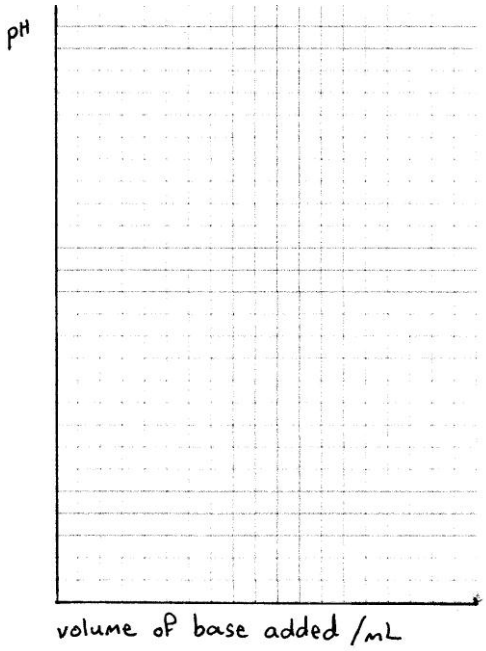
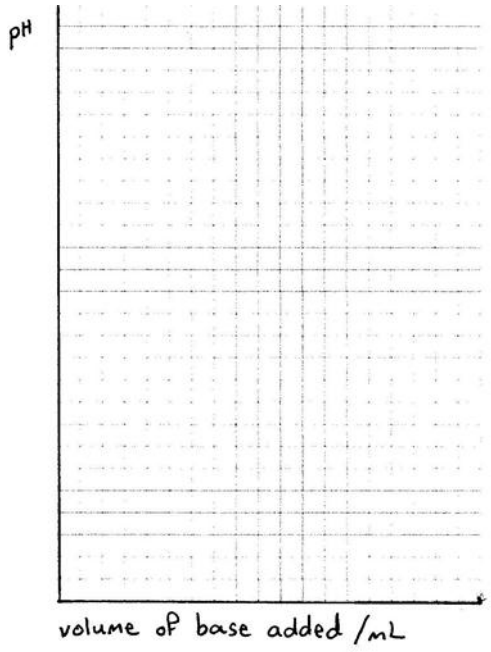
Practice at US8949 Element 2.2

Sketch pH titration curves for the following. Make sure you include the initial pH, the pH at the equivalence point and the midpoint of any buffer region. Make sure that your sketch is the correct "shape" for the type of titration stated in the question.

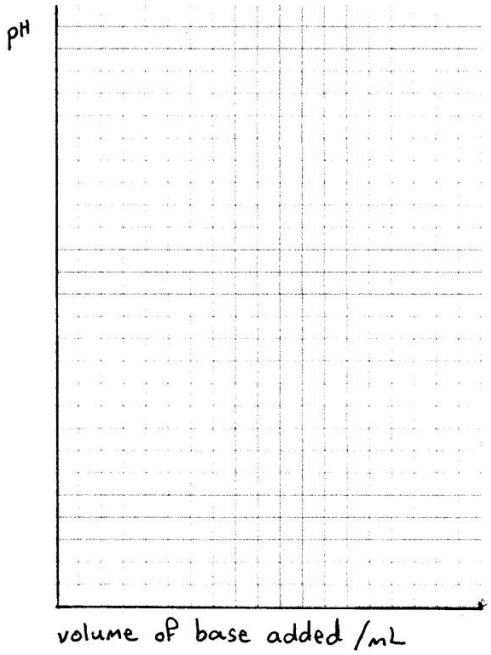
20mL of 0.05 mol L^{-1} hydrochloric acid (HCl) is titrated with 0.05 mol L^{-1} of sodium hydroxide (NaOH) solution



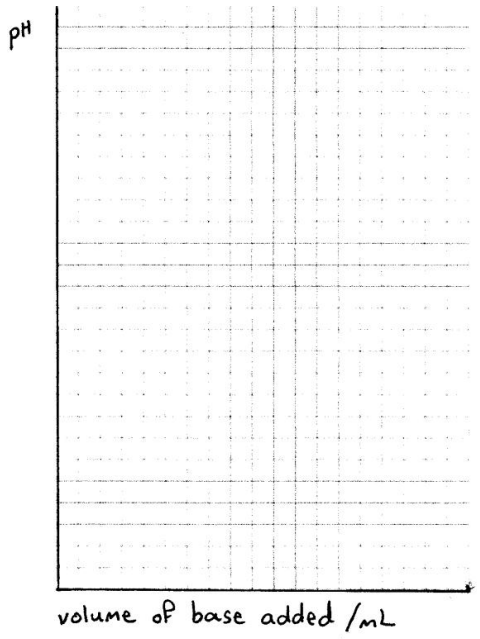
25 mL of 0.05 mol L^{-1} hydrochloric acid(HCl) is titrated with 0.10 mol L^{-1} of sodium hydroxide (NaOH) solution



20 mL of 0.15 mol L^{-1} ethanoic acid (CH_3COOH) is titrated with 0.15 mol L^{-1} of sodium hydroxide (NaOH) solution. pKa (CH3COOH) = 4.76



25 mL of 0.1 mol L^{-1} ammonium hydroxide (NH_3) solution is titrated with 0.1 mol L^{-1} hydrochloric acid (HCl) solution. pKa (NH_4^+) = 9.24

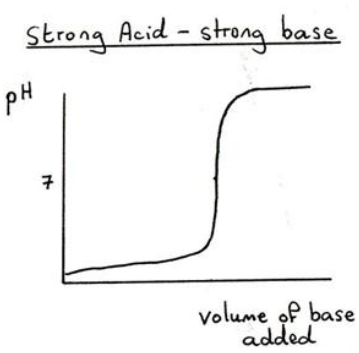


Practice at US8949 Element 2.2 sample answer

Sketch pH titration curves for the following. Make sure you include the initial pH, the pH at the equivalence point and the midpoint of any buffer region. Make sure that your sketch is the correct "shape" for the type of titration stated in the question

20mL of 0.05 mol L^{-1} hydrochloric acid (HCl) is titrated with 0.05 mol L^{-1} of sodium hydroxide (NaOH) solution

This is a titration using a strong acid (HCl) in a flask and a strong base.



Initial pH is given by pH = -log[HCl]

Substitute values pH = -log (0.05)

So pH = 1.30 (close to "guesstimate" of 1).

Equivalence point is when 20mL of the sodium hydroxide has been added since the acid and the base have the same concentrations and 20 mL of acid was in the flask.

The pH at the equivalence point will be 7 as none of the products in the neutralisation react further with the water $HCl + NaOH \longrightarrow NaCl + H_2O$

So