Name Date

Worksheet 19.1: Practical on acid–base titration using a pH meter, with 0.1 mol dm−3 aqueous solutions of NaOH, HCl,   
NH3 and CH3COOH

(TR material subchapter 19.14, main teaching ideas, activity 2)

Analysis of results

**1** Record the raw quantitative data in a table. You need to include their units and absolute uncertainties where appropriate.

**2** Write a chemical equation for each acid–base titration.

**3** Plot a pH titration curve for each acid–base combination (HCl and NaOH, HCl and NH3, CH3COOH and NaOH, and CH3COOH and NH3), for every 0.5 cm3 of alkali added to an acid.

**4** Identify the equivalence point on each titration curve and measure the pH at the equivalence point.

**5** Using the given concentrations of HCl and CH3COOH, calculate the expected initial pH for the acids (pKa of CH3COOH is 4.76).

Evaluation of experiment

**6** Explain why a pH meter should be calibrated before use.

**7** Describe how 25 cm3 of HCl can be accurately measured.

**8** Compare the measured initial pH for each titration with the values obtained in Question 5 and calculate the percentage errors in initial pH values.

**9** Explain, using suitable equations, the pH values of the titration mixtures at their equivalence points.

Extension of experiment

**10** Using HIn as an example of an indicator, explain qualitatively how an acid–base indicator works.

**11** Select a suitable indicator from the IB Chemistry data booklet for each of the acid–base titration combinations. Justify your selection.

**12** Explain the difference between the pH range of an indicator and the equivalence point of a   
titration curve.