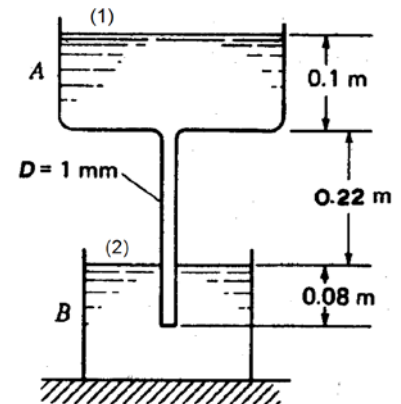NAME

Fluids-ID

Quiz 12. Water at 40°C flows from tank A to tank B as shown in the figure. Find the volumetric flow Q, neglecting entrance losses to the capillary tube as well as exit losses. Assume laminar flow and use the following energy equation and the head loss through the pipe,

$$\frac{p_1}{\gamma} + \alpha_1 \frac{V_1}{2g} + z_1 + h_p = \frac{p_2}{\gamma} + \alpha_2 \frac{V_2}{2g} + z_2 + h_t + h_L$$

$$h_L = \frac{128\mu L Q}{\pi \rho g D^4}$$

where, ρ = 992 kg/m³ and μ = 6.51 × 10⁻⁴ N·s/m² are the density and viscosity of water, D and L are the diameter and length of the tube, respectively, and V is the mean velocity through the tube. For laminar flow, $\alpha_1 = \alpha_2 = 2$.

Note: Attendance (+2 points), format (+1 point)