

KAMSSA S.4 CHEMISTRY SCORING GUIDE

NO1(a)

(i)

Nonrenewable fuel; because it takes long to replenish an example; wood charcoal.

Total score =03

Identify of the category with reason and example = 03

Identify of the category and reason/ identify with example = 02

Identify only or example only=01

No identify, no example, wrong identification=00

(ii)

Wood charcoal is made up of carbon.

Any two component = 02

Any one component =01

Wrong/No =00 (Total score = 02)

(b)

- Global warming hence climate as a result of high levels of carbon dioxide produced combustions of wood charcoal in excess.

This can be mitigated by;

- Used of renewable fuels,
- Reduced combustion.

Suffocation and death of animals due to toxic fumes (incomplete combustion leading to carbon monoxide)

Any one impact, how it occurs but no its mitigation=03

Any one impact or mitigation or how it occurs=01

No impact how it occurs =00

(c)

- Wood charcoal is used in gas masks to absorb toxic gases
- Wood charcoal is used as a fuel for cooking
- Used as drug (Total score =01)

One benefit of the natural resource =01

No benefit of the natural resource = 00 (wrong benefits)

ITEM 2

S/N	Basis of Assessment	Assessment Criteria	Scoring
A	CATEGORY OF ELEMENT COMPOUND. (substance and material with a reason)	A material is substance or a mixture of substance that constitute an object. It can be natural or artificial. Natural material is God made/exist in nature and its formation is not influenced by man e.g rocks, sand, wood, water, soil etc Artificial material is manmade/ synthetic	03

		manufactured by man e.g iron bars, plastics, paint, composites.	
B	PROSPERITIES OR PREDICTION OF THE PROPERTIES OF MATERIAL.	<p>Materials to be used for construction a good strong house have different qualities based on their nature. A house is made up of the following:</p> <ul style="list-style-type: none"> • Very strong (can support heavy load) • Has high tensile strength (resists breakage) • Its ductile and malleable (easy to mould) • Has high melting point (resists fire) • Galvanized iron resist rusting. • Steel has improved properties, making it suitable for many users <ul style="list-style-type: none"> • Low density (used on top of buildings) • Strong, not easy to break/durable • Has high melting points (resists fires) • Has bright appearance (used for doors, roofing, window frame) • High electrical/ heat conductivity (making utensils) <ul style="list-style-type: none"> • Readily available so easy to get cheaply • Strong, so it can support heavy load. • Light when dry so good for roofing • Easy to smoothen to give nice appearance • Can rot or be eaten by termites when not treated <p>Composite made of cement, sand and water</p> <ul style="list-style-type: none"> • Hard so reacts deformation • It is adhesive so can join bricks • Cushioning to spread the vertical load 	03
		<ul style="list-style-type: none"> • Ordinary glass is transparent so good for windows to see through. • Tinted glass allows light to pass through it in only one direction so good for 	

windows (visual security)

- Double-glazed glass (tampered glass) is strong, resistant to fire attack and it not brittle.
- Glass is reflective, attractive and it adds value when put in doors and windows

This is a liquid composite made of pigment, resin, solvent and additives.

- Weather guard resist bad weather (water proof). So good for outside walls
- Silk vinyl paint does not burn so good for interior purposes
- Paint can be insect repelling light sensitive to beautify, protect walls.

03

- These are man- made polymers which can undergo permanent deformation without breaking when subjected to a strong force. E.g. PVC, Polyethene, Nylon, Polyesters.
- They are flexible so can be bent easily.
- They are water prone so a good for plumbing and roofing
- They are light and strong, so good shuttering purposes
- They have low melting points so can be attacked by fires easily
- They are brittle so break easily.
- They are water proof so good for flooring.
- They are good looking, so nice for finishing purpose like floors, walls.
- They cannot be attacked by chemicals.
- Resistant to fire so good for wall construction.
- They are strong, so can support heavy loads.

	<p>USES OF MATERIALS, ELEMENTS OR SUBSTANCES/ APPLICATION. (Quantity of matter i.e Moles)</p>	<p>The choice of material for construction is dependent on the purpose it is meant to do and its impact to the environment.</p> <p>(a) Iron;</p> <ul style="list-style-type: none"> • Making shutter for doors, windows • Making frames for doors windows • Reinforcing concrete • Iron used to fix/join objects like timber, iron sheets. • Used for plumbing. <p>(b) Aluminium;</p> <ul style="list-style-type: none"> • Making shutter for doors, and windows. • Making frames for doors and windows • Reinforcing concrete • Making roofing materials (struts and ties) • Electrical installations, wires. <p>(c) Wood</p> <ul style="list-style-type: none"> • Use to make shutters for windows, door • Making frames for doors, windows. • Making struts and ties during roofing. • Making poles, pillars and beams. <p>(d) Mortar</p> <ul style="list-style-type: none"> • Joining and blinding bricks • Making concrete for floors • Plastering walls <p>(e) Glass;</p> <ul style="list-style-type: none"> • Making shutters for doors, windows <p>(f) Paint;</p> <ul style="list-style-type: none"> • Beautifying (better appearance) of buildings. • Protecting materials, from rusting. • Enhancing durability. <p>The choice of material for construction is dependent on the purpose it is meant to do and its impact to the environment.</p>	01
		<p>(g) Plastics;</p> <ul style="list-style-type: none"> • Making pipes (water pipes) for plumbing 	

		<ul style="list-style-type: none"> • Making door and window shutters. <p>(h) Clay and Ceramics;</p> <ul style="list-style-type: none"> • Making bricks • Making tiles (floor tiles). • Making roofing tiles <p>(i) Brick and blocks;</p> <ul style="list-style-type: none"> • Construction walls 	
	IMPACT/POLLUTION OF ENVIRONMENT ELEMENTS, COMPOUND MATERIAL/SUBSTANCE. (Quality of matter i.e moles)	Material used in construction of a house have impact to the environment. <p>(a) Iron</p> <ul style="list-style-type: none"> • Depletes soil fertility when it accumulates. • Being a heavy metal can cause cancer • Non-biodegradable. <p>(b) Aluminium;</p> <ul style="list-style-type: none"> • Depletes soil fertility when it accumulates. <p>(c) Plastic;</p> <ul style="list-style-type: none"> • Non-biodegradable spoils the soil. <p>(d) Mortar;</p> <ul style="list-style-type: none"> • Bulky, takes long to decompose and so spoil the soil. 	02

Response to ITEM Three

I greet you all;

I want to inform you about how ethanol is made on a large scale and its impact to society.

RAW MATERIALS

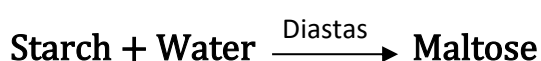
The raw materials for making ethanol include;

Source of carbohydrates like bananas

Millet

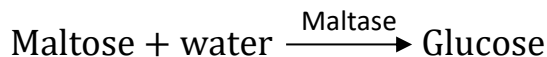
PROCESS OF PRODUCTION.

The bananas are covered after harvesting for about a week to ripen. The carbohydrates are covered into maltose by means of enzymes diastase.



The bananas are put in the metallic tank or wooden trough, then squeezed between grasses to extract the juice from them. The juice, is diluted by adding some water and then obtained from the mixture by filtration. Flour of germinated and roasted millet is added to the filtrate and mixture is stored. The mixture is then covered in a warm place to cut off oxygen supply to allow fermentation to take place.

Millet contains enzyme maltase that catalyzes the hydrolysis of maltose to glucose



Another enzyme zymase in millet flour catalyzes the decomposition of glucose to ethanol and carbon dioxide



The crude alcohol is then fractionally distilled to obtain pure ethanol

SIDE EFFECTS

- Over consumption of alcohol can lead to liver diseases i.e fatty liver (cirrhosis)

Mitigation: this can be overcome by reducing on the consumption of alcohol and seeking for medical attention for help.

- Burns from spills of ethanol during fractional distillation

Mitigation: By wearing protective gears like gumboots etc

SOCIAL BENEFIT

- Used making sterilizing agent and sanitizers because of its antimicrobial effect against bacterial, fungi and viruses preventing spread of diseases
- Used as fuel because it's flammable thus reducing on charcoal burning
- Used as solvent for paint and varnishes
- It's a beverage

BASIS OF ASSESSMENT		CRITERIA OF ASSESSMENT	SCORE
A	Raw materials	All raw material	02
		Any one raw material	01
		No raw material	00
B		Process of production with all V, cp, ch, pr	03
		Process of production with any three V, cp, ch, pr	03
		Process of production with any one of v, cp, ch, pr.	01
		No process of production	00
C	Side effect of the process of production and mitigation	Any one danger identified, explained and mitigated Any one danger identified and explained OR identified and mitigated OR explain and mitigated	03

		Any one danger identified OR explained OR mitigated	01
		No danger identified, explained or mitigated	00
D	Social benefits	Any one social identified, effect of the benefit and impact of the benefit	03
		Any one social benefit identified and effect of the benefit OR identified and impact of the benefit OR effect of the benefit and impact of the benefit	02
		Any one social benefit identified OR effect of the benefit OR impact of the benefit	01
		No social benefit identified	00

Item 4

AIR POLLUTION

Is the contamination of the atmosphere by addition of harmful substances that endangers its organism.

The substances that pollute air are called air pollutants

Pollutant	sources	Effect	Control measures
Carbon monoxide gas	Incomplete combustion of fossil fuels and lost	<ul style="list-style-type: none"> Low conciliation cause dizziness and headache High concentration interferes with O₂ temperature in the body which may cause death 	<ul style="list-style-type: none"> Avoid smoking Improving engines of vehicles to cause complete combustion of fossil fuels Banning discharge of fumes from vehicles in public
Sulphur dioxide gas	Combustion of Sulphur containing fuels like coal	<ul style="list-style-type: none"> Farms acid rain which decreases soil PH Causes lung diseases Cause irritation of eye surface Causes asthma 	<ul style="list-style-type: none"> Using Sulphur free fuels e.g natural gas Using absorbers of toxic fumes in vehicles
Carbon dioxide gas.	Motor exhaust fumes Deforestation Burning of fuel in factories	<ul style="list-style-type: none"> Causes global warming Causes headache and tiredness Causes acid rain 	<ul style="list-style-type: none"> Plantation more trees Using alternative sources of energy like electricity
Nitrogen	Motor vehicle	<ul style="list-style-type: none"> Cause acid rain 	<ul style="list-style-type: none"> Burning

dioxide and nitrogen monoxide	exhaust fumes Burning of fuel in factories	<ul style="list-style-type: none"> • Cause irritation of respiratory tubules e.g trachea. 	discharge of motor vehicles exhaust fumes in public. <ul style="list-style-type: none"> • Using absorbers and filters of toxic fumes in vehicles
Smoke	Tobacco smoking Motor vehicle exhausts Burning of fuel in homes	<ul style="list-style-type: none"> • Causes lung diseases • Blocks stomata reducing photosynthesis • Reduces vision in atmosphere 	<ul style="list-style-type: none"> • Use of smokeless fuels • Avoid smoking
Chlorofluorocarbons (CFCs)	Air conditions Refrigerators Aerosol (fog) propellants	<ul style="list-style-type: none"> • Reduces the ozone layer thus allowing U.V light to enter • The earth causing skin cancer 	Ban the use of CFCs.
Dust	Mining Quarrying Solid fuel ash	<ul style="list-style-type: none"> • Difficulty in breathing • Stomatal blockage • Lung diseases 	Installation of dust precipitates in industrial chimneys to solidify dust before it escapes to the atmosphere
Lead	Use of lead water pipes Combustion of leaded-petrol in vehicles engines	<ul style="list-style-type: none"> • Causes anaemia • Causes kidney failure • Damages children's brains • Damages the nervous system in adults 	<ul style="list-style-type: none"> • Using lead free petrol • Using plastic water pipes.

Item 5

(a) For part A

$$\text{Rmm of } (\text{NH}_4)_2\text{SO}_4 = (14 \times 2) + (1 \times 8) + 32 + (16 \times 4) = 132$$

$$\text{Percentage composition} = \frac{28}{132} \times 100$$

$$= 21.2\%$$

$$\text{Rmm of } \text{NH}_4\text{NC}_3 = (14 \times 2) + 4 + (16 \times 3) = 80$$

$$\text{Percentage} = \frac{28}{80} \times 100$$

$$= 35\%$$

The farmer should use ammonium nitrate since it contains a higher composition of nitrogen than ammonium sulphate

For part B

$$\text{Rmm of KNO}_3 = 39 + 14 + 16(3) = 101$$

$$\text{Percentage composition} = \frac{14}{101} \times 100 \\ = 13.9\%$$

$$\text{Rmm of Ca(NO}_3)_2 = 40 + (14 \times 2) + (16 \times 6) = 164$$

$$\text{Percentage composition} = \frac{28}{164} \times 100 \\ = 17.1\%$$

The former should be calcium nitrate since it has a higher composition of nitrogen than potassium nitrate

- (b) Nitrates dissolves in soil water making the soil acidic hence rendering it unfavourable for proper growth of crops which do not grow well in acidic soils

Excess nitrates dissolves and cause ground water contamination making it unfit for consumption by animals on farm

Excess nitrates undergo volatilization hence polluting the atmosphere.

TASK 6

(a) Raw- materials

Magnesium ribbon/magnesium

Dilute Sulphuric acid

Apparatus needed

Heat source, measuring cylinder, Filter funnel, Resorted stand, stirrer, filter paper, drilled water, glass beaker, Evaporating dish

Process of production

- Put a given volume of dilute Sulphuric acid into clean conical flask (warm it if magnesium is to be used)
- Add magnesium ribbon to the acid a little at a time while stirring until excess
- Filter the mixture to obtain magnesium sulphate solution in the filtrate and undissolved magnesium ribbon as the residue
- Heat the filtrate on an evaporating dish to saturate/ concentrate it.
- Cool the saturated solution for magnesium sulphate crystals to be formed
- Filter off the crystal, wash them with little cold distilled water and dry them by pressing them between filter papers or under sunlight

Magnesium + Sulphuric acid \longrightarrow magnesium

Or

Magnesium + Sulphuric acid \longrightarrow magnesium sulphate + water

This method of preparing magnesium sulphate is called crystallization since the salt is soluble in water

Side effect to the environment

Causes permanent hardness in water bodies

Mitigation

A void to the water bodies

b) Dangers of low magnesium in the body

- Low appetite
- Nausea
- Muscles spasms
- Abnormal heart rhythms