NORTHERN EDUCATION DIVISION

MALAWI SCHOOL CERTIFICATE MOCK EXAMINATIONS

CHEMISTRY marking key

Subject number: M038/II

Time Allowed: 2 hours

10:00hrs – onwards

PAPER II

PRACTICAL

(40 Marks)

Section A (20 marks)

Answer **both** questions in this section

1. Describe how a solution of $250\,cm^3$ of $0.2\,M$ hydrochloric acid can be prepared from a stock solution of $5\,M$..

$$C_1V_1 = C_2V_2 1$$

$$250\,cm^3 \times 0.2\,M = 5\,M \times V_2 1$$

$$V_2 = \frac{250\,cm^3 \times 0.2\,M}{5\,M} = 10\,cm^3 1$$

a. ***Pipette/measure*** $10\,cm^3$ ***of hydrochloric acid from the stock solution. 1***

b. ***Quantitatively transfer the volume of acid into a*** $250\,dm^3$ ***volumetric flask. 1***

c. ***Add distilled water to the volumetric flask until the solution level is just below the calibrated mark. 1***

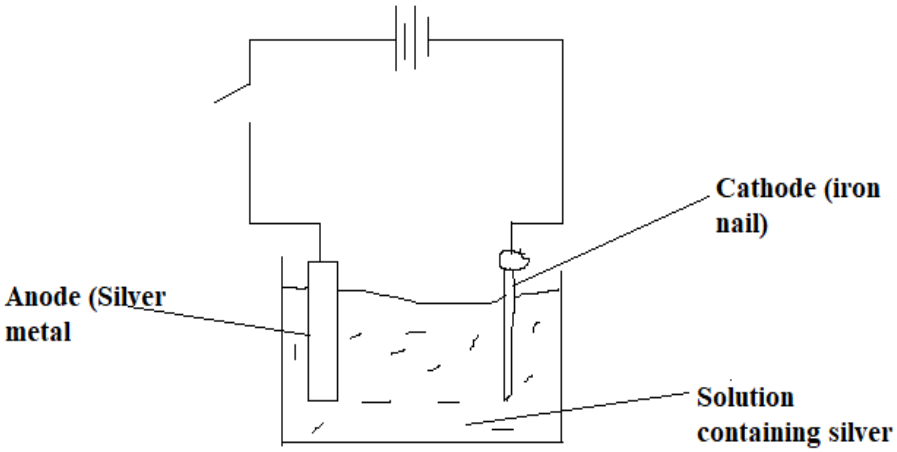
d. ***Using a wash bottle add more distilled water drop by drop until the bottom of the meniscus is at the*** $250\,dm^3$ ***mark. 1***

e. ***Cork/close the volumetric flask. 1***

f. ***Invert the flask several times to make sure the solution mixes thoroughly. 1***

g. ***Transfer the solution into reagent bottle and label it*** $0.2\,M\,HCl$***. 1***

2. With aid of a well labelled diagram, describe an experiment you could use to electroplate an iron metal using a silver metal (in your description include relevant chemical equations).



1 mark for correct diagram, 2 marks for 3 correct labels

- ***Set up an experiment as shown above (1)***
- ***Close the switch and observe***
- ***When the switch is closed, the silver metal dissolves/oxidizes by losing electrons and forms silver ions as follows (1)***

$$Ag(s) \rightarrow Ag^{+}(aq) + e^{-}$$ ***(1)***

- ***The electrons travel through the external circuit to the cathode (1)***
- ***The silver ions in the solution move to the cathode and gain an electron to become silver atoms as follows (1)***

$$Ag^{+}(aq) + e^{-} \rightarrow Ag(s)$$ ***(1)***

- ***The colour of the nail changes to silver showing that silver has been deposited on the nail (1)*** **(10 marks)**

3. You are provided with the following sodium hydroxide solution in a dropper bottle, test tube rack, 3 test tubes, distilled water in a wash bottle, solutions containing Calcium ions (Ca^{2+}), Aluminium ions (Al^{3+}) and Iron II ions (Fe^{2+})labelled **A,B and C** but not necessarily in that order.

a. Pour about 2ml of solution **A** into a test tube

b. Add 3 drops of sodium hydroxide solution into the test tube

c. Shake the testubes

d. Note and record your observation in the table below

e. Further add 15 drops of sodium hydroxide solution into the test tube

f. Note and record your observation in the table below

g. Repeat steps (a) to (f) using solutions **B and C** respectively

Solution	Addition of 3 drops of sodium hydroxide solution	Further addition of 15 drops of sodium hydroxide solution
A	**Pale green precipitate**	**Does not dissolve/insoluble**
B	**White precipitates**	**Dissolve/soluble**
C	**White precipitates**	**Does not dissolves/insoluble**

1 mark for each correct answer (6 marks)

h. Identify the ions

A: Iron (II) ions/ Fe^{2+}

B: Aluminium ions/ Al^{3+}

C: Calcium ions/ Ca^{2+}

(3 marks)

i. Name another reagent that can be used to test for the cations above

aqueous ammonia solution (1 mark)

4. You are provided with 4 test tubes, distilled water in a wash bottle, sand paper, a measuring cylinder, solutions of Copper sulphate, Zinc sulphate, Iron sulphate and magnesium sulphate, pieces of Copper, Zinc, iron and Magnesium metal.

a. Measure 5 ml of copper sulphate solution and put into each of the four test tubes.

b. Clean the copper, zinc, iron and magnesium metals using sand paper

c. Put a piece of each metal into each of the four test tubes containing copper sulphate.

d. Observe the contents of the test tubes for 2-3 minutes.

e. Record the results in the table below by indicating Reaction or No reaction

f. Rinse the test tubes with distilled water.

g. Repeat steps (a) to (f) using solutions of Zinc sulphate, Iron sulphate and Magnesium sulphate respectively.

Solution	**Copper**	**Zinc**	**Iron**	**Magnesium**
Copper sulphate		**Reaction**	**Reaction**	**Reaction**
Zinc sulphate	**No reaction**		**No reaction**	**Reaction**
Iron sulphate	**No reaction**	**Reaction**		**Reaction**
Magnesium sulphate	**No reaction**	**No reaction**	**No reaction**	

1 mark for any 2 correct answers (6 marks)

h. Arrange the metals in order of increasing reactivity.

Copper, iron, Zinc, Magnesium **(1 mark)**

i. State the most reducing and oxidising agents.

Most reducing agent: **Magnesium** **1**

Most oxidising agent: **Copper** **1**

j. Name the spectator ion in the experiment.

Sulphate ion **(1 mark)**

END OF QUESTION PAPER

This paper contains 6 printed pages