A Solution Lab: Precipitation of Lead (II) Iodide

Introduction

In this experiment you will prepare 10.0 mL of 0.500 mol L^{-1} lead (II) nitrate 25.0 mL of 0.500 mol L^{-1} potassium iodide solutions . A precipitate of lead (II) iodide is formed when these solutions are mixed. You will study the mole relationship between reactants and products - which of these solutions is the limiting reactant. Moles of reactants will be determined from volume and concentration of solutions used. Theoretical yield of the precipitate lead (II) iodide will be determined from the mole relationship in the balanced equation. Actual yield of lead (II) iodide will be determined experimentally.

Purpose

- To prepare solutions of lead (II) nitrate and potassium iodide of specific concentrations.
- To determine which reactant is the limiting reagent.
- To determine experimentally the number of grams of precipitate that form from the reaction between lead (II) nitrate and potassium iodide.
- To determine theoretically the number of grams of precipitate that should form from the reaction of lead (II) nitrate and potassium iodide, i.e. to determine the theoretical yield of the precipitate.
- To determine the percent error.

Materials

lead (II) nitrate, potassium iodide

Apparatus

10 mL graduated cylinder, 25 mL graduated cylinder, two - 100 mL beakers, funnel, filter paper, o-ring, retort stand.

Safety

Lead (II) ion is a cumulative poison. Thus, all lead (II) compounds, particularly the very soluble lead (II) nitrate, should be handled with care. Wash your hands with copious amounts of water.
Handle with Care !!!!!!!!!!

Procedure

DAY I

To Prepare 10.0 mL of 0.500 mol L^{-1} lead (II) nitrate solution.

1. How many mols are there in 10.0 mL of 0.500 mol L^{-1} lead (II) nitrate?
2. What is the molar mass of lead (II) nitrate?
3. What mass of lead (II) nitrate do you need to make 10.0 mL of 0.500 mol L^{-1} lead (II) nitrate?
4. Use a clean, dry 10 mL graduated cylinder to make 10.0 mL of 0.500 mol L^{-1} lead (II) nitrate.

To Prepare 25 mL of 0.500 mol L^{-1} potassium iodide solution.

1. How many mols are there in 25.0 mL of 0.500 mol L^{-1} potassium iodide?
2. What is the molar mass of potassium iodide?
3. What mass of potassium iodide do you need to make 25.0 mL of 0.500 mol L^{-1} potassium iodide?
4. Use a clean, dry 25.0 mL graduated cylinder to make 25.0 mL of 0.500 mol L^{-1} potassium iodide.

To complete the reaction of lead (II) nitrate and potassium iodide

1. Mix the two solutions that you prepared by adding one to another in a beaker.
2. Set up the filtration apparatus, mark your initials on the filter paper, and weigh the filter paper.
3. Filter the reaction mixture to collect the yellow lead (II) iodide precipitate.
4. Rinse the beaker and filter paper until all the precipitate is on the filter paper.
5. Leave filter paper to dry.
6. Clean all glassware and your hands with copious amounts of water and brushes.

DAY II

Weigh the dry filter paper with lead (II) iodide to determine the experimental mass of lead (II) iodide obtained.

Data Collection

1. Should include all observations, before, during and at the end of the reaction in a neat table format.
2. Should include all masses recorded in a neat table, allowing for uncertainty and correct units.

Data Analysis

- Write a balanced equation for the reaction of lead (II) nitrate and potassium iodide.
- Determine which of your solution was the limiting reagent.
- Determine the theoretical yield of lead (II) iodide that should form, from your limiting agent.
- Determine the experimental, (actual) yield of lead (II) iodide obtained.
- Determine the percentage yield of lead (II) iodide.
- Determine the percent error.
- Summarize your data analysis in a suitable table format.

Data Evaluation

- Provide a valid conclusion, based on the correct interpretation of the results, with an explanation.
- The procedure (apparatus, materials and method) including limitations, weaknesses or errors in manipulation, is evaluated.
- Suggestions to improve the investigation following the identification of weakness(es) are stated.