

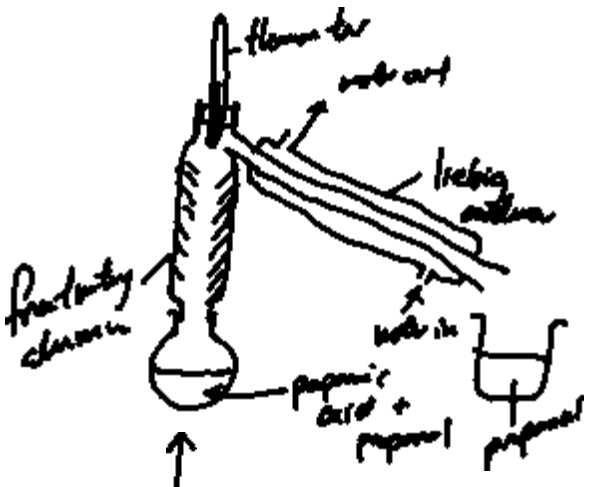
Victoria School
2023 O Level Chemistry
Suggested Answer to Chemistry Paper 3

Qn	Skill	Answer	Mark
1(a)(i)	PDO 		

		1m-Scale chosen is appropriate- no awkward scale(no 3, 8, 1.5, 6, 7, etc) (uniform scale chosen to use more than half of each axis) 1m- graph of best fit - equal distribution of points. -To draw curve if it looks like one - (only 1 anomalous point allowed) line must pass through origin points not on the line must be balanced on either side and any anomalous points ignored) * 1m-Axes (include labels with units) 1m all Points plotted correctly (to half a small square)	1 1 1 1
1(b)(ii)	ACE	volume of B / cm³ rate of reaction / s⁻¹ Correct volume of B read from graph with units shown (5.25 cm³ ± 0.10). Working on the graph	1 1
1(c)(i)	ACE	<u>Method 1</u>: conc. of B = $10/11 \times 0.1 = 0.0909 \text{ mol/dm}^3$ Or <u>Method 2</u> Concentration of B: 0.1 mol/dm³ Volume: 10 cm³ No. of moles of B: $0.1 \times 10/1000 = 0.001 \text{ mol}$ Volume of reaction mixture: 10+1= 11cm³ Concentration of B = $\frac{0.001}{(11/1000)} = 0.0909 \text{ mol/dm}^3$	1

1(c)(ii)	ACE	Concentration of B = $0.09091 \text{ mol/dm}^3 / 5 = 0.0182 \text{ mol/dm}^3$	1
	PDO	appropriate units in final answers in (c)(i) , (ii) (mol/dm^3) Rejected answer: concentration of B = $2/11 \times 0.1 = 0.0182$ as question asked for deduction. So students have to use the answer from ci.	1
1(c)(iii)		The rate of reaction increases as the volume of B added increases. If Line graph: graph shows a straight line and has a constant gradient If Curve: graph shows a curve with an increasing gradient. 1m	1
		As the concentration of B increases, there are more reacting particles per unit volume. Hence there are more effective collisions between reacting particles resulting in a higher rate of reaction.	1
1(c)(iv)		To dilute the sodium thiosulfate solution and ensure that the total volume of reaction mixture remains the same to ensure a fair experiment. 1m	1
		Volume of B is proportional to its concentration of B 1m	1
1(d)(i)	ACE	percentage uncertainty = $0.2 \div 10 \times 100 = 2.0\%$	1
		appropriate significant figures in final answers in (d) (i)	1
1(d)(ii)	PDO	Use a burette to measure volume of B instead of a measuring cylinder Or Use of a light sensor with a data logger to measure reaction time	1
Total: 27			

Qn	Skill	test	Answer observations	Mark
2(a)(i)	MMO			<i>At least 1m per box, Max 6m</i>
Test 1 Remove the stopper from a sample of C in a test tube. Heat the sample in the test tube gently at first then strongly for 1 minute.			- Green solid turned black on heating - Colourless liquid formed on wall of test tube/condensation occurred - Colourless gas produced white ppt when bubbled into limewater - CO₂ was produced	1
Test 2 Transfer the other provided 0.25g measure of C to a boiling tube. Carefully add dilute nitric acid to a depth of approximately 5cm. Keep the final solution for use in tests 3-5.			- Bubbling of colourless, odorless gas - Green solid dissolved in acid to form a blue solution - Colourless gas produced white ppt when bubbled into limewater - CO₂ was produced [marks awarded either in Test 1 or 2]	1
Test 3 Add a 1cm depth of the solution from test 2 into a test tube. Add aqueous ammonia slowly with shaking until no further change is seen.			- Blue ppt was produced - The ppt dissolved in excess aqueous ammonia to form a dark blue solution	1
Test 4 Add a 1cm depth of the solution from test 2 into a test tube. Add a few drops of aqueous barium nitrate.			No observable change	1
Test 5 Add a 1cm depth of the solution from test 2 into a test tube. Add a few drops of aqueous silver nitrate.			white ppt formed	1
2(a)(ii)	ACE	chloride / Cl ⁻		
		Test 5		1
2(b)	ACE	Mass of conical flask + A before reaction /g	175.83	
		Mass of conical flask with solution	176.46	

		after reaction/g	1
		1m proper statement/in a table; 1m correct to 2 d.p.	
2(c)(i)	ACE	$\text{CuCO}_3 (\text{s}) + 2\text{HCl} (\text{aq}) \rightarrow \text{CuCl}_2 (\text{aq}) + \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{l})$ 1m for equation, 1m for ss	1
2(c)(ii)		Total initial mass of conical flask + A + D = $175.83 + 0.7\text{g} = 176.53\text{g}$ Mass loss due to gas = Initial mass – final mass = $176.53 - 176.46 = 0.07 \text{ g}$	1
2(c)(iii)		No of mol of $\text{CO}_2 = 0.07 / 44 = 0.0015909 \text{ mol}$ 1 mol $\text{CO}_2 \equiv 1 \text{ mol CuCO}_3$ Mass of $\text{CuCO}_3 = 0.0015909 \times 124 = 0.197 \text{ g}$	1
2(c)(iv)		Total mass of D = 0.70 Percentage by mass of $\text{CuCO}_3 = 0.197 / 0.70 \times 100 = 28.1 \%$	1
3(a)	P	Diagram  Method Perform fractional distillation with the reaction mixture. <u>Heat the mixture in the round bottomed flask until it vaporizes and the gases rise up the fractionating column.</u> Propanal with the lower boiling point will condense in the condenser and be collected first at 49°C (as shown on the thermometer) as a distillate in a beaker/conical flask. Apparatus that has to be labelled in diagram/mentioned in procedure-2m fractionating column, round botted flask, condenser, water in and water out on condenser, thermometer, beaker/conical flask collect propanal at 49°C -1m method -1m [include underlined words in procedure]	1
3(b)		Add a reactive metal or carbonate	1

		If propanoic acid is present, there will be effervescence of colourless gas [reject esterification]	1
			Total: 13

-1m presentation overall if no statements for mole concept questions

Skill	Marks
PDO	8
MMO	10
ACE	17
P	5