

Candidate Name

Centre Number

Candidate Number



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Advanced Level

CHEMISTRY
PAPER 5 Practical Test

9189/5

NOVEMBER 2011 SESSION

1 hour 20 minutes

Candidates answer on the question paper.
Additional materials:
As listed in Instructions to Supervisors

TIME 1 hour 20 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.
You are advised to show all working in calculations.
Use of a Data Booklet is unnecessary.

FOR EXAMINER'S USE	
1	
2	
TOTAL	

This question paper consists of 6 printed pages and 2 blank pages.

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- 1 You are required to find n , the number of moles of water of crystallisation in the salt $\text{CuSO}_4 \cdot n\text{H}_2\text{O}$ by the following method.

FA1 is a solution of hydrated copper (II) sulphate of concentration 200 g/dm^3 .

FA2 is an aqueous solution of KI

FA3 is a $0.100 \text{ mol dm}^{-3}$ solution of sodium thiosulphate, $\text{Na}_2\text{S}_2\text{O}_3$.

Using a burette, place between 22.00 cm^3 and 24.00 cm^3 of **FA1** in a 250 cm^3 graduated flask.

Record your readings in **Table 1.1**.

Make up the contents of the flask to the mark with distilled water and label this solution **FA4**.

Table 1.1 dilution of **FA1**.

Final burette reading/ cm^3	
Initial burette reading/ cm^3	
Volume of FA1 / cm^3	

[3]

Pipette 25.0 cm^3 of **FA4** into a conical flask and add about 15 cm^3 of **FA2**. This will produce an off white precipitate in a yellow-brown solution of iodine.

Titrate the iodine liberated with **FA3** until the colour of the solution fades to a pale yellow colour.

Add about 1 cm^3 or three drops of starch indicator and titrate slowly until the blue-black colour of the starch-iodine complex just disappears leaving a permanent off-white solution.

Repeat the titration as many times as you consider necessary to obtain accurate results. Record your results in **Table 1.2**.

Table 1.2: Titration of Iodine liberated by FA4 with FA3.

Final burette reading/cm ³		
Initial burette reading/cm ³		
Volume of FA3 used/cm ³		

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[15]

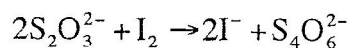
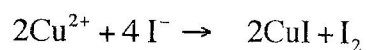
Summary

25.0 cm³ of FA4 liberated iodine to react with _____ cm³ of FA3.
Show with a (✓) which results you used to obtain the volume of FA3.

- (a) Calculate the number of moles of FA3 that reacted with the iodine liberated by FA4.

moles = _____ [1]

- (b) Given the following equations:



find the number of moles of Cu²⁺ in 25 cm³ of FA4.

moles = _____ [2]

- (c) Calculate the number of moles of $\text{CuSO}_4 \cdot n\text{H}_2\text{O}$ in 1 dm^3 solution of FA1.

$$\text{moles} = \underline{\hspace{2cm}} \quad [2]$$

- (d) Calculate the M_r of $\text{CuSO}_4 \cdot n\text{H}_2\text{O}$.

$$M_r = \underline{\hspace{2cm}} \quad [2]$$

- (e) Find the value of n .

A_r : [H = 1.0; O = 16; S = 32.0; Cu = 64.]

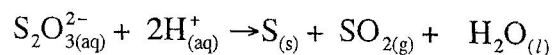
$$n = \underline{\hspace{2cm}} \quad [2]$$

ASSESSMENT OF PLANNING SKILLS

DO NOT CARRY OUT THE EXPERIMENT

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When sodium thiosulphate, $\text{Na}_2\text{S}_2\text{O}_3$, solution reacts with acid, sulphur is slowly precipitated according to the following ionic equation.



- (a) Design an experiment to investigate the effect of concentration of $\text{Na}_2\text{S}_2\text{O}_3$ on the rate of reaction.

You are provided with:

- stop watch
- measuring cylinder
- 250 cm³ beaker
- sheet of paper with a cross drawn on it
- 0.5 mol/dm³ sulphuric acid
- 0.1 mol/dm³ sodium thiosulphate

Present your plan as a sequence of numbered steps.

Plan

[10]

- (b) Using your results which you would have obtained, describe how you would determine the order of the reaction with respect to $\text{Na}_2\text{S}_2\text{O}_3$.

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[3]

[Total: 13]

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