Answer on Question #67289, Physics / Molecular Physics | Thermodynamics

At 0 degree celcius the pressure of the gas in constant volume gas thermometer is 30cm Hg. Calculate the temperature when the pressure of the gas is 50 cm of Hg

Find: T_2 – ?

Given:

T_1=273 K

$$P_1 = \frac{30\ \text{cm Hg}}{76\ \text{cm Hg}} \times 1.013 \times 10^5 \text{Pa} = 0.4 \times 10^5 \text{Pa}$$

$$P_2 = \frac{50\ \text{cm Hg}}{76\ \text{cm Hg}} \times 1.013 \times 10^5 \text{Pa} = 0.67 \times 10^5 \text{Pa}$$

Solution:

Gay-Lussac's Law:

$$\frac{P_1}{T_1} = \frac{P_2}{T_2} \quad (1)$$

Of (1) $\Rightarrow$ $T_2 = \frac{P_2}{P_1} T_1$ (2)

Of (2) $\Rightarrow$ T_2=457 K (3)

Of (3) $\Rightarrow$ t_2=+184 °C

Answer:

+184 °C (457 K)