

## Energy Changes

### Content

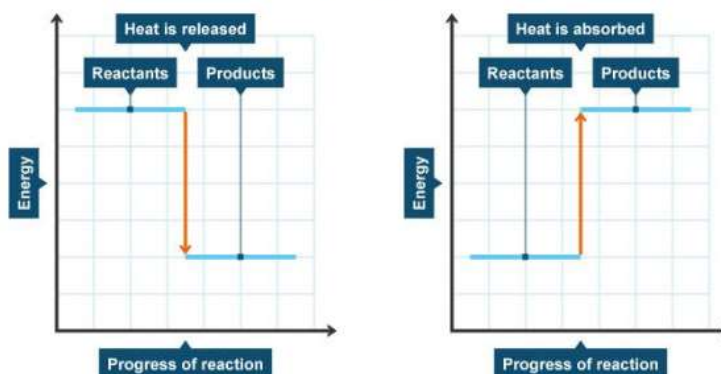
In all chemical reactions, there are energy conversions. The focus for this topic is heat energy change.

**$\Delta H$  Enthalpy Change:** the heat energy change when reactants form products according to the quantities in moles for a specified equation. (note the stress on quantities, must multiply to the bond energies)

= BB - BM (Always indicate the sign of  $\Delta H$ )

= Energy released from bond breaking - Energy absorbed in bond making

= Bond energy  $\times$  Number of bonds broken - Bond energy  $\times$  Number of bonds made



If  $\Delta H$  is positive, energy is absorbed and the reaction is endothermic. If  $\Delta H$  is negative, energy is released and the reaction is exothermic.

By remembering  $\Delta H$  as BB - BM, it is easier to hence see Bond breaking as endothermic (Energy-absorbing) and Bond making as exothermic (Energy-releasing), as absorbing more energy makes  $H$  increase, whereas releasing energy makes  $H$  decrease as BM is negative.

Another alternative method of remembering is the energy profile diagram. As you can see, the energy of the system has to increase first before decreasing. Of course, bonds are all broken first before being made into new bonds. Hence, bond breaking releases energy while bond making absorbs energy.

