

More practice

- 55 g of CaCl_2 is dissolved in 115 g of water, what is the mass percent? What is the molarity if the final solution has a density of 1.1 g/mL?

$$\frac{55\text{g CaCl}_2}{170\text{g Solution}} \times 100 = 32\%$$

$$\frac{55\text{g CaCl}_2 / 110.98\text{g/mol}}{1.1\text{g/mL} \times 170\text{g} / 1.1\text{g/mL}} = \frac{.491\text{mol CaCl}_2}{.154\text{L}} = 3.2\text{M CaCl}_2$$

More

- Convert 1.9 M $\text{Ca}(\text{NO}_3)_2$ solution to mass percent, if the solution has a density 1.3 g/mL.

* Assume 1 L of solution

$$1.9\text{M Ca}(\text{NO}_3)_2 = \frac{n}{1\text{L}}$$

$$n = 1.9\text{mol Ca}(\text{NO}_3)_2$$

$$1.3\text{g/mL} \times 1000\text{mL} = 1300\text{g}$$

$$\frac{1.9\text{mol} \times 164.1\text{g/mol}}{1300\text{g}} \times 100 = 24\%$$

Parts per thousand/million etc.

- Mass percent could also be called parts per hundred (although it never is)
- Parts per thousand is the same as mass percent except instead of multiplying by a 100 you multiply by 1000.
- Parts per million is multiplied by 1,000,000
- Pollen counts are normally reported in this

Mole Fraction

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- Mole Fraction or molar fraction is represented by the Greek letter chi, χ
- $\chi = \text{mole solute} / \text{mole solution}$

Convert

- Convert a 2.3 M of water solution of aluminum nitrate $\text{Al}(\text{NO}_3)_3$ to mole fraction of aluminum nitrate if the density of the solution is 1.14 g/mL.

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- Convert a 2.3 M of water solution of aluminum nitrate $\text{Al}(\text{NO}_3)_3$ to mole fraction of aluminum nitrate if the density of the solution is 1.14 g/mL.
- 2.3 M = 2.3 mol $\text{Al}(\text{NO}_3)_3$ / 1 L solution
- 2.3 mol x 213.01 g / 1 mol = 489.923 g $\text{Al}(\text{NO}_3)_3$
- 1 L = 1000 mL x 1.14 g / 1 mL = 1140 g solution
- 1140 g - 489.923g = 650.077 g water
- 650.077 g x 1 mol / 18.016 g = 36.0833 mol
- $\chi = 2.3\text{ mol} / (2.3 + 36.0833)\text{ mol} = .060$

Another

- Convert a 1.4 M solution of strontium sulfate, SrSO_4 , in water to mole fraction if the density of the solution is 1.24 g/mL.

Another

- Convert a 1.4 M solution of strontium sulfate, SrSO_4 , in water to mole fraction if the density of the solution is 1.24 g/mL.
- 1.4 M = 1.4 mol SrSO_4 / 1 L solution
- 1.4 mol x 183.68 g / 1 mol = 257.152 g SrSO_4
- 1 L = 1000 mL x 1.24 g / 1 mL = 1240 g solution
- 1240 g - 257.152 g = 982.848 g water
- 982.848 g x 1 mol / 18.016 g = 54.554 mol
- $\chi = 1.4 \text{ mol} / (1.4 + 54.554) \text{ mol} = .025$

Other way

- Convert a mole fraction .032 of a K_2CO_3 solution in water to molarity if the density is 1.08 g/mL.

Other way

- Convert a mole fraction .032 of a K_2CO_3 solution in water to molarity if the density is 1.08 g/mL.
- 0.032 K_2CO_3 = .032 mol / 1 mol solution
- Mol H_2O = 1.00 - .032 = .968 mol
- .032 mol K_2CO_3 x 138.21 g/mol = 4.422 g
- .968 mol H_2O x 18.016 g/mol = 17.439 g
- Total solution = 17.439 + 4.422 = 21.86 g
- 1.08 g/mL = 21.86 g / V, V = 20.24 mL
- M = .032 / .02024 = 1.6 M K_2CO_3