

Experiment 25

Recrystallization of an Unknown: Choice of Solvent

Study Questions

- 1) Could the following solvent pairs be used for recrystallization? Explain why or why not.
 - a. Hexanes and water. **Answer:** No, they are immiscible.
 - b. Chloroform and diethyl ether. **Answer:** Yes, they are miscible and have different polarities, so compounds that are soluble in one will probably not be as soluble in the other.
 - c. Propanol and ethanol. **Answer:** Maybe, but their polarities are so similar that they might not work well.

- 2) For each of the solvents listed below, indicate an advantage and a disadvantage in their use as solvents for recrystallization.
 - a. Water. **Answer:** Advantage is its low cost and low toxicity; disadvantage is the difficulty of removing it from products due to low volatility.
 - b. Methanol. **Answer:** Advantage is its low cost, reasonably low toxicity, and volatility; disadvantage is it may react with some functional groups.
 - c. Benzene. **Answer:** Advantage is its ability to dissolve aromatic compounds easily; disadvantage is its toxicity and the fact that it freezes at 5°C so cannot be cooled on ice.
 - d. Carbon tetrachloride. **Answer:** Advantage is its volatility and ability to dissolve nonpolar compounds; disadvantage is its toxicity.
 - e. Acetone. **Answer:** Advantage is its low cost, volatility, and ability to dissolve polar compounds; disadvantage is it may react with some functional groups.

- 3) A student crystallized a compound from benzene and observed only a few crystals when the solution cooled to room temperature. To increase the yield of crystals, the student chilled the mixture in an ice-water bath. The chilling greatly increased the quantity of solid material in the flask. Yet, when the student filtered these crystals with vacuum, only a few crystals remained on the filter paper. Explain this student's observations. **Answer:** The benzene froze solid, then melted while being filtered.