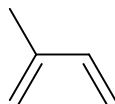
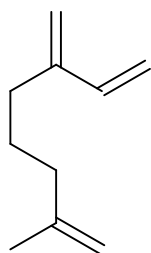


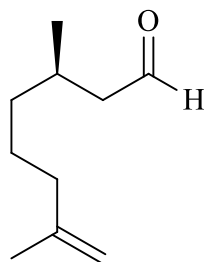
All terpenes are derived from isoprene and many, such as myrcene, (*R*)-citronellal and geraniol, are used in the perfume industry.



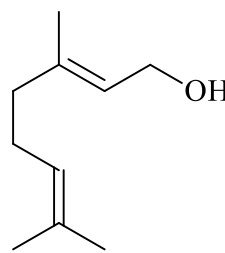
isoprene  
b.p. 34 °C



myrcene  
b.p. 167 °C



(*R*)-citronellal  
b.p. 201 °C



geraniol  
b.p. 230 °C

Explain the differences in boiling points of these four compounds in terms of the type and size of the intermolecular forces present.

**All the molecules experience dispersion forces. Dispersion forces are related to the polarisability of a molecule and increase as the number of electrons in the molecule increases (i.e. they increase with molecular size).**

**Dispersion forces are the only intermolecular forces present in isoprene and myrcene, but are stronger for the larger myrcene, so it has the higher boiling point.**

**Myrcene, citronellal and geraniol are all of similar size, so have similar dispersion forces.. Citronellal has a polar C=O group so can engage in dipole-dipole interactions so has a higher boiling point than myrcene.**

**Geraniol contains an –OH group so can engage in hydrogen bonding, a particularly strong intermolecular force, so it has a higher boiling point than citronellal.**