

Nano Effervescence

Surface Area and Reaction Rates

Introduction

This activity uses Alka-Seltzer to investigate the effects of an increase in surface area on reaction rates.

Material

Alka-Seltzer

Water

2 clear plastic film cans

Metal spoon



To Do and Notice

Break one tablet of Alka-Seltzer, or a generic antacid, into two pieces. Place one half of the tablet into one of the two clear plastic film cans, crush the remaining half of the antacid with the back of a metal spoon, and place it in the second plastic film can.

You will need two people for this next part:

At the same time pour approximately two tablespoons of water into each film can (the film can should be about half full) and immediately snap the lid tight on each film can. Sit back and observe.

Which film can was the first to explode?

What does this tell you about surface area and reaction rates?

What's going on?

Alka-Seltzer reacts with water to produce a gas, CO_2 , or Carbon Dioxide. This gas expands until there is so much pressure that the top of the film can pops off. The rate at which the gas is produced determines how quickly the top of the can will pop off, and with what force.

A powdered antacid has more surface area than a tablet. By crushing the antacid with a spoon, you are increasing the surface area. This increase in surface area will cause the gas to be produced in the crushed antacid film can much quicker than in the tablet containing film can. Therefore, the crushed antacid film can top will pop off first.

This activity can be used to introduce students to the idea of increased reaction rates in nanomaterials, and connected to nanomaterials used as catalysts.