CHEM 120 Review key (Molarity) for Chem. 141

1. Household bleach is an aqueous solution of sodium hypochlorite. What is the molarity of a bleach solution containing 17.8 g of sodium hypochlorite in a total volume of 455 mL?
2. Muriatic acid, an industrial grade of concentrated HCl, is used to clean masonry and etch cement prior to painting. What volume of 11.7 M muriatic acid is required to make 15.0 L of a 3.4 M acid solution?

***M1V1 = M2V2; (11.7 M)(V) = (3.4 M)(15.0 L)***

***V = 4.4 L***

1. Citric acid, H3C6H5O7, in orange juice may be neutralized by sodium hydroxide according to the equation below. A 1.25 L sample of orange juice required 6.67 mL of a 0.025 *M* solution of NaOH to reach the equivalence point. What was the molarity of the citric acid in the orange juice sample?

**H3C6H5O7 (*aq*) + 3 NaOH (*aq*) → Na3C6H5O7 (*aq*) + 3 H2O (*l*)**

*citric acid*

1. How many milliliters of 0.238 M KMnO4 are needed to react with 3.36 g of iron(II) sulfate, FeSO4? The reaction is as follows:

      10 FeSO4(aq) + 2 KMnO4(aq) + 8 H2SO4(aq) 🡪5 Fe2SO4(aq) + 2 MnSO4(aq) + K2SO4(aq) +8 H2O(l)

1. A solution is prepared with 70.0 g nitric acid, HNO3, and 130.0 g water. It has a density of 1.21 g/mL

What is the molarity of the solution?

1. You mix 732.0 mL of 0.2187 M lithium sulfate with 350.0 mL of 0.5988 M titanium(III) nitrate. Determine the number of grams of titanium(III) sulfate solid produced, and the final concentration of all ions in the solution.

3 Li2SO4(aq) + 2 Ti(NO3)3(aq) 🡪 6 LiNO3(aq) + Ti2(SO4)3(s)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **X = 0.0534 mol** |  | **X=0.1048mol** |  |  |  |  |
|  | **3 Li2SO4** | **+** | **2 Ti(NO3)3** | **🡪** | **6 LiNO3** | **+** | **Ti2(SO4)3 (s)** |
| **I** | **0.1601 mol** |  | **0.2096 mol** |  | **0 mol** |  | **0 mol** |
| **** | **-3x** |  | **-2x** |  | **+6x** |  | **+ x** |
| **E** | **0.1601 – 3x** |  | **0.2096-2x** |  | **6x** |  | **1x** |
|  | **=0.1601-3(.0534)**  **=0 mol** |  | **=0.1497-2(.0534)**  **=0.1028 mol** |  | **=6(0.0534)**  **=0.3202 mol** |  | **=0.0534 mol** |

**Concentrations of all ions present after mixing.**

**Moles Ti2(SO4)3 produced 0.0534 Mass Ti2(SO4)3 produced 20.5 g**

**Moles Li+1 = 0.3202 mol [Li+1] = 0.2959 M**

**Moles SO4-2 = 0.0 mol [SO4-2] = 0.0 M**

**Moles Ti+3 = 0.1028 mol [Ti+2] = 0.0950 M**

**Moles NO3-1 = 0.6287 mol [NO3-1] = 0.5811 M**