

Exercise walk-through

2.3.2

Ion evidence and titration concentration

Pearson Edexcel · International A-Level · Chemistry

Controls distinguish chemical evidence from contamination

- 1 Set up** Match measured amounts, particle size, apparatus and heating rate; compare sample temperature at a consistent decomposition criterion.
- 2 Reason** CO_2 : milky limewater; O_2 : glowing splint relights; NO_2 : brown and acidic.
- 3 Conclude** Clean flame-test wire and keep the flame region/loading consistent. Na yellow, K lilac, Ca brick-red, Sr crimson-red; sodium carry-over can mask another colour.

Equilibrium is dynamic

- 1** Forward and reverse rates are equal in a closed system; concentrations need not be equal.
- 2** Higher pressure favours fewer gas moles; higher temperature favours the endothermic direction.
- 3** A catalyst reaches the same equilibrium sooner. Industrial operation balances rate, yield and cost.

Independent identification

Your turn

$\text{C}_3\text{H}_6\text{O}$ has a carbonyl IR absorption and gives a positive Fehling's test. Which structure fits all evidence?

- A. CH_3COCH_3
- B. $\text{CH}_3\text{CH}_2\text{CHO}$
- C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- D. CH_3COOH

Exercises 2.1·2.3

2.1 Write the ionic equation for sulfate detection and explain acidification before adding BaCl_2 . [3]

2.2 AgNO_3 gives a cream precipitate after acidification with HNO_3 . State the likely halide and its behaviour with dilute and concentrated ammonia. [3]

2.3 A burette reads 0.25 cm^3 initially and 23.90 cm^3 finally. Calculate the titre and its

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2.1 $\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4(\text{s})$. Acid removes carbonate interference.

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2.2 Bromide; AgBr remains in dilute ammonia but dissolves in concentrated ammonia.

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2.3 Titre = $23.90 - 0.25 = 23.65 \text{ cm}^3$. Uncertainty $\pm 0.10 \text{ cm}^3$; $100(0.10/23.65) = 0.42\%$.

Exercises 3.1·3.2

3.1 25.00 cm³ of H₂SO₄ is neutralised by 20.40 cm³ of 0.1000 mol dm⁻³ NaOH. Calculate

3.2 Describe four actions needed to make an accurately known standard solution from a weighed solid acid. Explain why extra deionised water in a titration flask does not change the acid amount delivered by a pipette. [5]

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3.1 $\text{H}_2\text{SO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$. $n(\text{NaOH}) = cV = 0.1000 \times 0.02040 = 0.002040$ mol; $n(\text{acid}) = 0.001020$ mol. $c = n/V = 0.001020/0.02500 = 0.04080$ mol dm⁻³; mass concentration = $cM = 0.04080 \times 98.0 = 4.00$ g dm⁻³.

3.2 Describe four actions needed to make an accurately known standard solution from a weighed solid acid. Explain why extra deionised water in a titration flask does not change the acid amount delivered by a pipette. [5]

3.2 Accurately weigh solid; dissolve fully; transfer quantitatively with rinsings; make to the volumetric mark at eye level then mix thoroughly. Extra flask water changes concentration but not the moles already pipetted.