ICMS
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Laboratory Safety in ICMS

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Something you should know:

1. General Personal Protective Equipment (PPE)
2. Safety Facilities in ICMS
3. Chemical Safety
4. Biological Safety
5. Hazards in ICMS
6. Waste Disposal
7. Public Health & Hygiene

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Mandatory

- ☑ Safety Goggles
- ☑ Hair in Ponytail
- ☑ Gloves
- ☑ Longsleeved, Fastened Coat
- ☑ Long Pants
- ☑ Enclosed Shoes

Workplace Specific

- ☐ Head Cap or Hairnet
- ☐ Face Shield (UV)
- ☐ Heavy Chemical Resistant Gloves
- ☐ Heat/Freeze Resistant Gloves
- ☐ Chemical Resistant Apron (PVC)
- ☐ ESD Shoes

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Strictly adhere to proper attire before entry

Tied-up hair
(For long hair only)

Long Pants/Trousers

Covered Shoes

No untied long hair

No Shorts/Skirts

No Open Toed Shoes

General Personal Protective Equipment (PPE)

They are:

- **Goggles/safety glasses**
- **Mask (Optional)**
- **Head shield (Optional)**
- **Ear plug (Optional)**
- **Lab coat**
- **Gloves**
- **No-toes shoe**
- **……**

We are going to introduce you what we have in ICMS…

Goggle Box:

- Near the door in each general lab

- For Public use, please clean & return the goggle after use

Safety goggle

- **Model: 3M, 1611**
- **Polycarbonate** 聚碳酸酯
- **Reduce UVA and UVB radiation**

- **Examination Gloves (Nitrile? Latex?)**

	Nitrile gloves (no powder) 	Latex gloves (no powder) 
Chemical Resistant	Better	Good
Puncture Resistant	Better	
Touch Sensitivity		Better
Comfort & Fitness	Good	Better
Allergy	No	May be
Bio-degradable	No	Yes

- **Heat Resistant Gloves (heat contact up to 180c)**

PPE for liquid Nitrogen (LN)

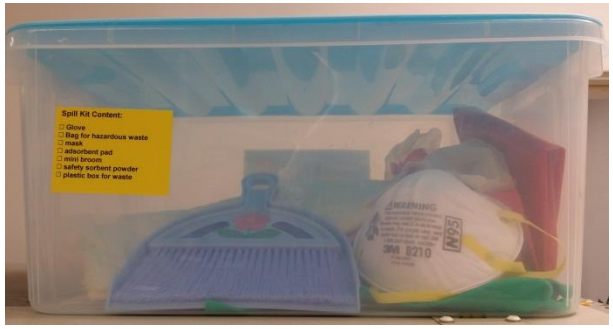
- Cryo-gloves
- Cryo-apron
- Face-shield

Use: Liquid Nitrogen, -195c
Location: 7F Liquid Nitrogen Room

Mask:

Surgical Mask (Not in stock now)	N95 (spill kit)	R95
➢ help block large-particle droplets, splashes, sprays, or splatter that may contain viruses and bacteria 	➢ Protect against certain airborne biological particles ➢ Filtration against certain non-oil based particles 	➢ reduce nuisance levels of organic vapors Organic / Acid vapor 

Chemical Spill Kit 化學品洩漏處理箱

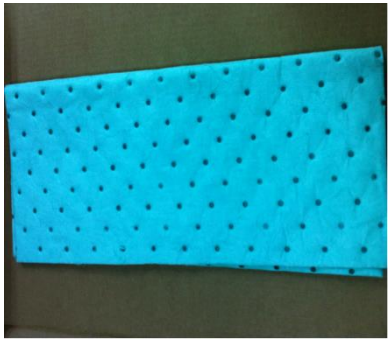


化學品洩漏處理箱 Spill kit

Nitrile Gloves 防護手套

Safety goggle 防護眼鏡

Absorbent pillow
吸液條



Absorbent sheet
吸液棉片

Hazardous bag
廢料處理袋

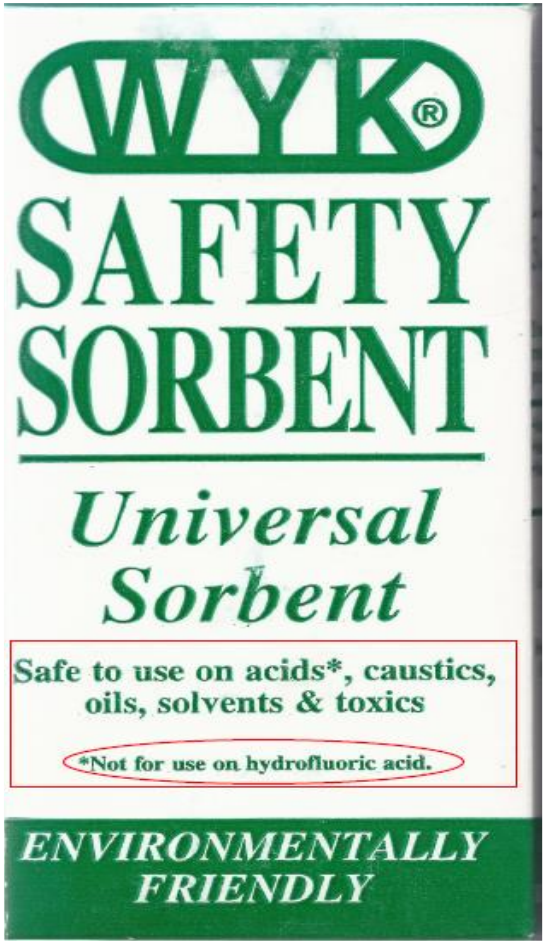
Sweep 小掃把/簸箕

- **Medical Waste bag**
- **Hazardous waste bag**
- **Yellow**

- **Biological waste (Biohazard) bag**
- **Red**
- **Auto-clavable**

WYK Universal safety sorbent

- **Use on oils, acids, caustics, solvents and toxics**
- **It leaves surfaces 100% dry which reduces slip and falls**
- **NOT for use on Hydrofluoric Acid (氫氟酸)**



Something you should know:

1. General Personal Protective Equipment (PPE)
2. Safety Facilities in ICMS
3. Chemical Safety
4. Biological Safety
5. Hazards in ICMS
6. Waste Disposal
7. Public Health & Hygiene

3. Safety Facilities in ICMS:

- Emergency / fire alarm
- Fire distinguisher
- Fire blanket
- Fire proof door
- Fire evacuation
- Goggle box
- Emergency button
- Eye wash and shower
- First aid box
- UV lamp (depends on the room)
- Oxygen & Flammable gas detector
- Spill kit
- Exhaust arm
- Chemical Hood
- Biosafety Cabinet
- Placard
- Waste Room
- ...

< Safety Facilities >

!! You need to know their location!!

We are going to give more details for the below items in ICMS

- **Fire evacuation route**
- **Goggle Box**
- **Placard & Emergency Contacts**
- **First aid box**
- **UV lamp (depends on the room)**
- **Oxygen & Flammable gas detector**
- **Spill kit**
- **Exhaust arm**
- **Hoods (Chemical hood / Biological safety cabinet / Ductless hood)**
- **Waste Room (to be introduced in the Waste Chapter)**

Fire Evacuation:

1. Inform your colleagues
2. Leave the laboratory ASAP, follow the evacuation route.
3. Do not use lift
4. Go to the evacuation assembly place
5. Report to the fire warden

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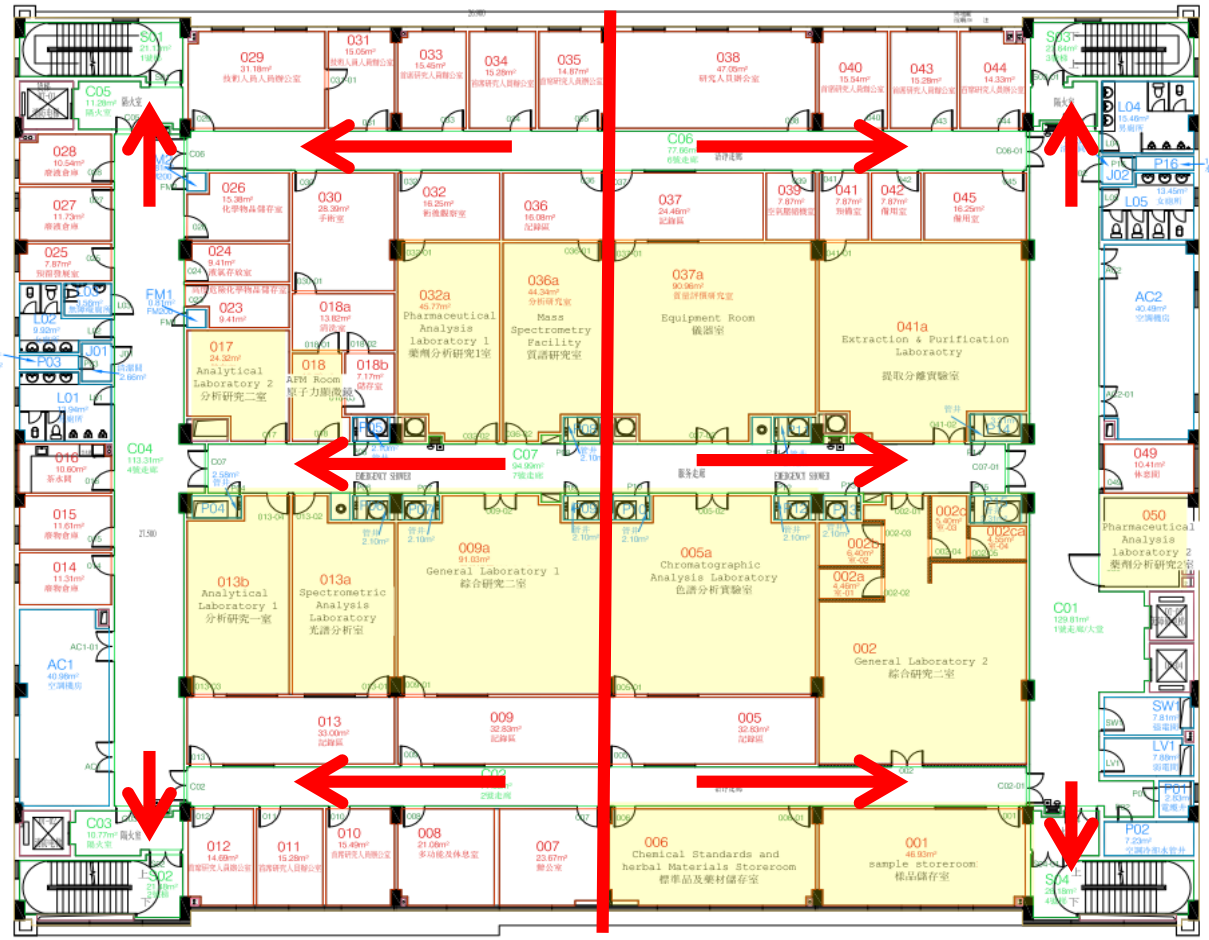
Fire Evacuation Route: Do not use Lift



ICMS_6F

EVACUATION ASSEMBLY PLACE

緊急疏散集合地點

N22

科研大樓北二十二座

Research Building N22

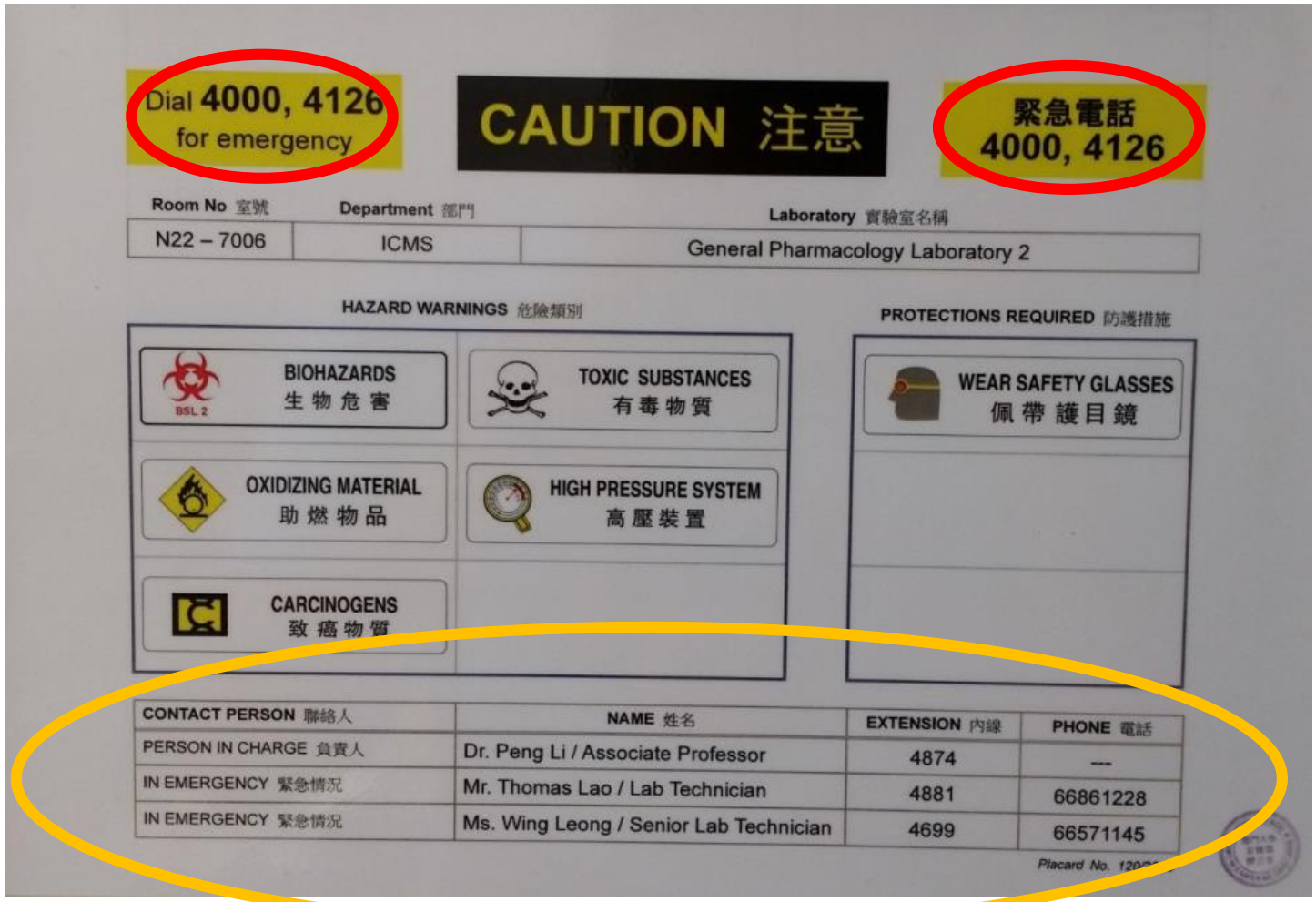
行政樓後面空地 (近凱旋大馬路)

Back of Admin Building
(Near Avenida da Vitória)

Fire Warden 消房負責人

Building code	Floor	Room Number	Name of Fire Warden	Contact
N22	1, 2/F (side building)	1043	Jeff PONG	8822-4875 JeffPong@umac.mo
N22	5/F	7005	Weng LEONG	8822-4699 Wengl@umac.mo
N22	6/F	6029	Sherry WONG	8822-8048 Waisanwong@umac.mo
N22	7/F	7005	Chris CHAN	8822-4880 Chrischan@umac.mo
N22	8/F	6029	Keith KEI	8822-4671 KeithL@umac.mo

Placard & Emergency contact: (Lab Contact Person)



Placard & Emergency contact:

Security Centre UM	大學保安中心	**8822-4000/4126**
Medical Center, G002, GF, UM Sport Complex	大學醫療中心	**8822-4123**
Emergency (ambulance service)	緊急求助 (救護車服務)	**999**
Hospital Conde de São Januário	仁伯爵綜合醫院 (山頂醫院)	**2831-3731**
Island Emergency Station of Hospital Conde de São Januário	仁伯爵綜合醫院離島急診站	**2899-2230**
Health Centre (Nossa Senhora do Carmo)	湖畔嘉模衛生中心	**2850-0400**
Health Centre (Jardins do Oceano)	海洋花園衛生中心	**2881-3089**
Kiang Wu Hopsital	鏡湖醫院	**2837-1333**
Kiang Wu Hopstial Taipa Clinic	鏡湖醫院氹仔醫療中心	**8295-4002/1017**

For the details, please visit the web site of HSEO: *https://hseo.umac.mo/health-and-hygiene-affairs/*

Emergency Procedure 緊急應變程序

1. 立即通知附近使用者
2. 評估自己是否可以處理
3. 立即通知相應人員

   ICMS: 技術員, 老師, 安全主任 (Placard)

   保安: 8822-4000 / 8822-4126

   HSEO: 8822-4235
3. 告訴對方: 你的名字、聯繫方式、事故地點
4. 封鎖區域, 人員清空
5. 意外受傷: 致電保安, **由保安**叫救護車或請醫護人員到場協助

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WHAT DO I SAY TO UNIVERSITY SECURITY OPERATOR

"I am at University Macau and I need help" (我在澳門大學，我需要求助)
Your name (你的名字是) _____
Your location (你所在的地點) _____(Building code 樓宇編號 & Name 樓宇名稱)
Floor (樓層) _____ & room number (房間號碼) _____
Leave your contact number (留下你的聯絡號碼)_____
Provide Details about (提供以下的詳細資料):

- ✓ Injuries (受傷)
- ✓ Fire (火勢)
- ✓ Exposures (substance name) (所曝露之化學品名稱)
- ✓ Hazardous spill (危險溢出物)
- ✓ Risk to other people in the building (對大樓裡的其他人所帶來危害)

During a University emergency go to https://go.um.edu.mo/qow5gra3 for the latest information.

First Aid Box

- Next to the Eye Wash / Safety Shower
@ Laboratory Hallway

Contents:

Saline	生理鹽水、
Bandage	創口貼 (膠布) 、
Alcohol cotton sheet	酒精棉、
Triangular bandage	三角巾、
Cotton ball	棉花球、
Adhesive tape	黏性繃帶、
Iodine	碘棒、
Wound dressing	敷料

- Rinse with plenty of water for at least ten minutes
- Seek immediately

Eye wash

Oxygen & Flammable Gas detector:

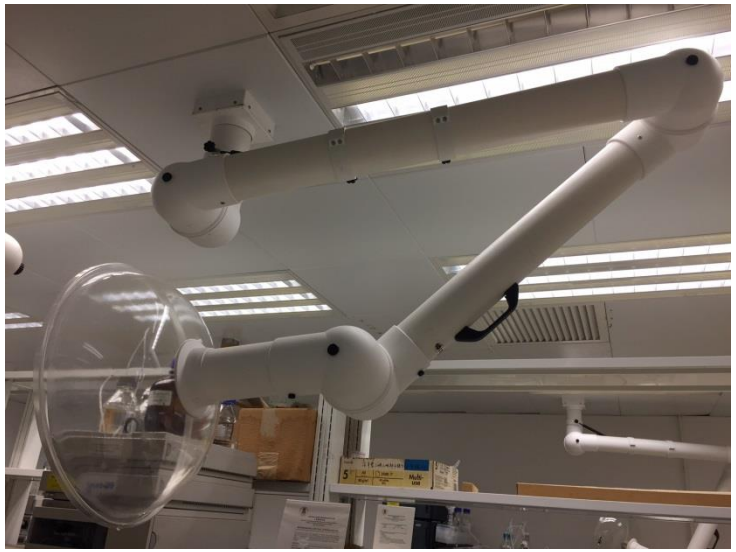
Oxygen detector:
@near breathing level

Flammable detector :
- Hydrogen,
- LNG Liquefied natural gas (the yellow pipe)
@ near the ceiling, Lighter than air

Gases you may find in ICMS:
He, H_2, N_2, Liquid N_2, CO_2, Liquid CO_2, Ar, Liquid Ar, O_2, Compress Air , mixture gas (eg. H_2/O_2) , etc.

Exhaust Arm:

- **Provide a weak exhaust at the top of the open bench area**
- **A valve to slightly adjust the exhaust flow rate**



Chemical Hood / Fume hood / 抽風櫃

- **Use:**
  A device for protecting workers when working with flammable, volatile or toxic chemicals…

- **Working: 0.5m/s**
- **Stand by: 0.3 m/s (energy saving)**
- **Mute**
- **WPC: water**
- **CA: compressed air**
- **Vac: vacuum**

■ **DO NOT just mute the alarm, contact lab technician when there is problem**

Fume hood DO:

- **Reduce exposure to hazardous fume, vapors, gases, dusts**
- **Confine hazardous airborne material by diluting it with a large of amount of air**
- **…**

Fume hood DO NOT:

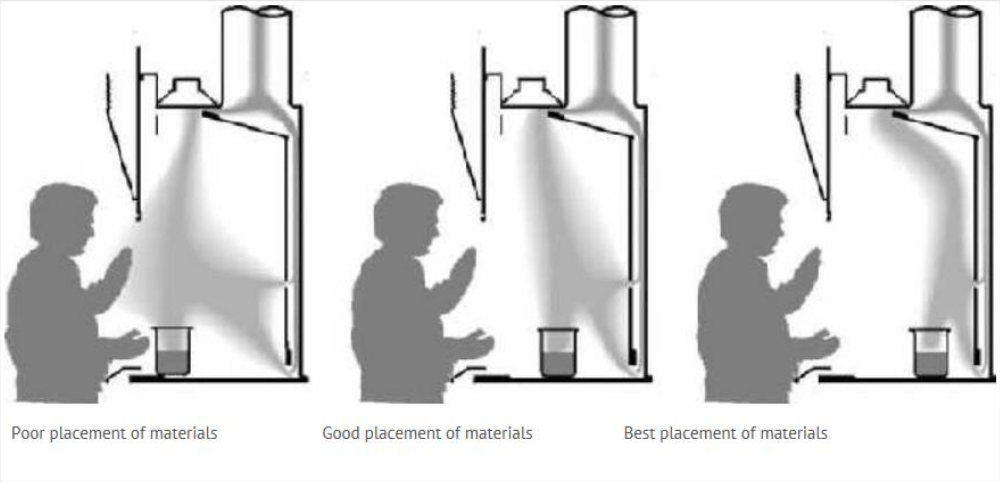
- **Use for storage**
- **Use for disposal of hazardous materials through air dilution**
- **Deal with Biological samples**
- **…**

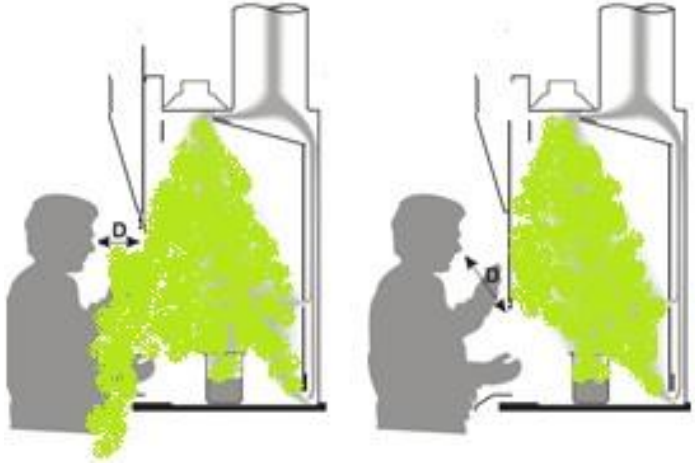
OSHA Occupational Safety and Health Administration
www.osha.gov 1-800-321-6742

OSHA 3407 Rev. 10/2011
DSG

Fume hood – Proper Use

- **Keep the sash lowered any time. (significant energy conservation)**
- **Keep the sash below your face when in use**
- **Keep your materials inside chemical hood at least six inches from the sash opening**
- **Be sure nothing block the airflow through the exhaust slot**





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www.osha.gov 1-800-321-6742

OSHA 3407 Rev. 10/2011
DSG

Fume hood – Proper Use

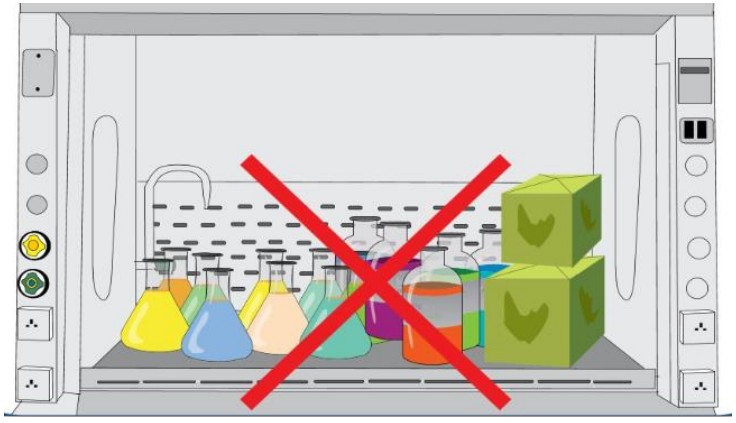
- **DO NOT place your face or head into the fume hood**

PROPER VIEWING
SASH POSITION

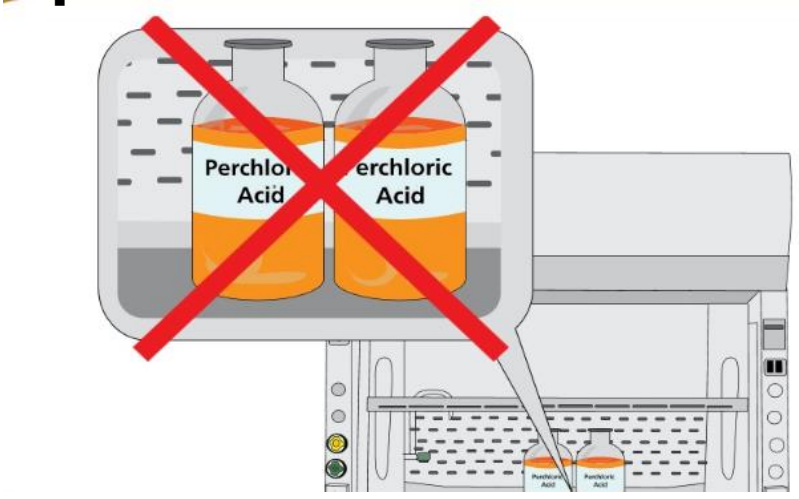
FIG. 1

FIG. 2

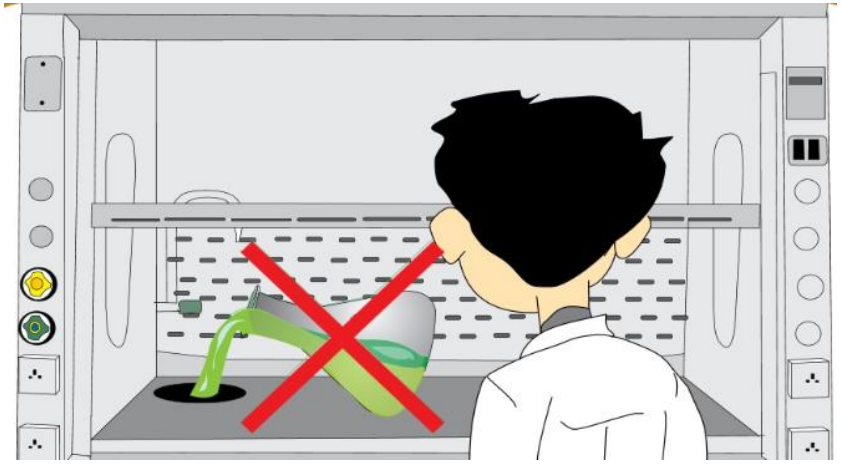
No Storage



No Perchloric Acid($HClO_4$)/Perchlorate Explosive!!



No waste disposal



Biosafety cabinet: (BSC)

It is designed to protect (1) the operator, (2) environment, (3) work materials/samples from exposure to infectious aerosols and splashes that may be generated during experiment.

Biosafety Cabinets types:

- **Class I**
- **Class II, A1, A2, B1, B2 (The red are available in ICMS)**
- **Class III**

World Health Organization

Laboratory Biosafety Manual 3rd Edition
http://www.who.int/en/

Biological safety – Biosafety level (BSL)

	BSL-1	BSL-2	BSL-3	BSL-4
Causing Individual Risk	No or Low	Moderate	High / Serious disease, fatal	High / Serious disease, fatal
Causing Community Risk	No or Low	Low	Low	High
Effective Treatment	Yes	Yes	Yes	No

BSL-2 samples include:

- **Bacteria, fungi, viruses, DNA, human or non-human cells, cell lines, liquid growth media, etc.**

World Health Organization

Laboratory Biosafety Manual 3rd Edition
http://www.who.int/en/

- **Biosafety Cabinet:**
  A device to working safely with infectious microorganisms

Biosafety Cabinet – Class I

- **Use: BSL-1**
- **Flow: Room air@0.38 m/s > BSC**
- **Exhaust: 100% of air > HEPA filter > outside**
- **Protect personnel and environment**
- **Not protect the sample/materials in the BSC**

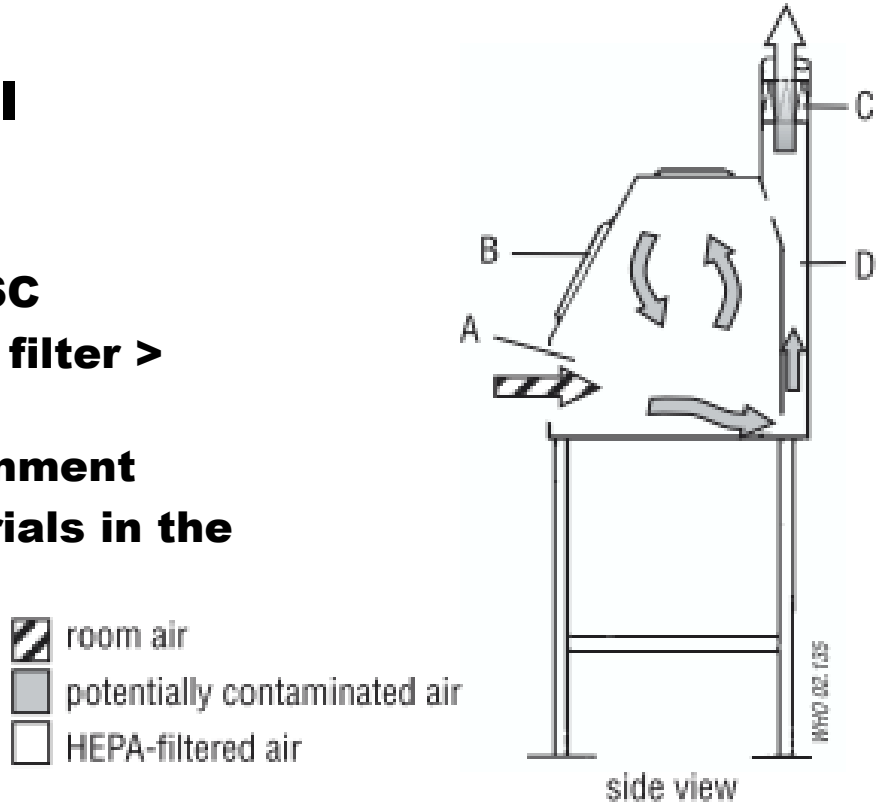


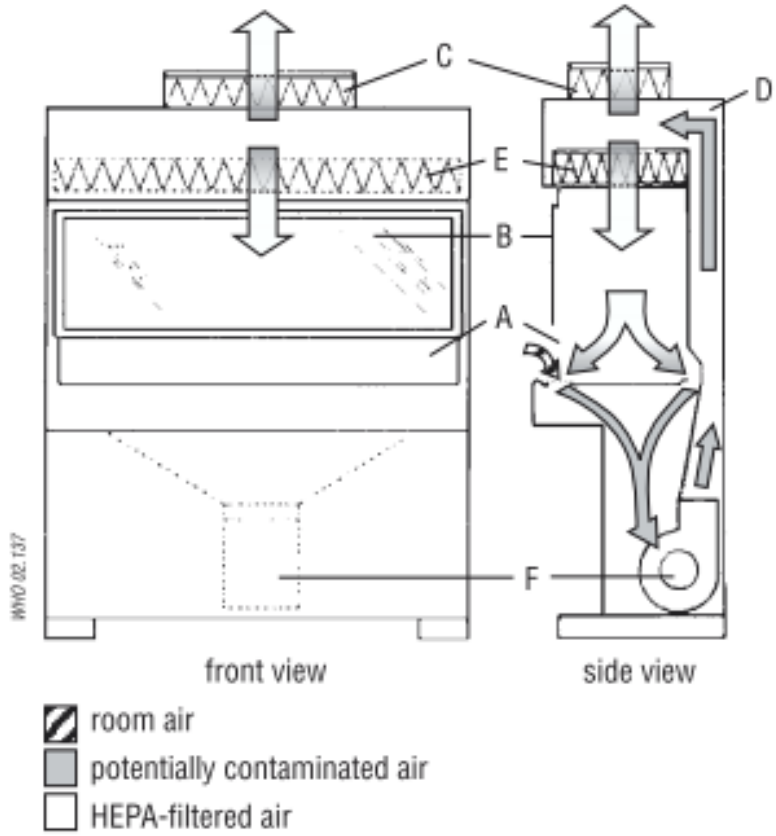
Figure 6. ***Schematic diagram of a Class I biological safety cabinet.***
A, front opening; B, sash; C, exhaust HEPA filter; D, exhaust plenum.

World Health Organization

Laboratory Biosafety Manual 3rd Edition
http://www.who.int/en/

Biosafety Cabinet – Class II type A2

- **Use: BSL-2**
- **Flow: Room air@ 0.51 m/s > BSC > Exhaust**
- **Exhaust:**
  70% of the air > HEPA filter > work zone;
  30% of the air > HEPA filter > outside;
- **Protect personnel, environment and samples**
- **More energy saving than the other type**

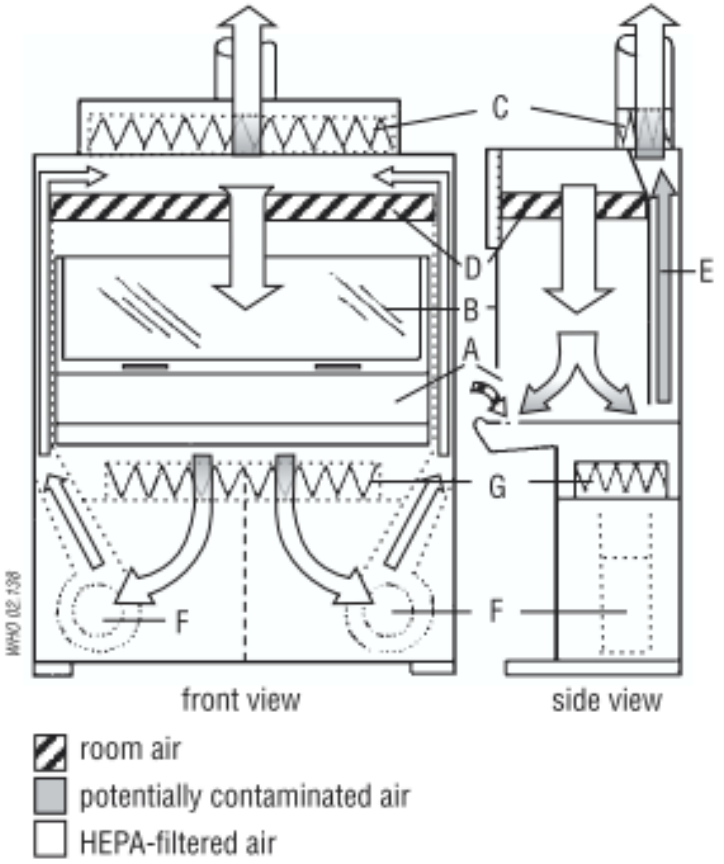


World Health Organization

Laboratory Biosafety Manual 3rd Edition
http://www.who.int/en/

Biosafety Cabinet – Class II type B2

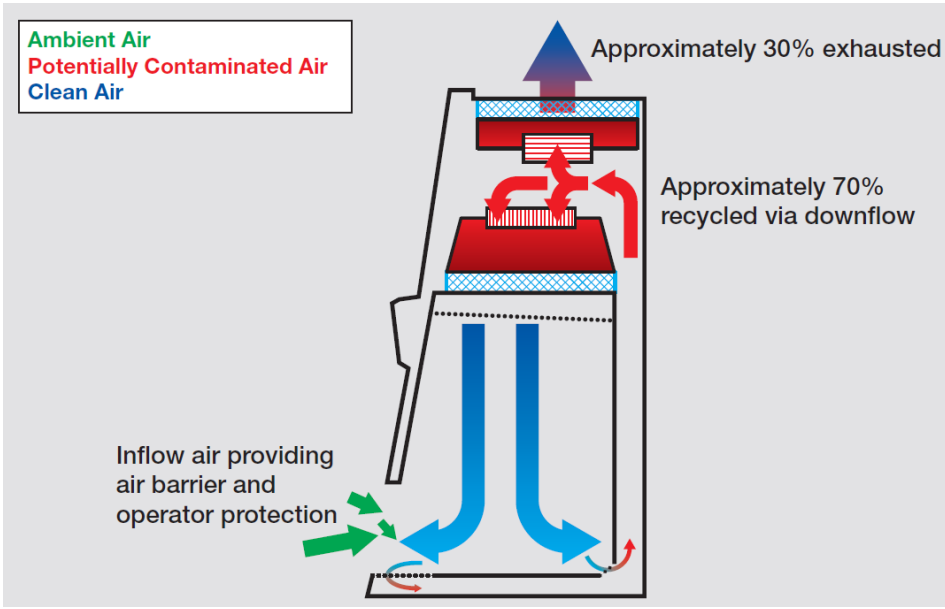
- **Room air@0.51 m/s > HEPA filter > BSC > exhaust**
- **Exhaust:**
  100% of the air to the outside through a HEPA filter
- **Protect personnel, environment and samples**
- **Chemical resistant**

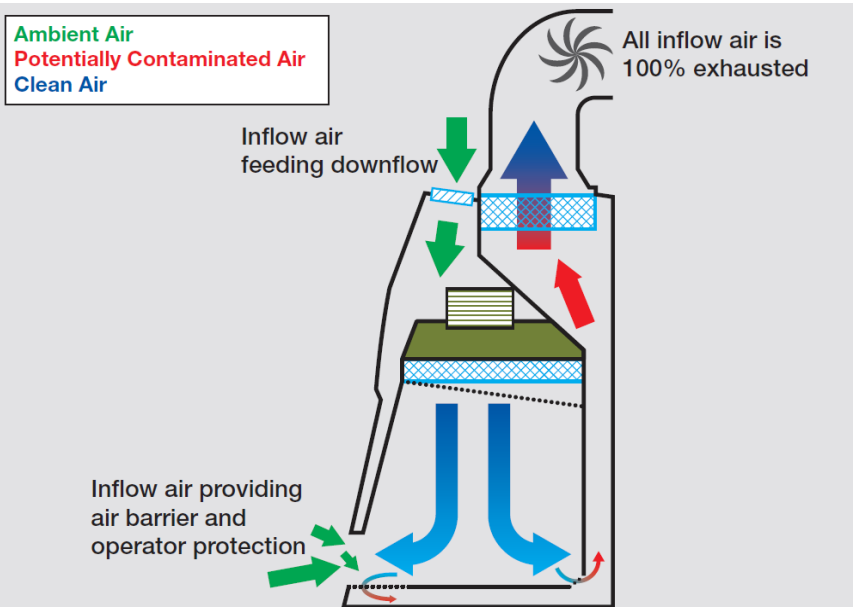


World Health Organization

Laboratory Biosafety Manual 3rd Edition
http://www.who.int/en/

Difference between A2 and B2 BSC (available in ICMS)





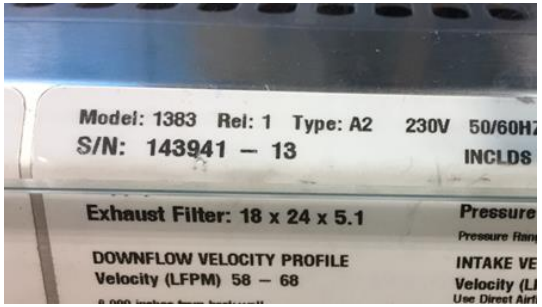
Biosafety Cabinet – Class II type A2

- Room air@ ~0.51 m/s > BSC
- Exhaust:
  70% of the air > HEPA filter > work zone;
  30% of the air > HEPA filter > outside;
- Protect personnel, environment and samples
- More energy saving than the other type

Biosafety Cabinet – Class II type B2

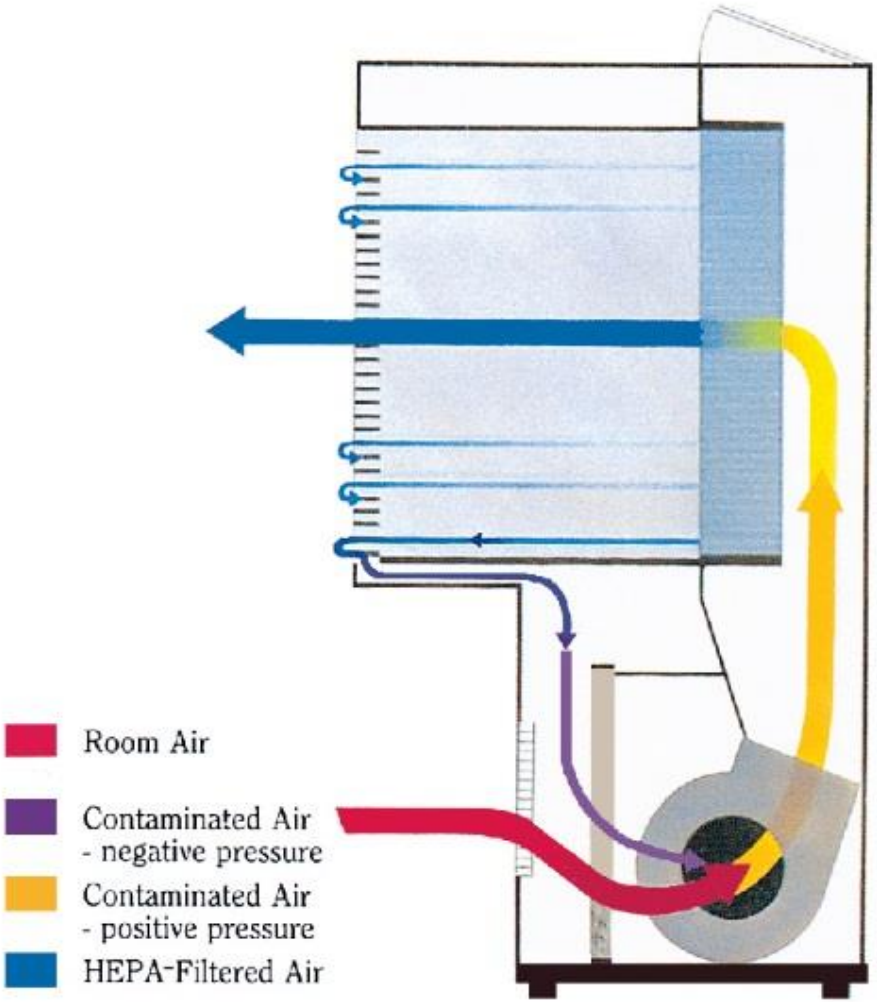
- Room air@ ~0.51 m/s > HEPA filter > BSC
- Exhaust:
  All is 100% exhausted
- Protect personnel, environment and samples
- work with toxic, volatile Chemicals or radionuclides

What type are these cabinets??

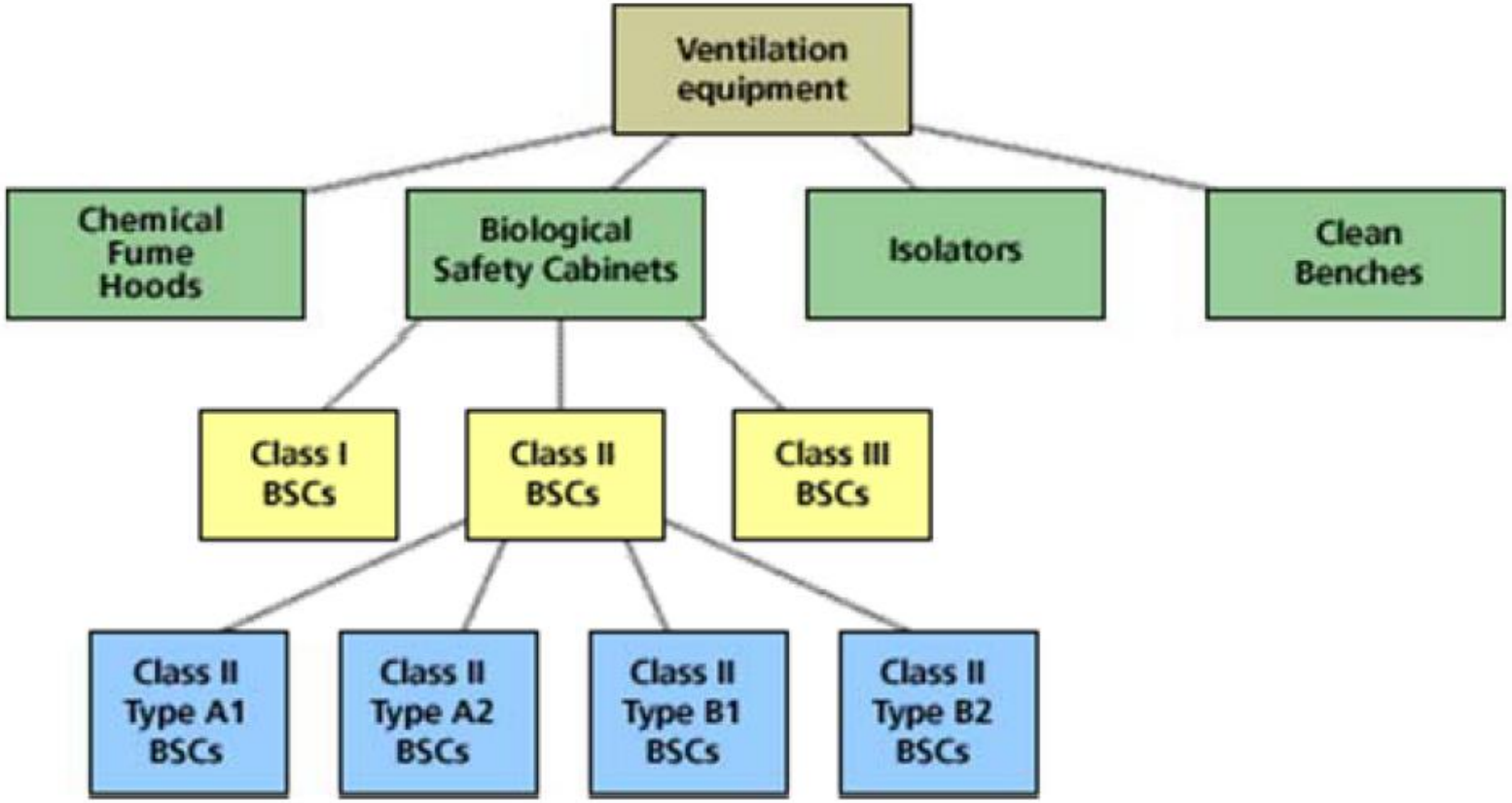


Laminar Flow Clean bench

- **Room air > HEPA filter > BSC > outside without HEPA filter**
- **Protect samples**
- **Not protect personnel, environment**
- **Not for Biological sample**



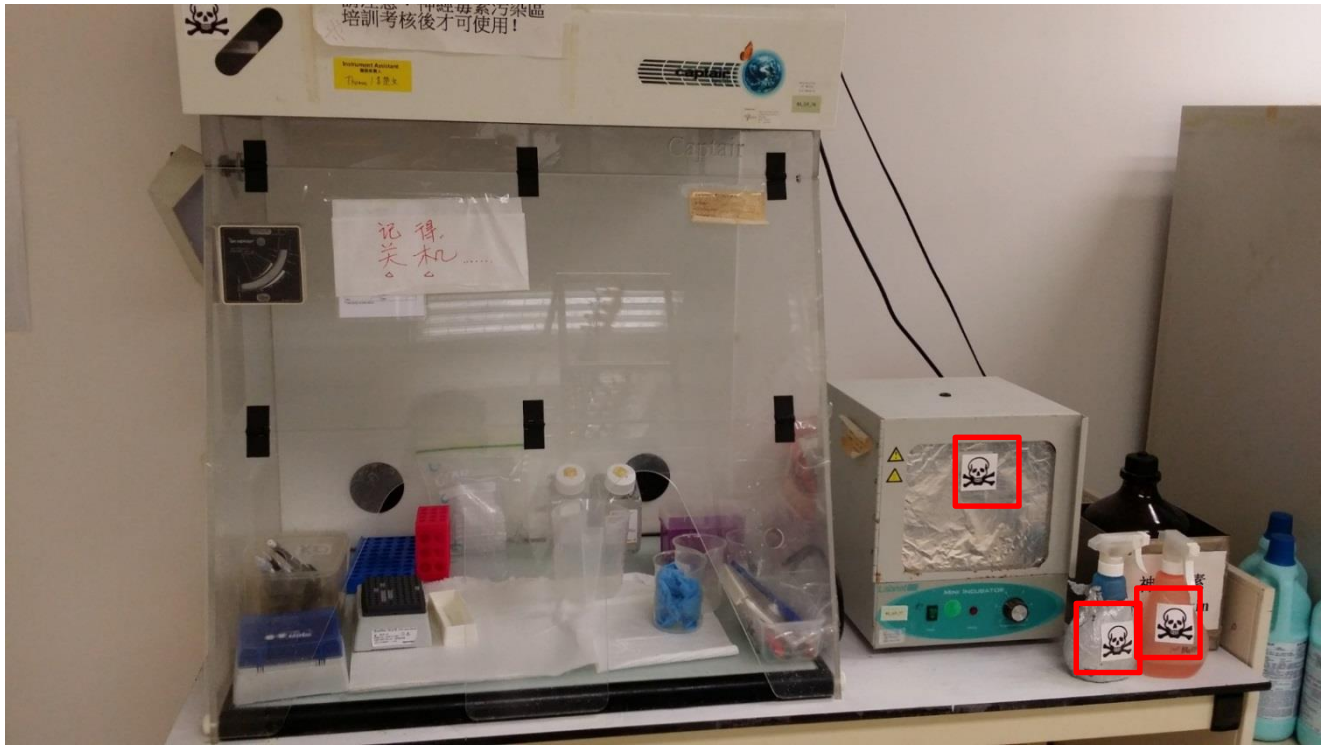
	BSC-Class I	BSC-Class II A2	BSC-Class II B2	Chemical hood	Clean bench
Toxic, organic vapor, etc	X	X	O	O	X
BSL-1 sample	O	O	O	X	X
BSL-2 sample	X	O	O	X	X
Protect personnel	O	O	O	O	X
Protect sample biologically	X	O	O	X	O
Protect environment biologically	O	O	O	X	X


Ventilation equipment
Chemical Fume Hoods
Biological Safety Cabinets
Isolators
Clean Benches
Class I BSCs
Class II BSCs
Class III BSCs
Class II Type A1 BSCs
Class II Type A2 BSCs
Class II Type B1 BSCs
Class II Type B2 BSCs

Other Hood in ICMS 神經毒素操作台 (Room 7009)

Ductless Hood

Filter type : Absorb Toxin
Build-in exhaust fan



Other Hood in ICMS (Room 1022, 6013b, etc)

Ductless Hood

Filter type : Absorb organic / acid vapor
Build-in exhaust fan

< Safety Facilities >

!! You need to know their location!!

We are going to give more details for the below items in ICMS

- **Fire evacuation route**
- **Goggle Box**
- **Placard & Emergency Contacts**
- **First aid box**
- **UV lamp (depends on the room)**
- **Oxygen & Flammable gas detector**
- **Spill kit**
- **Exhaust arm**
- **Hoods (Chemical hood / Biological safety cabinet / Ductless hood)**
- **Waste Room (to be introduced in the Waste Chapter)**

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MSDS (Material Safety Data Sheet)

ScienceLab.com
Chemicals & Laboratory Equipment

Material Safety Data Sheet
Sodium bicarbonate MSDS

Section 1: Chemical Product and Company Ident

Product Name: Sodium bicarbonate

Catalog Codes: SLS3241, SLS2446, SLS3868

CAS#: 144-55-8

RTECS: VZ0950000

TSCA: TSCA 8(b) inventory: Sodium bicarbonate

CI#: Not available.

Synonym: Baking Soda; Bicarbonate of soda; Sodium acid carbonate; Monosodium carbonate; Sodium hydrogen carbonate; Carbonic acid monosodium salt

Chemical Name: Sodium Bicarbonate

Chemical Formula: NaHCO3

Contact Information:

Sciencelab.com, In
14025 Smith Rd.
Houston, Texas 773

US Sales: **1-800-901**
International Sales: 1

Order Online: Scienc

CHEMTREC (24HR Em
1-800-424-9300

International CHEMTR

For non-emergency as

Section 2: Composition and Information on Ingr

Composition:

Name	CAS #
Sodium bicarbonate	144-55-8

Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of ey
inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TER
DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not kn

物質安全資料表

序　號：32　　第頁/ 5 頁

一、 物品與廠商資料

物品名稱：氯仿(CHLOROFORM)
物品編號：—
製造商或供應商名稱、地址及電話：—
緊急聯絡電話/ 傳真電話：—

二、 成分辨識資料

純物質：

中英文名稱：氯仿(CHLOROFORM)
同義名稱：三氯甲烷(TRICHLOROMETHANE 、METHANE TRICHLORIDE 、METHENYL TRICHLORIDE 、FORMYL TRICHLORIDE 、CHLOROFORME 、METHENYL CHLORIDE 、TRIC HLOROFORM)
化學文摘社登記號碼（CAS No.）:67-66-3
危害物質成分（成分百分比）:100

三、 危害辨識資料

最重要危害與效應	健康危害效應：劇毒，會抑制中樞神經系統。疑似致癌物。嘔吐可能造成倒吸入肺
	環境影響：—
	物理性及化學性危害：受熱可能產生高毒性氣體。密閉容器遇熱可能破裂釋出毒氣。
	特殊危害：—
主要症狀：刺激感、麻醉感、頭痛、困倦、嘔吐、暈眩。	
物品危害分類：6.1 II(毒性物質)	

MSDS Contents:

- 化學品企業名稱 **Product**
- 化學組成 **Composition**
- 危害摘要 **Hazards**
- 急救措施 **First Aid**
- 消防資訊 **Fire data**
- 泄漏應急處理 **Accident**
- 使用和儲存 **Handling and storage**
- 個人防護措施 **PPE**
- 化學/物理性質 **Chemical and Physical Properties**
- 穩定性/活性 **Stability**
- 毒理學資料 **Toxicological data**
- 對生態的影響 **Ecological data**
- 廢棄處理 **Disposal**
- 運輸 **Transportation**
- 法規 **Regulatory information**
- 其他資料 **Others**

Chemical Storage:

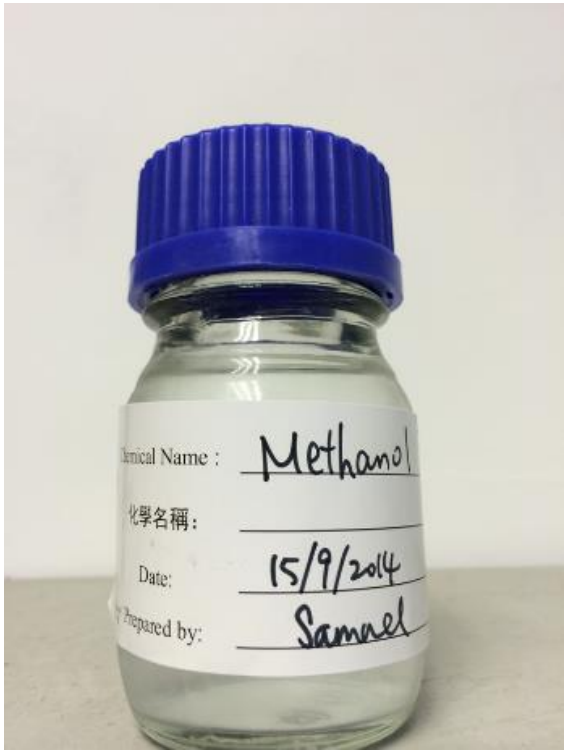
- Label the chemical properly
- Know the chemical incompatibility, store by hazard class (flammable / acid / corrosive / toxic……)
- Store the acids/organic solvent better in a ventilated area
- Do not store chemicals on the floor
- Do not store chemicals in the fumehood
- Do not store chemicals higher than eye level (shelves or cabinets)
- Always cap the chemical bottles
- Try to borrow the chemical if possible
- Consult laboratory technicians if possible
- ……

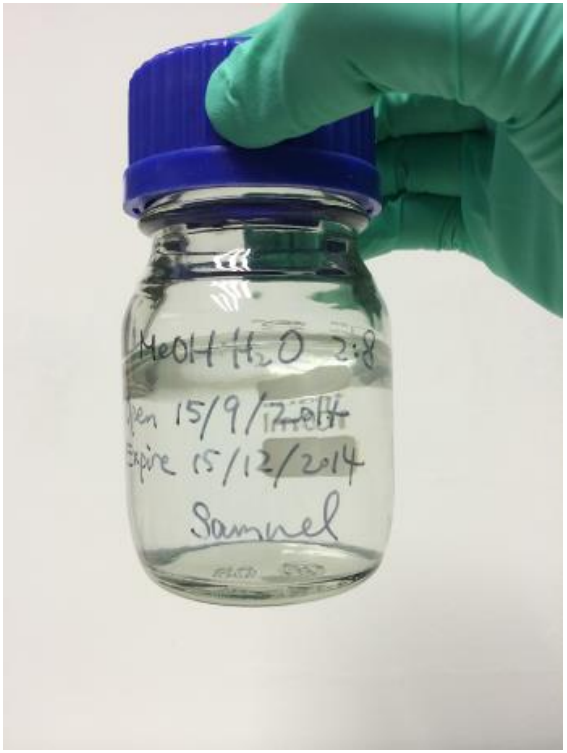
Some supporting materials:

- http://www.ehso.com/ChemicalStorageGuidelines.htm
- https://www.ors.od.nih.gov/sr/dohs/Documents/ChemicalSafetyGuide.pdf
- https://www.ors.od.nih.gov/sr/dohs/safety/laboratory/chemicalsafety/Pages/default.aspx

Label the samples properly:

- chemical name
- user name (do not use short term)
- Preparation date / expiry date
- Concentration: %, M, mol/L…





1. 化學品名稱/ 樣本名稱 (濃度)
2. **製備人 (不要寫簡稱, 要寫全名)**
3. 製備日期/開瓶日期
4. 有效日期 (建議1~3個月, 視乎試劑而定)

Without the correct information will give us a very big trouble when doing the disposal

Hazard Class

- **Explosives agents** 爆炸品
- **Compressed Gases** 壓縮氣體
- **Corrosive substances** 腐蝕性物質
- **Poisonous substances** 有毒物質
- **Flammable substances/vapors** 可燃物質
- **Substances which become dangerous by interaction with water** 與水反應危險物質
- **Strong supporters of combustion**助燃劑
- **Readily combustible substances**可自燃物質
- **Substances liable to spontaneous combustion** 隨時可燃的物質
- **Others** 其他 **(electrical)**

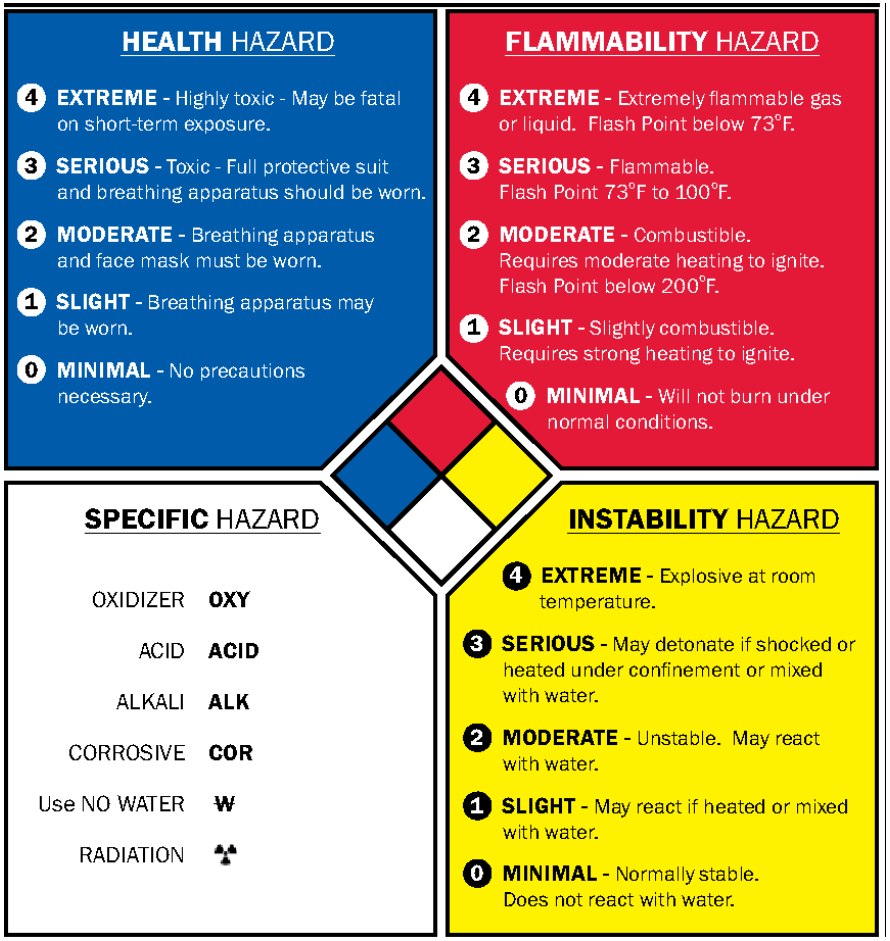
International Maritime Dangerous Goods Code (IMDG)

Global Harmonized System (GHS)

Health Hazard	Flame	Exclamation Mark
		
• Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	• Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	• Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder	**Corrosion**	**Exploding Bomb**
		
• Gases Under Pressure	• Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	• Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle	**Environment** (Non-Mandatory)	**Skull and Crossbones**
		
• Oxidizers	• Aquatic Toxicity	• Acute Toxicity (fatal or toxic)

National Fire Protection Association (NFPA)

Level: 0 > 4



Compatibility !!

- Yellow for flammable liquids
- Red for paints, inks, and other combustible liquids
- Blue for corrosive liquids
- Green for pesticides and insecticides
- White or Gray for waste materials or outdoor lockers
- Silver or Light Neutral to complement laboratory settings

Double Wall Construction with 1 1/2" Air Space
(NFPA 30, OSHA, FM 6050)

Large Warning Label, (also available in French and Spanish)
(NFPA 30, OSHA 1910.106, FM 6050)

Two 2" Vents with Flash Arrestors
(FM 6050)

Fusible Link Assembly on Self-Closing Models

Flush Mounted Locking Handle

Non-sparking closure w/ 3-Point, Self-Latching Doors
(NFPA 30, OSHA 1910.106, FM 6050)

Structurally Reinforced 18-Gauge All-Welded Construction
(NFPA 30, OSHA 1910.106, FM 6050)

Static Ground Connections
(FM 6050, OSHA, NFPA 70)

Continuous Piano Hinge

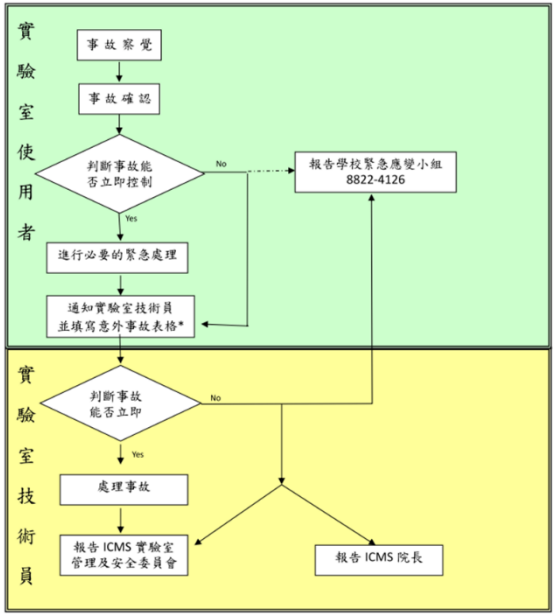
Finished in Chemical, UV & Impact Resistant Urethane

Leak Proof Sill 2" Deep, Prevents Leakage in the Event of Accidental Spills
(NFPA 30, OSHA 1910.106, FM 6050)

Adjustable Zinc Plated Leveling Legs

Chemical Spill

How to clean-up a chemical spill



- **Think of the emergency procedure**

- **If you can handle it, the following steps should be taken during spill cleanup**

1. **If it is toxic gases or vapors, prevent the spread of them**
   - **Close the lab, evacuate your fellows**
   - **Press the emergency button**
   - **Inform lab technicians**

2. **If it is liquid, prevent the spread of them**
   - **Inform or evacuate your fellows if necessary**
   - **Wear PPE & find the spill kit**
   - **contain the spill. Use absorbent to make a circle around the outside edges of the spill**
   - **Absorb the liquid**
   - **Collect and contain the cleanup residue**
   - **Dispose of the waste**
   - **Inform lab technicians for waste disposal**

Chemical Spill Clean-up

1. Inform or evacuate your fellows if necessary
2. Wear PPE & find the spill kit
3. Contain the spill. Use absorbent to make a circle around the outside edges of the spill

4. Absorb the liquid

5. Collect and contain the cleanup residue

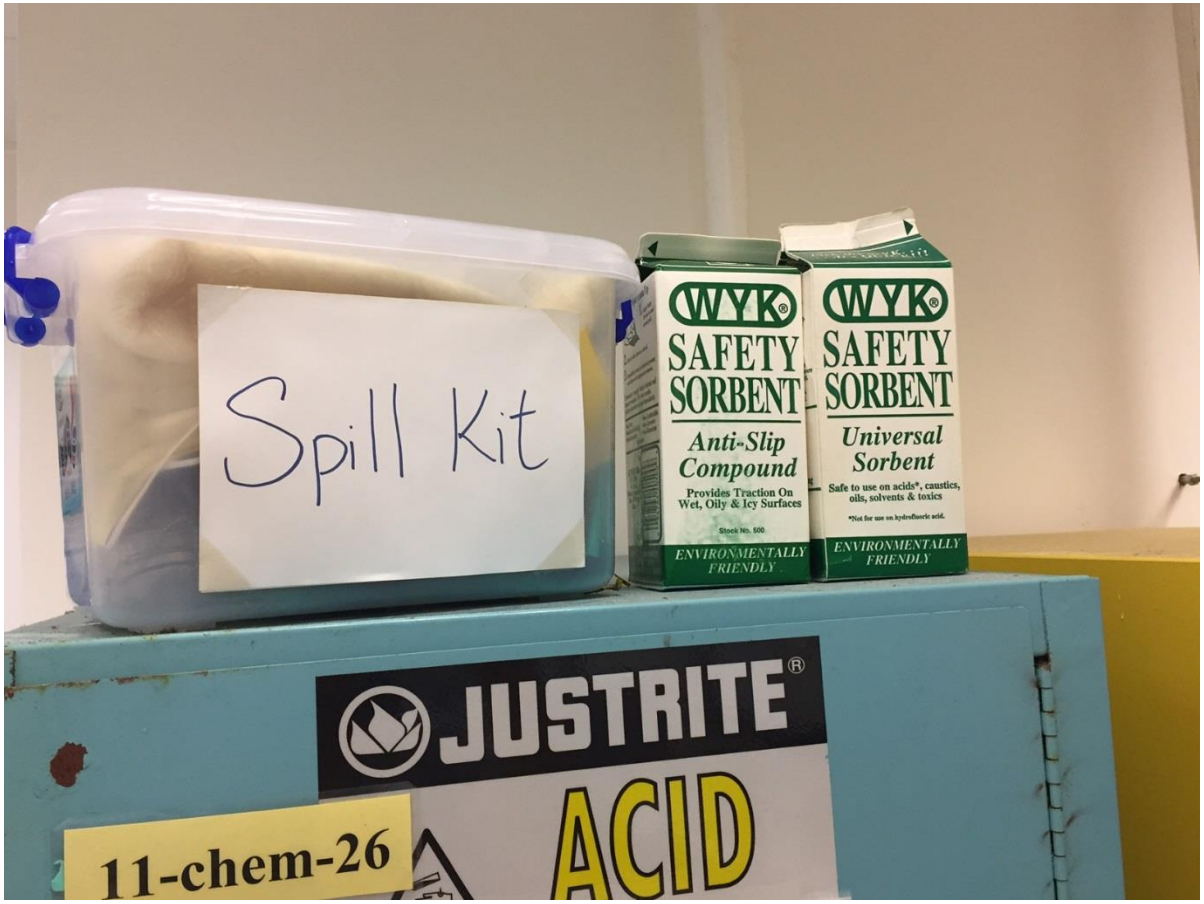
6. Dispose of the waste as medical hazard waste

7. Inform lab technicians for waste disposal

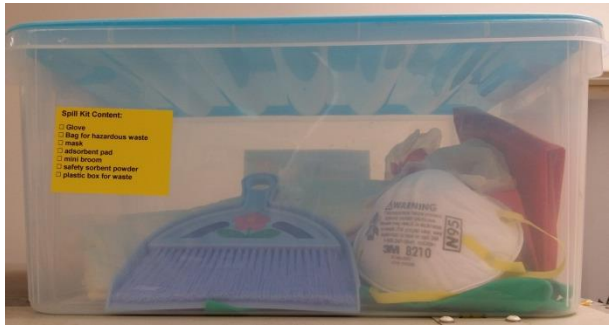
Chemical Spill Clean-Up:

https://www.youtube.com/watch?v=RTLIKuVPWzk

Do you still remember the Chemical Spill Kit???



Chemical Spill Kit 化學品洩漏處理箱

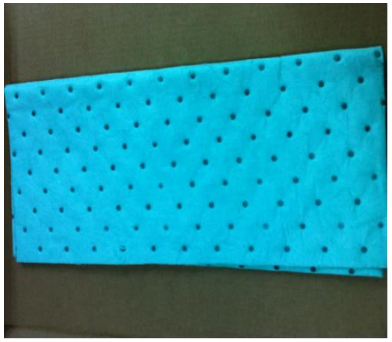


化學品洩漏處理箱 Spill kit

Nitrile Gloves 防護手套

Safety goggle 防護眼鏡

Absorbent pillow
吸液條



Absorbent sheet
吸液棉片

Hazardous bag
廢料處理袋

Sweep 小掃把/簸箕

- **Medical Waste bag**
- **Hazardous waste bag**
- **Yellow**

- **Biological waste (Biohazard) bag**
- **Red**
- **Auto-clavable**

Accident report

澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU

Office of Health, Safety and Environmental Affairs
安健及環境事務辦公室

實驗室意外及事故報告表 Laboratory Accident/Incident Report Form

This form is to be used to notify HSEO of an accident /incident. All mandatory fields must be completed. Completed forms should be sent to HSEO within 7 working days:

** indicates mandatory information*

報告人之個人資料 Details Information of Rapporteur

*報告者 (Name of Rapporteur):	*報告者之所屬實驗室或職位 (Dept. or Position of Rapporteur):
電郵地址 (Email):	電話號碼 (Tel No):

受傷人 Injured Person Details

受傷人中文姓名(Injured person's name in Chinese):	*受傷人英文姓名(Injured person's name in English):	
學生/員工編號 (Student/Staff no.):	性別 (Gender):	受傷人員所屬部門 (Injured person's department):
*職位 (Status): ☐職員 (Staff) ☐學生(Student) ☐訪問學者(Visitor) ☐外判 (Contractor) ☐其他 (Other)	電話號碼(Tel No):	電郵地址(Email):

***描述事故及意外事故及處理方式 *Description of Accident/Incident and Handling**

請盡可能準確地描述發生的事情，從當時正在進行的工作活動開始。如位置不足可附加 A4 紙作附件

Please describe what happened as accurately as you can, starting with what work activity was being undertaken at the time. Addition A4 pages can be used as attachment.

防止這種事故或意外事故再次發生而採取的行動建議
Describe The Action to be Taken to Prevent a Recurrence of This Type of Accident or Incident.

https://sklqrcm.umac.mo/laboratory-guidelines/

Working in Chemistry Laboratory

1. **Wear PPE**

2. **Evaluate the Chemical Safety:**
   MSDS / experiment procedure / Label of the chemical / Storage…

3. **Know the location of the lab safety equipment**

4. **Where to conduct our experiment:**

5. **How to clean up the spill**

6. **How to handle the waste and understand the disposal procedure**

4. Working in Chemistry Laboratory

1. **Wear PPE (What we have in ICMS?)**

2. **Evaluate the Chemical Safety:**
   MSDS / experiment procedure / Label of the chemical / Storage…

3. **Know the location of the lab safety equipment**

4. **Where to conduct our experiment: (Fume hood? Open bench? Other?)**

5. **How to clean up the spill (Spill kit and clean up procedure)**

6. **How to handle the waste and understand the disposal procedure (Waste Chapter)**

Something you should know:

1. General Personal Protective Equipment (PPE)
2. Safety Facilities in ICMS
3. Chemical Safety
4. Biological Safety
5. Hazards in ICMS
6. Waste Disposal
7. Public Health & Hygiene

- **Biological safety – Biosafety level (BSL)**

	BSL-1	BSL-2	BSL-3	BSL-4
Causing Individual risk	No or Low	Moderate	High / Serious disease, fatal	High / Serious disease, fatal
Causing community risk	No or Low	Low	Low	High
Effective treatment	Yes	Yes	Yes	No

BSL2 samples include:

Bacteria, fungi, viruses, DNA, human or non-human cells, cell lines, liquid growth media, etc.

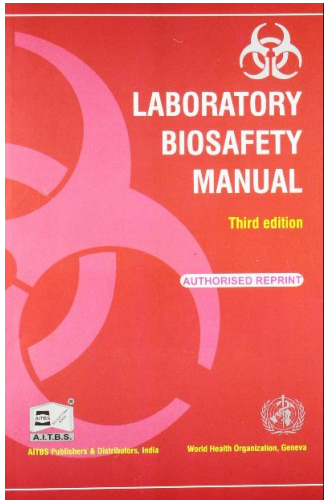
World Health Organization

Laboratory Biosafety Manual 3rd Edition
http://www.who.int/en/

Biosafety manual (Recommendation) :

1. **Laboratory Biosafety Manual – 3rd edition**

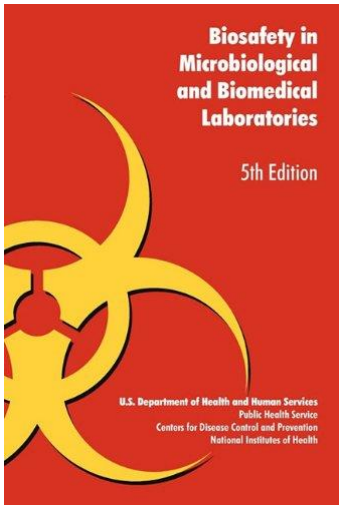
   WHO (World Health Organization)
   http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en/



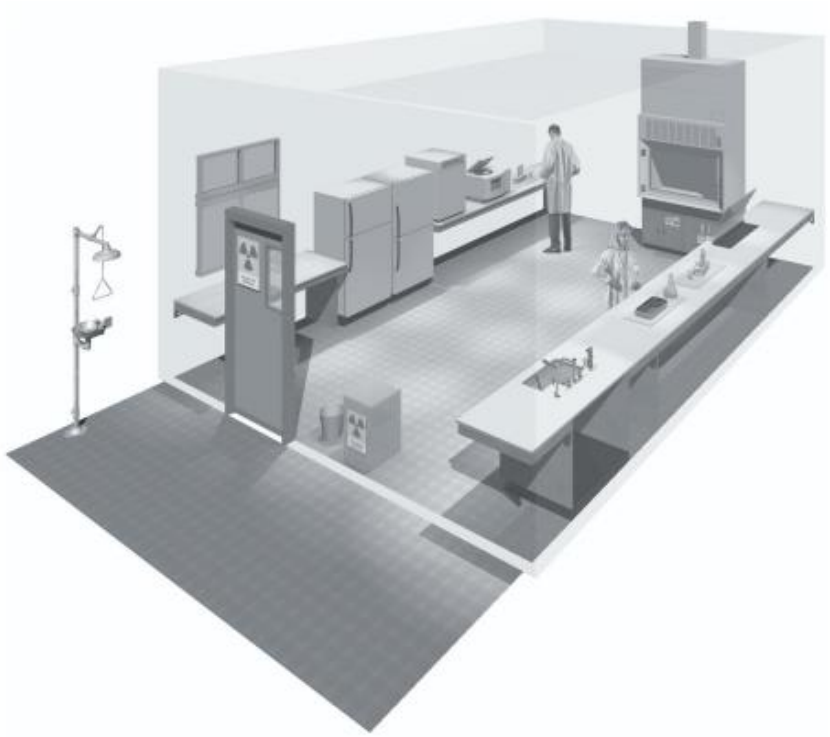
2. **Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition**

   CDC (Ceners of Disease Control and Prevention),
   NIH (National Institutes of Health)

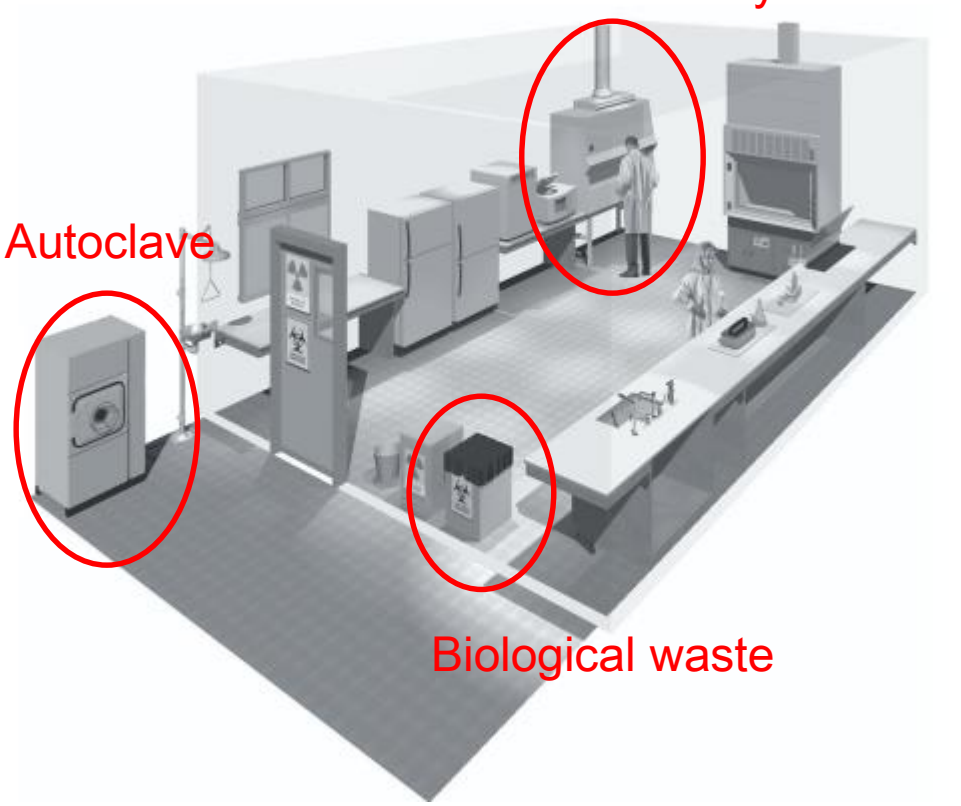
   https://www.cdc.gov/biosafety/publications/bmbl5/



BSL-1 Laboratory



BSL-2 Laboratory



World Health Organization

Laboratory Biosafety Manual 3rd Edition
http://www.who.int/en/

- Selection of Biosafety Cabinet (Class II A2, Class II B2)

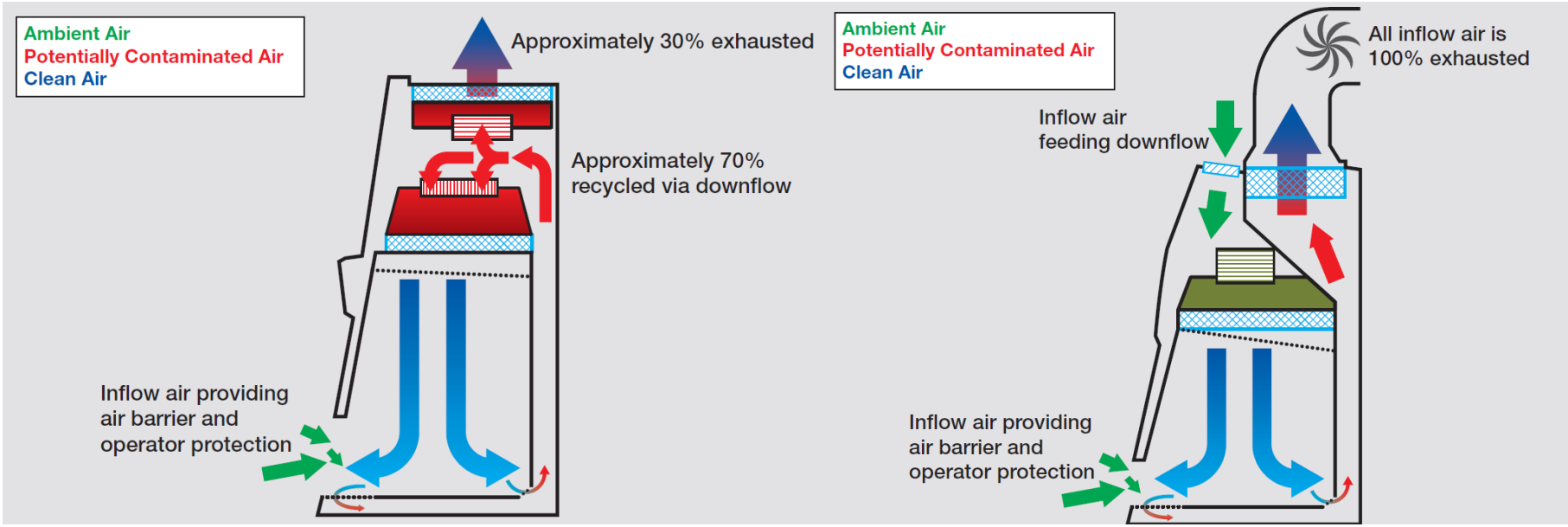
- Clean: Disinfection and sterilization

- Biological Spill

- Biological Waste

Selection of BSCs?? A2 / B2 Biosafety Cabinet

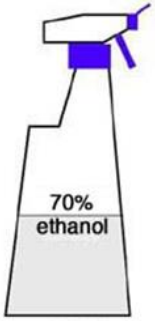
Do you remember the difference ??



Clean: Disinfection and sterilization

Chemical disinfectant

- **Bleach (NaOCl > Chlorine, Cl2)**
  oxidant,
  (e.g.10% Bleach solution)
  a widely available and broad-spectrum chemical germicide
  Corrosive to metal, do not use it to clean equipment, BSC…
  Toxic
  Incompatible with the waste treatment plant in N22-building, Not recommended in ICMS



- **70% (V/V) Alcohol (Ethanol)**
  actives against vegetative bacteria, fungi, lipid-containing viruses but not against spores
  widely available
  non-toxic
  Non-corrosive, very good for work surface/equipment/BSC/ skin
  May harden rubber and dissolve certain types of glue
  flammable, should be away from open flames & heat when in use

---

- **Virkons (Powder or tablet)**
  Peroxide
  1 – 5 % working solution
  a Broad spectrum chemical germicide
  Non-corrosive / Non-bleaching / biodegradable, more safe
  Consider to be a substitution for bleach solution in ICMS
  a freshly prepared Virkons solution can be stable for 7 days

  https://www.youtube.com/watch?v=bPKIOj8DTKI

How to mix 1 litre of Virkon Disinfectant Powder:

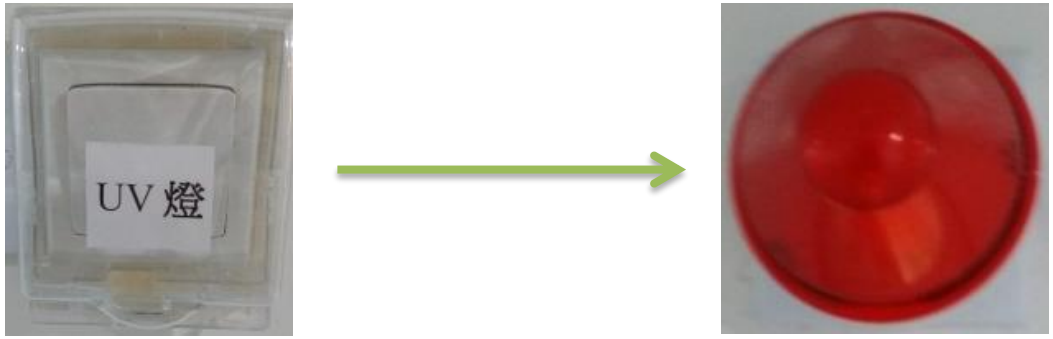
https://www.youtube.com/watch?v=bPKIOj8DTKI

Physical sterilization

- **UV**
- **Autoclave**

UV Lamp / UV 燈 :

- **254 nm,**
- **Use: Sterilizing microbiological contaminates from the working surface**
- **Skin and Eye hazard**
- **Location: e.g. cell culture room, BSC**

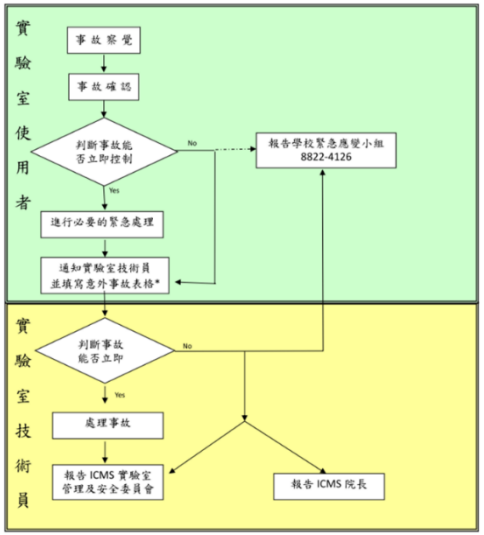


Heat/Steam sterilization – Autoclaving

- **Non-toxic**
- **Pressure: Under pressure e.g. 1.2 KG/cm2**
- **Steam: Saturated steam**
- **Temperature 121°C / 132°C**
- **Time: depends on the items**
- **Use: - all critical and semi-critical items that are heat and moisture resistant;**
  - decontaminate microbiological waste and sharps containers.
- **Hazard: Burns, Explosion, (NO flammable substance)**
- **Get Trained before use**

1. 3 min holding time at 134 °C
2. 10 min holding time at 126 °C
3. 15 min holding time at 121 °C
4. 25 min holding time at 115 °C.

How to clean-up a biological spill



- Think of the emergency procedure
- If you can handle it, the following steps should be taken during spill cleanup

If it is a small or medium spill:

1) close the lab, evacuate your fellows
2) Wear PPE, mask, goggle
3) Contain the spill with paper towel or absorbent
4) * Vacate the area for at least 30min for aerosol particles to be dispersed
5) Absorb the spill with paper towels or absorbent
6) Disinfect the area by flooding with disinfectant and allow 10 mins to react (freshly prepared 1% Virkon solution ??)
7) Discard all materials as biohazard waste
8) Cleanup the surroundings with Virkons again
9) Discard all materials as biohazard waste
10) wash your hands
11) Autoclave the waste
12) report to lab technicians

Biological Spill Clean-up

1. Inform or evacuate your fellows if necessary
2. Wear PPE & find the spill kit
3. Contain and absorb the spill (e.g. Paper towel)

4. Disinfect the area (allow a certain contact time for disinfection)

5. Collect absorbent and related materials as biohazard waste

6. Disinfect the area again, discard the remaining materials (gloves, absorbent, etc) as biohazard waste

7. Autoclave the waste, Inform lab technicians for waste disposal

Biological Spill Clean-Up:

https://www.youtube.com/watch?v=I6uJvEQ-J9A

Accident report

澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU

Office of Health, Safety and Environmental Affairs
安健及環境事務辦公室

實驗室意外及事故報告表 Laboratory Accident/Incident Report Form

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** indicates mandatory information*

報告人之個人資料 Details Information of Rapporteur

*報告者 (Name of Rapporteur):	*報告者之所屬實驗室或職位 (Dept. or Position of Rapporteur):
電郵地址 (Email):	電話號碼 (Tel No):

受傷人 Injured Person Details

受傷人中文姓名(Injured person's name in Chinese):	*受傷人英文姓名(Injured person's name in English):	
學生/員工編號 (Student/Staff no.):	性別 (Gender):	受傷人員所屬部門 (Injured person's department):
*職位 (Status): ☐職員 (Staff) ☐學生(Student) ☐訪問學者(Visitor) ☐外判 (Contractor) ☐其他 (Other)	電話號碼(Tel No):	電郵地址(Email):

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Describe The Action to be Taken to Prevent a Recurrence of This Type of Accident or Incident.

https://sklqrcm.umac.mo/laboratory-guidelines/

5. Working in Biological Laboratory in ICMS

1. **ICMS is a Biosafety Level 2 laboratory**
2. **Wear PPE**
3. **Evaluate the biological Safety:**
   MSDS / experiment procedure / Biosafety level / Storage…
4. **Know the location of the lab safety equipment**
5. **Where to conduct our experiment:**
6. **How to clean up the biological spill**
7. **Decontamination and Sterilization**
8. **How to handle the waste and understand the disposal procedure**

5. Working in Biological Laboratory in ICMS

1. **ICMS is a Biosafety Level 2 laboratory**
2. **Wear PPE**
3. **Evaluate the biological Safety:**
   MSDS / experiment procedure / Biosafety level / Storage…
4. **Know the location of the lab safety equipment**
5. **Where to conduct our experiment: (open bench? BSC? ….)**
6. **How to clean up the biological spill (Spill kit and decontamination)**
7. **Decontamination and Sterilization**
8. **How to handle the waste and understand the disposal procedure**
   (To be discussed in the waste chapter)

Something you should know:

1. General Personal Protective Equipment (PPE)
2. Safety Facilities in ICMS
3. Chemical Safety
4. Biological Safety
5. Hazards in ICMS
6. Waste Disposal
7. Public Health & Hygiene

<Break>

Hazards in ICMS (WHAT??)

- Chemical spill (acid/base/organic solvent…)
- Biological spill
- Medical sharps
- Neutroxin (Toxic)
- Explosion
- Fire
- Gas cylinder – e.g. gas leakage
- Liquid N2
- Cell culture/Virus (HCV virus plasmid, adenovirus)
- Radio-materials (beta energy)
- Animals
- ……

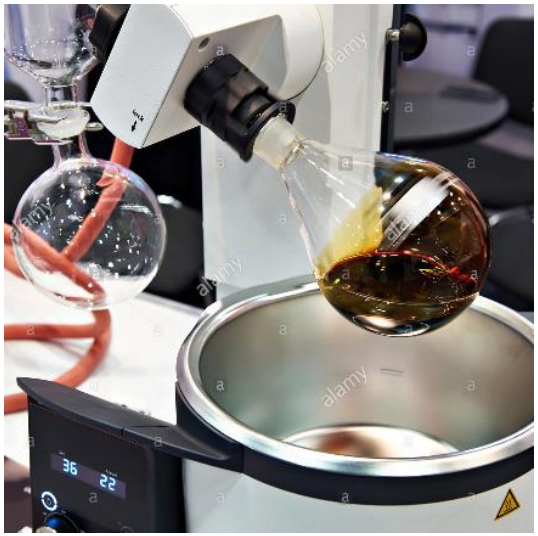
Chemical Hazards:

- **Carcinogenic:**
  $CHCl_3$, CH_2Cl_2, Benzene, Toluene…
- **Corrosive:**
  H_2SO_4, HCl, HNO_3, NaOH…
- **Harmful/Toxic:**
  Hexane, MeOH, Pyridine, DMSO, Heavy metals standards (Hg, Pb…),
  Acetone, CS_2, Isopropyl alcohol, Chromic acid, Formaldehyde…
- **Flammable:**
  Alcohol, Ether (Ethyl ether) , Acetic acid, Hexane, Propanol, Xylene
- **Explosive: Hydrogen Gas**
- **Irritation: NH_3, Ether**
- **Controlled substances: Acetic anhydride…**

Small scale explosion

While mixing the chemicals

While heating the chemicals



Biological hazards:

- Animal bite,
- Pathogens
- Bacteria (e.g. *E.coli, S.Aureus,*)
- Cell lines
- Prions
- Fungi
- Viruses (HBV, HCV…),
- Toxin
- DNA / RNA sample

……

Biological hazards:

Some toxic bio-reagent :

Gel Electrophoresis:
SDS, sodium dodecyl sulfate (十二烷基磺酸鈉)
Acrylamide丙基醯胺, TEMED tetramethylethylenediamine(四甲基乙二胺)

Solvent:
Isoproponal, Methanol

DNA extraction:
Phenol / chloroform

EB, Ethidium bromide , a classic DNA stain, very toxic/mutagenic

Alternatives: Methylene Blue, SYBR safe(debatable), Gel Red, Gel Green, EZ-vision…

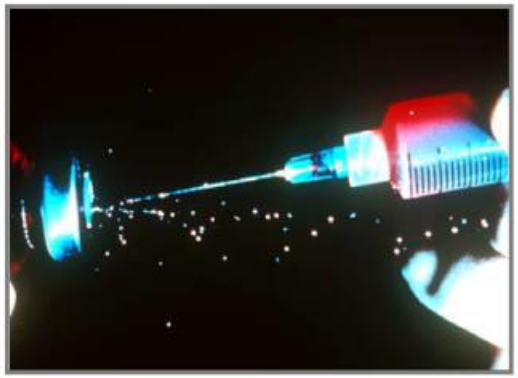
Biological hazards:

Aerosols

- are important sources of infection
- Can be generated by
- Are generated by blending, mixing, grinding, shaking, stirring, sonicating, centrifuging of infectious materials

To avoid aerosols:

- Wear PPE, use proper equipment, use BSC,etc.

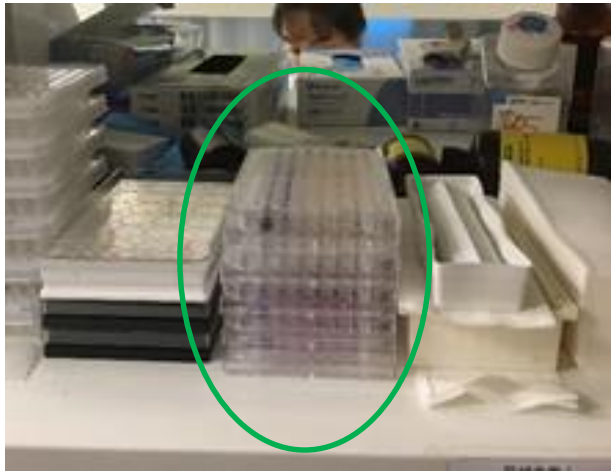

Biological Hazards:

Biological samples without proper storage

- **Culture media**
- **Unknown sample (DNA/RNA sample????)**

Contamination

Public Health



Biological Hazards:

Animal Bite/Scratch

Symptoms of infection after exposure:

- Inflammation around the bite wound
- High prostrating fevers
- Rigors
- Headache
- Polyarthralgia (pain in multiple joints)
- Allergy?

Do you wear PPE?

- Report to the PI / technicians…
- Wash the contaminated wound and skin with soap and water/saline for 15mins or more
- Consult Medical Advice (Medical center, Hospital)

Accident in ICMS

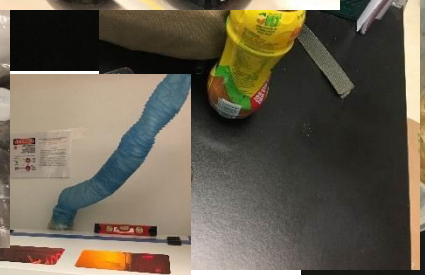
- 2016.06 - Inflammation caused by skin contact with chemicals
- 2017.02 - Improper heating during extraction
- 2017.02 - Animal bite
- 2017.09 - Gas leakage
- 2017.10 - Animal escape
- 2018.02 - Student faint in the office
- 2018.05 - Incision during western blot experiment
- 2018.05 - Puncture by syringe during animal experiment
- 2018.08 - Animal bite
- 2018.09 - Chemical spill (acid)
- 2018.10 - Splash by Trizol during RNA/DNA extraction (toxic substance)
- 2018.12 - Animal bite
- 2019.05 - Cut during animal experiment
- 2019.06 - Chemical spill (HSO_3Cl, toxic substance)

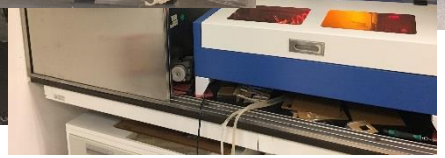
How to protect ourselves in ICMS:

1. Potential risk in ICMS
2. General Personal Protective Equipment
3. Safety Facilities
4. Working in Chemistry Laboratory
5. Working in Biological Laboratory
6. Public Health

- **Take off the PPE outside the lab**
- **Take off the PPE in the lift**
- **Do not eat and drink in the lab**
- **Keep the lab clean**
- **Keep the fume hood closed when not in use**
- **Cap the chemical and use secondary container during transportation**
- **Follow the waste disposal guideline**
- **.....**

ICMS
UM






C9
eppendorf

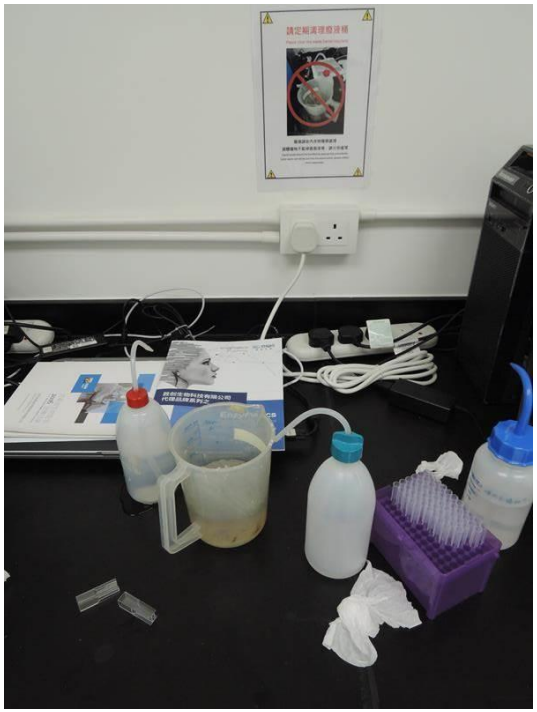
實驗桌上不堆積空瓶

定期清空液相廢液(有機溶劑廢物)收集玻璃空瓶

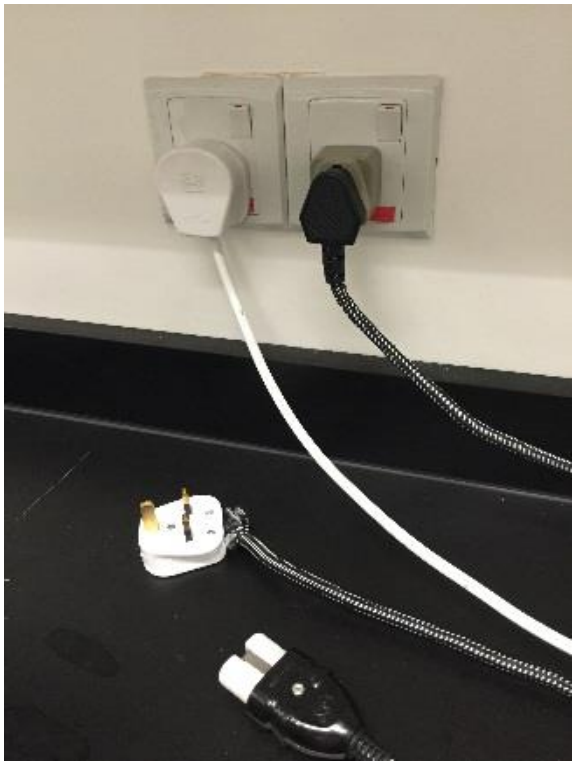
水槽內不能任意丟棄廢棄物
槍頭>>>利器盒

利器盒滿了可告知技術員更換

一般垃圾桶不可棄置移液槍頭/針頭，它們應丟到利器盒



定期收集廢液槍頭丟利器盒



1. 插線板永不放地上
2. 所有電器必須使用澳門規格插頭
(即英式三腳制式)
3. 可申報校園工程部免費更換插頭
https://cmms.umac.mo/helpdesk/login.aspx

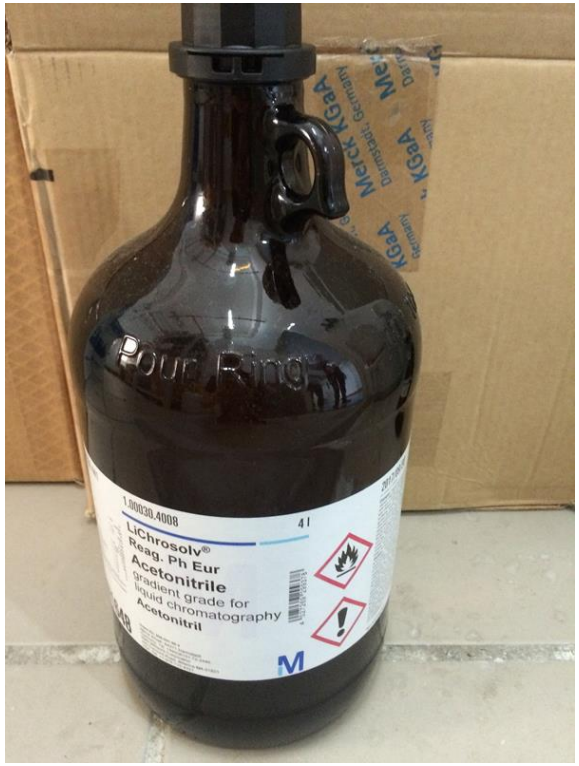
物品阻礙行走通道

定期整理物品

櫃子上不能隨意以油性筆標示

1. 不明液體? 毫無標示, 裝滿液體的瓶子被棄置在廢液房內. 如果這些液體是純淨的

HPLC GRADE 乙腈, 絕對是浪費!



2. 原管玻璃色譜柱被棄置於碎玻璃收集箱, 也沒有人告知技術員, 也沒有處理

How to protect ourselves in ICMS:

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