# 4.2 Crude Oil

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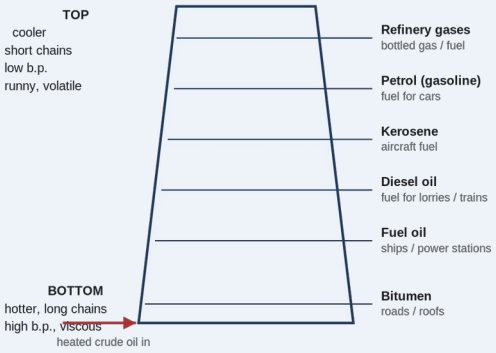
## 1. KEY VOCABULARY

| TERM | MEANING |
|---|---|
| Crude oil | A finite mixture of hydrocarbons, mostly alkanes. |
| Fraction | A group of hydrocarbons with similar boiling points. |
| Fractional distillation | Separating crude oil into fractions by boiling point. |
| Viscosity | How thick / how easily a liquid flows. |
| Volatility | How easily a substance turns into a vapour. |
| Cracking | Breaking long-chain hydrocarbons into shorter, more useful ones. |

## 2. FRACTIONAL DISTILLATION




## 3. HOW IT WORKS

Crude oil is heated and the vapours rise up the column.
**The column is hot at the bottom, cool at the top.** Each fraction condenses where the temperature matches its boiling point.
Short chains rise highest; long chains condense low down.

## 4. TRENDS DOWN THE COLUMN

**Going DOWN (longer chains):**

- higher boiling point
- more viscous (thicker)
- less volatile, less flammable
- darker in colour

## 5. CRACKING

**Long-chain hydrocarbons are less useful.** Cracking breaks them into shorter alkanes and alkenes.
**long alkane → shorter alkane + alkene**
Uses heat and a catalyst. It also supplies alkenes for making polymers.

## 6. THE WHY

**Why fractional distillation works:** hydrocarbons of different chain length have different boiling points, so they condense at different heights.
**Why we crack oil:** demand for short-chain fuels is higher than supply — cracking converts the surplus long chains.

## 7. COMMON EXAM MISTAKES

✗ "Crude oil is a compound."
✓ It is a MIXTURE of hydrocarbons.
✗ "Long chains are more volatile."
✓ Long chains are LESS volatile, more viscous.
✗ "Cracking joins molecules together."
✓ Cracking BREAKS long molecules into shorter ones.

## 8. SELF-CHECK · cover & quiz

*Can you…*

1. Explain what crude oil is?
2. Describe how fractional distillation separates it?
3. Name three fractions and a use for each?
4. State the trends in properties down the column?
5. Explain what cracking is and why it is done?
6. Write a general equation for cracking?