

# Introduction

- Fuels are most widely used energy sources in the world.
- Energy is required for human well being, economic and social development of the society, for transportation etc.
- **Definition of Fuel:**

Fuel is the substance which on combustion produces large amount of energy.

**Or**

Fuel is defined as a combustible substance mainly containing carbon which on burning produces large amount of heat.



# Characteristics of Ideal Fuel

- High calorific Value
- Moderate Ignition Temperature
- Low moisture content
- Low ash content
- Moderate velocity of combustion
- Low cost
- Products of combustion should not be harmful
- Easy storage and transportation
- Combustion should be easily controllable

# Classification of Fuels on the basis of Chemical Reactions

On the basis of chemical reactions fuels are classified into 3 types-

## 1) Combustion

- Oxidation in presence of atmospheric oxygen e.g. Wood
- Oxidation in absence of atmospheric oxygen e.g. Rocket fuels.

## 2) Spontaneous Oxidation Reduction e.g. Fuel cells

## 3) Nuclear reaction-

- Fission
- Fusion

# Calorific Value (CV)

- Calorific value of a fuel is the total quantity of heat liberated when a unit mass(or volume) of fuel is burnt completely.
- It is the characteristic property of fuel which determines the efficiency of fuel.
- **There are two types of Calorific Value**
  1. **Higher Calorific Value (Gross calorific value)and**
  2. **Lower calorific value (Net calorific Value)**

# Types of Calorific Values

## 1) Higher or Gross Calorific Value (HCV or GCV) :

- Usually all fuels contain hydrogen and when calorific value of hydrogen containing fuel is determined experimentally, the hydrogen is converted into steam.
- “Higher calorific value (HCV) is the total amount of heat liberated, when unit mass/volume of fuel is burnt completely and the products of combustion are cooled to room temperature”.

## 2) Lower or Net Calorific Value (LCV or NCV) :

- In actual use of any fuel, combustion takes place in open atmosphere. The products of combustion are not cooled to room temperature but allowed to escape in the atmosphere
- There is no any furnace, engine or device designed to collect the heat being taken away by the water vapours. Therefore practically we get lower calorific value than the theoretically expected.
- **Net calorific value** is defined as the amount of heat obtained practically on complete combustion of unit mass of solid or liquid fuel or unit volume of a gaseous fuel at STP and the products of combustion are allowed to escape with some heat. N.C.V. is also called as lower calorific value.