**CHEMISTRY FORM 3**

**DECEMBER HOLIDAY ASSIGNMENT**

1. The diagram shows part of the Periodic Table. The letters are not the actual symbols of the elements.



(a) Compare the reactivity between elements Q and T. (2 marks)

(b) Explain the electrical conductivity of the chloride of element T. (2 marks)

(c) Compare the melting and boiling points of elements R and S. (2 marks)

(d) Write an equation for the second ionization energy of element Q. (1mark)

(e) How does the atomic and ionic radius of each of the following elements compare?
(i) Element T. (1½ marks)

(ii)Element P (1½ marks)

(f) Compare atomic radius of elements R and Q. (1½ marks)

(g) Explain the difference in the melting points of the oxides of element Q and the oxide of element R.

2 (a) The diagram below shows the structure of an allotrope of sulphur



(i) What are allotropes? (1mark)

(ii) Identify the allotrope shown in the diagram above. (1mark)

(iii) State **two** properties of the allotrope above. (2 marks)

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



(i) Write the equation for the reactions in:

I. step I. (1mark)

II. Step II. (1mark)

(ii) State **two** observations made in step II. (2 marks)

(iii) Explain the observations made in:

I. Step IV. (1½ marks)

II. Step V. (1½ marks)

(iv) State **one** use of gas T. (1mark)

3. Next to each letter, **A** to **F**, in the table below is the molecular formula of an organic compound.



(a) Choose a molecular formula above that represents an organic compound below. Write down only the letter (A to F) next to the question numbers

(i) A haloalkane (½ mark)

(ii) An alcohol (½ mark)

(iii) An unsaturated hydrocarbon (½ mark)

(iv) A product of thermal cracking of compound C. (½ mark)

(b) If compound F is a carboxylic acid, write down the following:

(i) The structural formula of a functional isomer (an isomer with a different functional group) of F.

(ii) The IUPAC name of a functional isomer of F. (1mark)

(c) Compound B is a monomer used to make a polymer. Write down the:

(i) Definition of a polymer. (1mark)

(ii) IUPAC name of the polymer. (1mark)

(iii) Balanced equation for the polymerisation reaction (1mark)

(d) Compound A is used as a reactant in the production of compound D.

(i) Name the type of reaction that takes place. (1mark)

(ii) State two changes that can be made to the reaction conditions in (d) (i) to obtain compound B, instead of D, as product. (2 marks)

7 (a) (i) What is a salt? (1mark)

(ii) Write the formula of any **two** double salts. (1mark)

(b) A student has found that her sample of potassium nitrate is contaminated with small amounts of a green solid. She picks out a small piece of the green solid and finds that it is insoluble in water.

(i) Describe how you would make a pure sample of potassium nitrate from the impure mixture. (3 marks)

(ii) The student believes that the green solid is copper (II) carbonate. Describe a series of 3 tests that the student could use to confirm this. (6 marks)

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| --- | --- | --- | --- |
| **Test** | **Procedure** | **Observations** | **Conclusion** |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |

(c) In an experiment 50g of a saturated solution of a salt X was heated to dryness in an evaporating dish. The mass of crystals when weighed gave a reading of 2.7g. Determine the solubility of the salt. (2 marks)

9. During distillation in a laboratory the distillate can be collected either by a beaker or a conical flask.

(a) Define the term distillate. (1mk)

(b) Explain why a conical flask is the most preferred apparatus for the collection of the distillate. (1mk)

(c) Draw the diagram of a graduated conical flask. (1mk)

10. In an experiment to determine the proportion of oxygen in air, copper turnings were packed in excess in a long combustion tube connected to two syringes of 110cm3 each in volume. At the beginning of the experiment, syringe R contained 110cm3 of air while syringe **M** was closed and empty as shown.

Copper turnings

Heat

Syringe R

Syringe M

Glass wool

Air was passed over the heated copper slowly and repeatedly until there was no further change in volume. 97.5cm3 of air remained in syringe M.

(a) State and explain the observation made in the combustion tube. (2mks)

(b) If the volume of air in the **combustion tube** at the beginning of the experiment was 23.8cm3 and at the end of the experiment reduced to 10cm3, calculate the percentage of the active part of air. (2mks)

11. Below is a structure of an element X. Use it to answer the questions that follow.

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+

+

+

+

+

1. Name the chemical family to which element X belongs. Give a reason. (2mks
2. (i) Define covalent bond. (1mk)

 (ii) Using dots ( ) of cross ( **x** ) diagram, show bonding in Carbon (II) Oxide. (1mk)

12. (a) (i) State ***two*** allotropes of Carbon. (1mk)

 (ii) Explain the differences in their densities. (2mks)

(b) (i) Name the process used for large scale production of Sodium Carbonate using brine as raw material. (1mk)

(ii) Write the overall chemical equation for the reaction in the carbonator. (1mk)

(c) Name two gases recycled in the above process (1mk)