Q.1. All fluids in below figure are at 20°C. If atmospheric pressure \( P_{atm} = 101.33 \text{ kPa} \) and the bottom pressure is 242 kPa absolute, what is the specific gravity of fluid X?

**Solution**

Simply applying the hydrostatic formula from top to bottom:

\[
P_{\text{bottom}} = P_{\text{top}} + \Sigma \rho g h = P_{\text{top}} + \Sigma \rho' h
\]

\[
242000 = 101330 + (8720)(1) + (9790)(2) + \delta_x (3) + 133100 (0.5)
\]

\[
242000 = 101330 + 8720 + 19580 + 3 \delta_x + 66500
\]

\[
\therefore 3 \delta_x = 45870
\]

\[
\delta_x = 15290 \text{ N/m}^3 \quad \text{or} \quad SG_x = \frac{15290}{9790} = 1.56
\]

Q.2. Determine \( \Delta P \) between points A and B. All fluids are at 20°C.

**Solution**

Take the specific weights to be

- Benzene: 8640 N/m\(^3\)
- Kerosene: 7885 N/m\(^3\)
- Mercury: 133100 N/m\(^3\)
- Water: 9790 N/m\(^3\)
- \( \delta_{\text{air}} = 12 \text{ N/m}^3 \)

\[
P_A + (8640 \text{ N/m}^3)(0.20 \text{ m}) - (133100 \text{ N/m}^3)(0.08 \text{ m}) - (7885 \text{ N/m}^3)(0.32 \text{ m}) + (9790 \text{ N/m}^3)(0.26 \text{ m}) - (\frac{12}{3})
\]

\[
(2.09) = \Delta P
\]