Solutions, Suspensions and Colloids

Solutions:
Small particle size: Atomic ≈ 1nm or less
Will not seperate
Will not filter out
No Tyndall Effect
Completely homogeneous

Suspensions:
Large particle size (larger than 1 micrometer)
Will eventually seperate out
Heterogeneous

Colloids:
Medium Particle size (1 nanometer - 1 micrometer)
Tyndall Effect
Homogeneous
Will not settle

Concentration/Solutions:

A solution is made of 2 part a solute that is dissolved in a solvent.

Example: Salt water:

Molarity = M = Moles of solute / liters of solution

Molality = m = moles of solute/ kg of solvent
The molality (m) or molal concentration is the amount of solute, in moles, per kilogram of solvent.

Solving a concentration problem:
1. Find the gfm of the solute
2. Find the moles of the solute
3. Find the liters of the solvent
4. Divide moles by liters

Determine the molarity of a solution made by dissolving 20.0 g of NaOH in sufficient water to yield a 482 cm^3 solution.
Solution:
Na is 23.0
H is 1.0
O is 16.0

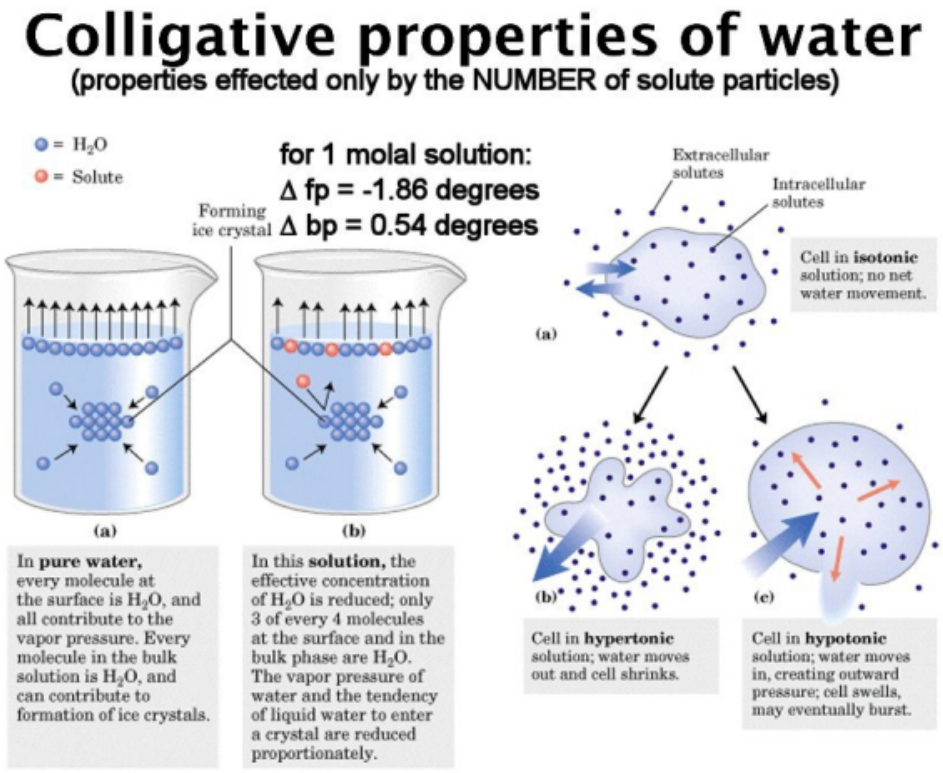
NaOH weighs 23.0 g + 16.0 g + 1.0 g = 40.0 g/mol

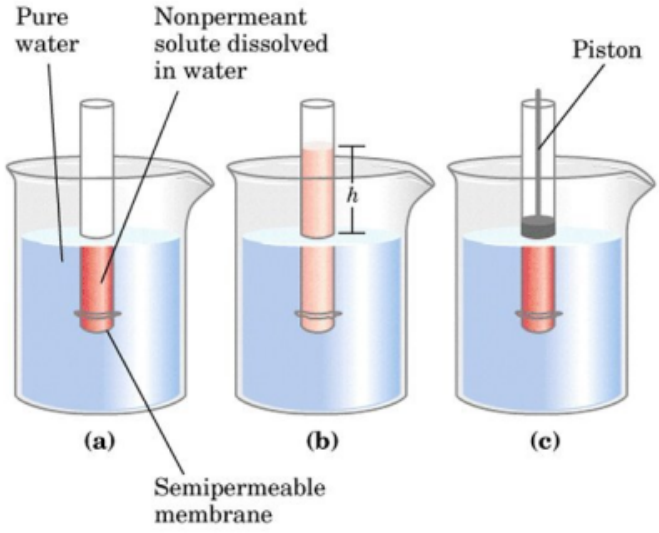
So the number of moles in 20.0 g is:
moles NaOH = 20.0 g/40.0 g = 0.500 mol
1 liter is 1000 cm^3, so the volume of solution is:
liters solution = 482 cm^3 x 1 liter/1000 cm^3 = 0.482 liter

Simply divide the number of moles by the volume of solution to get the molarity:
molarity = 0.500 mol / 0.482 liter = 1.04 mol/liter = 1.04 M

1.04 M

Solutions: Colligative Properties





$\Delta T = C_f \cdot m$

Solutions: Colligative Properties

$C_f = -1.86^0 C/m$

Freezing Point Depression

$C_b = .51^o C/m$

Boiling Point Elevation

Calculate the boiling and freezing point of a 1.25 Liters of solution with 10.0 grams of salt dissolved in it.

$-.0255°C$ FP

$100.07°C$ BP

$$\frac{10.0\,g}{58.5\,g/mole} = \frac{.171\,moles}{1.25\,Kg} = .137\,M \text{ or } m$$

$$\Delta T_{FP} = \left(-1.86\,\frac{°C}{m}\right)(.137\,m)$$

$$\Delta = -.0255°C$$

$$\Delta T_{BP} = \left(.51\,\frac{°C}{m}\right)(.137) = .07°C$$

Solutions: Colligative Properties

Find the boiling point and freezing point of a solution with 337.25 grams of Iron (II) Oxalate dissolved in 1725 mL of water.