

Colligative Properties

The addition of a _____ solute will result in a _____ freezing point and _____ boiling point.

SOLUTE	# OF PARTICLES	SOLUTE	# OF PARTICLES
sucrose (C ₁₂ H ₂₂ O ₁₁)		magnesium chloride (MgCl ₂)	
sodium sulfate (Na ₂ SO ₄)		methanol (CH ₃ OH)	

1. Give the number of particles that each compound will make in solution:

H₂SO₄ _____ C₂H₅OH _____
 C₆H₁₂ _____ CO₂ _____
 BaBr₂ _____ Na₃PO₃ _____
 LiOH _____ K₂SO₄ _____
 CH₃OCH₂CH₃ _____ NH₄Br _____

Write the ionic (dissociation) equations for the salts listed above:

Rank the following solutions from lowest to highest freezing point. Al(NO₃)₃, KCl, C₂H₅OH,

3. Why is a salt more effective at altering the freezing and boiling points of water than sugar?

4. Which compound will lower the freezing point of water most?

a) CaCl₂ b) NaCl c) C₆H₁₂O₆ d) KMnO₄

Compared to the freezing point and boiling point of water at 1 atmosphere, a solution of a salt and water at 1 atmosphere has a

- (1) lower freezing point and a lower boiling point
- (2) lower freezing point and a higher boiling point
- (3) higher freezing point and a lower boiling point
- (4) higher freezing point and a higher boiling point

Which solution has the *lowest* freezing point?

- (1) 10. g of KI dissolved in 100. g of water
- (2) 20. g of KI dissolved in 200. g of water
- (3) 30. g of KI dissolved in 100. g of water
- (4) 40. g of KI dissolved in 200. g of water

An unsaturated solution is formed when 80. grams of a salt is dissolved in 100. grams of water at 40.°C. This salt could be

- (1) KCl (3) NaCl
- (2) KNO₃ (4) NaNO₃

Activity 5-3

Relative Concentrations of Solutions

Saturated, unsaturated, supersaturated

Some descriptions of solution concentration are related to the amount of solute that can be contained in a given solution at specified conditions. Three such descriptions are the terms *saturated*, *unsaturated*, and *supersaturated*.

1. Define each of these terms:

Saturated. _____

Unsaturated. _____

Supersaturated. _____

2. What happens when a crystal of solute is added to:

A saturated solution? _____

An unsaturated solution? _____

A supersaturated solution? _____

3. Describe how a supersaturated solution of a compound such as sodium thiosulfate can be prepared. _____

4. How can a supersaturated solution of a substance such as sodium thiosulfate be converted to a saturated solution? _____

