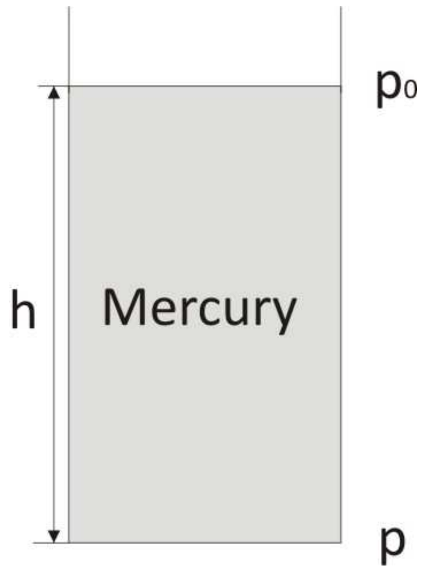
A reservoir contains mercury up to a height of *h=10cm*. the atmospheric pressure at the surface of the mercury is equivalent to a pressure made by a column of mercury of height *H=75cm*. Calculate in *Pa* the total pressure exerted at a point in the bottom of the reservoir. Take *g=10N/Kg* and density of mercury *P=13600kg/m* cubed.

Solution.

$$h = 10cm = 0.10m, H = 75cm = 0.75m, g = 10\frac{N}{kg}, \rho = 13600\frac{kg}{m^3};$$

$$P-?$$



The total pressure exerted at a point in the bottom of the reservoir is:

$$p = p_o + p_m;$$

p_o – the atmospheric pressure;
p_m – the pressure made by a column of mercury in the reservoir.

$$p_m = \rho gh.$$

$p_o = \rho gH$, because the atmospheric pressure at the surface of the mercury is equivalent to a pressure made by a column of mercury of height $H = 75cm$.

$$p = \rho gh + \rho gH;$$

The total pressure exerted at a point in the bottom of the reservoir is:

$$p = \rho g(h + H).$$

$$p = 13600\frac{kg}{m^3} \cdot 10\frac{N}{kg}(0.10m + 0.75m) = 115600Pa.$$

Answer: The total pressure exerted at a point in the bottom of the reservoir is $p = 115600Pa$.