Subject Chem-III
Date 18.04.23 Time 11:00 pm

: Thermochemistry :

1. Differentiate between endothermic and exothermic process.

Ans: Difference between endothermic and exothermic process is given below:

Endothermic Process	Exothermic Process
1) Endo means "Absord"	1) Exo means "Release"
11) Endothermic Process is a process that need to be supplied with energy.	11) Exothermic Process is the process in which energy is released in the form of light or heat.
111) In this process, heat is absorbed.	111) In this Process, it gives out heat.
IV) Energy content of the reactants is fewer than the products.	IV) Energy content of the products is ~~more~~ fewer than the reactants.
V) Energy of the reaction system increases relative to that of the surrounding i.e., that is, the reaction system becomes hotter.	V) Energy of the reaction system decreases relative to that of the surrounding i.e., that is, the surrounding becomes hotter.
VI) The change in enthalpy for an endothermic process is always positive.	VI) The change in enthalpy ΔH, for an exothermic process will always be negative.

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VII) Small positive free energy.	VII) Large negative free energy.
VIII) All endergonic processes are	VIII) All exergonic reactions are exothermic.
IX) Example: a) Making ice cubes b) Formation of snow in clouds.	IX) Example: a) Melting ice cubes b) conversion of frost to water vapour.

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3. State and explain Hess's law of constant heat summation.

Hess's Law of constant heat summation is as follows:

If a reaction can take place by single step or several steps, the overall change in enthalpy is the same which ever route is followed with same initial reactants and final products.

Explanation:

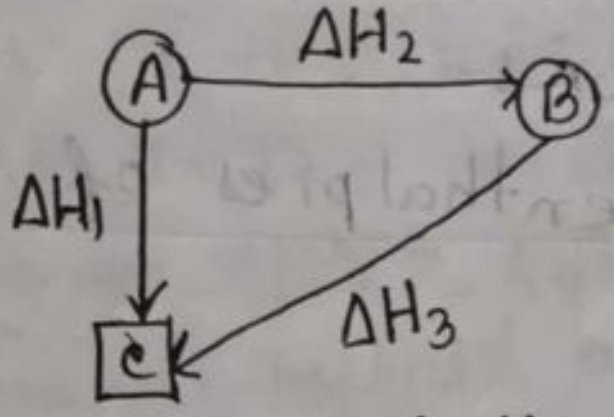

Fig: Explanation of Hess's Law with enthalpy diagram.

Let us suppose that a reactant 'A' may be converted to a product 'C' through two different paths or routes. These reactions with enthalpy changes have been shown in the figure.

(I) $A \xrightarrow{\Delta H_1} C$: (by single step)

(II) $A \xrightarrow{\Delta H_2} B \xrightarrow{\Delta H_3} C$: (by two steps)

So, according to Hess's Law, we get:

$$\Delta H_1 = \Delta H_2 + \Delta H_3$$

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Application of Hess's law :

Hess's law used for:

I) To calculate heat of formation, combustion, neutralization, ionization etc.

II) To calculate the heat of reaction which may not take place normally or directly.

III) To calculate heat of extemely slow or fast reactions.

IV) To calculate enthalpies of reactants and product.

V) Determination of enthalpy of slow reaction.