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### Application Questions Chapter 3

1- Calculate the molar mass of each of the following compounds: 9pts

a- Nitric acid,  $\text{HNO}_3$  1H= 1, 1N=14, 3O=48 =63g/mol

b- Malachite,  $\text{Cu}_2(\text{OH})_2\text{CO}_3$  2Cu= 128, 1C=12, 5O=80, 2H=2 =222g/mol

c- Caffeine,  $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$  8C=96, 10H=10, 4N= 56, 2O=32 = 194g/mol

2- Determine the percent water in  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  to three significant figures. 5pts

1Cu = 63.55 g/mol

1S = 32.07 g/mol

4O = 64.00 g/mol

5H<sub>2</sub>O = 90.10 g/mol

molar mass of 249.72 g/mol

$90.10 \text{ g} / 249.72 \text{ g} \times 100\% = 36.08\% \text{ water}$

3- Consider this question: What is the mass of solute in 200.0 L of a 1.556-M solution of KBr. 6pts

1. Outline the steps necessary to answer the question.

(a) **Find Molar Mass of KBr:** 1K=39, 1Br=80

molar mass  $39+80=119\text{g/mole}$

(b) **Find molarity concentration  $C = n/V$**

$1.556\text{M} = n/200.0\text{ liters}$

$1.556\text{mol/liter} = n/200.0\text{ liters}$

$n = 1.556\text{mol/liter} * 200.0\text{ liters}$

$n = 311.2\text{mol}$

(c) **Find molecular mass of solute  $n = m/M$**

$311.2\text{mol} = m/119\text{g/mole}$

$m = 311.2\text{mol} * 119\text{g/mole}$

$m = 37032\text{g}$