INSTRUCTION.

ANSWER ALL QUESTION.

1. Study the table below and answer the questions that follow. The letters do not show the actual symbol:-

Ion	Electron Arrangement
R^{2-}	2.8.8
S^{2-}	2.8

(handwritten margin: 2 8 8 2 / 2)

a) Write the electron arrangement of each atom.
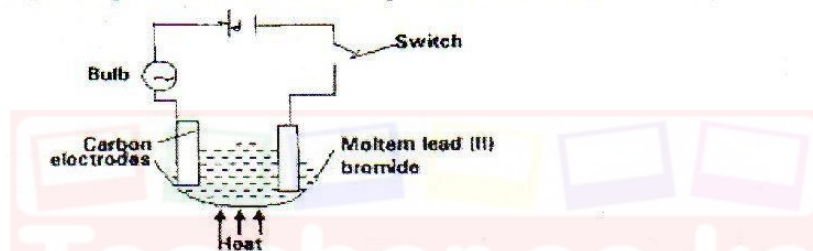
R ...... 2,8,8,2 ...... (1 mark)

S ...... 2,6 ...... (1 mark)

b) Write the formula of the oxide of R and Chloride of S

Oxide of R ...... RO ...... (1mark)

Chloride of S ...... SCl_2 ...... (1mark)

2. Study the set up below and answer the questions that flows

State all the observations that would be made when the circuit is completed   (3marks)

- Cathode is coated with a grey coat.
- Brown fumes produced at the anode.

3. Starting with solid lead (II) nitrate, solid sodium sulphate and water, describe how a solid sample of lead (II) sulphate can be prepared in the laboratory.
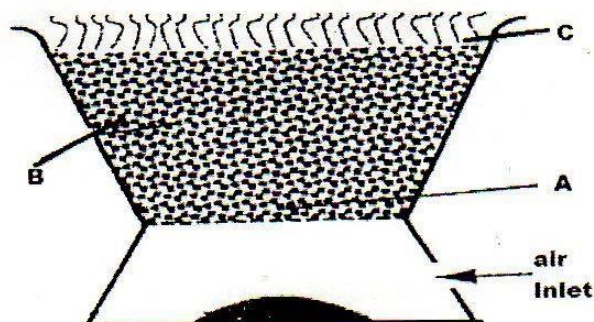(3mks)

- Dissolve $PbNO_3$ and $NaSO_4$ in water separately
- Mix the two solution

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wash
- Filter to obtain the ~~filter~~ residue (Ɓ $PbSO_4$).
- Dry the residue between two filter papers.

4. The diagram below shows a charcoalstove in a well-ventilated room. Study it and answer the questions that follow.

a) Write the chemical equation for the reaction that takes place at

   i)   Region B....$CO_{2(g)} + C_{(s)} \rightarrow 2CO_{(g)}$...........................(1mark)

   ii) Region A ....$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$...........................1mark)

   iii) Region C.....$2CO_{(g)} + O_{2(g)} \rightarrow 2CO_2$................. (1mark)

b) If the above stove is used in a poorly ventilated room, carbon (ii) oxide gas would be formed due to incomplete combustion of charcoal. State <u>two</u> reasons why the gas is also termed as 'silent killer'   (2 marks)

   — Is odourless
   — Is Colourless

5 (a) **Figure 8** shows chromatograms of different components of compound L administered to an HIV patient as an anti- retroviral. Use to answer the questions that follow.

Figure 8
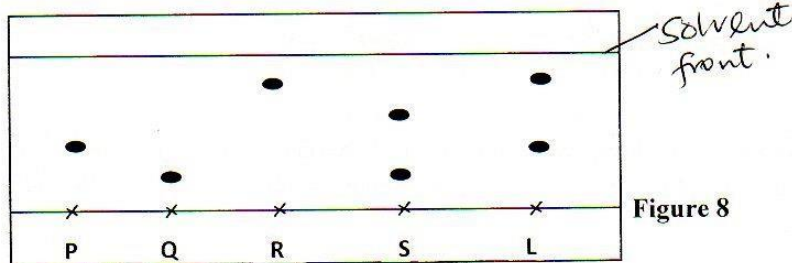
   (i) State the component of the anti- retroviral
        drug.....P and R...............(1 mark)

   (ii) Identify a pure substance(s).
        ....P, Q, and R...............(1mark)

   (b) On the diagram label the solvent front.   (1 mark)

(c) Give two factors that determines the flow of pigments in chromatograph
(1mark)
1. Adsorbent of pigment in the solvent paper.
2. Density.
3. Solubility of pigment to the solvent

(d) Give another practical application of the method above   (1mark)
- Identify banned substances used by sports men/woman
- Test for drug purity.   - Identify harmful subst
- Identify food contaminants   in foods & drinks
(e) Describe briefly how components of drug separated can be obtain   (2marks)
- Tear off the spots. Was dissolve the pigment
differently in suitable solvents.
- Evaporate the solvent to obtain the solvent.

6.   Use the information in the table below to answer the questions that follow.
(The letters do not represent the actual symbols of the elements).

Element	Q	P	R	S	T
Atomic number	18	5	3	5	20
Mass number	40	10	7	11	40

(a) Which **two** letters represent the same element. P and S (1mark)

(b) Give the number of neutrons in an atom of element
R 7-3 = 4 (1mark)

7.   Describe how crystals of sodium chloride can be prepared starting with sodium hydroxide solution.
                              hydroxide   (3 marks)
- React sodium chloride solution with dilute hydrochloric
acid in the presence of phenolphthalein indicator.
- Heat to saturation and allow it to cool
- Dry the crystals between two filter papers.

8.   The figure below represents a section of the periodic table. Study it and answer the questions that follow. The letters do not represent the actual symbols of elements.

B								
C			D	E			F	G
		Z						
H	J							

a) i). What chemical family does element **J** belong to? (1 mark)

Alkaline Earth metal.

ii). Compare the reactivity of element C and H. Explain. (2 marks)

- H is more reactive than C.
- H has a larger atomic radius than C hence loose electron easily.

b) i) Write the chemical formula of the chloride of element D

D_2Cl_6 ....(1 mark)

ii) Name the type of structure of the chloride in b (i) above

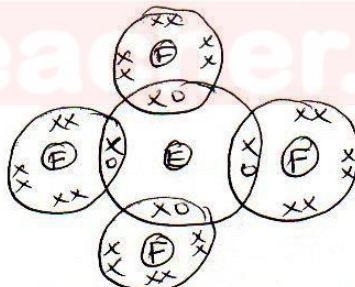*non covalent* .... (1 mark)

c). State and explain the difference in atomic radius and ionic radius of element F

(2 marks)

Ionic radius larger than atomic radius due to repulsion force of the incoming electron and electrons in the energy levels.

d). Using dots (.) and crosses (x) show how bonding occurs when element E and F react.

(2 marks)

9. Study the information below and answer the questions that follow:

Formula of the chloride	NaCl	$MgCl_2$	MCl_2	$SiCl_4$	PCl_3	SCl_2	
M.P(^{0}C)	801	714	-	-70	-91	-80	S
Formula of the oxide	Na_2O	MgO	Al_2O_3	SiO_2	P_4O_{10}	SO_2	Cl_2O_7
M.P(^{0}C)	1190	3080	2050	1730	560	-73	-90

(a) Aluminium chloride $AlCl_3$ has an unexpected bond type and structure.

(i) State the type of bond and the structure in Al_2Cl_6

Bond

Bond type......Covalent... (1 mark)

Structure..........~~simple and~~ Giant covalent.... (1 mark)

(ii) What type of bonding would AlCl₃ be expected to have why? (1 mark)

Ionic because Al is a metal Al can loose electrons and chlorine accept an electron

(iii) Why is the melting point of AlCl₃ not indicated in the table above. (1mark)

Because when heated it sublimes

(b) A piece of blue litmus paper is placed in a solution of sodium chloride and a solution of aluminium chloride. Explain what would be observed in each case.

Sodium chloride solution (1 mark)

No change is observed on litmus paper. Solution neutral

**Aluminium chloride solution** (2marks)

Blue litmus changes to red because aluminium chloride is hydrolysed in water to form Hcl acid

(c) Explain the large difference in the melting point of the compound of formula

MgO and P₄O₁₀ (2marks)

MgO— bonds ionically joined by strong electros force (Giant ionic structure)

P₄O₁₀ — bonds covalent joined by weak van de waals forces (covalent structure)

(d) Write down the equations for the reaction between the compounds of formula

Na₂O and water. (1mark)

$Na_2O_{(s)} + 2H_2O_{(l)} \longrightarrow 2NaOH_{(aq)} + H_{2(g)}$
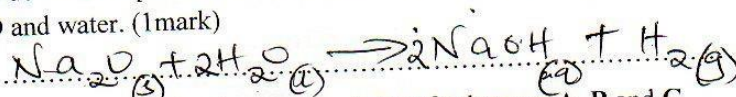
10. The table below shows the electrical conductivity of substance **A, B** and **C**

Substance	Solid state	Molten state	Aqueous solution
A	Conducts	Conducts	Not soluble
B	Doesn't conduct	Conducts	Conducts
C	Doesn't conduct	Doesn't conduct	Not soluble

(a) Which one of the substance is likely to be diamond? ......C...... (1mark)

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(b) Explain why the substance you have given in **(a)** above behaves in the way it does (1mark)

...... Bonds covalently with each carbon bonding with four other carbons.

(c) Which of the substances is likely to be sodium chloride? Explain (2marks)

...... B conducts electricity in molten but poor in solid state

(d) Give the type of structure and bonding that is present in substance **A.** (1 mark)

Structure ...... Giant metallic

Bonding ...... Metallic

e) .An element x belongs to group (IV) and period 3 of the periodic table. The two isotopes of x are ^{30}X and ^{Q}X. If it's RAM is 28.3. Calculate the number of neutrons in the isotope ^{Q}X if its abundance is 90%. (2 mks)

$$^{30}X \qquad ^{Q}X$$

$$Ab \Rightarrow 10\% \quad 90\%$$

$$\frac{30\times10 + 90\times Q}{100} = 28.3$$

$$300 + 90Q = 2830$$

$$90Q = 2530$$

$$Q = 28.$$

Configuration $\Rightarrow$ 2, 8 4

No of Protons = 14

Neutrons = 28 - 14

= 14.

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