Molarity

Dilution Problem 1

Using the Virtual Laboratory, prepare a 0.025M solution of Glucose by diluting the 1M Glucose solution located in the stockroom. Please tell us which solutions you mixed together, and the amount of each.

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Dilution Problem

Preparing a stock solution

You are a workstudy for the chemistry department. Your supervisor has just asked you to prepare 500mL of 3M HCl for tomorrow's undergraduate experiment. In the stockroom explorer, you will find a cabinet called "Stock Solutions". Open this cabinet to find a 2.5L bottle labeled "11.6M HCl". The concentration of the HCl is 11.6M. Please prepare a flask containing 500 ml of a 3 M (+/- 0.005M) solution and relabel it with its precise molarity. Note that you must use realistic transfer mode, a buret, and a volumetric flask for this problem.

Please do any relevant calculations on the paper supplied. As a reminder, to calculate the volume needed to make a solution of a given molarity, you may use the following formula:

$$C_1V_1 = C_2V_2$$

c [mol/L]，***v*** [mL] 中の，溶質の物質量

$$c\ [\mathrm{mol/L}] \times \frac{v}{1000}\ [\mathrm{L}] = \frac{cv}{1000}\ [\mathrm{mol}]$$

重要

まとめ４２より

<u>11.6 M HCl</u>

$C_1 = 11.6$ M　　V_1 (mL)

<u>3 M HCl</u>

$C_2 = 3$ M　　V2 = 500 mL

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Sucrose Problem

Molarity, molality, mass percent, mole fraction? Understanding concentrations.

Aqueous solutions of sucrose are important in many different food products. In this activity, you will prepare solutions with specific concentrations of sucrose. You will also design experiments to measure the concentration of sucrose.

- The Coca-Cola Company long ago decided not to patent its formula, but instead protected the recipe as a "trade secret" so no one else could copy it. While writing a book about the company entitled "For God, Country, and Coca-Cola," Mark Pendergrast believed he came across the formula (called Formula X) and published it. It contains 30 lbs of sugar in 25 gallons of water. Prepare this solution in the Virtual Lab and calculate its sucrose concentration in mass percent, molarity, molality and mole fraction.
- The virtual lab stockroom contains a sample of a 'Generic Brand Cola'. Design and perform experiments to determine the sucrose concentration. Give you answer in mass percent, molarity, molality and mole fraction. [Hint: compare the density of your "Formula X" solution with that of pure water.]
- Does the generic brand have more or less sugar than 'Formula X'?

1 lb = 0.453592 kg = 453.592 g 1 gallon = 3.78541 L

$$\frac{30\ \text{lbs}}{25\ \text{gallons}} = \frac{30\times 453.592\ \text{g}}{25\times 3.78541\ \text{L}} = \frac{13607.76\ \text{g}}{94.63525\ \text{L}} = \frac{13.60776\ \text{g}}{94.63525\ \text{mL}}$$

C = 12.011 H = 1.0079 O = 15.999

$$\frac{13.6}{13.6 + 94.6} \times 100$$

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Solution Concentrations

Making salt solutions at different concentration

For the following problems, calculate the mass of solid needed to make the solution, and then prepare the solutions in the Virtual Lab. Use the solution viewer to verify that the solutions you created have the target concentrations. Explain the steps you took in making each solution and in verifying that it has the correct concentration.

1). 100 ml of solution that is 1.0 M in sodium cation, using sodium chloride.

2). 100 ml of a solution that is 0.7 M in chloride anion, using magnesium chloride.

3). 250 ml of a solution that is 0.34 M in sodium cation, using sodium sulfate decahydrate.

4). 500 ml of a solution that is 0.25 m in sulfate anion, using sodium sulfate decahydrate.

O = 15.999 , Na = 22.99 , Mg = 24.305 , S = 32.066 , Cl = 35.453

sodium chloride	NaCl	塩化ナトリウム
magnesium chloride	$MgCl_2$	塩化マグネシウム
sodium sulfate decahydrate	$Na_2SO_4 10H_2O$	硫酸ナトリウム10水和物

solution 溶液,　concentration 濃度,　cation 陽イオン.　anion 陰イオン

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Identify a liquid from its density.

You work for a company that has many different research groups, and your group has just developed a new food preservative which has been named "Compund A"

Another group in your company has developed a new neurotoxin, which they have unfortunately also called "Compound A"

An intern was reorganizing the chemical storage stockroom, and placed all the bottles labeled "Compound A" on the same shelf.

You would like to begin testing the new food preservative, but don't know which bottle contains the food preservative and which contains the neurotoxin. It would clearly not be a good idea to put neurotoxin into your food products. You have asked a theoretical chemist what to do, and he said that the preservative will have a higher density.

Design an experiment to determine which bottle of "Compound A" contains the food preservative.

(Note, the solution viewers and precise transfer mode have been disabled for this activity, you may find a volumetric flask useful in performing this experiment.)

$$\text{density (g/cm}^3\text{)} = \frac{\text{mass (g)}}{\text{volume (cm}^3\text{)}}$$

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