

 <http://www.sciencegeek.net/Chemistry/taters/Unit6SolutionConcentration.htm>

# Solution Concentrations

Answer the following questions. Use the formula  $n = cV$ . Check your answers by using the web site shown above. All the following questions are found on this site

What is the concentration of a solution in grams/Litre when 80 grams of sodium chloride, NaCl, is dissolved in 2 litres of solution?

A solution of sodium hydroxide, NaOH, contains 12 grams of solute in 4 liters of solution. What is the concentration of the solution in grams/Liter?

Please note litres (Aus) = liters(US)

**Molarity** describes the concentration of a solution in moles of solute divided by liters of solution. Masses of solute must first be converted to moles using the molar mass of the solute. This is the most widely used unit for concentration when preparing solutions in chemistry and biology. The units of molarity, mol/L, are usually represented by a scripted capital “*M*”.

**Percent composition** is the ratio parts of solute to one hundred parts of solution and is expressed as a percent. Determine the mass of solute and solution and then divide the mass of the solute by the total mass of the solution. This number is then multiplied by 100 and expressed as a percent. In dilute water solutions, we can assume that 1 mL of water-based solution has a mass of 1 gram, so 1 liter of solution has a mass of 1000 grams.

3. A solution of sugar contains 35 grams of sucrose,  $C_{12}H_{22}O_{11}$  in 100 mL of solution. What is the concentration of the solution in grams/Liter?

4. What is the concentration of a solution in grams/Liter when 17 grams of potassium chloride, KCl, is dissolved in 500 mL of solution?

5. What is the molarity (moles per liter) of a solution in which 80 grams of sodium hydroxide, NaOH, is dissolved in 1 liter of solution?

6. Calculate the molarity of a solution of potassium fluoride, KF, in which 58 grams of the compound are dissolved in 4 liters of solution.

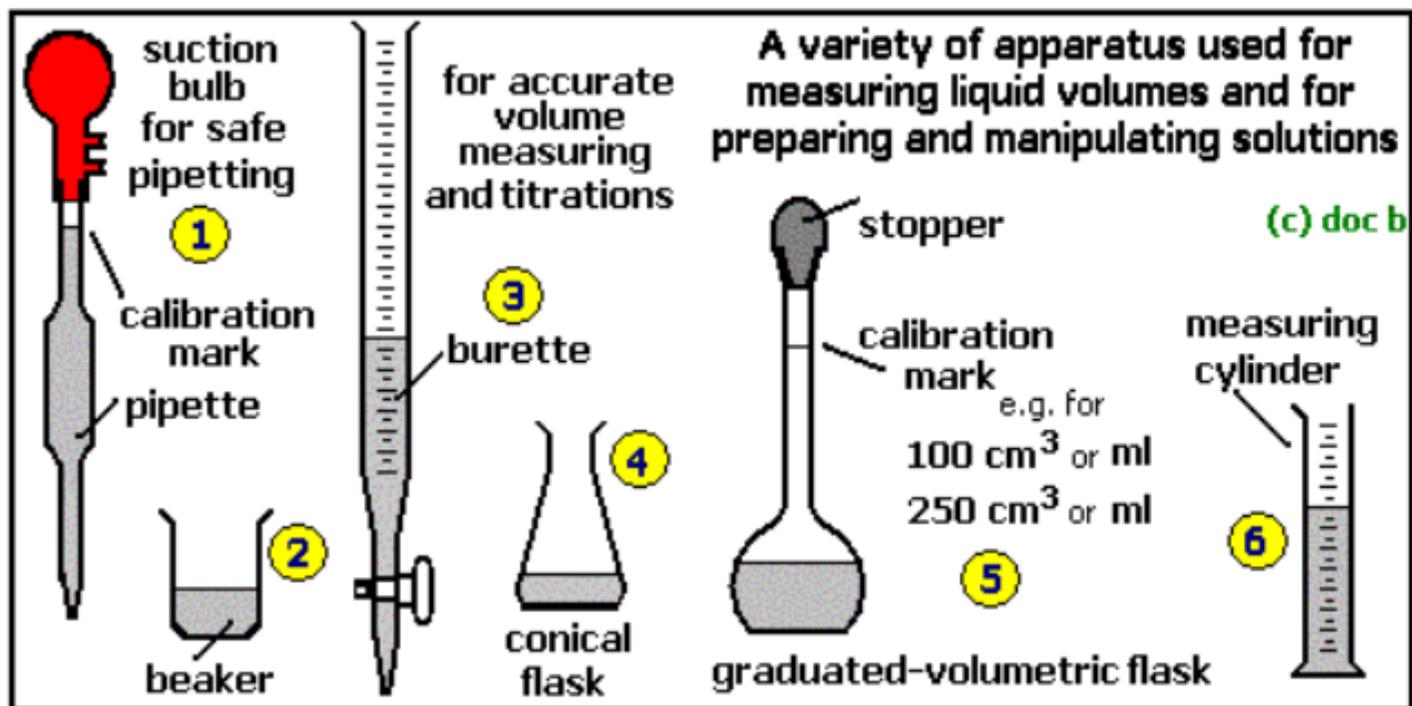
7. What is the molarity of a solution in which 51 grams of aluminum oxide,  $Al_2O_3$ , is dissolved in 500 mL of solution?

8. A solution with a volume of 0.25 liters contains 10 grams of hydrogen fluoride, HF. What is the molarity of the solution?
9. What is the percent composition of a solution in which 80 grams of sodium hydroxide, NaOH, is dissolved in 1 liter of solution?
10. A solution of sugar contains 35 grams of sucrose,  $C_{12}H_{22}O_{11}$  in 100 mL of solution. What is the percent composition of the solution?
11. What is the percent composition of a solution in which 50 grams of aluminum oxide,  $Al_2O_3$ , is dissolved in 500 mL of solution?
12. What is the percent composition of a solution in which 480 grams of sodium chloride, NaCl, is dissolved in 4 liters of solution.

**How well did you do? Check your answers here**

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[http://www.docbrown.info/page04/4\\_73calcs11msc.htm](http://www.docbrown.info/page04/4_73calcs11msc.htm)



<http://www.docbrown.info/page12/gifs/volumetricapparatus1.gif>



**Example 11.1**

- What mass of sodium hydroxide (NaOH) is needed to make up 500 cm<sup>3</sup> (0.5 dm<sup>3</sup>) of a 0.5M solution?  
[A<sub>r</sub>'s: Na = 23, O = 16, H = 1]
- 1 mole of NaOH = 23 + 16 + 1 = 40g
- for 1000 cm<sup>3</sup> (1 dm<sup>3</sup>) of 0.5M you would need 0.5 moles NaOH
- which is 0.5 × 40 = 20g
- however only 500 cm<sup>3</sup> of solution is needed compared to 1000 cm<sup>3</sup>
- so scaling down: **mass NaOH required** = 20 × 500/1000 = **10g**

WORK THROUGH THE QUESTIONS ON THE WEBSITE. THEY  
LOOK LIKE THIS

**Example 11.3**

- 5.95g of potassium bromide was dissolved in 400cm<sup>3</sup> of water. Calculate its molarity. [A<sub>r</sub>'s: K = 39, Br = 80]
- moles = mass / formula mass, (KBr = 39 + 80 = 119)
- mol KBr = 5.95/119 = 0.05 mol
- 400 cm<sup>3</sup> = 400/1000 = 0.4 dm<sup>3</sup>
- molarity = moles of solute / volume of solution
- **molarity of KBr solution** = 0.05/0.4 = **0.125M**

Try the online quiz..... UK GCSE level 4 type

 [http://www.docbrown.info/page04/4\\_73calcs/MSMcTEST.htm](http://www.docbrown.info/page04/4_73calcs/MSMcTEST.htm)