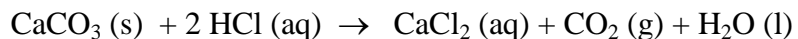


REVIEW QUESTIONS

Test 2

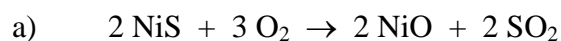
1. Consider the reaction shown below:



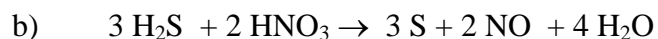
- a) How many mL of 0.55M HCl are needed to react with 3.7 g of CaCO₃?
- b) After the reaction has gone to completion, what volume of CO₂ gas can be collected at 25.0°C and barometric pressure of 755 mmHg? (Vapor pressure of water at 25.0°C is 23.8 mmHg)
2. What is the concentration of chloride ions in a solution that contains 0.375 g of aluminum chloride in 15.0 mL of solution?
3. A mixture of 7.00 g of CO and 10.0 g of SO₂ is placed in a 250-mL flask at a particular temperature. If the total pressure of the mixture is 755 mmHg, what are the partial pressures of each gas in the mixture?

4. An ideal gas with a density of 3.00 g/L has a pressure of 675 mmHg at 25 °C. Determine the molar mass of this gas.

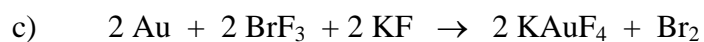
5. Identify the oxidizing and reducing agents in each of the following reactions:



oxidizing agent:_____ reducing agent:_____

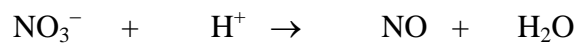


oxidizing agent:_____ reducing agent:_____



oxidizing agent:_____ reducing agent:_____

6. Balance the two half-reactions shown below and combine to find the overall equation for the reaction:



7. How many mL of 2.0M NaHCO_3 must be used to completely neutralize 55 mL of 3.0M H_2SO_4 spilled from a battery?

8. To find the mass percent of limestone (CaCO_3) in a soil sample, a geochemist titrates 1.586 g of the soil with 43.56 mL of 0.2516M HCl . What is the mass percent of CaCO_3 in the soil?

9. An unknown gas effuses 1.73 times faster than Kr. What is the molar mass of this gas?

10. What is the temperature of CO_2 gas if the root-mean-square velocity of the molecules is 750 m/s?

11. A solution is prepared by dissolving 10.8 g of ammonium sulfate in enough water to make 100.0 mL of stock solution. A 10.00 mL sample of this stock solution is added to 50.00 mL of water. Determine the concentration of ammonium and sulfate ions in the final solution.
12. Calculate the sodium ion concentration when 70.0 mL of 3.0 M sodium carbonate is added to 30.0 mL of 1.0 M sodium bicarbonate.
13. A 100.0-mL sample of 0.200 M aqueous KOH is mixed with 100.0 mL of 0.200 M of aqueous $\text{Mg}(\text{NO}_3)_2$.
- What is the mass of the precipitate produced after the reaction is complete?
 - Calculate the concentration of each ion remaining in solution after precipitation is complete.

ANSWERS

1a) 130 mL (2 sig figs)

1b) 0.94 L

2) 0.563 M

3) $P_{\text{CO}} = 465 \text{ mmHg}$ $P_{\text{SO}_2} = 290 \text{ mmHg}$

4) 82.6 g/mol

5a) Oxidizing agent = O_2 Reducing agent = NiS

5b) Oxidizing agent = HNO_3 Reducing agent = H_2S

5a) Oxidizing agent = BrF_3 Reducing agent = Au

6) $3 \text{P}_4 + 8 \text{H}_2\text{O} + 8 \text{H}^+ + 20 \text{NO}_3^- \rightarrow 12 \text{H}_2\text{PO}_4^- + 20 \text{NO}$

7) 170 mL (2 sig figs)

8) 34.58%

9) 28.0 g/mol

10) 992 K

11) $[\text{NH}_4^+] = 0.272 \text{ M}$ $[\text{SO}_4^{2-}] = 0.136 \text{ M}$

12) $[\text{Na}^+] = 4.5 \text{ M}$

13 a) 0.583 g

b) $[\text{Mg}^{2+}] = 0.050 \text{ M}$ $[\text{K}^+] = 0.100 \text{ M}$ $[\text{NO}_3^-] = 0.200 \text{ M}$