PROSES PENYIMPANAN BAHAN KIMIA

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JABATAN KIMIA

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MENGAPA PERLU PENYIMPANAN BAHAN KIMIA DENGAN BETUL?

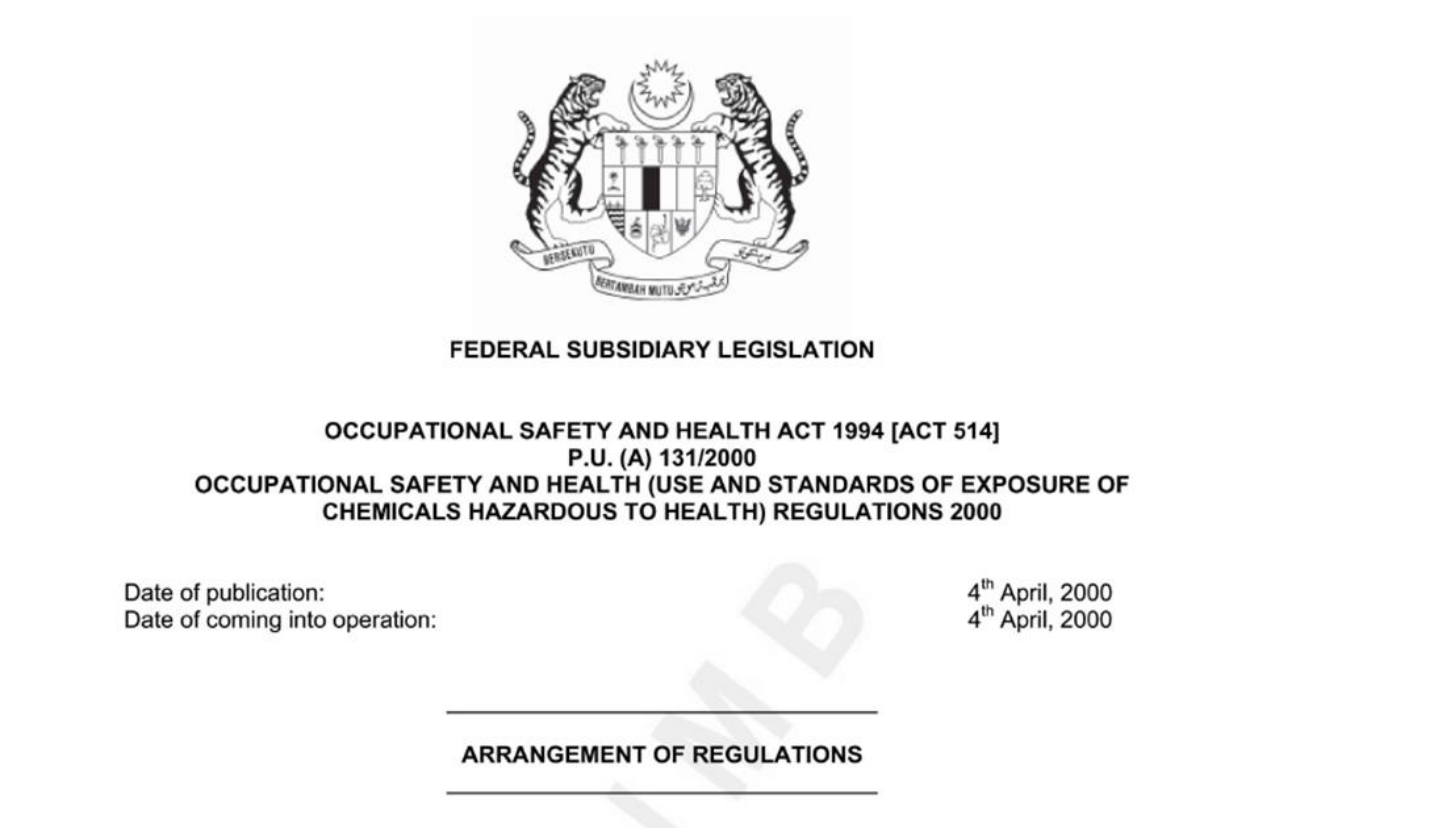
- Pengurusan bahan kimia yang baik/berkesan
  - maklumat/data bahan kimia
  - Kesan jejak bahan kimia
  - Contoh “chemical inventory”
- Mengurang risiko kebakaran, Mengelakkan kemalangan
- Mengurangkan pendedahan terhadap bahan kimia yang toxic dan pengkakis (Risiko Kesihatan)
- Mematuhi keperluan statut keselamatan yang berkaitan

Ref: Cambridge safety booklet

UNDANG-UNDANG DAN PERATURAN

- OCCUPATIONAL SAFETY HEALTH 1994

(USE AND STANDARD OF EXPOSURE OF CHEMICAL HAZARDOUS TO HEALTH) REGULATION 2000



FEDERAL SUBSIDIARY LEGISLATION

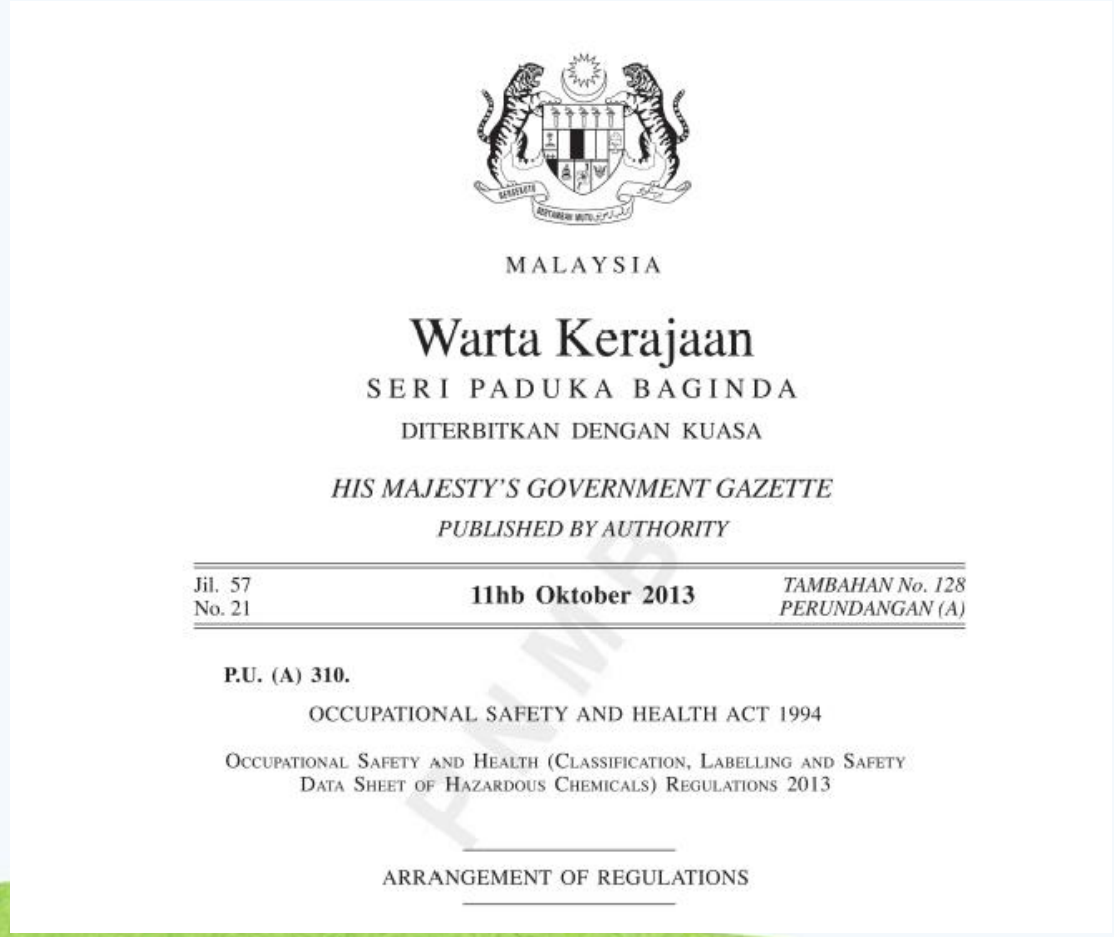
OCCUPATIONAL SAFETY AND HEALTH ACT 1994 [ACT 514]
P.U. (A) 131/2000
OCCUPATIONAL SAFETY AND HEALTH (USE AND STANDARDS OF EXPOSURE OF CHEMICALS HAZARDOUS TO HEALTH) REGULATIONS 2000

Date of publication: 4th April, 2000
Date of coming into operation: 4th April, 2000

ARRANGEMENT OF REGULATIONS

❑ OCCUPATIONAL SAFETY HEALTH ACT 1994

(CLASSIFICATION, LABELLING AND SAFETY DATA SHEET OF HAZARDOUS CHAMICALS) REGULATION 2013



MALAYSIA

Warta Kerajaan

SERI PADUKA BAGINDA

DITERBITKAN DENGAN KUASA

HIS MAJESTY'S GOVERNMENT GAZETTE

PUBLISHED BY AUTHORITY

Jil. 57 No. 21	**11hb Oktober 2013**	*TAMBAHAN No. 128* *PERUNDANGAN (A)*

P.U. (A) 310.

OCCUPATIONAL SAFETY AND HEALTH ACT 1994

OCCUPATIONAL SAFETY AND HEALTH (CLASSIFICATION, LABELLING AND SAFETY DATA SHEET OF HAZARDOUS CHEMICALS) REGULATIONS 2013

ARRANGEMENT OF REGULATIONS

A. PENYIMPANAN DENGAN SELAMAT

1. Penyusunan berdasarkan sifat bahan kimia
2. Inventori bahan kimia
3. Label bahan kimia
4. “Incompatibility” sesuatu bahan kimia
5. Bekas/tempat/kemudahan penyimpanan

1. SIFAT BAHAN KIMIA

FIZIKAL	JENIS	HAZARD / KELAS BAHAN KIMIA
PEPEJAL	ASID	'FLAMMABLE'
CECAIR	BASE / ALKALI	'CORROSIVE'
GAS	PELARUT ORGANIK	'TOXIC'
	PEROKSIDA	'WATER REACTIVE'

1. SIFAT BAHAN KIMIA

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

1.1 Product identifier

Catalogue No.	108600
Product name	Hydrogen peroxide 35% suitable for use as excipient EMPROVE® exp
REACH Registration Number	This product is a mixture. REACH Registration Number see section 3.

portal (www.merckgroup.com).

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms

Signal word

Danger

1. SIFAT BAHAN KIMIA

SECTION 9. Physical and chemical properties

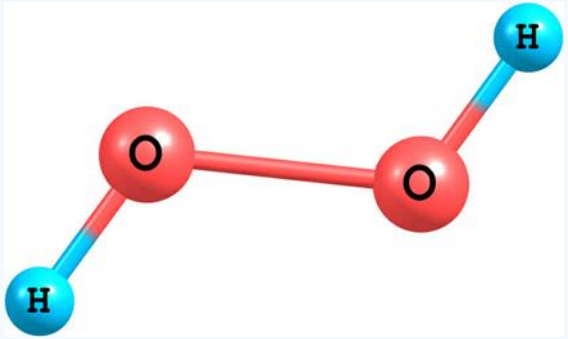
9.1 Information on basic physical and chemical properties

Form	liquid
Colour	colourless

Explosive properties	Not classified as explosive.
Oxidizing properties	Oxidizing potential

Hydrogen Peroxide

i. Cecair
ii. Agen Pengoksidaan
iii. Pengkakis
iv. Berbahaya



2.INVENTORI BAHAN KIMIA

Inventori bahan kimia: maklumat bahan kimia

I. Nama bahan kimia

II. Lokasi

III. Kuantiti

contoh

Required Information										Supplemental Chemical Information					Additional Vendor/Manufacturer Informa							
Product Name (as listed on SDS)	Building	Room	Physical State (S,	# of Container	Quantity per	Volume/ Size of	Manufacturer	Receipt Date	CAS Number	Chemical Formula	Molecular Weight	Specific Gravity	Storage Location	MAX on Hand	Catalog #	PO	Lot #	Open Date	Expiration Date	Contact	Comments	
Example: Sodium Chloride	BSB	4-301	solid	2	500	grams	Sigma-Aldrich	05/06/2015	7647-14-5	NaCl	58.44		Shelf #1									

https://ehs.research.uiowa.edu/chemical-inventory

2. INVENTORI BAHAN KIMIA

Required Information								
Product Name (as listed on SDS)	Building Code	Room #	Physical State (S, L or G)	# of Containers on hand	Quantity per Container	Volume/Size of Container	Manufacturer	Receipt Date
Example: Sodium Chloride	BSB	4-301	solid	2	500	grams	Sigma-Aldrich	05/06/2015

Strongly Recommended	Supplemental Chemical Information				
CAS Number	Chemical Formula	Molecular Weight	Specific Gravity	Storage Location	MAX on Hand
7647-14-5	NaCl	58.44		Shelf #1	

Additional Vendor/Manufacturer Information						
Catalog #	PO #	Lot #	Open Date	Expiration Date	Contact	Comments

3. LABEL BAHAN KIMIA

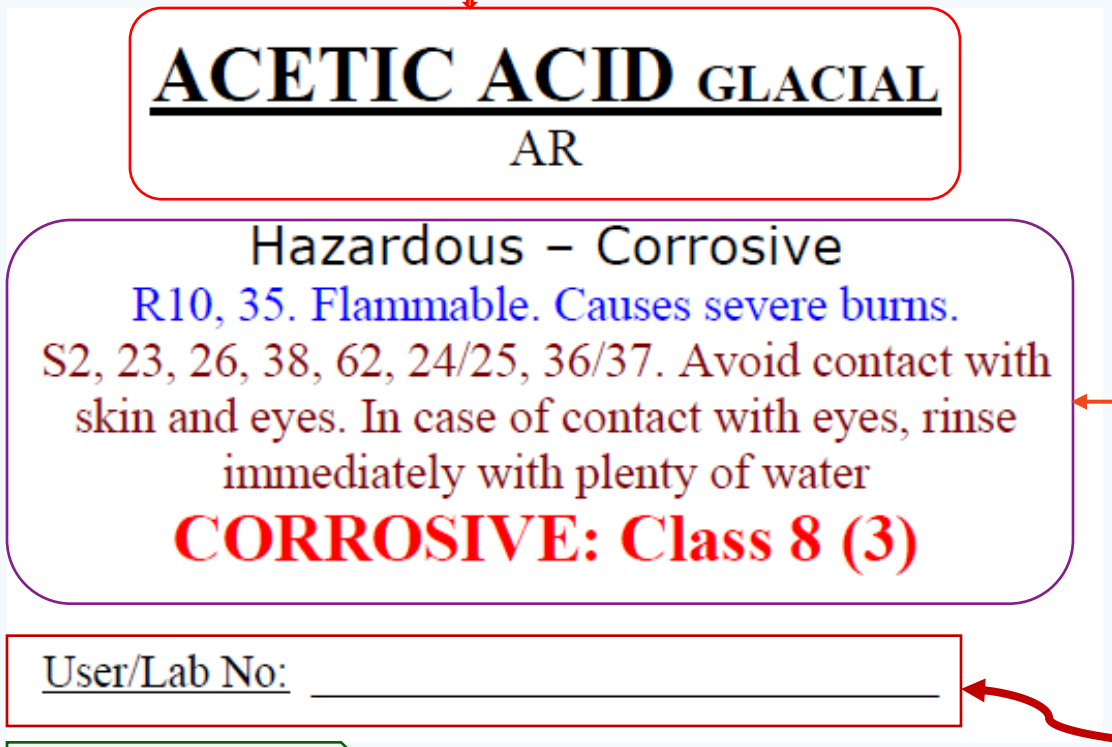
Ditulis atau dicetak atau yang dinyatakan dalam bentuk grafik yang ditampal pada bekas bahan kimia

1. Label dari kilang/pengeluar tidak boleh ditanggalkan
2. Bahan yang dipindahkan ke bekas lain (Secondary container)
   - Jika dipindahkan ke beaker, nama bahan kimia
   - Bekas simpanan kedua (sementara)?

3. LABEL

- Dilabelkan nama penuh bahan kimia tersebut

- Tidak boleh menggunakan formula atau abbreviation



- Hazard indentification seperti flammable

- Nama pengguna & No makmal

- Perlu ada tarikh mula dipindahkan

3. LABEL

Bahan sintesis atau bahan diekstrak

1. Struktur / struktur jangkaan

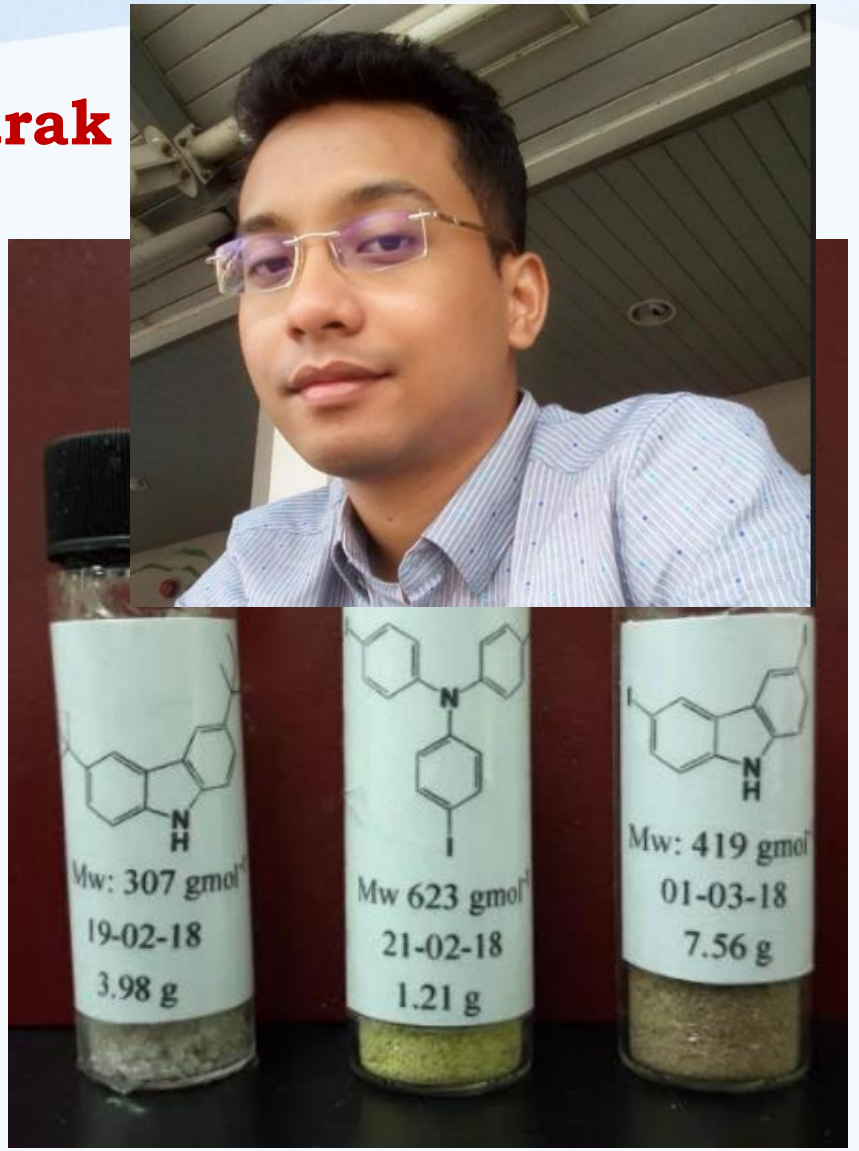
2. Kod,

Perlu dinyatakan kaedah

sintesis/ bahan yang digunakan

3. Kumpulan kimia seperti hidrokarbon, ester, alkohol

4. Nama, no makmal dan tarikh disintesis



4. 'INCOMPATIBILITY'

TI ASID DAN BES

Material Safety Data Sheet

Hydrochloric Acid

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: H

7. HANDLING AND STORAGE

10. STABILITY AND REACTIVITY

Stability: Stable

Conditions to avoid: Uncontrolled addition of water.

Incompatibility: Moisture, bases, organic material, metals, carbides, cyanides, chlorates, nitrates, picrates, permanganate, peroxides, zinc iodide, azides, perchlorates, phosphorus.

Hazardous decomposition products: Carbon oxides.

Hazardous polymerization: Will not occur.

Hazardous polymerization: Will not occur.

5. BEKAS/ TEMPAT PENYIMPANAN

Besesuaian dengan bahan tersebut

- Botol kaca/polyethylene

- Corrosive cabinet

- Drum

- Flammable Cabinet

5. BEKAS/ TEMPAT PENYIMPANAN

- Rak terbuka

- Kabinet besi

- Desiccator

Use desiccators for chemicals that react with air or water or are hydroscopic. Make sure that separate desiccators are used for incompatible chemicals.

5.BEKAS/ TEMPAT PENYIMPANAN

- ‘Refrigerator /Chiller’
  - ‘Conventional Refrigerator/Freezer’
  - ✓ **Tidak boleh simpan bahan yang “Flammable” !**
  - ✓ Boleh menyebabkan letupan yang besar
  - ✓ Wap (vapour) yang terkumpul dan bersentuh dengan punca elektrik yang boleh menghasilkan percikan api
  - ✓ Defrost timer, thermostat, unit pencahayaan dalaman, compressor motor

5.BEKAS/ TEMPAT PENYIMPANAN

Letupan terjadi pada "refrigerator"

University of Vermont, June 2000: Flammable liquids stored in a refrigerator resulted in an explosion. The door blew off and debris propelled across the room.

University of Virginia: A thermostat spark ignited flammable vapors.

Freezer compartment melted.

5. BEKAS/ TEMPAT PENYIMPANAN

Conventional Refrigerators

• Contain sparking components inside the refrigerator cabinet, such as thermostats and switches, that can ignite vapors from the flammable liquids stored inside. • Commonly used due to low cost. • **Flammable materials must never be stored in these types of refrigerator!** • Please look in your refrigerator now and remove any flammable materials if your refrigerator is not approved for flammables storage.

Flammable Storage Refrigerators

• UL listed for storage of flammable chemicals. • Electrical sparking devices are on the outside of the refrigerator and cannot ignite flammable vapors from chemicals stored inside. • More costly than conventional refrigerators, but can safely store chemicals that exude explosive vapors. • Cannot be placed in a room containing explosive vapors.

Explosion Proof Refrigerators

• UL listed for explosion-proof. • Similar in design to flammable approved units, but operating components and electrical junction boxes are sealed from explosive vapors. • Limited use on campus. • Only required for storage of volatile materials in areas or rooms with explosive atmospheres, such as solvent dispensing rooms. • Very expensive and requires special wiring.

https://labratnewsletter.wordpress.com/2014/12/18/flammable-chemicals-and-refrigerator-storage/

5.BEKAS/ TEMPAT PENYIMPANAN

Ciri-ciri 'Refrigerator Untuk Bahan 'Flammable'

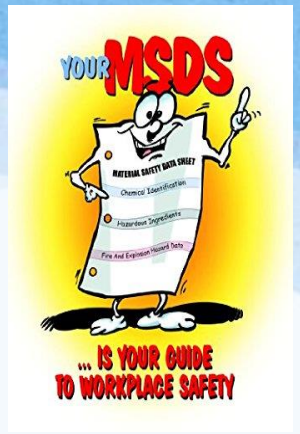
- Thermostat dan compressor diasing (di kawasan yang kalis wap : 'vapor proof')
- Sambungan elektrik direka khas untuk menghalang terjadinya percikan api

5. BEKAS/ TEMPAT PENYIMPANAN

Cara Penyimpanaan Dalam 'Refrigerator'

- Balut penutup vial dengan parafilm wax
- Simpan bahan yang merwap dalam 'ziplock bag'
- 'Secondary containment' digunakan
- Pengguna gabus dan 'glass stopper' tidak digalakkan
- Label perlu kalis air
- Senarai bahan

B. PANDUAN UMUM BAGI PENYIMPANAN BAHAN KIMIA



1.Rujuk SDS

2. Kumpulkan bahan kimia mengikut kategori ‘hazard’, bukan mengikut turutan abjad dan dipisahkan dengan sekatan fizikal.

3. Jauhkan dari punca nyalaan api

4. Elakkan kawasan penyimpanan dari sinaran matahari, sumber pemanas

B. PANDUAN UMUM BAGI PENYIMPANAN BAHAN KIMIA

5. Minimakan penyimpanan di atas ‘bench’ dan kawasan bekerja.

6. Tidak disimpan di atas lantai dan di kawasan laluan.

7. Gunakan kaedah ‘first-in – first-out system’.

8. Bahan Kimia yang merbahaya tidak diletakkan melebihi. paras bahu (Di bawah paras mata).

9. Jika diletakkan di rak, perlu ada bekas atau ‘tray’.

10. Pemeriksaan tempat penyimpanan

‘Secondary Containment’

C. CLASSES OF CHEMICAL/ PENGKELASAN BAHAN KIMIA

‘Corrosive’

‘Flammable’

‘Oxidiser’

‘Dry solid’

Reaktif terhadap air/udara

1. CORROSIVE (PENGKAKIS)

1. Perubahan / kemusnahan pada tisu hidup yang tidak dapat dikembalikan ke keadaan asal.

'Corrosive ACID' dan 'Corrosive BASE'

- diletakkan dalam bekas plastic atau dulang (secondary containment) jika di letakkan pada rak besi.
- 'Base' dan 'Asid' diasingkan
- Corrosive cabinet

‘Corrosive acid’

Asid mineral

Contoh: asid mineral / tak organic

H_2SO_4, HCl, HNO_3

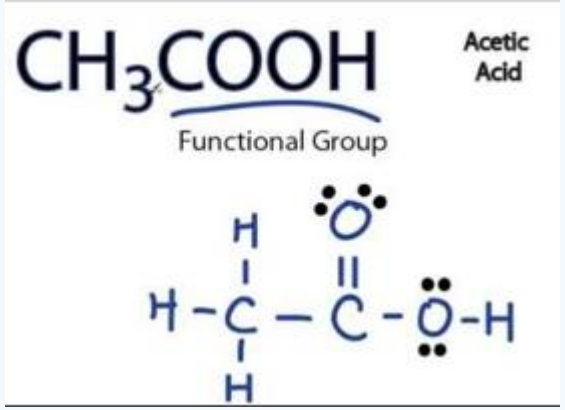
‘Corrosive base’

- Contoh NaOH, NH_3OH
- , Trisodium Phosphate (TSP)
- Inorganic hydroxide disimpan dalam bekas polyethylene

Asid organik

Contoh: asid organic, Formic acid, acetic acid

- Boleh disimpan bersama organic solvent kecuali dinyatakan dalam SDS
- mineral asid tetapi perlu diletakkan dalam secondary containment.
- Kecuali asetik asid perlu lihat SDS



Hydrofluoric Acid (HF)

- a highly corrosive inorganic acid
- can penetrate the skin extremely easily
- decalcifies bones leading to tissue necrosis,
- which may result in amputation and death

Hydrofluoric Acid must be stored in a:

- tightly closed container made from either Polyethylene, Fluorocarbon, or Lead.
- cool dry place away from other chemicals or materials.
- cabinet with warning signs posted outside of it.
- facility with adequate ventilation.
- secondary containment made of Polyethylene.

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HF (Cont'd)

HF should never be stored in glass containers!

Hydrofluoric Acid reacts with many materials;

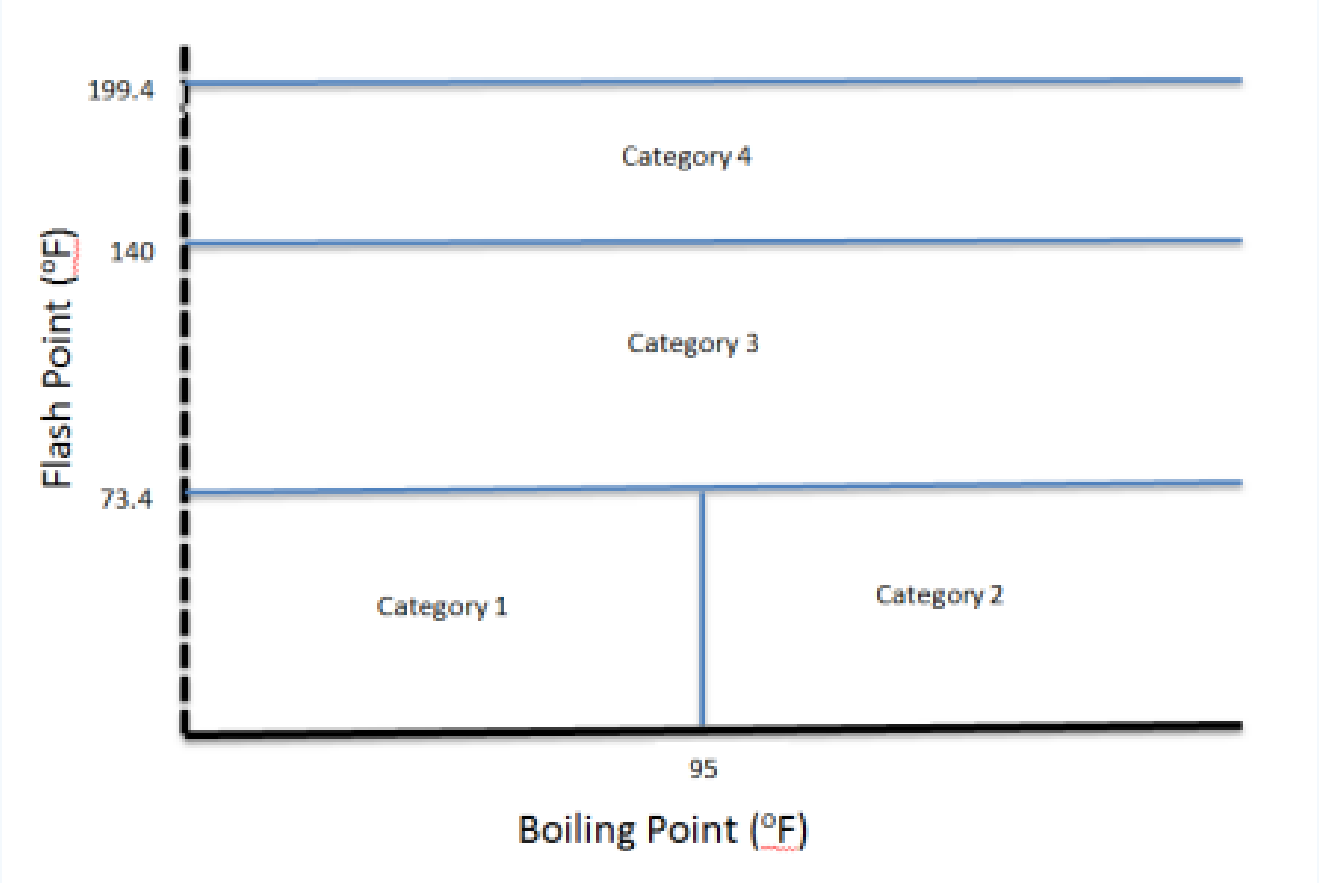
avoid contact with:

- Glass • Concrete • Metals • Water • Oxidizers • Alkalis
- Combustibles •Organics
- Ceramics Containers of HF may be hazardous when empty since they retain product residues (vapors liquid).

https://www.uab.edu/ohs/images/docs/chem/HFUserGuide-2016-09-29.pdf

2. FLAMMABLE (MUDAH TERBAKAR)

- Flash point pada atau bawah 93 ^{o}C (199.4 ^{o}F)
- Ada 4 kategori
- Contoh Ethanol, Isopropyl alcohol



https://www.osha.gov/dte/library/TrngandMatlsLib_FlammableLiquids.pdf

2. FLAMMABLE (MUDAH TERBAKAR)

- Disimpan dalam 'flammable safety cabinet'
- Disimpan jauh dari
  - asid pengoksidaan (oxidising acid), 'oxidizer,
  - Corrosive seperti asid dan base
  - Punca api, permukaan panas,
  - Bahan yang boleh bertindak dengan udara atau lembapan

  Eg H_2SO_4 (conc)

  Ammonium Nitrate, Chromic Acid, Sodium Peroxide, Halogen
- Tidak disimpan di dalam freezer/refrigerator/cold room

3. OXIDISER (PENGOKSIDAN)

- Bahan samada cecair atau pepejal
- yang membebaskan oksigen
- boleh memulakan proses pembakaran dengan bahan lain
- Contoh:Potasium dichromate, sodium hypochlorite, Hydrogen peroxide

- Disimpan dalam 'noncombustible cabinet''.
- Dipisahkan dari bahan 'flammable' dan 'combustible'.
- Boleh disimpan bersama inorganic oxidizers, organic peroxides, tetapi dipisahkan dengan 'secondary containment'.
- https://ehs.georgetown.edu/chemsegregation

4. DRY SOLID

4.1 Non hazardous – Starch, NaCl, $NaHCO_3$ (Baking Soda)

- Di rak terbuka
- Kabinet

4.2 Hazardous

Reaktif terhadap udara dan air

- Bertindakbalas dengan air menghasilkan haba/letupan
- Logam sodium, potassium, lithium hydride, aluminium hydride
- Disimpan dalam bekas yang diberikan oleh pengeluar
- Ditempat kering dan bebas dari haba dan cahaya
- Boleh disimpan bersama-sama bahan kimia yang pepejal yang kering diletak dalam secondary containment
- Diletakkan dalam ‘desiccator’ jika perlu

D. RINGKASAN KAEDAH PENYIMPANAN BERDASARKAN KELAS BAHAN KIMIA

Class of chemical	Example	Recommended storage method	Incompatible
Flammable	Methanol, Acetone, benzene, pyridine , all silane,	Flammable cabinet	- Oxidizer - Corrosive acid & bases - Water reactive material
Oxidiser	Sodium hyperchlorate, peroxide eg H2O2, peroxy acid, ammonium persulphate,	Kering & Sejuk Ventilated corrosive cabinet / cabinet biasa Secondary containment seperti	- Water reactive material - Reducing agent: ascorbic acid, copper hydride, formic acid - Flammable - Combustible

5. RINGKASAN KAEDAH PENYIMPANAN BERDASARKAN KELAS BAHAN KIMIA

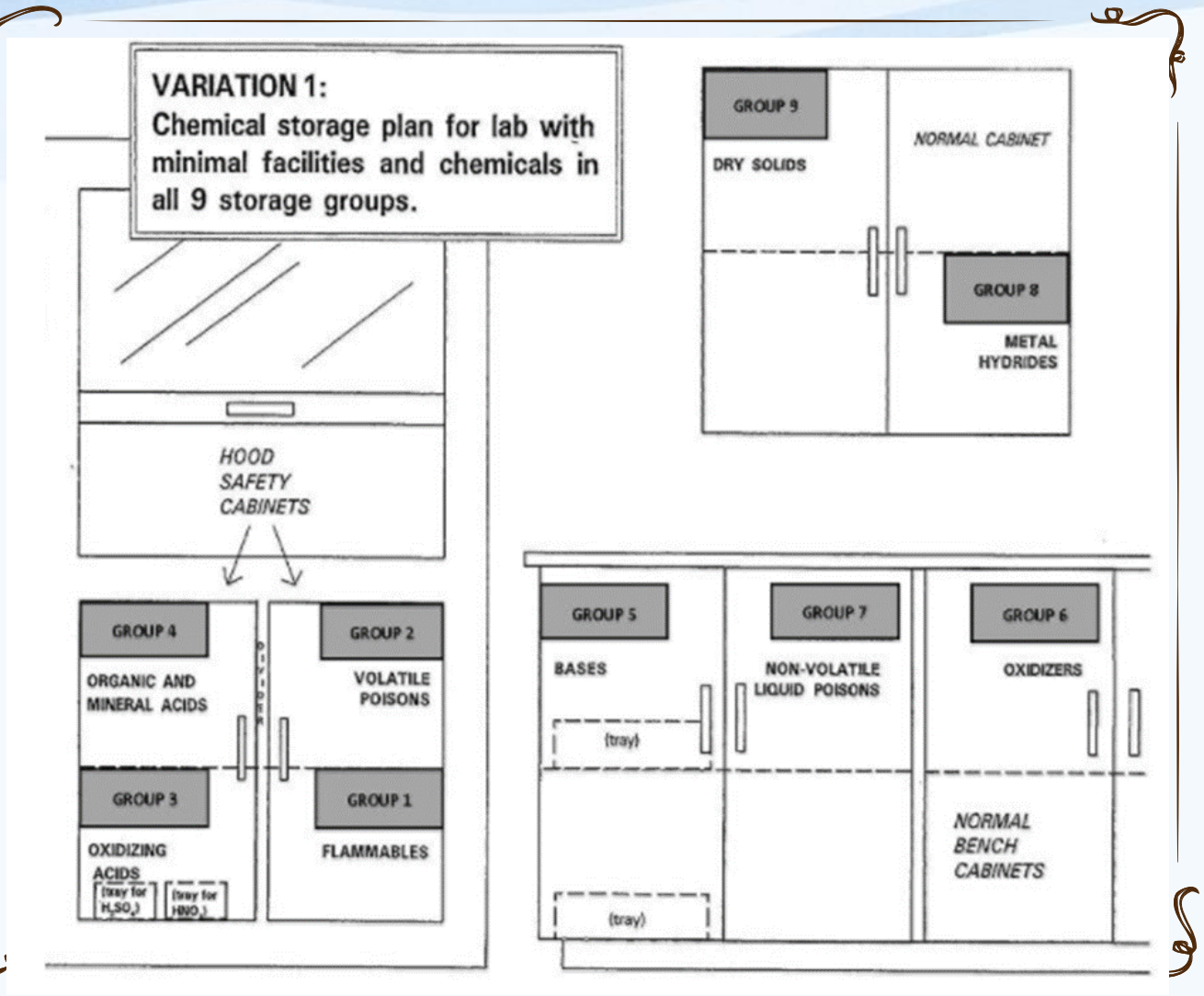
Class of chemical	Example	Recommended storage method	Incompatible
Acid- Mineral	HCl, HF (hydrofluoric acid)-perlu diasingkan.	Corrosive cabinet Secondary containment dengan organic acid	- Water reactive material - Organic acid - Bases - Flammable
Acid – Organic	Acetic acid, Formic acid	Corrosive cabinet Secondary containment dengan mineral acid	• Alkali, • oxidising mineral acid cth Perchloric acid
Bases – Corrosive	Sodium hydroxide, Ammonium hydroxide	Corrosive Cabinet Ventilated cabinet (secondary containment)	- Acid - Metal - Organic peroxide - Flammable

5. RINGKASAN KAEDAH PENYIMPANAN BERDASARKAN KELAS BAHAN KIMIA

Class of chemical	Example	Recommended storage method	Incompatible
Water reactive material	Lithium, Potassium metal	- Container provided by manufacturer - Can be stored with solid material, but keep in second containment.	Asid Base Agen pengoksidaan
Dry solid	Inorganic salt, sodium chloride, , glucose, starch	- Separate hazardous & non hazardous - Open shelf - Normal or ventilated cabinet	- Rujuk SDS

5. RINGKASAN KAEDAH PENYIMPANAN BERDASARKAN KELAS BAHAN KIMIA

Class of chemical	Example	Recommended storage method	Incompatible
Racun	Inorganic – Mercury Organic – Phenol Volatile : CCl4 Non volatile : larutan acrylamide	- Cabinet/ mengikut SDS - Dikunci - Ventilated cabinet /Flammable - Ventilated Cabinet	- Jauhkan dari asid - Alkali
Bahan yang oleh menghasilkan peroxide	Ether, Dioxane, THF Cyclic ketone Anhydrous acetaldehyde	- Bekas kedap udara - Gelap dan kering	- Rujuk SDS - Perlu - Pemeriksaan kehadiran peroxide



Contoh 1 Cadangan Susun Atur Bahan Kimia

https://ehs.research.uiowa.edu/chemical-storage-nine-compatible-storage-group-system

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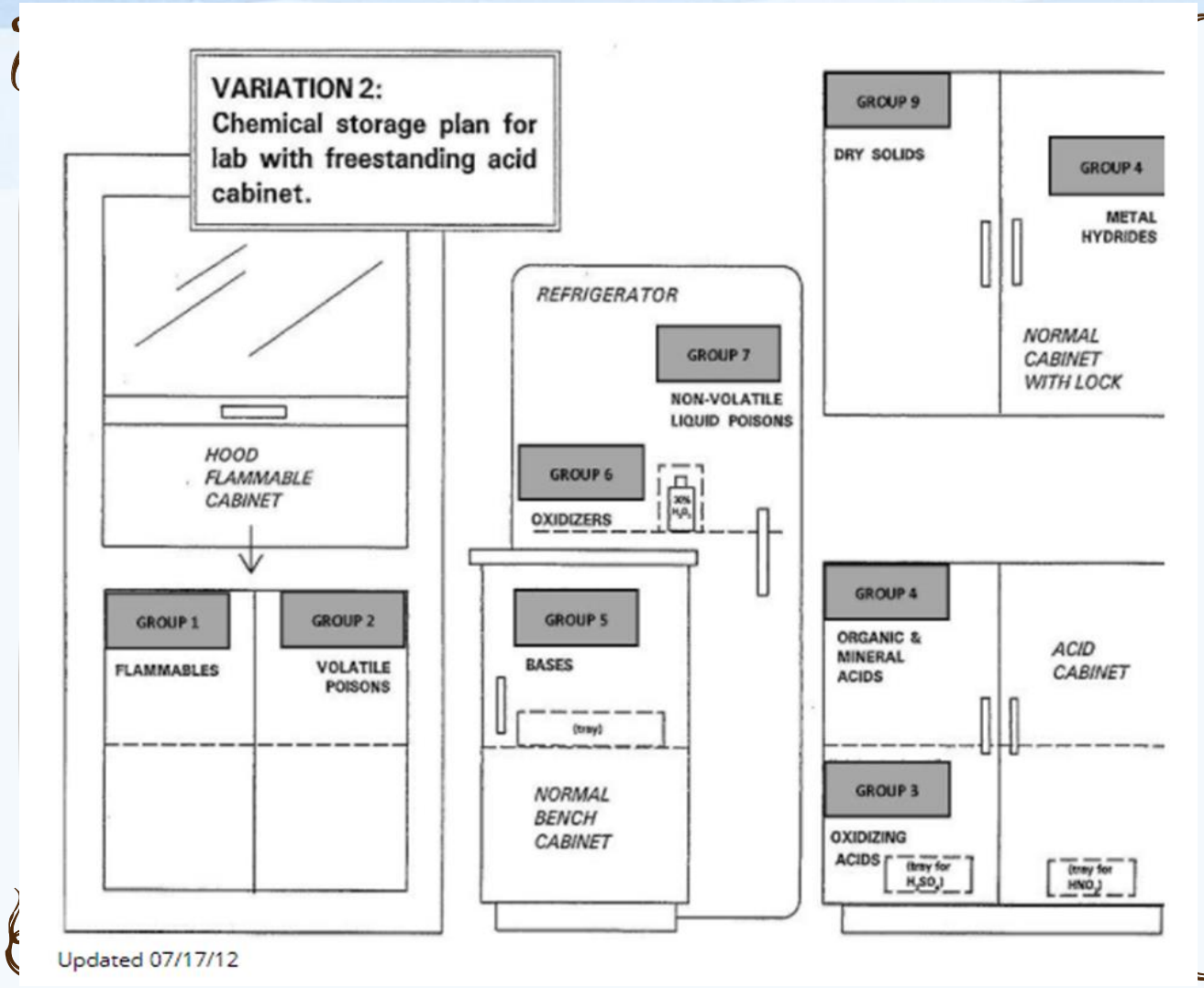

Contoh 2 Cadangan Susun Atur Bahan Kimia

https://ehs.research.uiowa.edu/chemical-storage-nine-compatible-storage-group-system

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Goals For Chemical Storage

L Label everything

A Appropriate containers in good condition

B Be neat and orderly

S Store only what you will use within the semester

A Always wear protective clothing

F Food allowed in eating areas only

E Everything in its place

T Time to inventory & organize

Y Your safety is important

Terima kasih

Storage Room Must-Haves

- Spill control and clean-up materials
- Master control shut-off valves for gas, water, and electricity
- Smoke detector (tested regularly)
- Forced ventilation from floor to ceiling with exhaust above roof level
- Safety cabinets for specific groups of compatible substances
- Communications channel to the main office or emergency center

Storage Room Must-Haves (Fire Extinguisher)

Fire extinguisher “quick checks” shall include at least the following items (NFPA 10 4-3.2):

- Fire extinguishers are located in designated place.
- Access and visibility are unobstructed.
- Operating instructions on nameplate are legible and are facing forward.
- Safety seals and tamper indicator are not broken or missing.
- Fullness is determined by weighing or “hefting.”
- Extinguishers are examined for obvious physical damage, corrosion, leakage, and clogged nozzles.
- Pressure gauge reading or indicator is in operable range or position.
- Inspections occur monthly and annually.

Storage Room Must-Haves (Eye Wash Station)

- Meets ANSI Z358.1.
- Is at least six inches from the wall or nearest obstruction.
- Has heads 33”–45” from floor.
- Is able to treat both eyes with water flow for at least 15 minutes.
- Is activated for at least three minutes every month.
- Is inspected annually.
- Has free and unobstructed path and use zone.

Storage Room Must-Haves (Shower)

- Meets ANSI Z358.1.
- Has heads 82” –96” from floor.
- Has spray pattern with minimum diameter of 20” at 60” above floor.
- Has clearance of at least 16” from center of spray pattern.
- Is activated monthly.
- Is inspected annually.
- Has free and unobstructed path and use zone.

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Chemical Storage

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Chemical Storage

Criteria for storage area:

- Chemicals are stored inside closeable cabinets or on sturdy shelves with a front-edge lip (3/4”) to prevent accidents and spills.
- Shelving is secured to the wall or floor.
- Storage areas have doors that lock.
- Storage areas are off limits to students.
- Storage areas are adequately ventilated.

Chemical Storage

Organization:

- Organize chemicals first by COMPATIBILITY, not by alphabetic succession.
- Store chemicals alphabetically within compatible groups.

Chemical Storage

The Trust
in partnership with the Alliance and SCIP

DYSART Unified School District

Chemical Storage

Proper use of chemical storage container: Never use food containers for chemical storage.

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Chemical Storage

Proper use of chemical storage container: Make sure all containers are properly closed or stopped.

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Chemical Storage

Proper use of chemical storage container: After each use, wipe down the outside of the container with a paper towel before returning it to storage.

Properly dispose of the paper towel after use.

Goals For Chemical Storage

- Removal of hazardous or excess chemicals
- No future accumulation of excess or hazardous chemicals
- Training in proper safety precautions for all personnel
- HOUSEKEEPING

Safety Guidelines

- Know which chemicals you work with.
- Read the labels.
- Follow all established safety policies and procedures for chemical handling and storage.
- Use the proper personal protective equipment.
- Wash your hands before eating, drinking, applying make-up, etc.