

## Practice Problems on Colligative Properties: Determining Freezing Point Depression and Boiling Point Elevation

### Practice Problem 1: Determining Freezing Point

Ethylene glycol ( $C_2H_6O_2$ ) is a molecular compound that is used in many types of commercial antifreeze. An aqueous solution of ethylene glycol lowers the freezing point of water in vehicle radiators, thereby preventing it from freezing. Calculate the freezing point of a solution of 400 grams of ethylene glycol in 500 grams of water. Ethylene glycol is a non-electrolyte.

## Practice Problem 2: Determining Freezing Point

Calculate the freezing point of a solution prepared by dissolving 27.56 grams of glucose ( $C_6H_{12}O_6$ ) in 125 grams of water. Glucose is a non-electrolyte.

### **Practice Problem 3: Determining Freezing Point and Boiling Point**

Determine the freezing and boiling points of a solution prepared by dissolving 82.20 grams of calcium chloride ( $\text{CaCl}_2$ ) in 400 grams of water. Calcium chloride is a strong electrolyte. Assume that  $i = 3$ .

### **Practice Problem 4: Determining Freezing Point and Boiling Point**

Calculate the freezing and boiling points of a solution prepared by dissolving 20.0 grams of  $\text{Al}(\text{NO}_3)_3$  in 100 grams of water. Aluminum nitrate is a strong electrolyte.