WODSS SCIENCE Name: ____________________

SCH 3UI Date: ________________

PREPARING SOLUTIONS

Standard Solution (Stock Solution): Solution in which the precise __________________ is known. There are two methods of preparing standard solutions:

1. From a solid
2. By dilution

1. FROM A PURE SOLID:

Example: Calculate the mass of copper (II) sulfate pentahydrate required to prepare 100.0 mL of a 0.5000 mol/L solution.

1. Determine the number of moles of $CuSO_4 \cdot 5H_2O$ in the solution.

2. Convert moles to grams.

3. Accurately weigh the number of grams and dilute in a volumetric flask.

EXAMPLES:

1. What mass of sodium hydroxide is required to prepare 500 mL of a 10.0 mol/L cleaning solution? (2.00 X 10^2 g)
2. Calculate the mass of potassium permanganate required to prepare 500.0 mL of a 0.0750 mol/L solution. (5.93 g)
3. Calculate the mass of cobalt (II) chloride dihydrate required to prepare 2.00 L of a 0.100 M solution. (33.2 g)
4. What mass of barium nitrate is needed to create 100 mL of a 0.125 M solution? (3.27 g)
5. What mass of ammonium oxalate monohydrate is required to prepare 100.0 mL of a 0.250 M solution? (3.55 g)

LAB: Kool–Aid Madness

Part 1: Making a Standard Solution from a Solid

Intro: Creating and diluting solutions requires careful practice and precise techniques. Today, your job is to create a 50 mL, 0.1 M solution of Kool-Aid using perfect technique.

Important Info:

Kool-Aid's main ingredient is sugar, a solid at room temperature:

Molecular formula: $C_{12}H_{22}O_{11}$

M (molar mass) of $_{\text{Kool-Aid}}$=

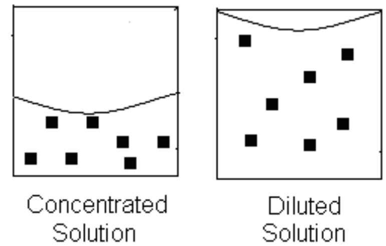
$n_{\text{Kool-Aid}}$ =

$\text{Molarity}_{\text{Kool-Aid}}$ =

2. DILUTIONS

A concentrated solution can be made more dilute by mixing the concentrated solution with solvent.

In dilutions the amount of solvent is increased, but the amount of solute is kept constant. This means that the original number of moles of solute and the final number of moles of solute are the same. The result is a decreased concentration, but an increased volume.



Same number of moles of solute in each.

Therefore we can develop this formula:

Where:

c_c = conc. of conc. solution (mol/L) c_d = conc. of dilute solution (mol/L)

v_c = vol. of concentrated solution (L) v_d = vol. of dilute solution (L)

This formula can be rearranged to solve for anyone of these variables.

Examples

6. How much 2.0 M NaCl solution would you need to make 250 mL of 0.15 M NaCl solution? (19 mL)
7. What would be the concentration of a solution made by diluting 45.0 mL of 4.2 M KOH to 250 mL? (0.76 M)
8. What would be the concentration of a solution made by adding 250 mL of water to 45.0 mL of 4.2 M KOH? (0.64 M)
9. How much 0.20 M glucose solution can be made from 50 mL of 0.50 M glucose solution? (125 mL)

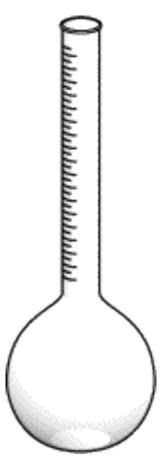
LAB: Kool–Aid Madness

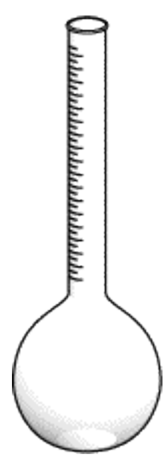
Part 2: Making a Solution by Diluting

Often times in Chemistry we do not need concentrated solutions. In order to prepare solutions that are adequately diluted, we dilute those solutions by adding more water to a small amount of the concentrated solution.

Determine the "diluted" concentration of the solution by pipetting 10 mL of the concentrated solution (from part 1) and placing it in a new 50 mL volumetric flask. Top it up with deionized water.

prepared solution from Part 1 | pipette 10 mL | 10 mL of concentrated + deionized water to 50 mL mark





V_{dilute}=

$C_{concentrated}$=

$V_{concentrated}$=

C_{dilute}= ?