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i) Natural or Primary fuels :- These are found in nature For Ex - wood coal, Petroleum & natural gas.

i) Artificial or Secondary fuels :- The fuels which are prepared artificially. For Ex - Coke, Petrol, kerosene oil etc

On the basis of Physical state:

) Solid fuels : → Coal, wood peat (primary)
Charcoal, Coke (secondary)

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...ally occurs
...teristics of a good fuel :

1. It must have high calorific value.
2. It must have moderate ignition temperature.
3. Its moisture content should be low.
4. It should have low ash content.
5. It should not pollute the environment.

Calorific value :

Total amount of heat evolved when unit mass or unit volume of fuel is completely burnt in excess supply of oxygen is known as calorific value of fuel.

$$C + O_2 \longrightarrow CO_2 \quad + 394 \text{ KJ/mole}$$

$\Rightarrow$ 12 gm - C - produces = 394 KJ of energy
$\Rightarrow$ 1 " " " = 32.83 KJ {Calorific value}

Units of heat :

(i) Calories : The amount of heat required to raise the temp of 1 gm of water through 1°C. is known as 1 calorie.

1 k Cal = amount of heat required to raise 1°C temp. of 1 kg of water

1 k Cal = 1000 Calories. = 4.185 J

(ii) British Thermal unit (B.Th.U.) :

1 (B.Th.U.) = Amount of heat required to raise the tem of 1 lb of water through 1°F.

1 B.T.U. = 1054.6 J

grade heat Unit (C.H.U):

C.H.U. = Amount of heat required to raise the temp. of 1 lb of water through 1°C.

1 K Cal = 3.968 B.T.U. = 2.2 C.H.U. $\left\{\begin{array}{l} 1\,kg = 2.2\,lb \\ 1°c = 1.8°F \end{array}\right.$

Calorific values of solid and liquid fuels are usually expressed in calories per gram or KCal/kg or B.Th.U./lb. Calorific values of gases are expressed as K.Cal^s/m^3 or B.Th.U./ft^3. There are two types of calorific values of fuels:-

1. Gross Calorific value or Higher calorific value (H.C.V.):

It is defined as the amount of heat evolved when unit mass or unit volume of a fuel is burnt completely in excess supply of oxygen and the products of combustion are allowed to cool at room temp.

In this case latent of heat of ~~steam~~ steam is also included.

2. Net calorific value or Lower calorific value (L.C.V.):

It is defined as the amount of heat evolved when unit mass or unit volume of a fuel is burnt completely in excess supply

oxygen and products of combustion are allowed to escape.

$$L.C.V. = H.C.V. - \text{Latent heat of water vapour formed.}$$
$$= H.C.V. - \{\text{Mass of Hydrogen per unit mass of fuel}\} \times 9 \times \{\text{Latent heat of steam}\}$$

if we represent hydrogen as %.

$$\Rightarrow L.C.V. = H.C.V. - \frac{H}{100} \times 9 \times 587$$
$$= H.C.V. - 0.09 \times H \times 587 \text{ Cal/gm or K Cal/kg.}$$

Dulong's formula:

If C, H, O & S are % of carbon, hydrogen oxygen and Sulphur in fuel then

$$H.C.V. = \frac{1}{100}\left[8080\,C + 34500\left(H - \frac{O}{8}\right) + 2240S\right] \text{ Cal/gm or K Cal/kg.}$$