Basic Information on Hazardous Chemical

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Take A look at Your Workplace

1. Are there any special features in your workplace? Are you in the upper floor, ground floor, basement or in a special facility?

2. Is your work area near any special hazards, such as gases, chemicals, equipment, or processes that could become a problem?

3. Where are the storage area for hazardous chemicals and other substances?

4. Do you have a chemical inventory?

5. Do you inform your employees regarding chemical hazards at your workplace?

6. Do you train and re-train workers in dealing with chemical hazards?

7. Do you routinely obtain MSDS for the chemical materials?

8. Do you ensure workers are aware of what MSDS are & where they can be found?

9. Do you have a system that evaluates the safety of all new chemical materials?

10. Do you dispose of chemical wastes appropriately and complying with local laws & regulations?

11. Is there appropriate PPEs for handling spills or working with particularly hazardous chemical?

12. Where are fume hoods and other safety equipment located?

13. Do you regularly maintain the equipment (fume hoods, PPE, etc) used to control chemical hazard?

14. Is there good lighting, both regular and emergency?

15. Where is your nearest exit and escape route? Is there an alternate route? Are your aisles clear?

16. Could you quickly turn off the electricity, water, gas, or other utilities in case of an emergency?

17. What type of alarm system does your LAB have? To contact help, do you have a special warning system, a private monitoring agency, or a telephone? Where are the emergency alarm pull stations located?

18. Do you know the appropriate emergency phone numbers? Could you quickly find them?

19. Where are the following types of emergency equipment located? Fire extinguishers, chemical spill kits, emergency showers, first aid kits, eye wash station?

20. Is your emergency response equipment easy to reach? Is anything blocking it that should be removed?

21 Do you have procedure for investigating accident in your workplace?

Type of Controls in the workplace

- Prevention: consists of developing safe mode of operations in the workplace. Example: Installation of elaborate ventilation systems when handling large amount of highly volatile organic liquid
- Protection: consists of interposing a barrier between operator & the danger. Only in the case of an accident will such a barrier play a part in protecting the operator.

Type of Controls in the workplace

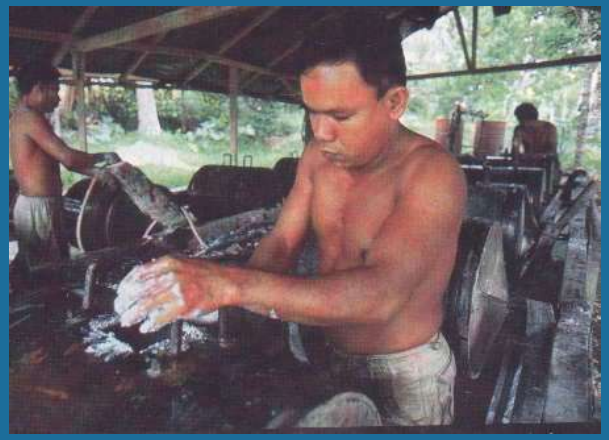
- Example: Installation of fire extinguishers is a protection measure
- Prevention and protection have costs to an organization. BUT a low risk situation will carry minimal cost in long run.

Why Manage Chemical

- **Mishandling of chemical** can be hazardous to Health and Environment
- **Legislative Requirement**

  (Safety and health Act or Regulations)

Mishandling of chemical



Mishandling of chemical can be hazardous to health and environment. The **use of mercury to extract gold** as depicted in the photo is an example of such misadventure. This scenario is happening at the illegal gold extraction process in **north Sulawesi, Indonesia**.

BRIGHT SPARKLER DISASTER (1991)

Environmental Damage

Individual

Sami titiskan gam super dalam mata

BANGKOK 23 Feb. – Seorang sami Buddha yang menyangka bahan yang dititiskan ke matanya merupakan ubat mata, terpaksa dikejarkan ke hospital kerana ia sebenarnya gam super.

Phra Khru Prapatworakhun, 81, berkata:

"Saya menitiskan beberapa titisan ke lantai dan melihat cecair berwarna cerah. Saya pun menitiskan empat titisan ke setiap mata. Dalam masa seminit, mata saya berasa sejuk dan kemudian tertutup rapat."

Lebih memudaratkan keadaan, atas cadangan seorang sami lain, dia membubuh sedikit pencair cat (thinner) ke mata dalam usaha untuk mencairkan gam itu menyebabkan matanya terbakar sedikit.

Hasil pembedahan, mata kanannya kini sudah boleh dibuka dan doktor merancang untuk memulihkan penglihatan mata kirinya pula, menurut akhbar *The Nation* hari ini.

Doktor di Hospital Angthong menggunakan pelarut aseton untuk mengeluarkan gam dari mata kanannya dalam pembedahan selama dua jam itu.

Sami itu dari tokong Mathuros di daerah Muang Angthong, 100 kilometer ke utara Bangkok, memberitahu *The Nation*, beliau membuka peti ubat di tokong itu pada 17 Februari lalu untuk mencari ubat titis mata bagi menghilang rasa gatal pada matanya.

Tetapi dia telah terambil satu tiub gam *super glue* dari peti ubat itu. – AFP

BH 15/03/05

Macam-Macam

GUWAHATI: Tiga penduduk kampung di India terbunuh manakala tujuh lagi cedera selepas seekor gajah daripada sekelompok besar haiwan itu 'naik minyak' kerana ketagihan samsu di timur laut negeri Assam, kata pegawai Jabatan Perlindungan Haiwan semalam.

"Gajah itu 'naik minyak' dan mengamuk lalu meranap rumah serta menyerang penduduk kampung yang tidur. Akibatnya tiga orang terbunuh dan tujuh lagi cedera parah," kata M Rahman.

Dalam kejadian itu kelmarin, gajah menyelongkar semua penjuru Kampung Dalokgarupara untuk mencari samsu.

"Gajah itu datang ke kampung untuk mencari samsu. Secara tiba-tiba seekor gajah 'naik minyak' dan memusnahkan banyak rumah," kata Rahman.

Penduduk kampung yang cedera dibawa ke hospital kira-kira 70 kilometer di barat Guwahati. – AFP

(Mac 19, 2005)

tegang 2 hari

HANOI: Seorang lelaki Vietnam yang mengambil Viagra tiruan terpaksa dimasukkan ke hospital selepas mengalami ketegangan selama dua hari, kata doktor kelmarin.

Lelaki berusia 47 tahun itu dimasukkan ke Hospital Binh Dan di Ho Chi Minh City Ahad lalu, dua hari selepas mengambil pil buatan China itu.

Dia membeli pil itu daripada seorang rakannya pada harga tidak sampai dua dolar Jumaat lalu dan memakan pil itu pada petang hari yang sama.

Dia tidak melakukan hubungan seks selepas menelan pil itu tetapi terus mengalami ketegangan, kata doktor yang enggan dikenali.

Doktor terpaksa melakukan pembedahan kecil untuk menyedut keluar darah dari kemaluan lelaki berkenaan.

Mereka juga tidak pasti kandungan pil itu kerana tidak mempunyai contoh untuk membuat kajian. – Agensi

LEGISLATIVE REQUIREMENT

HEALTH, SAFETY AND ENVIRONMENT (HSE)

- **SAFETY** - Denotes the **physical injuries** such as cuts, abrasions, puntures, burns and the crushing of feet or arms caused either mechanical, electrical or chemicals

- **HEALTH** - Is meant to explain the possible **physiological** (or negative effect to body biochemical process) injuries or illness to people particularly to workers at workplace

LEGISLATIVE REQUIREMENT OF HSE

1992 UN RIO EARTH SUMMIT AGENDA CONCLUDED THE FOLLOWING STATEMENT:

STATES SHALL DEVELOP NATIONAL LAW REGARDING LIABILITY AND COMPENSATION FOR THE VICTIMS OF POLLUTION AND OTHER ENVIRONMENTAL DAMAGE.

STATES SHALL ALSO COOPERATE IN AN EXPEDITIOUS AND MORE DETERMINED TO DEVELOP FURTHER INTERNATIONAL LAW REGARDING LIABILITY AND COMPENSATION FOR ADVERSE EFFECTS OF ENVIRONMENTAL DAMAGE CAUSED BY ACTIVITIES WITHIN THEIR JURISDICTION OR CONTROL TO AREAS BEYOND THEIR JURISDICTION

(1992 EARTH SUMMIT AGENDA , PRINCIPLE 21)

OCCUPATIONAL HAZARDS

- **Physical hazards** - can be defined as any **physical object, item or process** that is capable of causing an immediate or cumulative physical injury.

- **Chemical hazards** - a chemical hazards is more likely to cause **health problems to people.** It is defined as any chemical substance that is capable of causing a change in a person's behaviour, or a decrease in their mental alertness.
- **Biological hazards** - a biological hazards is also likely to cause health hazards to people. It is defined as any BILOGICAL substance (that is organic dust, fungi, insect, mite,,protozoa,bacteria,virus or enzyme, RICKETSIA-parasite cause disease) that is capable of causing an allergic reaction, disease or illness.
- **Ergonomic hazards** - an ergonomic hazards can be defined as any workplace situation or activity that is capable of **causing physiological and psychological stress** or undue stress to any part of the body's anatomy.

OCCUPATIONAL SAFETY AND HEALTH ACT 514 1994 (OSHA)

OSHA stipulates that the responsibility for safety and health at work lies with the employer and together with the employees to undertake a safe system of work at the organization

LINES OF RESPONSIBILITIES

- RESPONSIBILITY OF WORKERS
- RESPONSIBILITY OF EMPLOYERS AND SELF EMPLOYED PERSONS
- RESPONSIBILITY OF MANUFACTURERS

REGULATIONS

- OCCUPATIONAL SAFETY AND HEALTH (EMPLOYERS SAFETY AND GENERAL POLICY STATEMENT) REGULATION 1995
- OCCUPATIONAL SAFETY AND HEALTH (CONTROL OF INDUSTRIAL MAJOR ACCIDENTS HAZARDS) REGULATION 1996
- OCCUPATIONAL SAFETY AND HEALTH (SAFETY AND HEALTH COMMITTEE) REGULATION 1996
- OCCUPATIONAL SAFETY AND HEALTH (CLASSIFICATION, PACKAGING AND LABELLING OF HAZARDOUS CHEMICALS) REGULATION 1997
- OCCUPATIONAL SAFETY AND HEALTH (SAFETY AND HEALTH OFFICER) REGULATION 1997
- OCCUPATIONAL SAFETY AND HEALTH (USE AND STANDARDS OF EXPOSURE OF CHEMICALS HAZARDOUS TO HEALTH) REGULATION 2000)

GUIDELINES

IN ADDITION TO REGULATIONS, THERE ARE VARIOUS GUIDELINES THAT PROVIDE MORE DETAILED REQUIREMENTS FOR SPECIFIC AREAS. MOST OF THESE GUIDELINES PRODUCED BY DOSH. THERE ARE ALSO GUIDELINES PRODUCED BY THE RESPECTIVE INSTITUTIONS AND ENDORSED BY DOSH.

EXAMPLES OF GUIDELINES PRODUCED BY DOSH:

- ASSESSMENT OF THE HEALTH RISKS ARISING FROM THE USE OF HAZARDOUS CHEMICALS IN THE WORKPLACE
- GUIDELINES FOR THE FORMULATIONS OF A CHEMICAL SAFETY DATA SHEET
- GUIDELINES FOR THE CLASSIFICATION OF HAZARDOUS CHEMICALS
- GUIDELINES FOR LABELLING OF HAZARDOUS CHEMICALS
- GUIDELINE FOR PREPARATION OF CHEMICAL REGISTER

FORMAT FOR CHEMICAL REGISTER

- SECTION A
  - Information about the company using or producing chemical hazardous to health
- SECTION B
  - Lists of chemical hazardous to health
- SECTION C
  - Details on preparing or reviewing the chemical register

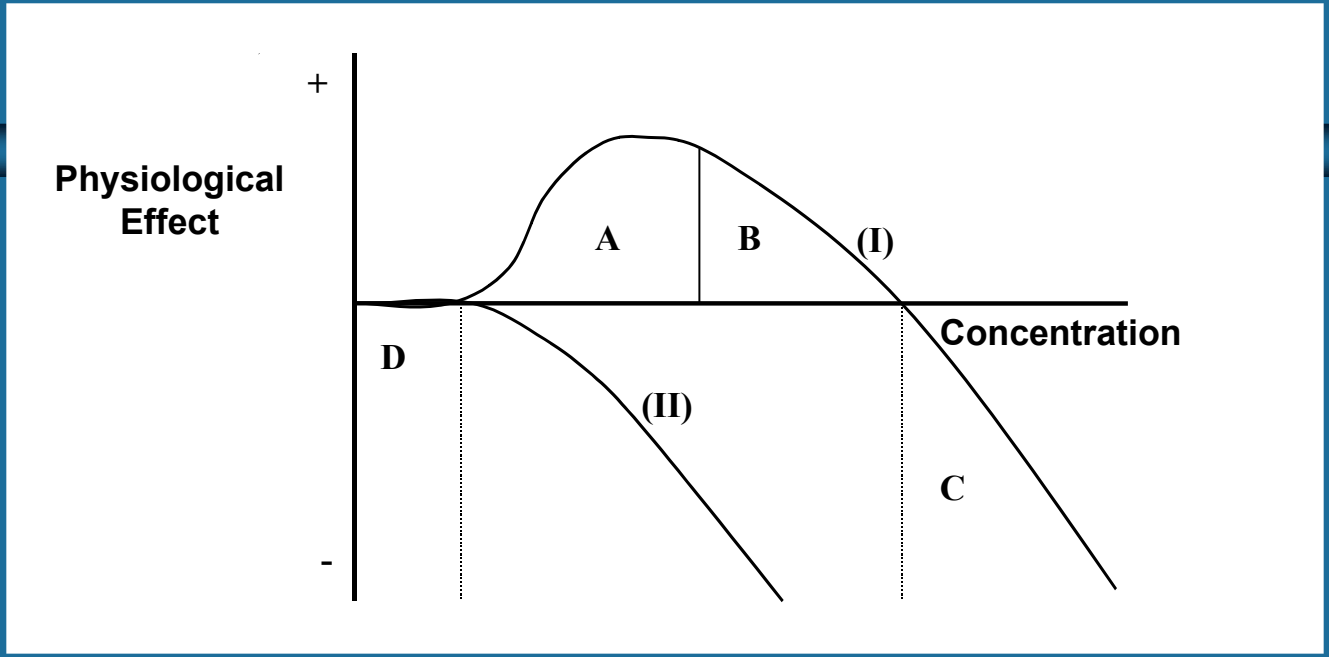
DANGEROUS CHEMICALS

16th. Century physician-Chemist, PARACLEUS said about dangerous chemicals:

ALL SUBSTANCES ARE POISONS, THERE IS NONE WHICH IS NOT A POISON. THE RIGHT DOSE DIFFERENTIATES A POISON FROM A REMEDY

EXAMPLES:

1. An intake of 500 mg - 3 g paracetamol is therapeutic but intake of 15g - 20g can be fatal
2. An intake of vitamin C less that 2000mg(3000iu) per day is beneficial but intake more than 2,000mg per day can cause abdominal cramps, nausea and diarrhea.
3. An intake of vitamin E less than 1,000mg per day is beneficial but intake of more than 1,000 mg per day can increased tendency to haemorrhage (loss of blood from a ruptured blood vessel).



Physiological effect of a chemical. A chemical can be beneficial but it is only so over a restricted concentration range (part A, curve I). Chemical with unknown functional value (curve II) can be toxic to health

GROUPS OF CHEMICALS

ORGANIC - Chemicals based on compounds of **carbon and hydrogen**. They also contain small percentage of sulfur, oxygen, phosphorous and halogen(chlorine, fluorine and bromine)

INORGANIC - The inorganic chemicals are chemicals of any elements and their compounds that **do not contain carbon**. Ninety or so other elements in the periodic table and their compounds are falling into the inorganic compounds group

WHY WE NEED TO KNOW THE CHEMICALS GROUP

- Organic solvents are mainly known to cause neurotoxic effects
- Solubility property of the chemicals
  - Inorganic chemicals are mostly water soluble (hydrophylic)
  - Organic chemicals are fat soluble (lipophilic)
- Water soluble compounds are more friendly to human bodily system than fat soluble
- Organic chemicals or fat soluble chemicals has to be metabolised to water soluble compounds before excretion.
- Water soluble compounds may be excreted from body without metabolism in which case the parent compounds may be detectable in urine, breath, or faecal material

OSH (Classification, Packing & Labeling) Regulation 1997

- Chemical Suppliers are responsible to:
  - Classify the chemical products according to hazard class
  - Pack hazardous materials in safe packages or containers
  - Label the container and packages with hazard & safety information
  - Provide standardized and up-to-date up to information on the chemical
- User : Relabeling

CHEMICALS THAT CAN CAUSE PHYSICAL INJURY

Listed in CPL, 1997, chemical classified based on physicochemical properties

- Explosive
- Oxidising
- Extremely Flammable
- Highly Flammable
- Flammable

CHEMICALS THAT CAN CAUSE PHYSIOLOGICAL INJURY

Listed in CPL, 1997, chemical classified based on health effects

- Very Toxic
- Toxic
- Harmful
- Corrosive
- Irritants
- Other acute : stimulant, depressant, sedative, effect to specific organ (Not in CPL but in Guideline)
- Chronic effect: Carcinogenic, Mutagenic, neurotoxic, hepatotoxic etc. (Not in CPL but in Guideline)

CHEMICALS THAT CAN CAUSE PSYCHOLOGICAL INJURY

- ANALGESIC EFFECTS
- DEPRESSANTS
- STIMULANTS
- HALLUCINOGENS

Information on Label

- Hazard Symbols
- Risk Phases & Safety Phases
- Risk & Safety Information
- Note on Storage
- Transport Data
- Expiry Date
- UN Identification Number

Hazard Symbol

Risk Phrases

R2	Risk of explosion by shock
R14	React violently with water
R14/15	Reacts violently with water liberating extremely flammable gas
R20/21/22	Harmful by inhalation, in contact with skin & if swallowed

Safety Phrases

S1	Keep locked up
S37	Wear suitable gloves
S30	Never add water to this product
S33	Take precautionary measures against static discharges
S43	In case of fire, use CO_2, never use water

Material Safety Data Sheet (MSDS)

- Substance, formulation and company name
- Composition/data on constituents
- Potential hazards
- First-aid measures
- Firefighting measures
- Measure to be taken in the event of accidental release
- Handling and storage

Material Safety Data Sheet (MSDS) cont…

- Exposure containment and PPE
- Physical & Chemical Properties
- Stability & reactivity
- Toxicological data
- Ecological data
- Disposal instructions
- Transport data
- Regulations
- Other information

Material Safety Data Sheet- MSDS

ScienceLab.com
Chemicals & Laboratory Equipment

Health	3
Fire	0
Reactivity	3
Personal Protection	

Material Safety Data Sheet
Perchloric acid, 60% MSDS

Section 1: Chemical Product and Company Identification

Product Name: Perchloric acid, 60%
Catalog Codes: SLP2683
CAS#: Mixture.
RTECS: SC7500000
TSCA: TSCA 8(b) inventory: Perchloric acid; water
CI#: Not available.
Synonym:
Chemical Name: Perchloric Acid
Chemical Formula: HClO4

Contact Information:
Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396
US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**
Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Science Kit & Boreal Laboratories

MATERIAL SAFETY DATA SHEET

777 East Park Drive
Tonawanda, N.Y. 14150-6788
(716)874-4000

859 Vansickle Road
St. Catharines, Ontario L2R 7P4

815 Flora Lane
San Luis Obispo, CA 93405-6815

MSDS No. PP 170
Effective Date February 18, 2000

SECTION I	NAME
Product	PHENOLPHTHALEIN, POWDER
Chemical Synonyms	3,3-Bis(para-hyroxyphenyl)phthalide
Formula	$C_{20}H_{14}O_4$
Unit Size	up to 2.5 Kg.
C.A.S. No.	77-09-8

24 HOUR EMERGENCY ASSISTANCE

CHEMTREC
800-424-9300
Day 716-226-6177

NFPA HAZARD RATING

Health	1
Fire	1
Reactivity	1

HMIS *

LEAST	SLIGHT	MODERATE	HIGH	EXTREME
0	1	2	3	4

SECTION II INGREDIENTS OF MIXTURES

Principal Component(s)	%	TLV Units
Phenolphthalein, powder	100%	None established.
CAUTION! MAY BE HARMFUL IF SWALLOWED.		

SECTION III PHYSICAL DATA

Melting Point (°F)	259-263°C (498°-505°F)	Specific Gravity (H_2O = 1)	1.277 (32.C/4°C)
Boiling Point (°F)	Decomposes.	Percent Volatile by Volume (%)	N/A

AVANTOR
PERFORMANCE MATERIALS

Version: 1.0
Revision date: 04-01-2013

SAFETY DATA SHEET

1 PRODUCT AND COMPANY IDENTIFICATION

Product name: Hexanes

Manufacturer:
Avantor Performance Materials, Inc.
3477 Corporate Parkway, Suite 200
Center Valley, PA 18034
U.S.A.

Contact Person: Environmental Health & Safety
e-mail: info@avantormaterials.com

Product No.: 9309-ZX, 9309-03, 9309-07, 9309-22, 9309-50, 9309-6Y, 9309-99, 9309-R, 9309-01, 9309-05, 9309-11, 9309-33, 9309-6Q, 9309-98
Telephone:
Customer Service: 855-282-6867

Emergency telephone:
24 Hour Emergency: 908-859-2151
Chemtrec: 800-424-9300

2 HAZARDS IDENTIFICATION

Emergency Overview:

Appearance:
Color: Colorless
Form : Liquid

International Chemical Safety Cards

MELAMINE ICSC

MELAMINE
2,4,6-Triamino-1,3,5-triazine
1,3,5-Triazine-2,4,6-triamine
Cyanuromamide
$C_3H_6N_6$
Molecular mass: 126.1

CAS # 108-78-1
RTECS # OS8750000
ICSC # 1154

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust, closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
• INHALATION		Ventilation (not if powder). Avoid inhalation of fine dust and mist.	Fresh air, rest.
• SKIN		Protective gloves.	Rinse skin with plenty of water or shower.
• EYES		Safety spectacles.	First rinse with plenty of water for several (remove contact lenses if easily possible),
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

UN HAZARD CLASSIFICATION

Class		Example
1	Explosive	picric acid, 2,4-dinitro-phenol, organic azides
2	Gases	carbon monoxide, hydrogen, oxygen
3	Flammable liquids	methanol, acetone, acetaldehyde
4.1	Flammable solids	Nitrocellulose, magnesium
4.2	Spontaneously combustible	aluminium alkyls, white phosphorus
4.3	Dangerous when wet	sodium, calcium, potassium, calcium carbide
5.1	Oxidising agent	nitric acid, bromine
5.2	Organic Peroxide	diethyl ether
6.1	Poisonous	chloroform, chromic acid, phenol, acetonitrile
6.2	Infectious substances	Biohazard compounds
7	Radioactive	Uranium, Plutonium
8	Corrosive	Acids/alkalis
9	Miscellaneous	Water reactive, Pyrophoric, carcinogen

CONCLUSION

- All common chemicals either at home or workplace can be considered harmful to us physically or physilogically. The toxicity of a substance to cause harm, and is the only factor in determining whether a hazrd exist.
- A chemical determined to be a hazard depending on the factors such as toxicity, route of exposure, dose, duration, reaction, interaction and sensitivity.
- Law and regulation will protect us excessively exposure to hazardous chemicals.