جامعة بيرزيت

BIRZEIT UNIVERSITY

Faculty of Science كلية العلوم

Department of Physics دائرة الفيزياء

Phys111 Report

95 (+1)

Experiment #3: Density of a Liquid

Name:		**ID #:**	
Partner:		**ID #:**	
Section:			
Date:	20/4/2022		

(1) Abstract:

- **Aim of the experiment:**

Calculating the density of unknown liquid (unknown type of oil)

- **The main result is:**
  - The density of the liquid is ρ = 0.78 ± 0.08 g/cm^3

(2) Data:

	1.	2.	3.	4.	5.	6.
L_1 (cm)	2.3	4.5	7.0	8.3	10.8	12.3
L_2 (cm)	2.4	5.0	8.2	10.7	12.8	14.7

$\Delta_1 = 0.1$ cm $\Delta_2 = 0.3$ cm $\Delta_3 = 0.1$ cm

$DL_2 = D_1 + D_2$

$DL_1 = D_2 + D_3$

Aneet 20/4/2022

(3)Calculations:

$\bar{L}_1 = 7.5$ cm $\quad \Delta\bar{L}_1 = \Delta_2 + \Delta_3 = 0.4$ cm

$\bar{L}_2 = 9.0$ cm $\quad \Delta\bar{L}_2 = \Delta_1 + \Delta_2 = 0.4$ cm

$\rho = \text{slope} = \frac{\Delta y}{\Delta x} = 0.78333 \approx \boxed{0.78}$ g/cm^3

$\frac{\Delta\rho}{\rho} = \frac{\Delta\bar{L}_1}{\bar{L}_1} + \frac{\Delta\bar{L}_2}{\bar{L}_2} = \frac{0.4}{7.5} + \frac{0.4}{9.0} = \boxed{0.097}$

$\Delta\rho = 0.076 \approx \boxed{0.08}$ g/cm^3

(4)Results:

- The density of the liquid is $\rho = 0.78 \pm 0.08$ g/cm^3

(5)Conclusions:

The Density of oil that we calculated is (0.78 ± 0.08) g/cm^3, This value is closer to the Density of Paraffin which has density value of $(0.82$ g/cm$^3)$, by applying the discrepency test to our value $|R_{true} - R_{measured}| \leq 2\Delta R$

$|0.82 - 0.78| \leq 2(0.08) \Rightarrow 0.04 \leq 0.16$ so our result is accepted.

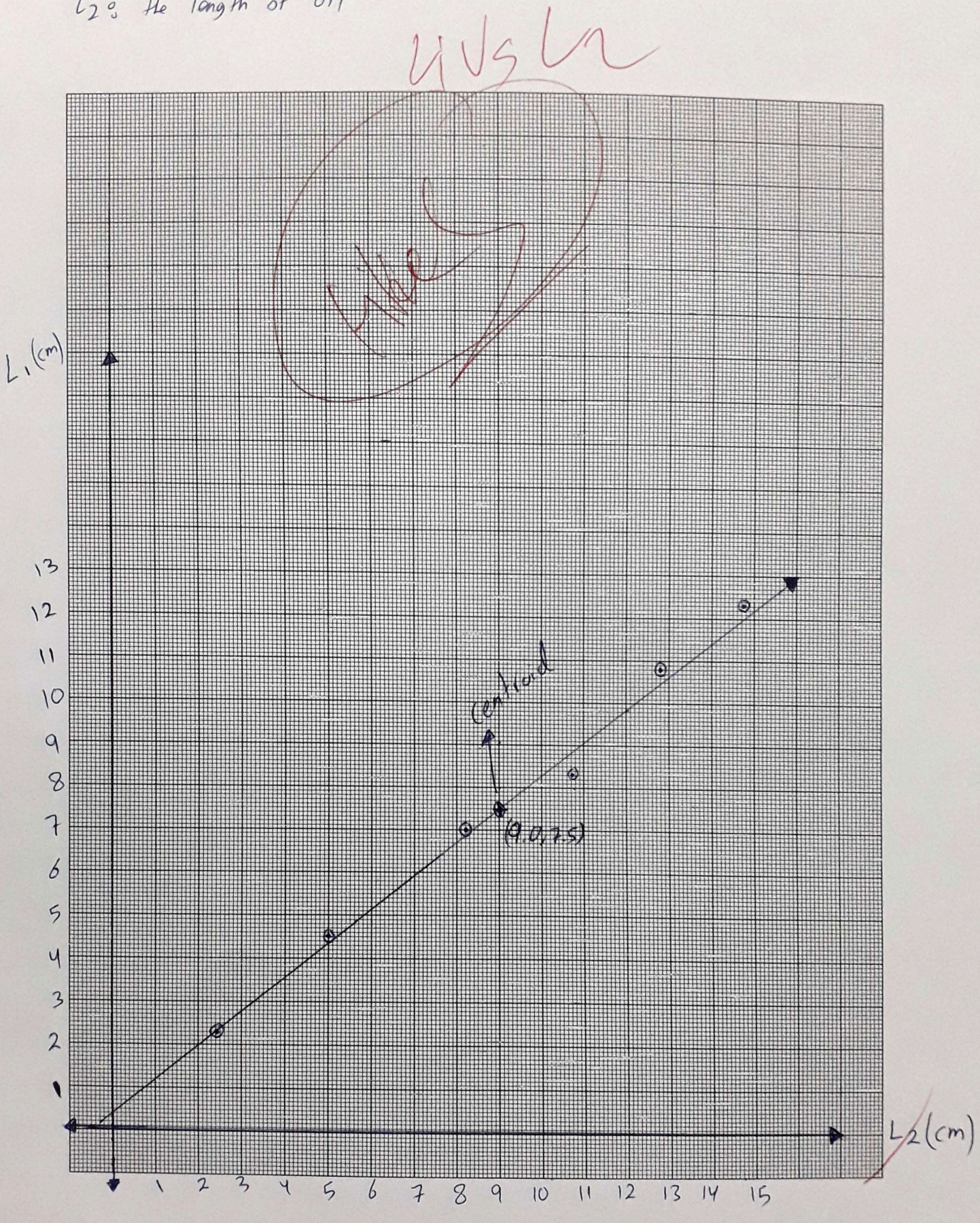
In this experiment, we have two sources of errors, the procedure of measuring the length of oil and water, and the errors occur during plotting graph and calculating the slop. First, in the process of measuring the values L_1 and L_2, the U tube wasn't very clear, so we might measure wrong values because of remains oil in the tube, another thing that measuring from improper angles could make error in measurements, and when every partner read the value, it will be different, Also, Oil drops is slow in the tube, so maybe we didn't wait enough to read values.

The other source of error is plotting graph and determine points, all process is by estimation on the graph, and plotting the best line for points is also not accurate, this affect the value of slop and so affect the value of density.

Our result of Density covers many type of oils, almost 3 types, by excluding types with different colour and types with far values, we determine the type of oil, our accuracy affects by factors mentioned above.

L_1 : the length of water

L_2 : the length of oil



centroid $(\overline{L_2}, \overline{L_1}) = (9.0, 7.5)$

slop $= \frac{\Delta y}{\Delta x} = \frac{11.4-2}{14-2} = 0.78333\ g/cm^3$

take $(14, 11.4)(2, 2)$