**PHY 122: Error Propagation Exercise**

**Student’s name: Hieu Pham**

**Date of experiment: 08/22/2015**

**Lab Section Number: 91007**

**TA’s name: Wayne Christenson**

**Experimental Data**

In the table below present the raw data that will be used for further calculations in Data Analysis.

**Hollow cylinder**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension | Mean value, unit | Stand. Deviation, unit | Error (stan.dev.of the mean Logger Pro), unit |
| Height | 128.0, mm | 0.06055, mm | 0.02472, mm |
| Thickness | 4.975, mm | 0.1541, mm | 0.062911, mm |
| Inner Diameter | 76.05, mm | 0.1612, mm | 0.06581, mm |
|  |  |  |  |

(Add/delete rows as needed)

**Important:** All Logger Pro statistics graphs need to be attached at the end of the lab report. The graphs can also be inserted as a picture under the tables.

**Data analysis**

1. Volume calculations and its Error Propagation

* 1. The equation that was used to calculate volume of the Hollow cylinder is:

Equation: where

, and

Calculations: V = (3.14156) \* (1280.02472) ( )

* 1. The standard deviations of the mean for each dimension found with the following equation:

Equation:

Calculations:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dimension | N |  |  |  |
| Height | 6 | 2.44949 | 0.06055 | 0.02472 |
| Thickness | 6 | 2.44949 | 0.1541 | 0.062911 |
| Inner Diameter | 6 | 2.44949 | 0.1612 | 0.06581 |

* 1. The error propagated in the volume of the hollow cylinder using the partial derivative method will be:

Equation:

Calculations:

**Report the Result with its error**

The correct format to report the volume and its error is to

* report the error to one significant figure **unless** that one significant figure equals to 1, then use the following significant figure;
* make sure the value of mean volume is reported to the same number of decimal places as the error;
* report the whole result (volume +/- its error) in scientific notation

**Conclusion: (2 points)**

Explain the concepts of the error propagation and show how the calculated result for volume and its error show the concept of error propagation.

