

Exercise 7.81 – Titrations

Q781-01 Sodium hydroxide, NaOH, is available as pellets, a deliquescent solid. Give three reasons why sodium hydroxide should not be used as a primary standard.

Q781-02 The following data were collected at the endpoint of a titration performed to find the molarity of an HCl solution.

- I Volume of acid (HCl) used = 14.4 cm^3
- II Volume of base (NaOH) used = 22.4 cm^3
- III Molarity of standard base (NaOH) = 0.20 M

What is the molarity of the acid solution?

- A. 1.6 M
- B. 64 M
- C. 0.31 M
- D. 0.13 M

Q781-03 What volume of 0.284 M NaOH is needed to titrate 100.00 mL of 0.124 M HCl to the equivalence point?

- A. 35.2 mL
- B. 40.8 mL
- C. 43.7 mL
- D. 229 mL

Q781-04 Separate 20.0 cm^3 solutions of a weak acid and a strong acid of the same concentration (0.1 mol dm^{-3}) are titrated with NaOH solution. Which will be the same for these two titrations?

- I. Initial pH
 - II. pH at equivalence point
 - III. Volume of NaOH required to reach the equivalence point
- A. I only
 - B. III only
 - C. I and II only
 - D. II and III only

Q781-05 Find the volume of 0.1 M HCl needed to neutralise 25 cm^3 of standard 0.1 M sodium carbonate solution.

Q781-06 25 cm^3 of a standard solution of potassium hydrogen phthalate, KHP (a monoprotic acid, relative mass 203.32) 0.12 mol dm^{-3} , is used to determine an unknown solution of sodium hydroxide. The following results are obtained:

Volume NaOH / $\text{cm}^3 \pm 0.05$	1st titre	2nd titre	3rd titre
Final reading	15.10	15.10	15.10
Initial reading	00.00	00.00	00.05
total volume added	15.10	15.10	15.05
average of concordant results	15.8 ± 0.1		

Use these results to find the molarity of the unknown NaOH solution.

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Q781-07 Which of the following pieces of apparatus can be rinsed out with distilled water before carrying out a titration, without affecting the results?

- I - pipette
 - II - burette
 - III - conical flask
- A. I and II only
B. II and III only
C. III only
D. I, II and III
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Q781-08 25 cm³ of a 0.22 mol dm⁻³ ethanoic acid solution was titrated against 0.15 mol dm⁻³ sodium hydroxide solution. Calculate the volume of sodium hydroxide required to completely neutralise the ethanoic acid.

Q781-09 Ethandioic acid, (COOH)₂, has two acidic hydrogen atoms. Calculate the volume of 0.1 mol dm⁻³ sodium hydroxide required to react with 25 cm³ of 0.025 mol dm⁻³ ethandioic acid solution.

Q781-10 An experiment was carried out to determine the concentration of an aqueous solution of ammonia by titrating it with a solution of sulphuric acid of concentration of 0.150 mol dm⁻³. It was found that 20.0 cm³ of the ammonia solution required 20.1 cm³ of the sulphuric acid for neutralisation.

Write the equation for the reaction and calculate the concentration in mol dm⁻³ of the ammonia solution.
