

# **Artificial Insemination**

## **Level-I**

# **Learning Guide#24**

**Unit of Competence: Follow Basic**

**Chemical Safety Rules**

**Module Title**

**Following Basic**

**Chemical Safety Rules**

**LG Code: AGR ATI1 M08 0919 LO1-LG-24**

**TTLM Code: AGR ATI1 TTLM 0919 v1**

**LO 01: Follow workplace  
requirements and instructions  
concerning chemicals**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ✓ Identifying Roles and Responsibilities of Peoples in work place
- ✓ Recognizing and following Safety Procedure in chemical handling
- ✓ Identifying and Reporting Occupational health and safety
- ✓ Following Organizational Procedures regarding Chemicals

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- ✓ Identify Roles and Responsibilities of Peoples in work place
- ✓ Recognize and following Safety Procedure in chemical handling
- ✓ Identify and Reporting Occupational health and safety
- ✓ Follow Organizational Procedures regarding Chemicals

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -6, 9, 12 and 14** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” **in page -15**.
6. Do the “LAP test” **in page – 16** (if you are ready).

## **1. Identifying roles and responsibilities of people in the work place**

Safe practice in chemical laboratory is necessary to every individual and the need to follow a set of rules. Safety is a mutual responsibility and requires the desire on the part of individual for self-protection as well as protection of one's associates. With this in mind this Learning guide is prepared to:

- ✓ Inform the responsibility of each individual when he/she is in chemical laboratory.
- ✓ Promote greater awareness of the potential hazards in the laboratory.
- ✓ Encourage the use of safety of safe procedures in the handling of chemicals.
- ✓ Enable laboratory workers to react promptly when accidents do occur.

### **Some rules are not made to be broken**

#### **1) Do not pipette by mouth-ever**

You say, "But it is only water." Even if it is, how do you think that glass ware really is? Using disposable pipettes? I know lots of people who rinse them and put them back! Do not pipette by mouth at either.

#### **2) Dress appropriately**

No sandals, no clothes you love more than life, no contact lenses, and long pants are preferable to shorts or short skirts. Tie long hairs back, wear safety goggles and a lab coat. Even if you are not clumsy, someone else in the lab probably is. Do not be bad example to others, remembered for all time for something stupid.

#### **3) Identify the safety equipment**

And know how to use it! Know the location of fire blanket, extinguishers, eye wash and shower

**4) Do not Taste or sniff chemicals**

For any chemicals, if you can smell them then you are exposing yourself to a dose that can harm you! Do not taste your experiment.

5) **Do not causally dispose** of chemicals down the drain wash it away rather than risk an unexpected reaction between chemical “left overs” later.

**6) Do not eat or drink in a lab**

Just do not do it!

**7) Do not pay mad Scientist**

Do not haphazardly mix chemicals! Pay attention to the order in which chemicals are to be added to other and do not deviate from the instructions.

**Responsibility of Instructor or Laboratory Supervisor**

Every instructor or laboratory supervisor should:

1. Set a good example by
  - a) observing all rules
  - b) wearing protective equipment where recommended
  - c) being enthusiastic about safety
2. Be alert for unsafe conditions
3. Inspect often and intelligently
4. Maintain discipline and enforce rules
5. Prohibit use of laboratory glassware as food or beverage container.
6. Careful review all experiments for possible safety problems before the experiments are assigned to students.
7. Maintain a life of publications on laboratory safety, readily available to students and others, and encourage its use.
8. Deliver an instruction to the students regarding hazards of the chemicals being used in a particular course and the manner in which these chemicals are to be handled and disposed of safely.

## **Responsibility of the Students**

Each student should:

1. Adhere to all safety rules and participate conscientiously in any training exercises.
2. Be aware of the location of the fire exits, alarms and prompt reporting to the instructors in case any danger occurs.
3. Be aware of the location of fire extinguishers and trained in the proper manner to operate them.
4. Know the location of the nearest safety shower and eye wash and how to operate them
5. Be responsible in taking care of the glassware and other materials he/she is using.

### **WASTE MATERIALS**

1. Clean up as you work, keeping your bench free of chemicals, scraps of paper, and dirty glassware. Discard unwanted solids in a covered solids waste container; use the waste paper container for paper only. Never discard uncontaminated paper with chemical waste, nor discard chemicals or broken glass with waste paper.  
A separated container should be available for broken glassware. All containers should be plainly marked.
2. Nonflammable liquids soluble in water may be flushed down the drain unless a special container is for them. Liquids heavier than water should be placed in a special container since they may clog the drain. Only on nonflammable, nontoxic, insoluble liquids should be flushed down the drain. Appreciable quantities(over a liter) of flammable or insoluble liquids should be placed in a special covered labeled container.
3. Waste Mercury, broken mercury thermometers, and all mercury compounds should be placed in a container designed for them and must not be discard in the sink or in to a vacuum pumps or vacuum system.
4. Waste sodium, other alkali metals, hydrides of alkali metals and phosphorus should be disposed of only as directed. Under no circumstances should such

substances be discarded in the sink or in the waste containers other than covered containers labeled and specifically indicated for these materials.

5. Each disposal should be considered separately and a handling, storage and disposal procedure , determined by physical and chemical properties of particular peroxide established.
6. Rinse material clinging to glassware in the laboratory sink, cleaning off any remainder with detergent, hot water, and a brush. Keep bare hands out of wash water. Use cleaning solvents in small amounts, and carefully rinse out any residual vapors
8. Bedding for livestock. **Material Safety Data Sheets (MSDS)** A **Material Safety Data Sheet** (MSDS) (also known as PSDS (Product safety data sheet) or a COSHH data sheet in the United Kingdom) is a form with data regarding the properties of a particular substance.

In some jurisdictions the MSDS is required to state the chemical's risks, safety, and effect on the environment.

Self-Check -1	Written Test
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**Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:**

1. Explain the Responsibility of Supervisor in Laboratory. (4 points)
2. Explain the Responsibility of students in Laboratory. (4 points)
3. Explain un broken rules in laboratory and during work with chemicals. (4 points)

**Note: Satisfactory rating - 5 and 8 points**

**Unsatisfactory - below 5 and 8 points**

**You can ask you teacher for the copy of the correct answers.**

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**

Information sheet 2	<b>Recognizing and following Safety Procedure in chemical handling</b>
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## 2.1. Recognize Risks associated with chemicals

### 2.1.1. Instructions for use, maintenance and storage of personal protective equipment and application equipment

#### a. Personal protective equipment and clothing

Personal protective equipment and clothing may act as a barrier to minimize the risk of exposure to aerosols, splashes and accidental inoculation. The clothing and equipment selected is dependent on the nature of the work performed. Protective clothing should be worn when working in the laboratory. Before leaving the laboratory, protective clothing should be removed, and hands should be washed. **Table 1** summarizes some personal protective equipment used in laboratories and the protection afforded.

#### b. Laboratory coats, gowns, coveralls, aprons

Laboratory coats should preferably be fully buttoned. However, long-sleeved, back opening gowns or coveralls give better protection than laboratory coats and are preferred in microbiology laboratories and when working at the biological safety cabinet. Aprons may be worn over laboratory coats or gowns where necessary to give further protection against spillage of chemicals or biological materials such as blood or culture fluids. Laundering services should be provided at/near the facility. Laboratory coats, gowns, coveralls, or aprons should not be worn outside the laboratory areas.

#### c. Goggles, safety spectacles, face shields

The choice of equipment to protect the eyes and face from splashes and impacting objects will depend on the activity performed.

### PERSONAL PROTECTIVE EQUIPMENT

EQUIPMENT	HAZARD CORRECTED	SAFETY FEATURES
Laboratory coats gowns, coveralls	Contamination of clothing	<ul style="list-style-type: none"> <li>• Back opening</li> <li>• Cover street clothing</li> </ul>
Plastic aprons	Contamination of clothing	<ul style="list-style-type: none"> <li>• Waterproof</li> </ul>



Footwear	Impact and splash	<ul style="list-style-type: none"> <li>• Closed-toe</li> </ul>
Goggles	Impact and splash	<ul style="list-style-type: none"> <li>• Impact-resistant lenses (must be optically correct)</li> <li>• Side shields</li> </ul>
Face shields	Impact and splash	<ul style="list-style-type: none"> <li>• Shield entire face</li> <li>• Easily removable in case of accident</li> </ul>
Respirators	Inhalation of aerosols	<ul style="list-style-type: none"> <li>• Designs available include single-use disposable; full-face or half-face air purifying; full-face or hooded powered air purifying (PAPR); and supplied air respirators</li> </ul>
Gloves	Direct contact with microorganisms  Cuts	<ul style="list-style-type: none"> <li>• Disposable microbiologically approved latex, vinyl or nitrile</li> <li>Hand protection</li> <li>• Mesh</li> </ul>

## EQUIPMENT HAZARD CORRECTED SAFETY FEATURE

### a. Eye protection

Prescription or plain eye glasses can be manufactured with special frames that allow lenses to be placed in frame from the front, using shatterproof material either curved or fitted with side shields (safety glasses). Safety spectacles do not provide for adequate splash protection even when side shields are worn with them. Goggles for splash and impact protection should be worn over normal prescription eye glasses and contact lenses (which do not provide protection against biological or chemical hazards). Face shields (visors) are made of shatterproof plastic, fit over the face and are held in place by head straps or caps. Goggles, safety spectacles, or face shields should not be worn outside the laboratory areas.

### b. Respirators

Respiratory protection may be used when carrying out high-hazard procedures (e.g. cleaning up a spill of infectious material). The choice of respirator will depend on the type of hazard(s). Respirators are available with interchangeable filters for protection against gases, vapours, particulates and microorganisms. It is imperative that the filter is fitted in the correct type of respirator. To achieve optimal protection, respirators should be individually fitted to the operator's face and tested. Fully self-contained respirators with an integral air supply provide full protection. Advice should be sought from a suitably qualified person, e.g. an occupational hygienist, for selection of the correct respirator. Surgical type masks are designed solely for patient protection and do not provide respiratory protection to workers. Some single-use disposable respirators (ISO 13.340.30) have been designed for protection against exposures to biological agents. Respirators should not be worn outside the laboratory areas.

### **c. Gloves**

Contamination of hands may occur when laboratory procedures are performed. Hands are also vulnerable to "sharps" injuries. Disposable microbiologically approved latex, vinyl or nitrile surgical-type gloves are used widely for general laboratory work, and for handling infectious agents and blood and body fluids. Reusable gloves may also be used but attention must be given to their correct washing, removal, cleaning and disinfection. Gloves should be removed and hands thoroughly washed after handling infectious materials, working in a biological safety cabinet and before leaving the laboratory. Used disposable gloves should be discarded with infected laboratory wastes.

Allergic reactions such as dermatitis and immediate hypersensitivity have been reported in laboratory and other workers wearing latex gloves, particularly those with powder. Alternatives to powdered latex gloves should be available.

#### **➤ Standard Operating Procedures**

##### **What are SOPs?**

SOP stands for "standard operating procedure". SOPs are powerful tools for seizing control of work procedures. In fact, they can really make the difference between success and failure in today's dairy economy. Why? Because SOPs are effective communication tools that contribute to both worker understanding and job satisfaction.

## **Objectives of SOPs**

The objectives of SOPs are to:

- Provide direction
- Improve communication
- Reduce training time
- Reduce variation

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Explain some of the Personal protective equipment's used during chemical handling . (4 points)
2. What is the objectives of SOPs (4 points)

Note: Satisfactory rating - 5 and 8 points

Unsatisfactory - below 5 and 8 points

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**

### 3. OHS requirements & identifying OHS hazards

#### 3.1. Workplace OHS policies:-

Workplace OHS policies are usually a statement about a safety issue in the workplace, and what the organization intends to do about the issue.

Examples of common OHS policies include:

- non-smoking policy
- policy on the use of drugs and alcohol
- Health and safety policy.
- OHS policies should be available to everyone at a workplace. You are likely to find

Policies displayed on a notice board at the workplace, in a training manual, or as part of an organization's Website.

#### 3.2. Workplace OHS procedures:-

Workplace OHS Procedures are step-by-step, or sets of instructions on how to deal with an activity in the workplace.

Three common OHS procedures are:

- emergency procedures
- first aid procedures
- Accident/near miss and hazard reporting procedures.

#### 3.3. Emergency procedures

Every workplace should have procedures to deal with emergencies.

Emergencies may include:

- Fire
- chemical spill
- explosion or gas leak

- bomb threat
- flooding
- Armed hold-up.

### **3.4. OHS Requirements**

In laboratory and during chemical handling it is required to take all practicable steps to ensure that no work activity carried out by her/him, or procedure used, will cause or be a source of harm to the visiting employer's employees, contractor's employees, or self-employed contractor (person), including subcontractors, while they are accessing, leaving, or in the area they are required to work. In taking all practicable steps to ensure that hazards arising from work, or work activities will not cause harm, the farmer or landowner may need to provide information, instructions or warning signs to alert people to known hazards, e.g. weight limits for access bridges, presence of unruly animals, use of pesticides, etc.

#### **Work Environment**

- ❖ Ensure that workplace safety inspections are routinely conducted by a person who can identify hazards and conditions that are dangerous to workers

E.g. obstructions in the aisle, blind corners and intersections, and forklifts that comes too close to workers on foot

- ❖ Install the workstations, control panel, and equipment away from the aisle when possible
- ❖ Do not store bins, racks, or other materials at corners, intersections, or other locations that obstruct the view of operators or workers at workstations
- ❖ Enforce safe driving practices such as obeying speed limits, stopping at stop signs, and slowing down and blowing the horn at intersections
- ❖ Repair and maintain cracks, crumbling edges, and other defects on loading docks, aisles, and other operating surfaces

The general duties of employers under the Health and Safety in Employment are to take all practicable steps to:

- Provide and maintain a safe working environment;
- Include employees in the development of health and safety procedures;
- Hazard identification and control);
- Provide and maintain facilities for the safety and health of employees;
- Ensure that any machinery or plant that employees use is safe;
- Ensure that any processes that employees are involved in will not adversely affect their health or safety;
- Provide employees with information on workplace hazards, and ensure that employees are trained and supervised;
- Record and investigate workplace accidents and illness, and report any that constitute serious harm; and
- Develop procedures to deal with emergencies which may arise at work

<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Explain Some common OHS Polices (4 points)

Note: Satisfactory rating - 4 points      Unsatisfactory - below 4 points

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**



#### 4.1. Following The organizational Procedure

1. Keep your hands and face clean. Wash thoroughly with soap and warm water whenever a chemical contacts your skin.
2. Most chemicals are harmful to some degree. Avoid direct contact with any chemical. Some substances considered to be safe today may in future be found to cause unsuspected long-term disorder.
3. Never taste or smell a chemical unless specifically directed to do so.
4. Carefully read label before removing a reagent from its container. Read it again as you promptly recap the container and return it to its proper location. Names of distinctly different substances are sometimes nearly alike and using the wrong substances can lead to accidents.
5. A large number of common substances are acute respiratory hazards and should not be used in a confined area in large amounts. They should be dispensed and handled only where there is adequate ventilation, preferably in a hood.
6. Some solvents may serve as vehicles for the rapid transport of toxic substances dissolved in them through the skin in to the body.
7. Anyone who swallows a chemical should be encourage to drink large amounts of water and immediately seek medical assistance.
8. All containers of chemical must be labeled clearly. Do not use any substance in an unlabeled container.
9. Wear an apron and gloves whenever pouring bromine, hydrofluoric acid, or related materials in the fume hood. Contact with these types of materials will lead to painful burns.
10. Always add a reagent slowly. Observe what takes place when the first small amount is added and wait a few moments before adding more; some reaction take time to start. If an expected reaction does not initiate, ask you instructor for advice before adding more reagent.

11. To avoid violent reaction while diluting solutions, always pour concentrated solution slowly in to water or in to less concentrated solution while stirring. The more concentrated solution is usually heavier and any heat evolved is better distributed. This procedure is particularly applicable in preparing dilute solutions.
12. Never look down the opening of a vessel unless it is empty.
13. Most ether, including cyclic ethers, form dangerously explosive peroxides on exposure to air and light.

#### **4.2. Employers to ensure safety of employees**

Every employer shall take all practicable steps to ensure the safety of employees while at work; and in particular shall take all practicable steps to

Ensure that while at work employees are not exposed to hazards arising out of the arrangement, disposal, manipulation, organization, processing, storage, transport, working, or use of things—

(i) In their place of work; or

(ii) Near their place of work and under the employer's control; and

#### **Electrical safety**

The electrical wiring and fittings of machinery connected to the mains supply (or similar) must comply with the Electricity Regulations. All portable or hand-held machinery that derives power from an electrical current should be used with an isolating transformer or residual current device properly connected. Specific guidance on the suitable types and use of these devices should be sought from the appropriate electrical supply authority or from an electrical inspector

#### **Hazard identification and control**

Managing health and safety effectively begins with identification of the actual and potential hazards that can harm people in the place of work. Once identified, the significant hazards should be appropriately controlled. The Health and Safety in

Employment Act 1992 requires employers, with the involvement of their employees, to identify and control hazards.

**Once the hazards are identified, the following steps should be taken:**

- The first attempt should be to eliminate or remove the hazard.( An example of elimination is the substitution of a hazardous chemical with a non-hazardous chemical.)
- If it is not practical to eliminate the hazard, then employees should be isolated from the hazard. An example of isolation is machinery guarding which isolates people from the hazardous parts of the machine (the hazard has not been eliminated by the provision of a guard because it is still there behind the guard).
- If it is not practical to do either of these things then the effects of the hazard on the employees in the place of work should be minimized. This in effect means doing everything else practicable to make the work safe, and may include:
  - Providing and ensuring the use of protective equipment and clothing;
  - Monitoring employees' exposure to the hazard;
  - With the employees' informed consent, monitoring their health;
  - Providing the employees with the results of the monitoring of their health; and
  - Providing employees with results relating to the monitoring of the place of work.

**Prevention of falls from heights**

Employers should take all practical steps to ensure that where a fall from 3 metres is possible that fencing or other means are provided to help prevent a fall. This will be practical in relation to most man-made structures. It is recognized that it is not usually practical to fence natural hazards and that employers and employees should take due care in situations where falls can occur.

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Hazard elimination is possible in work place. (true/False)(4 points)

Note: Satisfactory rating - 5 and 8 points                      Unsatisfactory - below 5 and 8 points

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**