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Chemistry SEM-3 MLC-3

Thermodynamics

Thermodynamics is the branch of Physics and Chemistry that studies the relations between heat, work, temperature and energy.

In Chemical thermodynamics the study of how heat and work relate to chemical re^{ns} and physical changes of state.

Core concept

(1) system and ~~surround~~ surroundings: -

The system is the specific chemical re^{ns} or mixture being studied, while the surroundings encompass everything else outside the system boundary.

(2) State functions: -

Properties like internal energy (U), enthalpy (H), entropy (S) and Gibbs free energy (G) depend only on the current state of the system, not the path taken to get there.

LAW of Thermodynamics

FIRST LAW of Thermodynamics

A/c to this law, Energy cannot be created or destroyed. It is only converted between heat (q) and work (w), expressed as

$$\Delta U = q + w$$

In chemistry, this law is also known as "Law of conservation of energy" and tracks how energy moves between a chemical system (like a rxn in a flask) and its surroundings.

Sign conventions in chemistry

The sign ~~of~~ for heat and work tell us the direction of energy flow:-

Heat (q)

Positive ($+q$) - Heat flows into the system from the surroundings (endothermic process i.e. temp. goes up).

Negative ($-q$) Heat flows out of the system into the surroundings (exothermic process) i.e. temp. goes down.

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