Assignment 2

3.6 As absolute pressure is the Sum of gage pressure and atmospheric pressure, absolute pressure will always be greater than that of gage pressure. Hence given statement is TRUE

3.7 Atmospheric pressure depends upon the density, Specific weight and temperature of the Surface. As these thing factors change from place to place, the atmospheric pressure will also change. Therefore given statement is False

3.8 The pressure in a Certain tank is -55.8 Pa (abs). The statement is False because there are no negative values on absolute pressure Scale.

3.9 Given $P_{abs} = -55.8$ Pa. Gage pressure is Measured relative to perfect vacuum, the absolute pressure is always positive. Hence the given statement is False

3.10 The atmospheric pressure near the earth's Surface is 101 KPa. As the given gage pressure is Negative, the Statement is False

3.11

3.11 Given;

$h = 4000\ ft$

atm. pressure at sea level $= P_{atm} = 14.70$ psia

let $P =$ elevation above sea level (4000)

$\Delta p = \gamma h$

Specific weight of air $\gamma = 0.0764\ lb/ft^3$

$\Delta p = (0.0764\ lb/ft^3)(4000\ ft)$

$\Delta p = 305.6 \left(\frac{lb}{12\ in^2}\right)$

$\Delta p = 2.12$ psia

$\Rightarrow P = P_{atm} - \Delta p$

$P = 14.70\ psia - 2.12\ psia$

$P = \underline{\underline{12.6\ psia}}$

3.13

$P_{abs} = P_{atm} + \rho g h$

$P_{abs} = P_{atm} + \rho g \times 0$

$P_{abs} = P_{atm}$

$P_{gage} = P_{abs} - P_{atm}$

$= P_{atm} - P_{atm}$

$= 0$

$\therefore$ In terms of gage pressure, the pressure at the surface of glass of milk is $\underline{0}$

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13.) The gage pressure at the surface of a glass of milk is,

$P_{abs} = P_{atm} + \rho g h$

$P_{abs} = P_{atm} + \cancel{\rho g 0} \to 0$

$P_{abs} = P_{atm}$

$P_{gage} = P_{abs} - P_{atm}$

therefore the answer is $\boxed{\text{zero}}$

41) what must pressure be at point A to be atleast 180 psig.

$(32\,in + 80\,in - 48\,in) = h = 64\,in$

$\frac{oil}{water} \approx sg$ $.9 = \frac{oil}{62.4\,lb/ft^3}$

$oil = (.9)(62.4) = 56.2\,\frac{lb/ft^3}{12\,in^3} = .033\,lb/in^3$

$\Delta p = (64)(.033) = 2.112\,lb/in^3$

$P_{air} = 180\,psig - 2.112\,psig$

$P_{air} = 177.9\,psig$

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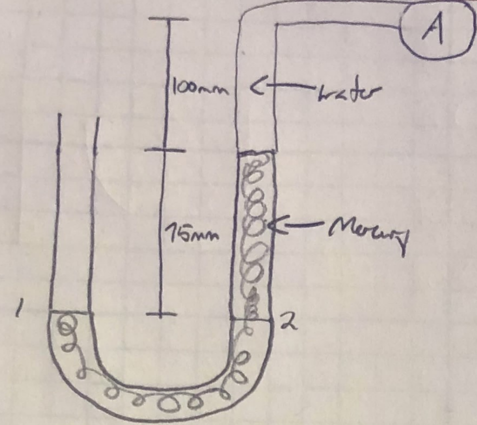
62)



$Sg_{Hg} = 13.54$

$\gamma_w = 9810 N/m^3$

$h_w = 0.1 m$

$\gamma_{Hg} = \gamma_w (Sg_{Hg})$

$h_{Hg} = 0.075 m$

$$P_A + \gamma_w h_w + \gamma_{Hg} h_{Hg} = P_{atm}$$

$$P_A - P_{atm} = -(\gamma_w h_w + \gamma_{Hg} h_{Hg})$$

$$(P_A)_{gage} = -(\gamma_w h_w + \gamma_w Sg_{Hg} h_{Hg})$$

$$(P_A)_{gage} = -(9810 N/m^3 (0.1 m) + 9810 N/m^3 (13.54)(0.075 m))$$

$$(P_A)_{gage} = -10943.055 N/m^2$$

$$(P_A)_{gage} = -10943.055 Pa$$

$$\boxed{(P_A)_{gage} = -10.943 kPa}$$

83) $P_{atm} = 30.65$ in of Hg

$1 \text{ in Hg} = 0.49 \text{ psia}$

$$P_{atm} = 30.65 \text{ in Hg} \left(\frac{0.49 \text{ psia}}{1 \text{ in Hg}}\right)$$

$$\boxed{P_{atm} = 15 \text{ psia}}$$

90

Given: $P = -68.2\ kPa$

To Find: P (in mmHg) = ?

Solution

As we know

$1\ Pa = 0.0075\ mmHg$

To convert any pressure given in Pa to mm of Hg

we would multiply it

$$P = -68.2\ kP$$
$$= -68\ 200\ Pa$$
$$= (-68200)(0.0075)\ mmHg$$
$$\boxed{P = -511.5\ mmHg}$$

Q 94

Given: $h = 16\ m$ $\gamma = 9.81\ kN/m^3$

To Find: Gauge Pressure, $\Delta P = \gamma h$

Solution: As the gauge pressure can simply be abtiuned by taking the product of specific weight and height

$\Delta P = \gamma h \Rightarrow (9.81)(16)\ kPa$ $\boxed{\Delta P = 156.96\ kPa}$

This the gauge pressure required the plumbing line is 156.96 k Pa