



MANGU HIGH SCHOOL

233/1
CHEMISTRY
PAPER 1
(THEORY)
JULY 2015
TIME: 2 HOURS

NAME: _____

ADM NO: _____ CLASS: _____

Kenya Certificate of Secondary Education
MOCK EXAMINATIONS
Chemistry
Paper 1
2 Hours.

Instructions To Candidates

1. Write your Name, Class and Index Number in the spaces provided above.
2. Answer **ALL** the questions in the spaces provided in the question paper.
3. Mathematical tables and silent calculators may be used.
4. All working **MUST** be clearly shown where necessary.

For Examiner's Use Only

Questions	Max. Score	Candidates Score
1-31	100	

This paper consists of **12 printed pages**.
Candidates should check the question paper to ascertain that all pages are
printed and that no page is missing.

Turn Over

1. A small crystal of potassium manganate (VII) was placed in a beaker water. The beaker was left standing for two days without shaking. State and explain the observations that were made (2mks)

2. When a hydrated sample of calcium sulphate $\text{CaSO}_4 \cdot x\text{H}_2\text{O}$ was heated until all the water was lost, the following data recorded,

Mass of crucible = 30.296g

Mass of crucible + hydrated salt = 33.111g

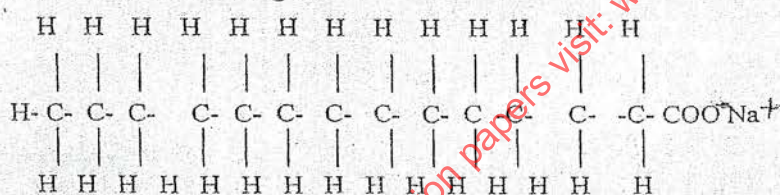
Mass of crucible + anhydrous salt = 32.781g

Determine the empirical formula of the hydrated salt (Relative formula mass of $\text{CaSO}_4 = 136$, $\text{H}_2\text{O} = 18$)

3. Complete the following table by filling in the missing test and observations (3mks)

No.	Gas	Test	Observation
I	Chlorine	Put a moist red litmus paper into the gas	
II	Sulphure (IV) oxide		Paper turns green
III	Butane	Add a drop of bromine water	

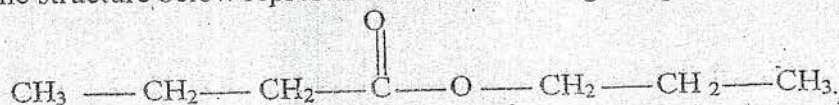
4. The structure of a detergent is



- a) Write the molecular formula of the detergent (1 mk)
- b) What type of detergent is represented by the formula? (1 mk)
- c) When this type of detergent is used to wash linen in hard water, spots (marks) are left on the linen. Write the formula of the substance responsible for the spots (1 mk)

5. Phosphoric acid is manufactured from calcium phosphate according to the following equation
 $\text{Ca}_3(\text{PO}_4)_2(\text{s}) + 3\text{H}_2\text{SO}_4(\text{l}) \rightarrow 2\text{H}_3\text{PO}_4(\text{aq}) + 3\text{CaSO}_4(\text{s})$
 Calculate the mass in (kg) of phosphoric acid that would be obtained if 155kg of calcium phosphate reacted completely with the acid. (Ca = 40, P = 31, S = 32, O = 16, H = 1) (2mks)

6. The structure below represents a sweet smelling compound



Give the names of the two organic compounds that can be used to prepare this compound in the laboratory (2mks)

7. a) What are isotopes? (1 mark)

- b) Determine the number of neutrons in ^{18}O . (1mk)

8

8. a) State the observation made at the end of the experiment when a mixture of iron powder and sulphur is heated in a test tube (1mk)

- b) Write an equation for the reaction the product in (a) above and dilute hydrochloric acid (1mk)

- c) When a mixture of iron powder and sulphur is heated, it glows more brightly than that of iron fillings and sulphur. Explain this observation (1mk)

9. Zinc reacts with both concentrated and dilute sulphuric (VI) acid. Write equations for two reactions. (2mks)

10. When magnesium was burnt in air, a solid mixture was formed. On addition of water to the mixture a gas which turned moist red litmus paper blue was evolved. Explain these observations

11. The table below gives atomic numbers of elements represented by the letters A, B, C and D

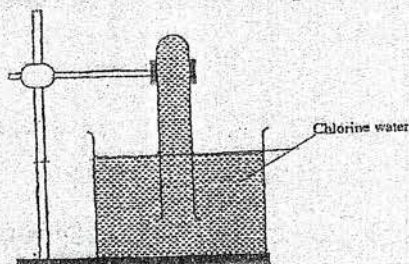
Element	A	B	C	D
Atomic Number.	15	16	17	20

Use the information to answer the questions that follow

- a) Name the type of bonding that exists in the compound formed when A and D react (1mk)

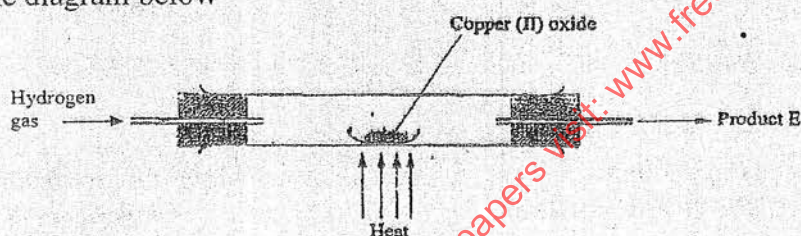
- b) Select the letter which represents the best oxidizing agent. Give a reason for your answer (2mks)

12. In an experiment, a test-tube full of chlorine water was inverted in chlorine water as shown in the diagram below and the set up left in sunlight for one day



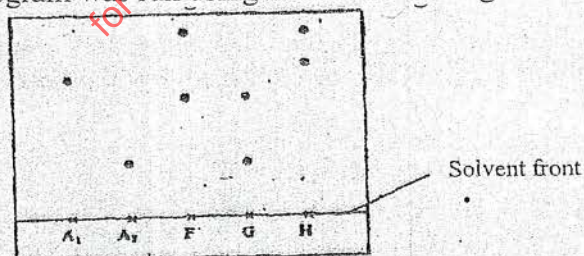
After one day, a gas was found to have collected in the test-tube

- a) Identify the gas
- b) What will happen to the PH of the solution in the beaker after one day? Give an explanation (2mks)
13. In a laboratory experiment hydrogen gas was passed over heated copper (II) oxide as shown the diagram below



Describe a chemical test that can be used to identify the product E (2mks)

14. Samples of urine from three participants F, G and H at an international sports meeting were spotted onto a chromatography paper alongside two from illegal drugs A_1 and A_2 . A chromatogram was run using methanol. The figure below shows the chromatogram



- a) Identify the athlete who had used an illegal drug (1mk)
- b) Which drug is more soluble in methanol? (1mk)

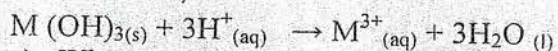
15. The table below gives the solubilities of substances J, K and L at different temperatures

Substance	Solubility in grammes per 100g water at			
	0°C	20°C	40°C	60°C
J	0.334	0.16	0.097	0.0058
K	27.60	34.0	40.0	45.5
L	35.70	36.0	40.0	37.3

Select the substance which, when dissolved in water, heat is given out. Give a reason (2mks)

16. Starting with copper metal, describe how a sample of crystals of copper (II) chloride may be prepared in the laboratory (3mks)

17. A compound whose general formula is $M(OH)_3$ reacts as shown by the equation below.
- $$M(OH)_{3(s)} + OH^-_{(aq)} \rightarrow M(OH)_{4(aq)}$$



- a) What name is given to compounds which behave like $M(OH)_3$ in the two reactions (1mk)

- b) Name two elements whose hydroxides behave like that of M (2mks)

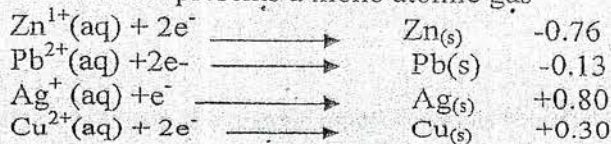
18. The grid below is part of the periodic table. Use it to answer the questions that follow, (the letters are not the actual symbols of the elements)

[illegible]

- a) Indicate on the grid the position of an element represented by letter V whose atomic number is 14 (1mk)

- b) Write the formula of the compound formed between Q and T (1mk)

19. Select a letter which represents a mono atomic gas (1mk)



- a) Write the cell representation for the electrochemical cell that would give the highest E

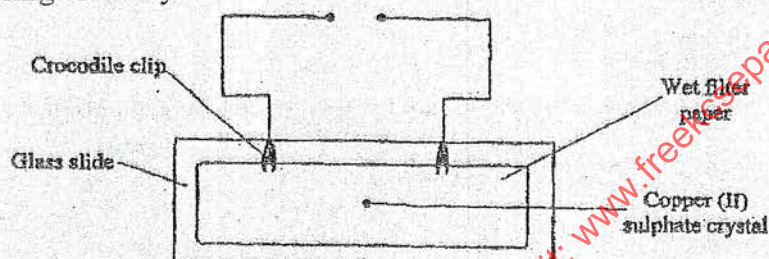
(1mk)

- b) State and explain the observations made when a copper rod is placed in a beaker containing silver nitrate solution (2mks)

20. a) State the Graham's law diffusion (1mk)

- b) The molar masses of gases W and X are 16.0 and 44.0 respectively. If the rate of diffusion of W through a porous material is $12\text{cm}^3\text{s}^{-1}$. Calculate the rate of diffusion of X through the same material (2mks)

21. The diagram below represents an experiment that was set up to investigate movement of ions during electrolysis

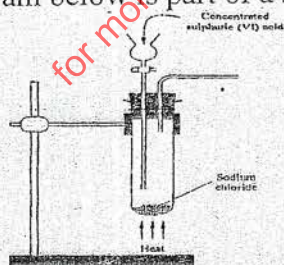


When the circuit was completed, it was noticed that a blue colour spread towards the right.

- a) Explain this observation (2mks)

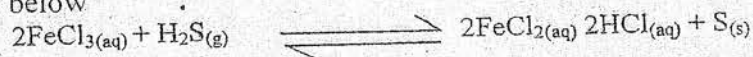
- b) Write the equation for the reaction that occurred at the anode (1mk)

22. The diagram below is part of a set up used in the laboratory preparation of gas



Complete the diagram to show how a dry sample of the gas can be collected (3mks)

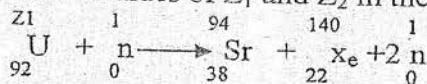
23. In a closed system, aqueous iron (III) chloride reacts with sulphide gas as shown in the equation below



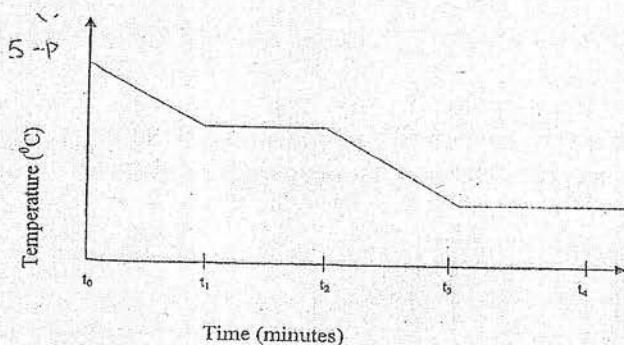
State and explain the observation that would be made if dilute hydrochloric acid is added to the system at equilibrium (2mks)

24. a) A radioactive substance emits three different particles
Give the symbol of the particle with the highest mass (1mk)

- b) i) Find the values of Z_1 and Z_2 in the nuclear equation below



- ii) What type of nuclear reaction is represented in b (i) above? (1mk)



25. Give the name of the:

a) Process taking place between t_0 and t_1 (1mk)

b) Energy change that occurs between t_3 and t_4 (1mk)

26. When solid B_1 was heated, a gas which formed a white precipitate when passed through lime water was produced. The residue was dissolved in dilute nitric (V) acid to form a colourless solution B_2 . When dilute hydrochloric acid was added to solution B_2 a white precipitate which dissolved on warming was formed

a) Write the formula of the:

i) Cation in solid B_1 (1mk)

ii) Anion in solid B_1 (1mk)

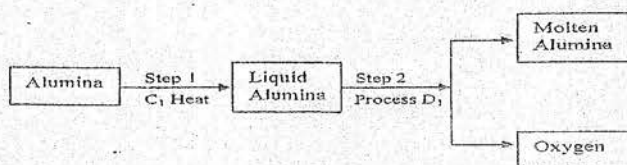
b) Write an ionic equation for the reaction between the residue and dilute nitric (V) acid (1mk)

27. In an experiment to determine the percentage of magnesium hydroxide in an anti-acid, a solution containing 0.50g of the anti-acid was neutralized by 23.0cm^3 of 0.010M hydrochloric acid (Relative formula mass of magnesium hydroxide = 58)

a) Calculate Mass of magnesium hydroxide in the anti-acid; (2mks)

b) Calculate percentage of magnesium hydroxide in the anti-acid (1mk)

28. During the extraction of aluminium from its ores: the ore is first purified to obtain alumina



a) Name

i) Substance C₁

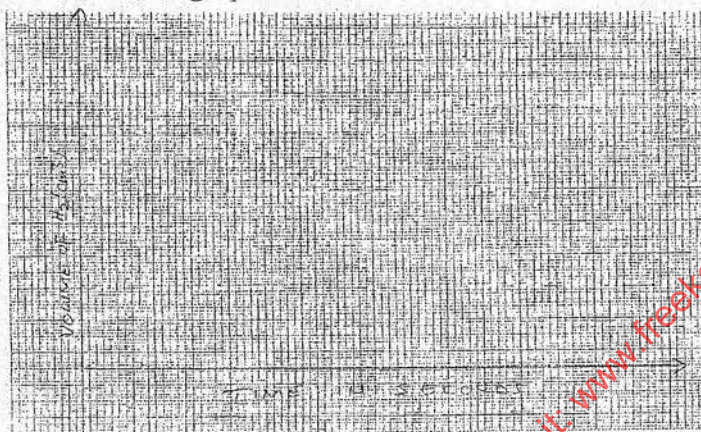
(1mk)

ii) Process D₁

(1mk)

b) Give two reasons why aluminium is used extensively in the making of cooking pans (1mk)

29. A certain mass of metal E₁ reacted with excess dilute hydrochloric acid at 25°C. The volume of hydrogen gas liberated was measured after every 30 seconds. The results were presented as shown in the graph below



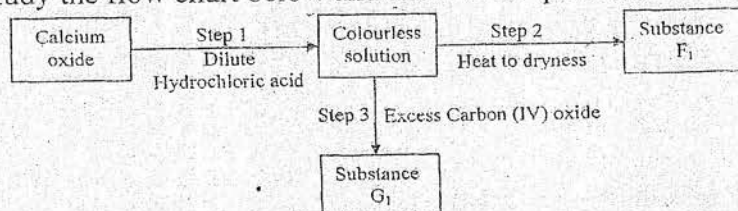
a) Name one piece of apparatus that may have been used to measure the volume of gas liberated (1mk)

b) i) On the same axis, sketch the curve that would be obtained if the experiment was repeated at 35°C (1mk)

ii) Explain the shape of your curve in b(i) above (1mk)

30. Crude oil contains sulphur. What would be the effect to the environment of using fuel containing sulphur? (1mk)

31. Study the flow chart below and answer the questions that follow



a) Give the name of the process that takes place in step 1 (1mk)

b) Give;

i) The name of substance G₁

ii) One use of substance F₁