

2024 S4 Chem Prelim Practical Examination Answer and Mark Scheme

Question 1																		
(a)	PDO	<i>Results table</i>																
		<table><tr><td>Titration number</td><td>1</td><td>2</td></tr><tr><td>Final reading / cm³</td><td></td><td></td></tr><tr><td>Initial reading / cm³</td><td></td><td></td></tr><tr><td>Volume of P used / cm³</td><td>18.60</td><td>18.40</td></tr><tr><td>Best titration results</td><td></td><td></td></tr></table>	Titration number	1	2	Final reading / cm ³			Initial reading / cm ³			Volume of P used / cm ³	18.60	18.40	Best titration results			
	Titration number	1	2															
	Final reading / cm ³																	
	Initial reading / cm ³																	
	Volume of P used / cm ³	18.60	18.40															
	Best titration results																	
		Format of table can be different but the main quantities must be in the table	[1]															
		Average reading: cm ³	[1]															
		If ticking of best results not shown in table, penalise under header																
MMO	Record initial burette reading, final burette reading and volume added with correct headings and units in a titration table.	[2]																
	all burette readings for all accurate titres in titration table are recorded to nearest 0.05 cm ³ . Volume of P calculated correctly.																	
	Titration results																	
	Accuracy	[1]																
	- For average titre (of consistent readings) within 0.20 cm³ of supervisor's average value score <u>2 marks</u> (- For average titre (of consistent readings) within 0.30 cm³ of supervisor's average value score <u>1 mark</u>																	
	Concordance																	
	At least two titre values are within 0.20 cm³ (using uncorrected titres)																	
(b)	MMO	Appropriate average volume of P in 2 d.p. from <u>closest</u> titre values (identified by a tick or in calculation)	[1]															
		If value is 18.28 cm ³ but round up to 18.30 cm ³ at the end penalise as dp																
(c)	ACE	(average volume × 0.100) ÷ 1000 to 3sf	[1]															
(d)	ACE	moles of citric acid = (c) / 3	[1]															
(e)	ACE	concentration of citric acid = (d) × 1000 / 25	[1]															

(f)	ACE	mass of citric acid = $(d) \times 20 \times 192$ or $[(e) / 2] \times 192$ Appropriate decimal place, significant figures in final answer of b), c), d), e), f). [1] Appropriate units in final answer of b), e), f) [units must be on the <u>line</u>] [1] (for final ans, if working is correct, will still get full marks as per qns, final ans need not be on <u>line</u>)	[3]
(g)	ACE	1/3 of part (b) (must give specific value, ignore dp/sf) [1] Ethanoic acid is monobasic while citric acid is tribasic. [1] (accept similar explanations) The mole ratio of KOH to ethanoic acid is 1:1 while the mole ratio of KOH to citric acid is 3:1. [1] (accept similar explanations) If show by balanced eqns only, give 2 out of 3	[3]
Total: 15			

Question 2

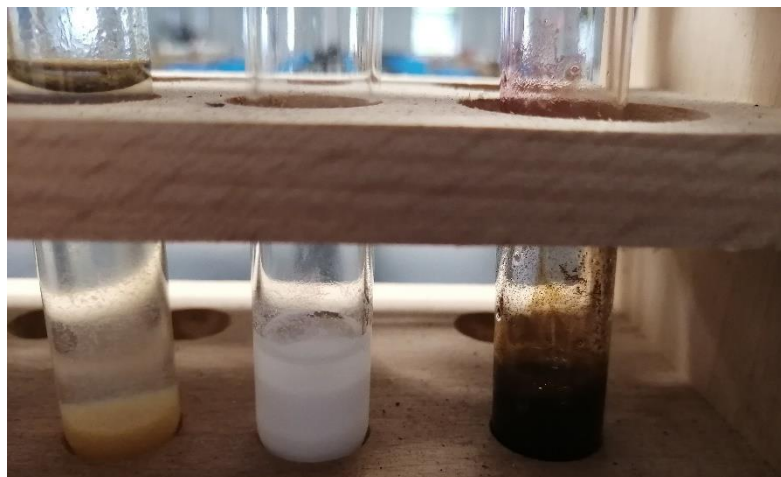
(a)

MMO

test	observations
Test 1 Put about 1 cm depth of aqueous hydrogen peroxide in a clean test tube. Add an equal volume of dilute sulfuric acid. Then add 10 drops of T with shaking. You do not need to test any gas evolved in Test 1.	Purple solution turned colourless [1] Effervescence, colourless, odourless gas evolved. [1] (penalise once if use bubbling/bubbles and if colourless/odourless does not appear)
Test 2 Put about 1cm depth of hydrogen peroxide in a clean test tube. Use a spatula to carefully add a small amount of D	Effervescence Colourless, odourless gas evolved. [1] Gas relights a glowing splint. Gas is oxygen [1]
Test 3 Put about 1 cm depth of dilute sulfuric acid in a clean test tube. Add an equal volume of aqueous potassium iodide. Then add a small amount of D .	Pale/light <u>yellow</u>/colourless solution turns –reddish brown/<u>Brown</u> [1]
Test 4 Put about 1 cm depth of S in a clean test tube. Add aqueous sodium hydroxide until a change is seen. Add excess aqueous sodium hydroxide to the mixture and allow to stand for a few minutes.	(Light) <u>cream/beige/brown/yellow/orange ppt</u> <u>insoluble in excess aqueous NaOH.</u>[1]
Test 5 Put about 1 cm depth of S in a clean test tube. Add an equal volume of aqueous barium nitrate then add an equal volume of dilute nitric acid.	<u>White ppt</u> <u>insoluble in aqueous nitric acid/no visible change</u> [1]
Test 6 Put about 1 cm depth of T in a clean test tube. Add an equal volume of S	<u>Purple solution turns brown/colourless</u>[1] <u>brown ppt observed</u>[1]

(b)	ACE	D is oxidising agent. [1] The oxidation state of iodine increased from -1 in KI to 0 in I ₂ . [1] OR KI becomes I ₂ (reject KI turns brown)	[2]
			Total: 11

Note: D MnO₂ T KMnO₄ S MnSO₄



Question 3

(a)	PDO	volume of aqueous potassium manganate(VII) / cm³ Labelled x and y axis with units correctly [1] Appropriate scale and graph is at least $\frac{3}{4}$ of graph paper [1] Plotted all points correctly [1] Appropriate best fit line drawn [1]	[4]
(b)(i)	PDO	Volume of acidified iron(II) sulfate is _____ 27.5 _____ cm ³ (dp to half of the smallest sq)	[1]
(ii)	PDO	Volume of acidified hydrogen peroxide is _____ 22.5 _____ cm ³ .	[1]

(c)(i)	ACE	Mole of iron(II) sulfate = 0.05×0.0275 =0.001375 =0.00138mol	[1]
(ii)	ACE	Mole of hydrogen peroxide = 0.03×0.0225 =0.000675mol Penalise (c)(i) & (ii) once if never convert to dm ³	[1]
(d)	ACE	FeSO ₄ : H ₂ O ₂ 0.00138 : 0.000675 0.00138/0.000675 : 0.000675/0.000675 2 : 1 ____2____ FeSO ₄ + ____1____ H ₂ O ₂ + sulfuric acid → iron(III) sulfate + water (accept the correct rounded off values of what they have)	[1]
Total marks: 9			

Question 4			
	P	To a fixed/known mass of A, [if wrong reagent, can only get 1 m for this] add <u>excess aqueous sodium hydroxide</u> / aq ammonia (but avoid using weak alkali) to separate	[1] [1]
		Filter the mixture to obtain magnesium oxide as residue.	[1]
		residue magnesium oxide is washed, dried and its mass is measured.	[1]
		% purity of magnesium oxide = mass of residue/mass of A x 100	[1]
Total marks: 5			

