

Friday Worksheet Name: .....

### Concentration

1) A 34.5g sample of pure NaCl was placed in a 250mL volumetric flask. What is the percentage concentration (w/v) of the salt solution?

*% (w/w) is the amount of solute in grams in 100 mL of solution.*

$$(34.5 / 250) \times 100 = 13.8\%w/v$$

2) A solution has a salt concentration of 1.25g/L. What is its salt concentration in ppm?

*Since ppm is mg/L, convert the mass from grams to milligrams: 1 gram = 1,000 mg 1.25g = 1.25 x 1000mg = 1250mg mg/L = 1250mg/L = 1250ppm*

3) A 1.00 Kg sample of baby food contains 0.044 grams of magnesium. What is the magnesium concentration in ppm?

*Since ppm is mg/Kg, convert the mass from grams to milligrams: 1 gram = 1,000 mg 0.044g = 0.044 x 1000mg = 44 mg mg/L = 44 mg/L = 44 ppm*

4) A sample of creek water has a lead concentration of 2250µg/kg. What is its concentration in ppm?

*Since ppm is mg/Kg, convert the mass from micrograms to milligrams: 2250 µg = 2250 / 1,000 = 2.25 mg mg/L = 2.25 mg/L = 2.25 ppm*

5) A sample of fish caught from the bay has a lead concentration of 0.431% w/w. What is its concentration in ppm?

*0.431% w/w can be written as 0.431g / 100mL Since ppm is mg/L, convert the mass from grams to milligrams: 0.431g = 0.431 X 1,000 = 431 mg 431/0.100 = 4310 mg/L = 4310 ppm*

6) A student is provided with 500.0 mL of a 950 ppm solution of KNO<sub>3</sub>. What volume of this solution in millilitres contains 0.45g of KNO<sub>3</sub>?

*950 ppm = mass solute (mg) ÷ volume solution (L) = 950mg/L Rearranging the equation above to find volume of solution we get volume solution = mass solute (mg) ÷ ppm  
=> volume solution (L) = (0.45 x 1000)mg ÷ 950 = 0.474L = 474mL*

7) What mass in milligrams of potassium nitrate is present in 0.35kg of a 450ppm  $\text{KNO}_3(\text{aq})$ ?

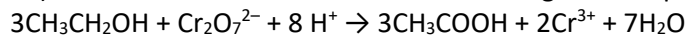
*ppm = mass solute (mg) ÷ mass solution (kg) mass of solute = ppm X mass of solution mass  $\text{KNO}_3$  = 450ppm x 0.35kg = 125mg*

8) What is the concentration in mol  $\text{L}^{-1}$  of NaCl in an 3.21% w/v NaCl solution? *3.21% w/v = 3.21g / 100 mL convert the units into mol and litres. mol of NaCl = 3.21 / 58.44 = 0.0550 mol/L = 0.0550 / 0.100 = 0.550M*

9) What is the mol of ethanol in a 750.0 mL bottle of wine with a concentration of 13.1% v/v ethanol if the density of ethanol (46.1 g  $\text{mol}^{-1}$ ) is given at 0.789g/mL

*Step 1 find the volum of ethanol in 750.0 mL of wine => (13.1 mL / 100 mL) X 750mL = 98.25mL Step 2 Find the mass of ethanol => mass = density X volume = 0.789 X 98.25 = 77.52g Step 3 Find the mol of ethanol => 77.52 / 46.1 = 1.68 mol*

10) Dichromate reacts with ethanol according to the equation below.



A 20.0 mL sample of wine was titrated against a 0.100M  $\text{K}_2\text{Cr}_2\text{O}_7$  and an average titre of 12.44mL was obtained. Find the percentage concentration in v/v if the density of ethanol is 0.789g/mL. *Step 1 find the mol of  $\text{Cr}_2\text{O}_7^{2-}$  that reacted. =>  $n(\text{Cr}_2\text{O}_7^{2-}) = C \times V = 0.100 \times 0.01244 = 0.001244$*

*Step 2 find the mol of ethanol present in the 20 mL sample of wine =>  $0.001244 \times 3 = 0.003732$  step 3 find the mass of ethanol present in 20 mL sample => mass = Molar mass X mol = 46.1 X 0.003732 = 0.172g step 4 find the volume of ethanol present => volume = mass / density = 0.172 / 0.789 = 0.218mL*

*Step 5 find the percentage(v/v) of ethanol in the wine =>  $(0.218/20.0) \times 100 = 1.09$*