Measurement and density

Purpose of this Lab What is the goal of this lab? What question are you trying to answer, or what problem are you trying to explain? Hypothesis After reading the lab instructions – but before starting the lab – record your best " educated guess" about each experiment: Experiment 1: Which method of finding the density give you the least percent error and why? Experiment 2: After completing the first experiment, answer this question. Which block do you think has the highest density and why? Experimental DesignList the materials used in this lab, and write a brief explanation of the procedures you followed. (You do not need to retype the procedure; simply summarize your procedures you used.) Procedures: Materials: © KC Distance Learning Data On the following pages record the data you collect in the lab. Show all calculations performed in the data analysis.

Calculating Percent Error In most cases, the values you obtain through experimentation will be slightly different from the documented accepted values. Using very precise measuring devices and utilizing the measuring devices correctly reduces the amount of error. The calculation for % error is similar to the calculation you would use to determine your average on an exam. The formula for % error is listed below.

Calculate the % error for each substance in experiments 1 and 2. The accepted values are given in the table above. The experimental values are the values you found in the lab. Percent Error = Experimental Value – Accepted Value x 100 Accepted Value Experiment-1 Measuring densities of the cubes using water overflow method.

Mechanical Balance Red Cube Green Cube No. 1 Blue Cube No. 1 2 3 4 5 Average Volume Cube Red Green Blue Element Iron Copper Zinc Graduated Cylinder Red Cube Green CubeBlue Cube Mass (in grams) Volume (cm3) Density(g/ cm3) = Mass/Volume Element Present Standard Density (g/cm3) 7. 8 8.

9 7. 1 Calculated Density (g/cm3) © KC Distance Learning Experiment-2 Measure densities of the cubes using Vernier Calipers and Digital Weighing balance. Digital Balance Red Cube Green Cube No. 1 2 3 4 5 Average mass Blue Cube No.

Length (L) Vernier Caliper Red Cube Width (W) Height (H) LxWxH 1 2 3 4 5 Average Volume Green Cube No. 1 2 3 4 5 Average Volume Length (L) Width (W) Height (H) LxWxH Blue Cube No. 1 2 3 4 5 Average Volume Length (L) Width (W) Height (H) LxWxH © KC Distance Learning Cube Red Green BlueMass (in grams) Volume (cm3) Density(g/ cm3) = Mass/Volume Element Present Element Iron Copper Zinc Standard Density (g/cm3) 7. 86 8.

96 7. 13 Calculated Density (g/cm3) © KC Distance Learning Data Analysis Analyze the data you collected in the lab. Support your calculated densities by showing the calculations that lead you to your results. Calculate your percent error and compare your percent error from experiment 1 to your percent error in experiment 2. © KC Distance Learning Conclusion After conducting the experiment, how would you now explain the problem(s) or answer the question(s) raised when you described the purpose of the lab? Do your results support your hypothesis? Why or why not? Be sure to base your answer on the data you collected. Consider whether your conclusion is the

only explanation for the data you collected, or if there could be alternate explanations.

© KC Distance Learning Post Lab Questions Answer the following questions before submitting your report to your teacher. Show all work in all questions requiring calculations. Use the following density table when needed. Density Table Substance Aluminum Oak Pine Polypropylene PVC Steel Water Lead Bismuth Density (g/cm3) 2. 70 0.

75 0. 42 0. 2 1. 40 7. 9 1. 0 11.

4 9. 78 1. Suppose you were asked to find the density of a metal object that appears to be a cube. You notice that the metal looks old and has a few chips in it. Without any other information, would it be correct to measure 1 side of the object and cube (^3) the value to determine the volume? Explain.

2. Suppose you determined the density of a cube to be 1. 40 g/cm3. Would the density of the cube be different if you had a cube made of the same material with twice as much mass? Explain. 3. A cube with a mass of 0.

0084 kilograms has a volume of 20. 0 cm3. Using the density table above, identify the object. Don’t forget to convert if needed. 4.

A cube of lead is 7. 00 centimeters per side. What is the mass of the cube? (See table for density of lead). © KC Distance Learning 5.

You fill a graduated cylinder with 50. 00 milliliters of water. You drop a piece of aluminum with a mass of 15. 00 grams into the graduated cylinder causing the water to rise.

What would the new volume of the graduated cylinder be after dropping the aluminum? 6. How many of the substances listed in the density table above would float in water? © KC Distance Learning