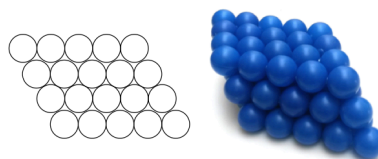


QUANTITATIVE ANALYSIS OF ZINC ATOMS IN ZINC-PLATED STEEL

Introduction

Steel, an alloy of iron, is a critical component in the construction of our infrastructure. It is strong and durable. Unfortunately, moisture can trigger the chemical process of oxidation and lead to the unwanted effects of corrosion and rusting. To combat this issue, some steel products are coated in a layer of zinc atoms because it greatly slows down the oxidative process. How much zinc is needed to provide this benefit? How can you use the reaction chemistry you already know to measure how much zinc is on a sample of steel? How can you determine how many zinc atoms thick this layer is?



Representation of three layers of atoms

Background Questions

1. Define the term *alloy*. What elements are found in steel?
2. Write the balanced chemical equation for the reaction of magnesium metal and hydrochloric acid.
3. Draw a particle diagram of the reaction in *Nº 2* above before, during, and at the end of the reaction.

Objectives

1. Design and outline a procedure to measure *a) the total number of zinc atoms on a sample of zinc-coated steel* and *b) the number of layers of zinc on the sample of zinc-coated steel*.
2. Work safely and collaboratively in the laboratory.
3. Carry out calculations using the correct number of significant figures.
4. Articulate your findings clearly and concisely in a written scientific paper.

Materials

Your group will have access to one piece of the zinc-plated steel, 6 M hydrochloric acid, an analytical balance, and standard chemical glassware and miscellany.

Safety

Outline the safety protocol you will take in carrying out this experiment including disposal.