Physics archimedes principle lab report

Science

Measurement of Mass, Volume, and Density through Archimedes Principle

Overview: The purpose of this experiment was to measure the density of a solid and a liquid using the Archimedes principle. Archimedes is one of the greatest inventors and mathematicians of all time. The principle we used in this experiment was discovered when Archimedes stepped into a full bathtub. Using the Archimedes principle, we were able to determine the density of a lead rod, water, and an unknown liquid.

Discussion

The objective of this experiment was to measure the density of a solid and an unknown liquid by using one of the oldest principles, Archimedes' principle. For part A of the experiment, we were able to use the spring constant found from the previous lab, in order to help determine the change in mass and volume of an object and the density of an unknown liquid. The spring constant that was found from the previous lab was 0. 23 N/m. In part B of the experiment, we were able to determine the change in mass of the lead rod from the air to the water and the volume of the lead rod. After conducting five trials, we were able to find the change in mass of the lead rod by using the spring constant formula of F= kx. After modifying the formula to solve for mass, we were able to find the change in mass for each trial by multiplying the spring constant and displacement of the lead rod in air versus water, then dividing by gravity. The average change in mass was found to be 9. 8X10-4g. Once we had found the mass of the lead rod, we were able to find calculate the volume of the lead rod by modifying the buoyancy force formula to solve for the volume of the object. Find that formula, we divided the mass of the lead rod by the density of water as

shown in the table of literature. The average volume of the lead rod was found to be 3. 422 cm3. In part C of this experiment, we were able to determine the change in mass of the lead rod from air to an unknown liquid and the density of the unknown liquid.

We used the same method in part B to calculate the change in the mass of the lead rod. The average change in mass of the lead rod in the unknown liquid was found to be ... Since the volume of an object does not change when submerged in various liquids, we were able to use the average volume of the lead rod found in part B. then, we were able to find the density of the unknown liquid by dividing the mass of the lead rod by the volume of the lead rod. The average density of the unknown liquid was found to be 1. 44 g/cm3. Since the unknown liquid had an aroma of rubbing alcohol, we hypothesized that the unknown liquid was a mixture of rubbing alcohol and water. Using the Archimedes principle, our hypothesis can be supported since the average density of the unknown liquid was 0. 843 g/mL. An alternative method for this experiment would be to set up the beaker so that the liquid level would be completely leveled, versus when a person lifts the beaker with an unleveled liquid level. A way a person could do this would be to place a book under the beaker with a leveled liquid level so that the lead rod is equally and fully submerged in the liquid.

Conclusion

The objective of this experiment was to determine the mass and volume of an object and the density of an unknown liquid using the Archimedes Principle. For part A, we used the spring constant from the previous lab to help determine the mass of the lead rod in part B. The displacement of the

lead rod from the air to the water was found in order to help determine the average mass of the lead rod. The average change in mass of the lead rod from air to water was 9. 38x10-4g. The average volume of the lead rod was 9. 38x10-7cm. In part C an unknown liquid was used. A similar method was used to determine the average change in mass of the lead rod in the unknown liquid, which was found to be 7. 04x10-4g. Since the volume of an object does not change in different liquids, the volume of the object found in part B was used in part C to help determine the density of the unknown liquid. The density of the unknown liquid was 0. 75g/mL.