Experimental General Physics for Engineers II

Laboratory Report PHYS 194 summer 2022

Section:L01 _____

Experiment name: Fuse

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Table of results (1 pt)	
Graph (1 pt)	
Data analysis (2.5 pts)	
Discussion (0.5 pt)	
References	
Others	
Report Grade (5 pts)	

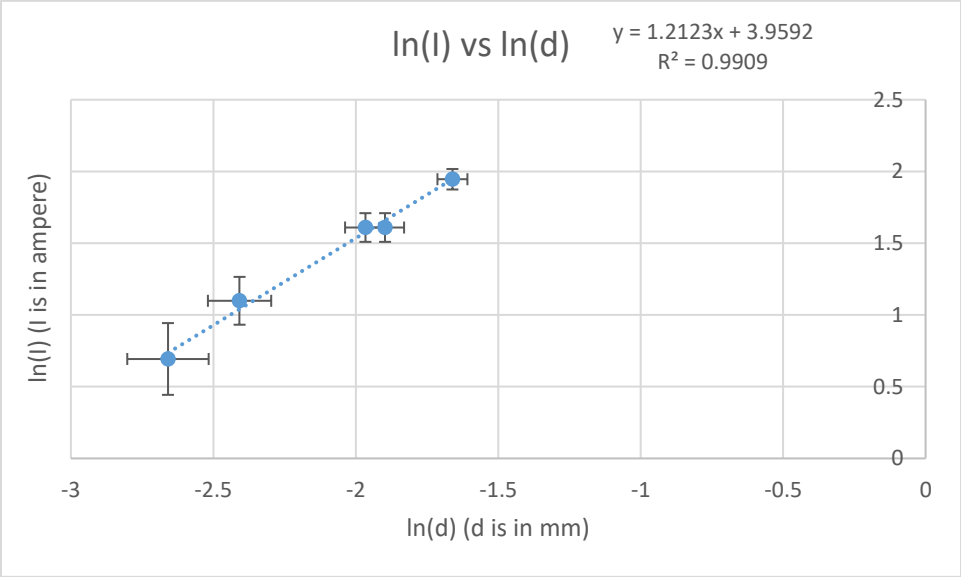
1. Table of Results (put the correct units in the tables)

Set No	d (mm)	$u(d)$ (mm)	I (ampere)	$u(I)$ (ampere)	$\ln(d)$ d is in mm	$u(\ln(d))$ d is in mm	$\ln(I)$ I is in ampere	$u(\ln(I))$ I is in ampere
1	0.07	±0.01	2	±0.5	-2.659	±0.142	0.6931	±0.250
2	0.09	±0.01	3	±0.5	-2.408	±0.111	1.0986	±0.167
3	0.14	±0.01	5	±0.5	-1.966	±0.071	1.6094	±0.100
4	0.15	±0.01	5	±0.5	-1.897	±0.067	1.6094	±0.100
5	0.19	±0.01	7	±0.5	-1.660	±0.053	1.9459	±0.071

2. Graph of $\ln(I)$ vs. $\ln(d)$

Insert the graph here

(don't forget error bars)



3. Data analysis

3.1. Calculation of the error on $\ln(d)$:

Show how you calculate $u(\ln(d))$

1. Calculate u(d) that is ±0.01 mm
2. U(ln(d)) = sqrt (d (ln(d))/d(d) * U(d))^2 = sqrt (1/d *U(d))^2 = sqrt (1/0.07 * 0.01)^2 = ±0.142 (d is in mm)

3.2. Calculation of the error on $\ln(I)$:

Show how you calculate $u(\ln(I))$

1. Calculate U(I) that is ±0.5 ampere
2. U(ln(I)) = sqrt (d (ln(I))/d(I) * U(I))^2 = sqrt (1/I *U(I))^2 = sqrt (1/0.6931 * 0.5)^2 = ±0.250 (I is in ampere)

3.3. Slope of the graph, intercept and their uncertainties

Slope = 1.21229 (I is in ampere / d is in mm)
U(Slope) = 0.066925 (I is in ampere / d is in mm)
Intercept = 3.959223 (I is in ampere)
U(Intercept) = 0.143827 (I is in ampere)

3.4. Value of K and n and their uncertainties

- K and u(K)

- n and u(n)

Ln(I) = ln(K) + n ln(d)

n=slope and U(n)=U(slope)

n=1.21 U(n)= ±0.06

Intercept = ln(k), $k=e^{intercept} = k^{3.96} = 52.41659$ A/ $mm^{1.5}$
$U(k)=sqrt\ (d\ (e^{intercept})/d(intercept)\ *U(Intercept)\ )^2 = sqrt\ (e^{intercept}\ *0.143)^2 = 7.538899 \pm 1.$ A / $mm^{1.5}$

3.5. Comparison with the expected values

- (Compare K with value of for your material search for info on the net or books and give reference)

- (Compare n with theoretical value n=1.5)

Theoretical reference value of k=80

| (Theoretical value-obtained value) / theoretical value | x 100

For K

|80-52.41 /80| x 100 =0.344 x 100 = 34.4%

For n

|1.5-1.21 /1.5| x 100 = 19.33%

4. Discussions

(Give a brief comment on whether your results are in agreement with what was expected or not and mention all the possible sources of error that you may have faced during the experiment)

The results are obtained with agreement of what was expected, with some margin of error.
One of the sources of error can be human based error and inaccuracies while taking value of I and also while measuring the diameters of the wires. Another source of error could be the maximum

capacity of the wire was not reached and we could not exactly be specific to record the maximum potential that the wire has.

The results for k was with an error 34.4% along with n value to be 19.33% error. Margin of this error can be high sometimes but still results were decent based on the margins and sources of error that is likely to be experienced for this experiment.

References