

Practice Problems on Intermolecular Forces – Chem 30A

- Which compound will have the higher boiling point, C_2H_6 or C_4H_{10} ? Explain why.
- Rank the following compounds in order from highest to lowest boiling point. Explain your reasoning, in terms of the types and strengths of intermolecular forces involved.
 - C_8H_{18}
 - $$\begin{array}{ccccccc} & H & & H & & H & \\ & | & & | & & | & \\ H & -C & - & C & - & C & -H \\ & | & & | & & | & \\ & H & & H & & H & \end{array}$$
 - $$\begin{array}{ccccccc} & H & & H & & & \\ & | & & | & & & \\ H & -C & - & C & - & F & \\ & | & & | & & & \\ & H & & H & & & \end{array}$$
 - $$\begin{array}{ccccccc} & H & & H & & & \\ & | & & | & & & \\ H & -C & - & C & - & O & -H \\ & | & & | & & & \\ & H & & H & & & \end{array}$$
- Water has a boiling point of $100^\circ C$. Octane, C_8H_{18} , has a boiling point of $126^\circ C$. Explain why octane has a higher boiling point than water, even though water can hydrogen bond.
- State whether each of the following compounds would be more soluble in water or more soluble in oil. Explain your reasoning.
 - KBr
 - CH_3CH_2OH
 - C_6H_{12}
 - NH_3
 - $CH_3CH_2CH_2CH_2CH_2CH_2OH$
 - $$\begin{array}{ccccccc} & H & & OH & & H & & OH & & H \\ & | & & | & & | & & | & & | \\ HO & -C & - & C & - & C & - & C & - & C & -OH \\ & | & & | & & | & & | & & | \\ & H & & H & & OH & & H & & H \end{array}$$
- Rank the following compounds in order from most to least soluble in water. Explain your reasoning, in terms of intermolecular forces.
 - $$\begin{array}{ccccccc} & H & & H & & H & & H \\ & | & & | & & | & & | \\ H & -C & - & C & - & C & - & C & -OH \\ & | & & | & & | & & | \\ & H & & H & & H & & H \end{array}$$
 - $$\begin{array}{ccccccc} & H & & H & & H & & H & & H \\ & | & & | & & | & & | & & | \\ H & -C & - & C & - & C & - & C & - & C & -H \\ & | & & | & & | & & | & & | \\ & H & & H & & H & & H & & H \end{array}$$
 - $$\begin{array}{ccccccc} & H & & H & & & \\ & | & & | & & & \\ H & -C & - & C & - & OH & \\ & | & & | & & & \\ & H & & H & & & \end{array}$$
 - $$\begin{array}{ccccccc} & OH & & OH & & OH & \\ & | & & | & & | & \\ H & -C & - & C & - & C & -H \\ & | & & | & & | & \\ & H & & H & & H & \end{array}$$