

Science & Technology 404
Worksheet # 2 - ppm

The concentration of a solution can be measured using different units such as g/l (grams per liter), % (percent) and ppm (parts per million).

Each set of units can be used to describe the exact same solution, but in a slightly different way.

- A solution with a concentration of 1 g/L has 1 g of solute dissolved in every 1000 ml (or 1 L) of solution.
- A solution with a concentration of 1% has 1 g of solute dissolved in every 100 ml of solution.
- A solution with a concentration of 1 ppm has 1 g of solute dissolved in every 1 000 000 ml of solution.

1. Fill out the table below:

Solution #	Concentration in g/l	Concentration in %	Concentration in ppm
1	2 g/L		
2		10%	
3			47 ppm
4		26%	
5	18 g/L		
6			1 ppm

2. You dissolved 2.50 grams of solute in 3 500 000 ml of water.
- a. What is the concentration of this solution in ppm?

 - b. What is the concentration of this solution in g/L?
3. In Science class, you dissolved 0.00401 g of salt into 675 000 ml of water.
- a. What is the concentration of this solution in ppm?

 - b. What is the concentration of this solution in g/L?
4. You are given 3 different 100 mL solutions. Solution A has a concentration of 6%, Solution B has a concentration of 58 g/L, and Solution C has a concentration of 57 418 ppm. Which solution contains the most solute?

5. A salt solution has a volume of 150 ml and a concentration of 27 ppm. How much solute does the solution contain?

6. The following table lists the concentration of gases in the atmosphere. Convert the percent concentrations to ppm.

Gases in the Atmosphere	%	ppm
Nitrogen	78%	
Oxygen	19%	
Water Vapour	0.4%	
Carbon Dioxide	0.035%	
N ₂ O	0.00003%	
CFCs	0.000005%	
Hydrogen	0.00005%	
Ozone	0.000001%	

7. Global atmospheric carbon dioxide levels have been on the rise fairly consistently over the past century, as shown in the table below:

Year	Carbon Dioxide Level (ppm)
1900	295.8
1950	310.7
1975	330.3
2000	369.62
2008	385.54
2010	389.69

a. In an average breath, a human breathes in about 500 ml of air. How many g of carbon dioxide would be breathed in per breath in 1900?

b. In 1975?

c. In 2010?

8. Why have global atmospheric carbon dioxide levels been increasing?

9. Why is this phenomenon a problem?

10. What can be done about it?

11. A lab technician left a plant in a completely sealed aquarium overnight for an experiment on photosynthesis and cellular respiration. The lab technician left the lab at 8 PM and programmed the lights to turn off at midnight. When she left, the concentration of carbon dioxide in the aquarium was exactly 350 ppm. Her equipment was set up to take samples of the air in the aquarium every 2 hours for 8 hours. Unfortunately, the computer system crashed and mixed up the times on some of the samples.

Your task is to calculate the carbon dioxide concentration of each sample (in ppm) and then decide which sample goes with what time during the night (10 PM, midnight, 6 AM).

Sample	Mass of CO ₂	Volume of Air Sample	Calculations	Concentration in ppm	Time
A	0.066 g	200 ml			
B	0.0945 g	300 ml			
C	0.09 g	250 ml			