



Volumetric Analysis: Acid-Base

Chemistry – Leaving Cert

Quick Notes

Volumetric Analysis: Acid-Base

The concentration of a solution is the amount of solute that is dissolved in a given volume of solution. Concentration can be expressed in three ways - as a percentage, as parts per million or as molarity. 1- Percentages may be % weight/weight, % weight/volume, or % volume/volume. 2- Parts per million is the number of milligrams per litre. 3- The molarity of a solution is the number of moles of solute per litre of solution. To calculate the number of moles, we multiply volume by molarity and divide this by 1000. In the dilution of solutions, remember that the number of moles of solute in the diluted solution is the same as the number of moles of solute in the concentrated solution. So if 50 cm³ of a solution is brought up to an exact volume of 250cm³ by adding water, then it has been diluted by a factor of 5. A standard solution is a solution of precisely known concentration. A primary solution is a substance which can be obtained in a stable, pure and soluble solid form so that it can be weighed out and dissolved in water to give a solution of accurately known concentration e.g. anhydrous sodium carbonate. A burette, pipette and conical flask may be used during titrations. There are certain things you must remember when using the burette for accuracy e.g. rinse first with deionised water and then with the solution it is to contain, remove funnel before adjusting to zero, ensure the burette is fully vertical when filling, read the meniscus at eye level, make sure there are no air bubbles, fill underneath tap as this has been taken into account in the calibration process. Similarly, There are certain things you must remember when using the pipette for accuracy e.g. use a pipette filler, read the bottom of the meniscus at eye level, make sure there are no air bubbles, hold pipette vertically when delivering and do not blow out last drop as this has been taken into account in calibration process. The conical flask is shaped so as to prevent spillage when it is been swirled and it should only be rinsed with deionised water because it is designed to receive exact amounts. To standardise a HCl solution, HCl solution of unknown molarity should be placed in the burette, sodium carbonate solution of known molarity is in the conical flask and the indicator is methyl orange so the colour change is from yellow to pink. To prepare a sample of sodium chloride, HCl solution of known concentration is put in the burette, NaOH solution of unknown concentration is placed in the conical flask and the indicator is methyl orange so the colour change is from yellow to pink. To determine the percentage of ethanoic acid in vinegar, diluted vinegar solution is placed in the burette, standardised NaOH solution is in the conical flask and the indicator is phenolphthalein so the colour change is from pink to colourless. To determine the percentage of water of crystallisation in hydrated sodium carbonate, HCl

solution of known molarity is in the burette, sodium carbonate solution is in the conical flask and the indicator is methyl orange so the colour change is from yellow to pink. The formula (volume of acid multiplied by molarity of acid) divided by (the number or moles of acid) is equal to (the volume of base multiplied by molarity of base) divided by (the number or moles of base) may be used in most cases of solving volumetric equations.