**Solutions**

Def: Homogeneous mixtures of 2 substances. **Aqueous solutions ⇒ solvent is water**



Solute (solid, gets dissolved) + Solvent (liquid, does the dissolving) = Solution (combined Solute and Solvent)

Concentration: The amount of solute dissolved in a given amount of solution. Can be expressed in g/L, %, ppm. To calculate conc. we always look at : ***solute***

How can you make a drink more concentrated? Dissolution (increasing conc. by adding solute)

Make your soup saltier (add more broth)

How can you make a drink more diluted? Dilution (decreases conc. by adding solvent)

Make your soup less salty (add more water)

Formula to solve for solution:

C = concentration

m = mass

v = volume

C=m/v (triangle!) C (solute + solvent) m (solute) v (solvent)

 C= m/v m= (C)(v) v= m/C

\*ALWAYS USE PENCIL!!!!\*

**Conversions: 1- to go from L to ml you must x 1 000**

 ex: 5 L = 5 000 ml 2.5 L = 2 500 mL

 **2- to go from mg to g you must ÷ 1 000** ex: 5 mg = 0.005 g 0.4 mg = 0.0004 g

Steps to complete concentration problems:

1. Use pencil

2. Write the equation or your triangle

3. Insert the known variables

4. Check your UNITS

5. Solve for unknown (box final answer)

**Units used**

|  |  |  |  |
| --- | --- | --- | --- |
| **g/L** | **ppm** | **%** | **mg/L** |
| 1g/1000mL | 1g/1000000mL | 1g/100mL | 0.001g/1000mL |

When doing the math you are making the concentration proportional. How?

**Procedure used in a lab to make a solution**

1. Weigh \_\_\_\_ grams of solute *(depends on the amount needed in lab)*
2. Place \_\_\_\_ grams of solute into \_\_\_\_ mL beaker/flask *(depends on equipment used and amount needed)*
3. Add a little water and swirl *(do not need specific amount here)*
4. Add solvent to true mL measurement line *(since you added a little water in step 3, must add the rest to achieve proper volume)*
5. Check meniscus

**Solution problems** (see PDF)

1. You have a 7 g/L and you want to use 150 g, what is the new solution?
2. You have a 15 g/200 mL solution, how much solute is needed if you use 450 mL?
3. Convert the following to percent concentration.

|  |  |  |  |
| --- | --- | --- | --- |
| 150 g/L | 25 ppm | 37 g/400 mL | 14 mg/L |
|  |  |  |  |

1. Convert the following to g/L.

|  |  |  |  |
| --- | --- | --- | --- |
| 12% | 28 ppm | 30 g/500 mL | 24 mg/L |
|  |  |  |  |

1. Convert the following to ppm.

|  |  |  |  |
| --- | --- | --- | --- |
| 25% | 18 g/L | 30 g/700 mL | 0.5 mg/L |
|  |  |  |  |

1. Determine the order of least to most concentrated for the following solutions.

|  |  |  |  |
| --- | --- | --- | --- |
| 0.4 % | 10 g/L | 35 ppm | 15 mg/L |
|  |  |  |  |

1. You have a 15 g/L solution; explain the process of making the solution in percent concentration.
2. You are making Kool-aid, you add 12 g of powder to 450 mL of water. What is the concentration in ppm of your drink?
3. What is the difference between 15% concentration and a 20% concentration?
4. If blue algae in a lake reaches 7 ppm the water is considered dangerous to swim in and the lake must be closed. You test the water for the contaminant and find the algae concentration is at 0.003 mg/l. Is the water contaminated?
5. You have 2 types of soil. Soil A has a mercury concentration os 0.03 ppm and soil B has a concentration of 1.6 mg/L. If the lethal concentration of mercury is 0.0005 g/L determine if either soil is contaminated.
6. Two lakes are being tested for different pollutants that can harm aquatic life. Below shows the pollutants with their lethal doses.

Lethal doses for pollutants

|  |  |
| --- | --- |
| Pollutant 1 | 20 ppm |
| Pollutant 2 | 0.4 ppm |
| Pollutant 3 | 0.9 ppm |

The table below shows the results of sample water taken from the four lakes and each pollutant.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pollutant 1 | Pollutant 2 | Pollutant 3 |
| Lake 1 | .015 g/L | 0.006 % | 18 mg/L |
| Lake 2 | 0.15 g/L | 0.00003 % | 1.6 mg/L |

Determine if either lake has any pollutants in it.