Artificial Insemination

Level-I

Learning Guide #26

Unit of Competence: Follow Basic Chemical Safety Rules

Module Title Following Basic Chemical Safety Rules

LG Code: AGR ATI1 M08 0919 LO1-LG-26

TTLM Code: AGR ATI1 TTLM 0919 v1

LO 03: Follow chemical handling and storage rules

Instruction Sheet	Learning Guide #-26

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

- ✓ Following labels on chemical handling and storage
- ✓ Following safety rules when working and chemical storages
- ✓ Obtaining and using appropriate Personal Protective equipments
- ✓ Following Procedures in accident or spillage events

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 –**

- ✓ Follow labels on chemical handling and storage
- ✓ Follow safety rules when working and chemical storages
- ✓ Obtain and use appropriate Personal Protective equipments
- ✓ Follow Procedures in accident or spillage events

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).

Information Sheet-1	Following labels on chemical handling and storage

1. General Chemical Safety Rules Classification of hazardous chemicals

Chemicals may be corrosive, toxic or harmful by inhalation, skin absorption or ingestion. Below are some hazardous chemicals commonly used in the laboratory and the appropriate precautions outlined.

Safety Data Sheet (SDS) contain information necessary for the safe handling of hazardous or potentially hazardous chemicals. Some examples of the types of information provided by an SDS for a chemical include the:

- Product name
- Chemical name
- Formula
- Physical and chemical properties
- Hazard identification -types of hazard(s) posed by the chemical, adverse health effects and symptoms of overexposure.

Basic Chemical Safe Handling Tips

- Read the label.
- Dress the part.Wear the proper safety protection, clothing and equipment as required.
- Know emergency procedures.
- Be careful!Don't work alone; make sure there is someone there to help you if necessary. Don't try to hurry or take shortcuts, you just can't rush safety! Don't roughhouse or goof around. Chemical safety is a job for professionals.
- Report any suspected problems.
- Keep your work area neat, clean and organized.You'll know where everything is, and you'll be able to work more efficiently.
- Store everything properly.

Information sheet 2	Following safety rules when working and chemical storages

GENERAL GUIDELINES

1. Conduct yourself in a responsible manner at all times in the laboratory.

2. Follow all written and verbal instructions carefully. If you do not understand a direction or part of a procedure, ASK YOUR TEACHER BEFORE PROCEEDING WITH THE ACTIVITY.

3. Never work alone in the laboratory. No student may work in the science classroom without the presence of the teacher.

4. When first entering a science room, do not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.

5. Perform only those experiments authorized by your teacher. Carefully follow all instructions, both written and oral. Unauthorized experiments are not allowed.

6. Do not eat food, drink beverages, or chew gum in the laboratory. Do not use laboratory glassware as containers for food or beverages.

7. Be prepared for you're with chemicals. Read all procedures thoroughly before using chemicals. Horseplay, practical jokes, and pranks are dangerous and prohibited.

8. Always work in a well-ventilated area.

9. Observe good housekeeping practices. Work areas should be kept clean and tidy at all times.

10. Be alert and proceed with caution at all. Notify immediately of any unsafe conditions you observe.

11. Dispose of all chemical waste properly. Never mix chemicals in sink drains. Sinks are to be used only for water. Check with your teacher for disposal of chemicals and solutions.

12. Labels and equipment instructions must be read carefully before use. Set up and use the equipment as directed by your teacher.
13. Keep hands away from face, eyes, mouth, and body while using chemicals or lab equipment. Wash your hands with soap and water after performing all experiments.

14. Experiments must be personally monitored at all times. Do not wander around the room, distract other students, startle other students or interfere with the laboratory experiments of others.

15. Know the locations and operating procedures of all safety equipment including: first aid kit(s), and fire extinguisher. Know where the fire alarm and the exits are located.

16. Know what to do if there is a fire drill during a laboratory period; containers must be closed, and any electrical equipment turned off.

CLOTHING
17. Any time chemicals, heat, or glassware are used, students will wear safety goggles. NO EXCEPTIONS TO THIS RULE!

18. Contact lenses may be not be worn in the laboratory.
19. Dress properly during a laboratory activity. Long hair, dangling jewelry, and loose or baggy clothing are a hazard in the laboratory. Long hair must be tied back, and dangling jewelry and baggy clothing must be secured. Shoes must completely cover the foot. No sandals allowed on lab days.
20. A lab coat or smock should be worn during laboratory experiments.
ACCIDENTS AND INJURIES
21. Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the teacher immediately, no matter how trivial it seems. Do not panic.

22. If you or your lab partner is hurt, immediately (and loudly) yell out the teacher's name to get the teacher's attention. Do not panic.

23. If a chemical should splash in your eye(s) or on your skin, immediately flush with running water for at least 20 minutes. Immediately (and loudly) yell out the teacher's name to get the teacher's attention.
24. All chemicals in the laboratory are to be considered dangerous. Avoid handling chemicals with fingers.Always use a tweezer. When making an observation, keep at least 1 foot away from the specimen. Do not taste, or smell any chemicals.

25. Check the label on all chemical bottles twice before removing any of the contents. Take only as much chemical as you need.

26. Never return unused chemicals to their original container.

27. Never remove chemicals or other materials from the laboratory area
28. Never handle broken glass with your bare hands. Use a brush and dustpan to clean up broken glass. Place broken **glass** in the designated glass disposal container.
29. Examine glassware before each use. Never use chipped, cracked, or dirty glassware.
30. If you do not understand how to use a piece of equipment, ASK THE TEACHER FOR HELP!

31. Do not immerse hot glassware in cold water. The glassware may shatter.

32. Do not operate a hot plate by yourself. Take care that hair, clothing, and hands are a safe distance from the hot plate at all times. Use of hot plate is only allowed in the presence of the teacher.

33. Heated glassware remains very hot for a long time. They should be set aside in a designated place to cool, and picked up with caution. Use tongs or heat protective gloves if necessary.

34. Never look into a container that is being heated.

35. Do not place hot apparatus directly on the laboratory desk. Always use an insulated pad. Allow plenty of time for hot apparatus to cool before touching it.

Information sheet 3	**Obtaining and using appropriate Personal Protective equipments**

Information sheet 4	**Following Procedures in accident or spillage events**

4.1 Chemical handling and storage labels

The following measures should be observed when handling hazardous chemicals:

Care should be taken in selecting protective equipment to ensure that it is fitting and appropriate for protection, against the hazardous chemical

Work area involving hazardous chemicals should be clearly designated and labeled. All work surfaces should be covered with stainless steel or plastic trays, dry absorbent plastic-backed paper or other impervious material in order to contain any spills.

Procedures that involve volatile chemicals or may result in the release of airborne contaminants should be performed in a chemical fume cupboard. This includes the weighing of hazardous chemicals.

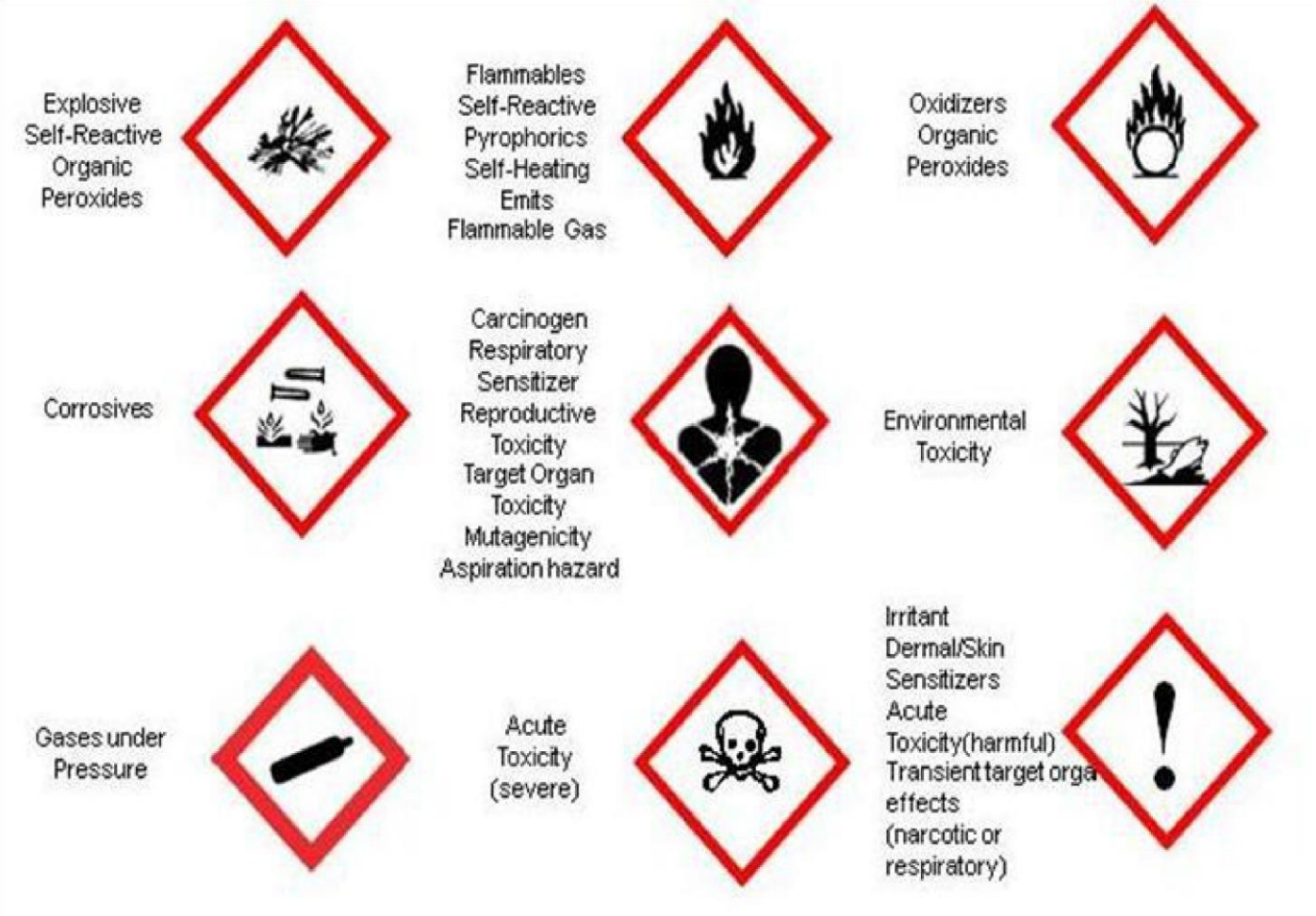
Hands must be thoroughly washed after any contact with chemicals.

Labeling of Chemicals

The Globally Harmonised System of Classification and Labeling of Chemicals (GHS) is a United Nations (UN)-developed system for chemical classification and hazard communication through harmonized provisions for standardized labels and safety data sheets (SDS). The GHS is essentially a hazard communication system for identifying and conveying chemical hazards, and for providing information related to chemical hazards and their control and prevention.

The GHS requires chemicals to be classified based on their inherent properties or hazards and in accordance with certain classification criteria.

The classified chemicals are assigned to a fixed set of GHS pictogram(s), signal word, hazard and precautionary statements.



4.2 Safety rules for chemicals storage

Good housekeeping, regular inspection as well as clear and exact labeling are essential for minimizing accidents resulting from the storage of chemicals. The following precautions should be closely observed when storing chemicals:

- Chemicals should be stored in a cool and well-ventilated place. Hazardous chemicals should be stored for easy access by lab staff. It is not advisable to store chemicals on high shelves.

- Chemical stores should be examined regularly and checked for its expiry date. Chemicals that show signs of deterioration or are redundant must be disposed of according to established procedures.
- Chemicals should be stored according to hazard classification (for example, oxidising, flammable, corrosive and explosive) rather than according to alphabetical order. Incompatible classes of chemicals must be physically separated from each other, for example, by placing them on different shelves or by using a secondary container.

Flammable chemicals

Flammable solids must be kept dry or in suitable "immersion" liquids. For example, sodium in paraffin and phosphorus in water. Sodium perchlorate is unstable and potentially explosive when it comes into contact with combustible materials. These flammable solids should be clearly labeled

Flammable chemicals should not be stored on open shelves but should instead be stored in a place where there is no likelihood of ignition from a naked flame. It is advisable to store flammable chemicals in a fire resistant metal cabinet provided. Flammable chemicals should never be left exposed.

Flammable liquids (for example, alcohol, diethyl ether and propanone) should be stored in a cool place away from heat sources and direct sunlight. Their containers should not be completely filled.

Highly flammable volatile liquids must be labeled "HIGHLY FLAMMABLE" and **should not be stored in refrigerators** because vapor from flammable liquids may potentially ignite due to electrical sparks from the refrigerator.

Unstable chemicals

Unstable chemicals should be stored in a fire resistant metal cabinet, away from heat and moisture, and regularly inspected. It is always advisable to **keep only a minimum amount that is sufficient for current use.** Two examples of unstable chemicals are chlorates and peroxides

Moisture-absorbing chemicals

Chemicals which readily absorb moisture must be kept in tightly sealed containers or desiccators. Some examples are, aluminum chloride, calcium chloride, phosphorus chloride, phosphorus oxide, sodium peroxide and thionyl chloride

Acids and alkalis

Main stocks of concentrated sulphuric, nitric and hydrochloric acids, ammonia, and inflammable liquids should be stored in the corrosive cabinet or as near to floor level as possible.

Compatible hazard classes of chemicals

Incompatible chemicals refer to chemicals that can possibly react violently with each other to produce heat, flammable products or toxic products.

4.3 Procedures in the event of an accident or spillage

Chemical Spills

The range and quantity of hazardous substances used in laboratories require pre-planning to respond safely to chemical spills. **The clean-up of a chemical spill should only be done by knowledgeable and experienced personnel.**

Spill kits with instructions, absorbents, reactants, and protective equipment should be available to clean up minor spills. Solid sodium hydrogen carbonate may be used to contain acid spills **Chemical spill management**

The necessary steps to manage a chemical spill, reducing the potential for injury or damage to the environment, are as followed:

Emergency Spill Response	Non-Emergency Spill Response
Evacuate – Stop work, do not touch any sibstance, evacuate personnel from the spill area and alert those nearby. Do NOT use elevators/ lifts. **Confine** – Isolate the spill area **Report** – Contact the members of the NSSE SC. If necessary, inform the Campus Security. **Secure** – Block off the areas leading to the spill until the arrival of the emergency response personnel. **Caution** – Do NOT go back into an area where a spill has occurred. Rescuers not wearing protective equipment have been overcome by toxic or asphyxiating fumes attempting to rescue others. Determine if any person is injured. Take care not to become a victim yourself. If required, summon a First Aid Officer. To assist the responding emergency service, identify the chemical involved check the SDS or label.	**Containment** - spills must be cleaned up promptly and thoroughly. Limit access to the spill area to those involved in the cleanup process. **Identify** the chemical/s and hazards involved – check Material Safety Data sheet. Approach with care. Never assume that the spilled chemicals are harmless. Use the information on the physical and chemical properties of the material to judge response and/or evacuation procedures Choose the appropriate personnel protective equipment. Always wear gloves and protective eyewear. Use additional protective equipment if needed. Confine or contain the spill. Cover/absorb liquid spills with absorbent (e.g., floor dry, sand, paper towels) and sweep/scoop clean up materials into a bag. Decontaminate equipment, clothing and personnel, including any victims, on site if necessary. Dispose of contaminated equipment and materials only after receiving specialist advice. Ensure emergency procedures are in place and practiced.

Specific Chemical Spills and actions

Type of chemical spills	Action
Acid	Neutralize spill with sodium bicarbonate. Use spill kits that contain soda ash (sodium bicarbonate). Avoid breathing soda ash dust.
Alkali	Neutralize with boric acid.

Mercury	Use the mercury spill kit. Clean up the mercury thoroughly, because mercury vapors from fine droplets that are highly toxic. Once the mercury is contained it should be clearly labeled and submitted for waste disposal.
Body or skin contact	Flood the exposed area with running water from the tap or safety shower for at least 5 minutes. Remove contaminated clothing and make sure that the chemical does not seep into the footwear. **Seek medical attention.**
Body contact with eyes	Flush the eyes with running water, for example, using the eye- washers in the laboratory for a minimum of 15 minutes. Eyelids have to be forcibly opened to ensure that the water/eye solution goes behind the eyelids. Washing should be done from the direction of the nose out to the ear so as to avoid washing chemicals back into the eye or into an unaffected eye. Remove contact lenses as soon as possible in order to rinse off any harmful chemical from the eyes. Cover both of the victim's eyes with clean or sterile gauze.
Solid or liquid poisoning by ingestion	Get the victim to spit the poison out if it is still in the mouth and wash the mouth with plenty of water. Induce vomiting by stimulating the back of the throat with the tip of a finger. **Seek medical attention immediately.**

Chemical burns	Remove the victim's clothes and shoes if necessary. Use water only for treating chemical burns. Wash the injured area with running water for at least 10 minutes. This can prevent further damage to the burnt tissue. Minor burns are best treated by soaking the affected area in cold water. Do not apply burn ointments/spray to affected areas. Cover with sterile or dry and clean material. For large affected areas, seek medical attention immediately. Protective gloves and safety goggles should be worn when attempting to assist a casualty covered with chemicals (so that the person, assisting does not in turn become a victim).

Questions		Satisfactory Response	
☐ The trainee should answer the following question		YES	NO
☐ The trainee's underpinning knowledge was:			
Explain the rules that must you follow for minimizing accidents resulting from the storage of chemicals What is incompatible chemicals			
☐ Satisfactory	☐ Not satisfactory		
☐ Feedback to trainee:			
Trainee's Signature:		Date:	
Instructor's signature:		Date:	
	OPERATION SHEET 3	**Unit of competency:**	**Follow basic chemical safety rules**

☐ Answer the following questions. Get the answer sheet from your trainer/ instructor.

		Module Title:	**Following basic chemical safety rules**

LO 3: Follow chemical handling and storage rules

Operation Title	Follow chemical handling and storage rules
Purpose	To acquaint the trainees to follow chemical handling and storage rules
Equipment, tools and materials	Equipment hats, face shields, goggles, respirators, overalls, aprons, chemical resistant gloves and footwear.
Conditions or situation for the operation	All the tools and equipment should be ready on time.
Procedure	▪ Wear personal protective equipment while you are following chemical ▪ handling and storage rules ▪ Follow chemical handling and storage instructions on labels ▪ Follow safety rules when working in areas where chemicals are stored Followed in the event of an accident or spillage
Precautions	Care should be taken when following chemical handling and storage rules.
Quality criteria	✓ Did personal protective equipment worn while following chemical handling and storage rules ✓ Did follow chemical handling and storage instructions on labels ✓ Did follow safety rules when working in areas where chemicals are stored ✓ Did follow procedure in the event of an accident or spillage