

Concentration

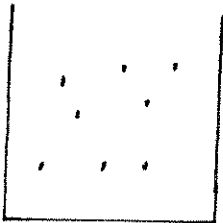
The terms **concentrated** and **dilute** are relative terms. Normally we say that something is more concentrated than something else. This means that the concentrated sample has more of the solute in it but really doesn't say how much is in it. For that we need a more quantitative term.



Conc.



Dilute



Conc.



Dilute



Conc.



Dilute

Concentration

Concentrated and diluted don't really give an idea of how much is in there.

Why need to know amount?

Breathalyzer

Swimming pools

Soil samples

Blood and urine

IV solutions

$$\text{Concentration} = \frac{\text{Quantity of solute}}{\text{Quantity of solution}}$$

% Concentration

1. V/V

Uses volumes (must be same units)

i. Vinegar

ii. Rubbing alcohol

5% v/v acetic acid means 5 mL in 100 mL

$$\text{v/v} = \frac{V_{\text{solute}}}{V_{\text{solution}}} \times 100$$

A solution of rubbing alcohol contains 140 mL pure propanol in 200 mL of solution. What is the concentration in v/v of propanol in the rubbing alcohol?

2. W/V

Mass (weight) of solute in a Volume of solution

$$\text{w/v} = \frac{W_{\text{solute}}}{V_{\text{solution}}} \times 100$$

An IV solution is made by mixing 2.8 g of salt into water to make 250 mL of solution. What is the w/v% of salt in the IV solution?

Parts per Million

-used for very dilute solution

le Dioxin -very toxic

-by product of pulp and paper mills

-human body is very sensitive

ppm = parts per million

= approximately 1 drop in a bath tub

$$\text{ppm} = \frac{\text{mg}_{\text{solute}}}{\text{L}_{\text{solution}}} \times 1,000,000$$

There is 1000mg in a g

ppb = parts per billion

= approx. 1 drop in a full size pool

$$\text{ppb} = \frac{\text{mg}_{\text{solute}}}{\text{L}} \times 1,000,000,000$$