**Class\_\_\_\_\_\_\_\_\_ Student No.\_\_\_\_\_\_\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_ Signature (Teacher)\_\_\_\_\_\_\_\_\_**

**Date of Experiment\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade(Preview)\_\_\_\_\_\_ Total Score\_\_\_\_\_\_\_\_\_\_\_**

**Experiment：Measurement of the specific heat capacity and thermal conductivity of poor conductors using the quasi-steady state method**

1. **Experimental Preparation**
2. Based on the one-dimensional infinite-flat-plate heat conduction model, deduce the expression for thermal conductivity.
3. How to determine when the system has reached a quasi-steady state in this experiment?
4. **Original Data**

*S*1: Thermoelectric potential of the center surface (中心面热电势)

*S*2: Thermoelectric potential of the heating surface (加热面热电势)

: Difference of the thermoelectric potentials of two surfaces (两面热电势之差)

: Rise of *S*1 in 5 min (5分钟热电势升高).

1. **Organic glass (2) Rubber**

Heating voltage *V* = \_\_\_\_ V, thickness *R* = 0.010 m Heating voltage *V* = \_\_\_\_ V, thickness *R* = 0.010 m

Resistance of the heating films *r* =\_\_\_\_\_\_\_\_\_\_\_ Resistance of the heating films *r* =\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *τ* (min) | *S*1  (mV) | *S*2  (mV) | (mV) | (mV) |  | *τ* (min) | *S*1  (mV) | *S*2  (mV) | (mV) | (mV) |
| **0** |  |  |  |  |  | **0** |  |  |  |  |
| **1** |  |  |  |  |  | **1** |  |  |  |  |
| **2** |  |  |  |  |  | **2** |  |  |  |  |
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| **Teacher** | **Name** |
| **Signature** |  |

**III. Data Processing**

1. Convert *S*1, *S*2, and into temperature. Plot *T*-τ curves of both the central surface and the heating surface, and the *T*-τ curve using computers. By examining the graph, please determine at what time the steady state is reached.
2. Calculate the average and using the **quasi-steady-state data**. And calculate the averager Δ*T* and d*T*/dτ in the quasi-steady state.

4. Calculate the thermal conductivities and specific heat capacities of the organic glass and the rubber samples.

1. **Analysis of the experimental phenomena and conclusion**
2. **Discussion**
3. In this experiment, we adopt the method of heating at both ends of the sample to determine the thermal conductivities and specific heats of the samples based on the temperature difference between the heated surface and the center surface, as well as the rate of temperature rise. Why are four samples used in this experiment?
4. What are the conditions for the system to reach the steady state in this experiment?

3) Will the steady state be maintained indefinitely in this experiment? Does longer time guarantee better experimental data?