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

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

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]

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				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**