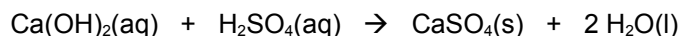


Chemistry: *Molarity and Stoichiometry*

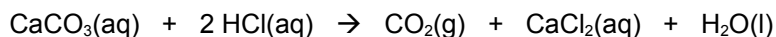
Directions: Using the definition of molarity, the given balanced equations, and stoichiometry, solve the following problems. Show your work and include units for full credit.

1. Calcium hydroxide ("slaked lime") and sulfuric acid react to produce calcium sulfate and water according to the following balanced equation:



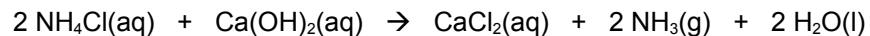
- How many liters of 0.5 M calcium hydroxide do you need in order to have 5.5 moles of calcium hydroxide?
- Find the number of moles of sulfuric acid needed to react with 5.5 moles of calcium hydroxide.
- If the sulfuric acid has a concentration of 0.82 M, how many liters of it are needed to react with 5.5 moles of calcium hydroxide?

2. Calcium carbonate ("limestone") reacts with hydrochloric acid according to the following balanced equation:



- What mass of calcium carbonate is needed to make 1.2 liters of a 1.7 M calcium carbonate solution?
- What volume of 3.0 M hydrochloric acid is needed to completely react with the amount of calcium carbonate in Part 2a above?
- Based on Parts 2a and 2b above, how many moles of water would be produced?

3. Ammonium chloride and calcium hydroxide react according to the following balanced equation:

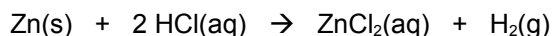


a. What mass of ammonium chloride is needed to make 1.0 liter of a 2.0 M ammonium chloride solution?

b. What mass of calcium hydroxide is needed to make 2.0 liters of a 2.0 M calcium hydroxide solution?

c. How many grams of calcium chloride will be made when 1.0 liter of a 1.0 M calcium hydroxide solution react with excess ammonium chloride?

4. Zinc and hydrochloric acid react according to the following balanced equation:



a. What volume of 0.1 M hydrochloric acid will react with 26 grams of zinc?

b. What mass of zinc will react with 2.0 liters of 0.25 M hydrochloric acid?

c. How many liters of hydrogen will you make (at STP) if you react 2.74 L of 0.45 M hydrochloric acid with excess zinc?

Answers:

1a. 11.0 L of 0.5 M $\text{Ca}(\text{OH})_2(\text{aq})$

1b. 5.5 mol H_2SO_4

1c. 6.71 L of 0.82 M $\text{H}_2\text{SO}_4(\text{aq})$

2a. 204 g CaCO_3

2b. 1.36 L of 3.0 M $\text{HCl}(\text{aq})$

2c. 2.04 mol H_2O

3a. 107 g NH_4Cl

3b. 296 g $\text{Ca}(\text{OH})_2$

3c. 111 g CaCl_2

4a. 7.95 L of 0.1 M $\text{HCl}(\text{aq})$

4b. 16.4 g Zn

4c. 13.8 L H_2 (at STP)