

**Marks
8**

- Sketch the titration curve (pH against mL of added base) when 25.0 mL of 0.010 M hydrofluoric acid (HF) with a pK_a of 3.17 is titrated with 0.010 M NaOH.

Calculate the pH at the following four points:

- (i) before any NaOH is added;
- (ii) when half of the HF has been neutralised;
- (iii) at the equivalence point; and
- (iv) 50% beyond the equivalence point, *i.e.* when 1.5 times the equivalence volume has been added.