



**O'LEVEL CHEMISTRY SEMINAR HELD ON 22ND-JUNE-2024 ORGANISED BY MEBU EXAMINATIONS
CONSULT AT LONDON COLLEGE OF ST.LAWRENCE MAYA**

SECTION A

Attempt all items in this Section

1. An agribusiness company in Uganda organized a washing competition which was held in Walukuba division, Jinja district in order to evaluate its products. Two ladies were each provided with a full jerry can of bore hole water, a basin and a stained cloth. One lady was provided with detergent **A** another with detergent **B**. Mrs. Menha, the usual annual winner of the competitions used detergent **A** to clean the cloth but it remained with some dirty marks even after rinsing it several times. Mrs. Kirunda used detergent **B** and won the race as she cleaned the cloth with one rinse. Mrs Menha was frustrated and could not understand what went wrong this time round.

Task;

- a) As a chemistry learner,
 - i. Explain categories of products, **A** and **B** used by the two ladies.
 - ii. Help Mrs. Menha to understand how the product works.
 - b) Advise the two ladies on the challenges associated with the use of the products.
2. Peter's father died before completing the construction of their house. Mainly doors and windows are missing, so Peter is in the process of making good and strong window and door frames for this house without affecting the environment. He is aware that there are various materials on the market for making window and door frames. He also knows that in order for one to produce good quality frames and windows; he should select the right material with suitable qualities and properties. However, he is still confused with the choice and has approached you for some advice.

Task;

Use your chemistry knowledge to:

- a) Explain
 - i. The categories of the materials.
 - ii. The suitability of the materials.
- b) Advise Peter on the choice of the materials.

SECTION B

Part One

Attempt one item from this Part.

3. Of recent, the prices of iron nails and bars have abnormally increased. This is due to low production of iron all over the world. **Uganda Builders' Forum** has raised its concern to the government about the high prices of iron nails and bars. Due to this, the government has contracted a local investor to produce iron locally so that affordable nails and bars can be made.

The investor plans to set an iron production plant in one of the villages in Kisoro due to the availability of iron ore.

However, the locals are worried of the environment impacts of the plant and their valuable land.

The locals also do not know how iron will be obtained from its ore. As a result, the District Development Officer has organized a sensitization workshop and has invited both the investor and local representatives.

Task;

As a chemistry learner, write a brief message that you will deliver during the workshop.

4. People in most remote villages of Uganda often suffer from scarcity of some synthetic products. Sometimes their only available suppliers hike prices for these products. A women's group in Kigaragara village, Isingiro district is planning to manufacture a soapy detergent as a new business project to reduce on their expenses and to increase their annual gross sales. The group is planning to set up a soapy detergent production plant with minimal environmental concerns in this village.

Some locals of this village are also complaining that their valuable land is about to be taken up by these women in order to set up their production plant. However, the science club members in your school would like to know how the process of production will be carried out.

The head of science club has appointed you to sensitize the club members.

Task;

Prepare a write up that you will use during the presentation.

PART TWO

Attempt one item from this Part.

5. Due to increase in population in Buikwe District, many natural forests have been cleared to provide charcoal for use as fuel and natural swamps have reclaimed to create space for settlement. These happenings have left the district officials wondering.

As a result, the government through the district officials is planning to create awareness to the people in Buikwe District through sensitization workshops organized in different village.

Task;

As a chemistry learner, prepare a short presentation that you will deliver during the workshop when invited.

6. Kachumbala, a rocky region in Bukedea district is developing at a fast pace. There are many trading Centre's that have been established. Many swamps and forests have been reclaimed and filled with new buildings. Stone quarrying is the order of the day. Recently both the vegetation and wells have started drying up, and yet the little water that is available is not fresh. The few residents that practice crop husbandry also say that seasons have left many residents wondering.

A sensitization workshop is to be organza by the chairman through the village environment management committee.

Task;

As a learner of chemistry, present the message you will share when called upon.

SAMPLE PAPER

SET 2

SECTION A

Attempt all items in this Section

1. Mebra opened up a new restaurant in one of the trading Centre's in Mpigi. Her restaurant often receives many customers during lunch time, because of the good taste of the food she serves. While the other restaurant owners in the same locality often receive very few or no customers at all. This has created jealousy resulting into regular quarrels between Mebra and the other restaurant owners.

The local council chairperson of the area understands the cause of the quarrels is the ingredients the restaurant owner's use.

As a result, the chairperson of the area has scheduled a meeting to solve the issues at hand.

Task;

As chemistry learner, write down a short message you would deliver if you were invited to the meeting.

In your message,

- a) Categories the ingredients.
 - b) Explain the suitability of the ingredients.
 - c) Advise the restaurant owners on the use of the ingredients.
2. A political party is trying to devise ways of gathering support from the masses. Recently it cleared a group of youths in Iganga town to setup a bakery. However, the officials have cautioned the youths to use sustainable and environmentally friendly packaging materials for their bakery products.

As a result, the youths have organized a meeting to discuss possible alternative packaging materials.

Task;

As a chemistry learner, write a short message you would deliver to the youths upon invitation, in your message:

- a) Explain
 - i. Categories of materials.
 - ii. The suitability of the materials.
- b) Advise the youths on the choice of the materials.

SECTION B

Part One

Attempt One Item From This Part.

3. A soap manufacturing plant uses sodium hydroxide as one of the chief raw materials in the production process. To ensure that sodium hydroxide is readily available and at a cheaper cost, the manager is planning to set up a sodium unfortunately, the residents have raised concerns about its environmental effects and their valuable land about to be taken by the investor.

The science club in your school is also wondering how the production process of sodium hydroxide will be carried out.

As a result, the chairperson of the club has appointed you to make a presentation to be published in one of the local newspaper.

Task;

As a chemistry learner, prepare a brief message that you will use during the presentation.

4. Fertilizers are added often added to boost soil productivity. One such fertilizer is ammonia nitrate which is often imported at higher costs. To boost the local production of ammonium nitrate, government recently cleared bloom Uganda limited to set up ammonium nitrate production plant in one of the villages in Kotido district with minimal environment impact.

The locals however, don't know how the process of production will be carried out.

As a result, a radio talk show has been organized in one of the local radio stations by the government to sensitize the locals.

Task;

Prepare a presentation you will make during the talk show if you were invited.

Part Two

Attempt one item from this Part

5. Natural resources have been destroyed as a result of increasing population and human activities. This has attracted the attention of the officials from the National Environment Management Authority (**NEMA**).

The officials are planning to create awareness to the people of the country through sensitization workshops organized in different district communities.

Task;

As a chemistry learner, prepare a short presentation you will deliver during the workshop upon invitation.

6. Petta village in Tororo district is development at a rapid pace. Many of the recently existing swamps and forests are now filled with buildings. Stone quarrying is the order of the day among most the locals in the village. Recently the wells have started drying up and yet the little water available is not fresh. The few residents that practice crop husbandry also say that seasons have changed and this has caused famine in the area. All these happenings have left many of the residents wondering why. A sensitization workshop is to be organized in the district by the government through National Environment Management Authority (**NEMA**).

Task;

As chemistry learner, prepare a brief presentation you will deliver in upon invitation.



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ASSESSMENT GUIDE

Attempt All Items in This Section

1. PROPOSED RESPONSE FOR ITEM ONE

- a) As a chemistry learner,
- Explain categories of products, A and B used by the two ladies.
 - Mr's Menha used soapy detergent A while Mrs. Kirunda used soapless detergent B.**
 - Help Mrs. Menha to understand how the product works.
 - Soap molecule consists of hydrophilic and hydrophobic parts. Hydrophilic parts dissolves in water but hates dirt while hydrophobic part dissolves in the dirt but hates water.**
 - During washing, the surface tension between dirt and water is lowered. On agitation, the dirt is removed.**
- b) Advise the two ladies on the challenges associated with the use of the products.
- Soap contains chemicals that cause skin burns hence pain. This can be mitigated by thorough washing of the affected area with plenty of clean water.**

OR

- Soap contains chemicals that cause eye redness and pain, hence loss of vision. This can be mitigated by thorough washing of the affected area with plenty of clean water.**

Evaluation

Similarity: both are effective cleansing agents in soft water.

Difference; Detergent A is biodegradable while detergent R

B is non-biodegradable in the environment.

2. Proposed response for item two

- i) The categories of the materials.

Synthetic material: made by man: example aluminium

ii) The suitability of the materials.

- **Strong**
- **Bright appearance**
- **Durable**
- **High heat conductivity**

b. Advise Wig on the choice of the materials.

- **Aluminium depletes soil fertility when it accumulates in the soil and this can be mitigated by recycling.**

SECTION B

Part One

Attempt one item from this Part

3. Proposed response for item three

As a chemistry learner, write a brief message that you will deliver during the workshop.

- Raw materials; Ore (haematite), coke and limestone.
- Process of production
- Haematite, coke and limestone are fed into a blast furnace from the top. Hot air is blown from the bottom of the furnace.
- Coke is oxidized by hot air forming carbon dioxide. The carbon formed reacts with unreacted (excess) coke reducing it to carbon monoxide. Carbon monoxide reduces haematite to molten iron and carbon dioxide given off in the process.
- Limestone decomposes to calcium oxide and carbon dioxide. The calcium oxide formed reacts with silicon dioxide, which is an impurity, forming calcium silicate that is tapped off.
- Side effects and mitigation
- Hot surface burns causing wounds hence pain to workers and this can be mitigated by proper use of required personal protective equipment.
- Social benefits
- Employment opportunities: increased income among residents hence improved standards of living.

4. Proposed response for item four

Task

Prepare a write up that you will use during the presentation.

Raw materials;

- Vegetable oil (animal fat) and concentrated sodium hydroxide solution.

PROCESS OF PRODUCTION

- A mixture of vegetable oil or animal fat and concentrated sodium hydroxide solution is boiled while stirring until no more reaction occurs in a boiler (plastic container). The resultant soap solution is cooled. Concentrated sodium chloride solution is added to soap solution to precipitate out the soap.

Soap floats and it is skimmed off.

Additives like perfumes and dyes may now be added.

Soap is baked into desired bars and it is stored.

- ❖ Hot surface burns during the boiling process causing wounds hence pain to workers and this can be mitigated by proper use of required personal protective equipment.
- ❖ Social benefits
- ❖ Employment opportunities; increased income among residents hence improved standards of living.

Part One

Attempt One Item From This Part.

5. Proposed response for item five

Task

As a chemistry learner, prepare a short presentation that you will deliver during the workshop when invited.

CATEGORY OF THE NATURAL RESOURCES

They are classified as:

- Renewable Natural resources; can be replenished example Air, trees
- Non-renewable resources; cannot be replenished example.

COMPOSITION NATURAL RESOURCE ON THE ENVIRONMENT;

(Select only one from above examples you have stated)

Air; contains Nitrogen gas, Oxygen gas, Carbon dioxide gas, rare gases, water vapour.

IMPACT OF THE NATURAL RESOURCE IN THE ENVIRONMENT;

(Only one explained point with its mitigation is required)

AIR;

- When carbon dioxide levels in air increase, being a greenhouse gas, it traps heat in the atmosphere leading to global warming.
- Mitigation: increased Afforestation to replace the cut trees which absorb carbon dioxide from the atmosphere to reduce global warming.

BENEFITS OF THE NATURAL RESOURCE

(Only one explained point required)

Air;

- Contains carbon dioxide that facilitates photosynthesis in green plants.
 - During photosynthesis, carbon dioxide from air combines with water in presence of sunlight trapped by chlorophyll to form glucose, oxygen and energy.
6. Propose response for item six

As learner of chemistry, present the message you will share when called upon.

CATEGORY OF THE NATURAL RESOURCES

They are classified as:

Renewable Natural resources; cannot replenished example Air, Water, Trees

Non-renewable resources; cannot be replenished example, Fossil fuels, rocks

COMPOSITION OF THE NATURAL RESOURCE.

(Select only one from above examples you have stated)

Air; contains Nitrogen, Oxygen, carbon dioxide, rare gases, water vapour.

Water; contain Hydrogen and oxygen atoms.

Fossil fuels contain carbon, hydrogen, oxygen atoms.

Rocks; contain minerals for example limestone, iron, Gold, Copper, Quarts.

IMPACT OF THE NATURAL RESOURCE ON THE ENVIRONMENT

(Only one explained point with its mitigation is required)

AIR;

- When carbon dioxide levels in air increase, being a greenhouse gas, it traps heat in the atmosphere leading to global warming.
- Mitigation: increase Afforestation to replace the cut trees which absorb carbon dioxide from the atmosphere to reduce global warming.

WATER;

- It has dissolved oxygen which facilitates rusting of iron containing materials since water and oxygen are necessary for iron materials to rust;
- Mitigation; Use of Alloys, painting, galvanizing to reduce the effect of rusting.

ASSESSMENT

PAPER NO. 2

SECTION A

Attempt all items in this section

1. Proposed response for item one

Item about masaka youth with a bakery.

Basis of assessment;

- i) category +, Reason +, Example

Assessment criteria

- Materials can be natural or synthetic.
- Natural materials are God made, exist in nature, its formation is not influenced by man

Examples includes: rocks, sand, wood, paper, water. Air.

- Artificial/synthetic materials are man-made.
- Examples include iron bars, plastics, concrete.

- iii) Properties of materials

Plastics

- Water proof
- Resistant to chemical/weather attack
- Very strong/high tensile strength
- Tough/hard
- Light
- Durable/long lasting/do not rust
- Poor conductor of heat/electricity
- Easily moulded into different shapes and sizes

Paper

- Lightweight
- Cheap
- Poor conductor of electricity
- Easily moulded ointo different shape and sizes
- Tears easily
- Poor weather resistance
- Recyclable

c) Advise On Use Part 1: Reason For Use

- Plastics are water proof and thus, more appropriate for use in making packaging materials since the juice will the products will not be affected by water, this also makes them long lasting.
- Plastics are light and thus, more appropriate for use in making packaging materials since this facilitates easy carrying of the packed products.
- Paper is biodegradable and thus, cannot pollute the environment.
- Paper is made from renewable resources(trees) which can be replenished naturally
- Papers are light and thus, more appropriate for use in making packaging materials since this facilitates easy carrying of the packed products.

PART 2: IMPACTS OF MATERIAL IN THE ENVIRONMENT + MITIGATION

- Plastics are non-biodegradable/don't decompose hence, pollute the soil and water. This lowers soil productivity. Chlorinated plastics release harmful chemicals into the soil and hence, into the groundwater. This can be mitigated through recycling/reducing its usage/use biodegradable plastics.
- Paper in landfills litters the environment and affects the surrounding ecosystems. And when combined with other piled wastes, they decompose and produce unhealthy amounts of greenhouse gas and hence global warming. This can be mitigated by recycling/re-using it.
- Paper production contributes to deforestation, as trees are cut down to make wood pulp. This increase amounts of carbon dioxide in the atmosphere and hence global warming. This can be mitigated by planting trees that grow and mature so fast.

SECTION B

Part One

Attempt one item from this part.

2. Proposed response for item three.

As a chemistry learner, prepare a brief message that you will use during the presentation.

Raw material;

- Brine
- Graphite
- Mercury

Process of Sodium Hydroxide Production

- Brine is electrolyzed in an electrolytic cell having graphite anode and mercury cathode.
- During the process, chloride and hydroxide ions migrate to the anode.

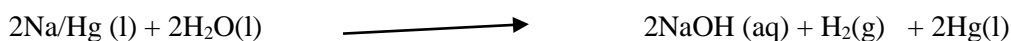
Chloride ions are preferentially discharged by electron loss to form chlorine gas. This is due to its high concentration.



The chlorine formed is dried, liquefied and stored in tightly closed tanks.

- Sodium and hydrogen ions move to the cathode. Due to its high concentration, sodium ions are discharge in preference to hydrogen ions by electron gain to form sodium metal.
- The sodium metal dissolves (or combines with) in mercury to form sodium amalgam which is reacted (or dissolved in) with water to form sodium hydroxide solution, hydrogen and mercury. Mercury is fed back into the cell for re-use as the cathode.

Equations are:



- The sodium hydroxide solution is evaporated to dryness to molten sodium hydroxide and cooled form solid sodium hydroxide.

Negative Effects of Sodium Hydroxide Plant on the Environment

- Mercury poisoning. Exposure to inhalation of mercury can result into damage to the nervous system, kidneys, liver and immune system. This may result into cancer and hence death.

This can be mitigated by posting hazard and warning information in the working are/commuting all information on the health and safety hazards of mercury to potentially exposed persons.

- Air pollution by waste gases/fumes. Waste acidic gases/fumes can cause acid rain which leads to crumbing of buildings, bridges, lowering of soil PH/low crop production/soil productivity etc.

This can have mitigated by encouraging the production and use of renewable energy instead of fossil fuels, fitting scrubbers in exhaust pipes of machines to neutralize the acidic gases/ fumes, fitting catalytic converters to convert oxides of nitrogen to etc.