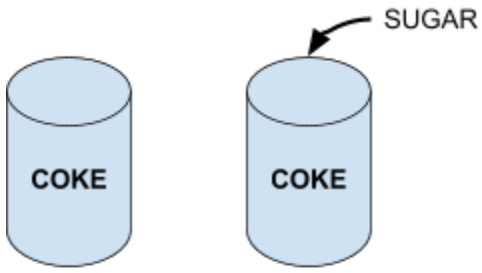
Chemistry 20	Unit 3
Lesson 2 - Concentration	84 mins

What is Concentration?

- Comparison of amount of solute to amount of solution	%, ppm, mol/L



More concentrated
(More Solute in the same amount of solvent)

Molar Concentration (mol/L)

Also known as:
- Amount concentration
- Molarity

$C = \frac{n}{V}$
$C = concentration\ (mol/L)$
$n = moles\ (mol)$
$V = volume\ (L)$

Units:
mol/L, M, [ ]

The unit M is NOT the same as the M used to represent molar mass in m = Mn

Eg.

$n = 25.0\ mol$
$V = 800\ L$

$C = \frac{25.0\ mol}{800L} = 0.0313\ mol/L$ (M)

Eg.

$NH_4NO_{3(aq)}$

$V = 2500\ mL = 2.500\ L$ $m = 800.80\ g$ $n = \frac{m}{M} = \frac{800.80\ g}{2(14.01)+4(1.01)+3(16.00)}$ $n = 10.00\ mol$	$C = \frac{n}{V}$ $C = \frac{10.00\ mol}{2.500\ L}$ $C = 4.001\ mol/L$

$[NH_4NO_{3(aq)}]$ = 4.001 M

Eg.

$M = 25.0\ g/mol$ $m = 150\ g$ $C = 3.50\ M$ $V = ?\ (L)$ $n = \frac{150\ g}{25.0\ g/mol}$ $n = 6.00\ mol$	$C = \frac{n}{V}$ $C \times V = \frac{n}{V} \times V$ $CV \div C = n \div C$ $V = \frac{n}{C}$ $V = \frac{6.00\ mol}{3.50\ mol/L}$ $V = 1.71\ L$

Chemistry 20 - Unit 2 - Concentration

Name: _____

You may find the following formulas useful:

$$C = \frac{n}{V}$$

$$m = Mn$$

1. In moles per litre, calculate the molarity of each of the following solutions.

a. 1.50 mol of zinc nitrate is dissolved in 3.00 L of solution.

b. 2.25 mol of elemental oxygen is dissolved in 5.00 L of solution.

c. 3.25×10^{-3} kmol of barium sulfide is dissolved in 1.25 L of solution.

d. 4.56×10^{3} mmol of sodium is dissolved in 3.25×10^{9} nL of solution.

e. 40.00 grams of sodium hydroxide is dissolved in 450.0 mL of solution.

f. 159.00 grams of iron (III) oxide is dissolved in 20.0 L of solution.

g. 8.75×10^{4} milligrams of calcium chloride is dissolved in 4.50×10^{-4} kL of solution.

2. In moles, calculate the chemical amount of solute in each of the following solutions. Following that, calculate the mass of solute in grams.

a. A 1.50 M zinc nitrate solution has a volume of 4.50 L.

b. A 2.45 M calcium chloride solution has a volume of 32.0 L.

c. A 6.26 mmol/L ammonium oxalate solution has a volume of 3500 mL.

d. A 4.54 kmol/L hydrochloric acid ($HCl_{(aq)}$) solution has a volume of 2.65 x 10^{-3} kL.

e. A 3.28 x 10^{10} nmol/L sodium hydroxide solution has a volume of 5.6 x 10^{12} nL.

f. A 4.55 x 10^{-10} Gmol/L manganese (VII) oxide solution has a volume of 6.8 x 10^{-8} ML.

g. A 7.5 x 10^{-7} Mmol/L vanadium (V) nitrite solution has a volume of 6.78 x 10^{-13} GL.

3. In litres, calculate the volume of each of the following solutions.

a. 1.50 M zirconium nitrate solution has 12.0 mol of solute.

b. 3.25 M barium sulfide solution has 1.54 x 10^{-4} kmol of solute.

c. 5.50 mmol/L ammonium hydroxide solution has 4.5 x 10^{4} mmol of solute.

d. A 6.70 x 10^{6} nmol/L rubidium selenide solution has 3.20 x 10^{-5} Mg of solute.

e. A 8.5 M nitric acid ($HNO_{3(aq)}$) solution has 7.85 x 10^{-8} Gg of solute.