**Name:** _____ **Date:** _____

***Chemistry*** *~ Ms. Hart* **Class:** Anions or Cations

THE URBAN ASSEMBLY SCHOOL FOR CRIMINAL JUSTICE

## 8.8 Colligative Properties WS

**Review and then some:**

| | **Molecular Compounds** | **Ionic Compounds** |
|---|---|---|
| **What are they?** | | |
| **How are they bonded?** | | |
| **What happens when they dissolve in water?** | | |
| **Example** | | |

**Colligative Properties:**

A property that depends only on the _____

of solute rather than the _____ of the solvent.

| | **FREEZING POINT** | **BOILING POINT** |
|---|---|---|
| **Definition** | | |
| **How does the presence of a solute affect it?** | | |
| **How does the number of particles affect it?** | | |

**KEY POINT**

**How do we determine the number of particles?**

| **Compound** | **Ionic compound or Molecular compound?** | **Number of Particles in an aqueous solution** |
|---|---|---|
| **NaCl** | | |
| **$CaCl_2$** | | |
| **$CO_2$** | | |
| **$Ca(NO_3)_2$** | | |
| **$NH_4Cl$** | | |

**Compare and Practice:**

| Compounds or Solutions | Lower freezing point? | Higher boiling point? |
|---|---|---|
| **1.0 M $KNO_3$ or 2.0 M $KNO_3$** | | |
| **NaCl or $CaCl_2$** | | |

Regents Practice

1. Why is salt (NaCl) put on icy roads and sidewalks in the winter?
   (1) It is ionic and lowers the freezing point of water
   (2) It is ionic and raises the freezing point of water
   (3) It is covalent and lowers the freezing point of water
   (4) It is covalent and raises the freezing point of water

2. Assume equal aqueous concentrations of each of the following substances. Which has the lowest freezing point?
   (1) $C_2H_{12}O_6$
   (2) $CH_3OH$
   (3) $C_{12}H_{22}O_{11}$
   (4) NaOH

3. What occurs when sugar is added to water?
   (1) The freezing point of the water will decrease, and the boiling point will decrease.
   (2) The freezing point of the water will decrease, and the boiling point will increase.
   (3) The freezing point of the water will increase, and the boiling point will decrease.
   (4) The freezing point of the water will increase, and the boiling point will increase.

4. Compared to the freezing point of 1.0M KCl (aq) at standard pressure, the freezing point of 1.0 M $CaCl_2$(aq) at standard pressure is
   (1) lower
   (2) higher
   (3) the same

5. Which sample, when dissolved in 1.0 liter of water, produces a solution with the *lowest* freezing point?
   (1) 0.1 mol of $C_2H_3OH$
   (2) 0.1 mol of LiBr
   (3) 0.2 mol of $C_2H_{12}O_6$
   (4) 0.2 mol of $CaCl_2$

6. Which aqueous solution of KI freezes at the lowest temperature?
   (1) 1 mol of KI in 500. g of water
   (2) 2 mol of KI in 500. g of water
   (3) 1 mol of KI in 1000 g of water
   (4) 2 mol of KI in 1000 g of water

7. Compared to a 2.0M aqueous solution of NaCl at 1 atmosphere, a 3.0 M aqueous solution of NaCl at 1 atmosphere has a
   (1) lower boiling point and a higher freezing point
   (2) lower boiling point and a lower freezing point
   (3) higher boiling point and a higher freezing point
   (4) higher boiling point and a lower freezing point

8. Which solution containing 1 mole of solute dissolved in 1000 grams of water has the *lowest* freezing point?
   (1) KOH(*aq*)
   (2) $C_2H_{12}O_6$(*aq*)
   (3) $C_2H_5OH$(*aq*)
   (4) $C_{12}H_{22}O_{11}$(*aq*)

9. Which aqueous solution has the lowest freezing point?
   (1) 1.0 M $C_6H_{12}O_6$
   (2) 1.0 M $C_2H_5OH$
   (3) 1.0 M $CH_3COOH$
   (4) 1.0 M NaCl

10. Compared to a 0.1 M aqueous solution of NaCl, a 0.8 M aqueous solution of NaCl has a
    (1) higher boiling point and a higher freezing point
    (2) higher boiling point and a lower freezing point
    (3) lower boiling point and a higher freezing point
    (4) lower boiling point and a lower freezing point

11. Compared to the freezing point of 1.0 M KCl(aq) at standard pressure, the freezing point of 1.0 M $CaCl_2$(aq) at standard pressure is
    (1) lower
    (2) higher
    (3) the same