

NAME..... INDEX NO.....

233/3  
CHEMISTRY  
PAPER 3  
(PRACTICAL)  
TIME: 2¼ HOURS

CANDIDATE'S SIGN.....

DATE.....



SERIES 1 EXAMS

**INSTRUCTIONS TO CANDIDATES:**

- Answer **ALL** questions in the spaces provided for each question.
- You are **NOT** allowed to start working with the apparatus for the first 15 minutes of 2¼ hours. This time enables you to read the questions and ensure you have all the chemicals and apparatus that you may need.
- All working must be clearly shown where necessary.
- Mathematical tables and silent electronic calculators may be used.
- This paper consists of **6** printed pages. Ensure that the question paper has all the pages and no questions are missing.

**FOR EXAMINER'S USE ONLY:**

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	19	
2	12	
3	09	
<b>TOTAL SCORE</b>	<b>40</b>	

1. You are provided with
- **Solution A**, a saturated solution of sodium ethanedioate,  $\text{Na}_2\text{C}_2\text{O}_4$  (sodium oxalate).
  - **Solution B**, aqueous potassium manganate (VII).
  - **Solution C**, 0.1M ammonium iron (II) sulphate.
  - 1M sulphuric (VI) acid.

You are required to:

- (a) Standardize **solution B** using **solution C**.
- (b) Determine the **solubility of A** at room temperature.

### Procedure I

Fill the burette with **solution B**.

Pipette  $25\text{cm}^3$  of **solution C** into a conical flask and add  $5\text{cm}^3$  of 1M sulphuric (VI) acid using a measuring cylinder.

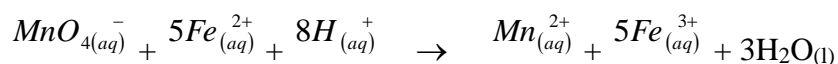
Titrate **solution C** using **solution B** until a **permanent pale pink** colour **just** appears.

**Repeat** the procedure and complete **table A** below.

<b>Table A</b>	I	II	III	
Final burette reading ( $\text{cm}^3$ )				
Initial burette reading ( $\text{cm}^3$ )				
Volume of B used ( $\text{cm}^3$ )				(4mks)

- (a) Calculate the average volume of solution B used. (1mk)

- (b) The reaction between manganate (VI) and iron (II) ions is shown by the ionic equation.



- (i) Calculate the number of moles of C used. (1mk)

- (ii) Calculate the number of moles of B used. (1mk)

(iii) Calculate the number of moles of B per litre.

(1mk)

**Procedure II**

Measure the temperature of **solution A** and record it in the space provided below.

Using a measuring cylinder, measure **2cm<sup>3</sup> of solution A** into a conical flask and **dilute** it by adding 75cm<sup>3</sup> of distilled water. **Label this solution D.**

**Fill** the burette with **solution B**. Using pipette filler pipette 25cm<sup>3</sup> of solution D into a conical flask and add 5cm<sup>3</sup> of **1M sulphuric acid** using a measuring cylinder.

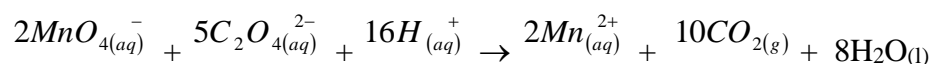
**Heat** the solution to about 60°C and titrate while still hot with B until a **permanent pink colour just** appears. Record your results in the **table B** below. **Repeat** this procedure to complete the table.

Temperature of solution A \_\_\_\_\_ °C.

<b>Table B</b>	I	II	III	
Final burette reading (cm <sup>3</sup> )				
Initial burette reading (cm <sup>3</sup> )				
Volume of B used (cm <sup>3</sup> )				(4mks)

(c) (i) Calculate the average volume of B used. (1mk)

The reaction between manganate (VII) ions and ethanedioate ions is given by the ionic equation below.



(ii) Calculate the number of moles of manganate (VII) ions in average volume of B used. (1mk)

- (iii) Calculate the number of moles of ethandioate ions in  $25\text{cm}^3$  of solution D. (1mk)
- (iv) Calculate the number of moles of ethandioate ions in  $100\text{cm}^3$  of solution D. (1mk)
- (v) How many moles of ethandioate ions are in  $25\text{cm}^3$  of solution A used? (1mk)
- (vi) Given that the molecular formula of sodium ethandioate is  $\text{Na}_2\text{C}_2\text{O}_4$ , calculate its solubility in grams per 100g of water at room temperature ( $\text{Na} = 23$ ,  $\text{C} = 12$ ,  $\text{O} = 16$ ). (Assume the density of solution is  $1\text{g/cm}^3$ ). (2mks)

2. You are provided with **solid G**. Carry out the tests below. Write your observations and inferences in the spaces provided.

(a) Place about **half** of solid G in a clean dry test tube and heat it strongly.

Observation	Inference
(1mk)	(1mk)

(b) Place the **remaining** solid G in a boiling tube. Add **10cm<sup>3</sup>** of distilled water. Shake the mixture for 1 minute. **Filter** the mixture.

Observation	Inference
(1mk)	(1mk)

(i) **Dip** blue and red litmus papers into the filtrate.

Observation	Inference
(1mk)	(1mk)

(ii) To about 2cm<sup>3</sup> of **filtrate**, add 3 drops of **dilute hydrochloric acid**.

Observation	Inference
(1mk)	(1mk)

(iii) To about 2cm<sup>3</sup> of **filtrate**, add drops of 2M sulphuric (VI) acid.

Observation	Inference
(1mk)	(1mk)

(iv) To about 1cm<sup>3</sup> of filtrate, add 5cm<sup>3</sup> of dilute sodium hydroxide (**excess**).

Observation	Inference
(1mk)	(1mk)

(1mk)	(1mk)
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3. You are provided with **liquid F**. Carry out the tests below and write your observations and Inferences in the spaces provided.

(a) Place **one drop** of liquid F on a metallic spatula and **burn** it using a Bunsen burner.

Observation	Inference
(1mk)	(1mk)

(b) Place about 2cm<sup>3</sup> of the **remaining** liquid F in a test tube. Add 3cm<sup>3</sup> of distilled water and shake the mixture well.

Observation	Inference
(½mk)	(½mk)

(c) (i) To about 2cm<sup>3</sup> of the remaining liquid F, add a **small amount** of sodium hydrogen carbonate.

Observation	Inference
(1mk)	(1mk)

(ii) To about 1cm<sup>3</sup> of liquid F, add 1cm<sup>3</sup> of **acidified potassium dichromate (VI)**.

Observation	Inference
(1mk)	(1mk)

(iii) To about 2cm<sup>3</sup> of the mixture, add two drops of **bromine water**.

Observation	Inference
(1mk)	(1mk)

