

Year 12 Chemistry

Titration Practice Worksheet

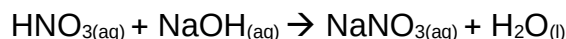
1. If it takes 54 mL of 0.1 M NaOH to neutralise 125 mL of an HCl solution, what is the concentration of the HCl?
2. If it takes 50 mL of 0.5 M KOH solution to completely neutralize 125 mL of sulfuric acid solution (H_2SO_4), what is the concentration of the H_2SO_4 solution?
3. Explain the difference between an endpoint and equivalence point in a titration.
4. 25 cm³ of a sample of vinegar (CH_3COOH) was pipetted into a volumetric flask and the volume was made up to 250 cm³. This solution was placed in a burette and 13.9 cm³ were required to neutralise 25 cm³ of 0.1 mol dm⁻³ NaOH. Calculate the molarity of the original vinegar solution.

5. Volumetric analysis is used for the quantitative determination of PbCO_3 in mineral ores. A 3.15 g sample of an ore was analysed to determine the percentage of PbCO_3 present, using the following procedure:

Step 1: An excess of $0.6293 \text{ mol L}^{-1} \text{HNO}_{3(\text{aq})}$ was added to the sample. The equation for this reaction is shown below:



Step 2: When the reaction was complete, the unreacted HNO_3 was titrated with $0.1423 \text{ mol L}^{-1} \text{NaOH}_{(\text{aq})}$. The equation for the titration reaction is shown below:



State one observation that would indicate that the reaction in Step 1 was complete.

The volume of HNO_3 added in Step 1 was 25.00 mL. Calculate the number of moles of HNO_3 added to the sample.

The volume of NaOH required was 23.67 mL. Calculate the number of moles of NaOH that reacted with the HNO_3 in Step 2.

Calculate the number of moles of unreacted HNO_3 that remained after Step 1. Then, calculate the number of moles of HNO_3 that reacted during Step 1.

Calculate the number of moles of PbCO_3 in the ore sample.

Calculate the percentage, by mass, of PbCO_3 in the ore sample.

6. 0.80 g of impure chalk was reacted with 100 cm³ of 1 mol dm⁻³ hydrochloric acid (an excess). The mixture was filtered into a volumetric flask and made up to 250 cm³. A 25.0 cm³ portion of the solution required 8.5 cm³ of 1 mol dm⁻³ sodium hydroxide solution for neutralisation. What is the percentage of calcium carbonate in the impure chalk?

7. 0.601 g of an impure sample of ammonium chloride were boiled with 10.0 cm³ of 1.04 mol dm⁻³ aqueous sodium hydroxide until no more ammonia was evolved. Afterwards the solution was titrated with 0.101 mol dm⁻³ hydrochloric acid, 26.25 cm³ of which were needed to reach an end-point with methyl orange. Calculate the percentage by mass of ammonium chloride in the impure sample.