

Capillary Tubes in Action

Equipment:

“capillary tubes apparatus” (communicating system of several capillary tubes with different diameters and a main reservoir)

glass beaker
glass funnel

Chemicals:

deionized water
food coloring

Procedure:

The water in the glass beaker is dyed with food coloring as dark as possible. Subsequently, the “capillary tubes apparatus” is cautiously filled with the colored water via the main reservoir with the help of the glass funnel until the main reservoir is two-thirds full.

Observation:

The water rises in the capillary tubes higher than in the main reservoir. The smaller the diameter of the tube, the higher the water rises.

Explanation:

The capillary rise h of a liquid with a surface tension σ and a density ρ depends on the radius r_c of the capillary:

$$h = \frac{2\sigma}{\rho r_c g},$$

meaning the capillary rise is inversely proportional to the capillary radius. This relationship is proven by the experiment.

