FORM FOUR TERM ONE EXAM 2017

PRACTICAL
PAPER 3
PRACTICAL
TIME: 2 ¼ HOURS

1.   ***You are provided with:***
    - 4.5g of solid **A** in a stoppered container .
    - Solution B, 0.06M acidified potassium manganate (VII)
    -You are required to determine:

(a) Solubility of solid **A** at different temperatures.
(b) The number of moles of water of crystallization in solid A.
    Procedure:

(a) Using a burette, add 4cm^3 of distilled water to solid A in the boiling tube. Heat the mixture while
    stirring with the thermometer to about 70°C. When all the solid has dissolved, allow the solution
    to cool while stirring with the thermometer. Note the temperature at which crystals of solid **A**
    first appear. Record this temperature in table I.

(b) Using the burette add 2cm^3 of distilled water to the contents of the boiling tube. Warm
The mixture while stirring with the thermometer until all the solid dissolves. Allow the mixture
To cool while stirring. Note and record the temperature at which crystals of solid **A** first appear.

(c)   Repeat procedure (b) four more times as directed and record the temperatures in table I below.
    Retain the contents of the boiling tube for use in procedure (e).

(d) (i) Complete table **I** by calculating the solubility of solid **A** at different temperatures.   (5mrks)

Volume of water in boiling tube(cm^3)	Temperature at which crystals of solid A first appear(^{o}C)	Solubility of solid A (g /100g of water)
4		
6		
8		
10		
12		

    (ii) On the grid provided, plot a graph of solubility of solid A (vertical axis) against temperature(3mks)
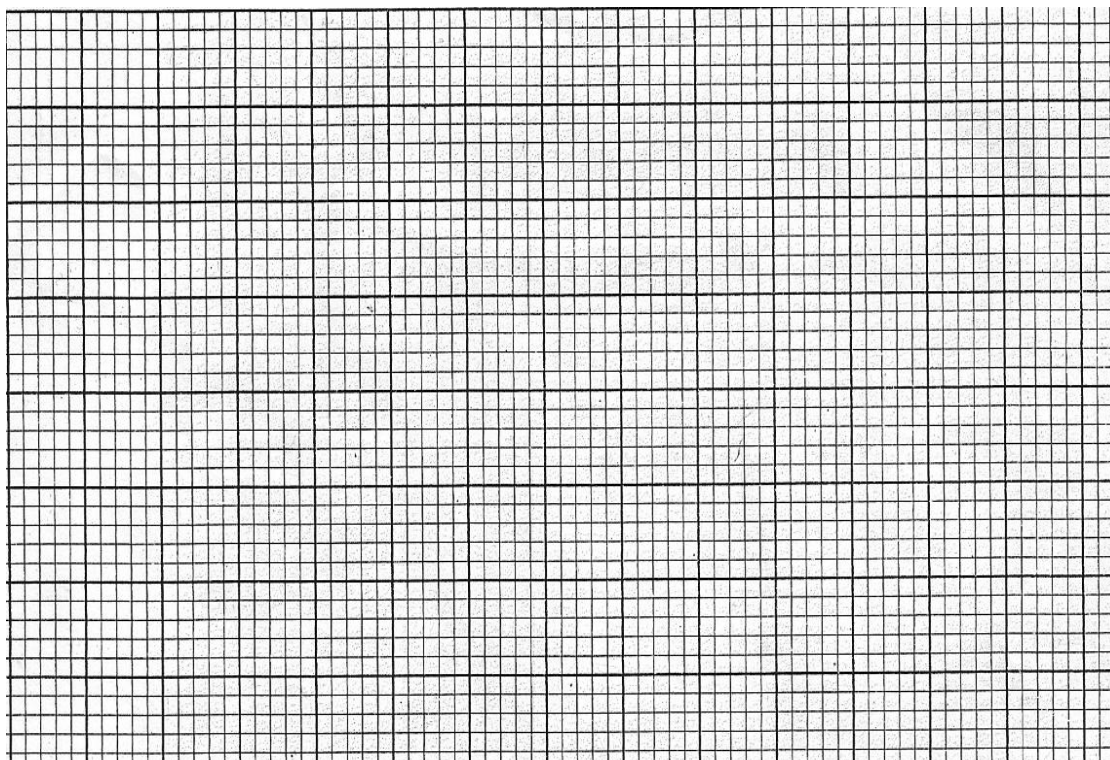
(ii) Using your graph, determine the temperature at which 100g of solid **A** would dissolve in 100g of water. (1mrk)

(e) (i) Transfer the contents of the boiling tube into a 250mls volumetric flask. Rinse both the boiling tube and the thermometer with distilled water and add to the volumetric flask. Add more distilled water to make up to the mark. Label this solution **A**. Fill the burette with solution **B**. Using a pipette and pipette filter, place 25.0cm^3 of solution A into a conical flask. Warm the mixture to about 60°C Titrate the hot solution **A** with solution **B** from the burette until a permanent Pink colour persists. Record your results in table II below and repeat the titration 2 more times and complete the table.

Table II

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution B used(cm^3)			

(4mrks)

Calculate the:

(ii) Average volume of solution B used. (1mrk)

(iii) Number of moles of potassium Manganate (VII) used. (1mrk)

(iv) Number of moles of **A** in 25.0cm^3 of solution **A**, given that 2 moles of potassium permanganate (VII) reacts completely with 5 moles of **A**. (1mrk)

(v) Relative formula mass of **A**. (1mrk)

(vi) The formula of **A** has the form M.XH$_2$O. Determine the value of **X** in the formula given; *(RFM of M=90, O =16.0, H = 1.0)* (2mrks)

2. You are provided with solid **C**. Carry out the tests below determine the ions present in the solid. Record your observations and inferences in the spaces below. Dissolve the whole of solid **C** provided in 10mls of distilled water and divide into **five** portions.

(i) To the first portion add 2M NaOH drop wise, then excess

Observations	Inference
1mrk	1mrk

(ii) To the second portion add 2M NH$_4$ OH drop wise, then excess

Observations	Inference
1mrk	1mrk

(iii) To the third portion dip a clean glass rod and burn in the non- luminous flame of the burner.

Observations	Inference
1mrk	1mrk

(iv)To the fourth portion add about 2.0cm^3 of IM Na$_2$ CO$_3$

Observations	Inference
1mrk	1mrk

(v)To the fifth portion add about 2.0cm^3 of Pb(NO$_3$)$_2$solution and an equal volume of water
And warm the mixture.

Observations	Inference
1mrk	1mrk

(b) You are provided with solid **D.** Carry out the following tests and write your observations and inferences in the spaces provided below.

(i) Add the 10mls of distilled water, shake well and divide the mixture into **four** portions.

Observation	Inference
1mrk	1mrk

(ii)   To the first portion ,add (2-3) drops of universal indicator and note the pH.

Observation	Inference
1mrk	1mrk

(iii)To the second portion, add 2 drops of acidified potassium manganate(VII)   from the burette.

Observation	Inference
1mrk	1mrk

(iv)To the third portion, add 2cm^3 of acidified potassium dichromate (VI)

Observation	Inference
1mrk	1mrk

(v)   To the fourth portion, add all solid sodium hydrogen carbonate provided and shake well.

Observation	Inference
1mrk	1mrk