Organic Compounds, Hydrocarbons, Alkyl and Aryl Groups

- Organic chemistry is a branch of chemistry specialising in carbon-containing compounds
  - Carbon is everywhere and in most things
  - Carbon is essential for all life, for example:
    - $\text{CO}_2$ in the blood
    - $\text{CO}_2$ in the air, absorbed by plants and animals
    - Carbon based fossil fuels used for energy production

- Carbon can be arranged in a number of ways:
  - **Carbon atoms each bonded covalently to 4 other carbon atoms produces diamond**
    - This produces a very strong 3D lattice
  - **Carbons that are each bonded to 3 other carbons produces graphite**
    - This is a much weaker structure as they are arranged in sheets
  - **Carbon that is bonded to 3 other carbons can also form fullerene when it rolls into a dome shape**
    - The following is a diamond structure compared to a graphite structure and a fullerene structure:

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Graphite    Diamond    Fullerenes
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- All organic compounds contain 2 things:
  - **Functional Groups**
    - These are more complicated parts of the compound which add functionality
  - **Hydrocarbons**
    - These are made of hydrogen and carbon and can be put into 3 groups based on the nature of the covalent bonds between them:

<table>
<thead>
<tr>
<th></th>
<th>Only one single carbon-carbon bond</th>
<th>At least one double carbon bond</th>
<th>At least one triple carbon bond</th>
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</thead>
<tbody>
<tr>
<td><strong>AlkANE</strong></td>
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<tr>
<td><strong>AlkENE</strong></td>
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<td><strong>AlkYNE</strong></td>
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</table>

- To name a hydrocarbon compound you need to know:
  - How many carbons are in the longest unbroken chain
  - If its saturated or unsaturated
  - Finally, the shape of the compound

- The **number of carbons in the longest unbroken chain** gives the **prefix** for the compounds name