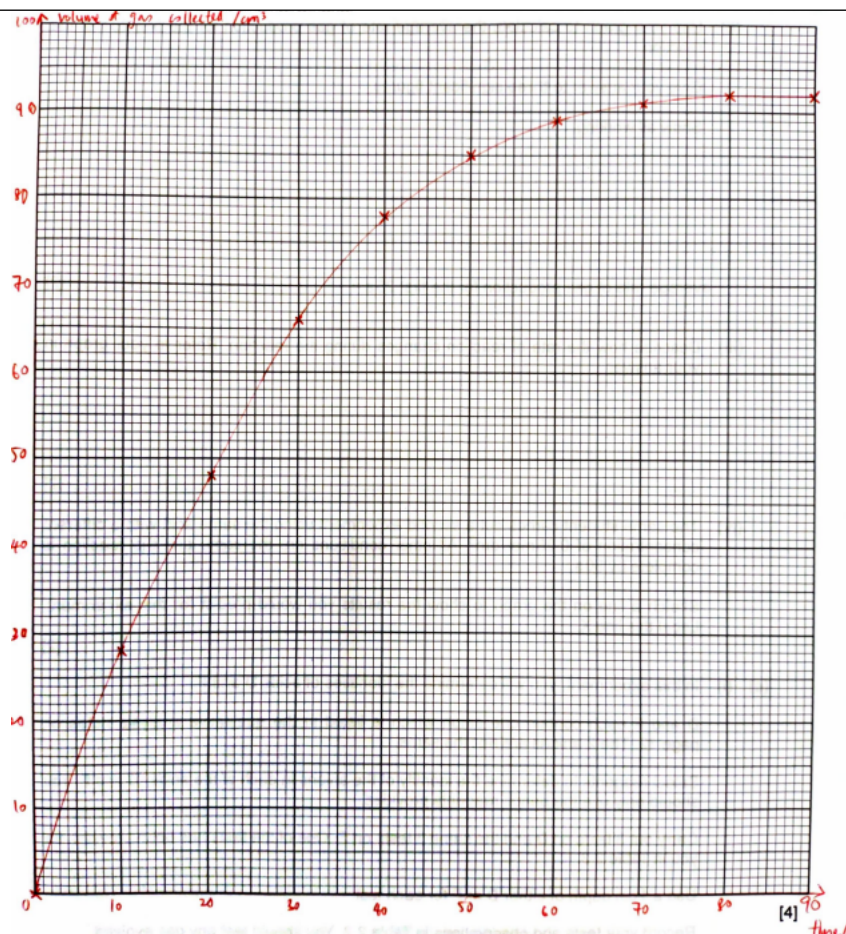


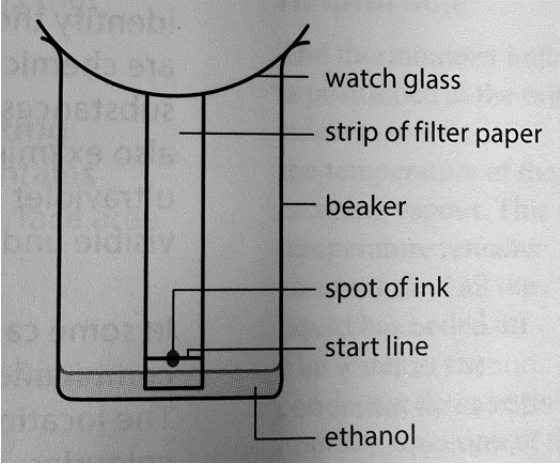
Victoria School
2024 O Level Chemistry
Suggested Answer to Chemistry Paper 3

Qn	Skill	Answer	Mark															
1(a)(i)	PDO	Results <table><tr><td>Titration number</td><td>1</td><td>2</td></tr><tr><td>Final burette reading / cm³</td><td>23.20</td><td>23.20</td></tr><tr><td>Initial burette reading / cm³</td><td>0.00</td><td>0.00</td></tr><tr><td>Volume of B used / cm³</td><td>23.20</td><td>23.20</td></tr><tr><td>Best titration results</td><td>√</td><td>√</td></tr></table>	Titration number	1	2	Final burette reading / cm ³	23.20	23.20	Initial burette reading / cm ³	0.00	0.00	Volume of B used / cm ³	23.20	23.20	Best titration results	√	√	4
Titration number	1	2																
Final burette reading / cm ³	23.20	23.20																
Initial burette reading / cm ³	0.00	0.00																
Volume of B used / cm ³	23.20	23.20																
Best titration results	√	√																
	MMO	1m: correct headings + units & correct subtraction 1m: readings to nearest 0.05 cm ³ 1m: readings used are within ±0.20 cm ³ 1m: readings are within ±0.20 cm ³ of supervisor's readings																
1(a)(ii)	ACE	Average volume of B = (23.20 + 23.20) / 2 = 23.20 cm ³ [answer must be 2 d.p.]																
1(b)(i)	ACE	Amount of sodium hydroxide used = 23.20/1000 x 0.150 = 0.00348 mol Amount of ethanedioic acid in 25.0 cm ³ = 0.00348/2 = 0.00174 mol																
1(b)(ii)	ACE	Amount of ethanedioic acid in 1 dm ³ = 0.00174/25 x 1000 = 0.0696 mol																
1(b)(iii)	ACE	Mass of ethanedioic acid in 1 dm ³ = 0.0696 x (24+2+64) = 6.26 g	1															
1(b)(iv)	ACE	Mass of water in 1 dm ³ = 8.90 – 6.26 = 2.64 g Amount of water in 1 dm ³ = 2.64 / 18 = 0.147 mol 3 s.f for (b)(ii), (b)(iii) and (b)(iv)	1 1 1															
1(b)(v)	ACE	x = 0.147 / 0.0696 = 2 [must be whole no.]	1															
1(c)(i)	MMO	No effect on volume of B. The number of moles of B remains the same even with deionised water added.	1															
1(c)(ii)	MMO	increase in the mass (no. of moles) of ethanedioic acid calculated. Or no. of moles/ mass of water decreases Hence, X is still rounded off to the same value.	1 1															
2(a)(i)	PDO	<table><tr><td>Volume of D / cm³</td><td>15.0</td></tr><tr><td>Volume of deionised water added to D / cm³</td><td>5.0</td></tr><tr><td>Volume of gas collected / cm³</td><td>41</td></tr></table> 1m: 1 d.p. for volume of D and water 1m for 15.0 and 5.0 1m for accuracy for volume of gas to whole no./1 d.p.	Volume of D / cm ³	15.0	Volume of deionised water added to D / cm ³	5.0	Volume of gas collected / cm ³	41	3									
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2(a)(ii)	MMO	Magnesium is the limiting reactant. Magnesium has completely reacted away at the end of the experiment.	1															
2(b)(i)	ACE																	

		1m: Scale chosen is appropriate with no awkward scale (uniform scale chosen with graph taking up more than half of each axis) 1m: Line of best fit - smooth curve - constant at 80-90s - to pass through origin 1m: Axes (include labels with units) 1m: Points plotted correctly (to half a small square)	1 1 1 1
2(b)(ii)	ACE	Average rate of gas production = $57.5/25 = 2.30 \text{ cm}^3/\text{s}$	
2(b)(iii)	ACE	Rate of reaction is highest at the start of the reaction(0-40s), with the steepest gradient. As the reaction proceeds, the rate of reaction slows down as the gradient becomes more gentle. At 80s, the reaction is completed and the rate of reaction is zero as the gradient of the graph becomes zero.	1 1
2(b)(iv)	MMO		



2(c)(i)	MMO	test	observations for D	observations for F	1
		Add about 1 cm depth of D in a clean test tube. Add about 1 cm depth of dilute nitric acid, followed by a few drops of aqueous barium nitrate. Repeat the test using F .	No observable changes	No observable changes	
		Add about 1 cm depth of D in a clean test tube. Add about 1 cm depth of dilute nitric acid, followed by a few drops of aqueous silver nitrate. Repeat the test using F .	White ppt was formed	No observable changes	
		Add about 1 cm depth of D in a clean boiling tube. Add about 2 cm depth of aqueous sodium hydroxide, shake the contents and then add a	No observable changes / Effervescence of colourless gas. Gas evolved extinguishes a lighted	Colourless pungent gas turned moist red litmus paper blue. Ammonia gas was formed.	2

		piece of aluminium foil. Heat the contents carefully. Repeat the test using F. splint. Hydrogen gas was formed. Aluminium foil dissolved to form a colourless solution.	
2(c)(ii)	ACE	D is HCl F is HNO₃	1
3	P	 1. On a piece of filter paper, draw a starting line in pencil about 2.0 cm from the bottom of the filter paper. 2. Dissolve the food supplement powder in excess water and stir thoroughly. 3. Use a toothpick to apply a spot of the dissolved food supplement on the starting line. 4. Place the filter paper into a beaker containing ethanol/water as the solvent, with the starting line above the solvent. 5. Leave the set-up to stand with the set up covered with a lid. The solvent should move up the filter paper and separate the food supplement into the three amino acids. 6. Trace the solvent front at the end of the experiment and analyse the chromatogram. 7. Apply a locating agent for the separated components to show. 8. Measure the distance travelled by each component and the distance travelled by the solvent. 9. Calculate the R_f values of each of the components 10. Compare the values with literature values of all amino acids. The amino acids with the same R_f values as the components are the amino acids found in the food supplement powder. Or run chromatograms of amino acids and compare with the food supplement to identify the components. 1m – apparatus (filter paper, beaker, lid, solvent) 1m – method (labelling start line, solvent front, level of solvent, location of spots on start line, use of locating agent at the end) 1m – measurements 1m – analysis of results/conclusion	4

