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 = 250mm				
Trial	L_1 (mm)	L_2 (mm)	h = L1 – L2	$\gamma = \frac{H}{H-h}$
1	355	297	58	1.30
2	356	296	60	1.32
3	354	298	56	1.29
4	355	297	58	1.30
5	354	298	56	1.29
6	355	297	58	1.30
7	356	296	60	1.32
8	356	296	60	1.32
9	357	295	62	1.33
10	357	295	62	1.33

2. Calculation of heat ratio of air

We have:

$$\bar{\gamma} = \frac{1}{10}\sum_{i=1}^{10}\gamma_i = \ 1.31$$

We have the standard deviation:

$$\text{s. d} = \sqrt{\frac{\sum_{i=1}^{10}(\gamma_i - \bar{\gamma})^2}{10}} = 0.02$$

The uncertainty of γ:

$$S.D._{\gamma} = \Delta\gamma = \frac{s.d}{\sqrt{n}} = \frac{0.02}{\sqrt{10}} \approx 0.01$$

Hence:

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

3. Theoretical result and comparison

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

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 results is a little higher than the directly measured results.