Chapter 18

FUELS & CRUDE OIL

1. Natural Gas

colourless & odourless

1. Consists mainly of methane
2. Burnt in excess O_2 to produce energy:
   $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$
3. "Cleanest" fossil fuel (✗ air pollutants produced)
4. Liquefied for consumers → ease of transport & safety

2. Crude Oil (Petroleum)

- A raw natural resource that is extracted from the Earth & used to propel vehicles, heat buildings, produce electricity, & make everyday products
- Contains mixture of hydrocarbons
- Needs to be separated before use
- Found beneath land & ocean floors (obtained by drilling)

⚠ Natural gas & crude oil are non-renewable (will be used up)

3. Biofuels

What is it?

Biofuels are alternative renewable energy sources to crude oil & natural gas.

Biofuels come from:

1. Sugar cane → fermentation of sugar to produce ethanol
2. Corn → ethanol produced from plants = bioethanol
3. Animal waste → decomposed organic waste produce biogas

Advantages

1. Renewable

2. Cleaner energy
3. Reduces oil dependence
4. Uses waste

Disadvantages

1. Competes with food
2. Land & water use
3. Energy intensive
4. Environmental impact

4. Ways to Conserve Crude Oil

1. Reduce number of vehicles
    - drive smaller cars / take public transport
2. Use alternative energy (biofuels)
3. Improve design of power stations & vehicles to be more efficient

5. Competing Uses of Crude Oil

90%

used as fuel

10%

petrochemical feedstock

→ **Supply is limited!**

6. Fractional Distillation of Crude Oil

Crude oil is heated & boiled to abt 400°C. The vapour is passed into the fractionating column.

Furnace

Heats and vaporises the crude oil before it enters the column.

Fractionating Column

- Hottest @ the bottom, cooler towards the top
- Fractions with higher boiling points condense @ higher temperatures (at the lower level)
- Fractions with lower boiling points rise up the column before they condense & collect

Level (bottom → top)	Fraction	Use
Highest temp	Bitumen	Road surfacing
↑	Fuel oil	—
↑	Diesel oil	Fuel for vehicles
↑	Kerosene	—
↑	Naphtha	Chemicals
↑	Petrol	Fuel for vehicles
Lowest temp	Petroleum gas	Fuel for cooking

7. Naming Prefixes (No. of Carbon Atoms)

Prefix	No. of C atoms

Meth-	1
Eth-	2
Prop-	3
But-	4
Pent-	5
Hex-	6