Hazard Communication under GHS

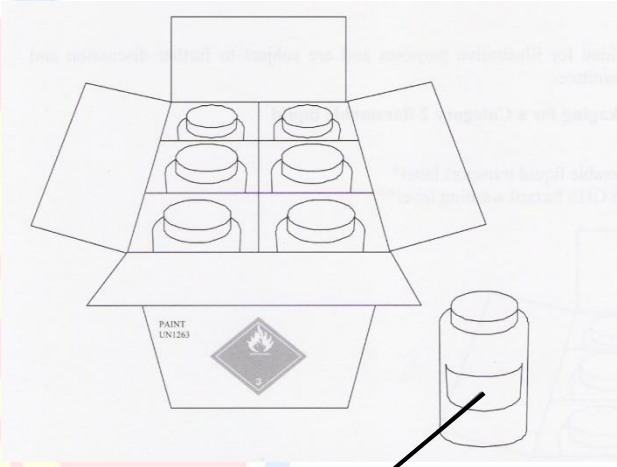
Example of GHS Label



Hazard Communication under GHS

Example of GHS Label

II. Combination Packaging



PAINT (FLAMMALINE,

Product Identifier

SIGNAL WORD

Hazard Statements

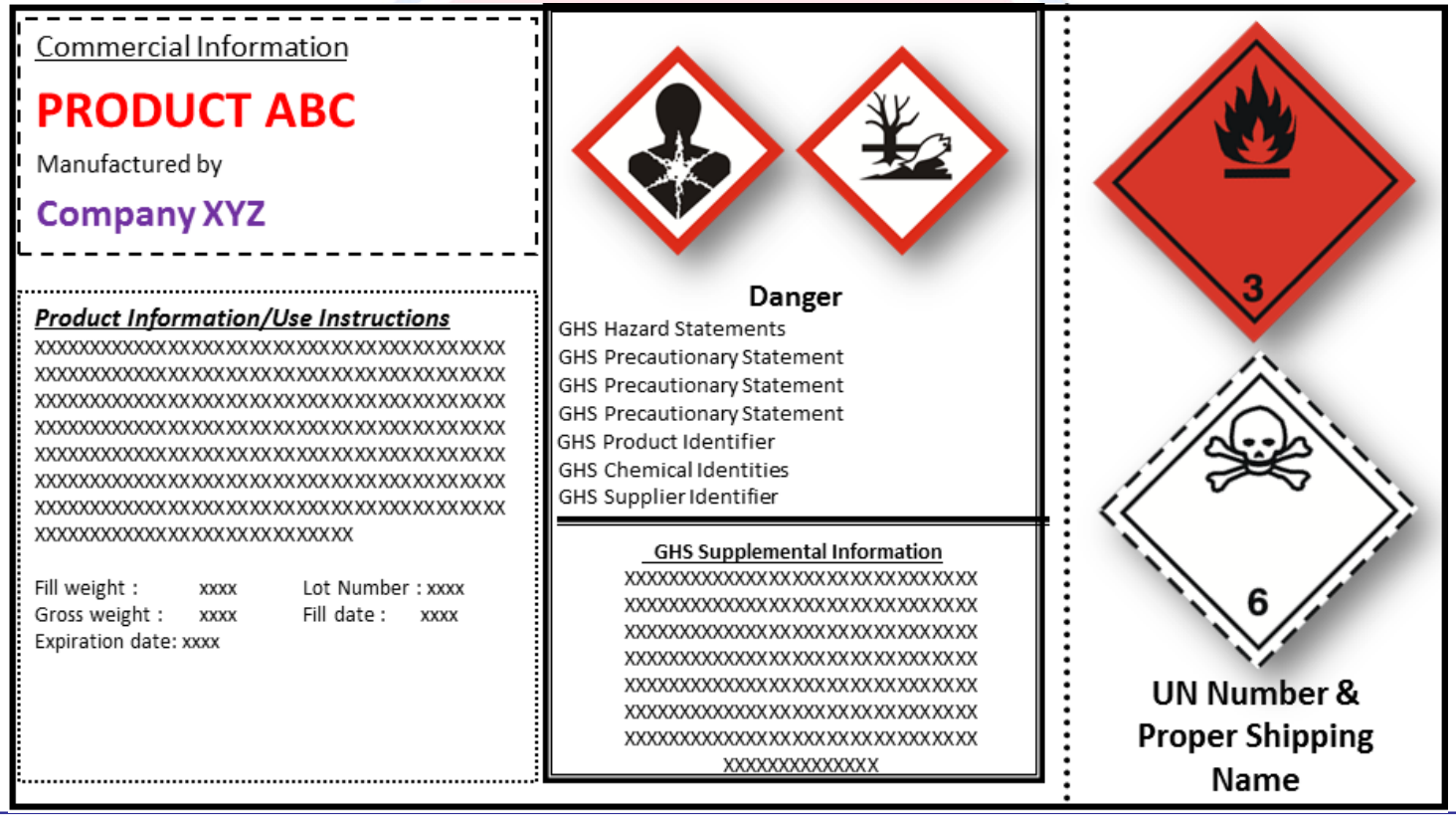
Precautionary Statements

Additional information as required by the competent authority as appropriate.

Supplier Identification

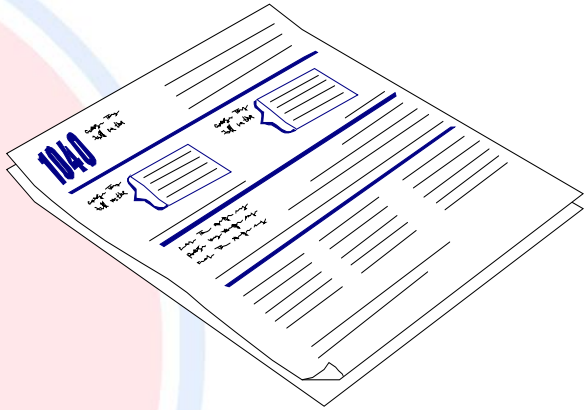
Hazard Communication under GHS

Combination of GHS & UNTDG Label



Hazard Communication under GHS

Safety Data Sheet (SDS)



- Primarily workplace use
- **16 headings** format agreed
- Minimum additional information specified, where applicable or available, under the relevant headings

Hazard Communication under GHS

Criteria for SDS Production

- For all substances and mixtures which meet the harmonized criteria for physical, health or environmental hazards under the GHS

- An SDS should be provided based on the generic cut-off values/concentration limits indicated in the next table.

Hazard Communication under GHS

Criteria for SDS Production

Hazard class (Health & Environmental Hazards)	Cut-off value Concentration limit
Acute Toxicity	≥ 1.0%
Skin Corrosion/Irritation	≥ 1.0%
Serious damage to eyes/eye irritation	≥ 1.0%
Respiratory/Skin sensitization	≥ 1.0%
Mutagenicity: Category1	≥ 0.1%
Mutagenicity: Category2	≥ 1.0%
Carcinogenicity	≥ 0.1%
Reproductive Toxicity	≥ 0.1%
Target Organ Systemic Toxicity (Single Exp.)	≥ 1.0%
Target Organ Systemic Toxicity (Repeat Exp.)	≥ 1.0%
Hazardous to the Aquatic Environment	≥ 1.0%

Hazard Communication under GHS

Use of GHS SDS

1. Identification
2. **Hazard(s) identification**
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection
9. Physical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal information
14. Transport information
15. Regulatory information
16. Other information

Hazard Communication under GHS - SDS

Substances Info & Properties	Hazard Prevention and Protection	First Aid & Emergency Response	Additional Information
1. Identification	1. Identification	1. Identification	1. Identification
2. Hazard Identification	2. Hazard Identification	2. Hazard Identification	2. Hazard Identification
3. Composition/Ingredients	3. Composition/Ingredients	3. Composition/Ingredients	3. Composition/Ingredients
4. First Aid Measures	4. First Aid Measures	4. First Aid Measures	4. First Aid Measures
5. Fire Fighting Measures	5. Fire Fighting Measures	5. Fire Fighting Measures	5. Fire Fighting Measures
6. Accidental Release Measures	6. Accidental Release Measures	6. Accidental Release Measures	6. Accidental Release Measures
7. Handling/Storage	7. Handling/Storage	7. Handling/Storage	7. Handling/Storage
8. Exposure Control/PP	8. Exposure Control/PP	8. Exposure Control/PP	8. Exposure Control/PP
9. Physical Properties	9. Physical Properties	9. Physical Properties	9. Physical Properties
10. Stability & Reactivity	10. Stability & Reactivity	10. Stability & Reactivity	10. Stability & Reactivity
11. Toxicological Info	11. Toxicological Info	11. Toxicological Info	11. Toxicological Info
12. Ecological Info	12. Ecological Info	12. Ecological Info	12. Ecological Info
13. Disposal Info	13. Disposal Info	13. Disposal Info	13. Disposal Info
14. Transport Info	14. Transport Info	14. Transport Info	14. Transport Info
15. Regulatory Info	15. Regulatory Info	15. Regulatory Info	15. Regulatory Info
16. Other Info	16. Other Info	16. Other Info	16. Other Info

Hazard Communication under GHS - SDS

1	**Identification of the substance or mixture and of the supplier**	• GHS product identifier • Other means of identification • Recommended use of the chemical and restrictions on use • Supplier's details (including name, address, phone number etc) • Emergency phone number.
2	**Hazards identification**	• GHS classification of the substance/mixture and any National or regional information • GHS label elements, including precautionary statements. Other hazards which do not result in classification or are not covered by the GHS.
3	**Composition/information on ingredients**	**Substance** • Chemical identity • Common name, synonyms, etc. • CAS number, other unique number etc. • Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance. **Mixture** • The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of the GHS and are present above their cut-off levels.
4	**First aid measures**	• Description of necessary measures, subdivided according to the different routes of exposure, i.e. inhalation, skin and eye contact and ingestion • Most important symptoms/effects, acute and delayed • Indication of immediate medical attention and special treatment needed, if necessary.

Hazard Communication under GHS - SDS

5	Fire-fighting measures	• Suitable (and unsuitable) extinguishing media • Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products) • Special protective equipment and precautions for firefighters.
6	Accidental release measures	• Personal precautions, protective equipment and emergency procedures • Environmental precautions • Methods and materials for containment and cleaning up
7	Handling and storage	• Precautions for safe handling • Conditions for safe storage, including any incompatibilities
8	Exposure controls/personal protection	• Control parameters e.g. occupational exposure limit values or biological limit values • Appropriate engineering controls • Individual protection measures, such as personal protective equipment.
9	Physical and chemical properties	• Appearance (physical state, colour etc) • Odour • Odour threshold • PH • Melting point/freezing point • Initial boiling point and boiling range • Flash point • Evaporation rate • Relative density • Flammability (solid, gas) • Upper/lower flammability or explosive limits • Vapour pressure • Vapour density • Solubility(ies) • Partition coefficient: n-octanol/water • Auto-ignition temperature • Decomposition temperature

Hazard Communication under GHS - SDS

10	Stability and reactivity	• Chemical stability • Possibility of hazardous reactions • Conditions to avoid (e.g. static discharge, shock or vibration) • Incompatible materials • Hazardous decomposition products
11	Toxicological information	• Concise but complete and comprehensible description of the various toxicological (health) effects and the available data used to identify those effects, including: • Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact); • Symptoms related to the physical, chemical and toxicological characteristics; • Delayed and immediate effects and also chronic effects from short- and long-term exposure; • Numerical measures of toxicity (such as acute toxicity estimates).
12	Ecological information	• Ecotoxicity (aquatic and terrestrial, where available) • Persistence and degradability • Bioaccumulative potential • Mobility in soil • Other adverse effects
13	Disposal considerations	• Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

Hazard Communication under GHS - SDS

14	**Transport information**	• UN number. • UN Proper shipping name. • Transport Hazard class(es). • Packing group, if applicable. • Marine pollutant (Yes/No). • Special precautions which a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises.
15	**Regulatory information**	• Safety, health and environmental regulations specific for the product in question.
16	**Other information including information on preparation and revision of the SDS**	

Basic Concept about Risk Assessment

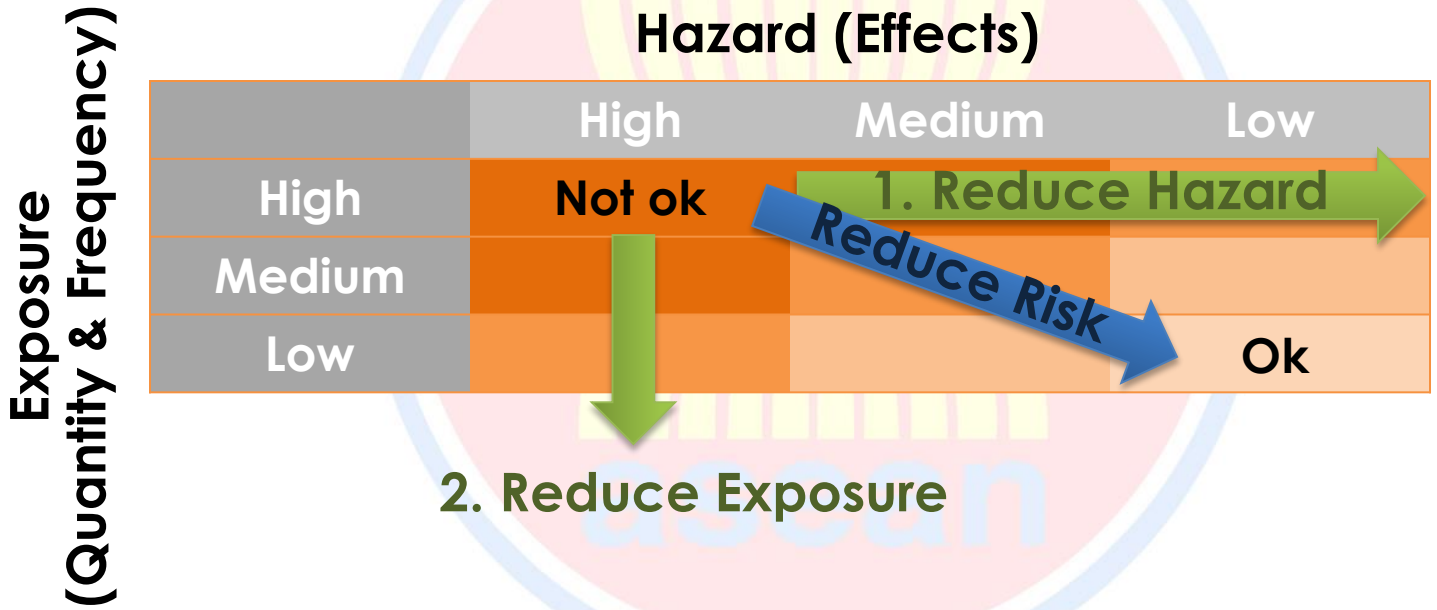
Risk = Hazard × Exposure

- Risk: **Probability** of *Adverse **Effects*** resulting from a given **exposure**
- Hazard: **Intrinsic properties** causing *Adverse **Effects***

- Even if the substance has a **High** hazard,
  Low exposure can minimize the risk
- Even if the substance has a **Low** hazard,
  High exposure may cause high risk

It is important to **assess the "risk"** by substance in use

Risk Assessment vs Risk Management

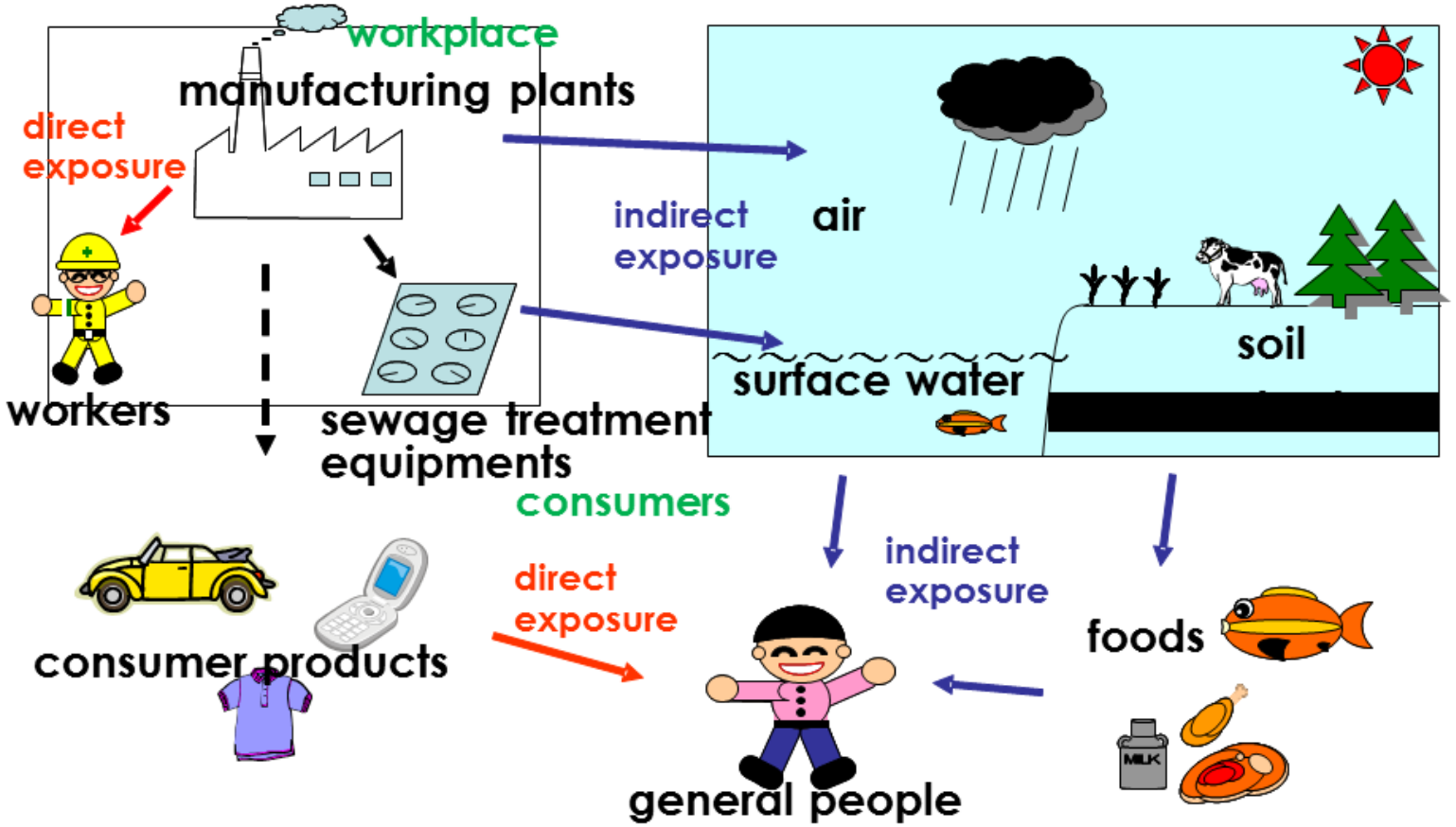


Hazard Based vs Risk Based System

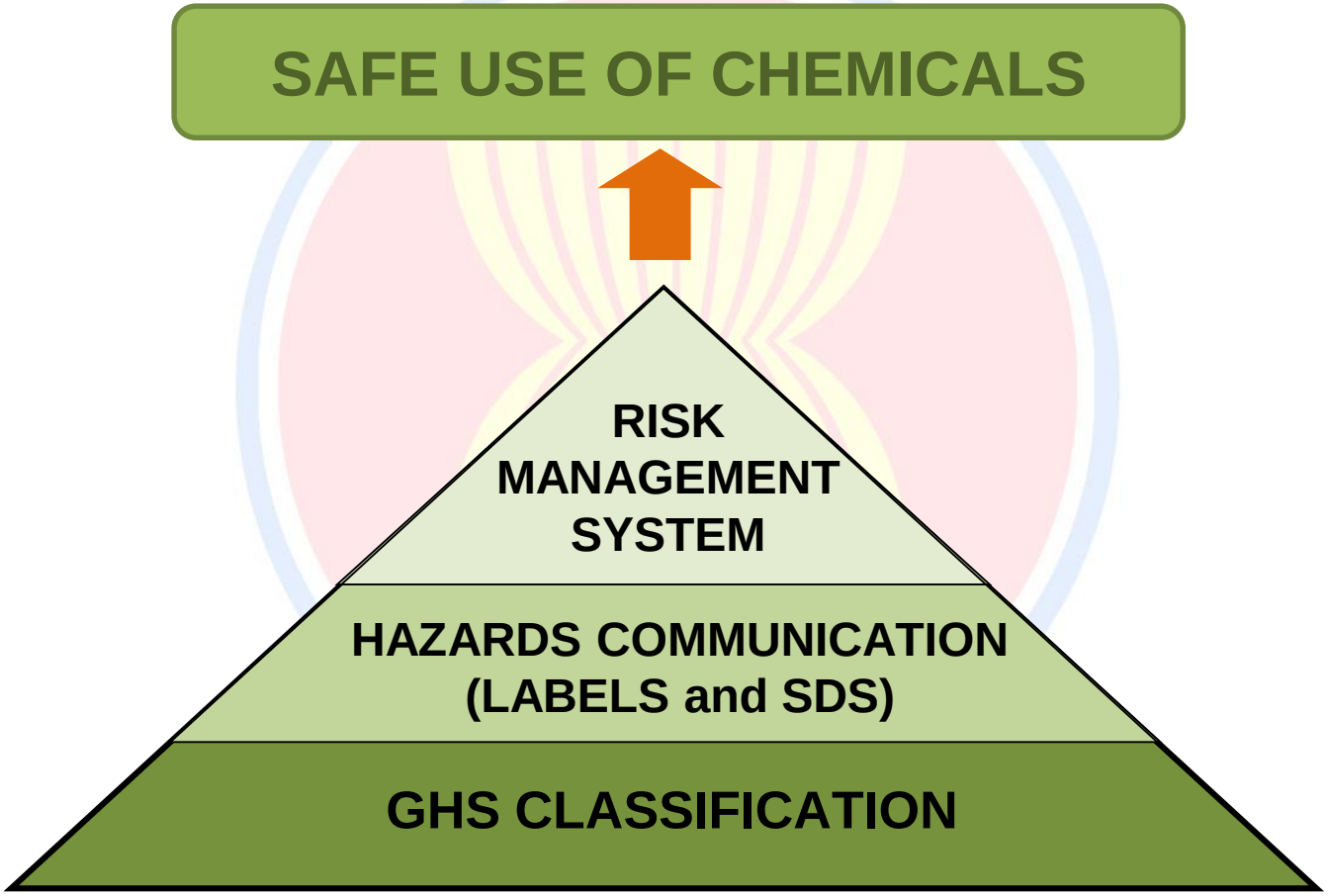
System	Benefits	Risks
Hazard-based Management	Simple and easy understanding	Conservative and Surplus restriction or regulation
Risk-based Management	Practical and reasonable base Management	Assessment method is bit complicated. **Exposure** data is needed

Hazard-based Management → **Risk-based Management** = **Sufficient Knowledge base**

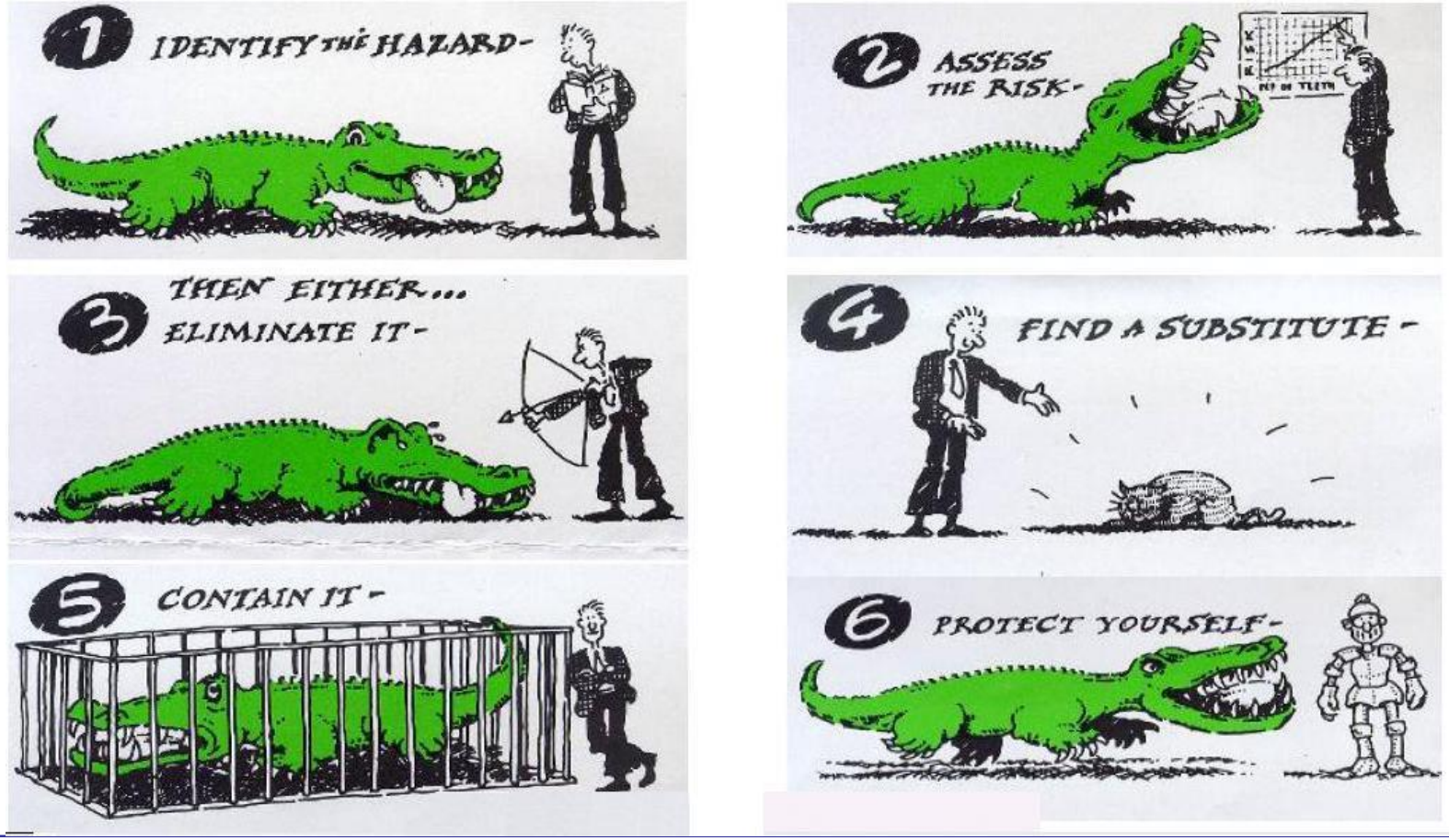
Exposure Assessment



GHS as a baseline of Chemical Management



Risk Assessment vs Risk Management



Risk Assessment vs Risk Management

Dangerous Goods Handling

Basic Understanding about GHS

(Globally Harmonized System of Classification and Labelling of Chemicals)

Mr. Chalermsak Karnchanawarin