

Organic Properties Worksheet

- For each of the following pairs of compounds, select the one that has the higher boiling point. Give reasons for your answer.
 - ethylene glycol or glycerol
 - water or methoxymethane
 - methanol or propanol
 - methoxyethane or propanol
- Consider the two compounds, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ and $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$. Giving reasons for your choice, select the compound that:
 - will evaporate at a lower temperature;
 - has higher solubility in a nonpolar solvent;
 - can undergo an addition reaction with hydrogen.
- Name and draw a general structure for the functional group in a carboxylic acid. Explain the effect of the components of this functional group on the molecule.
- The labels have fallen off three bottles. Bottle A contains a gas, bottle B contains a liquid, and bottle C contains a solid. The labels indicate that the compounds have the same number of carbon atoms, one being an alkane, one an alcohol, and the other a carboxylic acid. Suggest the identity of the contents of each bottle, and give reasons for your answer.
- Suppose that you are given three colourless liquids whose identities are unknown. You are told that one is an aldehyde, one a ketone, and the other a carboxylic acid. What physical and chemical properties would you examine in order to identify each compound? Give reasons for your strategy.
- In what way is the functional group of an ester different from that of a carboxylic acid? How does this difference account for any differences in properties?
- Explain why amines generally have lower boiling points than alcohols of comparable molar mass.
- Look at the following pairs of compounds and arrange each pair in order of increasing solubility in nonpolar solvents. Give reasons for your answer.
 - an alcohol and an amine of similar molecular mass
 - a primary amine and a tertiary amine of similar molecular mass
 - a hydrocarbon and a tertiary amine of similar molecular mass
 - a primary amine of low molecular mass and one of high molecular mass
- Draw structural formulas for three isomers of $\text{C}_3\text{H}_9\text{N}$, and classify them as primary, secondary, or tertiary amines. Write IUPAC names for each isomer.
- What features in the molecular structure of a compound affect its solubility and its melting and boiling points? Illustrate your answer with several examples, including structural diagrams.
- In some cuisines, fish recipes include lemon garnish or a vinegar sauce such as sweet-and-sour sauce. Suggest a reason why these common culinary technique might be used. Support your answer with chemical information.