Birzeit University

Physics Department

Phys211

Experiment #9

**Thermal Conductivity**

**Student’s Name :**Sarah Jamal

**Student’s # :** 1152166

**Partner:**Yasmin AbuGharbieh

**Instructor :**Areej Abdulrahaman

**Abstract**

**The Aims of the experiment**

* To understand the thermal properties of the insulating materials.
* To determine the thermal conductivity of ebonite and glass using lee’s disk method.

**The method used**

By using the apparatus in the lab that consists of a heavy copper disk C suspended from a firm stand, and by placing the ebonite disk on the top of the disk C and the ebonite was heated by passing steam through a hollow cylinder which is placed on the top of the ebonite.

**The main result**

**Data**

T2= 40 C

T1 = 68 C

|  |  |  |
| --- | --- | --- |
| **Temp.(C)** | **time** | **t (sec)** |
| 56 | 00:00 | 0 |
| 54 | 1:42 | 102 |
| 52 | 4:07 | 247 |
| 50 | 6:04 | 364 |
| 48 | 8:28 | 508 |
| 46 | 10:28 | 628 |
| 44 | 12:38 | 758 |
| 42 | 15:36 | 936 |
| 40 | 18:58 | 1138 |
| 38 | 22:45 | 1365 |
| 36 | 27:06 | 1626 |
| 34 | 31:38 | 1898 |

**D** = 36.5/3.14 = 11.6183108457 = 11.6 cm

**Thickness** = 3.92

M = 985 g

**Calculations**

In the steady state , the rate at which slab C loses heat to the surrounding through its surface is equal to the rate of heat transfer through the ebonite.

K : the thermal conductivity of ebonite

A : the area of ebonite disk

D : the diameter of ebonite disk

d : the thickness of ebonite disk

the steady state temperatures

C : the specific heat of copper

: the rate of change of the temperature at T2

M : the mass of the copper disk

|  |  |
| --- | --- |
| Temp. (C) | t (sec) |
| 56 | 0 |
| 54 | 102 |
| 52 | 247 |
| 50 | 364 |
| 48 | 508 |
| 46 | 628 |
| 44 | 758 |
| 42 | 936 |
| 40 | 1138 |
| 38 | 1365 |
| 36 | 1626 |
| 34 | 1898 |

0.016299922

= 1.37375\*10^-6 = 0.0195 cal/ (sec.m.C)

=

cal/ (sec.m.C)

**Conclusion**

D = 0.0406-0.0195 = 0.0211

**D >2** (not acceptable)

There were many sources of error in this experiment

* The ebonite disk is not exactly cylindrical so using the diameter is not that accurate in calculations
* There was an air layer between the ebonite disk and the copper disk which affected the heat transfer between the disks .
* The weighing scale that used was not accurate.
* The temperatures were not the exact steady state ones we had to wait more time