

SOLID FUELS AND THEIR CHARACTERISTICS

Solid fuels are mainly classified into two categories, i.e. natural fuels, such as wood, coal, etc. and manufactured fuels, such as charcoal, coke, briquettes, etc.

The various advantages and disadvantages of solid fuels are given below:

Advantages:

- (a) They are easy to transport.
- (b) They are convenient to store without any risk of spontaneous explosion.
- (c) Their cost of production is low.
- (d) They possess moderate ignition temperature.

Disadvantages:

- (a) Their ash content is high.
- (b) Their large proportion of heat is wasted.
- (c) They burn with clinker formation.
- (d) Their combustion operation cannot be controlled easily.
- (e) Their cost of handling is high.

Coals and their Characteristics

The coal is a mineral substance of vegetable origin. The large deposits of coal in India are in Bengal, Bihar and Madhya Pradesh.

Most of the Indian coal is of low-grade variety and coal washing to obtain low ash metallurgical coal is must. Over 30% of coal output is consumed by railways, another similar proportion is used by industry including iron and steel works. This leaves barely 40% of coal mined for use of the power supply undertakings.

Analysis of Coal

Two commonly used analysis of coals are:

Proximate analysis and **Ultimate analysis** of coal.

Calorific value of coal is defined as the quantity of heat given out by burning one unit weight of coal in a calorimeter.

Proximate Analysis of Coal:

- ✚ This analysis of coal gives good indication about heating and burning properties of coal.
- ✚ The test gives the composition of coal in respect of moisture, volatile matter, ash and fixed carbon.
- ✚ The moisture test is performed by heating 1 gm of coal sample at 104°C to 110°C for 1 hour in an oven and finding the loss in weight.
- ✚ The volatile matter is determined by heating 1 gm of coal sample in a covered crucible at 950°C for 7 minutes and determining loss in weight, from which the moisture content as found from moisture test is deducted.
- ✚ Ash content is found by completely burning the sample of coal in a muffled furnace at 700°C to 750°C and weighing the residue.

The Ultimate Analysis of Coal:

This analysis of coal is more precise way to find the chemical composition of coal with respect to the elements like carbon, hydrogen, oxygen, nitrogen, Sulphur and ash.

- ✚ Sine the content of carbon and hydrogen that is already combined with oxygen to form carbon dioxide and water is of no value for combustion, the chemical analysis of coal alone is not enough to predict the suitability of coal for purpose of heating.
- ✚ The chemical composition is very useful in combustion calculations and in finding the composition of flue gases.