Petrol

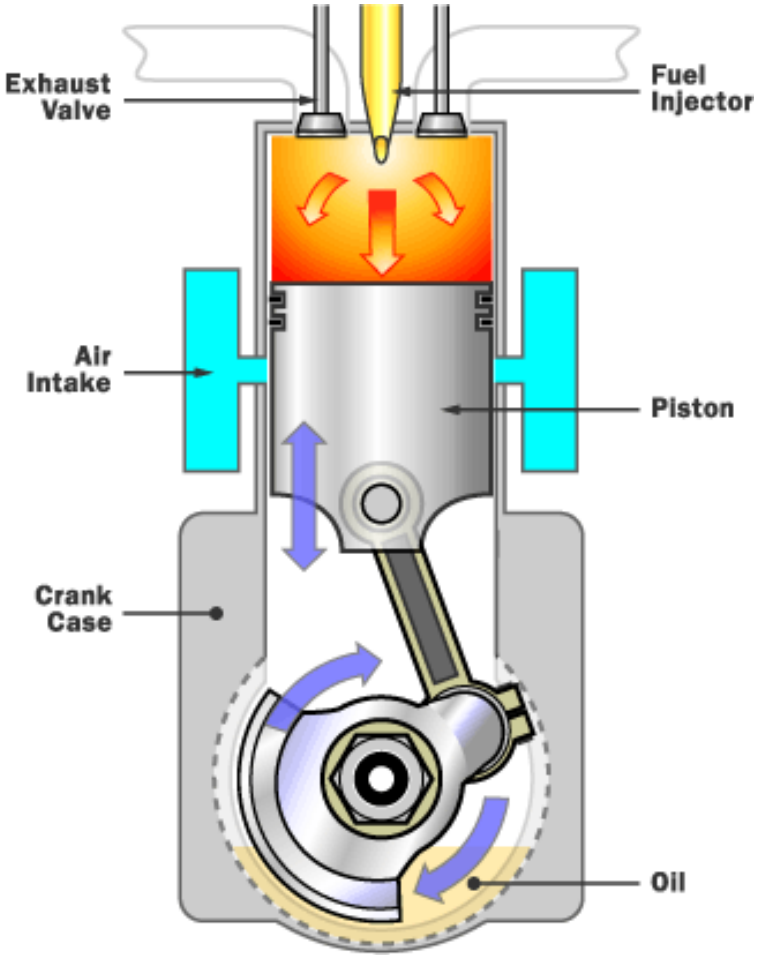
- **PETROL COMPOSITION**
- Petrol is a complex mixture of at least 100 different compounds, mostly hydrocarbons.

- Most of these are branched-chain alkanes, and some are aromatic compounds.

Auto igniting

- The greater the extent to which gases are compressed the more they tend to heat up. Sometimes this causes ignition before the spark is produced. This is intended in a diesel engine, where there is no spark plug, but in a petrol engine the occurrence is called auto-ignition or knocking or pinking. This is quite a problem as it can cause loss of power, with obvious danger, or damage to the engine.
- Is premature ignition of explosion of the petrol-air mixture before normal ignition of the mixture by a spark takes place

Internal combustion engine



It can be prevented in two ways during

1. Use of additives

- **Lead compounds e.g. tetra ethyl lead**
- environmental effects—the lead compounds present in exhaust fumes are toxic.

2. Use of a suitable mixture of high-octane compounds.

Analyse the results

Name	Draw Structure	Octane no.
Heptane		0
Hexane		25
2- methyl hexane		65
2,3-dimethyl pentane		91
cyclohexane		83

HIGH OCTANE COMPOUNDS

a) A high degree of branching

b) Short chain length

c) The existence of rings.

- Octane number is the measure of the tendency of a fuel to resist knocking.

High-octane compounds can be obtained from low by three processes, each involving the use of catalysts:

- a) Isomerisation
- b) Dehydrocyclisation
- c) Catalytic cracking.
- d) Oxygenation

Iso-Octane

- 2,2,4-trimethyl pentane

ISOMERISATION

Pentane and 2-methyl,butane

- Alkanes heated using a suitable catalyst which causes the chain to break.

DEHYDROCYCLISATION

Hexane to cyclohexane and H_2 gas

CATALYTIC CRACKING
$C_{11}H_{24}$ (3 products)

Oxygenation
adding ethanol, methanol, MTBE

OCTANE RATING

- The octane rating is a measure of the tendency of a fuel to auto-ignite.
- Heptane (C_7H_{16}) has an octane number of 0.
- 2,2,4-trimethylpentane octane number of 100.