

**SERIES 45 EXAMS**

233/3

**CHEMISTRY**

**Paper 3**

**(PRACTICAL)**

**MARKING SCHEME**

	<b>1</b>	<b>2</b>	<b>3</b>
Final Burette reading cm <sup>3</sup>			
Initial Burette reading cm <sup>3</sup>			
Final Burette reading cm <sup>3</sup>			

$$\frac{15.0 + 15.0 + 15.0}{3}$$

Mean titre =

$$\text{Mean} = 15.033 \text{ cm}^3$$

$$\text{Mean} = 15.0 \text{ cm}^3$$

1. (i) Moles of  $\text{MnO}_4^-$  is  $\left(\frac{0.02 \times 15}{1000}\right) = 3.0 \times 10^{-4} \text{ mole}$   
 From equation: 2 moles of  $\text{MnO}_4^-$  react with 5 moles of  $\text{C}_2\text{O}_4^{2-}$   
 $3.0 \times 10^{-4}$  Moles reacts with:

$$\frac{3.0 \times 10^{-4}}{2} \times 5 = 7.5 \times 10^{-4} \text{ moles}$$

- (ii) Number of Moles of  $\text{C}_2\text{O}_4^{2-}$  that are  $25 \text{ cm}^3$  is  $7.5 \times 10^{-4}$

- (iii)  $25 \text{ cm}^3$  contain  $7.5 \times 10^{-4}$  moles

$$250 \text{ cm}^3 \text{ will contain } \frac{7.5 \times 10^{-4}}{25} \times 250$$

$$= 7.5 \times 10^{-3} \text{ Moles}$$

$$\text{Moles in } 25 \text{ cm}^3 \text{ of solution } S_1 = 7.5 \times 10^{-3}$$

$$\frac{7.5 \times 10^{-3} \times 50}{25}$$

$$\text{Moles in } 50 \text{ cm}^3 \text{ of Solution } S_1 =$$

$$= 1.5 \times 10^{-2} \text{ Moles}$$

$$\text{Mass dissolved in } 50 \text{ ml H}_2\text{O} = 1.5 \times 10^{-3} \times 134 = 2.01 \text{ g}$$

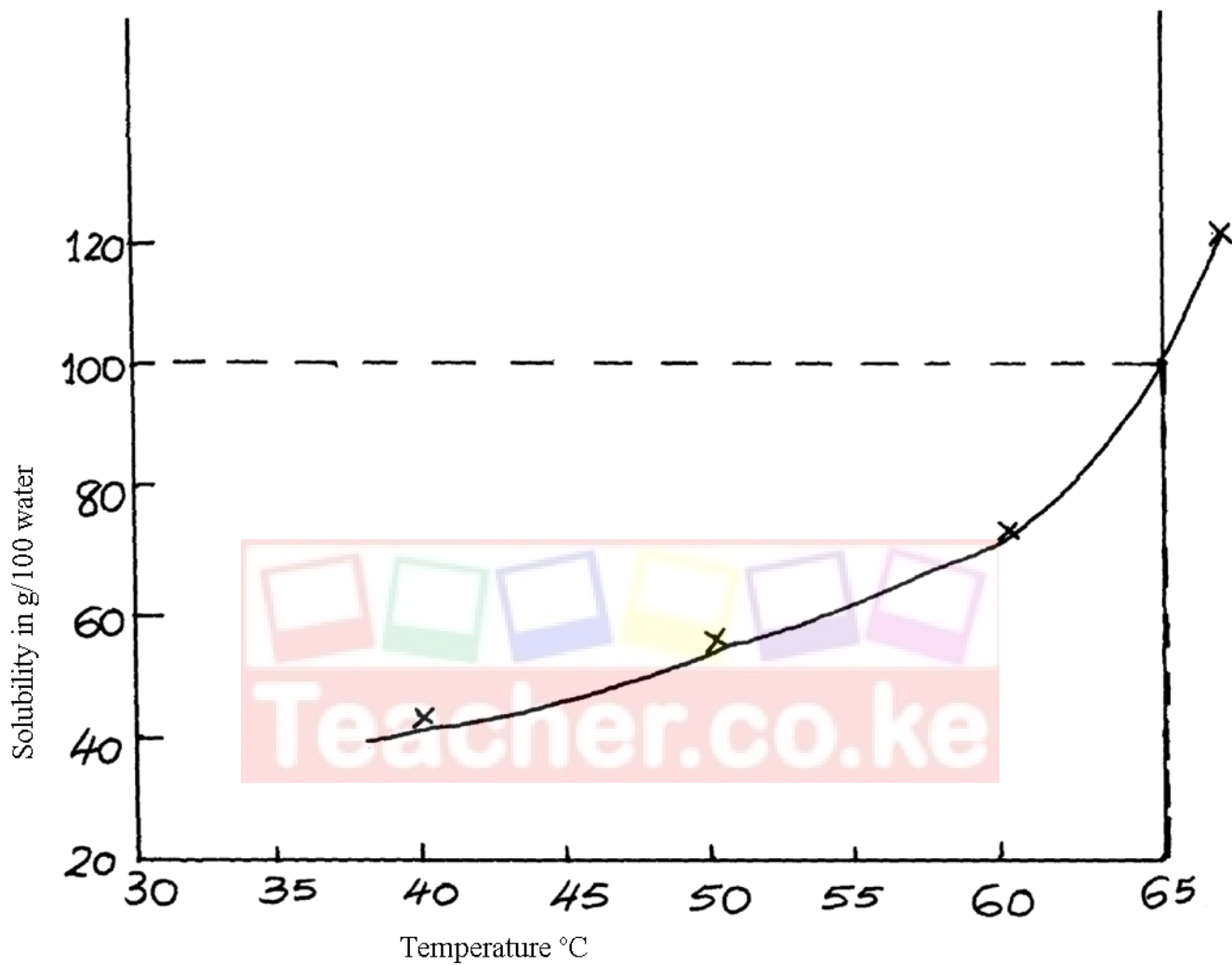
$$\text{Mass dissolved in } 100 \text{ ml H}_2\text{O} = 2.01 \times 2 = 4.02 \text{ g}$$

$$\text{Solubility of } S_1 = 4.02 \text{ g}/100 \text{ g H}_2\text{O}$$

2.

<b>Volume of water in boiling tube (cm<sup>3</sup>)</b>	<b>Temperature at which crystals of solid M first appear (°C)</b>	<b>Solubility of solid M in g/100g of water</b>
4	67	112.50
6	58	75.00
8	48	56.25
10	38	45.00

(a)



(b) 65°C

(c) Solubility of Solid M increases with increase in temperature.

3.

(i)	<b>OBSERVATIONS</b> Part of solid dissolves and on filtering a pale blue solution is obtained. ✓ ½.	<b>INFERENCES</b> Z could be a mixture of an insoluble salt ✓ ½ and a soluble Cu <sup>2+</sup> salt ✓ ½
(ii)	White residue remains ✓ ½	

**O**

<b>BSERVATIONS</b>	<b>INFERENCE</b>
A white precipitate is formed ✓ 1	SO <sub>4</sub> <sup>2-</sup> (aq) ions are present ✓ 1

(iii)	<b>OBSERVATIONS</b> A pale blue precipitate is formed ✓ ½ The precipitate is insoluble in excess alkali ✓ ½	<b>INFERENCE</b> Possibly Cu <sup>2+</sup> (aq) ions present ✓ 1
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(iv)	<b>OBSERVATIONS</b> A pale blue precipitate is formed ✓ ½ Precipitate dissolves to form a deep blue solution ✓ ½	<b>INFERENCE</b> Presence of Cu <sup>2+</sup> (aq) ions ✓ 1
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(v)	<b>OBSERVATIONS</b> The residue dissolves in Nitric (v) acid with evolution of a gas. ✓ ½. The resultant solution is colourless. ✓ ½	<b>INFERENCES</b> Possibly CO <sub>3</sub> <sup>2-</sup> (aq) ✓ ½ or SO <sub>4</sub> <sup>2-</sup> (aq) one present ✓ ½
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(vi)	<b>OBSERVATIONS</b> A white precipitate is formed ✓ ½ Soluble in Excess alkali ✓ ½	<b>INFERENCES</b> Possibly Pb <sup>2+</sup> (aq) ✓ ½, Zn <sup>2+</sup> (aq) or Al <sup>3+</sup> (aq) ions present ✓ ½
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(vii)	<b>OBSERVATIONS</b> A white precipitate is formed ✓ ½ Insoluble in Excess ammonia solution ✓ ½	<b>INFERENCES</b> Possibly Pb <sup>2+</sup> (aq) ✓ ½ or Al <sup>3+</sup> (aq) ions present ✓ ½
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(viii)	<b>OBSERVATIONS</b> A white precipitate is formed ✓ ½	<b>INFERENCES</b> Pb <sup>2+</sup> (aq) ions present ✓ ½
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4. (i)

<b>OBSERVATIONS</b>	<b>INFERENCES</b>
U is a colourless liquid ✓ ½	Coloured ions absent ✓ ½

(ii)

<b>OBSERVATIONS</b>	<b>INFERENCES</b>
U burns with a blue flame ✓ 1	U possible alkane ✓ ½ or an alkanol of low molecular mass ✓ ½

(iii)

<b>OBSERVATIONS</b>	<b>INFERENCES</b>
U mixes freely with water ✓ ½ Universal indicator paper turns pale blue ✓ ½	U possibly contains an OH ✓ 1

(iv)

<b>OBSERVATIONS</b>	<b>INFERENCES</b>
No reaction with sodium hydrogen carbonate ✓ 1	R-COOH absent ✓ 1

(v)

<b>OBSERVATIONS</b>	<b>INFERENCES</b>
Potassium Dichromate (VI) changes colour from orange to green on warming ✓ 1	U is a reducing agent , Possibly an alkanol ✓ 1

(vi)

<b>OBSERVATIONS</b>	<b>INFERENCES</b>
Potassium Manganate (VII) is decolourized on warming ✓ 1	U is a reducing agent ✓ 1

(vii)

<b>OBSERVATIONS</b>	<b>INFERENCES</b>
A pleasant fruit smell is produced ✓ 1	U is an alkanol. R – OH present ✓ 1