

MANGU MOCK TRIAL 3

CHEMISTRY

233/1

PAPER 1

TIME: 2 HOURS

NAME.....

SCHOOL..... SIGN.....

INDEX NO..... ADM NO.....

Kenya Certificate of Secondary Education.

Instructions To Candidates

- Write your name and index number in the spaces provided
- Sign and write the date of examination in the spaces provided
- Answer ALL questions in the spaces provided
- Mathematical table and electronic calculators may be used.
- ALL working MUST be shown clearly where necessary
- Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing*

For Examiner's Use Only

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORES
1 – 25	80	

QUESTIONS

1. The table below gives information about ions of **A** and **B**

Ion	A ⁺	B ²⁻
Electron arrangement	2.8	2.8.8
Number of Neutrons	12	16

a) Write the electrons arrangement for the atom of **B** (1mk)

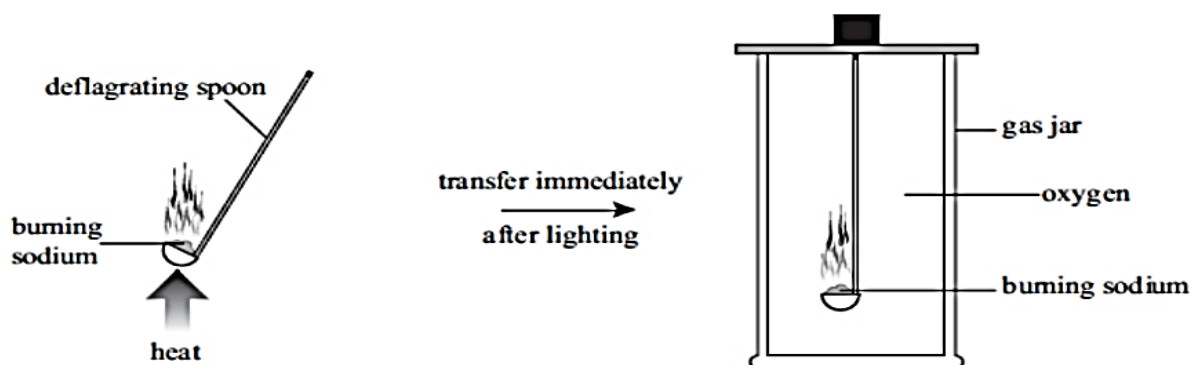
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b) Draw the atomic structure of A showing the composition the nucleus (2mks)

c) Write the formula of the compound formed when A and B reacts (1mk)

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2. Sodium metal was warmed until it began burning. The burning sodium was lowered in a gas jar of oxygen as shown below.



(a) State the expected observations. (2mks)

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(b) Some water was added to the product of this reaction and the resulting solution tested with blue and red litmus papers. State and explain the observations made. (1mk)

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(c) Write a chemical equation for the reaction of

(i) Sodium with oxygen. (1mk)

(ii) Product with water. (1mk)

3. The melting point of phosphorous trichloride is -91°C while that of sodium chloride is 801°C .

In terms of structure and bonding. Explain the difference in their melting point (2mks)

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(b) Using dots (.) and crosses (x), show bonding in

(i) Sodium oxide. (Na = 11, O = 8) (1mk)

(ii) Hydroxonium ion, H_3O^+ (H=1, O=8) (1mk)

4. When solid Q_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 Q_2 . When dilute hydrochloric acid was added to solution Q_2 a white precipitate which dissolved on warning was formed.

(a) Write the formula of the;

I. Cation in solid Q_1 (1 mark)

II. Anion in solid Q_1 (1 mark)

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

5. (a) Using electrons only, distinguish between oxidation and reduction (2mks)

(b) Identify the oxidizing agent in the reaction below and explain your answer (2 mk)



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6. 200g of a radioactive substance was reduced to 12.5g in 20.8 years. Calculate the half-life of the substance (2 mks)

7. (a) Define graham's gas law. (1mk)

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(b) Two containers, one with Nitrogen (IV) oxide and other with bromine simultaneously develop leaks, after 30 minutes, the smell of Nitrogen (VI) oxide is detected. How much longer will it take before bromine is detected. (N = 14, O = 16, Br = 80) (2mks)

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8. In the Haber process, the optimum yield of ammonia is obtained when a temperature of 450°C, pressure of 200 atmospheres and an iron catalyst are used. Equation for the reaction is shown below.



How would the yield of ammonia be affected if:

i) Temperature raised to 600°C (1mk)

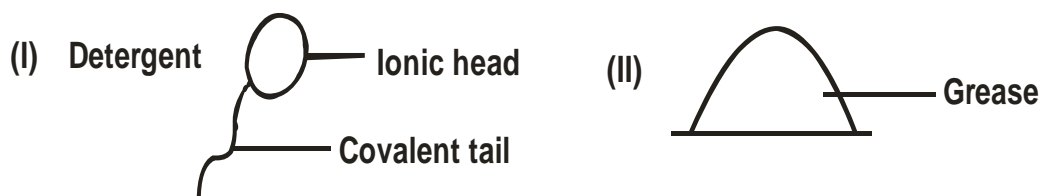
ii) Pressure raised to 250 atmospheres. (1mk)

iii) The amount of catalyst doubled Explain. (2mk)

9. a) The ability of temporary hard water to conduct electricity falls when water is boiled but it is not much affected when the temporary hardness is removed by addition of washing soda (Sodium carbonate). Explain. (2 mks)

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b) Diagram (I) below is simple representation of a detergent material. Complete the diagram in (II) to show the orientation of the detergent in the grease and water occurs. (1 mk)



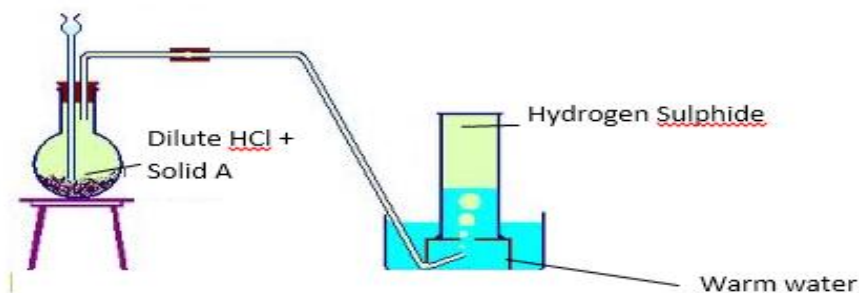
10. Describe how you would prepare crystals of sodium nitrate starting with 200 cm³ of 2M sodium hydroxides. (3 mks)

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11.(a) Using equations only, differentiate the bleaching effect of Chlorine and Sulphur (iv) oxide **(2mks)**

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(b) Study the diagram below and answer questions that follow.



Identify solid A. **(1mk)**

(i) Give a reason why warm water is used. **(1mk)**

(ii) What observation would be made if hydrogen Sulphide gas was bubbled into a solution of lead (II) nitrate. **(1mk).**

12. An oxide of copper in a porcelain boat was reduced by a stream of hydrogen. The results obtained were as follows;

Mass of porcelain boat = 4.5g

Mass of boat + Oxide = 6.40g

Mass of boat + Copper = 6.02 g

(i) Determine the empirical formula of the oxide. **(3 mks)**

- (ii). If the relative formula mass of the oxide is 80, determine its chemical formula. (Cu = 64, O = 16) (1 mk)

13.(a) The table below shows the number of drops of soap solution needed to lather with 10cm³ of water.

Sample	Cold water	Heated water
A	5	5
B	6	2
C	2	2

b) Identify the anions likely to be in:

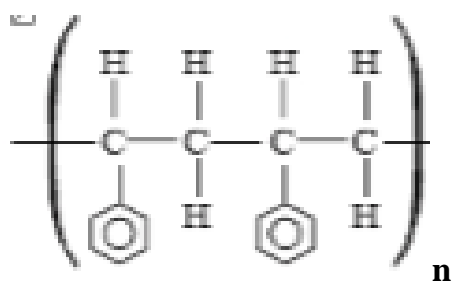
A..... (1mk)

B..... (1mk)

c) State **TWO** methods used in removing permanent hardness of water. (1mk)

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14. The formula given below represents a portion of a polymer.



a) Give the name of the polymer (1mk)

b) Give **one** industrial use of the polymer (1mk)

c) One disadvantage of the continued use of this polymer. (1mk)

15. A piece of cover slip was weighed before and after a student made a circle on it using a pencil lid of pure graphite. The masses were as shown below;

Mass of cover slip before = 1.804g

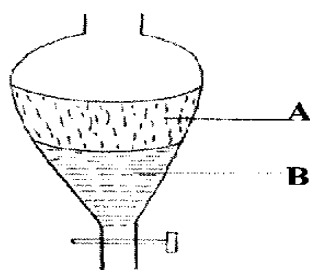
Mass after drawing the circle = 1.9053g

Determine the number of carbon atoms used to draw the circle. (C =12, L=6.00 x 10²³)(3mks)

16. A mass of 40g of a saturated solution of potassium chlorate at 25⁰C yields 14g of potassium chlorate when evaporated to dryness. Calculate the solubility of potassium chlorate at 25⁰C.

(3mks)

17. A mixture of kerosene, methylbenzene and water were shaken and left to separate out as shown in the diagram below.



(i) Identify liquids **A** and **B**

(2mks)

A.....

B.....

(i) Apart from density, state **one** other property that makes it possible to separate them using the set up above?

(1mk)

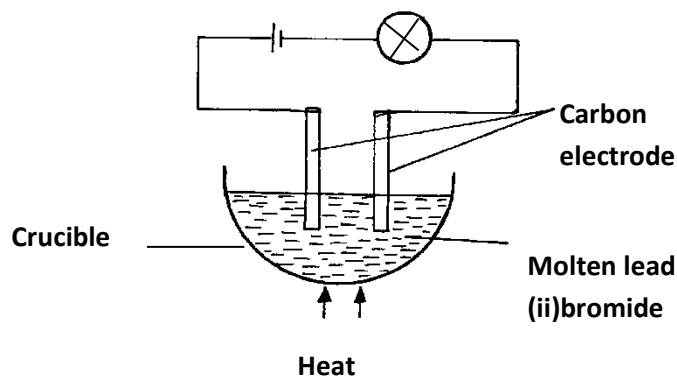
18. Volume of liquids can be measured using a pipette; measuring cylinder or burette. Which one would be best for measuring exactly 29.1cm^3 of liquid. (1mk)

19. The third member of the alkenes is converted to its corresponding saturated hydrocarbon by hydrogenation. Using the bond energy values given below, answer the questions that follow.

Bond	Bond energy kJ/Mol
H-H	432
C=C	610
C-C	346
C-H	413

Determine the enthalpy change for the conversion of the 4th member of the alkenes to its corresponding saturated hydrocarbon by hydrogenation. (3mks)

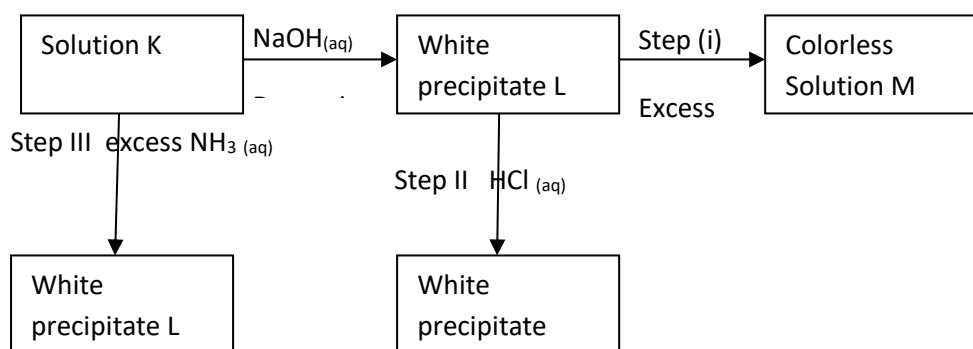
20. The set up below was used to electrolyze molten lead (II) bromide.



a) Explain why the bulb lights brightly at the beginning of the experiment and becomes dim after sometime (2mks)

b) Write ionic equation for the reaction that took place at the cathode (1mk)

21. Study the flow chart below and answer the questions that follow:



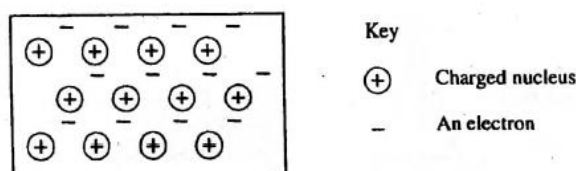
(a) Identify

(i) The cation present in solution K (1mk)

(ii) The white precipitate L (1mk)

(b) Write down the formula of the complex ion present in the colorless solution M (1mk)

22. The diagram below is a section of a model of the structure of element T.



(a) State the type of bonding that exists in T. (1 mark)

(b) In which group of the period table does element T belong? Give a reason. (2 mks)

23. (a). Describe how carbon (IV) oxide can be distinguished from Carbon (II) Oxide using calcium hydroxide solution. (2 mks)

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(b) What is the role of carbon (IV) oxide in fire extinguishing? (1 mk)

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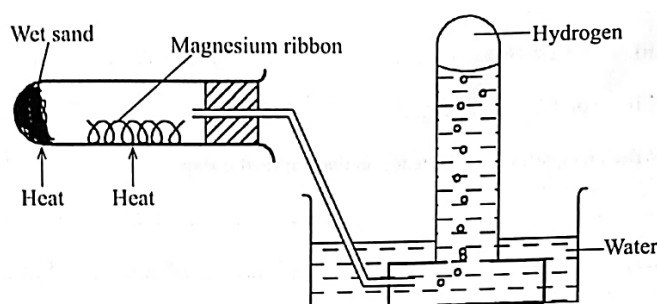
24. During extraction of iron in the blast furnace, state the uses of the following from the furnace.

a. Molten slag (1 mark)

b. Waste gases leaving the furnace. (1 mark)

c. Limestone (1 mark)

25. Hydrogen can be prepared by passing steam over heated magnesium ribbon as shown in the figure below



(a) Write an equation for the reaction that produces hydrogen gas. (1mk)

(b) Explain why the delivery tube must be removed from beneath the water before heating is stopped. (1 mark)

(c) Explain why sodium metal is not suitable for this experiment. (1mk)