MANGU HIGH SCHOOL

NAME..... Mar King Scheme ..... CLASS .....

INDEX NO..... ADM. NO.....

233/3
CHEMISTRY
PAPER 3
(PRACTICAL)

MOCK 2022

TIME: 2¼ HOURS

INSTRUCTIONS TO CANDIDATES

i. Write **your name** and **index number** in the spaces provided above
ii. **Sign** and **write** the date of examination in the spaces provided.
iii. Answer **all** questions in the spaces provided in the question paper.
iv. You are not allowed to start working with the apparatus for the first **15 minutes** of the 2¼ hours allowed for this paper. This time is to enable you to **read** the questions paper and **make sure** you have all the chemicals and apparatus that you may need.
v. All working **must** be clearly shown where necessary.
vi. Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY:

Question	Maximum Score	Candidate's Score
1	22	
2	10	
3	08	
TOTAL	40	

*This paper consists of **6** **printed pages**. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing*

Turn Over

1. You are provided with
   (i) 4.5g of solid A in a boiling tube
   (ii) Solution B, 0.06M acidified potassium manganite (VII)

   You are required to determine.

   (i) The solubility of solid A at different temperatures
   (ii) The number of moles of water of crystallization of solid A.

Procedure 1

(a) Using a burette, add 4cm^3 of distilled water to solid A in a boiling tube. Heat the mixture while string with a thermometer to about 70°c. When all the solids 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 1.

(b) Using a burette add 2cm^3 of distilled water to the content of the boiling tube. Warm the mixture while stirring the thermometer until all the solid dissolve. Allow the mixture to cool while stirring. Note and record the temperature at which crystals of solid A first appears.

(c) Repeat procedure (b) two more times and record the temperature in table 1. Return the content of boiling tube for use in procedure.

(d) (i) Complete the table calculating the solubility of solid A at different temperatures. The solubility of a substance is the mass of that substance that dissolves in 100cm^3(100g) of water at a particular temperature. (6mks)

Table 1

Volume of water in the boiling tube (cm^3)	Temperature at which crystals of solid A first appear (°C)	Solubility of solid A (g/100g of water)
4	65 - 67.0 - 69	112.5
6	decrease	75
8		56.25
10		45

C.T 3mks
- Temp ✓ 1mk
- Solubility 2mks

A. ✓1mk
67°c ± 2

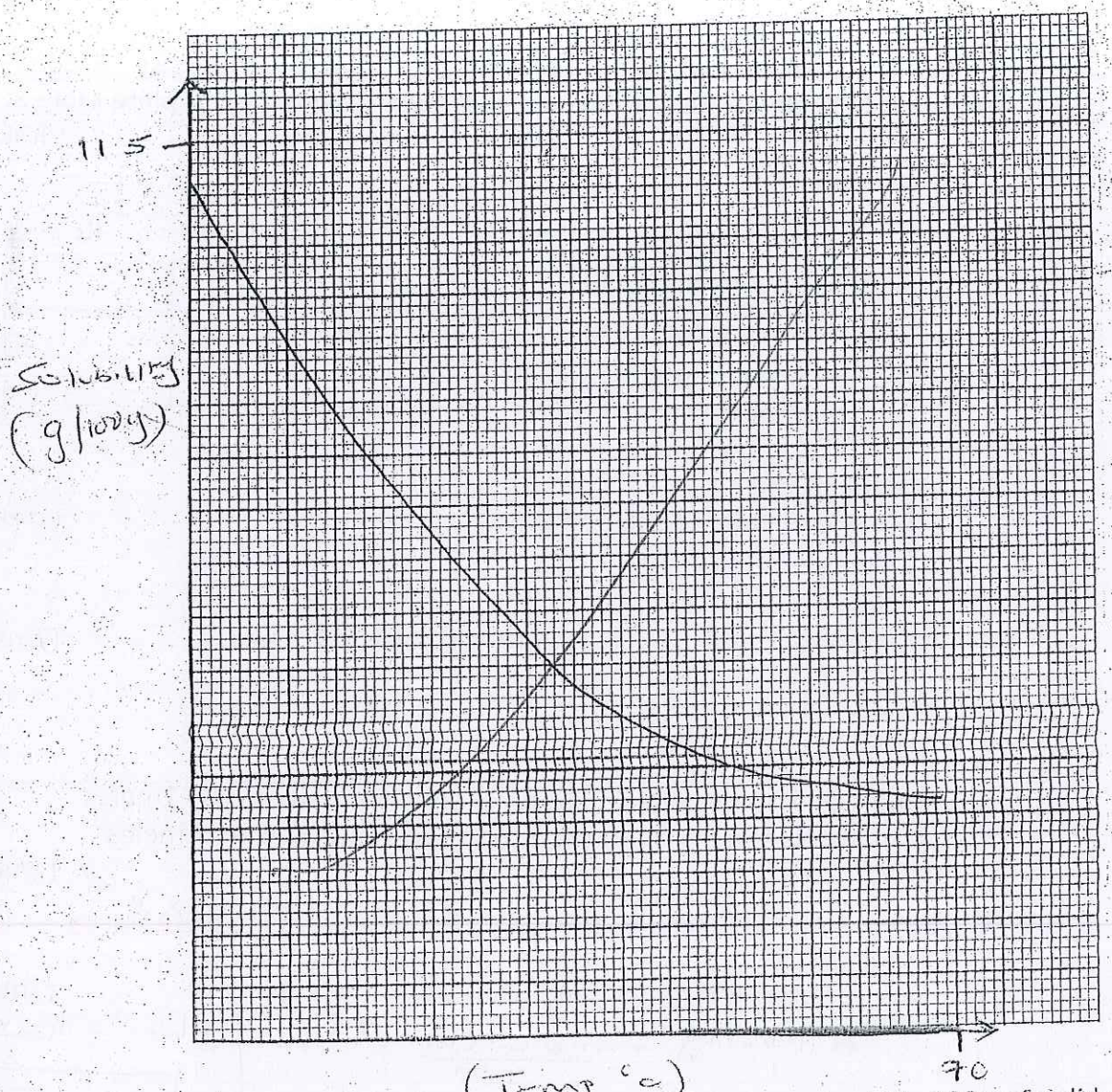
T - 1mk

D - 1mk (.0 or .5)
(For Temp only)

6

A - 1
2
T - 1
CI - 1
D - 1

(ii) On the grid provided plot a graph of the solubility of solid A (vertical axis) against temperature. (3mks)



C 1/2
S 1/2
P 1/2
C 1
3MK

(iii) Using your graph determine the temperature at which 100g of solid A would dissolve in 100cm^3 of water. (1mk)

Evidence ½ 3 Reject for wrong shape of the graph
Value ½

(iv) Using your graph determine the solubility of solid A at 55°C. (1mk)

Evidence ½ 3 Reject for reading wrong graph.
Value ½

Procedure 2

(e) (i) Transfer the content of the boiling tube into about 250ml volumetric flask. Rinse both the boiling tube and thermometer with distilled water and add it 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, place 25.0cm^3 of solution A into a conical flask. Warm the mixture to about 60°C. Titrate this hot solution A with solution B, until a permanent pink colour persist. Record your readings in table 2. Repeat the titration more times and complete table 2. (4mks)

5 V 25.0 cm

Table 2

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution **B** used (cm^3)			

C 1
D 1
A 1 - ±0
P 1 ±0
F 1
5

(ii) Calculate the

(a) Average volume of solution B used. (1mk)

Show working.

(b) Number of moles of potassium amangate (VII) used. (2mks)

$\frac{0.06 \times A.V}{1000}$ = ans ✓

(c) Number of moles of A in 25cm^3 of solution A given that 2moles of potassium manganite (VII) reacts completely with 5 moles of A. (1mk)

$KMnO_4 : A$
$2 \quad : \quad 5$
$= \frac{ans\ b \times 5}{2} = ans$ ✓

(d) (i) Relative formula mass of A. (3mks)

Molarity = $\frac{ans\ c \times 1000}{250}$ = ans ✓

g/dm^3 = $\frac{4.5 \times 1000}{250}$ = 18 ✓

⇒ RFM = $\frac{ans\ c \times 1000}{250}$ ✓

(ii) The formula of a has the formula of D.XH$_2$O. Determine the value of x in the formula, given that the relative formula mass of D is 90. (O=16, H=1) (2mks)

ans

$X = \frac{(ans\ d(i) - 90)}{4 \quad 18}$ ✓ ✓ = ans

2. You are provided with solid FA5, FA6, and FA7. Carry out the following tests and write your observations and inferences in the spaces provided.

(a) Place all solid FA5 in the boiling tube. Add about $10cm^3$ of distilled water and shake until all the solid dissolves. Label this as solution FA5.

(i) To about $2cm^3$ of solution FA5 in a test tube, add 2M sodium hydroxide solution drop wise until in excess.

Observation	Inferences
- White PPt ✓ 1 - Soluble in excess to form Colourless Sol ✓ 1 (2mks)	Zn^{2+}, Pb^{2+}, Al^{3+} Present ✓ (1mk)

(ii) To about $2cm^3$ of solution FA5 in a test tube, add 2M ammonium hydroxide solution dropwise until in excess.

Observation	Inferences
- White PPt ✓ - Resist in excess ✓ (2mks)	Pb^{2+}, Al^{3+} Present (1mk)

(iii) To about $2cm^3$ of solution FA5 in the test tube, add 4 drops of 2M sulphuric (VI) acid.

Observation	Inferences
White PPt ✓ 1 (1mk)	Pb^{2+} Present ✓ (1mk)

(iv) To about $2cm^3$ of solution FA5 in a test tube, add 2 drops of potassium iodide solution.

Observation	Inferences
Yellow PPt ✓ (1mk)	Pb^{2+} ions Present ✓ (1mk)

(b) Place solid FA7 into boiling tube. Add about $10cm^3$ of distilled water and shake well. Label this as solution FA7. Use this solution for the following tests.

(i) Place about $2cm^3$ of solution FA7 in a test tube and place the universal indicator paper provided into the solution hence determine its pH.

Observation	Inferences
pH 4 or 5 or 6 any 1x1 (1mk)	weakly acidic solution (1mk)

(ii) To about $2cm^3$ of solution FA7 made in (ii) above, add 3 drops of acidified potassium manganite(VII) solution

Observation	Inferences
Purple colour of $H^+/KMnO_4$ changes to colourless (1mk)	$-C=C-$ / $H-C\equiv C-H$ $R-OH$ (1mk)

(iii) To the remaining solution FA~~8~~7 in the boiling tube, add the other half of solid FA6.

Observation	Inferences
Effervescence (1mk)	H^+, H_3O^+, $R-\overset{O}{\overset{\|}{C}}-OH$ (1mk)