Calculating Liquid Chemical Dilutions

Important Note: All warnings, cautions and recommendations listed by the manufacturers/OSHA should be complied with when working with chemicals.

Example No. 1 - Dry Powder-weight Dilutions

Assume desired concentration of citric acid solution is 15 percent (%). Concentration of stock dry powder citric acid is 100 %. Total amount of 15 % solution desired is approximately 1000 milliters (ml) *

- 1 ml of purified water weighs 1 gram.

- 15 percent of the 1000 ml solution must be citric acid.

- 15% (0.15) x 1000 = 150 ml (or 150 g) of the solution must be citric acid and the remainder is 1000 - 150 = 850 ml of purified water (add 850 ml of water to 150 g of powder).

- to check your calculations: 150 ml (grams) / 1000 ml total x 100 = 15 % solution

$$\frac{150 \text{ ml (grams)}}{1000 \text{ ml total}} \times 100 = 15\ \%\ \text{solution}$$

*** Important Note**
Total liquid volume of a diluted and mixed solution will depend on the specific gravity of the chemical powder you choose. Specific gravity for different dry powder chemicals may not be the same. For RPC citric acid powder the actual total volume of the example to the left is 940 mL. For more information on citric acid dilution, ask for filename "dilution.pdf".

Example No. 2 - Stock Solution at 100 % Concentration

Assume desired concentration of Flocide 375 peracetic acid solution is one percent (1 %).
Concentration of stock solution is 100 % Flocide 375. Total amount of 1 % solution desired is 5 gallons.

- 5 gallons is equal to 640 fluid ounces (fl.oz).

- 1 % of the 640 fl.oz solution must be stock Flocide 375.

- 1 % (0.01) x 640 = 6.4 fl.oz of the solution must be Flocide 375 and the remainder is 640 - 6.4 = 633.6 fl.oz of purified water (add 633.6 fl.oz of water to 6.4 fl.oz of 100 % Flocide 375).

- to check your calculations:

$$\frac{6.4 \text{ fl.oz}}{640 \text{ fl.oz (5 gal)}} \times 100 = 1\ \%\ \text{solution}$$

- to convert fl. oz to ml or liters (l) refer to conversion chart on reverse side, 6.4 fl.oz = 189 ml, 633.6 fl.oz = 18.74 liters

Compliments of RPC/Rabrenco Scientific 1-800-647-3873

Example No. 3 - Stock Solution Not At 100 % Concentration

Assume desired concentration of hydrogen peroxide is 0.5 percent.
Concentration of stock solution is 3 percent.
Total amount of 0.5 percent solution desired is 1000 ml.

- 0.5 is what percent of 3? Or: 0.5/3 = 0.167 (16.7%)

- 16.7 percent of the 1000 ml solution must be 3% stock solution to make 1000 ml of 0.5 percent solution.

- 16.7 % (.167) x 1000 = 167ml of 3 % solution and the remainder is 1000 - 167 = 833ml of purified water.

- to check your calculations: $\dfrac{\text{167ml x .03 (3\%)}}{\text{1000ml total}}$ x 100 = 0.5% solution

Example No. 4 - Converting PPM to Percent Concentration

Assume 500 part per million (ppm) sodium hypochlorite solution is to be mixed from bleach solution (5.25 % sodium hypochlorite). Desired amount of solution is 1000 ml.

- 1 million/1million = 100% therefore bleach which is 5.25% sodium hypochlorite is 5.25% (0.0525) x 1 million ppm's of sodium hypochlorite. A 500 ppm solution would be 500/1 million = 0.0005 or 0.05 percent sodium hypochlorite.

- 0.0525 x 1 million = 52,500 ppm of sodium hypochlorite in bleach.

- 500 ppm is what percent of 52,500? Or: 500/52500 = 0.00952 (0.952 %)

- 0.952% of the 1000 ml solution must be stock bleach solution to make 1000 ml of a 500 ppm sodium hypochlorite solution.

- 0.952% (0.00952) x 1000 = 9.52 ml of bleach and the remainder 1000 - 9.52 = 990.48 of purified water.

- to check your calculations: $\dfrac{\text{9.52 ml x 0.0525 (5.25\%)}}{\text{1000 ml total}}$ x 100 =0.05% solution

<u>Measurement Unit Conversion Chart</u>

- 1 milliliter of purified water weighs 1 gram
- 1 pound (lb) = 453.6 grams
- 1 fluid ounce (fl.oz) = 29.57 milliliters (ml)
- 1 gallon (gal) = 128 fluid ounces = 3785 ml = 3.785 liters (l)
- 1 milliliter (ml) = 0.0338 fluid ounces (fl.oz)
- 1 liter (l) = 0.2642 gallons (gal)