

**Problem:**

If  $\left(p + \frac{a}{V^2}\right)(V - b) = RT$  find the dimension of a/b.

**Solution:**

The given equation is the Van der Waals equation of the state of gas, where

$p = [Pa]$  – pressure of gas

$V = [m^3]$  – volume

$R = \left[\frac{J}{mol*K}\right]$  – universal gas constant

$T = [K]$  – temperature

a, b – some constants

As in the equation pressure is added to  $\frac{a}{V^2}$ , this two physical quantities have the same dimensions. The same way we consider  $V$  and  $b$  have the same dimensions too. Thus, the dimension of  $a$  is the same as the dimension of  $p * V^2 = [Pa * m^6]$ , and dimension of  $b$  is  $b = [m^3]$ . Then

$$\frac{a}{b} = \left[ \frac{Pa * m^6}{m^3} \right] = [Pa * m^3]$$

where

Pa – pascal

m - meter