# Concentration worksheet

1. How much solute is found in each solution?
   A) 15g/L  B) 10g/300mL  C) 15%  D) 25%

   15g  10g  15g  25g

2. You have a 15g/L solution, you want to make a 350 mL solution. How much solute will you need?

   $\frac{15}{1000} = \frac{x}{350} =$ 5.25g

3. You have 13 mg/L of saltwater. What is the concentration in ppm?

   $\frac{13\text{mg}}{\text{L}} = \frac{0.013\text{g}}{1000} = \frac{x}{1\,000\,000} =$ 13 ppm

4. Put the following concentrations in order from weakest to strongest.
   A) 7.5%  B) 33 g/L  C) 11 g/ 200 mL  D) 0.003 ppm

   7.5%  $\frac{33}{1000} = \frac{x}{100}$  $\frac{11}{200} = \frac{x}{100}$  $\frac{.003}{1000000} = \frac{x}{100}$

   D → B → C → A  3.3%  5.5%  0.0000003%

5. You have a 0.6 mg/L solution. What will the concentration be in ppm and %?

   $\frac{0.006}{1000} = \frac{x}{1\,000\,000} =$ 0.6ppm  $\frac{.006}{1000} = \frac{x}{100} =$ 0.00006%

6. You have a 25 g/L solution. You want to make a 400 mL solution. Solve and explain the process of making the solution.

   $\frac{25}{1000} = \frac{x}{400} =$ 10g

   1. Weigh 10g of solute
   2. Put 10g in 400mL volumetric flask.
   3. Add water & swirl
   4. Add water to line
   5. Check mixing

7. Convert the following units to ppm
   a) 8.75 %  b) 19 g/L  c) 6 mg/L

   $\frac{8.75}{100} = \frac{x}{1\,000\,000}$  $\frac{19}{1000} = \frac{x}{1\,000\,000}$  = 6ppm

   87 500ppm  19 000ppm

8. Convert the following units to %

a) 425 g/L

$\frac{425g}{1000} = \frac{x}{100} = 42.5\%$

b) 225 ppm

$\frac{225}{1000000} = \frac{x}{100} = 0.0225\%$

c) 10 mg/L ÷1000

$\frac{.01g}{1000} = \frac{x}{100} = .001\%$

9. Convert the following units to g/L

a) 63%

$\frac{63}{100} = \frac{x}{1000} = 630g$

b) 1576 ppm

$\frac{1576}{1000000} = \frac{x}{1000} = 1.576g$

c) 1.5 mg/L ÷1000

$\frac{0.0015g}{L}$

10. Rank the following in increasing order of concentration:

a) 14%

14%

b) 32 g/L

$\frac{32}{1000} = \frac{x}{100} = 3.2\%$

c) 1 200 ppm

$\frac{1200}{1000000} = \frac{x}{100} = 0.12\%$

C → B → A

11. You are making yourself a glass of chocolate milk and you decide to add 4 g of powder to 250 ml of milk. What is the concentration of your chocolate milk in g/L, % and ppm?

$\frac{4}{250} = \frac{x}{1000} = 16g$

$\frac{4}{250} = \frac{x}{100} = 1.6\%$

$\frac{4}{250} = \frac{x}{1000000} = 16000 ppm$

12. The label on a bottle of water says that the water contains 45 ppm of sodium.

A- What does this mean?

You dissolved 45g of Na in 1000000mL of water.

B- What is the concentration of sodium in g/L?

$\frac{45}{1000000} = \frac{x}{1000} = 0.045g$

13. You have 2 different types of vinegar. One is a 4% concentration the other is a 5% concentration. The 4% is cheaper than the 5% concentration. Explain if there is a difference between the 2 and if the 5% one is charging extra for nothing.

4% has 1% less solute ∴ less concentrated

5% has 1% more " ∴ more "

14. Janine has a sheepdog with big droopy ears. The veterinarian advised her to clean her dog's ears regularly. She noticed that the solution she uses contains 0.15% m/v salicylic acid, which is one of the main ingredients in aspirin. What is the equivalent concentration in ppm?

$\frac{0.15}{100} = \frac{x}{1\,000\,000}$ = 1500 ppm

15. The water in a lake is contaminated. To determine the concentration of the contaminant, a technician takes a 50-mL sample of the water. After several tests, he concludes that the sample contains 3.75 mg of contaminant. Calculate the concentration of the contaminant, in ppm.

$\frac{0.00375\,g}{50\,mL} = \frac{x}{1\,000\,000}$ = 75 ppm

16. Chlorine is sometimes used in a city's water filtration system to kill micro-organisms. To ensure fish in an aquarium are not affected by the chlorine, tap water could be left sitting for 24 hours to allow the chlorine to evaporate. The lethal dose of chlorine for most goldfish is 0.05 mg/L. Most water filtration systems use 45.5 ppm to kill micro-organisms. Do you need to let the water sit for 24 hours so the chlorine could evaporate?

0.05 mg/L = 0.05% ppm = Lethal dose

Using 45.5 ppm. Yes you need to let sit out.

17. The nearby ocean is being tested for two dangerous substances.
Lethal concentrations and sample

| | Lethal concentration | Sample taken |
|---|---|---|
| Contaminant 1 | 0.004 mg/L | 0.003 ppm |
| Contaminant 2 | 0.04 g/L | 0.2 ppm |

Determine if the water is contaminated by each dangerous substance.

Lethal

.004 ppm .003 sample = ok

$\frac{.04}{1000} = \frac{x}{1000000}$ = 40 ppm .2 sample = ok

18. City regulations state that municipal pools must be closed when the concentration of chlorine in the water is less than 0.3 ppm or greater than 5 ppm. The table below lists the concentration of chlorine in water samples taken from four swimming pools.

Pool 1 + 4 must close

Table 1- Chlorine results

| | Pool 1 | Pool 2 | Pool 3 | Pool 4 |
|---|---|---|---|---|
| Concentration | 0.00002 % | 0.0004% | 0.0004 g/L | 0.0058 g/L |

good bt .3-5

Determine which pools need to be closed because they do not conform to the regulations.

**Pool 1**

$\frac{.00002}{100} = \frac{x}{1000000}$

.2 ppm

bad, too low

**Pool 2**

$\frac{.004}{100} = \frac{x}{1000000}$

4 ppm

GOOD

**Pool 3**

$\frac{.0004}{1000} = \frac{x}{1000000}$

.4 ppm

Good

**Pool 4**

$\frac{.0058}{1000} = \frac{x}{1000000}$

5.8 ppm

Too high

19. You want to verify the soil around different areas of a national park to determine the quantity of contaminants. The table below shows the maximum amount of contaminant the soil can hold before it becomes dangerous to the plants growing in the park.

**Table1: Lethal concentration of different forms of nitrogen**

| Form of nitrogen | Molecular formula | Lethal concentration |
|---|---|---|
| Mercury | Hg | 0.02 mg/L |
| Lead | Pb | 0.04 g/L |

Lethal = .02 ppm

Lethal = 40 ppm

You test the soil for the quantity of mercury and lead at three different places in the park. The table below shoes the results that were found.

$\frac{.04}{1000} \quad \frac{x}{1000000}$

**Table2: Results contaminants**

bad ↑than 0.002

bad ↑than 0.002

| | Test area 1 | Test area 2 | Test area 3 |
|---|---|---|---|
| Mercury | 0 ppm ok | 45 ppm | 0.03 g/L |
| Lead | 0.15 ppm ✓ | 2.5 ppm ✓ | 0.006 mg/L .006ppm ✓ |

Determine for each sample area whether there is too much lead or mercury.

$\frac{.03}{1000} = \frac{x}{100000}$ = 30 ppm