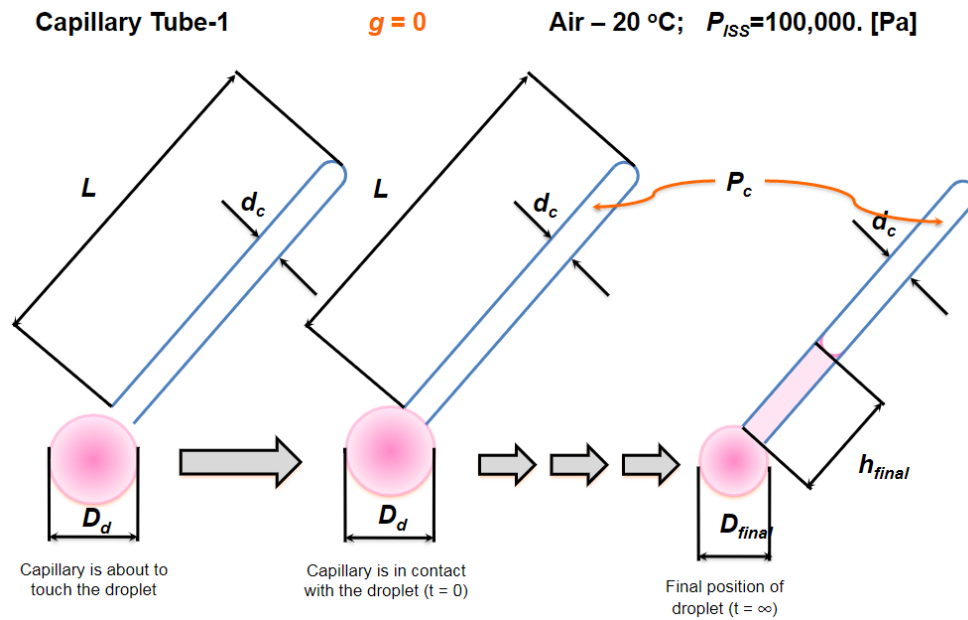


1) Consider an experiment on the International Space Station, which is illustrated below. A cylindrical capillary of length $L = 10$ [cm] and inner diameter of $d_c = 100$ [μm] are positioned to contact a droplet of water, $D_d = 1.0$ [mm], which are floating in the ISS laboratory. The capillary tube is sealed at one end. Water is completely hydrophilic with the inner surface of the capillary. The temperature in the ISS laboratories is 20°C and the pressure of $P_{ISS} = 100,000$ [Pa]. As soon as the water droplet comes into contact with the capillary tube (at time $t = 0$), the droplet starts entering the capillary tube.



Data: $d_c = 100$ [μm]; $D = 1$ [mm]; $L = 0.1$ [m]; $\mu_{water} = 0.001$ [Pa s]; $\rho_{water} = 1000$ [kg/m^3];
 $\sigma_{water-air} = 0.072$ [N/m]; $P_{ISS} = P_{atm} = 100,000$ [Pa]

Show all your work on a separate page and state all the assumptions that you made.

a) Determine how far will the water enter the capillary; i.e. determine ' h_{final} [m]', at the ISS.