SNS COLLEGE OF TECHNOLOGY
AN AUTONOMOUS INSTITUTION

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DEPARTMENT OF AGRICULTURE ENGINEERING

COURSE CODE & NAME: 16AGT301 & 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.
- $C + O_2 \longrightarrow CO_2 + 94$ kcals.
- $2H_2 + O_2 \longrightarrow 2H_2O + 68.5$ 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

Primary Fuel or Natural Fuel

Solid	Liquid	Gaseous
Wood	Crude oil	Natural gas
Peat		
Lignite		
Coal		
Dung		

Secondary or Derived Fuel

Secondary or Derived Fuel

Solid	Liquid	Gaseous
Coke	Tar	Coal Gas
Charcoal	Kerosene	Water gas
Petroleum	Diesel	Oil gas
Coke	Petrol	Bio gas
Coal	Fuel oil	Blast furnace gas
Briquette	Synthetic Gasoline gas	Coke over gas

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- bituminouscoal,
Bituminous coaland
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...