

Chapter 15 Problem 24 †

Given

$$\Delta P = 100 \text{ kPa}$$

$$\Delta h = 6.0 \text{ m}$$

Solution

Find the density of the fluid.

The hydrostatic equation states

$$\frac{dP}{dh} = \rho g$$

Solving for density gives

$$\rho = \frac{1}{g} \frac{dP}{dh}$$

For the given interval the differential can be replaced with a difference

$$\rho = \frac{1}{g} \frac{\Delta P}{\Delta h}$$

Now solve for density

$$\rho = \frac{1}{(9.8 \text{ m/s}^2)} \frac{1.0 \times 10^5 \text{ Pa}}{(6.0 \text{ m})}$$

$$\rho = 1.7 \times 10^3 \text{ kg/m}^3$$

†Problem from Essential University Physics, Wolfson