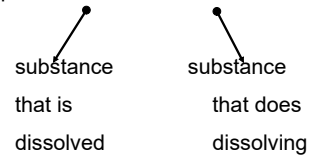


SOLUTIONS (Ch. 2)



What's a solution?

- homogeneous mixture
  - > components can't be distinguished
    - » only 1 phase is visible
  - > made up of a solute and a solvent



- > aqueous solution
  - » solvent is water

Solubility

- maximum amount of solute that can be dissolved in a given amount of solvent (ex. 18g/100ml)
- ↑ temperature = ↑ solubility of solids  
(\* ↑ space between molecules, therefore more "solid" can hide)

Concentration

- amount of solute in a given amount of solution (How strong a solution is.)



Diluted ← → Concentrated

- ways to change concentration
  - 1) \_\_\_ solute = \_\_\_ concentration
  - 2) \_\_\_ solvent = \_\_\_ concentration (ex. dilution)
  - 3) \_\_\_ solvent = \_\_\_ concentration (ex. evaporation)

$$\text{concentration} = \frac{\text{mass of solute}}{\text{volume of solution}}$$

- different ways of showing concentration
 

g/L	#g of solute in 1L of solution
% (m/v)	#g of solute in 100ml of solution
% (v/v)	# ml of solute in 100ml solution
% (m/m)	#g of solute in 100g of solution
ppm	#g of solute in 1 000 000g solution
mol/L	# mol solute in 1L of solution

Making a solution

- 1- calculate the mass of solute needed
- 2- mass solute (on electronic scale)
- 3- pour solute into a volumetric flask\*
  - \* (correct size/volume)
- 4- add water half-way up bulb of volumetric flask
- 5- swirl until solute is dissolved
- 6- fill flask with water up to line (check that bottom of meniscus is on the line)
- 7- mix



example: Solution "A"

How can you prepare 250 ml of a 3% solution.

Steps:

- 1- calculate the mass of solute needed
  
- 2- mass solute 7.5 g of solute.
- 3- pour solute into a 250 mL volumetric flask
- 4- add water half-way up bulb of volumetric flask
- 5- swirl until solute is dissolved
- 6- fill flask with water up to the 250 mL line
- 7- mix

Concentration Word Problems

a) g/L, g/100ml

- ex. 1 How much solute is required to make 500ml of a 6g/L solution?
- 
- ex. 2 How much solution will be made if 20g of solute are used to make a 5g/L solution?
- 
- ex. 3 What is the concentration of a solution in g/L if 200ml of the solution contains 30g of salt?

b) Mass percent (%)

\* remember 1g H<sub>2</sub>O = 1ml H<sub>2</sub>O

- ex. 1 200ml of a solution contains 30g of solute. What is the concentration of the solution in mass percent?
- 
- ex. 2 Calculate the volume of solution prepared if it is made up of 6g of solute and has a concentration of 5%.

## Order of Concentrations

1) Which is more concentrated?

a) 3% or 10g/L

b) 1% or 10ppm

c) 4% or 40mg/L

d) 20% , 2g/L or 200ppm

Solutions in the Environment : Contamination

- ppt, ppm

- how much is too much?

examples:

1) The water in a lake has been contaminated with a pollutant. A technician takes several 50 mL samples of the contaminated water. He concludes that the sample contains 3.75mg of contaminant. Calculate the concentration in ppm.

2) Three lakes have been contaminated with mercury. The lethal concentration of this pollutant is 0.02 mg/L. Lake # 1 is said to have a concentration of 5ppm. Lake # 2 a concentration of 25ppm and Lake #3 0.03g/L. Determine if the fish in each of the lakes are in danger. Justify.

3) A pond is contaminated with lead at a concentration of 2.5ppm. If the lethal concentration of lead is 0.04g/L, are the animals in the pond in danger of dying?