YESMARK EDUCATION COSULTANTS

FORM3 PRACTICAL PAPER 2016
2HOURS
40MARKS

1. You are provided with :

    - Solution **A** (**16.68g** of hydrated iron (II) Sulphate, **$FeSO_4.7H_2O$**, dissolved in a litre of solution)
    - Solution **B** (**3.675 g of $K_2Cr_2O_7$** dissolved in a litre of solution.

    You are required to determine the equation for the reaction between **$FeSO_4.7H_2O$** and **$K_2Cr_2O_7$**)

    PROCEDURE1

    Pipette 25.0cm^3 of solution **A** into a conical flask. Add 5cm^3 of diphenylamine indicator provided into the flask. Fill the pipette with solution **B**. Titrate solution **A** with **B** and record the results in the table below.

    Tablel

	I	II	III
Final Burette reading (cm^3)			
Initial Burette reading (cm^3)			
Volume of **B** (cm^3)			

(4mks)

a) Calculate the average of **B** used (1mk)

b) What is the concentration of:

I. $FeSO_4.7H_2O$) in moles per litre **(Fe=56, S=32, O= 16, H=1)** (1mk)

II. $K_2Cr_2O_7$ in moles per litre **(K=39 Cr=52, O=16)** (1mk)

c) Find the number of moles of:

i) Fe^{2+} in 25.0cm^3 of solution **A**. (1mk)

ii) $Cr_2 O_7^{2-}$ in the average volume obtained. (1mk)

d) Calculate the number of moles of Fe^{2+} required to react with one mole of $Cr_2 O_7^{2-}$ (1mk)

e) Use the results in (d) above to balance the equation below (1mk)

$$Fe^{2+}_{(aq)} + Cr_2O_7^{2-}{}_{(aq)} + H^+_{(aq)} \longrightarrow Fe^{3+}_{(aq)} + Cr^{3+}_{(aq)} + H_2O_{(l)}$$

2. You are provided with:
Solution **C** (2.37g **of salt X dissolved in in a litre of solution**)
You are required to determine the formula mass of salt **X**

PROCEDUREII

Pipette 25.0 cm^3 of solution **A** into a conical flask. Fill the burette with solution **C**. Titrate solution **A** with **C** until pink colour just appears. Record your results in the table below. Repeat the procedure to fill the table.

Table II

	I	II	III
Final Burette reading (cm^3)			
Initial Burette reading (cm^3)			
Volume of C (cm^3)			

(4marks)

Calculate the average volume of C used. (1mark)

Given that one mole of **X** reacts with five moles of $FeSO_4.7H_2O$, calculate the number of moles of salt **X** in the average volume. (1mark)

Work out the concentration of **X** in moles per litre. (2marks)

Calculate the formula mass of X (2marks)

3. (a)You are provided with solid **E**. Carry out the tests below and write the tests and inferences in the spaces given.

   i. Put half of solid **E** provided into a dry test-tube. Heat it gently, then strongly as you test for any gas given out using red and blue litmus papers.

Observations	Inferences
(2 Mks)	(1 Mk)

   ii. Put the other half of solid **E** into boiling tube. Add $10cm^3$ of water, shake the mixture to dissolve. Divide solution into five equal portions.

   To the first portion add ammonia solution dropwise until in excess.

Observations	Inferences
(2 Mks)	(1 Mk)

iii. To the second portion add sodium hydroxide solution dropwise until in excess.

Observations	Inferences
(1½Mk)	(1 Mk)

iv. To the third portion add four drops of sulphuric acid.

Observations	Inferences
(1 Mk)	(1Mk)

v. To the fourth portion add $2cm^3$ of barium nitrate solution. Retain the mixture.

Observations	Inferences
(1½ Mk)	(1 Mk)

vi. To the fifth portion add five drops of acidified dichromate (vi)

Observations	Inferences
(1Mk)	(1 Mk)

vii. Add 1cm^3 of hydrochloric acid to the mixture obtained in v above.

Observations	Inferences
(1Mk)	(1Mk)

Short notes to guide the teachers.

This experiment is supposed to help the students to relate balancing of chemical equations to mole ratios. Use the following information to guide you on how to assist the students to handle the experiment.

Quiestion1

- Prepare diphenylamine indicator by dissolving 1g of the indicator in about 50cm^3 of concentrated sulphuric (v) acid dilute the mixture with water to 1 litre.
- The end- point is sharp and the solution turns from green to purple.

Question2

- **Prepare** solution X by dissolving 2.37g of potassium manganite (vii) in 500cm^3 of 1M sulphuric acid (v) solution and dilute the mixture with water to1 litre.
- The end-point is sharp and the mixture turns from colourless to purple.

Question 3(a)

- Use alum for solid E. Alum is a double salt with the chemical formula: $(Al_2(SO_4)_3.(NH_4)_2SO_4.12H_2O)$
- Give the students about 0.5g of solid E.