Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Chemistry

Assessment Unit AS 3

assessing

Module 3: Basic Practical Chemistry
Practical Booklet B (Theory)

[SCH32]

FRIDAY 1 JUNE, AFTERNOON

MARK SCHEME

Booklet B

AVAILABLE MARKS

1 **(a)** $H_2C_2O_4 + 2NaOH \rightarrow Na_2C_2O_4 + 2H_2O$ [2]

(b) **(i)** Apparatus (beaker, stirring rod, funnel) rinsed with deionised water [1]

Washings transferred into flask [1] [2]

(ii) To ensure uniform distribution of the solute in the solution [1]

(c) **(i)** (0.1/24.6) × 100 = 0.4% [2]

(ii) Colourless [1] to pink [1] [2]

(iii) Number of moles of sodium hydroxide required for neutralisation

0.1 × (24.6/1000) = 0.00246

Number of moles of oxalic acid in the 25.0 cm^3 portion

0.00246/2 = 0.00123

Number of moles of oxalic acid in the 250 cm^3 solution

0.00123 × 10 = 0.0123

Number of moles of hydrated oxalic acid in the 1.55 g sample

0.0123

Relative formula mass of hydrated oxalic acid

1.55/0.0123 = 126 [3]

(iv) Relative formula mass of anhydrous oxalic acid

90

Value of x in $H_2C_2O_4.xH_2O$

126 – 90 = 36, x = 2 [2] 14

				AVAILABLE MARKS
2	**(a)**	**(i)**	Use a lid [1] Place the cup in another cup/beaker/thicker polystyrene [1] [2]	
		(ii)	The enthalpy change when one mole of water is produced in a neutralisation reaction under standard conditions. [2]	
		(iii)	100 kPa [1] and 298 K [1] [2]	
	(b)	**(i)**	Use a burette/pipette [1]	
		(ii)	Wear gloves and goggles [1] Sodium hydroxide is corrosive/causes eye damage [1] [2]	
		(iii)	11/40 = 0.275 0.275/10 = 0.0275 moles sodium hydroxide = 0.028 moles [2]	
		(iv)	1.0 × (25/1000) = 0.025 moles hydrochloric acid [1]	
	(c)	**(i)**	The density of the solution is 1 g cm^{-3}/no heat escapes (from mixture) [1]	
		(ii)	50 × 4.2 × 6.2 = 1302 J 1302/1000 = 1.302 kJ = 1.3 kJ [2]	
		(iii)	1.3/0.025 = -52.1 kJ mol^{-1} = –52 kJ mol^{-1} [2]	
	(d)	**(i)**	Barium hydroxide is a strong base [1]	
		(ii)	Low solubility [1]	
		(iii)	Sulfate ion [1] Make a solution of the ion and add (a solution of) barium chloride to suspected ion [1] White precipitate [1] [3]	22

				AVAILABLE MARKS
3	**(a)**	A – potassium dichromate(VI) (solution) [1]		
		B – Anti-bump granules [1]	[2]	
	(b)	Addition/reaction is exothermic	[1]	
	(c)	Orange to green	[1]	
	(d)	So the ethanal condenses/stops evaporating	[1]	
	(e)	mass ethanol = 0.79 × 5 = 3.95 g		
		moles ethanol = 3.95/46 = 0.086		
		0.086 moles of ethanal for 100% yield		
		0.039 moles of ethanal for 45% yield		
		mass of ethanal = 0.039 × 44 = 1.72 g		
		volume of ethanal = 1.72/0.82 = 2.1 cm^3	[5]	
	(f)	Loss in transfer/not all the ethanal condenses [1] Further oxidation/side reactions [1]	[2]	12
4	**(a)**	**(i)** No more fizzing/plunger stops moving in the syringe/solid disappears	[1]	
		(ii) Use pH paper (after reaction finished [1]), goes red [1]/ add more carbonate [1] and it will fizz [1]	[2]	
	(b)	Bung not placed in flask quickly enough and some carbon dioxide escapes/some carbon dioxide dissolves in the reaction mixture	[1]	
	(c)	**(i)** Carbon dioxide is soluble (in water)	[1]	
		(ii) Use of burette [1] as it has less percentage uncertainty [1]		
		Or use warmer water [1] as carbon dioxide is not as soluble [1]	[2]	7
			Total	**55**