Laboratory Safety Manual

Prepared by

RAEIN-Africa & Partners

Under the Implementation of The National Biosafety Framework Project for Swaziland

Contents

Preamble/ Introduction

UNISWA, molecular biology laboratory aim and safety statement

E.g. To provide a healthy and safe environment for staff, students, associates, partners, visitors and community at large

This manual sets out procedures and practices for the maintenance of a safe environment for the laboratory personnel, affiliates, the general public, and the environment.

The UNISWA Molecular Biology Lab is designated Biosafety Level 2. The associated risks and regulations require implementation of a security system for restricted access (typically, access control using staff/ student card swiping is ideal. All staff not directly involved in activities in the MBL will not be given card access).

No personnel will be allowed to work on the premises without having read the safety manual, signing the declaration and submitting it to the Laboratory Safety Officer(s).

Safety declaration

I, …… (insert full name), hereby acknowledge that I have read and understood the contents of the Molecular Biology Laboratory Safety Manual. I undertake to adhere to these regulations. Furthermore, I commit to consult one of the safety officers should I become unsure of any of the contents herein and will endeavour to discuss any concerns relating to safety issues.

Signature ……..

Date ……

Witnessed by Safety Officer …….

(Name of Safety Officer & Date)

Laboratory health and safety committee(s)

Members to the Laboratory Health and Safety Committee are to have combined experiences and expertise in a) working with chemical, radiation and biological agents b) understanding of the technologies in use; c) capability to assess safety within the scope research experiments being undertaken; d) the capability to assess potential health and/or environmental risks. The committee will assist in implementing safe procedures and maintaining safe environments in the University facilities; laboratories, offices and other workstations. All accidents and incidents are to be reported to the committee, who are tasked with writing incident reports.

Emergency response procedures and Emergency numbers

The laboratory personnel should be well versed in emergency response procedures. In addition, Emergency numbers should be posted in plain view for easy access. Important Emergency Numbers may include;

a) University security
b) Police
c) Fire Brigade
d) Campus Health Centre (if applicable)
e) Medical Emergency/ Ambulance
f) Poison Information Centre (if available)

Fire Drills should be practiced from time to time to measure the level of alertness and the speed of response among the staff and students. Laboratory personnel are encouraged to be variously trained as First Aiders, Fire Marshalls, Chemical Safety and/ or Biological Safety Officers. A First Aid box should be made available in an accessible and well labelled place within the laboratory.

Personal safety

The likelihood of accidents in the laboratory is high. Laboratory personnel should be constantly aware of their actions, their surroundings, and possible threats to safety. Practicing due care when undertaking the following processes may reduce injurious incidents.

1. Protective clothing

Personal protective clothing (PPC) and other personal protective equipment PPE) are designed to safeguard the health and safety of all lab users.

- *Lab coats and other PPC* must be worn at all times and in all lab areas. **Gloves** must be worn all the time when handling specimens or preparing reagents**. Sandals, flipflops, and shoes with woven uppers** expose the wearer to danger when spillage of corrosive materials or irritants occurs. PPC are designed to protect personnel from contamination with specimens and reagents. As such, PPC may harbour infectious materials, experimental organisms or harmful reagents. PPC must be removed before leaving the laboratory for 'clean areas' (eating or public areas).
- *Eye protection* is mandatory in all areas where there is a potential for injury. It is now common practice to wear **safety glasses** every time when manipulating reagents and specimens in the laboratory. When working with corrosive reagents or large volumes of liquids, it is recommended to wear **full-face shields**. Eye wash bottles containing water or other eye-washing reagents should be readily available in case of accidents. Liquid nitrogen and ultra violet (UV) light also pose great danger to eyes. Equipment such as laminar flow hoods, PCR workstations, and gel eliminators (gel documentation systems) normally incorporate high intensity UV lamps that require special eye-shields should personnel be required to work when the UV light is on. Wearing of **contact lenses** should not be permitted in the laboratory.
- *Inhalation and absorption poisoning* can result from fine powders, smoke, gases emitted by noxious reagents, spillage of toxic chemicals or solvents. Dust masks should be worn when working with high volumes of powdered reagents or known irritants such as detergent powders. Noxious reagents should be stored in recommended safety cabinets to reduce emission of toxic fumes. Appropriate gloves should be worn, taking cognisance of solvents that may cause them to disintegrate.
- *Hot, cold and chemical burns* can be prevented by wearing the appropriate gloves when handling such specimens. Special heavy duty gloves are worn when handling corrosive chemicals, while oven or leather are used for hot and cold surfaces. Corrosive reagents must be decanted using appropriate pumps/ equipment and recommended preparation procedures must be adhered to.

2. Handwashing

Hands must be washed
- Before leaving the lab
- Before eating or drinking
- Before touching the mouth or eyes
- Immediately after spilling a reagent or sample
- Immediately after removing gloves

3. *Equipment with moving parts*, such as centrifuges, blenders, vortex mixers and shaking incubators, can cause injury if slowed down or stopped by hand. Always use the designated switch to stop the motion and wait until the moving parts come to a complete stop before handling/ removing the specimens

4. *Compressed gases* such as LP and liquid nitrogen must be handled with care. Gas cylinders should always be secured on cylinder racks or trolleys. LP gas poses fire risks due to leaks from faulty connections. Liquid nitrogen can cause cold burns and frost bite. Liquid nitrogen can also cause suffocation by displacing oxygen. It is not advisable carry N2 canisters in lifts (spillage danger) or to work with it in small spaces or poorly ventilated areas.

5. *High level noises* from ultrasonic probes, tissue disruptors, other high frequency equipment or high decibel noises should be blotted out using high grade ear mufflers.

Storage of toxic reagents

Chemicals and reagents should not be segregated alphabetically unless compatible. Segregation and storage should follow the chemical family and/ or hazard classification. Hazard classes include:

- Flammable/combustible substances
- Corrosive acids and bases
- Highly toxic chemicals
- Oxidizing agents
- Compressed gases
- Cryogenic substances
- Water reactive substances
- Explosive substances

All substances are to be stored as recommended for their class. Separate SOPs for storage, making up and disposal of these substances must be developed as needed.

Waste management: Segregation and disposal

The laboratory produces different types of wastes that is potentially dangerous to people and the environment. The laboratory must therefore follow strict procedures for waste disposal. Several categories of waste, for example:

- Chemical waste; Many different classes, e.g. Inorganic and organic acids, Alkalis, Metal solutions, gel wastes. Chemical waste must be processed safely to protect the environment. The method for processing depends on the type of chemical. SOPs for disposal must be specific to the type of chemical concerned. Alternatively, waste disposal service providers may dispose chemical wastes for a fee. Labelling of the different chemicals is important as unlabelled wastes present a requirement for investigative tests.
- Infectious waste or waste that can pose contamination risks to the environment (E.g. GM seeds) must be stored in a secure location, preventing access by anyone but the person assigned for the processing of the waste. Incineration is best.
- Contaminated glassware for reuse must be properly sterilized and cleaned.
- Non-infectious/ non-contaminated wastes must be processed according to normal waste disposal procedures.
- Sharps must be incinerated.
- Uncontaminated broken glass must be disposed according to municipal recommendations.

An inventory of the types of waste produced by the laboratory must be compiled and SOPs developed for categories of wastes requiring unique processing and disposal methods.