A U tube is filled with a liquid and water. Here the water is denser than the liquid. See the sketch. The horizontal line \( \overline{AB} \) is at the level of the water-liquid interface.

\[ h_1 \]

\[ L \]

\[ h_2 \]

Compare the pressure \( P_2 \), which the water column exerts on the liquid at the interface, and the pressure \( P_1 \), which the liquid column at the left tube above the line \( \overline{AB} \) exerts on the liquid below it.

A) \( P_1 < P_2 \).
B) \( P_1 = P_2 \).
C) \( P_1 > P_2 \).

Denote \( P_0 \) to be the atmospheric pressure.
At point \( C \), which is at the bottom of the U-tube and it is a static point, the pressure from the left must be the same as the pressure from the right. This implies that

\[ P_0 + \rho_{liquid} g (h_1 + L + h_2) = P_0 + \rho_{water} g L + \rho_{liquid} g h_2. \quad (1) \]

Since

\[ P_1 = P_0 + \rho_{water} g L \]

and

\[ P_2 = P_0 + \rho_{liquid} g (h_1 + L), \]

we see Eq. (1) implies

\[ P_1 = P_2. \]

Answer B

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