

Exam: CHEMICAL CALCULUS

1. Batxilergoa

Name:

Course:

EXERCISE #1

The density of a concentrated sulfuric acid solution (18.5 M) is 1.85 g/mL.

Determine:

- The number of moles of sulfuric acid in 5 mL of this solution
- The mass percent (% mass) of sulfuric acid in this solution
- The volume needed to take in order to obtain 120 g of solute

Sulfuric acid: H_2SO_4

Atomic weights: S=32; O=16; H=1

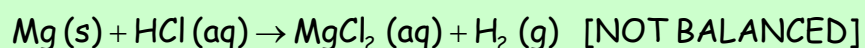
EXERCISE #2

Determine the volume of 5 M sulfuric acid that is needed to prepare 400 mL of 120 g/L sulfuric acid by dilution (adding water)

Atomic weights: S=32; O=16; H=1

EXERCISE #3

A sample with an unknown content in magnesium was analyzed by reacting with an excess of HCl, according to this reaction:



1.32 g of this sample was treated with 0.1 L of 0.75 M HCl and 0.0125 moles of HCl remained unreacted. Assuming that the impurities in the sample do not react with the acid, what is the mass % Mg in that sample.

Atomic weights: Mg=24; H=1; Cl=35.5

EXERCISE #4

Hydrazine (N_2H_4) and dinitrogen tetroxide (N_2O_4) react to form nitrogen (N_2) gas and water vapor. Determine

- How many grams of nitrogen gas form when 100 g of N_2H_4 and 200 g of N_2O_4 are mixed
- The volume of that gas at $P=2.2 \text{ atm}$ and $T=23 \text{ }^\circ\text{C}$

Atomic weights: N=14; O=16; H=1

$$R = 0.082 \frac{\text{atm}\cdot\text{L}}{\text{K}\cdot\text{mol}}$$