



# SNS COLLEGE OF TECHNOLOGY AN AUTONOMOUS INSTITUTION



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## DEPARTMENT OF AGRICULTURAL ENGINEERING

**COURSE CODE & NAME: 19AGT301 & HEAT POWER ENGINEERING**

III YEAR / V SEMESTER

**UNIT : 1 FUELS AND COMBUSTION**

**TOPIC 1 : Introduction**



# INTRODUCTION

- ❖ The various types of fuels like liquid, solid and gaseous fuels are available for firing in boilers, furnaces and other combustion equipments.
- ❖ The selection of right type of fuel depends on various factors such as availability, storage, handling, pollution and landed cost of fuel.
- ❖ The knowledge of the fuel properties helps in selecting the right fuel for the right purpose and efficient use of the fuel.

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## INTRODUCTION

- A fuel is a combustible substance containing carbon as the main constituent which on proper burning gives large amount of heat that can be used economically for domestic and industrial purposes.
- During the process of combustion of a fuel, the atoms of carbon, hydrogen, etc combine with oxygen with simultaneous liberation of heat. The calorific value of a fuel depends mainly on the two elements.
  - $$\text{C} + \text{O}_2 \longrightarrow \text{CO}_2 + 94 \text{ kcals.}$$
  - $$2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O} + 68.5 \text{ kcals.}$$
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- So, carbon compounds have been used for many centuries as the source of heat and energy.



# CLASSIFICATION OF FUELS

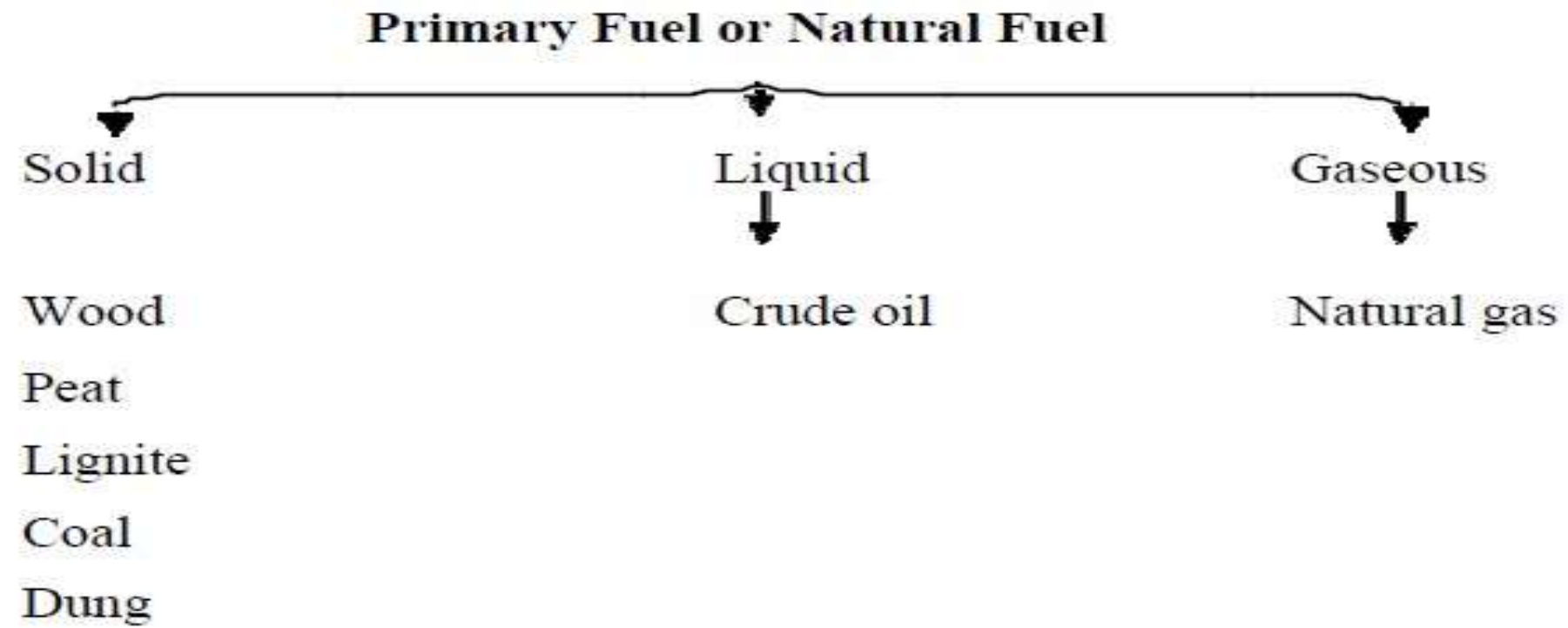
It is of two types.

**Primary Fuels** : It occurs in nature as such. ex. coal, petroleum, natural gas.

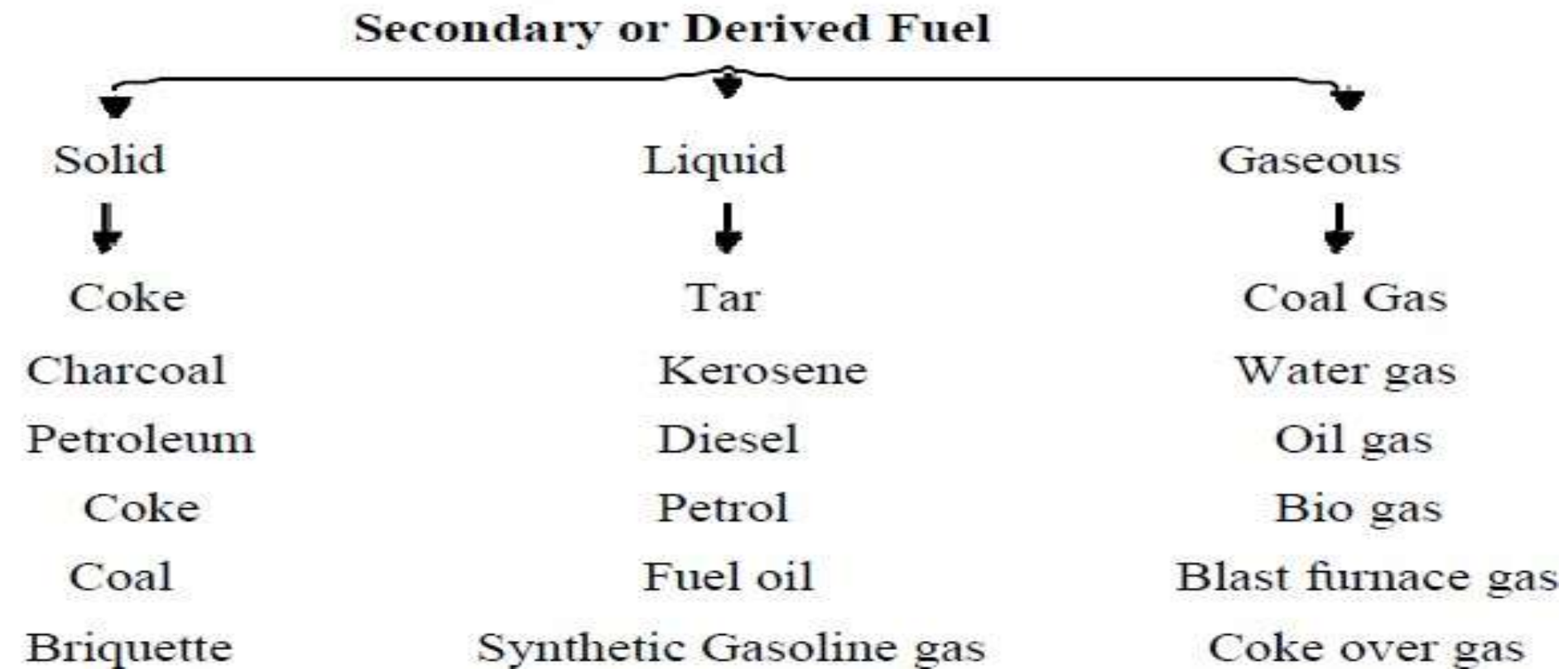
**Secondary Fuels**: It is derived from primary fuels ex.: coke, gasoline, coal gas.



### *Primary Fuel or Natural Fuel*



### *Secondary or Derived Fuel*





# CALORIFIC VALUE



- Calorific value of a fuel is "**the total quantity of heat liberated, when a unit mass (or volume) of the fuel is burnt completely.**"

Units of heat :

- (1) '**Calorie**' is the amount of heat required to raise the temperature of one gram of water through one degree Centigrade (15-16°C).
- (2) "**Kilocalorie**" is equal to 1,000 calories. It may be defined as 'the quantity of heat required to raise the temperature of one kilogram of water through one degree Centigrade. Thus: **1 kcal = 1,000 cal**
- (3) "**British Thermal unit**" (**B.T.U.**) is defined as "the quantity of heat required to raise the temperature of one pound of water through one degree Fahrenheit (60-61°F). This is the English system unit.  
**1 B.T.U. = 252 cal = 0.252 kcal      1 kcal = 3.968 B.T.U.**



# I. SOLID FUELS

## COAL

- ❖ Coal is a highly carbonaceous matter that has been formed as a result of alteration of vegetable matter (eg., plants) under certain favourable conditions.
- ❖ It is chiefly composed of C, H, N and O besides non-combustible inorganic matter.
- ❖ The successive stages in the transformation of vegetable matter into coal are— wood, peat, lignite, bituminous coal, steam coal and anthracite.
- ❖ Anthracite is probably the purest form of coal and contains 95 % carbon.



# CLASSIFICATION OF COAL



## **Peat**

Peat is the first stage in the formation of coal.

Its calorific value is about 4000-5400 k cal/kg.

It is an uneconomical fuel due to its high proportion of (80 -90%) moisture and lower calorific value.

It is a brown fibrous mass.

## **Lignite**

Lignite is an intermediate stage in the process of coal Formation.

Its calorific value is about 6500-7100 kcal/kg

Due to the presence of high volatile content, it burns with long smoky flame.

## **Bituminous Coal**

Bituminous coal is further sub-classified on the basis of its carbon content into three types as:

Sub- bituminous coal,

Bituminous coal and

Semi-bituminous coal.

## **Anthracite**

Anthracite is the superior grade of coal.

Its volatile, moisture and ash contents are very less.

Its calorific value is about 8650 kcal/kg





THANK YOU..!!