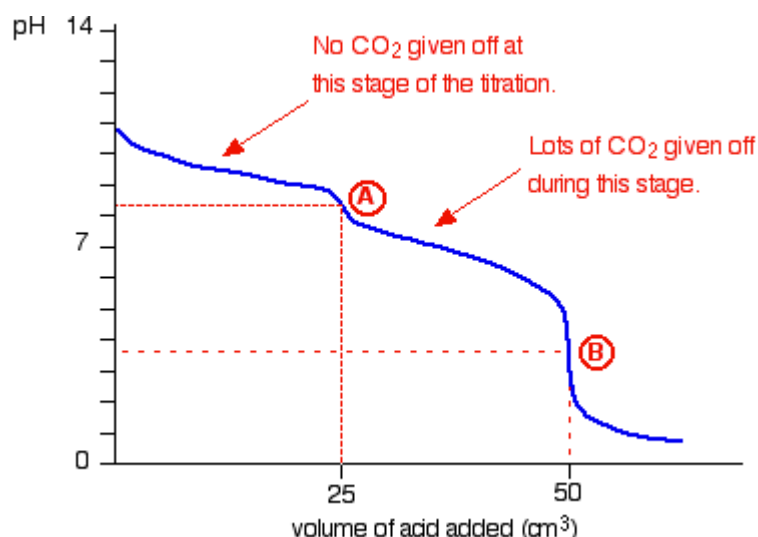


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pH CURVES

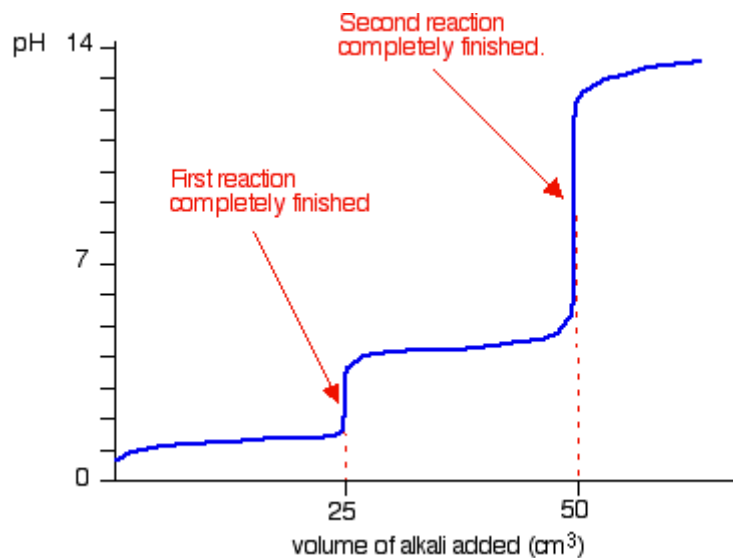
- What do you understand by the *equivalence point* of the reaction between sodium hydroxide solution and dilute hydrochloric acid?
 - Draw the pH curve you would expect to get if you added 1 mol dm^{-3} hydrochloric acid to 25 cm^3 of 1 mol dm^{-3} sodium hydroxide solution. Mark the position of the equivalence point on the curve.
 - Now draw the pH curve you would expect if you added 1 mol dm^{-3} sodium hydroxide solution to 25 cm^3 of 1 mol dm^{-3} hydrochloric acid. Mark the position of the equivalence point on the curve.
- Repeat this for the following combinations of acid and alkali, in each case marking the position of the equivalence point.
 - Adding 1 mol dm^{-3} hydrochloric acid to 25 cm^3 of 1 mol dm^{-3} ammonia solution.
 - Adding 1 mol dm^{-3} ammonia solution to 25 cm^3 of 1 mol dm^{-3} hydrochloric acid.
 - Adding 1 mol dm^{-3} ethanoic acid to 25 cm^3 of 1 mol dm^{-3} sodium hydroxide solution.
 - Adding 1 mol dm^{-3} sodium hydroxide solution to 25 cm^3 of 1 mol dm^{-3} ethanoic acid solution.
 - Adding 1 mol dm^{-3} ethanoic acid to 25 cm^3 of 1 mol dm^{-3} ammonia solution.
- The following curve shows the changes in pH when 1 mol dm^{-3} of hydrochloric acid is added to 25 cm^3 of 1 mol dm^{-3} sodium carbonate solution.



- Write the equation for the reaction which is complete at point A.
- Write the equation for the reaction which is occurring between points A and B.

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c) The titration curve for running sodium hydroxide solution into ethanedioic acid (oxalic acid) solution looks like this:



- (i) Ethanedioic acid is a *diprotic* acid. Explain what that means.
- (ii) Write the equation for the first reaction marked on the curve.
- (iii) Write the equation for the second reaction marked on the curve.