CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J0125

Project Title
Bubbles or Buoyancy

Abstract

Objectives/Goals
My project was designed to test the effect of gas bubbles on the density of water. I obtained my idea from a television show I watched about the Bermuda Triangle. One of the theories of how ships sank in the Bermuda Triangle is methane hydrates, or methane gas eruptions, decrease the density of water so that a once buoyant ship becomes a sinking metal rock. By the time the bubbles are gone, the boat is too deep to surface. I wanted to see if other gases, besides methane, could also cause an object to sink.

Methods/Materials
Methods: I built a bubble manifold out of PVC pipe to fit on the bottom of a fish tank. I then connected different gas tanks to a valve system connected to the manifold. After I filled the tank with 30L of water, I placed a full 237mL water bottle in the tank. I let the gas flow at 600 kilopascals (kPa) for 15 seconds and recorded the depth.
Materials: fish tank;safety goggles;one tank each of carbon dioxide, welding grade oxygen,acetylene,and propane;air compressor;water bottles;air hoses;pieces to make bubble manifold;pieces to make valve system.

Results
The water bottle did not stay at any certain depth for very long; therefore I did the best I could to accurately measure how deep the bottle sank after 15 seconds. In my experiment, compressed air bubbles, my control, caused the bottle to sink to an average depth of 13cm. Carbon dioxide bubbles caused the bottle to sink to an average depth 11cm. Oxygen bubbles caused the bottle to sink to an average depth of 14cm. Acetylene bubbles caused the bottle to sink to an average depth of 9cm. The propane gas did not produce enough bubbles to cause the bottle to sink.

Conclusions/Discussion
From the data, it is evident that the oxygen caused the bottle to sink the deepest. It sank to an average depth of 14cm. Compressed air caused the bottle to sink to an average depth of 13cm. These two show it is hard to tell whether it was a specific type of gas bubble that affected the density of the water, or if gas bubbles, in general, contributed to the sinking of the bottle. If this project had been done in a more condensed container, the bubbles would have less area to disperse in, and the cloud of bubbles would therefore become denser. It would also increase the pressure of bubbles coming from the PVC pipe at the bottom. With less area of pipe, the gas can generate more pressure and force out more bubbles to create an even denser cloud of bubbles.

Summary Statement
Based on one of the theories about the Bermuda Triangle, my project is about how different types of gas bubble eruptions in water affect the buoyancy of an object.

Help Received
My dad helped me purchase the right parts, build the correct valve system and supplied me with the gases I needed; My mom edited my writing and also helped me with converting my measurements from standard to metric form.