

Chemistry

Solution Stoichiometry

1. Mercury salts have a number of important uses in industry and in chemical analysis. Because mercury compounds are poisonous, the mercury ions must be removed from the wastewater, this is often accomplished by adding a substance that causes the mercury to precipitate. Calculate the mass of precipitate that forms when 25.0 mL of 0.0850 mol/L sodium sulfide is added to waste water that contains mercury(II) nitrate.
2. Silver plated tableware is popular because it is less expensive than sterling silver. Silver nitrate solution is used by an electroplating business to replate silver tableware for their customers. To test the purity of the solution, a technician observes 10.00 mL of 0.500 mol/L silver nitrate reacting with an excess quantity of 0.480 mol/L sodium hydroxide solution. Calculate the mass of precipitate that forms.
3. When silver nitrate is added to sodium chromate, a brick-red precipitate forms. Calculate the mass of precipitate that forms when 50.0 mL of 0.100 mol/L silver nitrate is added to excess sodium chromate.
4. Calculate the mass of precipitate that forms when 15.0 mL of 0.250 mol/L sodium hydroxide is added to a solution of aluminum nitrate.
5. Suppose you want to remove the barium ions from 120.0 mL of a 0.0500 mol/L barium nitrate solution. What is the minimum mass of sodium carbonate that you should add?
6. One method of analyzing for arsenic in a pesticide is to treat the sample chemically to convert the arsenic into soluble sodium arsenate. Then a solution of silver nitrate is added until a precipitate of silver arsenate is no longer formed. If a 1.10 g sample of a pesticide required 23.7 mL of 0.0968 mol/L silver nitrate in a given analysis, what was the percentage of arsenic present in the pesticide?
7. When a clear, yellow solution of potassium chromate is added to a clear, colourless solution of silver nitrate, a brick-red precipitate forms. A laboratory technician added 30.0 mL of 0.150 mol/L potassium chromate to 45.0 mL of 0.145 mol/L silver nitrate.
 - a) Write the chemical equation for the reaction.
 - b) Perform calculations to show which of the two reagents is limiting.
 - c) Calculate the theoretical yield of the precipitate in grams.
 - d) Only 0.220 g of dry precipitate is collected. What is the percent yield of the reaction?
8. In an experiment, Kendra mixed 40.0 mL of 0.552 mol/L lead(II) nitrate with 50.0 mL of 1.22 mol/L hydrochloric acid. A white precipitate forms, which Kendra filtered and dried. She determined the mass of the precipitate to be 5.012 g.
 - a) Write the chemical equation for the reaction.
 - b) What is the formula of the precipitate that formed?
 - c) Which is the limiting reactant?
 - d) What is the theoretical yield?
 - e) Calculate the percentage yield.