Experiment 1 Block and Cylinder Densities

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We used given measurements of a metal block and cylinder made of the same material and were asked to calculate its density and the uncertainty of that value due to the measurement. We concluded that the metal used was aluminium.

Questions for Discussion:

Write your answers in complete sentences.

1. Both the Rectangular Block and the Right Circular Cylinder are made from the same common metal substance. Go online and find a table that lists the densities of metals and determine which metal the Block and Cylinder are made of. Are there any other metals on the table that you found that are close to, or may overlap with the metal you are stating when you consider the Range of Density Values? If there is another metal that could fit within the Range of Density Values what justification(s) can you use to state which one is more likely to be the actual metal? List the website that you found the table in your answer.

The only metals that fall within the range for the block and cylinder are aluminium and strontium. It may be aluminium because its density is closer to the middle value of both the ranges determined for the block and cylinder.

https://sites.google.com/site/chempendix/densities-of-pure-metals

1. Fractional Uncertainties of Measured Quantities can tell you which measurement is causing the most uncertainty in the derived answer. Do a comparison and determine which measurement, one for the Rectangular Block, and one for the Right Circular Cylinder, that would need to be measured with more accuracy to lower its larger contribution to the overall Total Uncertainty.

Height would need to be measured more accurately for the block and diameter would need to be measured more accurately for the cylinder.

1. When experimentally determining a physical quantity, such as the densities of the Block and Cylinder, it is considered to be in agreement with a handbook value if the handbook value falls within the Range of Values of the experimentally determined value. But, this does not really tell you how accurate the experimentally determined value is compared to the handbook value. To show how close the average experimental value is to the handbook value a percent error can be calculated. The equation for this is:

The absolute value is used to give a positive % error to compare it to an acceptable upper limit. Do some research online to see what a reasonable % Error maximum would be when comparing an experimentally determined value to a Handbook value. Then, determine the % Error for both the Block and Cylinder using the handbook value for the Density of the metal that you stated in Question 1 is the actual Density. How do these % Errors compare to the reasonable % Error maximum?

5% is a generally accepted maximum % error, but the value would vary depending on what you are doing. The block has a % error of 0%, while the cylinder has a % error of 0.37% which both fall under the reasonable % error maximum.

1. When used in physics experiments describe each of the following:
2. Accuracy: how close the values are to the handbook value
3. Precision: how close the values are to each other
4. Uncertainty: range of likely values for a/some given measurement(s)
5. Significant Figures: the degree of certainty of a measured value