Lower sixth chemistry note .

Indirect way of determine the enthalpy changes

\_there are many compounds for which the enthalpy of formation can not be.measured directly by calorimetry e.g. CH4 and other hydrocarbons

\_this is because carbon and hydrogen donot react directly .It is also the case with B2O3 and AL2O3 because boron and aluminum cannot completely burns in oxygen due to the formation of a protective oxides layer on the surface of the unreactive elements.

\_One methods of measuring their enthalpy change indirectly is by using the Hess's Law

Hess's Law states that “the enthalpy change accompanying a chemical reaction is independent of the route by which the reaction takes place ,provided the initial and final conditions are the same



E.g from the diagram beloe and following the arrows

Rout1.=A + B + C

Rout2.=D



By Hess's law ,the total enthalpy change is the same for the reaction ,therefore A + B + C = D

If three of the enthalpies are known the forth can be calculated fire examples, starting from ammonia gas and HCL gas ,we can prepared a solution of NH4CL in two ways

* The gas can be allow to react and the resulting NH4CL dissolved in H2O
* The gas can first be dissolved in water and the solution then mixed .

According to Hess's law ,the heat change us thesame in both cases of molar proportion of the gases are the same

