THE ELITES JET

233/3 CHEMISTRY Paper 3

(Practicals)

PRE-MOCK

March 2025 – Time: 2¼ hours

Name ……..…. Adm No…….…….. Class……

School……..…Date……....…Sign……....….

INSTRUCTIONS TO THE CANDIDATES:

a) Write your name, Admission number and class in the spaces provided
b) ***Write your school, date*** *of examination and sign in the spaces provided*
c) ***Answer all the questions in the spaces provided.***
d) *Mathematical tables and electronic calculators may be used.*
e) *All working* ***MUST*** *be clearly shown where necessary.*
f) *Use the first 15minutes of the 2 ¼ hours to ascertain you have all the chemical and apparatus that you may need.*

For Examiner's Use Only

Question	Maximum score	Candidate's score
1	22	
2	11	
3	7	
TOTAL	**40**	

1. You are provided with: -
   - Solid A, 4g of hydrated ethanedioic acid, $H_2C_2O_4.nH_2O$.
   - Solution B, a 0.2M solution of sodium hydroxide.

   You are required to determine:

   (i) Solubility of solid A.

   (ii) The value of n in the formula $H_2C_2O_4.nH_2O$.

Procedure I

(i) Fill the burette with distilled water.

(ii) Place solid A in the boiling tube.

(iii) Transfer $4cm^3$ of distilled water from the burette into the boiling tube containing solid A. Heat the mixture while stirring with the thermometer to a temperature of 80^0.

(iv) Allow the solution to cool while stirring with the thermometer. Record the temperature at which crystals start to form in the table 1 below.

(v) Add a further $2cm^3$ of distilled water from the burette to the mixture. Repeat the procedure (iii) and (iv) above and record the crystallization temperature. Complete the table I below by adding the volumes of distilled water as indicated.

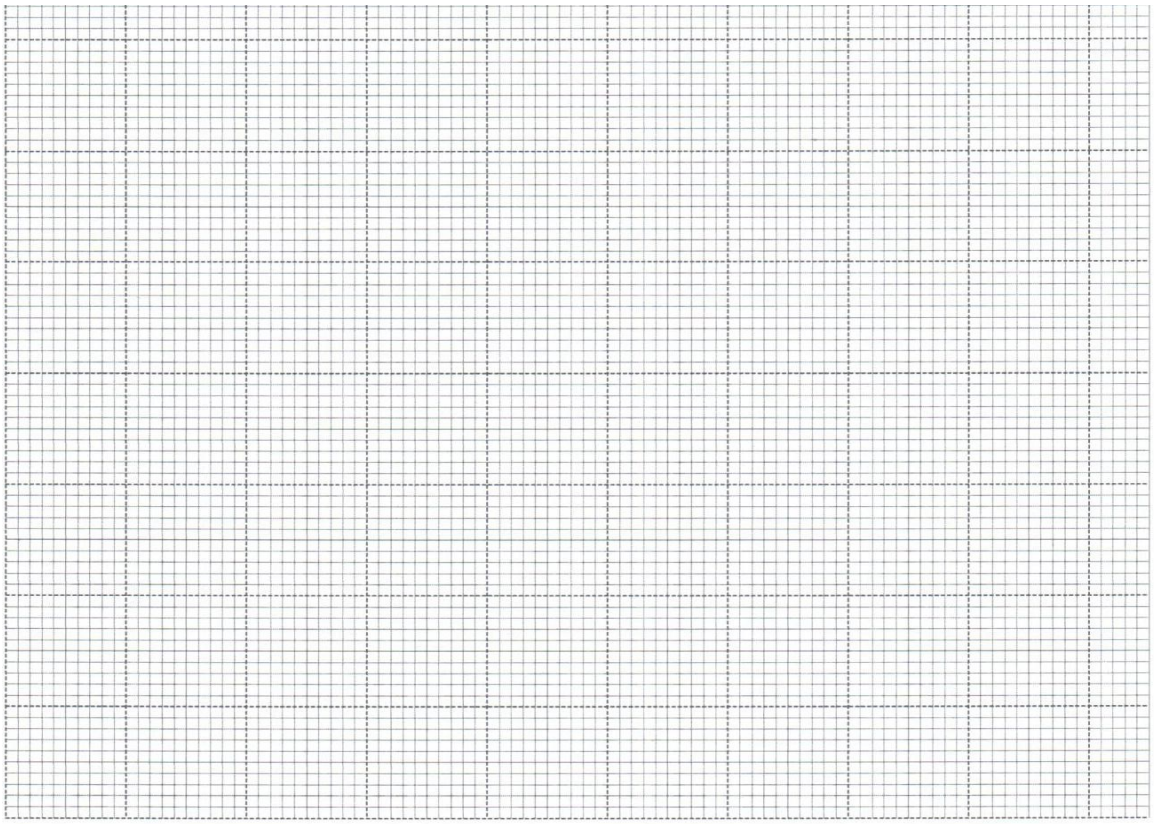
(Preserve the contents of the boiling tube for procedure II)

TABLE I

Volume of distilled water in boiling tube	**Crystallization temperature**	**solubility of solid A in g/100g of water**
4		
6		
8		
12		

(6 marks)

(a) On the grid provided, plot a graph of solubility of solid A (y-axis) against crystallization temperature. (3 marks)



From the graph determine:

(i) Solubility of A at 55^0C (1 mark)

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(ii) The temperature at which 60g of A dissolve in 80g of water. (2 marks)

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Procedure II

- Transfer the contents of the boiling tube in procedure I to a clean 250ml volumetric flask. Add distilled water to the mark. Label the resulting solution A.
- Fill the burette with solution A. Pipette 25cm^3 of B into a clean 250ml conical flask. Add 3 drops of phenolphthalein indicator.
- Titrate A against B to an accurate end point. Record your results in the table II below.
- Repeat the experiment two more times and complete the table II below.

Table II

	I	II	III
Final burette reading cm^3			
Initial burette reading cm^3			
Volume of A used cm^3			

(4 marks)

Calculate:

(a) Average volume of A used. (1 mark)

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(b) (i) Moles of B used. (1 mark)

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(ii) Moles of A used. (1 mark)

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(iii) Concentration of A in moles per dm^3. (1 mark)

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(c) Determine the value of n in the formula $H_2C_2O_4.nH_2O$. (2 marks)

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2. You are provided with solid D. Carry out the test s below. Write your observations and inferences in the spaces provided

(a) Place all of solid D in a clean dry test tube and heat it strongly until no further change occurs. Test any gases produced with both blue and red litmus papers. Allow the residue to cool and use it for test (b).

Observations	**Inferences**
(2 marks)	(1 mark)

(b) Add about $10cm^3$ of 2M hydrochloric acid to the residue and shake for about three minutes. Keep the mixture for test (c)

Observations	**Inferences**
(1 mark)	(2 marks)

c) i) Place about $1cm^3$ of the mixture in a test tube and add aqueous ammonia dropwise until in excess

Observations	**Inferences**
(1 mark)	(1 mark)

ii)To the rest of the mixture, add all of solid E provided and shake the mixture well.

Observations	**Inferences**
(2 marks)	(1 mark)

3. You are provided with solid F. Carry out the tests below. Write your observations and inferences in the spaces provided.

a) Place about one third of solid F on a metallic spatula and burn it using a Bunsen burner

Observation	**Inferences**
(½ mk)	(½ mk)

b) Place the remaining of solid F in a test tube. Add about 6cm^3 of distilled water and shake the mixture well. (Retain the mixture for use in test (c)

Observation	**Inferences**
(1 mark)	(1 mark)

c) i) To about 2cm of the mixture, add a small amount of solid sodium hydrogen carbonate

Observation	**Inferences**
(1 mark)	(1 mark)

ii)To about 1cm of the mixture, add 1 cm^3 of acidified potassium dichromate (VI) and warm

Observation	**Inferences**
(1 mark)	(1 mark)

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