

Exam 2 Practice Problems
Chem 60 (Chapters 5 & 6)

This is NOT a comprehensive study guide for the exam, but includes some topics you may need to review.

1. Complete the following table and show your work below.

	Mass solute	Volume solution	Concentration %(w/v)
A)	15.5 g	253.6 mL	6.11%
B)	2.74 g	22.8 mL	12.0 %
C)	183.3 g	2930 mL	6.25 %

$$A) \frac{15.5 \text{ g}}{253.6 \text{ mL}} \times 100 = 6.11\%$$

$$B) 22.8 \text{ mL} \times \frac{12.0 \text{ g}}{100 \text{ mL}} = 2.74 \text{ g}$$

$$C) 183.3 \text{ g} \times \frac{100 \text{ mL}}{6.25 \text{ g}} = 2930 \text{ mL}$$

2. Complete the following table and show your work below.

	Solute	Mass Solute	Moles Solute	Volume Solution	Molarity
A)	KNO ₃	22.5 g	0.223 mol	125.0 mL	1.78 M
B)	NaHCO ₃	2.10 g	0.0250 mol	250.0 mL	0.100 M
C)	CH ₃ OH	12.5 g	0.390 mol	0.780 L or 780 mL	0.500 M

$$A) 22.5 \text{ g KNO}_3 \times \frac{1 \text{ mol}}{101.11 \text{ g}} = 0.223 \text{ mol KNO}_3$$

$$\text{molarity (M)} = \frac{0.223 \text{ mol}}{0.125 \text{ L}} = 1.78 \frac{\text{mol}}{\text{L}}$$

$$B) 250.0 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{0.100 \text{ mol}}{1 \text{ L}} = 0.0250 \text{ mol NaHCO}_3$$

$$0.0250 \text{ mol NaHCO}_3 \times \frac{84.01 \text{ g}}{1 \text{ mol}} = 2.10 \text{ g NaHCO}_3$$

$$\begin{aligned} \text{C) } 12.5 \text{ g } CH_3OH &\times \frac{1 \text{ mol}}{32.04 \text{ g}} = 0.390 \text{ mol } CH_3OH \\ 0.390 \text{ mol } CH_3OH &\times \frac{1 \text{ L}}{0.500 \text{ mol}} = 0.780 \text{ L sol'n} \end{aligned}$$

3. How many grams of K_2CO_3 are in 750 mL of a 3.5% (w/v) K_2CO_3 solution?

$$750 \text{ mL sol'n} \times \frac{3.5 \text{ g } K_2CO_3}{100 \text{ mL sol'n}} = 26.3 \text{ g } K_2CO_3$$

4. A 158 mL sample of a 1.2 mol/L sucrose solution is diluted to 500.0 mL. What is the molarity of the diluted solution?

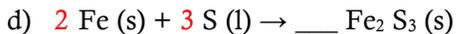
$$C_1V_1 = C_2V_2 \quad \Rightarrow \quad C_2 = \frac{C_1V_1}{V_2}$$

$$\frac{158 \text{ mL} \times 1.2 \text{ M}}{500.0 \text{ mL}} = 0.379 \text{ M}$$

5. How many L of a 3.0 mol/L solution of NaCl are needed to make 15.0 L of 0.15 mol/L saline?

$$V_1 = \frac{C_2V_2}{C_1} = \frac{0.15 \frac{\text{mol}}{\text{L}} \times 15.0 \text{ L}}{3.0 \frac{\text{mol}}{\text{L}}} = 0.75 \text{ L}$$

6. Balance the following reactions:



7. Gases: in each of the following situations, the properties of a gas are changing. Indicate whether each property will **increase**, **decrease** or **remain constant**:

Inflating a beach ball:

Pressure: constant Moles: increasing Volume: increasing Temperature: constant

Propane tank valve is opened to grill a steak: (consider the gas inside the tank)

Pressure: decreasing Moles: decreasing Volume: constant Temperature: essentially constant