

# Solutions

**Solutions:** a homogeneous mixture of two or more substances where different phases (solids, liquids or gases) cannot be seen

- Made up of a solute and solvent.

Solute: gets dissolved in another substance

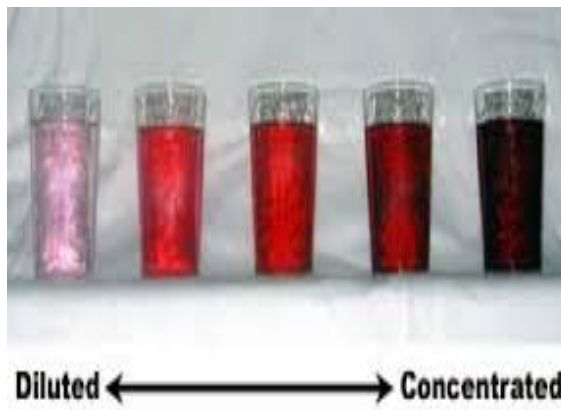
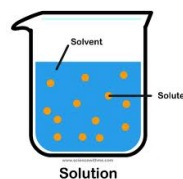
Solvent: substance that dissolves the solute.

**Solubility:** maximum amount of solute that can be dissolved in a given amount of solvent.

Concentration.mp4



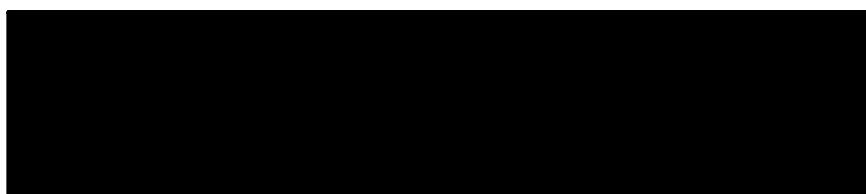
**Concentration:** is the proportion of solute/solvent in a solution



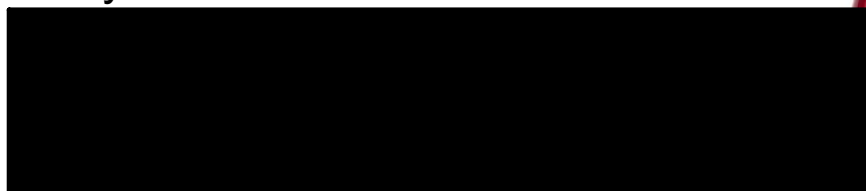
Solutes, solvents, solutions and scallywags.mp4



How can you make a drink more concentrated?



How can you make a drink more diluted?



## Formula to solve for concentrations

$$C = m/v \quad C = \text{concentration}$$

$m = \text{mass}$

$v = \text{volume of solution}$

### Conversions:

500 ml or 0.5 L

1- to go from L to ml you must  $\times 1\,000$

$$\text{ex: } 5\text{ L} = 5\,000\text{ ml} \quad 2.5\text{ L} = 2\,500\text{ mL}$$

$$1\text{ L} = 1000\text{ mL}$$



**to go from ml to L you must  $\div$  by 1000**

$$2\,500\text{ ml} = 2.5\text{ L}$$

2- to go from mg to g you must  $\div 1\,000$

$$\text{ex: } 5\text{ mg} = 0.005\text{ g} \quad 0.4\text{ mg} = 0.0004\text{ g}$$

**to go from g to mg you must  $\times$  by 1000**


$$5\text{ g} = 5000\text{ mg}$$

Concentration can be expressed as:

percentage %	PPM	g/L	mg/L (ppm)
g/ml x 100	g/ 1000000 ml  g/1000L  mg/L	g/l or g/ 1000ml	g/1000ml
Ex: $\frac{30g}{100ml} \times 100$ $= 30\%$	$\frac{50g}{1000000ml}$ $= 50ppm$  $\frac{50mg}{L}$ $= 50ppm$	$\frac{25g}{L}$  $\frac{25g}{1000 mL}$	$\frac{15mg}{L}$ <small><math>\div 1000</math> to put in g</small>  $\frac{0.015g}{1000 mL}$

When doing the math you are making the concentration proportional. How?

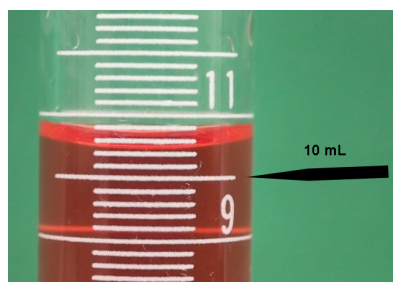
Travel Pictures


$$100 \text{ mL} \quad \frac{3}{10} \quad \frac{6}{20} \quad \frac{12}{40} = 0.3$$

$$\frac{3}{100 \text{ mL}} = \frac{x}{1000 \text{ mL}} \quad x = 30 \text{ g}$$



## Procedure to make a solution



1. Weigh ~~##~~ (mass) solute
2. Put solute in ~~##~~ (volume) volumetric flask)
3. Add some water and swirl
4. Add water to line
5. check meniscus

## REVIEW

always convert all units to g/ml

- $L = 1000\text{ml}$
- $\text{ppm} = 1\,000\,000\text{ ml}$
- $\% = \text{g/ml} \times 100$

For answers to solution problems  
refer to document call solution  
problems answers



## Past exam Questions

A lake is considered polluted if the concentration of mercury exceeds 8 ppm.

You take a sample of three different lakes to verify if any are polluted.

Results from samples takes from lakes

Lake	Mercury concentration
Lake 1	0.0005%
Lake 2	2.5 mg/L
Lake 3	0.085 g/L

Determine if any of the lakes have a lethal concentration of mercury.

## Attachments

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Concentration.mp4



Solutes\_\_solvents\_\_solutions\_and\_scallywags.mp4