Campus Occupational Safety and Health knowledge and education training promotion program of the Ministry of Education

C1 Basic concepts for hazard communication

Notices for use of the teaching material

Contents

I. Introduction

■ In line with the UN regulation of labeling of chemicals, article 7 of Taiwan's Occupational Safety and Health Act stipulates that employers should label dangerous and hazardous substances and highlight necessary safety and health notices. In 1992, the Council of Labor Affairs (forerunner of the Ministry of Labor) promulgated "Regulations of Hazard Communication on Dangerous and Harmful Materials.“

I. Introduction

■ After having successfully ironed out differences among some countries concerning classification and labeling of chemicals, the United Nations publicized Global Harmonized System (GHS) in 2002, calling for implementation by countries around the world by 2008.

I. Introduction

■ Accordingly, Taiwan has revised CNS6864 on symbols for the transport of dangerous goods (keeping nine categories, only applicable to the transportation industry) and formulated CNS 15030 "standards for classification and labeling of chemicals," according to the UN GHS Purple Book, which divides chemicals into 27 kinds under three categories, including 26 kinds under two categories of chemicals in workplaces and one kind under one category involving environmental hazard.

I. Introduction

■ Subsequently, the Council of Labor Affairs formulated "Regulations of Hazard Communication on Dangerous and Harmful Materials," renamed as "Regulations of Hazard Communication on Hazardous Chemicals" by its successor the Ministry of Labor on July 3, 2014.

II. Development of Taiwan's hazard communication system for chemicals

- Promulgation of "Labor Safety and Health Act" on April 16, 1974.
- Revision of "Labor Safety and Health Act" on May 17, 1991, with addition of article 7.
- Formulation of "Regulations of Hazard Communication on Dangerous and Harmful Materials" on Dec. 28, 1992.
- Revision of "Regulations of Hazard Communication on Dangerous and Harmful Materials," changing MSDS to 16 items on Jun. 29, 1999

II. Development of Taiwan's hazard communication system for chemicals

- Formulation of "Regulations for the Labeling and Hazard Communication of Dangerous and Harmful Materials" on Oc. 19, 2007 (in compliance with the preliminary norms of GHS).
- Implementation of GHS on Dec. 31, 2008, in line with the resolutions of the United Nations and APEC.
- Implementation of "Regulations of Hazard Communication on Hazardous Chemicals" on July 3, 2014.

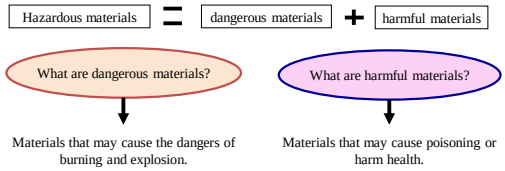
Original hazard communication system & GHS

Original hazard communication system:	GHS:
1. Categorization: nine categories 2. Basis of labeling: CNS6864 and UN Orange Book, or UN Recommendations on the Transport of Dangerous Goods Model Regulations 3. Consistent labeling between transport and workplaces 4. MSDS covers contents of 16 items.	1. Categorization: 27 kinds under three major categories 2. Basis of labeling: CNS15030 and the UN GHS Purple Book 3. Labeling inconsistent between transport and workplaces but more inclusive 4. No much change in substantial contents, with SDS still covering 16 items.

III. Purposes of hazard communication

1. Hazard recognition: Help laborers recognize potential hazards in workplaces.
2. Laborers' right to know: Laborers have the right to know potential hazards for substances they contact in workplaces.
3. Reduction of hazards: Consensus forms between employers and laborers, thereby cutting hazards.

IV. What are hazardous chemicals (hazardous materials)



▪Dangerous materials and harmful materials monitored and controlled by the Council of Labor Affairs

▪Toxic chemicals monitored and controlled by the Environmental Protection Administration (305 kinds in four categories)

▪Dangerous materials monitored and controlled by Ministry of Transportation and Communications (nine major categories)

V. Regulations for the Labeling and Hazard Communication of Hazardous Chemicals

Chapter 1 General principles

Chapter 2 Labeling

Chapter 3 Safety data sheet, checklist, disclosure, and communication measures

Chapter 4 Supplementary provisions

Five major mandatory work items for employers

1. Produce checklist of hazardous materials.
2. Provide safety data sheet (SDS).
3. Place label on containers (hazard symbol + contents)
4. Provide employees education and training on hazard communication (three hours).
5. Formulate hazard communication plan.

Chapter 1 Hazardous chemicals in workplaces (26 kinds)

Physical hazards (16 kinds)	Health hazards (10 kinds)
● Explosives ● Inflammable gas ● Inflammable aerosol ● Oxidizing gas ● Pressurized gas ● Inflammable liquid ● Inflammable solid ● Self-reaction substances ● Pyrophoric liquid ● Pyrophoric solid ● Substances forbidden to contact with water ● Oxidizing liquid ● Oxidizing solid ● Organic peroxide ● Metal corrosive	● acute toxins: swallowing, skin, inhalation ● Corrosive/skin-irritating substances ● Substances seriously damaging/irritating eyes ● Allergens for respiratory tract or skin ● Mutable substances for reproductive cells ● Carcinogen ● Reproductive toxin ● Toxin for specific organ system -- Single exposure ● Toxin for specific organ system --Multiple exposure ● Inhalation hazardous substance

Chapter 2 Labeling

Labeling items:
1) Hazard symbol 2) Contents

Labeling regulations:

- Containers containing over 100 ml hazardous chemicals should bear label according to the classification and symbol set in the regulation (for chemicals unable to be classified, label with contents only is sufficient), with description of contents mainly in Chinese, supplemented with some foreign language understandable to laborers handling operation, if necessary.
- For containers with capacity less than 100 ml, labeling only needs to include chemical name, symbol, and word of warning.

Types of hazard symbols (1)

Flame	
	• Inflammable substances • Pyrophoric substances • Substances forbidden to contact with water • Organic peroxide
Corrosion	
	• Metal corrosive • Corrosion/grade-1 irritant
Exclamation mark	
	• Grade-4 acute toxin • Corrosion/grade-2 irritant

Types of hazard symbols (1) (cont.)

Flame atop a circle	
	• Oxidizing gas • Oxidizing liquid • Oxidizing solid
Gas cylinder	
	• Pressurized gas
Health hazard	
	• Carcinogen • Toxin • Inhalation hazardous substance

Types of hazard symbols (1) (cont.)

Bomb explosion	
	• Explosive • Self-reaction substances • Organic peroxide
A skull and crossbones	
	• Grade 1-3 acute toxins
Hazardous substances for environment	
	• Toxin for water environment

Types of hazard symbols (2)

Physical hazards (five kinds)

Health hazards (five kinds)

Environmental hazard (one kind)

Shape and size of symbols

1. Upright square at 45-degree angle
2. Large enough for clear identification
3. Black pattern, white background, in red frame with sufficient wide for warning function

Significance of symbols

- Flame→inflammable substance
- Flame atop a circle→oxidizing substance
- Bomb explosion→explosive
- Corroded hand and metal→corrosive
- Steel cylinder→pressurized gas
- Skull→toxin
- Exclamation mark→warning (low toxicity, low irritation) Human body→hazardous substance for health (including carcinogen)
- Withered tree and dead fish→hazardous substance for environment

Contents of labeling

1. Name：	Name of substance, common name and chemical name
2. Hazardous ingredients：	All the ingredients with physical hazard or health hazard
3. Word of warning	consisting of warning for danger and common warning, the former involving more serious hazard

4. Message for hazard warning：	Describe hazardous nature of substance in common language, such as gas with propensity to burn, fatal for ingestion.
5. Preventive measures for hazards：	Necessary preventive measures, such as deposit in shaded cool area, keeping containers sealed, avoiding contact with skin, and wearing proper protective equipment. Business units can produce message by their own, since there are no standard one
6. Name, address, and telephone number of manufacturer or supplier：	a rapid channel for inquiry by users, which can be exempted in case there is constant change in the information and SDS is available.

Labeling format

- Hazard symbol, word of warning, hazard warning message should conform to regulations in table 1 in the appendix.
- Health hazards which need labels of skull, corrosion, and respiratory-duct allergy don't need exclamation mark label.
- When there are two or more labels, they should be juxtaposed in a clear manner arranged according the status of container.
- In case word of warning contains both danger and common warning, label of danger will suffice.
- Hazard warning message should be displayed in entirely

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1. Name: Benzene
2. Hazardous ingredient: Benzene
3. Word of warning: Danger
4. Hazard warning message: Highly inflammable liquid and vapor, inhalation hazard, irritant to skin, possible carcinogen
5. Preventive measures for hazard:
   Cap container tightly
   Deposit container in place with good ventilation
   Stay away from inflammable
   In case of contact with eyes, wash eyes with massive amount of water before seeking medical treatment.
   Don't pour the material into drainage.
6. Manufacturer or supplier:
   (1) Name: (2) Address: (3) Telephone No.:

* For more detail data, refer to the substance's safety data sheet.

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Containers exempt from labeling

1) Internal-layer container as lining with external layer already bearing label
2) External container with internal-layer container with label visible from outside
3) Personal portable container of laborer containing hazardous substance retrieved from labeled container for use by laborers on duty.
4) Hazardous substance retrieved from labeled container for use in experiment and research in laboratory

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Containers whose labels can be substituted by installation of bulletin board

1) Several containers containing similar hazardous substance placed in the same place
2) Ducting or piping system
3) Such chemical equipment as reactor, distillation tower, absorption tower, extractor, blender, precipitator, heat exchanger, measuring tank, or storage tank
4) Equipment such as cooling device, stirring device, or compression device
5) Conveying apparatus

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Chapter 3 Safety Data Sheet

Safety Data Sheet, SDS

ID of Chemicals

Instructions of Chemicals

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Notices for safety data sheet

- For hazardous chemicals, employer should provide laborers safety data sheet (mainly in Chinese) conforming to regulation in terms of content items and format.
- For chemical which is a mixture of two or more hazardous ingredients, produce safety data sheet according to the hazard after mixture.
- Employer should review and update the contents of safety data sheet to assure its correctness at least once every three years.
- Record for upgrading of safety data sheet, including contents, date, and edition, should be kept for three years.
- Employer cannot refuse requirement by competent authority, labor inspection institution or doctors, and first responders for the provision of safety data sheet and withholding information.

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A. Data on chemicals and companies

Name of substance:
Other name:
Suggested usage and usage restriction
Name, address, and telephone number of manufacturer, importer, or supplier
Emergency contact phone number/fax number:

Purpose: Provide a rapid channel for inquiry, when user has question on contents of SDS or emergent accident occurs.

B. Data on hazard identification

Classification of chemical hazards:
Contents of labeling:
Other hazards

Purpose: Enable user to have a rapid grip on the classification of chemical hazards and their effect

C. Data on identification of ingredients

Name in Chinese and English:
Synonym:
CAS No.:
Composition of hazardous ingredients (percentage):

Purpose: Enable user to know name and composition of chemicals

D. First aids

First aids for different kinds of exposures:
Major symptoms and hazard effect
Protection for first-aid providers
Suggestions to doctors

Purpose: Help first-aid providers and doctors take handling measures instantly following occurrence of disaster.

E. Fire-fighting measures

Applicable fire-extinguishing agents:
Possible special hazards in fire fighting:
Special fire-fighting procedure
Special protective equipment for fire fighters:

Purpose: Minimize fire loss by providing information on applicable fire-fighting agents, procedure, and possible special hazards.

F. Leakage handling method

Notices for individuals:
Notices for environment:
Cleaning method:

Purpose: Provide notices in handling chemical leading, so as to reduce adverse effect and damage on human life, properties, and environment.

G. Safe disposal and storage method

Disposal:
Storage

Purpose: Provide user norm or guidance for disposal and storage of substance, to cut its potential hazard.

H. Preventive measures for exposure

Engineering control:
Control parameter: • PEL-TWA, permissible exposure limit-time weighted average/PEL-STEL/PEL-C, permissible exposure limit-ceiling • Biological indicator:
Personal protective equipment:
Health measures:

Purpose: Provide user information on necessary engineering control countermeasure and personal protection equipment and measures, in order to reduce exposure hazard, plus provision of control parameters, such as permissible exposure limit-ceiling.

Three kinds of permissible exposure limits

1. PEL-TWA: applicable to chronic hazardous substance.
2. PEL-STEK (15 minutes): applicable to chronic hazardous substance

PEL-TWA	E.P.	Notes
Less than 1	3	Permissible exposure for gaseous substance is based on the unit of ppm, granular material on mg/m^3, asbestos on f/cc.
More than 1, less than 10	2	
More than 10, less than 100	1.5	
More than 100, less than 1,000	1.25	
More than 1,000	1	

PEL-STEL(15Minutes)＝PEL-TWA× E.F

3. PEL-ceiling (PEL-C，for any time)：applicable to highly acute

I. Physical and chemical properties

Appearance (substance, color)	Odor
Olfactory threshold	Fusion point
pH value:	Boiling point/boiling range
Flammability (solid, gas):	Flash point: °F ℃ Testing method: open cup closed cup
Decomposition temperature:	
Self-ignition temperature:	Explosion limit:
Vapor pressure:	Vapor density:
Density:	Solubility:
Octanol/water partition coefficient (log Kow):	Evaporation rate:

Purpose: To assist users to identify the physical and chemical properties of this substance, as a reference for normal operation and emergency

J. Stability and reactivity

Stability:
Possible hazard reaction under special situation:
Status which should be avoided:
Substance which should avoided:
Hazardous decomposition products:

Purpose: Provide data on reaction feature of substance, as reference for laborers or occupational safety and health workers in storage, transport, handling, or disposal of chemicals

K. Toxicity data

Exposure channel:
Symptoms:
Acute toxicity:
Chronic toxicity or long-term toxicity:

Purpose: Provide information on toxicity of chemicals and possible hazard for health, thereby achieving the functions of warning and precaution.

Toxicity indicator of chemicals

1. LD_{50}(50% Lethal Dose)
   50% lethal dose refers to 50% mortality rate for experimental animals within 14 days after receiving specific dosage (mg/kg) either via feeding or spreading on skin, the lower the value of the indicator the higher the toxicity.

1. LC_{50}(50% Lethal Concentration)
   50% lethal concentration refers to 50% mortality rate for experimental animals within 14 days with a specific time (mostly 1-4 hours) after inhaling gaseous or vaporized chemical at specific density (ppm), the lower the value of the indicator the higher the toxicity.

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L. Ecological data

Ecological toxicity:
Durability and degradability:
Bioaccumulation:
Fluidity in soil:
Other adverse effect:

Purpose: Provide data on polluting effect caused by leakage of substance into environment, as reference for environment-protection and waste-disposal workers in handing the situation.

M. Waste disposal method

Waste disposal method：

Purpose: Offer proper waste disposal method for first-aid responders or environmental-protection workers

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N. Transport data

UN code No.:
UN transport name:
Classification of transport hazard
Kind of packaging:
Oceanic pollutant (yes/no):
Special transport method and notices:

Purpose: Offer noteworthy related regulations on the transport of hazardous substances.

O. Legal data

Applicable laws/regulations：

Purpose: List laws/regulations related to the substance, to facilitate inquiry by users.

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Other data

References		
Production unit		Name: Address: Tel. No.:
Producer:	Title:	Name (signature):
Production data		
Note		

Purpose: Offer data on producer, facilitate inquiry by users.

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Data sources:

- Compiled by Li Yi-yang, researcher, Taiwan Occupational Health Association
- Edited by Chang Jung Christian University team-Li Yung-hui