



MANGU HIGH SCHOOL

233/1
CHEMISTRY
PAPER 1
MOCK 2022
TIME: 2 HOURS

NAME: M/S ADM NO: _____

INDEX NO. _____ CLASS: _____

Kenya Certificate of Secondary Education
MOCK EXAMINATIONS

Chemistry
Paper 1
2 Hours.

Answer **ALL** the questions in the spaces provided.

This paper consists of **9 printed pages**.
Make sure that all the pages are printed and that no page is missing.

1. Briefly describe how chromatography is used to detect illegal steroids used by athletes (3mks)

- Drop of ^{sample and solvent} urine on paper chromatography at base
- Dip the paper on ^{solvent} solvent
- The spot on the urine moves the same distance with the illegal steroids

2. State one physical process which is

(i) Endothermic

Melting/Boiling

any 1 (1mk)

(ii) Exothermic

condensation/boiling/freezing. any 1 (1mk)

3. One large scale source of alkanes is through fractional distillation of crude oil, state one other large scale source in which alkanes can be obtained. (1mk)

✓ (cracking of long chain alkanes)
✓ Biogenic source of Biogas. any one

4. (i) State and explain the observation made when chlorine is bubbled through a solution of potassium bromide. (2mks)

solution changes to orange - Cl_2 strong oxidising agent oxidises Br^- to Br_2 or Cl_2 is more reactive than Br_2 hence displaces bromide

(ii) Write the ionic equation for the reaction in 4(i) above. (1mk)



5. (a) When element J was placed in water the following observations were made.

- (i) Float on the surface of the water
- (ii) Darts on the surface of the water
- (iii) Melt to a silvery ball

Give the name given to group in which element belongs (1mk)

Alkali Metals

(b) State one observation made if calcium was used instead of element J. (1mk)

- sink to the bottom
- bubbles
- white ppt

any 1

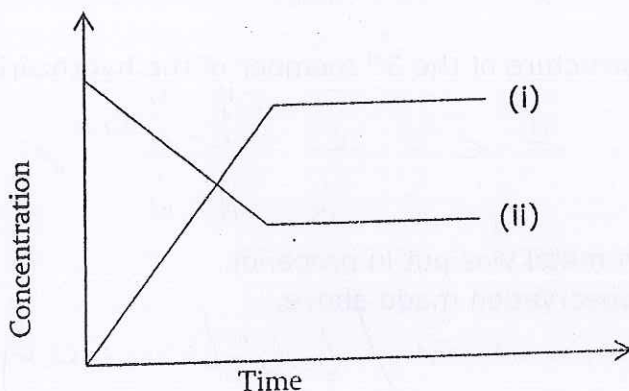
6. Study the information below and answer the questions that follow.



(i) Which of the two curves below represent the concentration of $\text{Cr}_2\text{O}_7^{2-}$.
Explain (2mks)

Curve II, initially the conc of $\text{Cr}_2\text{O}_7^{2-}$ is initially high but decrease with time then becomes constant.

(ii)



Using the graph above deduce the colour of the solution mixture at equilibrium. (1mk)

Yellow

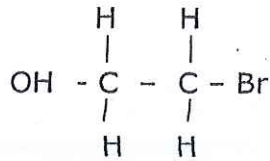
(iii) What be observed if dilute hydrochloric acid is added to the reaction mixture in 6 above. Explain (2mks)

orange colour intensify since addition of H^+ reacts with OH^- and the conc OH^- equilibrium shift the left backward reaction is favoured.

7. When a solute is dissolved in a solvent the temperature of the solution will either a drop or a rise. Give a reason why a solute dissolves in solvent may result to a drop in temperature. (2mks)

If the lattice energy is larger than hydration energy.

8. The structure below was formed when a certain hydrocarbon was bubbled through bromine water.



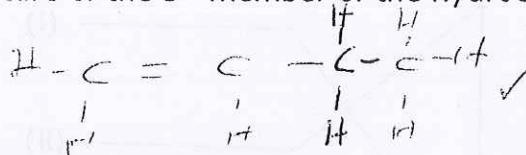
- (i) State the observation made during the process. (1mk)

Yellow to colourless ✓

- (ii) State the homologous series to which the hydrocarbon belongs. (1mk)

Alkanes ✓

- (iii) Draw the structure of the 3rd member of the hydrocarbon above. (1mk)

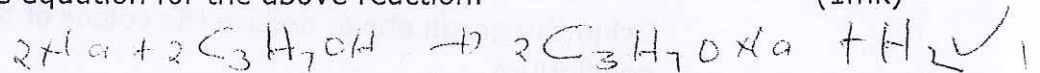


9. A piece of sodium metal was put in propanol.

- (i) State the observation made above. (1mk)

effervesces / bubbles away ↓

- (ii) Write the equation for the above reaction. (1mk)



- (iii) State and explain the observation made when a red litmus paper was put in the resultant solution. (2mks)

changes to blue $\text{C}_3\text{H}_7\text{ONa}$ - basic ✓

10. State one application of radioactivity in

- (i) Agriculture - use of P-32, as control (1mk) ✓

- (ii) Medicine - Radiation from Cobalt-60 used in Radiotherapy (1mk) ✓
 - Na-24 used for iodine - 121 any work ✓

11. (i) State two impurities found together with bauxite. (2mks) ✓

Al SiO_2 / silica / silicic acid ✓

Fe_2O_3 / iron(III) oxide ✓

any 1 ✓

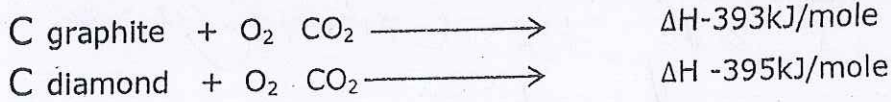
(ii) Explain how the impurities named above are removed at the purification stage. (3mks)

crushed mixed with NaOH to dissolve mixed with NaOH, which dissolves SiO₂ and Bauxite Fe₂O₃ filter

(iii) During extraction of aluminium metal the anode is periodically replaced at the electrolysis stage. Give a reason. (1mk)

Due to high temperature in the cell the graphite reacts with oxygen hence products

12. Use the information provided to answer the questions that follow.



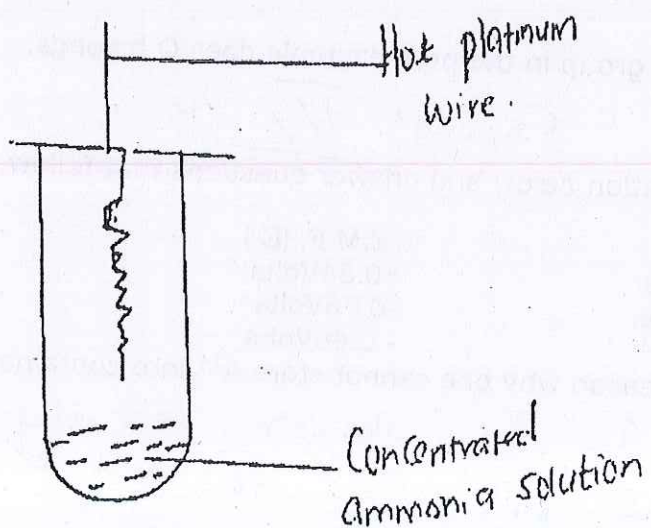
(i) Determine the enthalpy changes that occur when diamond is formed from graphite (1mk)

-393 + 395 = +2 *analyse 1/2 when no +ve.*

(ii) Is the formation of diamond from graphite endothermic or exothermic? (1mk)

Endothermic

13. Study the diagram below and answer the question that follows.



(i) State two observations made (2mks)

Brown fumes
platinum wire continues to glow red.

(ii) Write the chemical equation taking place on the surface of platinum wire. (1mk)

avoid no marks if not

$4H_2SO_4 \rightarrow 4H_2O + 2O_2$

14. (i) Write the chemical formula of Trona. (1mk)

$Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$

(ii) After extraction of Trona in Lake Magadi. It is taken to the washery in the processing plant. Briefly describe the other processes that follow from the washery till sodium carbonate is obtained. (2mks)

- Dried at the centrifuge ✓

- Roaster / Kiln ✓

15. An element Q in the periodic table Q not the actual symbol is in period III it forms an oxide with a formula Q_2O_3 (1mk)

(i) Calculate the oxidation number of Q. (1mk)

$$2Q + 3(-2) = 0 \times \frac{1}{2}$$

$$Q = +3$$

(ii) Write the electronic arrangement of A in the above compound. (1mk)

$Q = 2, 8$

(iii) To which group in the periodic table does Q belongs. (1mk)

Group III ✓

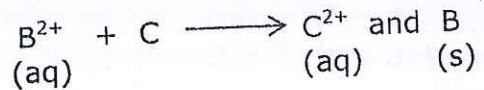
16. Use the information below and answer questions that follow.

Element	E.M.F. (E^\ominus)
$A^{2+} + 2e^-$	+0.34Volts
$B^{2+} + 2e^-$	-0.76Volts
$C^{2+} + 2e^-$	-0.46Volts

(i) Give a reason why one cannot store A^{2+} into container of C (2mks)

C is a stronger reducing agent than A. Hence will reduce A^{2+} .

(ii) Show if the below reaction can occur or not. (2mks)



$$-0.76 - -0.46 = -0.30V \text{ (1)}$$

It's not possible / don't do (1)

17. State how each of the following changes.

(i) pH during electrolysis of copper (II) sulphate using carbon electrodes. (2mks)

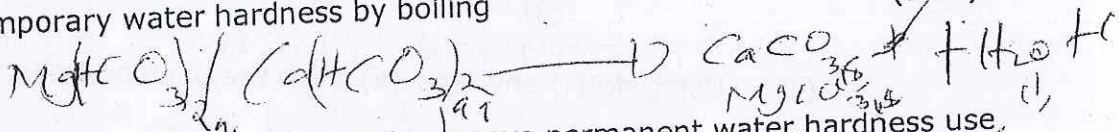
pH decreases H^+ concentration increases

(ii) Concentration during electrolysis of sodium sulphate using carbon electrode. (2mks)

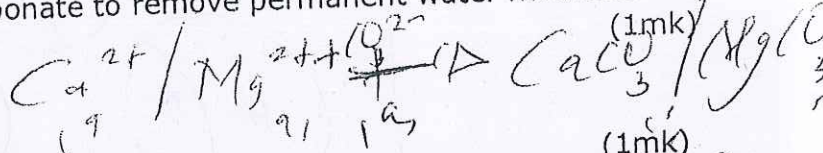
Concentration increases due to removal of H_2 as a result of discharge of OH^- and H^+

18. Write equations to show removal of water hardness by

(i) Temporary water hardness by boiling (1mk)



(ii) Addition of sodium carbonate to remove permanent water hardness use ionic equation. (1mk)



19. (i) Define the term solubility. (1mk)

Maximum amount of solute that can dissolve/saturate 100g of a solvent at a given temperature.

(ii) If saturated solution at 25°C containing 50g saturated solution was heated till all the water evaporated and 10 grams of salt was left. Calculate the solubility of the salt. (2mks)

$$50g - 10g = 40g \text{ salt}$$

$$100g - 40g \text{ H}_2O = 60g \text{ H}_2O$$

$$\frac{10 \times 100}{60} = 16.67g$$

20. (a) Study the table below and answer the questions that follow.

Element	Atomic Radius	Ionic Radius
R	0.436	0.123
Q	0.234	0.348
T	0.371	0.254
S	0.124	0.671

If the elements are in the same period arrange them as they occur from left to right. (1mk)

(b) Identify

(i) Metallic elements (1mk)

R and T

(ii) Non-metallic elements (1mk)

S and Q

(iii) Identify the metallic element with the highest melting point and give a reason. (2mks)

W TV° - smaller atomic size strong metallic bond.

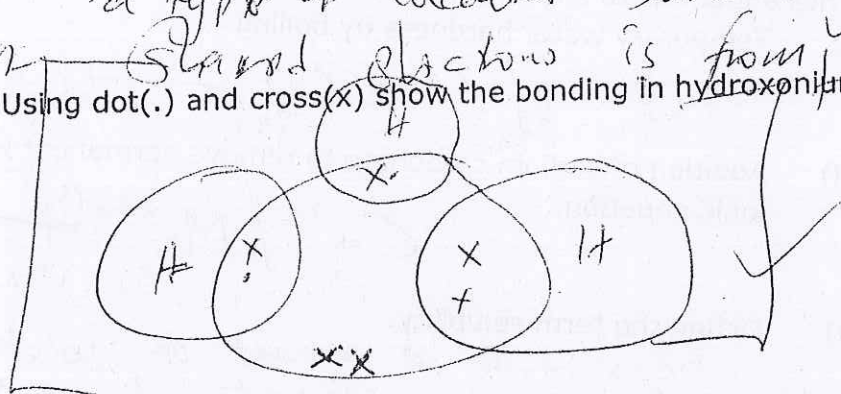
21. State one way in which the purity of a substance can be tested. (1mk)

- test by MTP or BPT. any 1

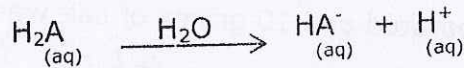
22. (i) Define the term dative bond. (1mk)

a type of covalent bond where a pair of shared electrons is from one atom

(ii) Using dot(.) and cross(x) show the bonding in hydroxonium ion. (1mk)



23. The equations below show the ionization of two acidic substances in water.



(i) Identify the acid which is a better conductor of electricity and give a reason. (2mks)

H_2B - more H^+

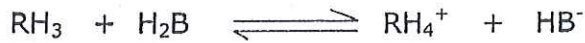
(ii) Name the acid that is likely to have a pH value that ranges between (pH4 - pH6) (1mk)

H_2A

24. (i) Define the term acid according to Bronsted lowry theory. (1mk)

proton donor

(ii) Given the equation



Which substance is the acid in the forward reaction.

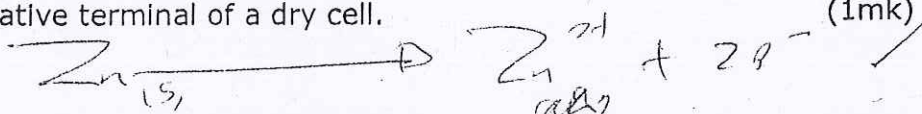
(1mk)



25. Write the ionic equation that occurs

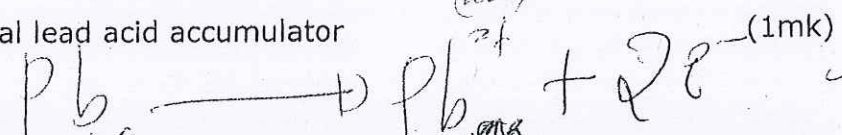
(a) At the negative terminal of a dry cell.

(1mk)



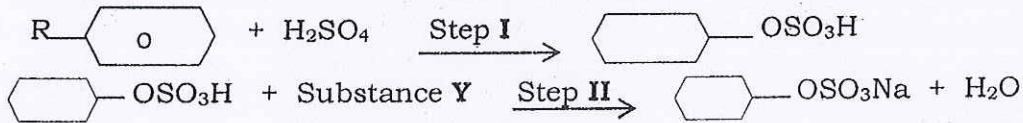
(b) Negative terminal lead acid accumulator

(1mk)



peaks fully if not start symbol

26. The information below is used in the preparation of a cleansing agent. Study it and answer the question that follows.



(a) Give the type of the cleansing agent.

(1mk)

Soap plus detergent.

(b) Name substance Y

(1mk)

sodium hydroxide ✓

(c) Name the type of reaction taking place in step II above.

(1mk)

Neutralisation ✓

27. Give the main difference between the bleaching of sulphur IV oxide and chlorine.

(2mks)

Sulphur (IV)	Chlorine
- Reduction ①	oxidised ①
- permanent ①	temporary ✓ ①

any 2

28. Starting with solid aluminium sulphate describe how a solid sample of aluminium oxide can be prepared.

(1mk)

- Add $Al(OH)_3$ ✓
 - filter $Al(OH)_3$ ✓
 - heat $Al(OH)_3$ ✓

29. Define salt.

(1mk)

a substance formed along with H^+ from an acid and a base. cation.