

CHEMISTRY III

015

21/11/2019 8:30 AM – 10:00 AM



ADVANCED LEVEL NATIONAL EXAMINATIONS, 2019

SUBJECT: CHEMISTRY

PAPER III: PRACTICAL

COMBINATIONS:

- BIOLOGY-CHEMISTRY-GEOGRAPHY (BCG)
- MATHEMATICS-CHEMISTRY-BIOLOGY (MCB)
- PHYSICS-CHEMISTRY-BIOLOGY (PCB)
- PHYSICS-CHEMISTRY-MATHEMATICS (PCM)

DURATION: 1 hour 30 minutes

INSTRUCTIONS:

- 1) Write your names and index number on the answer booklet as written on your registration form and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
- 2) Please read carefully before you start and make sure that you have all the apparatus and chemicals that you may need.
- 3) This paper consists of **one question**.
- 4) Answer the question in this paper and record your answers in the spaces provided.
- 5) Non-programmable scientific calculators may be used.
- 6) Use only a **blue** or **black** pen.

PRACTICAL: IODOMETRY TITRATION.

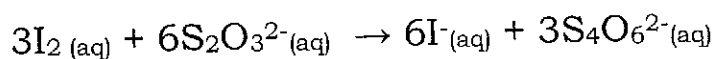
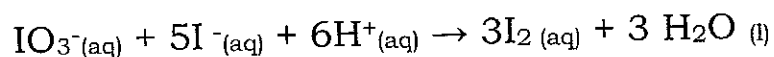
(Reaction of **thiosulphate ions** with **iodine** produced from the oxidation of **iodide ions** by **iodate ions** in HCl acid).

PROCEDURE:

- i) Pour 25 ml of **FA1** which is a 0.06mole/litre solution of KI (potassium iodide) in a conical flask/beaker at room temperature (25^o C) using a 50 ml measuring cylinder.
- ii) Add 10ml of a 0.2 mole/litre HCl (hydrochloric acid) solution to the KI solution in the conical flask/beaker to acidify it using the measuring cylinder.
- iii) Measure 25 ml of **FA2** which is a 0.01 mole/litre solution of KIO₃ (potassium iodate) using a pipette then add it to the acidified KI solution in the conical flask/beaker.
- iv) Fill the burette (fixed on the retort stand) with the solution of **FA3** which is Na₂S₂O₃.xH₂O (hydrated sodium thiosulphate) using a beaker and a filter funnel.
- v) Titrate (add) 12 ml of Na₂S₂O₃.xH₂O solution in the resultant acidified red solution of KIO₃ and KI in the conical flask/beaker.
- vi) Then put 5 drops of starch solution in the red solution of KIO₃ and KI in the conical flask/beaker.
- vii) Continue the titration of Na₂S₂O₃.xH₂O until the blue-black colour of starch disappears (solution becomes colourless).
- viii) Record the volume of titrated (used) Na₂S₂O₃.xH₂O solution in the table of results on page 3.
- ix) Repeat the experiment **procedures i) to viii) 3 times** to get consistent results.

TABLE OF RESULTS**(12 marks)**

Experiment	1	2	3	4
Final volume of FA3 (Na ₂ S ₂ O ₃ .xH ₂ O) (ml)				
Initial volume of FA3 (Na ₂ S ₂ O ₃ .xH ₂ O) (ml)				
Volume of FA3 (Na ₂ S ₂ O ₃ .xH ₂ O) (ml)				

Equations of the reactions:**Questions:**a) Calculate the average volume of Na₂S₂O₃.xH₂O used.**(2 marks)**b) Calculate the number of moles of IO₃⁻ in 25 ml of the solution. **(2 marks)**

c) Determine the number of moles of I_2 produced from the reaction. **(2 marks)**

d) Calculate the number of moles of $S_2O_3^{2-}$ that reacted with the I_2 (iodine) produced. **(2 marks)**

e) Calculate the molarity of $S_2O_3^{2-}$. **(2 marks)**

f) Determine the value of **x** (number of moles of water of crystallization) in the formula **if 12.4 g of $Na_2S_2O_3 \cdot xH_2O$ was dissolved to make 1 litre of solution.**

(Atomic mass: Na = 23, S=32, O=16, H=1)

(3marks)