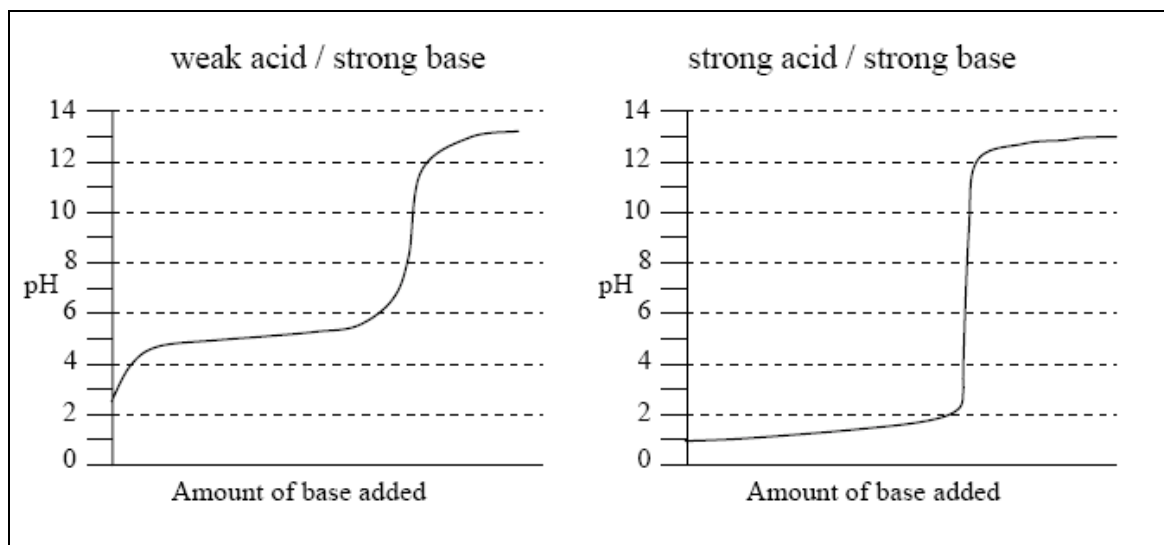


- The titration curves for a titration of a weak acid with a strong base and for a strong acid with a strong base are distinctly different. Draw a diagram for each case.

Marks
7



List the main differences.

- The initial starting pH is higher for the weak acid than for the strong acid.
- The equivalence point, where the moles of added base is the same as the initial moles of acid, is at $\text{pH} = 7$ for the strong acid/strong base case but it is at $\text{pH} > 7$ for the weak acid/strong base.
- The weak acid/strong base curve has an inflexion point at the half equivalence point. No such point is seen on the strong base/strong acid curve.

Explain these differences.

- This is because the strong acid dissociates completely but the weak acid dissociates only to a small extent. Thus, assuming equal concentrations of strong and weak acid, $[\text{H}_3\text{O}(\text{aq})]^+$ is thus larger for the strong acid and the pH is lower.
- At the equivalence point, the conjugate base of the acid is present. For the strong acid, the conjugate base is an extremely weak base and the solution is neutral. For the weak acid, the conjugate base is a weak base and the solution thus has $\text{pH} > 7$.
- At the half-equivalence point, the weak acid and its conjugate base have equal concentrations and the pH is equal to pK_a , as given by the Henderson-Hasselbalch equation. This is the point of maximum buffering so that addition of extra base has limited effect on the pH.

ANSWER CONTINUES ON THE NEXT PAGE

- What is the difference between the 'end point' and the 'equivalence point' in a titration.

The end point is the first permanent change of the indicator – it is when you see that the reaction has finished.

The equivalence point is when the stoichiometrically correct amount of reactant has been added.