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FUEL & FUEL PRPPERTIES



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PROPERTIES OF FUEL

Fuel is a substance consumed by the engine to produce energy. The common fuels for internal combustion

engines are:

1. Petrol
2. Power kerosene
3. High speed diesel oil
4. Light diesel oil.



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QUALITY OF FUEL

The quality of the fuel mainly depends upon the following properties:

1. Volatility of the fuel
2. Calorific value of the fuel
3. Ignition quality of the fuel



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Volatility:

Volatility of fuel has considerable effect on the performance of the engine by affecting the following:

- (i) Ease of starting the engine.
- (ii) Degree of crankcase oil dilution,
- (iii) Formation of vapour lock in the fuel system,
- (iv) Accelerating characteristics of the engine,
- (v) Distribution of fuel in multi-cylinder engine.



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Calorific value:

The heat liberated by combustion of a fuel is known as calorific value or heat value of the fuel. It is expressed in kcal /kg of the fuel. The heat value of a fuel is an important measure of its worth, since this is the heat which enables the engine to do the work.



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Ignition quality:

Ignition quality refers to ease of burning the oil in the combustion chamber. Octane number and cetane number are the measures of ignition quality of the fuel.

(a) Octane number: It is a measure of knock characteristics of a fuel. The percentage of iso-octane (C_8H_{18}) in the reference fuel consisting of a mixture of iso-octane and normal heptane (C_7H_{16}), when it produces the same knocking effect as the fuel under test, is called octane number of the fuel.



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(b) Cetane number: The percentage of cetane in a mixture of cetane ($C_{16}H_{34}$) and alphanaphthelene ($C_{11}H_{16}$) that produces the same knocking effect as the fuel under test is called cetane number of the fuel. Diesel fuels are rated according to cetane number which is the indication of ignition quality of the fuel. The higher the cetane number the better the ignition quality of the diesel fuel. The commercial diesel fuels have got cetane rating varying from 30 to 60.



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Detonation (Knocking): *Detonation or engine knocking refers to violent noises, heard in an engine, giving a pinging sound during the process of combustion.*



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Fuel-Air Ratio (F/A) IC Engine Testing

- Fuel-air ratio (F/A) is the ratio of the mass of fuel to the mass of air in the fuel-air mixture. Fuel-air ratio of the mixture affects the combustion phenomenon.
- It determines the flame propagation velocity, the heat release in the combustion chamber, the maximum temperature and the completeness of combustion.
- Relative fuel-air ratio is defined as the ratio of the actual fuel-air ratio to that of the stoichiometric fuel-air ratio required to burn the fuel supplied.
- Stoichiometric fuel-air ratio is the ratio of fuel to air in which case fuel is completely burned