Hanoi University of Science and Technology
School of Engineering Physics

LAB REPORT
For Electrics and Thermodynamics

Experiment 6

Student name : Nguyen Viet Anh
Student ID   : 20150143
Group number : 1

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DETERMINATION OF SPECIFIC HEAT RATIO OF AIR BASED ON CLEMENT DESORME'S METHOD

I. EXPERIMENT MOTIVATION

- To determine the specific heat ratio $\gamma = Cp/Cv$ for air.

II. EXPERIMENTAL RESULTS

1. Measurement result:

H = 240mm			
Trial	L_1 (mm)	L_2 (mm)	$h = L_1 - L_2$
1	355	297	58
2	356	296	60
3	354	298	56
4	355	297	58
5	354	298	56
6	355	297	58
7	356	296	60
8	356	296	60
9	357	295	62
10	357	295	62
	$\overline{L_1} = 355.5$	$\overline{L_2} = 296.5$	$\bar{h} = 59.0$

2. Calculation average value and uncertainly measuring

$$\bar{h} = \frac{1}{10} \sum_{i=1}^{10} h_i = 59.0$$

The uncertain of L_1:

$$\Delta L_1 = s.d = \sqrt{\frac{\sum_{i=1}^{10}(L_i - \overline{L_1})^2}{10}} = 1.02 \ (mm)$$

The uncertain of L_2:

$$\Delta L_2 = \text{s.d} = \sqrt{\frac{\sum_{i=1}^{10}(L-\overline{L_2})^2}{10}} = 1.02(mm)$$

The uncertain of h:

$$\Delta h = \sqrt{1.02^2 + 1.02^2} = 1.44 \text{ (mm)}$$

Hence:

$$\boxed{h = \bar{h} \pm \Delta h = \ 59.0 \pm 1.44 \ (mm)}$$

3. Calculation of heat ratio of air

- The formula: $\gamma = \dfrac{H}{H-h}$
- We have:

$$\bar{\gamma} = \frac{250}{250 - 59.0} = 1.31$$

$$\Delta\gamma = \gamma \sqrt{\left(\frac{\Delta H}{H}\right)^2 + \left(\sqrt{\left(\frac{\Delta H}{H}\right)^2 + \left(\frac{\Delta h}{h}\right)^2} \times \frac{1}{H-h}\right)^2} = 0.01$$

Hence:

$$\boxed{\gamma = \bar{\gamma} \pm \Delta\gamma = \ 1.31 \ \pm 0.01}$$

4. Theoretical result and comparison

- The formula: $\gamma = \dfrac{i+2}{i}$

Where i is the Degree of Freedom of ideal gas (in this case is air), which mean $i = 5$. We got:

$$\gamma = \frac{5+2}{5} = 1.40$$

The theoretical result is a little higher than the directly measured result.