

Solutions

Original marking guidance: M1 method, A1 accuracy, B1 explanation.

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

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

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

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

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.