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This presentation is used with  
Lesson Plan 18: Concentration  
and Unit Conversions in the  
Drinking Water Quality Testing  
Trainer Manual.

Available at  
[www.cawst.org/resources](http://www.cawst.org/resources)

# Concentration and Unit Conversions



# Learning Expectations

1. Explain concentration and units.
2. Calculate unit conversions for different concentrations.

# Concentration and Units

- **Concentration** = amount of a component (or chemical) per volume of water, stated in units
- **Units** = standards of measurement
  - e.g., milligrams, litres
- Without units test values are meaningless
  - e.g., Colony Forming Units/100 mL tell us the number of bacteria in a 100 millilitre volume of water

# Parts Per Million (ppm)

- 1 ink drop in 200 L barrel of water = ink **concentration** of **1 ppm**
- 1 ppm = 1 mg/L
- ppm or mg/L on a lab report means the same thing



# Parts Per Billion (ppb)

- 1 ink drop in tanker truck used to haul gasoline = ink **concentration** of 1 **ppb**
- 1 ppb = 1  $\mu\text{g/L}$
- ppb or  $\mu\text{g/L}$  on a lab report means the same thing



# Unit Conversions Chart

$$1 \text{ ppm} = 1 \text{ mg/L}$$

$$1 \text{ ppb} = 1 \text{ } \mu\text{g/L}$$

$$1 \text{ mg/L} = 1000 \text{ } \mu\text{g/L}$$

$$1 \text{ ppm} = 1000 \text{ ppb}$$

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To convert ppb to ppm divide by 1000

To convert  $\mu\text{g/L}$  to mg/L divide by 1000

To convert ppm to ppb multiply by 1000

To convert mg/L to  $\mu\text{g/L}$  multiply by 1000



# Unit Conversion Activity

1. Convert: 0.01 ppm into ppb

Answer: 10 ppb

2. Convert: 20  $\mu\text{g/L}$  into  $\text{mg/L}$

Answer: 0.02  $\text{mg/L}$

# Unit Conversion Activity

3. The WHO Guideline for Drinking Water is  $<0.01$  mg/L for arsenic.
- You are the project manager for an NGO that has implemented a borehole drilling project.
  - Water quality testing was done on 1 borehole and the lab report states that the arsenic concentration is 8 ppb.
  - Is the water within the WHO Guideline?

Answer: Yes, the results are equal to 0.008 ppm or 0.008 mg/L and are within the WHO Guideline.

# Review

## True or False

1. Is 1 part per million larger than 1 part per billion?

*True (= 0.000001 is bigger than 0.000000001)*

2. 1 ppb = 1 mg/L

*False (1 ppb = 1  $\mu$ g/L)*

3. 1  $\mu$ g/L = 1 ppb

*True*