

Assignment: The Mole

Name: Answers

1. How many moles?

a) of sodium are in 1 mole of Na_3P ? 3b) of oxygen in 1 mole of CO_2 ? 2c) of hydrogen in $\text{CH}_3\text{CO}_2\text{H}$? $3+1 = 4$

2. Determine the molar mass of the following elements. Include the unit g/mol.

a) Xenon (Xe) 131.3 g/molc) Barium (Ba) 137.3 g/molb) Sulfur (S) 32.06 g/mold) Calcium (Ca) 40.08 g/mol

3. Determine the molar mass of the following compounds. Again, include units. Remember to use Rule #1: least number of decimal places since you are adding.

a) NH_3 $14.01 + 3(1.008) = 17.024 \text{ g/mol}$ c) NaOH $22.99 + 16.00 + 1.008 = 39.998 \text{ g/mol}$ b) $\text{Fe}_2(\text{SO}_4)_3$ $2(55.85) + 3(32.06) + 12(16.00) = 399.88 \text{ g/mol}$ d) AlPO_4 $26.98 + 30.97 + 4(16.00) = 121.95 \text{ g/mol}$

4. Calculate the mass of each molar quantity. Include units. Remember to use Rule #2: least number of significant digits since you will be multiplying.

$$m = n \times mm$$

n 3.90 mol of carbon $mm = 12.01$ $m = 3.90 \times 12.01 = 46.839 \text{ g}$ or <u>46.8 g</u>	n 2.52 mol of O_3 $mm = 3(16.00) = 48.00$ $m = 2.52 \times 48.00$ $= 120.96 \text{ g}$ or <u>121 g</u>
n 55.6 mol of water, H_2O $mm = 18.016$ $m = 55.6 \times 18.016$ $= 1001.6896 \text{ g}$ or <u>1000 g</u>	n 1.5 mol NaCl $mm = 22.99 + 35.45 = 58.44$ $m = 1.5 \times 58.44$ $= 87.66 \text{ g}$ or <u>88 g</u>

5. Calculate the number of moles in each sample. Include units. Remember to use Rule #2: least number of significant digits since you will be dividing.

$$n = m/mm$$

a) ^m 103 g of potassium $mm = 39.10$ $n = \frac{103}{39.10} = 2.6342711$ or <u>2.63 mol</u>	b) ^m 0.736 g of silicon (Si) $mm = 28.09$ $n = \frac{0.736}{28.09} = 0.02620$ or <u>0.0262 mol</u>
c) ^m 39.2 g of SiO_2 $mm = 28.09 + 2(16.00)$ $= 60.09$ $n = \frac{39.2}{60.09} = 0.6523548$ or <u>0.652 mol</u>	d) ^m 7.34 g of HNO_3 $mm = 1.008 + 14.01 + 3(16.00)$ $= 63.018$ $n = \frac{7.34}{63.018} = 0.1164746$ or <u>0.116 mol</u>
e) ^m 25 g of $C_6H_{12}O_6$ $mm = 6(12.01) + 12(1.008)$ $+ 6(16.00)$ $= 180.156$ $n = \frac{25}{180.156} = 0.137686$ or <u>0.14 mol</u>	f) ^m 52.45 g of silver $mm = 107.9$ $n = \frac{52.45}{107.9} = 0.486098 \text{ mol}$ or <u>0.4861 mol</u>