

Capillary Tubes in Action

Equipment:

three capillary tubes with different inner diameters (e.g. 1 mm, 0.6 mm and 0.4 mm) and the same length of about 7 cm

glass beaker

glass rod

Petri dish

permanent marker

“Chemicals”:

water

food coloring

Safety:

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Procedure:

The water in the glass beaker is dyed with dark food coloring such as blue and then filled in the Petri dish. Subsequently, the three capillary tubes are vertically placed into the water beginning with the tube with the largest inner diameter (but they should not touch the bottom of the Petri dish). After waiting for the liquid to stop rising, the respective level reached is indicated with the permanent marker.

Observation:

The water rises in the capillary tubes and reaches different levels. The narrower 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 tube:

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

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

Disposal:

The dyed water can be disposed by flushing it down the drain.

