

Laboratory Techniques (Theoretical)

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1. Rationale of the session

- The Baseline Survey in 2011 found out that practical activities including experiment was one of **the least practiced** teaching method in Mathematics and Science lessons.
- The Survey results also showed that shows that the opportunities for students to develop **scientific inquiry skills** were very limited.

1. Rationale of the session (conti.)

- The Survey also revealed that one of the major causes was **lack of skills in conducting practical activities** as well as **lack of basic laboratory techniques**.
- In addition, the Follow-up Survey, which is conducted in 2012, also confirmed the **necessity of the laboratory techniques in the INSET**.

1. Rationale of the session (conti.)

Therefore, this session is intended to give opportunities to participants to revisit:

- some common grades 7&8 science subjects **laboratory apparatus, chemicals** and their **uses**.
- **safety rules** so that they could provide safe science laboratory environment for their students.

2. Objectives of the session

By the end of the session, the participants will be able to:

- name common laboratory apparatuses and chemicals at Grades 7 and 8;
- state the use of some common laboratory apparatuses and chemicals;
- describe the laboratory safety rules.

3. Session plan

	Activities	Time
1	Introducing the session	5 min
2	Question and Answer Session: Use of laboratory apparatuses and chemicals	25 min
3	Activity 1: Brainstorming	10 min
4	Exposition by session facilitator	10 min
5	Activity 2: Brainstorming	10 min
6	Exposition by session facilitator	10 min
7	Activity 3: Brainstorming	10 min
8	Exposition by session facilitator	10 min
	Total	90 min

1) Question and Answer on uses of laboratory apparatuses and chemicals

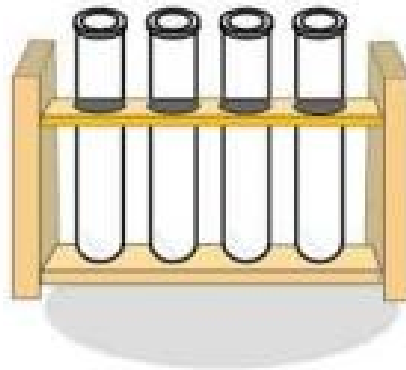
1. How much solution can you put into a test tube at most?

a. $\frac{1}{2}$
 $\frac{1}{10}$

b. $\frac{1}{3}$

c. $\frac{1}{4}$

d.



2. Which of the following apparatuses is not used for heating operation?

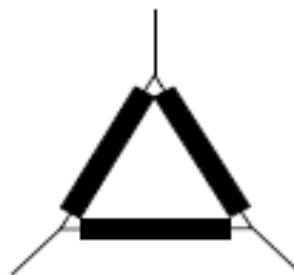
a.



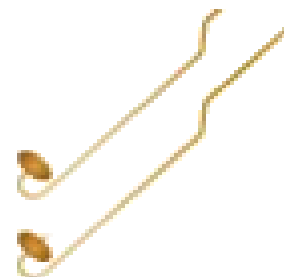
b.



c.



d.



3. Which of the followings is used for measuring weight?

a.



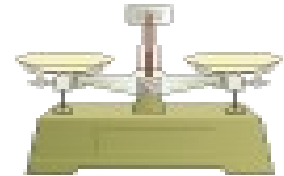
b.



c.



d.



4. The mouth is used to put a liquid to be measured in:

a. Burets
cylinders

b. Graduated

c. Droppers

d. Pipets

5. Which of the following is the wrong way of keeping permanent magnets?

a.



b.



c.



d.

None of them.

6. Which of the following require(s) great cares in handling?

- a. Ethanol (97%)
- b. Diluted hydrochloric acid (HCl) (5%)
- c. Concentrated hydrogen peroxide (H_2O_2)
- d. All of them.

7. Which of the following does not show basicity (alkalinity) when dissolved in water?

- a. Sodium chloride
- b. Sodium hydroxide
- c. Calcium carbonate
- d. Sodium bicarbonate

8. In which of the following sulfuric acid is used?

- a. Car battery
- b. Dry cell
- c. Mobile phone battery
- d. Fruit battery

9. The color of an indicator changes to pink when it is added to a basic solution. What is this indicator?

- a. Methyl orange
- b. Iodine
- c. Methylene blue
- d. Phenolphthalein

10. Which of the following can't be natural indicators?

- a. Lemon
- b. Turmeric (Erid)
- c. Tea
- d. Beetroot

2) Laboratory Safety Rules

Activity 1: Brainstorming (10 min)

“What are personal and general science lab safety rules?”

- Discuss in pairs (5 min)
- Share ideas in whole-group (5 min)

2-1-1) Personal Safety Rules

- 1) Disposable gloves or polyethylene (plastic) bags should be available to wear in holding corrosive (toxic) chemicals, biological stains or potentially infectious organisms.
- 2) Wear safety goggles when necessary.



2-1-1) Personal Safety Rule (conti.)

- 3) 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.
- 4) Shoes must be worn. No sandals, open toes or open heeled shoes.
- 5) Don't eat, drink or store food in the lab.
- 6) Wash hands with soap and water before leaving laboratory.

2-1-2) General laboratory safety rules for students

- 1) Conduct yourself in a responsible manner at all times in a laboratory.
- 2) Follow all written and verbal instructions carefully. If you do not understand a direction or part of a **procedure ask your teacher.**
- 3) Never work alone in the laboratory. No learner may work in the science lab 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.**

2-1-2) General laboratory safety rules for students (conti.)

- 5) Perform only those experiments authorized by your teacher. Carefully follow all instructions, both written and oral. Unauthorized experiments are not allowed.
- 6) Perform only those experiments authorized by your teacher. Carefully follow all instructions, both written and oral. Unauthorized experiments are not allowed.
- 7) Do not use laboratory glassware as containers for food or beverages.
- 8) Be prepared for your work in the laboratory. Read all procedures thoroughly before entering the lab. Never fool around in the laboratory.

2-1-2) General laboratory safety rules for students (conti.)

- 9) Always work in a **well-ventilated area**.
- 10) Use good housekeeping practices. **Keep work area neat** and free of unnecessary materials.
- 11) Be alert and proceed with caution at all times in the laboratory. Notify the teacher **immediately** of any unsafe conditions you observe.
- 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.

2-1-2) General laboratory safety rules for students (conti.)

- 14) Experiments must be personally monitored at all times. Do not wander around the room, distract other learners 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 during a laboratory period; containers must be closed, and any electrical equipment turned off.

2-1-2) General laboratory safety rules for students (conti.)

- 17) Never leave a bunsen flame unattended. When the flame is not being used, close off the air inlet when you complete your work.
- 18) Be very careful with sharp objects like dissecting scalpels, needles and razor blades. When doing dissections with scalpels, always cut down and away from yourself.
- 19) Clean all work area and equipment at the end of the experiment.

Activity 2: Brainstorming (10 min)

“What are the safety ways of handling & using the followings?”

- ✓ **Chemicals**
 - ✓ **Electricity and light sources**
 - ✓ **Glass ware and equipment**
 - ✓ **Heating substances**
-
- Discuss in pairs (5 min)
 - Share ideas in whole-group (5 min)

2-2) Handling and Using Chemicals

- Avoid handling chemicals with fingers.
- Check the label on all chemical bottles TWICE.
- Put labels on any container (e.g. test tubes, beakers, etc.) to make sure what they are.



- **Never** return unused chemicals to their original container
- Always pour **acid into water**.

2-3) Handling Electricity & Light Sources

- Make sure hands are dry when working with electric circuits.
- Avoid touching a live circuit with both hands.
- When pulling electric plugs out of sockets, grasp the plug, not the cord.
- Never look directly at a bright light source.

2-4) Handling Glassware and Equipment

- **Never** handle broken glass with your bare hands. Use a brush and dustpan (ቆሻሻ ማፈሻ) to clean up broken



- Always **clean** glassware before you use it to be sure that residues are cleaned away.
- Do not immerse **hot** glassware in **cold** water. The glassware may shatter.
- Prevent breakage and spills by making sure glass equipment is well-supported.

2-5) Heating Substances

- When using heat sources, take care your hair, clothing and hands are at a safe distance from heat source.
- When heating or mixing substances in test tubes, make sure that the mouth of the test tube is pointed away from yourself and students. Heat test tubes gently, moving them through the flame.



2-5) Heating Substances (conti.)

- Do not place hot apparatuses directly on the laboratory desk. Use bricks or clay materials.

Activity 3: Brainstorming (10 min)

“What are the measures taken when accidents occur?”

“What are the safety ways of heating substances and disposing wastes?”

- Discuss in pairs (5 min)
- Share ideas in whole-group (5 min)

2-6) Accidents and injuries

- If a chemical splash in your eye(s) or on your skin, **immediately** wash with plenty water for at least 20 minutes.
- If you get burnt by heat sources or heated materials, **immediately** make the burnt part of body with cold water for 20 min.



- Let all your students report to any accidents or injuries immediately.
- In case your students meet the same accidents, help them to take the same measures.

2-7) Handling and disposal of wastes after experiments

At the end of the class, the teachers should collect all the used materials, such as laboratory apparatuses, specimens and chemicals. The used chemicals should be treated and disposed of in a safe manner.

2-7) Handling and disposal of wastes after experiments (conti.)

- For the waste fluid of acid and base, it is recommended to treat it immediately after the class. The steps of the disposal are:
 - 1) First, confirm that there is no danger in mixing one to the other.
 - 2) Second, add one solution (for example, the acid solution) to the other (basic solution) **little by little**, by taking care of heat to be generated. You will continue adding the solution until **the value of the power of hydrogen (pH) became approximately 7**, by using blue and red litmus paper.

2-7) Handling and disposal of wastes after experiments (conti.)

- 3) If there is any precipitate made by the neutralization, **sediment it** completely and dispose only the neutralized layer of fluid above sediment. The sediments can be disposed as a general waste.

2-7) Handling and disposal of wastes after experiments (conti.)

- If you do not treat the acid and basic waste fluid immediately after the class, prepare proper containers with labels for acid and basic solution respectively, and keep them in a safe place until the proper treatment is done.
- Prepare a separate bin for broken glass or glass disposal containers (not in regular garbage).
- Note that the schools should inquire from or follow the rules and regulations of the responsible institutions when the disposal of the expired chemicals is needed.

2-8) After experiment

After the experiment, the teachers have to make sure that:

- Laboratory apparatuses and equipment should be cleaned and **returned to the designated places**.
- The lids of all chemical containers as well as disposal containers should be **closed**;
- Water taps should be **closed**;
- The main tap of gas cylinder should be **closed**;
- All electric equipment should be **switched off and/or unplugged**.

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Thank you!!