

Ch#10 CHEMICAL ENERGETIC

THERMOCHEMISTRY

Definition:

“Thermochemistry is the branch of chemistry, which deals with the study of thermal energy changes or heat changes occurring during chemical reactions.”

THERMO CHEMICAL REACTIONS

The chemical reaction during which material changes are accompanied with thermal (heat) energy changes are called Thermo Chemical Reaction.

TYPES:

Thermochemical reactions are of two types depending upon heat change.

1. Exothermic reaction
2. Endothermic reaction

EXOTHERMIC REACTION:

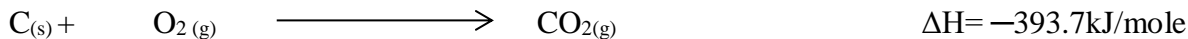
Definition:

“The chemical reactions which are accompanied by the liberation or emission of heat energy are called exothermic reaction.”

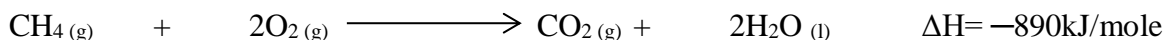
Exothermic is Greek word and compose of “Exo” means “out of or to evolve” and “therm” means “heat”. All combustion reactions are exothermic reactions. Amount of heat energy liberated during exothermic reaction is represented by ΔH with negative sign (–).

Example:

1. The combustion of coal in air is well known example of exothermic reaction releasing 393.7kJ/mole heat energy.



2. The other well-known example of exothermic reaction is burning or combustion of methane in the presence of oxygen evolving 890 kJ/mole of heat energy.



ENDOTHERMIC REACTION:

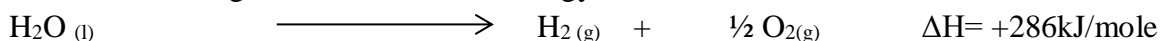
Definition:

“The chemical reactions which are accompanied by the absorption of heat energy are called endothermic reaction.”

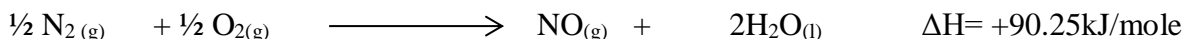
Endothermic is Greek word and compose of “Endo” means “into or to absorb” and “therm” means “heat”. Generally in endothermic reactions, heat is absorbed from surrounding to system and container becomes cold. Amount of heat energy absorbed during exothermic reaction is represented by ΔH with positive sign (+).

Example:

1. The decomposition of water into hydrogen and oxygen is an example of endothermic reaction absorbing 286kJ/mole of heat energy.



2. The formation of nitric oxide gas from nitrogen and oxygen is another example of endothermic reaction requiring 90.25 kJ/mole of heat energy.



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HEAT CONTENT OF REACTION (ENTHALPY)

Definition:

“The total heat content i.e. the energy possessed by a substance is called its enthalpy.”

Explanation:

It is difficult to measure the absolute enthalpy of reaction but we can measure the change the enthalpy denoted by ΔH (Greek letter Δ , delta signifying the change in property).

The enthalpy (heat content of a substance depends on its internal energy, which in turn depends upon;

1. Structure or chemical identity of substance
2. Physical state of substance
3. Temperature
4. Sample size (volume)
5. Pressure.

HEAT OF REACTION

Definition:

“The heat absorbed or evolved during thermochemical reaction is called heat of reaction.”

Detection Of Exothermic And Endothermic Reaction:

Exothermic and endothermic reaction can easily be detected by touching the vessel before and after chemical reaction. The increase in temperature indicates that reaction is exothermic and decrease in temperature indicates that the reaction is endothermic.

HEAT OF NEUTRALIZATION

Definition:

The amount of heat released during a neutralization reaction in which one mole of water is formed is called the heat of neutralization or when one mole of hydrogen ions (H^+) from an acid reacts with one mole of hydroxide ions (OH^-) from a base to form one mole of water in addition to the salt is called the heat of neutralization.

FILL IN THE BLANKS

- | | | |
|--------------------|------------------|-----------------|
| i. exothermic | ii. endothermic | iii. enthalpy |
| iv. neutralization | v. -393.7KJ/mole | vi. -286KJ/mole |

TICK THE CORRECT ANSWER

- | | | | | |
|------|-------|--------|-------|------|
| i. a | ii. a | iii. a | iv. a | v. a |
|------|-------|--------|-------|------|