**ELERAI MCK GIRLS SECONDARY SCOOL**

**FORM THREE**

**CHEMISTRY PAPER 1**

***Attempt all the questions***

1. (a) The grid below represents part of the periodic table. Study the information and answer the questions that follow. The letters do not represent the actual symbol of the elements.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| C  |  |  |  |  |  |  |  |  |
| H |  |  W  |  | T |  | R | Y  | F |
|  | E  |  | S |  |  |  | Z |  |
| M | I |  |  |  |  |  |  |  |

 (i) Which element would form a trivalent cation? (1 mark)

 (ii) Write the equation for the reaction that would occur between E and Y. (1 mark)

 (iii) Which elements belong to the region labelled W (1 mark)

 (iv) Which is the most reactive non-metallic element in the table above? Explain

 (2 mks)

 (v) How does the atomic radius of T compare with that of Y (2 marks)

 (b) The table shows some properties and electron arrangements of common ions of elements represented by letters D to K. Study the information and answer the questions that follow.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | Formula of ion | Ionic electron arrangement | Atomic radius (nm) | Ionic radius (nm) |
| D | D- | 2.8 | 0.072 | 0.136 |
| E  | E+ | 2.8.8 | 0.231 | 0.133 |
| F | F3+ | 2.8 | 0.143 | 0.050 |
| G | G2+ | 2.8.8 | 0.133 | 0.074 |
| H | H2+ | 2.8 | 0.160 | 0.064 |
| I | I+ | 2.8 | 0.186 | 0.095 |
| J | J3- | 2.8.8 | 0.110 | 0.190 |
| K | K- | 2.8.8 | 0.099 | 0.181 |

 (i) State the atomic numbers of elements F and G (1 mark)

 (ii) Select two metals that belong to period 3. (1 mark)

 (iii) Element I reacts violently with water. Write the equation for the reaction. (1 mark)

 (iv) Why is the ionic radius of G smaller than its atomic radius (1 mark)

 (v) Compare and explain the reactivity of G and H (2 marks

1. Study the table below and answer the questions that follow.

|  |  |  |
| --- | --- | --- |
| **Element** | **Atomic radii (nm)** | **Ionic radii (nm)** |
| **Flourine** | 0.071 | 0.136 |
| **Chlorine** | 0.099 | 0.181 |
| **Bromine** | 0.114 | 0.195 |

 (a) Explain why

 (i) Atomic radius increases from fluorine to bromine (2 marks)

 (ii) The ionic radius is larger than the atomic radius. (2 marks)

 Thermometer

 X

 Y

Liquid

Mixture A

 Heat

(i) Name X and Y (1 mark)

 (ii) What is the purpose of apparatus X? (1 mark)

 (iii) Show the direction of flow of cold water used for cooling the vapour formed. (1 mark)

 (iv) What name is given to the above method of separating mixtures (1mk)

1. A student set-up the experiment below to collect gas K. The glass wool was heated before heating the zinc powder.

Glass wool

Soaked

with water

Boiling tube

Gas K

Zinc powder

Heat

Heat

1. Why was it necessary to heat the moist glass wool before heating the zinc powder? (1 mark)

(b) What observation was made in the boiling tube. (1 mark)

(c) Identify gas K. (1 mark)

5. State whether solution with the following PH values are acidic, base or neutral

A= PH = 3, B=PH =6, C=PH =2, D=PH=12, E=PH=7, F=PH =8

Which of the following PH values listed above is of

1. A strong acid …………………………………………………………… (1mks)
2. A weak base……………………………………………………………… (1mk)
3. A strong base ………………………………………………………… (1mk)
4. A weak acid ……………………………………………………….. (1mk)

6. Using dots (.) and crosses (x) show the bonding in (4mks)

1. NH4+
2. Nacl

**7.** Study the diagram below and answer the questions that follow

1. What is observed on the anhydrous copper (II) sulphate? 1**mark**

………………………………………………………………………………………………………………

1. Write an equation for the reaction between lead (II) oxide and hydrogen 1**mark**

………………………………………………………………………………………………………………

1. After the reaction is over, dry hydrogen is continuously passed through the combustion tube until it cools down. Explain 1**mark**

………………………………………………………………………………………………………………

8. A chromatogram of acid enzymes X and Y and three simple jars are shown below



1. On the diagram, show the solvent front 1**mark**
2. Which two simple sugars must be present in X and Y only 1**mark**

………………………………………………………………………………………………………………

1. Give two properties that make the pigments in the substances move furthest from the original spot 2**marks**

…………………………………………………………………………………………………………………………………………………………………………………………………………………………

9.Potassium is isotopic and has relative atomic mass of 39.5. Workout the percentage abundance of each isotope. The two isotopes are 39K, 40K and 38K(0.01%). (3mks)

10.Study the diagram below and use it to answer the questions that follow.

H2(g)

I II

Heat

Anhydrous copper II sulphate

Y

M

Anhydrous CaCl2

CuO

1. What are the observation made in the combustion tube at:

Part I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1mk)

Part II \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1mk)

Write a chemical equation for the reaction taking place at point Y. (1mk)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(c)Name the apparatus labeled M. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1mk)