

NAME.....

SCHOOL.....

S.2
CHEMISTRY
PAPER 1
SARB EXAMS
NOV/DEC 2024
2 HOURS

SESEMAT MBARARA REGION
2024 END OF YEAR SARB EXAMINATIONS
NEW LOWER SECONDARY CURRICULUM

S.2 CHEMISTRY PAPER 1

TIME: 2 HOURS

INSTRUCTIONS:

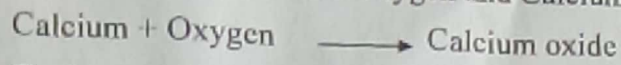
- This paper consists of two sections A and B. It has four examination items.
- Section A has two compulsory items
- Section B has two compulsory items; Answer each question on a fresh page on the answer sheets provided.

SECTION A

Answer all questions in this section

ITEM 1

Calcium oxide is one of the components used in the manufacture of acid neutralizers. Calcium oxide can be prepared in the laboratory from the reaction between calcium and oxygen, which are some of the elements in the periodic table. (The atomic numbers of Oxygen and Calcium are 8 and 20 respectively)



Task ;

As a learner of chemistry

- a) Identify the categories of the elements used in the formation of calcium oxide, with reason and example.

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- b) Explain;

- (i) four properties of any one element mentioned in (a) above

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- (ii) Any other use(s) of the elements

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- c) Explain the impact of one the elements on the environment and how the impact can be overcome.

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ITEM 2

A local entrepreneur in Kisoro town wants to start a factory of an energy drink but wants to use packaging that is environmental friendly. There are different materials of various quality and properties on the market.



The manager of the factory has approached you to guide him on the choice of the materials.

TASK

As a learner of chemistry;

- a) Identify the category of the materials used, with reason and example

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- b) Explain the;

- i) Properties of any one material named

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- ii) Use(s) of the material

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- c) Advise him on the impact of the material on the environment and how it can be overcome.

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SECTION B.

Answer both items in this section

PART 1

ITEM 3

Agri Rich manufacturers is a company which specializes in production of high quality plant nitrogen based fertilizers. Nitrogen gas the most abundant component of air is important in the production process. Currently the company is facing unstable nitrogen supplies. They are now seeking for guidance on how to establish an industrial nitrogen production facility without endangering the environment.



TASK:

As a learner of chemistry, write a message that will provide the company with information that will enable them establish the facility. (Include the following in your message; process of production with raw materials, side effects and the benefits of the process).

Part II

ITEM 4

River Nyamwamba is located in Kasese district in western Uganda. People around the river survive on crop husbandry, animal husbandry, sand mining, brick making and charcoal burning. Recently the water levels have drastically reduced and even the little water available is not fresh. The fish and other animals are dying while crops are drying up. These happenings have left the local authorities worried.



The chairperson of the village has called for a meeting to sensitize the community on the existing situation around the river.

TASK

As a learner of chemistry, make a write up you would present when invited in the meeting. *(In your response include category of natural resources, composition, impact on the resource and the benefit).*

END

ITEM ①

(a)

Category: Metals such as Calcium because Calcium forms a positive ion by loss of electrons from its outermost shell or Calcium belongs to group (II) Since it has two electrons in its outermost shell 2, 8, 2.

Non-metals such as Oxygen because oxygen forms a negatively charged ion by gain of (2) electrons into the outermost energy level or belongs to group (VI) of the Periodic Table Since it has six electrons in the outermost shell, 2, 6.

②

For any one category identified

- b (i) Calcium is a hard metal and strong
Has a high density, solid at room temp
Has a high melting point (or boiling point)
Conducts heat and electricity.
Calcium is malleable

or Oxygen is a colourless gas at room temperature
Poor conductor of electricity
Has low melting point (or boiling point)
Has a low density

For 4 properties and 1 use give 3 marks

- (ii) Calcium is used in manufacture of Calcium-based fertilizers, water treatment
Calcium compound such as calcium carbonate or calcium oxide is used in making cement
Calcium-aluminium alloys are used to make overhead power lines
Calcium salts are used in electroplating processes, etc.

①

any one

or Oxygen is used for respiration, welding and cutting of hard metals

(c)

Calcium makes water ~~hard~~ This can be mitigated by boiling water.
Calcium oxide or hydroxide increases ^{any one impact} the pH of ^{its mitigation} the soil hence reducing the soil productivity.
This can be overcome by neutralising the basic compounds using acids.

②

X/8

S. 2 GESEMAT Chemistry '24 ITEM 2 SCORING GUIDE

BASIS OF ASSESSMENT	CRITERIA OF ASSESSMENT	SCORE
CATEGORY OF THE MATERIAL	<p>A material is a substance or a mixture of substances that constitute an object. It can be natural or artificial.</p> <ul style="list-style-type: none">• <u>Natural materials exist in nature</u> (God made) and their formation is not influenced by man e.g. <u>wood, soil</u>• Artificial materials are man-made (synthetically manufactured by man) e.g. plastics, iron bars. <p>Plastics are further divided into thermoplastics and thermosetting plastics.</p> <p>Thermoplastics soften when melted and can be reshaped e.g. nylon, Teflon...</p> <p>Thermosetting decompose when heated and are not remoulded e.g. rubber, melamine.</p>	(03)
PROPERTIES OF THE MATERIAL	<p>Materials (Plastic bottles) to be used for packaging should have the suitable properties;</p> <p>Plastics are;</p> <ul style="list-style-type: none">- Light in weight and can be easily transported.- They are chemically stable and do not corrode hence last long.- Are easily moulded into different shapes and sizes hence different attractive shapes.- They are strong and ductile hence last long- They have good transparency	for the and give

USES OF THE MATERIAL

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- Polyethylene is used in making plastic bottles, polythene bags, cables, toys and houseware.
- Bakelite is used in making electrical insulators, radio casings, crates.
- Polyvinyl chloride is used in making pipes, bottles, electrical cables.
- Nylon is used in making ropes, clothing, tarpaulins, thread.
- Polyethylene; for packaging film, garbage bags, bottles.

IMPACT OF MATERIAL TO THE ENVIRONMENT

The materials/plastics used in the packaging have an impact to the environment.

- The plastics are non-biodegradable and therefore they accumulate damaging the soil, can poison ground water and can cause serious health impacts.

~~People~~ Mitigation;

Alternative packaging degradable materials should be used. ^{any one time and use}

- People working in factories producing the plastics are exposed to fumes resulting into health issues.

Mitigation; use of proper personal protective gears like masks...

X/8

BASIS OF ASSESSMENT	CRITERIA OF ASSESSMENT	SCORE
RAW MATERIAL	Air / Liquid air	
PROCESS OF PRODUCTION	<p>Air is passed through filters to remove dust and smoke particles.</p> <p>Air is passed through concentrated sodium/potassium hydroxide solution to absorb/remove carbon dioxide which is acidic.</p> $2\text{NaOH(aq)} + \text{CO}_2\text{(g)} \rightarrow \text{Na}_2\text{CO}_3\text{(aq)} + \text{H}_2\text{O(l)}$ <p>The remaining air is now passed through silicon (IV) oxide or silica gel to absorb water vapour. Carbon dioxide and water vapour are removed from air before it is liquefied because they solidify and block the apparatus.</p> <p>The air is now compressed at 200 atmospheres and allowed to cool by making it escape into a large space through a jet. The process of cooling is repeated several times to obtain liquid air at about -200°C.</p> <p>The liquid air is fractionally distilled using a fractionating column tower.</p> <p>Nitrogen boils off first because it has a lower boiling point (-196°C) leaving behind oxygen with a higher boiling point (-183°C).</p> <p>The obtained nitrogen is redistilled and pure nitrogen is stored under pressure in steel cylinders.</p>	<p>3 scores for raw material and process</p>

SIDE EFFECTS
OF THE
PROCESS OF
PRODUCTION
AND MITIGATION

(a) Air pollution by waste gases. Acidic gases can cause acid rain which leads to crumbling of buildings, lowering of soil pH and corrosion of roofs made of iron.

Mitigation can be done by;

- fitting catalytic converters in exhaust pipes of machines to convert oxides of nitrogen into nitrogen and carbon monoxide to carbon dioxide.
- Neutralise the acidic gases before releasing waste gases into the atmosphere

03 marks
Side effect explained and mitigated

(b) Exposure to liquid nitrogen can cause skin burns and eye damage which may cause cancer and loss of vision.

This can be mitigated by;

- Posting hazard and warning information in the working area.
- Communicating all information on the health and safety hazards of nitrogen to potentially exposed workers for example submerging the affected body parts in warm water.
- putting on gas masks

SOCIAL
BENEFITS

- Employment opportunity which improves income thus better standards of living.
- Development of infrastructure e.g roads, and churches, electricity lines, schools, improved road network will facilitate trade hence improved income and better standards of living.

03

leading to
increased
service
delivery

X/9

BASIS OF ASSESSMENT	CRITERIA OF ASSESSMENT	SCORE
IDENTITY OF CATEGORY OF NATURAL RESOURCE, REASON AND EXAMPLE	<p>Natural resources are classified as;</p> <ul style="list-style-type: none"> Renewable and Non-renewable. Renewable natural resources can be replenished to replace the depleted portion e.g. air, water. Non renewable resources can not be replenished and get used up e.g. fossil fuels, rocks & minerals. 	<p>03 score for category and composition of the resource</p>
COMPOSITION OF NATURAL RESOURCE	<p>⇒ Air contains Nitrogen, Oxygen, Carbon dioxide, rare gases, dust, water vapour.</p> <p>⇒ Water is chemically composed of hydrogen and oxygen. Water also contains living organisms, dissolved gases, dissolved minerals</p>	
IMPACT OF NATURAL RESOURCE ON THE ENVIRONMENT AND HOW IT OCCURS AND MITIGATION	<p>Air; Some components of air pollute the environment and cause global warming. When burning charcoal, Carbon dioxide is produced which is a greenhouse gas thus traps heat in the atmosphere.</p> $C(s) + O_2(g) \rightarrow CO_2(g)$ <p>Carbon monoxide is also formed during charcoal burning. Carbon monoxide is a poisonous gas and causes suffocation. This can also be converted to Carbon dioxide.</p> $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$	<p>Any one in explained and mitigation 03 score</p>

Mitigation;

Increased afforestation to replace the cut trees which absorb carbon dioxide from the atmosphere to reduce global warming.

Water;

- Farming involves the use of fertilizers and manure which pollutes water bodies and makes the water unsafe for use.

- Animal husbandry causes water pollution through excreta.

Mitigation;

• Sensitize farmers to use controlled doses of fertilizers and manure in gardens.

• People should ensure proper disposal of animal excreta and also convert it into other useful products like biogas, organic fertilizers and briquettes.

**BENEFIT/
IMPORTANCE
OF NATURAL
RESOURCE**

- Air is used for respiration where carbohydrates combine with oxygen in air to release energy and carbon dioxide for proper body functioning.

- Air facilitates photosynthesis, where the carbon dioxide combines with water in presence of sunlight to form glucose and oxygen.

- Water is a habitat for many aquatic organisms; rivers contain necessary conditions for survival of animals like fish, snails and plants like algae.

- Water from water bodies evaporates and eventually cools, condenses and forms ice

which falls back as rain

02 scores

any one benefit explain

X/8