

Year 12 Chemistry Titrations Worksheet 2

1. To determine the concentration of a sodium hydroxide solution it is titrated against a solution of hydrochloric acid of known concentration. In this example:
 - a. What is the analyte?

 - b. What is the standard solution?

 - c. What is the titre?

2. State two characteristics of sodium hydrogen carbonate that make it suitable for use in a primary standard solution.

3. A titration is being performed where hydrochloric acid is placed in the burette and sodium hydroxide (the primary standard solution) is in the conical flask.
 - a. What would be used for the final rinse of each of these?
 - i. The burette.

 - ii. The conical flask.

 - iii. The volumetric pipette that is used to transfer sodium hydroxide solution to the conical flask.

 - b. What is used to rinse the tip of the burette after each drop of acid is added to the conical flask as you approach the end point?

- c. Explain how to identify concordant titres.

- 4. It is not possible to directly determine the purity of a sample of copper(II) oxide by titration because copper(II) oxide is insoluble. Explain how the purity of such a sample could be determined indirectly. Name this method.

- 5. Select an appropriate indicator for each of the following titrations. Choose from bromothymol blue, methyl orange and phenolphthalein.
 - a. Hydrochloric acid and potassium hydroxide

 - b. Ethanoic acid and potassium hydroxide

 - c. Hydrochloric acid and sodium carbonate.

6. Sketch titration curves for each of the following titrations acid-base titrations, where the acid is in the burette and the base is in the conical flask. Indicate with dashed lines the volume of acid added and the pH at the equivalence points.
- Strong base and weak acid
 - Strong base and strong acid
 - Weak base and strong acid
 - Weak base and weak acid

7. A student added 50.00 mL of 0.1000 mol L⁻¹ HCl to 25.00 mL of a commercial ammonia-based cleaner. It took 21.50 mL of 0.1000 mol L⁻¹ NaOH to neutralise the excess HCl. What was the concentration of ammonia in the cleaner, in mol L⁻¹ and in g L⁻¹?

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8. A sample of chalk weighing 0.135 g was reacted with 40.00 cm³ of 1.00 mol/l hydrochloric acid (an excess). After the reaction was complete the solution was transferred to a 250 cm³ volumetric flask and made up to the mark with distilled water. 25.00 cm³ portions of this solution were then titrated against 0.15 mol/l sodium hydroxide using methyl orange as the indicator. An average titre of 25 cm³ of the sodium hydroxide was required.

Calculate the percentage purity of the chalk.

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