

Solutions

CHM 1020

Definitions

- A solution is a mixture in which one substance, called the solute is uniformly distributed in another substance called the solvent.
- The most common solvent is water.
- Examples: Kool Aid, vodka

Properties

- Homogeneous (uniform)
- Almost always transparent, clear.
- Does not separate on standing
- Cannot be separated by filtration.
- Can be separated by other physical means such as distillation.
- Differing concentrations can be made.

Solutions, Colloids, Suspensions

Property	Solutions	Colloids	Mixtures
example	saline soln.	milk	mud pie
Particle size	.1-1 nm	1-1000 nm	>1000 nm
Behavior to light	clear	opaque	opaque
Can be separated by filtration*	no	no	yes
settles on standing	no	no	yes
homogeneous	yes	borderline	no

*Using ordinary filter paper

Measuring concentrations

$$\text{concentration} = \frac{\text{amount of solute}}{\text{amount of solution}}$$

- Amounts can be in grams, moles, liters, ml

W/W%

$$w/w\% = \frac{\text{grams of solute}}{\text{grams of solution}} \times 100\%$$

- A 10% (w/w) solution of glucose means that there are 10 g of glucose in every 100 g of solution. (Parts per hundred)
- If a patient has to be fed 80.0 grams of glucose, how many ml of a 10% solution is needed?

Similar

$$w/v\% = \frac{\text{grams of solute}}{\text{ml of solution}} \times 100\%$$

A 0.8% (w/v) saline solution has 0.8 g of NaCl in every 100 ml.

Generally, since the density of water solutions is about 1g/mL, w/v% is close to w/w%

$$\text{ppm} = \frac{\text{grams of solute}}{\text{grams of solution}} \times 1,000,000$$

A dilution problem:

- $C_1V_1=C_2V_2$
- the subscripts indicate time one and time 2
- How would you make 2.00L of a 0.800% NaCl solution from a 12.0% stock solution?