

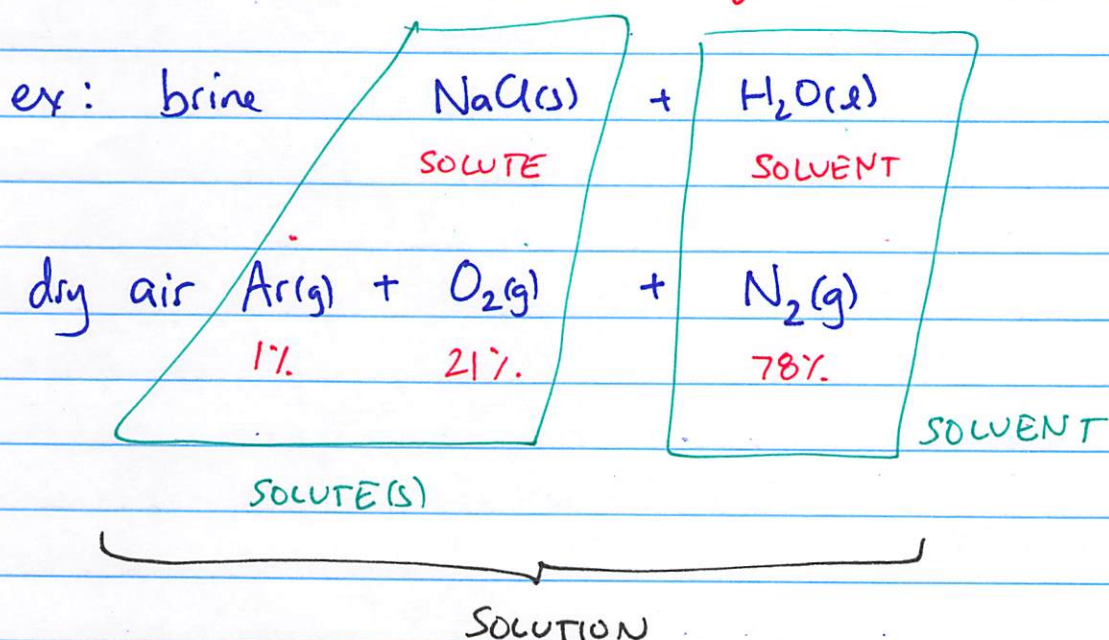
9/25/2019

Chapter 5 : Intro to solutions + aqueous reactions

(solⁿs) aq. rxn

Solⁿ: homogeneous mixture

solⁿ: solute(s) + solvent
smaller amount(s) largest amount



In our body, solvent is usually: water

AQUEOUS solⁿ is when solvent is water.
Brine: NaCl(aq)

Concentration terms?

DILUTE: low ratio of solute : solvent
CONCENTRATED: large " ————— "

Quantitative measure of conc.
(#)

$$\text{Molarity (M)} = \frac{\text{moles of solute}}{\text{liters of solution}}$$

or molar conc.

ex: 0.45 mol NaCl in 3000. mL of solution,
can calc. molarity: 3.000 L

$$\text{molarity} = \frac{0.45 \text{ mol NaCl}}{3.000 \text{ L}} = 0.15 \frac{\text{mol}}{\text{L}} \text{ NaCl}$$

$$M = \frac{\text{mol}}{\text{L}}$$

$$[\text{NaCl}] = 0.15 \text{ M NaCl}$$

$$[X] = \text{molar conc of } X$$

physiological saline
conc!

Molarity as a conversion factor!

ex: 0.15 M NaCl means: 0.15 mol NaCl = 1 L soln

ex: 0.822 M FeCl₃ means: 0.822 mol FeCl₃ = 1 L

ex: 18.0 M H₂SO₄ means: 18.0 mol H₂SO₄ = 1 L

can convert:

$$\text{mol} \leftrightarrow \text{L}$$

need to convert L → mol

ex: How many mol FeCl₃ are in 0.528 L of a 0.822 M soln?

$$0.528 \text{ L} \times \frac{0.822 \text{ mol FeCl}_3}{1 \text{ L}} = 0.434 \text{ mol FeCl}_3$$

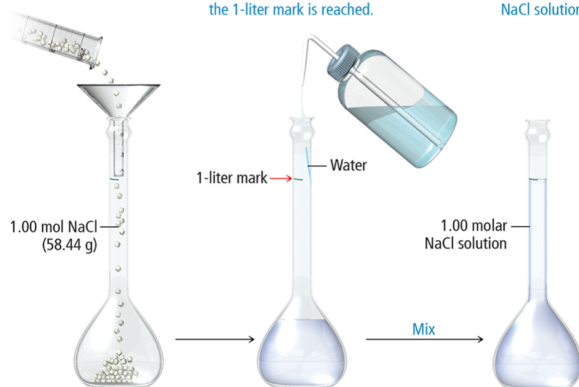
Preparing 1 L of a 1.00 M NaCl Solution

Preparing a Solution of Specified Concentration

Weigh out and add
1.00 mol of NaCl.

Add water until solid is dissolved.
Then add additional water until
the 1-liter mark is reached.

The result is a
1.00 molar
NaCl solution.



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Conceptual Connection 5.1 (2 of 2)

How many moles of solute are required to make 3.0 L of a 2.0 M solution?

- a. 2.0 mol solute
- b. 3.0 mol solute
- c. 4.0 mol solute
- d. 6.0 mol solute**



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? L

ex: What vol of 0.822M FeCl_3 contains 0.100 mol FeCl_3 ?

$$\text{mol} \rightarrow \text{L} \quad 0.100 \text{ mol } \cancel{\text{FeCl}_3} \times \frac{1 \text{ L}}{0.822 \text{ mol } \cancel{\text{FeCl}_3}} = 0.122 \text{ L}$$

or
122 mL

- 1 How many mol H_2SO_4 in 0.280 L of 18.0M H_2SO_4 ? 5.04 mol
- 2 " " " HCl " 0.199 L " 12.0M HCl? 2.39 mol
- 3 " " " HNO_3 " 0.344 L " 0.100M HNO_3 ? 0.0344 mol
- 4 What vol of 18.0M H_2SO_4 contains 0.210 mol H_2SO_4 ? 0.0117 L
- 5 " 12.0M HCl " 0.903 mol HCl? 0.0753 L
- 6 " 0.100M HNO_3 " 0.0892 mol HNO_3 ? 0.892 L

$$\textcircled{1} \quad 0.280 \text{ L} \times \frac{18.0 \text{ mol } \text{H}_2\text{SO}_4}{1 \text{ L}} = 5.04 \text{ mol } \text{H}_2\text{SO}_4$$

$$\textcircled{2} \quad 0.199 \text{ L} \times \frac{12.0 \text{ mol } \text{HCl}}{1 \text{ L}} = 2.39 \text{ mol } \text{HCl}$$

$$\textcircled{3} \quad 0.344 \text{ L} \times \frac{0.100 \text{ mol } \text{HNO}_3}{1 \text{ L}} = 0.0344 \text{ mol } \text{HNO}_3$$

$$\textcircled{4} \quad 0.210 \text{ mol } \text{H}_2\text{SO}_4 \times \frac{1 \text{ L}}{18.0 \text{ mol } \text{H}_2\text{SO}_4} = 0.0117 \text{ L} \quad \text{or } 11.7 \text{ mL}$$

$$\textcircled{5} \quad 0.903 \text{ mol } \text{HCl} \times \frac{1 \text{ L}}{12.0 \text{ mol } \text{HCl}} = 0.0753 \text{ L} \quad \text{or } 75.3 \text{ mL}$$

$$\textcircled{6} \quad 0.0892 \text{ mol } \text{HNO}_3 \times \frac{1 \text{ L}}{0.100 \text{ mol } \text{HNO}_3} = 0.892 \text{ L} \quad \text{or } 892 \text{ mL}$$