Answer on Question #55734, Physics / Mechanics | Relativity

Task: In an experiment to determine the surface tension of water, the travelling microscope is used to determine ----------

A. external diameter of the capillary tube

B. height of the capillary rise of water in the tube

C. surface tension of water

D. density of water

Solution

Experiment to determine the surface tension of water

AIM:

The aim of this experiment is to investigate the capillary rise of water in capillary tubes and as an extension to determine the surface tension of water.

WHAT TO DO:

Make sure that all the apparatus is clean and free from grease. Taking one of the capillary tubes set up the apparatus as shown in the diagram (Figure 1).

Measure the diameter (d) of the bore of the capillary tube using the travelling microscope.

Using either a ruler or the travelling microscope measure the difference in levels between the water in the beaker and the bottom of the water meniscus in the capillary tube (h).

Repeat the experiment for a number of different bore capillary tubes.

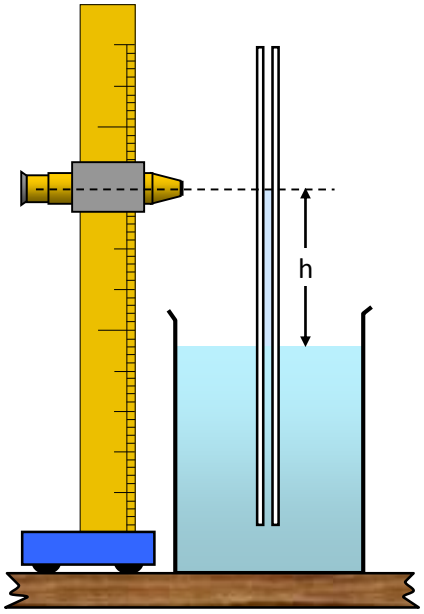


Figure 1

ANALYSIS AND CONCLUSIONS:

Plot a graph of the height (h) against the inverse of the radius (1/r).

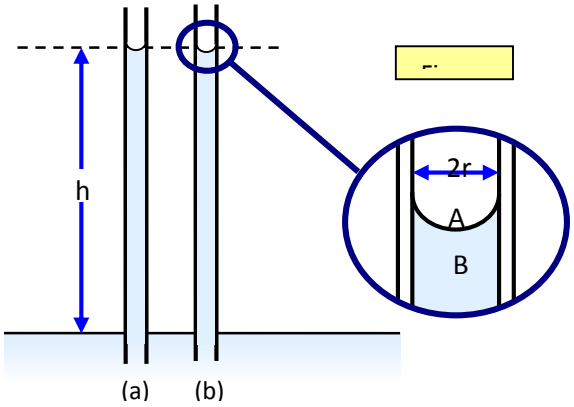
THEORY:

Calculate the surface tension of the water from the equation: $T = gr\rho h/2$ N/m

Or by using the gradient of your graph. Where r is the radius of the capillary tube and r the density of water.

See Figure 2.

Take g = 9.81 Nkg^{-1}



Answer: B. height of the capillary rise of water in the tube