Coefficient of longitudinal expansion of metals

Theory

Most solid, liquid, and gaseous bodies expand under the influence of heat. The reason for this expansion is that the thermal energy that the body gains increases the kinetic energy of its molecules, so the interspaces between the molecules increase, and this leads to expansionIf we take a metal strip or a rod of a material with a length of ($L_\circ$) at an initial temperature (T) and when its temperature is increased by (T) and the length increases by (L) and experiments have shown that when the temperature is directly proportional to the length and if there are two rods of the same material and (ΔT) is equal for both But the initial length of one of them is twice the other, so the amount of change in length will also be double. Then this relationship can be written as follows:

$$\Delta L = \alpha L_\circ \Delta T$$

Where (α) represents the coefficient of longitudinal expansion, which varies depending on the material

$$\alpha = \left(\frac{\Delta L}{L_\circ \Delta T}\right) \quad K^{-1}$$

There are several ways to determine the longitudinal expansion parameter, but in this experiment we will use a device consisting of a metal rod inside a tube. One end of the rod is fixed with a screw regulator that limits the expansion of the rod, while the other end of the rod is left free to expand. The length must be increased using a micrometer. There are two holes at each end of the tube, one of which is One for water to enter and the other for water to exit

The practical part

1- Determine using the thermometer the initial temperature of the rod (t1) as well as its length at this temperature) $L_\circ$=50 cm

2- Fix the metal rod so that one end is in contact with the fixing screw

3- Rotate the micrometer until it touches the free end. Check the status of the contact and reading length (L_1) and rotate the micrometer backwards to allow the penis to expand

4- Water vapor passes through the tube for a sufficient period of time, about half an hour, then we turn the micrometer back and record (L_2) and calculate the increase in length, as well as recording the second temperature.

Questions

1-Spaces are left between bridge parts during their construction

2 -The surface of mercury rises when its contact comes into contact with a hot body

3- What is dilation and its causes?