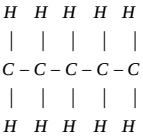
Chemistry Revision Notes – Organic Chemistry

1. The **fractional distillation** of crude oil produces many **organic molecules**.
2. **Alkanes** are **saturated hydrocarbons**, e.g. pentane (C_5H_{12}) –

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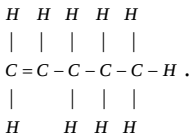
3. A **homologous series** is a 'family' of chemicals with similar properties.
4. If you take an 'H' from an alkane, you are left with an **alkyl**, e.g. methyl (CH_3) and ethyl (C_2H_5).
5. **Alkenes** are **unsaturated hydrocarbons**, with a double covalent bond in the carbon chain, e.g. pentene (C5H10) –

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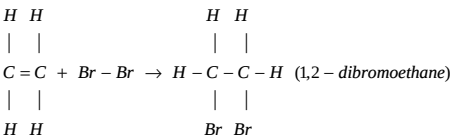
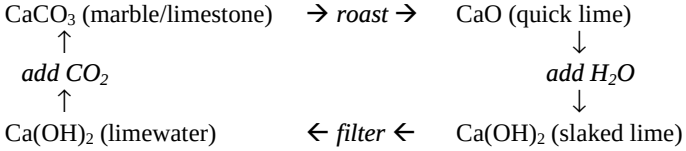
6. The general formula for an alkane is $\mathbf{C_nH_{2n+2}}$, and for an alkene it is $\mathbf{C_nH_{2n}}$.
7. Alkanes undergo **substitution reactions** whereas alkenes undergo **addition reactions**.
8. If an alkene is added to bromine water, it will be **decolourised** (an alkane has no effect):



9. Hydrocarbons can be **cracked** by breaking down long chain alkanes into smaller chain alkanes and alkenes, e.g. $C_{10}H_{22} \rightarrow 2C_3H_6 + C_4H_{10}$.
10. **Addition polymerisation** is an addition reaction with unsaturated hydrocarbons – i.e. a large number of **monomers** join together to create **polymers**. For example, ethene makes polythene.
11. The properties of a polymer are affected by:
    - The length of the chain (a longer chain gives a higher melting point)
    - Whether or not there is **cross-linking** (this makes it stronger).
    - The degree of crystallisation.
12. Iron is extracted from its ore (haematite) in the **blast furnace**:
    - $C + O_2 \rightarrow CO_2$
    - $CaCO_3 \rightarrow CaO + CO_2$
    - $CO_2 + C \rightarrow 2CO$
    - $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
    - $CaO + SiO_2 \rightarrow CaSiO_3$
13. Steel is made from iron in the **steel-making furnace**.
14. Lead metal can be extracted from lead oxide by **reduction** – $2PbO + C \rightarrow 2Pb + CO_2$.
15. Aluminium is extracted from its ore (bauxite) by **electrolysis**, dissolving it in molten **cryolite**. This forms aluminium at the cathode, $Al^{3+} + 3e^- \rightarrow Al$, and oxygen at the anode, $2O^{2-} \rightarrow O_2 + 4e^-$.
16. The **lime cycle**:



17. The **Haber process**:
    - The preparation of hydrogen – $CH_4 + H_2O \rightarrow CO + 3H_2$
    - The production of **ammonia** – $N_2 + 3H_2 \rightleftarrows 2NH_3$
    - Increasing the pressure (which costs more) and lowering the temperature (which slows down the reaction) increases the **yield of ammonia**.