Topic 12 – Acids, Bases and Buffers

* I can describe an acid as a proton donor, a base as a proton acceptor and acid–base equilibria as reactions involving the transfer of protons
* I can appreciate that the concentration of hydrogen ions in aqueous solution covers a very wide range, and therefore a logarithmic scale, the pH scale, is used as a measure of hydrogen ion concentration: pH = –log10[H+]
* I can convert concentration of hydrogen ions into pH and vice versa
* I can calculate the pH of a solution of a strong acid from its concentration
* I understand that water is slightly dissociated, that KW is derived from the equilibrium constant for this dissociation (KW = [H+][OH–]) and that the value of KW varies with temperature
* I can use Kw to calculate the pH of a strong base from its concentration
* I can explain that weak acids and weak bases dissociate only slightly in aqueous solution, that Ka is the dissociation constant for a weak acid and that pKa = –log10Ka
* I can construct an expression for Ka and perform calculations relating the pH of a weak acid to the concentration of the acid and the dissociation constant, Ka
* I can convert Ka into pKa and vice versa
* I can describe titrations of acids with bases and I can perform calculations for these titrations based on experimental results
* I can sketch and explain the shapes of typical pH curves in all combinations of weak and strong monoprotic acids and use pH curves to select an appropriate indicator
* I can carry out an experiment to investigate how pH changes when a weak acid reacts with a strong base and when a strong acid reacts with a weak base (Required Practical 9)
* I can describe a buffer solution as maintaining an approximately constant pH, despite dilution or addition of small amounts of acid or base, that acidic buffer solutions contain a weak acid and the salt of that weak acid and that basic buffer solutions contain a weak base and the salt of that weak base, and I can explain qualitatively the action of acidic and basic buffers
* I can calculate the pH of acidic buffer solutions
* I can describe applications of buffer solutions