

# Fuels

A substance that can supply energy either alone or by reacting with another substance is known as fuel. Heat produced by fuel is measured in Calories. An ideal fuel should

- (i) have high calorific value
- (ii) be cheap and easily available
- (iii) be easily stored & transport
- (iv) be regulated and controlled
- (v) have low ignition temperature

The quantity of fuel is expressed in the form of calorific value.

Calorific value is the total quantity of heat liberated by complete combustion of a unit mass of fuel in air or oxygen.

Calorific value of fuels are expressed in kcal/m<sup>3</sup> or British Thermal unit (B.T.U) per cubic foot.

$$1 \text{ kcal/m}^3 = 0.107 \text{ B.T.U/ft}^3$$

Fuel may be sold (e.g wood, coal etc.)

Liquid (e.g kerosene, oil, petroleum, alcohol etc.) or gas (e.g water gas, producer gas, coal gas, oil gas, natural gas, gobar gas, LPG etc.) However, gaseous fuel are considered to be the best fuels.

1. Water gas (syngas) : It is a mixture of carbon monoxide and hydrogen. It is obtained by the reaction of steam on a red hot coke at 1000° C.



It has a high calorific value (2700 kcal / m<sup>3</sup>)

Producer gas : It is a mixture of CO and N<sub>2</sub>. It is prepared by burning coke in limited supply of air. It is the cheapest gaseous fuel, however its calorific value is not very high because it has a large proportion of nitrogen.

Coal gas : It is a mixture of  $H_2$ ,  $CH_4$ ,  $CO$  and other gases like  $N_2$ ,  $C_2H_4$ ,  $O_2$  etc. It is obtained by destructive distillation of coal at about  $1000^\circ C$

Oil gas : It is a mixture of  $H_2$ ,  $CH_4$ ,  $C_2H_4$ ,  $CO$  and other gases like  $CO_2$ . It is obtained by thermal cracking of kerosene oil. It is used in laboratories.

Gobar gas : It contains  $CH_4$ ,  $CO$  and  $H_2$ . It is produced by fermentation of gobar in absence of air. It is used as a domestic fuel in villages.

Natural gas : It is a mixture of gaseous hydrocarbons viz methane 8 %, ethane, propane butane etc. Liquefied petroleum mainly butane and isobutane.