Hanoi University of Science and Technology
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LAB REPORT

For Electrics and Thermodynamics

Experiment 6

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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
	$\overline{L_1} = 355.5$	$\overline{L_2} = 296.5$	$\overline{h} = 59.0$

2. Calculation average value and uncertainly measuring

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

The uncertain of L_1:

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

The uncertain of L_2:

ΔL_2 = s.d = $\sqrt{\frac{\sum_{i=1}^{10}(L-\overline{L_2})^2}{10}} = 1.02(mm)$

The uncertain of h:

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

Hence:

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

3. Calculation of heat ratio of air

- The formula: $\gamma = \frac{H}{H-h}$
- 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:

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