



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35.



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB301 – AUTOMOTIVE FUELS AND LUBRICANTS

III YEAR / V SEMESTER

Unit 4 – Properties and Testing of Fuels

Topic : Thermochemistry of Fuels



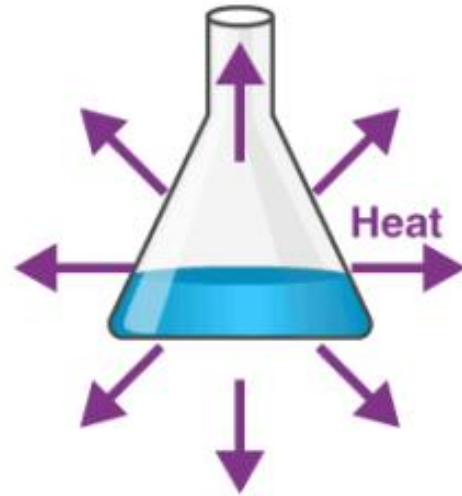
THERMOCHEMISTRY



- Thermochemistry is defined as the branch of thermodynamics that focuses on changes occurring during chemical reactions.
- Thermochemistry deals with energy, heat and work.
- Heat changes during reactions are determined indirectly by measuring the work done or a temperature change.

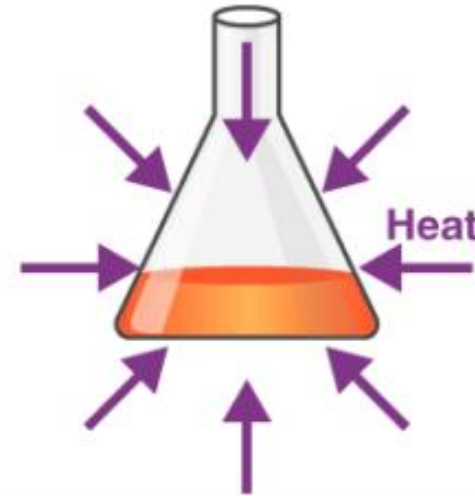


ENDOTHERMIC AND EXOTHERMIC ENERGY



Exothermic Reactions

A reaction that releases energy from the system in the form of heat.



Endothermic Reaction

A reaction that the system absorbs energy from its surrounding in the form of heat.



THERMOCHEMISTRY



- **Heat of reaction** is the heat change that takes place when the number of moles of reactants indicated in the balanced equation for the reaction react completely.
- Thermochemical equations must be balanced, the value of ΔH must be written and the states of reactants and products must be given, e.g. gas, liquid etc.
- **Heat of combustion** is the heat change that takes place when 1 mole of a substance is completely burned in excess oxygen.
- The **calorific value** of a fuel is the heat energy produced when 1kg of the fuel is completely burned in oxygen



THERMOCHEMISTRY



- **Bond energy** is the energy required to break one mole of covalent bonds and to separate the neutral atoms completely from each other.
- **Heat of neutralisation** is the heat change that takes place when 1 mole of H^+ ions from an acid react with 1 mole of OH^- ions from a base.
- The **heat of formation** of a compound is the heat change that takes place when one mole of a compound in its standard state is formed from its elements in their standard states.
- Standard state is at 25 degrees and at 1 atmospheric pressure or 101 KPa



LAWS OF THERMOCHEMISTRY



- **Lavoisier–Laplace law:** The energy change accompanying any transformation is equal and opposite to energy change accompanying the reverse process.
- **Hess Law:** If a chemical reaction takes place in a number of stages, the sum of the heat changes in the separate stages is equal to the heat change if the reaction is carried out in 1 stage.



STOICHIOMETRIC RATIO



- It is the exact ratio between air and flammable gas or vapor at which complete combustion takes place.
- A stoichiometric ratio is neither too rich nor too lean.
- For gasoline fuel, the stoichiometric air–fuel mixture is **about 14.7:1**



REFERENCE



- <http://chemcases.com/fuels/fuels-a.htm>



THANK YOU !!!