1. Crude oil is a complex mixture of compounds called hydrocarbons.

Hydrocarbon molecules may be either straight chain or ring structures.

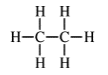
Carbon atoms have 4 covalent bonds.

Hydrogen atoms have 1 covalent bond.

1. Draw structures showing all bonds for the following hydrocarbons.

|  |  |
| --- | --- |
| **Methane, CH4** | **Propane, C3H8** |
|  |  |
| **Pentane, C5H12** | **Butane, C4H10** |
|  |  |

1. Give the molecular formula and structure of the missing molecule in part a).

Answer: Missing formula is C2H6.

1. Place the four molecules in part a) in order of boiling point, lowest first.

Answer: Methane, propane, butane, pentane.

All of the hydrocarbons shown in part a) belong to a homologous series.

These hydrocarbons are also saturated.

1. What is the name of the homologous series?

Answer: The alkanes.

1. What is the meaning of the term ‘saturated’?

Answer: Hydrocarbons containing carbon single bonds only.

1. What is the general formula of the alkanes?

Answer: CnH2n+2.

1. Use the names, formulae or structures to work out which of the molecules are hydrocarbons and which are alkanes.

Place a tick or cross in the box.

|  |  |  |
| --- | --- | --- |
|  | **Hydrocarbon** | **Alkane** |
| **H2O** | Answer: x | Answer: x |
| **C5H12** | Answer: 🗸 | Answer: 🗸 |
| **C4H8** | Answer: 🗸 | Answer: x |
| **C2H5OH** | Answer: x | Answer: x |
| **Pentane** | Answer: 🗸 | Answer: 🗸 |
|  | Answer: 🗸 | Answer: 🗸 |
| C:\Users\Owner\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\EDEBED26.tmp | Answer: 🗸 | Answer: x |
| C:\Users\Owner\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\24629C24.tmp | Answer: x | Answer: x |

1. This is a hydrocarbon puzzle.

Write down the molecular formula of the alkane using the following clues.

1. It contains 5 carbon atoms.

Answer: C5H12.

1. It contains 18 hydrogen atoms.

Answer: C8H18.

1. It contains 6 carbon-carbon single bonds per molecule.

Answer: C7H16.

1. It has the highest boiling point of the first 10 alkanes.

Answer: C10H22.

1. A molecule known as centane.

Answer: C100H202.