Reminders

1000 mL = 1 L

1 mL H_2O = 1 g H_2O (based on density of H_2O 1)

1000 g = 1 kg

Freezing point of water 0 °C
Boiling point of water 100 °C

Mar 10-7:39 AM

Colligative Properties

Colligative Property: a property that depends only on the **number** of solute particles, and not the **type** of particle.

Examples of some colligative properties:
1. Freezing Point Depression
2. Boiling Point Elevation
3. Vapor Pressure Lowering

We will focus on Freezing Point and Boiling Point.

Apr 25-8:04 AM

Freezing Point Depression

What happens when something freezes (for example, water)?

- Decrease in energy slows molecules/atoms down
- Intermolecular forces have more effect (atoms have less energy to fight them)
- Frozen water (ice) molecules are in an orderly pattern.

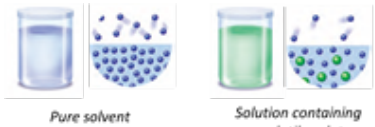
What happens when you add a solute?

The addition of another substance (a solute) disrupts and prevents water molecules from forming an orderly pattern.

Freezing Point Depression: adding a substance to a pure solvent *lowers* the freezing point

Mar 10-7:41 AM

Boiling Point Elevation



Pure solvent *Solution containing nonvolatile solute*

Solute particles also get in the way of a solvent's ability to boil thereby increasing the boiling temperature.

Boiling Point Elevation: adding a substance to a pure solvent *increases* the boiling point

Mar 10-7:45 AM

Dissociation Factor

Dissociation factor:
How many particles the solute will break in to in solution.

Dissociation Factor
Covalent compounds: will not dissociate → *i = 1*
Ionic compounds: will dissociate into ions → *i = # of ions per compound*

*** **The larger the dissociation factor, the lower the freezing point and higher the boiling point.**

**** **Count the number of IONS NOT ATOMS**

Mar 10-7:46 AM

Dissociation Factor examples

What is the dissociation factor for each compound? Which will raise the boiling point the most? Lower the freezing point the most?

1. $AlPO_4$
2. N_2O_4
3. $LiCl$
4. CaI_2
5. PCl_5
6. $Pb(OH)_4$
7. XeF_4
8. Cu_2CO_3

Mar 10-7:47 AM

Dissociation Factor
examples

What is the dissociation factor for each compound? Which will raise the boiling point the most? Lower the freezing point the most?

1. $AlPO_4$ i =2: Al^{3+}, PO_4^{3-}
2. N_2O_4 i =1: covalent
3. LiCl i =2: Li^+, Cl^-
4. CaI_2 i =3, Ca^{2+}, I^-, I^-
5. PCl_5 i =1: covalent
6. $Pb(OH)_4$ i =5: Pb^{4+}, OH^-, OH^-, OH^-, OH^-
7. XeF_4 i =1: covalent
8. Cu_2CO_3 i =3: Cu^+, Cu^+, CO_3^{2-}

Mar 10-7:47 AM

Attachments

solutionSalt.zip

clipboard(20615).galleryitem