

- Consider the boiling points of the compounds 1-propanol, 1-propanethiol and 1-propaneselenol shown in the table below?

Compound	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> OH	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> SH	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> SeH
Boiling point (° C)	97.2	67.8	147.0

With reference to intermolecular forces, explain briefly why the boiling points increase in the order CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>SH < CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH < CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>SeH.

**Polarisability of atoms increases as the size of the atoms increase. The greater the polarisability, the stronger the dispersion forces. On this basis, the expected boiling point order would be C<sub>3</sub>H<sub>7</sub>OH < C<sub>3</sub>H<sub>7</sub>SH < C<sub>3</sub>H<sub>7</sub>SeH.**

**C<sub>3</sub>H<sub>7</sub>OH also has hydrogen bonding between the OH groups. H-bonding is a stronger intermolecular force than dispersion forces and this increases the boiling point of C<sub>3</sub>H<sub>7</sub>OH to be above that of C<sub>3</sub>H<sub>7</sub>SH. The effect is not enough to push it above the boiling point of C<sub>3</sub>H<sub>7</sub>SeH.**