

NAME: Marking Scheme CLASS: ADM.NO. :

CHEMISTRY OPENER

TERM 1 -2024

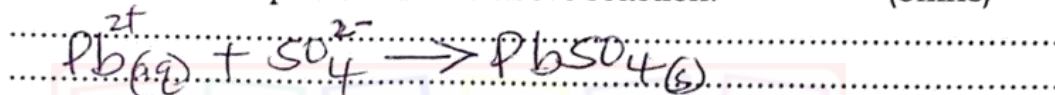
FORM THREE

TIME: 1HR 30 MIN

Answer All questions in the spaces provided.

1. In an experiment, lead nitrate $Pb(NO_3)_{2(aq)}$ reacted with magnesium sulphate $(MgSO_4)_{(aq)}$

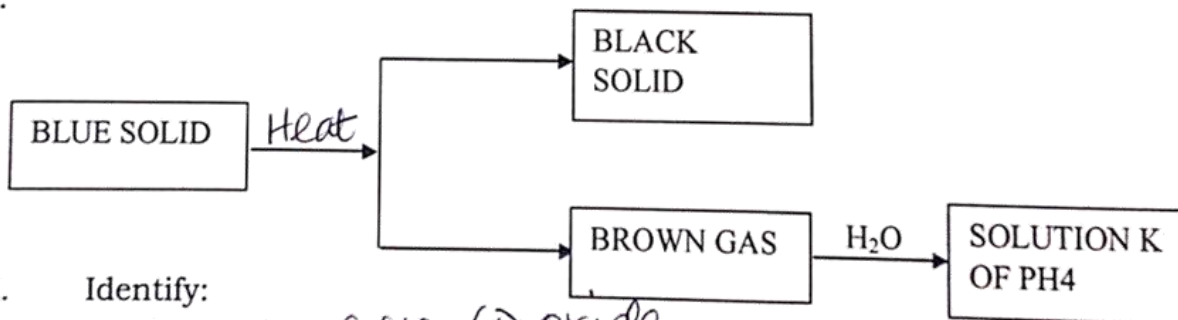
a. Derive an ionic equation for the above reaction. (3mks)



b. Given lead (II) oxide, nitric (V) acid, sodium carbonate solution, water, explain into details how you can prepare lead II carbonate. (3mks)

- React ~~excess~~ excess Lead (II) oxide with dil. HNO_3 to obtain and filter to obtain $Pb(NO_3)_2(aq)$
- React $Pb(NO_3)_2$ with $Na_2CO_3(aq)$ and filter to obtain $PbCO_3(s)$
- Dry residue between two filter papers

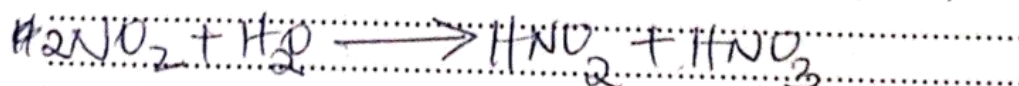
c. .



i. Identify:

- a) Black solid - Copper (II) oxide
- b) Blue solid - Copper (II) nitrate
- c) Brown - Nitrogen (IV) oxide

ii. Write a chemical equation between Brown gas and water to form solution K. (2mks)



2. The reactivity of alkali metals increase down the group while that of halogens increase up the group. Explain. (2mks)

Alkali metals reacts by losing electrons while halogens reacts by gaining electrons. Increase in atomic size in Alkali metal reduces force of attraction of the atom outermost electron while in halogen smaller atomic size pull electron easily. The first and second ionization energies of sodium are 496 KJ mol^{-1} and 4563 KJ mol^{-1} respectively. Explain why the second ionization energy is far much higher than the first ionization energy. (2mks)

Because 1st electron was in the 3rd energy level while 2nd is in the 2nd energy level hence more attraction.

4. Explain the following observations:

a. Solid sodium chloride does not conduct electricity whereas molten sodium chloride and sodium chloride solution are good conductors of electricity. Explain. (2mks)

Solid NaCl \rightarrow No mobile ions

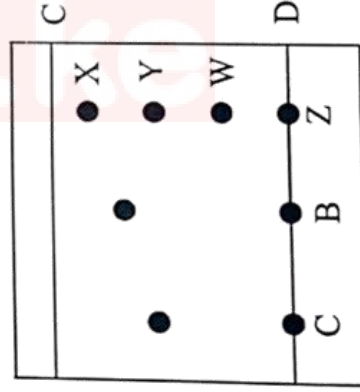
Molten NaCl \rightarrow Has mobile ions

Solution NaCl \rightarrow Has mobile ions.

b. Sodium has a melting point of 98°C while aluminium has a melting point of 660°C (atomic numbers : Na=11, Al=13) (2mks)

Aluminium has a smaller atom than sodium and three valence electrons hence has more force of attraction.

5. Spots of pure pigments A and B and a mixture Z were placed on a filter paper and allowed to dry. The paper was then dipped in a solvent. The results obtained were as the paper chromatogram.



a) Which is the;

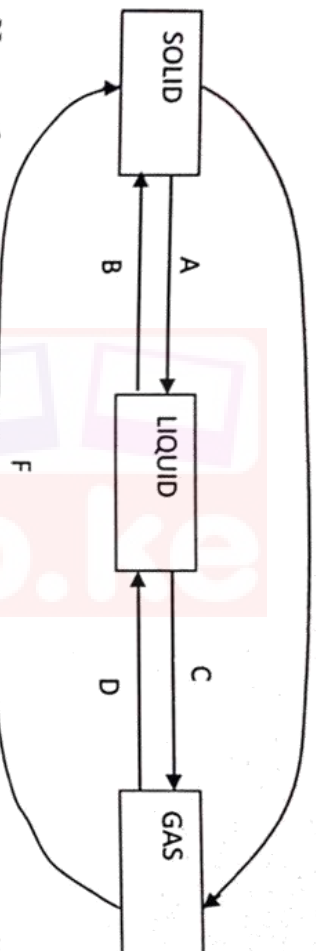
i) Baseline? D

ii) Solvent front? C

(2mks)

b) Which of the pure pigments was a component of Z? Explain. (2mks)
 C because the spots are corresponding.

6. The diagram below shows the inter-conversions between the various states of matter. Study it and answer the questions that follow:



a) Name the processes labeled A to E. (3mks)

A - Melting
 B - Freezing
 C - Evaporation
 D - Condensation
 E - Sublimation

b) Name any two substances that can be recovered from a solid mixture using the processes labeled E and F. (2mks)

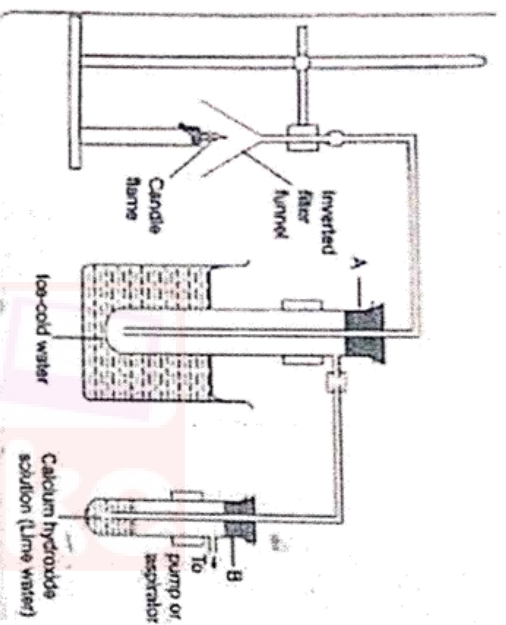
- Iodine
 - Ammonium chloride
 - Benzene acid
 - Amphetamine
 - Camphor

7 (a) What is rust? (1mk)
 It is the corrosion of iron due to its reaction with atmospheric oxygen and moisture.

(b) Explain one advantage of rusting. (1mk)
 Helps in elimination of iron waste.

(c) Name two methods of preventing rust. (1mk)
 - Painting
 - Alloying
 - Sacrificial protection
 - Coating with other metals
 - Oiling and greasing

8 The set-up below was used to investigate the products formed when candle wax burns in air. Study it and answer the questions that follow.



a) What observations are made in:

i) Test-tube A?

- a colourless liquid is formed.

(1mk)

ii)

Test-tube B? Explain.

Lime water changes to milky white forms a white precipitate. (2mks)

b) Explain why test-tube A is dipped in cold water.

To condense the vapours from the burning candle. (1mk)

9. The atomic numbers of elements C and D are 19 and 9 respectively. State and explain the electrical conductivity of the compound CD in:

a) Solid state.

- Does not conduct

- ions at a fixed position

(1 ½ mks)

b) Aqueous state.

- Conducts electricity

- ions are free and mobile

(1 ½ mks)

10. What type of bond is formed when lithium and fluorine reacts? Explain. (Atomic numbers Li=3 and F=9) (2mks)

- Ionic,
- Total transfer of electrons from Lithium to Fluorine.

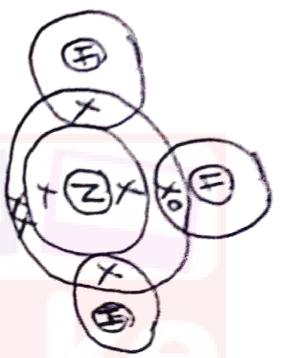
11. Iron (III) oxide was found to be contaminated with copper (II) sulphate. Describe how a pure sample of iron (III) oxide can be obtained. (3mks)

- Dissolve the mixture in water. Copper(II) sulphate
 dissolves while iron(III) oxide does not.
 - Filter to obtain iron(III) oxide

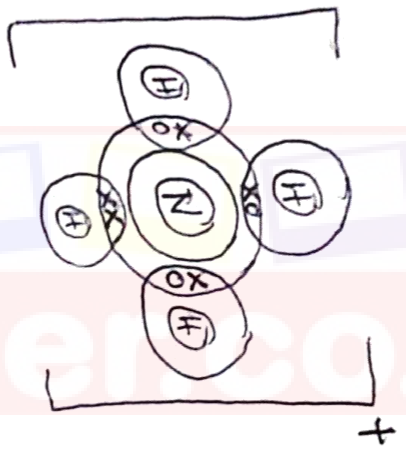
12. Using dots (.) and crosses (x) to represent electrons draw diagram to represent the bonding in;

(4mks)

i) NH_3



ii) NH_4^+



13. (a) What are isotopes? (1mk)

atoms of the same elements with equal atomic number and different mass number.

(b) Lithium has two isotopes ${}^7\text{Li}$ and ${}^6\text{Li}$. Determine the number of neutrons in ${}^6\text{Li}$. (2mks)

$$6 - 3 = 3 \text{ neutrons}$$

(c) If the relative atomic mass of lithium is 6.94. Which of the two isotopes is the most abundant? Give a reason. (2mks)

${}^7\text{Li}$ because the RAM is closer to it.