EUNOIA JUNIOR COLLEGE
JC2 Preliminary Examination 2023
General Certificate of Education Advanced Level
Higher 2

CANDIDATE NAME							
CIVICS GROUP	2	2	–			INDEX NUMBER	

CHEMISTRY

9729/04

Paper 4 Practical

29 August 2023

2 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidental Instructions

---

READ THESE INSTRUCTIONS FIRST

Write your name, civics group and registration number on the work you hand in.
Give details of the practical shift and laboratory, where appropriate, in the boxes provided.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.

Shift
Laboratory

Do not use paper clips, highlighters, glue or correction fluid.

For Examiner's Use	
1	/ 21
2	/ 13
3	/ 11
4	/ 10
Total	/ 55

Answer **all** questions in the spaces provided on the Question paper.
The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **19** printed pages and **1** blank page.

Answer **all** the questions in the spaces provided.

1 Determination of the kinetics of the reaction between thiosulfate ions and acid

FA 1 is aqueous sodium thiosulfate, $Na_2S_2O_3$.

FA 2 is 2.00 mol dm^{-3} dilute hydrochloric acid, HCl.

Solid sulfur is one of the products formed in the reaction between sodium thiosulfate and hydrochloric acid, as shown in equation 1. The presence of sulfur causes the solution to become opaque.

equation 1 $S_2O2–3(aq) + 2H^+(aq)$ □ $SO_2(g) + S(s) + H_2O(l)$

In this experiment, the rate of this reaction is studied by measuring the time taken for the reaction mixture to become opaque.

(a) Determination of order of reaction with respect to thiosulfate ions

You will perform a series of five experiments. Then, you will graphically analyse your results in order to determine the order with respect to the concentration of thiosulfate ions, $[S_2O2–3]$.

For each experiment, you will note the volume of **FA 1** added, $V_{\mathbf{FA\,1}}$, and the time in seconds, t, taken for the reaction mixture to become opaque.

In each experiment, you will need to ensure that the same total volume of reaction mixture is used by adding an appropriate volume of deionised water, V_{water}, as required.

You will then calculate values for

- $\frac{1000}{t}$, to 1 decimal place
- $\lg\left(\frac{1000}{t}\right)$ and $\lg(V_{\mathbf{FA\,1}})$, to 3 significant figures

Prepare a table in the space provided on page 4 in which to record, to an appropriate level of precision:

- all volumes,
- all values of t,
- all calculated values of $\frac{1000}{t}$, $\lg\left(\frac{1000}{t}\right)$ and $\lg(V_{\mathbf{FA\,1}})$.

Notes: In each of these experiments, you will need to place the conical flask containing the reaction mixture on the printed page on page 2 of the insert. You will view the page by looking vertically down through the mixture. You will stop the stopwatch when the mixture **first** becomes opaque. This will be the **first** instant when you can no longer see the printed numbers on the page.

Experiment 1

1. Fill the burette labelled **FA 1**, with **FA 1**.
2. Transfer 50.00 cm^3 of **FA 1** into a clean, dry 100 cm^3 conical flask.
3. Measure 5.0 cm^3 of **FA 2** using a 25.0 cm^3 measuring cylinder.

Note: Small amounts of SO_2 will be produced during the reaction.
Minimise inhalation of SO_2.

4. Pour the **FA 2** rapidly into the conical flask. Start the stopwatch during this addition.
5. Mix the contents thoroughly by swirling the flask. Then place the flask on the printed page of page 2 of the insert.
6. Stop the stopwatch when the solution **first** becomes opaque.
7. Note the time taken, *t*, to the nearest second, in your table.
8. Discard the reaction mixture **immediately** down the sink. Wash out the conical flask and stand it upside down on a paper towel to drain.

Experiment 2

Repeat experiment 1, adding 10.00 cm^3 of **FA 1** and 40.0 cm^3 of deionised water using a 50.0 cm^3 measuring cylinder at point 2, while keeping the volume of **FA 2**, $V_{\textbf{FA 2}}$, the same at point 3.

Record all required volumes, time taken and calculated values in your table.

Experiments 3 to 5

In experiment 1, you would have obtained the time taken for the 'fastest' reaction and in experiment 2, the time taken for the 'slowest' reaction.

Repeat experiment 1 **three** more times, with different volumes of **FA 1**, $V_{\textbf{FA 1}}$, at point 2, while keeping the volume of **FA 2**, $V_{\textbf{FA 2}}$, the same at point 3.

In each case, you will need to ensure that the **same total volume** of reaction mixture is used by adding an appropriate volume of deionised water, $V_{\textbf{water}}$, as required.

Record all required volumes, time taken and calculated values in your table.

expt	$V_{\text{FA 1}}$ / cm^3	$V_{\text{FA 2}}$ / cm^3	V_{water} / cm^3	t / s	$\frac{1000}{t}$ / s^{-1}	$\lg(V_{\text{FA 1}})$	$\lg\left(\frac{1000}{t}\right)$
1	50.00	5.0	0.0	18	55.6	1.70	1.75
2	10.00	5.0	40.0	100	10.0	1.00	1.00
3	40.00	5.0	10.0	23	43.5	1.60	1.64
4	30.00	5.0	20.0	28	35.7	1.48	1.55
5	20.00	5.0	30.0	43	23.3	1.30	1.37

Results

[6]

(b) **(i)** Plot a graph of $\lg\left(\frac{1000}{t}\right)$ on the y-axis against $\lg(V_{FA1})$ on the x-axis in Fig. 1.1. Draw the best-fit straight line taking into account all of your plotted points.

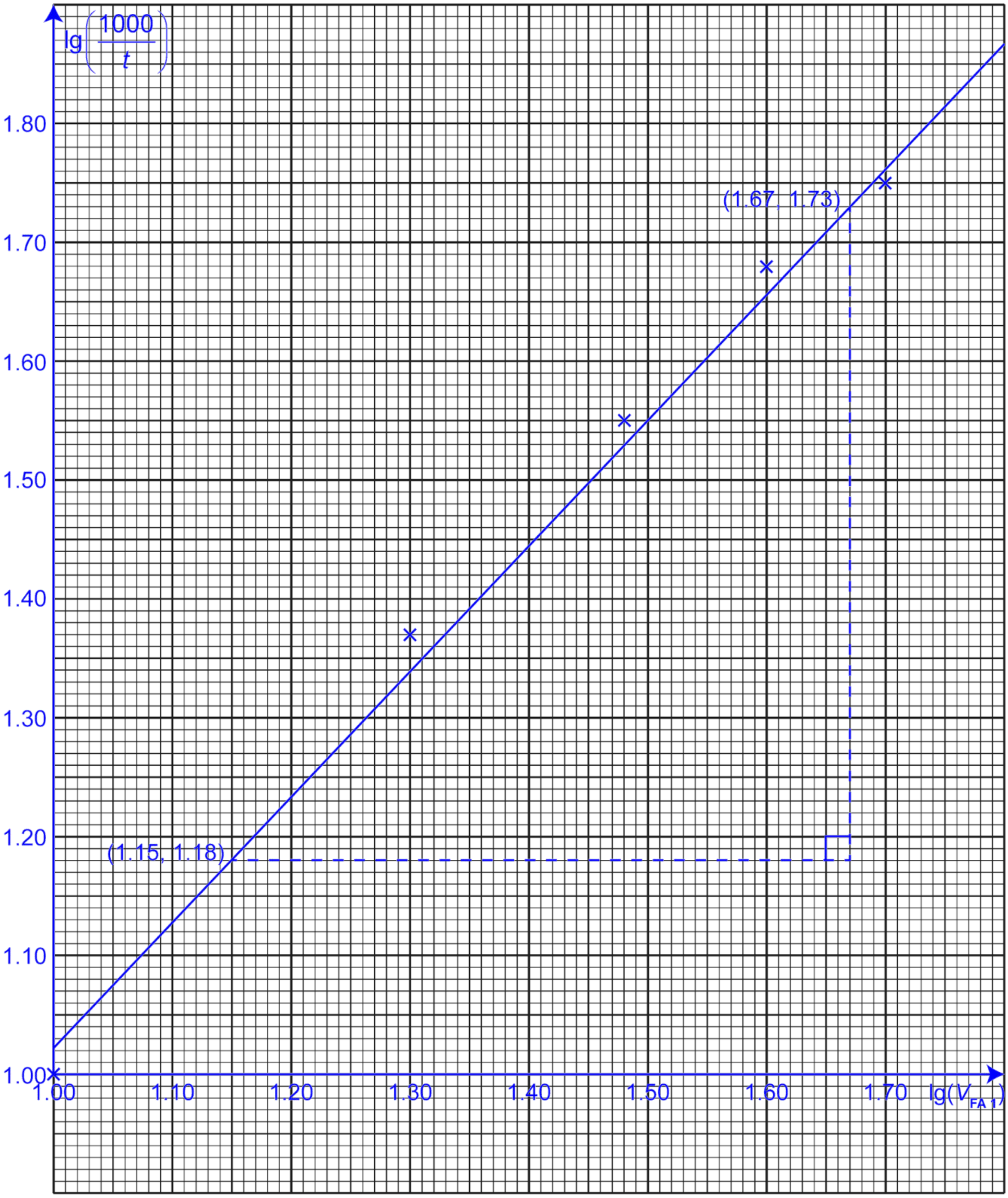


Fig. 1.1

[3]

The rate equation of the reaction is given by

$$\text{rate} = k[H^+]^y[S_2O2–3]^x$$

When H^+ is present in large excess, $[H^+]$ is essentially a constant, and we have

$$\text{rate} = k'[S_2O2–3]^x$$

where $k' = k[H^+]^y$.

The initial rate of the reaction can be represented by $\frac{1000}{t}$, while $[S_2O2–3]$ can represented by the $V_{\text{FA 1}}$.

Hence, in order to determine the order of reaction with respect to $[S_2O2–3]$, x, the following equation is used.

$$\lg\left(\frac{1000}{t}\right) = x\lg(V_{\text{FA 1}}) + c$$

(ii) Use the graph in Fig 1.1 to determine the order of reaction with respect to $[S_2O2–3]$.

order = **1** [3]

(c) Besides ensuring that the concentration of $S_2O2–3$ is proportional to $V_{\text{FA 1}}$, suggest why it is critical to keep the total volume of reaction mixture constant in experiments 1 to 5.

This is to ensure that **depth of the solution is the same** so that **same amount of sulfur is required** to when the solution **becomes opaque** for all 5 experiments.

[1]

(d) In the last steps of both procedures given, you were instructed to wash and drain the conical flask before using it again.

State and explain the likely effect on t of **not** draining the conical flask before reuse.

The ***t* will increase.** There will be **residual water** in the conical flask if it is not drained, hence **diluting the mixture/causing the [reactants] to decrease**. The **rate of reaction will decrease**, causing a larger t value to be recorded. [1]

(e) In the experiments, the burette and the measuring cylinders were used to measure volume of various solutions.
Calculate the total percentage error for the volumes measured in **experiment 2**.

[2]

(f) **Determination of order of reaction with respect to hydrogen ions**

The experimental procedure stated in **1(a)** can be modified to enable the order with respect to the concentration of hydrogen ions, $[H^+]$, to be determined.

Taking reference from the information provided for experiment 6 in Table 1.1, complete the table to show the volumes of **FA 1**, **FA 2**, and deionsied water you will use for experiment 7, that will enable you to determine the order with respect to $[H^+]$.

Carry out both experiments similar to how you did so for the five sets done earlier, and record the time taken, *t*, to the nearest second in each case.

Table 1.1

experiment	$V_{\mathbf{FA\ 1}}$ / cm^3	$V_{\mathbf{FA\ 2}}$ / cm^3	$V_{\mathbf{water}}$ / cm^3	*t* / s
6	10.00	10.0	40.0	74
7	10.00	20.0	30.0	74

[2]

(i) Use your experimental results from Table 1.1 to deduce the order of reaction with respect to $[H^+]$.

Comparing experiment 6 and 7, when $V_{\mathbf{FA\ 2}}$ was doubled, **$[H^+]$ doubled** while $V_{\mathbf{FA\ 1}}$/[S_2O2–3] remained constant, *t* remained almost the same, which means the **rate of reaction remained the same/did not change**, hence **order of reaction w.r.t. $[H^+]$ is zero**.

[1]

(ii) Hence, write the overall rate equation for the reaction between thiosulfate and hydrogen ions, and determine the units for the rate constant.

rate = $k[S_2O_3^{2-}]$ or **rate = $k[Na_2S_2O_3]$**
k =

[2]

[Total: 21]

2 Determination of the composition of a mixture of sodium hydroxide and sodium carbonate

A double indicator titration can be carried out to analyse the composition of an aqueous mixture of sodium hydroxide and sodium carbonate.

When the mixture is titrated with hydrochloric acid using thymol blue as indicator, the reactions in equations 2 and 3 would have taken place when thymol blue changes colour.

equation 2 $NaOH(aq) + HC\ell(aq) \rightarrow NaC\ell(aq) + H_2O(\ell)$

equation 3 $Na_2CO_3(aq) + HC\ell(aq) \rightarrow NaHCO_3(aq) + NaC\ell(aq)$

If screened methyl orange is **subsequently** added as the indicator and the titration **continued**, a further reaction takes place as shown in equation 4.

equation 4 $NaHCO_3(aq) + HC\ell(aq) \rightarrow NaC\ell(aq) + CO_2(g) + H_2O(\ell)$

FA 3 is a solution containing sodium hydroxide, NaOH, and sodium carbonate, Na_2CO_3.

You will perform a two-part titration using **FA 2** to determine the composition of **FA 3**. Thymol blue and screened methyl orange are provided as indicators for the titration.

(a) Titration of FA 3 against FA 2, using thymol blue as the indicator

1. Fill the burette with **FA 2**.
2. Using a pipette, transfer 25.0 cm^3 of **FA 3** into the conical flask. Replace the cap over the bottle containing **FA 3** immediately and ensure that the bottle remains capped when you are not transferring **FA 3**.
3. Add 3 or 4 drops of thymol blue indicator into the conical flask.
4. Run **FA 2** from the burette into this flask until the solution turns pale yellow.
5. Record your titration results at this first end-point in Table 2.1 on page 9. **Keep the solution for step 6.**

Continued titration of FA 3 against FA 2, using screened methyl orange as the indicator

6. Add 3 or 4 drops of screened methyl orange indicator into the conical flask from step 5.
7. Continue to run **FA 2** from the burette into this flask until the solution turns grey.

8. Record your titration results at this second end-point in Table 2.2 on page 9.

9. Calculate and record in Table 2.3
   - the total volume of **FA 2** used, V_t, and
   - the volume of **FA 2** required for the reaction in equation 4, V_2.

10. Repeat steps 1 to 8 of the two-part titration as necessary until consistent results are obtained are obtained for V_t and V_2.

Table 2.1

titration	1	2			
final burette reading / cm^3	21.00	23.00			
initial burette reading / cm^3	0.00	2.00			
volume of **FA 2** added /cm^3	21.00	21.00			

Table 2.2

titration	1	2			
final burette reading / cm^3	28.50	30.60			
initial burette reading / cm^3	21.00	23.00			
volume of **FA 2** added /cm^3	7.50	7.60			

Table 2.3

titration	1	2			
total volume of **FA 2** used, V_t / cm^3	28.50	28.60			
volume of **FA 2** required for reaction in equation 4, V_2 / cm^3	7.50	7.60			

[4]

(i) From your titrations, obtain a suitable total volume of **FA 2**, V_t, to be used in your calculations. Show clearly how you obtained this volume.

V_t = 28.55 cm^3 [1]

(ii) From your titrations, obtain a suitable volume of **FA 2** required for reaction in equation 4, V_2, to be used in your calculations. Show clearly how you obtained this volume.

V_2 = 7.55 cm^3 [1]

(b) **(i)** Using relevant answers in **2(a)** and equations 2 to 4, calculate the amount of sodium carbonate, Na_2CO_3, present in 25.0 cm^3 of **FA 3**.

amount of Na_2CO_3 present in 25.0 cm^3 of **FA 3** = 0.0151 mol [1]

(ii) Using relevant answers in **2(a)** and equations 2 to 4, calculate the amount of sodium hydroxide, NaOH, present in 25.0 cm^3 of **FA 3**.

amount of NaOH present in 25.0 cm^3 of **FA 3** = 0.0269 mol [3]

(c) In step 2 of the titration, instructions were given to ensure that the bottle of **FA 3** remains capped as much as possible.
With the aid of an appropriate equation, explain why this is necessary.

Not replacing the cap of the container exposes **FA 2** to **CO_2 in the air**. NaOH in

FA 2 reacts with CO_2 to give Na_2CO_3:

2NaOH + CO_2 Na_2CO_3 + H_2O. [1]

(d) State and explain how the volume of acid required for the first end-point will change if CH_3CO_2H(aq) is used instead of HC*l*(aq).

There will be **no change**.

CH_3CO_2H(aq) is also a **monobasic** acid, hence the **same amount** of

CH_3CO_2H(aq) will be required to react with the two bases in **FA 3**. [2]

[Total: 13]

Question 3 starts on the next page

3 Investigation of some inorganic reactions

FA 4 is an aqueous solution containing a cation and an anion.

You will perform tests to identify the cation and anion in **FA 4**.

Unless otherwise stated, the volumes given below are approximate and should be estimated rather than measured. Test and identify any gases evolved. If there is no observable change, write **no observable change**.

(a) Carry out the following tests. Carefully record your observations in Table 3.1.

Table 3.1

	test	observations
1	Test solution **FA 4** with Universal Indicator paper.	Universal Indicator paper turned **orange (pH = 2)**.
2	Add 1 cm depth of **FA 4** into a clean test-tube. Add aqueous sodium hydroxide slowly with shaking, until no further change is seen.	**red-brown precipitate** forms, precipitate **insoluble in excess** NaOH.
3	Add 1 cm depth of **FA 4** into a clean test-tube. Add an equal volume of aqueous silver nitrate.	**white precipitate** forms in **yellow solution**.
4	Add 1 cm depth of **FA 4** into a clean test-tube. Add 1 cm depth of aqueous potassium iodide.	**yellow solution turns brown** upon addition of KI.
5	Add 1 cm depth of **FA 4** followed by 1 cm depth of aqueous sulfuric acid. Add 2 cm depth of hydrogen peroxide.	**Brown/orange solution** turns **yellow**. **effervescence** of **O_2** gas **relights a glowing splint**.

[5]

(b) Identify the cation and anion present in **FA 4**.

(i) cation present Fe^{3+}

(ii) anion present Cl^- [2]

(c) With the aid of an equation, account for your observations for test **1**.

$[Fe(H_2O)_6]^{3+}(aq)\ \ [Fe(H_2O)_5(OH)]^{2+}(aq) + H^+(aq)$

Hence, the **FA 4** is **acidic**.

[1]

(d) **(i)** What is the role of **FA 4** in test 4? Support your answer using your observations from Table 3.1.

Fe^{3+} in **FA 4** is acting as an **oxidising agent**. A brown solution is formed, indicating that **iodine is formed**, which means that **iodide has been oxidised**.

[2]

(ii) Is **FA 4** playing the same role as in test 4 when reacted with hydrogen peroxide? Explain your answer fully.

No. The **yellow colour of FA 4 does not fade/FA 4 does not turn green when H_2O_2 is added**, meaning that it **did not undergo reduction**, and thus cannot be an oxidising agent. [1]

[Total: 11]

4 Planning

Instant cold packs are often used to help minimise swelling around injuries and reduce muscle spasm and pain.

A cold pack contains water with an inner pouch filled with a small amount of ammonium nitrate. When the cold pack is ‘popped’, the inner pouch breaks to release the ammonium nitrate which rapidly dissolves in the water in the packet, lowering the temperature of it.

You are to plan an experiment to determine an accurate and reliable value for the molar enthalpy change of solution, $\otimes H_{\text{solution}}$, when ammonium nitrate dissolves in water in a cold pack.

In your experiment, you will add ammonium nitrate to water and monitor the maximum temperature change, $\otimes T_{\text{max}}$, for the experiment. You will then plot a graph to correct for surrounding heat transfer.

(a) Through preliminary investigations, the enthalpy change of solution of ammonium nitrate was found to be approximately +25.7 kJ mol^{-1}.

Calculate a suitable mass of ammonium nitrate for your experiment, stating any assumptions made clearly.

[Given 4.3 J are required to raise the temperature of 1.0 cm^3 of any solution by 1 °C, and relative formula mass of ammonium nitrate = 80.0]

Assumptions:

No heat gain from surroundings OR
Temperature change of **between 5 to 10 °C** and **25 to 150 cm^3** of water used for the dissolution of ammonium nitrate

$q = -mcT = -(100)(4.3)(-5) = +2150$ J

Minimum mass of NH_4NO_3 = 0.08366 x 80.0 = **6.69 g**

[3]

(b) Plan a procedure to determine the enthalpy change of solution, $\otimes H_{\text{solution}}$, of ammonium nitrate.

Measurements should be taken:

- before the reaction starts,
- during the reaction,
- for some time after the reaction is complete.

You may assume that you are provided with:

- sample of ammonium nitrate salt,
- the equipment normally found in a school or college laboratory.

Your plan should include brief details of:

- the appropriate apparatus, masses and volumes of reagents used,
- the procedure you would follow,
- the measurements you would make to allow for the plotting of a suitable temperature–correction graph,
- how you would ensure that an **accurate** value of $\otimes T_{\text{max}}$ is obtained.

Using an **electronic balance**, weigh accurately **about 7.00 g of ammonium nitrate** into a **weighing bottle**.

Using a **100 cm^3 measuring cylinder**, add **100 cm^3 of water into a dry styrofoam cup**. **Cover** with a lid, and **place the styrofoam cup into another** and then in a 250 cm^3 beaker. Ensure that there is **no draught in the room**.

Stir the water using the **0.2 °C interval thermometer** and **record its temperature**.

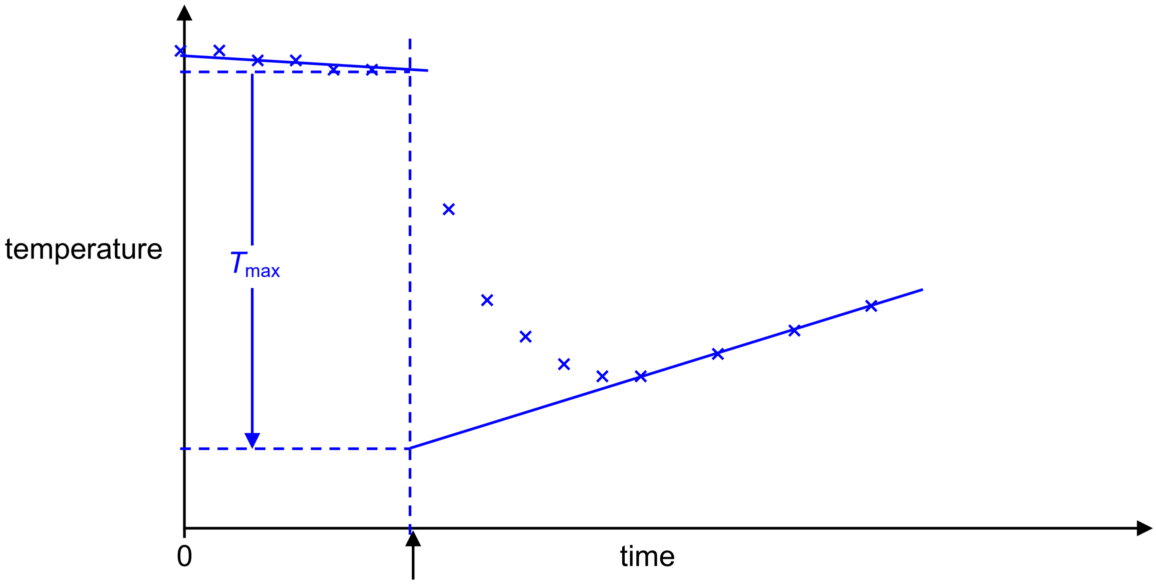
Start the stopwatch.

Continue to stir the water. **Read and record the temperature of the water** in the styrofoam cup using the thermometer, **at 30 s**

Read and record the temperature of the solution at 3.5 min, and continue to stir and **record the temperature at 30 s (or 1 min) intervals** until the temperature reaches a minimum, and then every minute **until a constant increase in the temperature is observed for at least 4 data points.**

[4]

(c) **(i)** Sketch, on Fig. 4.1., the graph that you would expect to obtain using your measurements you planned to make in **4(b)**. Indicate clearly on the graph how the maximum temperature change, $\otimes T_{\text{max}}$, is determined.



time at which ammonium nitrate was added

Fig. 4.1

[2]

(ii) Instead of using the graphical method, the maximum temperate change, $\otimes T_{\text{max}}$, can also be determined by direct measurement of the initial temperature and lowest temperature reached only.

Explain why the graphical method is likely to give a more accurate value of $\otimes T_{\text{max}}$.

The reaction between the ammonium salt and water is not instantaneous/takes time to go to completion, hence there will be **heat gained from the surroundings**, causing the direct measurement method to give a lower $T_{\text{max.}}$ The graphical method attempts to compensate for heat gained from the surroundings.

[1]

[Total : 10]

BLANK PAGE

Qualitative Analysis Notes

[ppt. = precipitate]

(a) Reactions of aqueous cations

cation	***reaction with***	
	NaOH(aq)	NH_3(aq)
aluminium, Al^{3+}(aq)	white ppt. soluble in excess	white ppt. insoluble in excess
ammonium, $\square\square_4^{+}$(aq)	ammonia produced on heating	–
barium, Ba^{2+}(aq)	no ppt. (if reagents are pure)	no ppt.
calcium, Ca^{2+}(aq)	white. ppt. with high [Ca^{2+}(aq)]	no ppt.
chromium(III), Cr^{3+}(aq)	grey-green ppt. soluble in excess giving dark green solution	grey-green ppt. insoluble in excess
copper(II), Cu^{2+}(aq),	pale blue ppt. insoluble in excess	blue ppt. soluble in excess giving dark blue solution
iron(II), Fe^{2+}(aq)	green ppt., turning brown on contact with air insoluble in excess	green ppt., turning brown on contact with air insoluble in excess
iron(III), Fe^{3+}(aq)	red-brown ppt. insoluble in excess	red-brown ppt. insoluble in excess
magnesium, Mg^{2+}(aq)	white ppt. insoluble in excess	white ppt. insoluble in excess
manganese(II), Mn^{2+}(aq)	off-white ppt., rapidly turning brown on contact with air insoluble in excess	off-white ppt., rapidly turning brown on contact with air insoluble in excess
zinc, Zn^{2+}(aq)	white ppt. soluble in excess	white ppt. soluble in excess

(b) Reactions of anions

anion	*reaction*
carbonate, CO_3^{2-}	CO_2 liberated by dilute acids
chloride, Cl^-(aq)	gives white ppt. with Ag^+(aq) (soluble in NH_3(aq))
bromide, Br^-(aq)	gives pale cream ppt. with Ag^+(aq) (partially soluble in NH_3(aq))
iodide, I^-(aq)	gives yellow ppt. with Ag^+(aq) (insoluble in NH_3(aq))
nitrate, NO_3^-(aq)	NH_3 liberated on heating with OH^-(aq) and Al foil
nitrite, NO_2^-(aq)	NH_3 liberated on heating with OH^-(aq) and Al foil; NO liberated by dilute acids (colourless NO → (pale) brown NO_2 in air)
sulfate, SO_4^{2-}(aq)	gives white ppt. with Ba^{2+}(aq) (insoluble in excess dilute strong acids)
sulfite, SO_3^{2-}(aq)	SO_2 liberated with dilute acids; gives white ppt. with Ba^{2+}(aq) (soluble in dilute strong acids)

(c) Tests for gases

gas	*test and test result*
ammonia, NH_3	turns damp red litmus paper blue
carbon dioxide, CO_2	gives a white ppt. with limewater (ppt. dissolves with excess CO_2)
chlorine, Cl_2	bleaches damp litmus paper
hydrogen, H_2	“pops” with a lighted splint
oxygen, O_2	relights a glowing splint
sulfur dioxide, SO_2	turns aqueous acidified potassium manganate(VII) from purple to colourless

(d) Colour of halogens

halogen	*colour of element*	*colour in aqueous solution*	*colour in hexane*
chlorine, Cl_2	greenish yellow gas	pale yellow	pale yellow
bromine, Br_2	reddish brown gas / liquid	orange	orange-red

iodine, I_2	black solid / purple gas	brown	purple

EUNOIA JUNIOR COLLEGE
JC2 Preliminary Examination 2023
General Certificate of Education Advanced Level
Higher 2

CHEMISTRY

9729/04

Paper 4 Practical

29 August 2023

2 hour 30 minutes

INSERT

READ THESE INSTRUCTIONS FIRST

The insert is for use in **Question 1(a)** and **1(f)**.

This document consists of **2** printed pages.

For use in Question 1(a) and 1(f)

9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04
9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04 9729/04

© EJC 9729/04/J2PE/23