Gravimetric Analysis

Concepts:

Double replacement reactions, Filtration technique, Gravimetric analysis, Stoichiometry, Precipitation reactions, Error analysis

Use the following recommendations to increase and/or decrease the challenge difficulty for your students.

Short-on-time Inquiry Lab:

Students precipitate calcium carbonate by mixing aqueous solutions of sodium carbonate and calcium chloride. They then determine the amount of calcium carbonate produced by gravimetric analysis. Students learn to set up and use a vacuum filtration or gravity filtration apparatus and how to use basic stoichiometric calculations.

Guided Inquiry Lab:

Students precipitate calcium carbonate by mixing aqueous solutions of sodium carbonate and calcium chloride. They then determine the amount of calcium carbonate produced by gravimetric analysis. Students learn to set up and use a vacuum filtration or gravity filtration apparatus and how to use basic stoichiometric calculations to solve an analytical problem.

Open Inquiry Lab:

Students precipitate calcium carbonate by mixing aqueous solutions of sodium carbonate and calcium chloride. They then determine the amount of calcium carbonate produced by gravimetric analysis. Students learn to set up and use a vacuum filtration or gravity filtration apparatus and how to use basic stoichiometric calculations in an analytical application. They then apply these ideas to determine the amount of $CaCO_3$ in an over-the-counter antacid tablet, using a self-developed procedure.

Advanced Inquiry Lab:

Students must develop a procedure to determine the amount of $CaCO_3$ in an over-the-counter antacid tablet with very minimal scaffolding, or guidance.

Outcomes:

Students come to understand how gravimetric analysis and precipitation reactions can be applied in the real world to answer questions and solve problems.

Associated Phenomena:

How do we design materials for specific functions?

Standards

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using mathematics and computational thinking Obtaining, evaluating, and communicating information	HS-PS1.B. Chemical Reactions HS-PS2.B. Types of Interactions	Energy and Matter in Systems Structure and Function

Performance Expectations

HS-PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.