

SESEMAT MUKONO REGION

UGANDA LOWER SECONDARY CURRICULUM CERTIFICATE OF EDUCATION

COMPETENCE BASED CURRICULUM

CHEMISTRY PROPOSED MARKING GUIDE

SENIOR THREE

1.

<p>Award as follows;</p> <ul style="list-style-type: none"> ✓ Material (1 mark) ✓ Property (1 mark) ✓ Application (1 mark) <p>Application is NOT tied to the property</p>	<ul style="list-style-type: none"> ✓ Each learner response carries a max of 3 marks. ✓ Mark any 7 relevant responses (7 responses@3 marks) ✓ Maximum marks (20 marks)
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Expected responses

To build a permanent house, John will require the following building materials.

Material	Properties	Application	N
1. Iron sheet	High tensile strength; Not breakable; Not porous to water; Good malleability; Good ductility;	For roofing the house For making gutters For constructing concrete poles For making windows For making doors	
2. Concrete blocks / Burnt clay/ bricks	Very strong and hard Cannot be attacked by fire Easy to construct with Moderately durable Not easily breakable Not porous	For building the walls For building the foundation For making poles For laying the floor	
3. Plastics (Damp proof plastic)	Water proof Resistant to acids and bases They are light Poor conductor of heat and electricity Durable/ Non-biodegradable	Making water pipes, light fitting eg sockets, plugs and bulb holders Laying on the foundation Laying on timber before roofing Nail caps for roofing	

4. Wood	It is cheap Readily available Easily replaced Poor conductor of heat Hard and strong Water proof	For roofing the house For making windows and window frames For making doors and door frames For making the ceiling Act as ladders for standing on while building the walls and roofing For holding concrete while making floor and verandah
5. Soil/Sand	Readily available Cheap	For laying bricks on the wall For laying the foundation For making the ceiling For making the floor
6. Iron bar	High tensile strength; Not breakable; Not porous to water; Good malleability; Good ductility;	For making the beam For laying foundation For making concrete poles For reinforcing the walls For making windows For making doors For making the burglar proofs
7. Concrete	Low tensile strength; Not easily breakable; Not porous; Moderately durable; Not malleable; Not ductile;	For Laying the floor For making the verandah For making the poles or pillars For laying the foundations For making the beams
8. Cement	Strong, Adhesive, water proof when dry,	Making floor Making concrete Binding bricks Making the beam Plastering the walls
9. Stones	Hard Strong	Making concrete Making a strong foundation Making wall fences Making the beam
10. Water	Universal solvent	For mixing concrete For dissolving paint For moisturing concrete during setting For washing building tools

11. Paint	Adhesive Waterproof Attractive colour/ appearance Resistant to changes in temperature	For smoothening the walls For beautifying the house Prevent corrosion of metallic surfaces especially windows, doors, iron sheets	
12. Glass	Strong Resistant to fire Enough lighting in the house Little material required Not porous Easily breakable Low tensile strength	For fixing on the windows For fixing on the doors Act as mirrors in bathrooms and wash tabs	
13. Clay Tiles	Low tensile strength; Easily breakable; Not porous; Durable; Not malleable; Not ductile;	For roofing the house For laying the floor For making walls	

2.

- ✓ Any two(2) causes of the pain correctly stated, award 2 marks each (Max =4 marks)
- ✓ Any eight(8) correctly stated ways of reversing the pain, award 2 marks each (Max=16 marks)
- ✓ Total scores =20 marks
- ✓ Don't penalize learners for not giving the explanation on each application/way

Expected Responses

Causes of pain of bee stings

1. Bee stings release methanoic/formic acid into the skin, which cause intense pain and irritation. To relieve the pain and irritation alkaline substances are applied to neutralize the methanoic acid injected into the skin.
2. The swelling is due to allergic reaction occurring when the immune system is over-sensitized/ elicited to the bee venom and produces antibodies to it. The histamine and other substances are released into the blood stream causing blood vessels to dilate and tissues to swell.

The following can be done to reverse the effects of the bees stings;

3

1. Fresh onion has compounds that can breakdown the proteins in the bee venom
2. Apply ice cube on the sting site to reduce pain and swelling, after washing the site properly to remove any remaining bee venom
3. Apply essential oils like lavender oil, rosemary oil, tea tree oil that contains anti-septics, anti-bacteria, anti-fungal properties that relieve the pain or the swelling
4. Apply aloe vera extract, that contains anti-inflammatory and anti-bacterial properties to reduce swelling and prevent further infection
5. Apply honey that contain anti-inflammatory compounds that reduce swelling. Honey also contains anti-bacteria agents that prevent infection and speeds up healing
6. Apply baking soda powder that is alkaline to neutralize the acidic bee sting, hence relieving the pain
7. Apply toothpaste, that is alkaline unto the site of the sting to neutralize the acidic bee sting, hence relieving the pain
8. Apply crushed potato leaves or banana peeling extract, that contain alkaline substances/agents that can neutralize the acidic bee venom, hence relieving pain
9. In case of severe allergic reactions due to bee stings refer the causality to the nearby hospital for further assistance
10. Apply organic solvents like paraffin to the stung area

3.

- ✓ For any approach the learner uses, follow the following steps during the marking
- 1. Title/Aim (1 mark)
- 2. Hypothesis (1 mark)
- 3. Materials/Apparatus (02 mark)
- 4. Procedure/Set up (06 marks)
- 5. Observations/Results (04 marks)
- 6. Discussion of results / Explanation (05 marks)
- 7. Conclusion (01 mark)
- ✓ Mark each step independently, don't penalize the learner due to a step not correctly stated/explained, at the expense of others following, that are correctly stated.
- ✓ Mark the steps, not following their order, but their presence in the response

Response 1

Aim: To arrange the given elements in order of their reactivity.

Hypothesis: The more reactive the metal, the more vigorous the reaction will be.

Materials: Powdered Magnesium, Iron filings, Copper turnings and Potassium manganate (VII) crystals

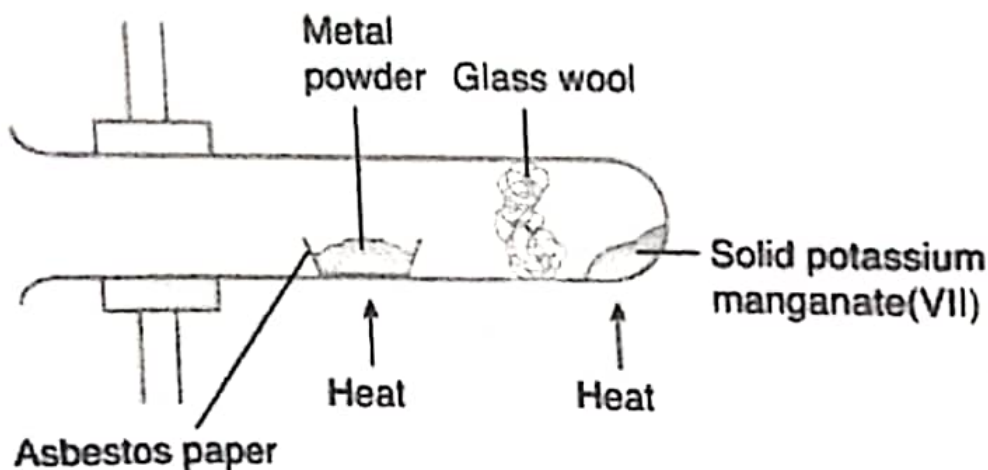
page-4 -

Apparatus: Boiling tubes, Glass wool, Spatula, Retort stand with clamp, Bunsen burner,

Procedure

1. One spatula of Potassium manganate (VII) crystals is placed in the boiling tube, and then some glass wool is placed in the boiling tube so as to separate the potassium manganate (VII) from the hot metal.
2. One spatula of the powdered magnesium is placed on a piece of asbestos paper, which is then placed in the boiling tube.
3. The boiling tube is then clamped in a horizontal position as shown below.

Set up



4. The magnesium powder is then heated first to glow red-hot before heating the potassium manganate crystals strongly.
5. The intensity of the reaction that took place is observed and noted.
6. The color of the product immediately after the reaction after it has cooled is also noted.
7. The experiment is then repeated with other metals

Table of results

Metal	Observation(s)	Conclusion
Magnesium	Burns very rapidly in oxygen giving off bright light. White powder when hot and remains white even when cold.	Magnesium is a very reactive metal. Magnesium oxide is formed.
Iron	Iron burns fairly rapidly with a very bright glow. The product is reddish brown when hot and even on cooling.	Iron is a reactive metal although not as reactive as zinc. Iron(III) oxide is the product.
Copper	Glowes a little and very slowly. The product is black, whether hot or cold.	Copper is a less reactive metal. The product is copper(II) oxide

Conclusion

Additional information:

Potassium manganate (VII) functions as a source of oxygen when it decomposes on heating.

The metals used are powdered to speed up the rate of reaction.

Different metals react with a different degree of intensity with oxygen; the more reactive the metal, the more vigorous it reacts with oxygen hence the brighter the flame/glow.

The metals can then be arranged in order of decreasing reactivity as;

Magnesium \longrightarrow iron \longrightarrow copper

Response 2

Aim: To arrange the given elements in order of their reactivity.

Hypothesis: The more reactive the metal, the more vigorous the reaction will be.

Materials: Powdered Magnesium, Iron filings, Copper turnings, Magnesium oxide, Iron (III) oxide, Copper (II) oxide

Apparatus: Boiling tubes/ crucible, Spatula, Tripod stand and wire mesh, Bunsen burner,

Procedure

1. Transfer one spatula endful of Magnesium powder in a crucible
2. Add one spatula endful of Iron (III) oxide to the same crucible
3. Mix the two powders together using a spatula
4. Heat the mixture strongly and note your observation.
5. Repeat procedures (1-4) using a mixture of Iron fillings and Magnesium oxide
6. Identify from your observations which of the two elements is more reactive than the other.
7. Repeat procedures (1-6) using the following pairs of materials
 - (i) Magnesium powder and copper (II) oxide, then copper and Magnesium oxide
 - (ii) Iron fillings and copper (II) oxide, then copper powder and iron (II) oxide

Set up

page-6-

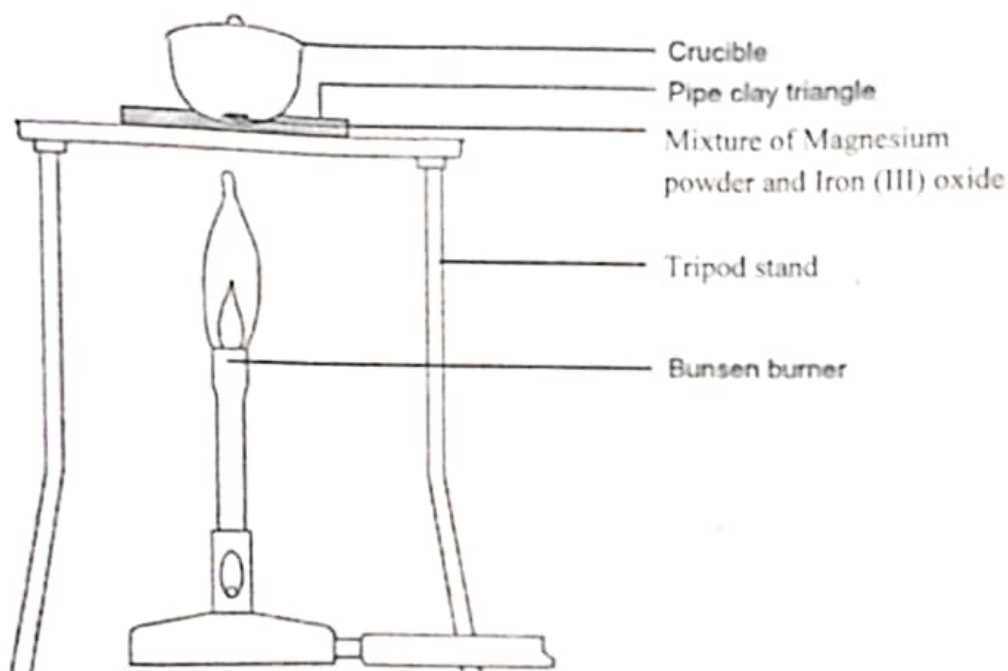


Table of Results

PAIR	OBSERVATION	CONCLUSION
Magnesium powder and Iron (III) oxide	Mixture glows red hot, forming white ash	Magnesium is more reactive than Iron
Magnesium oxide and Iron	No observable change	Iron is less reactive than Magnesium
Magnesium powder and Copper (II) oxide	Mixture glows red hot, the black powder turned to white ash, and a brown solid	Magnesium is more reactive than Copper
Copper and Magnesium oxide	No observable change	Copper is less reactive than Magnesium
Iron and Copper (II) oxide	Mixture glows red hot, the black powder turned to brown	Iron is more reactive than copper
Iron (III) oxide and Copper	No observable change	Copper is less reactive than Iron

Conclusion

The metals used are powdered to speed up the rate of reaction.

The most reactive metal displaces the less reactive metal from its metal oxide. The reaction is so vigorous when the most reactive metal is displacing a less reactive metal from its oxide, that is

far lower than it in the reactivity series. The less reactive metal can not displace the more reactive metal from its oxide, hence no reaction takes place.

The metals can then be arranged in order of decreasing reactivity as;

Magnesium \longrightarrow iron \longrightarrow copper

Response 3

Aim: To arrange the given elements in order of their reactivity.

Hypothesis: The more reactive the metal, the more vigorous the reaction will be.

Materials: Magnesium turnings/ribbon, Iron filings, Copper turnings, and dilute hydrochloric acid/ dilute sulphuric acid, water

Apparatus: Round bottomed flask, Thistle funnel, Delivery tubes, Retort stand with clamp, Gas jar, Water trough, Bunsen burner,

Procedure

1. Put Magnesium ribbon in a round bottomed flask
2. Add dilute hydrochloric acid into the flask using a thistle funnel
3. Observe what takes place in the round bottomed flask and the rate at which the gas jar is being filled with hydrogen.
4. Repeat the procedure 1-3, using Iron and Copper
5. Record your observations in the table below

Set up

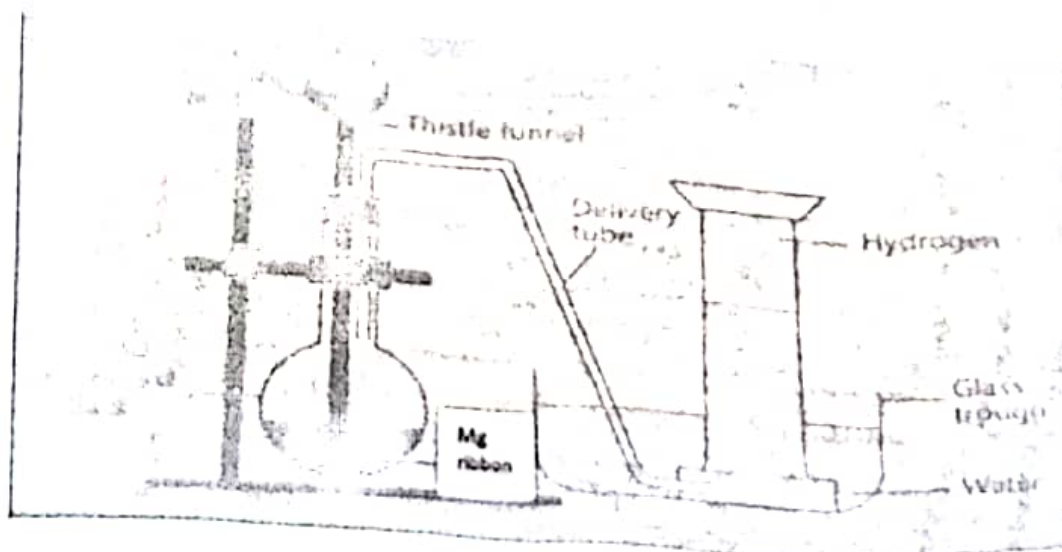


Table of results

Metal	Observation	Conclusion
Magnesium	The grey solid reacted vigorously forming a colourless solution	Magnesium is a very reactive metal
Iron	The grey solid reacted moderately forming a pale green solution	Iron is relatively reactive metal
Copper	No observable change	Copper is a less reactive metal

Conclusion

Different metals react with a different degree of intensity with dilute hydrochloric acid or dilute sulphuric acid; the more reactive the metal, the more vigorous it reacts with the acid

The metals can then be arranged in order of decreasing reactivity as;

Magnesium \longrightarrow iron \longrightarrow copper

Response 4

Aim: To arrange the given elements in order of their reactivity.

Hypothesis: The more reactive the metal, the more vigorous the reaction will be.

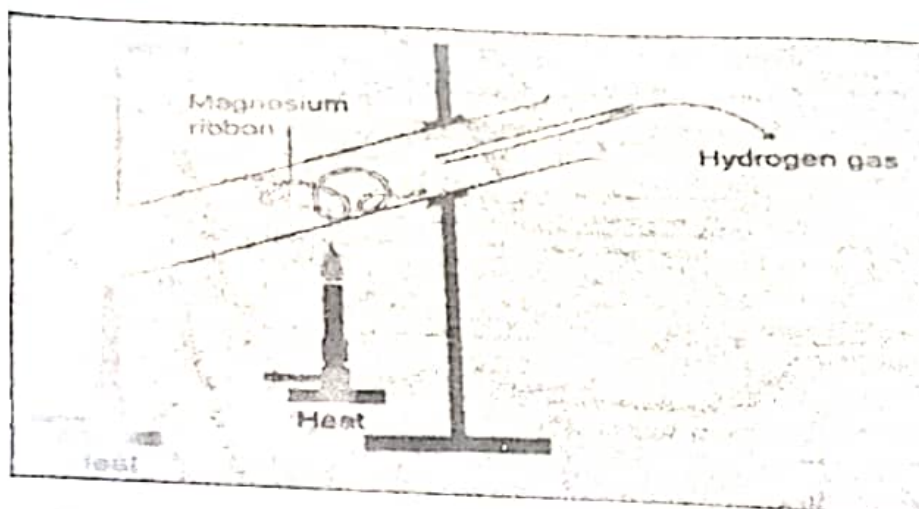
Materials: Magnesium ribbon, Iron plate, Copper foil, sand paper

Apparatus: Boiling tubes, Wet glass wool, Spatula, Retort stand with clamp, Bunsen burner, Cork with a glass tube

Procedure

1. Soak glass wool in water and insert it at the bottom of the boiling tube
2. Clean a piece of magnesium ribbon using a sand paper
3. Insert it in the middle of the boiling tube
4. Stopper the boiling tube with a cork containing glass tubing
5. Clamp the boiling tube as shown below

Set up



6. Heat the magnesium ribbon strongly and then heat the wet glass wool gently
7. Estimate the time for the mixture to glow red hot and carefully record your observations
8. Repeat the procedures 1-7, using Iron and Copper in place of Magnesium

Table of results

Metal	Observation	Conclusion
Magnesium	The grey solid reacts vigorously with steam, forming white ash	Magnesium is a very reactive metal
Iron	The grey solid reacts moderately with steam, forming a black solid	Iron is a relatively reactive metal
Copper	No observable change	Copper is a less reactive metal

Conclusion

Some metals react with a different degree of intensity with steam; the more reactive the metal, the more vigorous it reacts with steam.

The metals can then be arranged in order of decreasing reactivity as;

Magnesium \rightarrow iron \rightarrow copper

4.

- ✓ Award learners who either gave word equation or chemical equations
- ✓ Don't accept a diagram of fractional distillation in the laboratory
- ✓ For point 5, accept mixture covered for 3-5 days

page - 10 -

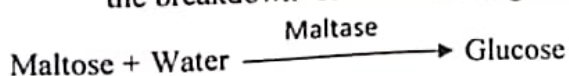
- ✓ Award 9 marks for the nine (9) points raised by the learner (9 points @ 1 mark=9 marks)
- ✓ Award 6 marks for any 6 advantages the learner state (6 benefits@1 mark=6 mark)
- ✓ Award 5 marks for any 5 disadvantages the learner state (5 harmful effects=5 marks)

Expected responses

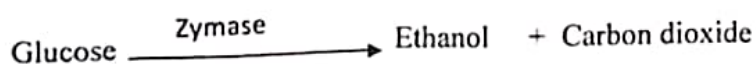
1. The product that can be produced from ripe bananas and millet is ethanol

Local method of preparing ethanol

2. Ripe bananas are peeled, put in a container and squeezed well using spear grass to extract most of the juice.
3. Clean cotton cloth is used to filter out a clear juice
4. Flour of the germinated millet seeds is added to the filtrate
5. When bubbles begin forming, the mixture is stirred at regular intervals until no more bubbles are formed.
6. The millet flour added contains two enzymes, that is maltase which catalyses/ hydrolyses the breakdown of maltose into glucose.



7. Another enzyme, zymase, which catalyses/hydrolyses the breakdown of glucose to ethanol and carbon dioxide, by fermentation process.



8. To obtain fairly pure ethanol from the resulting mixture, distillation is done, where ethanol is collected as a distillate.
9. Cooling or condensation of ethanol vapour is effected using plenty of cold water.

Positive effects of ethanol

- ✓ Manufacture of perfumes
- ✓ Used in thermometers as a thermometric liquid
- ✓ Solvent while preparing lab reagents like phenolphthalein
- ✓ Anti-septic/ Disinfectant when cleaning wounds
- ✓ Used as a fuel when burnt
- ✓ Used to prepare hard drinks like beers or wines
- ✓ Used as a preservative
- ✓ Food processing
- ✓ Medicinal uses

Negative effects of ethanol

- ✓ Accelerated poverty
- ✓ Insanity
- ✓ Sexual immorality
- ✓ Family violence and break ups
- ✓ Road accidents
- ✓ Increased school dropouts
- ✓ Death

- END -