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Laboratory Safety Guidelines

(Research Centre's)

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BML MUNJAL UNIVERSITY RESEARCH & DEVELOPMENT CELL DIRECTOR

Laboratory Safety Guidelines
(Academic Year 2022-23)

General Hazard Information

The research centres at BML Munjal University (BMU) are committed to maintaining a safe and secure environment for all research and teaching activities. The use of hazardous chemicals and radioactive materials is strictly prohibited in the labs. Only standard, non-hazardous chemicals are permitted for research purposes.

Labelling of Chemicals Containers

The research centres at BMU follow a standardized labelling system for effective hazard communication. All containers holding chemicals are clearly and appropriately labelled to ensure safety and compliance.

Correct Identification of Hazardous Waste

The hazardous levels of different wastes are defined by the following characteristics.

Hazardous	Characteristics
Flammable/ Explosive	This type of waste may cause damage to the surroundings by Producing harmful gases at high temperature and pressure or by causing fire hazards.
Oxidizng	Types of wastes that may yield oxygen and thereby cause or contribute to the combustion of other materials.
Poisonous (Acute)	These waste have high potential to cause death, serious injury or to harm health if swallowed, inhaled or by skin contact.
Infectious Substances	Hazardous wastes containing micro-organisms and their toxins, and responsible for diseases in animals or humans.
Corrosives	These wastes are chemically active and may cause severe damage to the flora and fauna, or to the other materials by direct contact with them.
Eco-toxic	These wastes may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems.
Toxic (Delayed or Chronic)	These wastes, if inhaled or ingested or if they penetrate the skin, may cause delayed or chronic effects, including carcinogenicity.
Organic Peroxides	These are organic waste containing bivalent-O-O- structure and may undergo exothermic self-accelerating decomposition

If a container cannot be permanently labelled, a written note indicating the chemical's name must be placed nearby.

All chemicals in the research centres are stored in their designated areas and can only be used with proper safety precautions. Aside from commonly used chemicals such as acetone, ethanol, and isopropanol, no other chemicals are permitted.

Information related to common chemicals and their hazards

Use of Protective Equipment

The research centres at BMU adhere to strict safety practices when using various equipment, especially in the presence of hazardous chemicals. The following protective equipment is available to ensure the safety of all personnel:

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1. **Protective Gloves:** All chemicals are handled using appropriate hand gloves, which are disposed of following the standard operating procedure.

2. **Protective Eyewear:** Safety glasses are available in laboratories where chemicals or physical hazards are present. These goggles provide a proper seal around the eyes to prevent any splashed material from entering.

3. **Respirators:** Disposable face masks are used during the cleaning of vacuum systems to prevent inhalation of hazardous particles.

4. **Lab Coats and Aprons**: The use of lab coats is strongly encouraged in laboratories to protect clothing from minor or accidental chemical exposures.

Protective firefighting gear for Toxic Gases:

All Toxic gases are handled with appropriate Safety PPEs (Self-contained breathing apparatus with Oxygen Cylinder) are available in Research centres.

Gas Scrubber:

All toxic gases are neutralized using a gas scrubber before being safely released into the environment.

Good housekeeping is crucial to maintaining a safe laboratory environment. The following rules should be followed:

- Store chemicals, reagents, and equipment properly at the end of each day.
- Avoid placing chemicals on the edges of countertops.
- Position tubing and glassware securely to prevent accidental bumps or interference from people passing by.
- Immediately clean up any spilled chemicals or water to avoid hazards.
- Keep bench tops organized and free from clutter to maintain a clean workspace.
- Ensure aisles and doorways are never blocked to maintain clear access in case of emergencies.

Gas Safety

The following gas safety rules are implemented to ensure the safe and responsible handling of gases within the research centres:

1. Always transport and store gas cylinders with the protective cap securely in place over the valve.
2. Use dedicated cylinder carts for transporting gas cylinders; no alternative methods should be used.
3. Ensure that all gas cylinders are securely fastened to a sturdy surface, such as a wall or bench, at all times.
4. Toxic gases must be stored in separate gas cabinets to minimize risk.
5. Protective firefighting gear must be used when handling toxic gases to ensure the safety of personnel.
6. Gas scrubbers are employed for the treatment and neutralization of toxic gases before they are released into the environment.

Working alone:

Working alone in the laboratory is strictly prohibited. Prior approval is also required for any individual who is not a permanent member of the research centres (i.e., a person without biometric access) to work as a guest in the lab.

Emergency Awareness: Emergency Evacuation Plan is there.

Laboratory Safety Training: All faculty, research scholars, and students are required to undergo proper training before using the research centre facilities.

The Laboratory Coordinator conducts comprehensive training sessions on laboratory hazard awareness before any individual starts working in the lab, with periodic reviews thereafter. The training covers detailed information about the various equipment, chemicals, and gases present in the laboratories. Additionally, it includes vital safety information such as the locations of fire extinguishers, emergency assembly points, and the proper handling and disposal of chemicals, used gloves, and sharp objects like broken glass. Electrical hazards related to instruments, power supplies, and extension cords are also addressed during the training.

Common carcinogens (cancer-causing agents) with laboratory use:

Chromic Acid	Chloroform	Carbon Tetrachloride
Benzene	Ethylene Oxide	Styrene
Methylene Chloride	Arsenic	Cadmium
Formaldehyde	Acrylonitrile	Beryllium
Acrylamide		

Common corrosives (cause acute respiratory, skin or eye damage) with laboratory use:

Nitric acid	Hydrochloric acid	Ammonia
Sulfuric acid	Phenol	Hydrogen peroxide
Sodium hydroxide	Potassium Hydroxide	

Common solvents (may cause irritation as well as long term organ effects) with laboratory use:

Acetone	Hexanes	Toluene
Methanol	Ether	Tetrahydrofuran
Ethanol	Isopropanol	

Common reproductive hazards (may affect reproductive organs or systems) with laboratory use:

Arsenic	Cadmium compounds	Vinyl chloride
Benzene	Lead compounds	Xylene
Ethylene oxide	Mercury compounds	

Common acute toxins (may cause serious, immediate hazards) with laboratory use:

Acrolein	Chlorine	Hydrofluoric acid
Arsine	Cyanides	Sodium azide

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Daily Safety Check Points: There are daily safety check points for monitoring and controlling the CAMD lab equipment's.

CAMD DAILY SAFETY CHECK POINTS											
Sr. No.	Routine Check Points Details	Frequency	Mon	Tues	Wed	Thur	Frid	Sat	Checked By	Verified By	Remark
1	To be check the all clean room equipments physical condition they should be covered with proper cover with no dust and placed in proper manner .	Daily									
2	To be check the air compressor physical condition , cleaning and drain the moisture from the air reciever tank .	Daily									
3	To be check the water chiller physical condition , cleaning and check the water level if required maintain the water level .	Daily									
4	To be check the inlet water availibility from DI water system .	Daily									
5	To be Check the all Gas valves they should be in closed position when system is not in use .	Daily									
6	To be Check the Gas detector system that power supply should be always in ON condition through UPS and tower lamp green light should be elited in ok normal condition .	Daily									
7	To be check the Nitrogen gas pressure in Gas bank that should be alwas more than 50 kg/cm 2 , if less than 50 kg immediately inform to Mr. Ajay Yadav or Dr OS Panwar .	Daily									
8	To be check the Gas bank & scrubber floor cleaning and for any abnormality obsereved .	Mon & Wed									
9	To be check the Vaccum Gauge of phosphine , diborine and Silane gas . If vaccum gauge is showing atmospheric pressure immediate inform to Mr. Ajay Yadav or Dr. O.S Panwar .	Daily									
10	To be Check and cleaning of outside PECVD Clustor tool rotary pump by vaccum cleaner machine .	Mon & Wed									
11	To be Check the all cleam rooms floor cleaning including galleries if there is any issue call to help desk .										
12	To be Check and cleaning of all earthing strips	3rd Sat									
13	To be check and water filling of RO tank for DI water processing . Tank should be always full.	Daily									

Specific Safety Procedures for Equipment

1. **Robotics Systems**:
   - Do not operate robotic systems without proper training.
   - Ensure that the emergency stop button is functional and within reach.
   - Clear the workspace of any obstacles before starting operations.
   - Never attempt to manually stop or obstruct moving robots.
2. **Automation Devices**:
   - Follow the manufacturer's manual for all automated devices.
   - Use proper lockout/tagout procedures during maintenance or troubleshooting.
3. **Mechatronics Equipment**:
   - Ensure all connections and wiring are secure before powering the systems.
   - Avoid touching electrical components when systems are powered.

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Chemical and Hazardous Materials

1. **Storage**: All hazardous materials must be labeled and stored in appropriate containers.
2. **Handling**: Use fume hoods when working with volatile substances. Dispose of chemicals as per the waste disposal guidelines.
3. **Spill Management**: In case of spills, use spill kits and inform the lab supervisor immediately.

Carbon management:

1. Involves identifying and reducing CO_2 emissions from lab activities, such as energy use and equipment operations.
2. This can be achieved by improving energy efficiency, switching to renewable energy sources, and ensuring equipment is well-maintained.
3. Monitoring energy consumption and using sustainable practices help minimize the lab's environmental impact. Regular reviews ensure continuous improvement in reducing emissions.

Electrical Safety

1. Inspect all electrical equipment for damage before use.
2. Avoid overloading circuits or using damaged cables.
3. Do not touch live wires or electrical components with wet hands.
4. Ensure proper grounding of all electrical devices.

Fire Safety

1. Familiarize yourself with the location and operation of fire extinguishers.
2. Ensure flammable materials are stored away from heat sources or open flames.
3. In case of fire, follow the evacuation plan and use the nearest fire extinguisher if safe to do so.

Ergonomics and Manual Handling

1. When lifting heavy objects, use appropriate lifting techniques to avoid injury.
2. Use mechanical aids (cranes, dollies) when available.

Waste Disposal

1. Dispose of general and hazardous waste according to the lab's waste management plan.
2. Ensure that no hazardous materials are disposed of in regular trash bins.

Incident Reporting

1. Any accidents, injuries, or equipment malfunctions must be reported immediately to the lab supervisor.
2. Maintain a log of all incidents and near-misses for future review and improvement of safety procedures.

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Training and Review

1. All lab users must undergo safety training before working in the lab.
2. This Document/SOP must be reviewed and updated annually or as required.

(Abhimanyu Singh Rana)
Director-Research

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