**Answer all the questions.(70 Marks)**

1. Name the chemical technique for separating the following : -

(i) Copper (II) oxide and Copper(II)Sulphate.   **(1 Mark)**

....

(ii) Propane (b.p 58C) from a mixture of propane and water.   **(1 Mark)**

....

2. Pure water can be obtained from sea water by using the apparatus below.
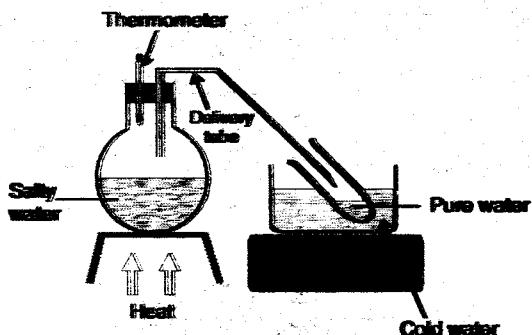
(a) Why is the thermometer placed in the position shown in the figure?   **(2 Marks)**

....

(b) Why is the distilled water collected in the conical flask unlikely to contain any dissolved salts? How can you show that this is true?   **(3 Marks)**

....

....

(c) Name industrial process where fractional distillation is applied in separating substances. **(2 Marks)**

....

3. Illustrate by the aid of a diagram, how one would collect Hydrogen gas in the laboratory.   (5 Marks)

4. Define the following terms : -

(a) Atomic number   **(2 Marks)**

....

(b) Mass number   **(2 Marks)**

....

(c) Oxidation number   **(2 Marks)**

....

(d) Ionisation energy   **(2 Marks)**

....

5. How many atoms are there in each of the following formulae units?

Example: $Ca(NO_3)_2 = 9$ atoms

(i) $Na_2SO_4 =$ _____ atoms   **(1 Mark)**

....

(ii) $HNO_3 =$ _____ atoms   **(1 Mark)**

....

(iii) $(NH_4)_2CO_3 =$ _____ atoms   **(1 Mark)**

....

(iv) $Mg(NO_2)_2 =$ _____ atoms   **(1 Mark)**

....

(v) $2Na_3AlO_3 =$ _____ atoms   **(1 Mark)**

....

6. Write the chemical formula of:
  (a) One molecule of Helium gas **(1 Mark)**

....
  (b) Sodium sulphate **(1 Mark)**

....
  (c) Zinc oxide **(1 Mark)**

....
  (d) Sodium chloride **(1 Mark)**

....
  (e) Lead carbonate **(1 Mark)**

....
7. A metallic element X has a valency of 2. Write down the formulae of its
  (i) Oxide **(1 Mark)**

....
  (ii) Chloride **(1 Mark)**

....
  (iii) Carbonate **(1 Mark)**

....
  (iv) Sulphate **(1 Mark)**

....
  (v) Hydroxide **(1 Mark)**

....
8. Balance the following chemical equations
  (i) $H_2S + SO_2 \rightarrow H_2O + S$ **(2 Marks)**

....
  (ii) $NaCl + Pb(NO_3)_2 \rightarrow PbCl_2 + NaNO_3$ **(2 Marks)**

....
  (iii) $CaCO_3 + HCl \rightarrow CaCl_2 + CO_2 + H_2O$ **(2 Marks)**

....
  (iv) $CuSO_4 + H_2S \rightarrow CuS + H_2SO_4$ **(2 Marks)**

....
  (v) $P(s) + O_2(g) \rightarrow P_2O_3(s)$ **(2 Marks)**
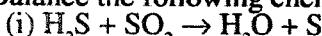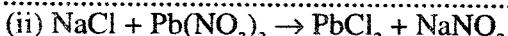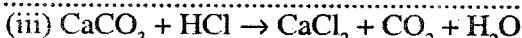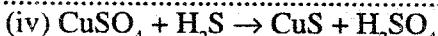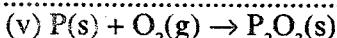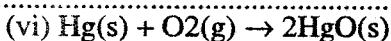
....
  (vi) $Hg(s) + O2(g) \rightarrow 2HgO(s)$ **(2 Marks)**

....
9. Use the grid below to answer the questions that follow.(The letters do not represent the actual symbols of the elements).

		Transitional metals						G
O				Q				
T						R	S	A
V							U	Z

  (i) Which element will require the least amount of energy to remove one of the outer-most electrons? Give a reason for your answer. **(2 Marks)**

....
  (ii) Which name is given to the family of element to which
    (a) Elements G and A belongs **(2 Marks)**

....
    (b) Elements O, T and V belongs **(2 Marks)**

....
  (iii) An element W has atomic number 15, indicate the position of W on the grid. **(1 Mark)**

....
  (iv) What is the atomic number of Z? **(1 Mark)**

....
10. Use the table below to answer questions that follow.

Element	T	U	V	W	X	Y
Atomic number	12	13	14	15	16	17

(i) Give the electronic arrangement of:

Element U .... (1 Mark)

Element W .... (1 Mark)

Element X .... (1 Mark)

Element Y .... (1 Mark)

(ii) In which period of the periodic table do these elements belong? Give a reason. (2 Marks)

....

(iii) Give the formula of the compound formed between U and V. (2 Marks)

....

(iv) Which of the ions X^{2+} and X^{2-} is more stable? Explain. (2 Marks)

....

(v) Define the term "energy level". (1 Mark)

11. A student was asked to determine the percentage of zinc metal in a mixture of zinc metal and zinc oxide. He reacted the mixture with excess hydrochloric acid and accurately collected the gas evolved, which was then used to calculate the amount of zinc in the mixture.

   a) Name the gas that was evolved? (2 marks)

....

(b) Apart from the reaction liberating the gas write a balanced equation for the other reaction that took place (2 marks)

....

(c) Why would dilute nitric acid not suitable for this reaction? (2 marks)

....

12. The table below shows some properties of elements in period three of the periodic table. (The letters do not represent actual symbols of the elements)

Element	R	T	Q	V	X	G
Atomic size (nm)	0.125	0.110	0.136	0.117	0.104	0.156
M.P (0C)	660	44.2 59.0	650	1410	113 119	98
Electrical conductivity	Good	Poor	Good	Poor	Poor	Good
Formula of oxide	R_2O_3	T_2O_3	QO	VO_2	XO_2	G_2O

   a) (i) Using the atomic radii given, arrange the elements as they appear across the period. (1 mark)

   (ii) Comment on the trend of atomic sizes as arranged in a(i) above. (2 marks)

....

   b) Which element is likely to be sulphur. Explain. (1 mark)

   c) Element T has two melting point values. Explain. (1 mark)

   d) Explain why the melting point of V is much higher than that of T. (2 marks)

....

   e) An oxide of G was placed in water containing phenolphthalein indicator. Explain the observation that was made. (1 mark)

....

   f) Select the oxide which can react with both sodium hydroxide and hydrochloric acid solutions. Explain. (1 mark)

...

   g) State the mode of electrical conductivity and form in which Q and QO conducts electricity.

   Q (1 mark)

....

   Q O (1 mark)

CHEMISTRY MARKING SCHEME   FORM 2

1. (i) Crystallization
   (ii) Simple distillation

2. (a) To ensure that temperature does not rise beyond 1000C
   (b) -It is impossible for the solute to escape to the delivery tube with the vapour
       - Finding the boiling point of water collected. Pure water boils at 1000C
   (c) - Separation of crude oil
       - Brewing of alcohol (pure ethanol)

3.
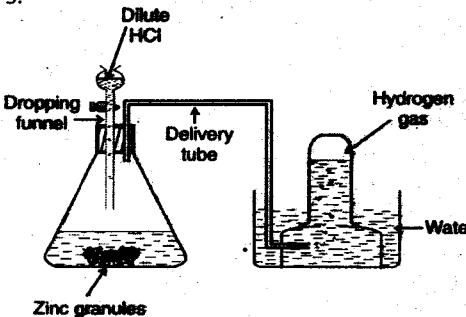
4. (a) No of protons in the nucleus of an atom
   (b) The number/total/sum of protons and neutrons in the nucleus of an atom
   (c) The charge on the resulting ion when an atom loses or gains electrons
   (d) Energy required by an atom to lose electrons in gaseous state

5. (i) 6
   (ii) 5
   (iii) 14
   (iv) 9
   (v) 14

6. (a) He
   (b) Na2SO4
   (c) ZnO
   (d) NaCl
   (e) PbCO3

7. (a) XO
   (b) XCl2
   (c) XCO3
   (d) XSO4
   (e) X(OH)2

8. (i) 2H2S + SO4 ⊗ 2H2O + S
   (ii) 2NaCl + Pb(NO3)2 ⊗ PbCl2 + 2NaNO3
   (iii) CaCO3 + 2HCl ⊗ CaCl2 + CO2 + H2O
   (iv) Balanced
   (v) 4P + 3O2 ⊗ 2P2O3
   (vi) 2Hg + O2 ⊗ 2HgO

9. (i) V=The outermost electron is the farthest in V than in T or O. The force of attraction to the positive nucleus in V is the least
   (ii) (a) Noble gases
       (b) Alkali metals
   (iii) The same box (position) as R
   (iv) 25

10. (i) 2.8.3
    2.8.5
    2.8.6
    2.8.7
    (ii) Period 3: They have three energy levels
    (iii) U4V3
    (iv) X2- = When X gains 2 electrons it forms a stable octet
        (v) The specific site from the nucleus where electrons are located

11. a) Hydrogen gas.   2mk
    b) ZnO(s) + 2HCl(aq)   ZnCl2 + H2O(l)   2mk

    c) It's a stronger oxidizing agent and so would oxidize some of the gas formed to water.

12. a)i) G, Q, R, V, T, X□   1 mark
    (No other order)

        ii) Atomic size decreases □ across the period; due to increase in nuclear charge
    hence electrons pull □ ½ towards the nucleus strongly□ ½
        2mks
    b) Element □ ½ x ; has a low melting point // has a melting point of 113
    c) Its allotropic□
    d) V has covalent bonds □ ½ with giant atomic structure which requires a lot of heat to break while T has simple □ ½ molecular structure held by weak intermolecular forces which are easily broken.
    e) Solution turns pink □ ½; oxide form an alkaline solution in water □ ½
    f) R2O3 □ ½ // oxide of R; Amphoteric□ ½
    g) Q mode of conductivity :- molten □ ½ or solid conducts by : delocalized electrons□ ½
    Q□ mode: Molten□ ½ or in solution conducts by: free ions □ ½ // mobile ions.