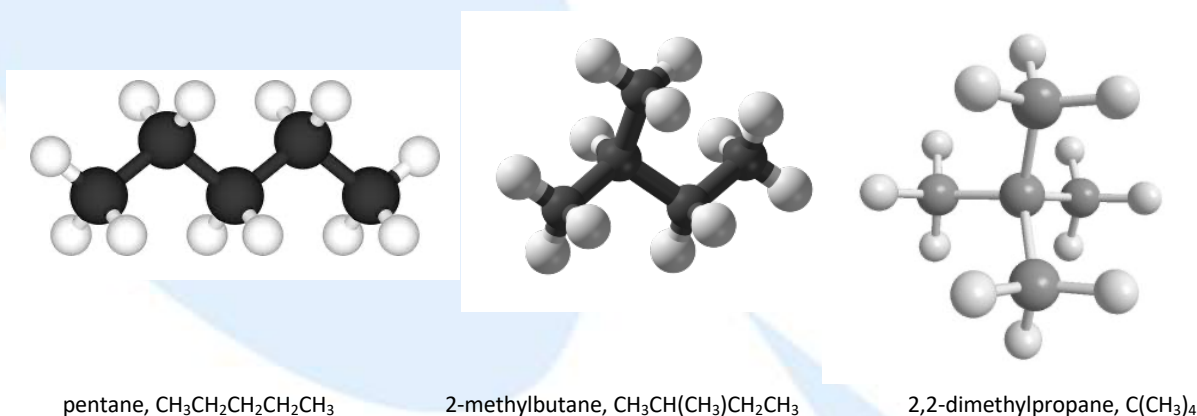


SL & HL Questions on Intermolecular forces

1. The following five compounds have identical or very similar molar masses. Deduce the increasing order of their boiling points (lowest first).

ethanol, $\text{CH}_3\text{CH}_2\text{OH}$, propane, C_3H_8 , ethanal, CH_3CHO , methanoic acid, HCOOH , and methoxymethane, CH_3OCH_3

2. Pentane, C_5H_{12} , has three structural isomers (compounds with the same molecular formula but a different structural formula). They are pentane, 2-methylbutane and 2,2-dimethylpropane.



Deduce, with an explanation, the correct order of their increasing boiling points.

3. Ethanol has a relative molar mass of 46 and boils at 78.5°C . Water has a relative molar mass of 18 and boils at 100°C under the same conditions. Both show hydrogen bonding. Explain why water has a higher boiling point.

4. Trichloromethane, CHCl_3 has a boiling point of 61.2°C . Propanone, CH_3COCH_3 , has a boiling point of 56.2°C . Explain why a mixture of trichloromethane and propanone can have a higher boiling point (measured under the same atmospheric conditions) than either of the two pure components.

5. Place the following four types of attractive forces in order of increasing strength.

Dipole-dipole interactions, hydrogen bonding, London (dispersion) forces and ionic bonding.