Answer to Question #50748, Chemistry, Physical Chemistry

Deduce the SI units for the gas constant, R.

Solution:
In order to derive this, we'll use the ideal gas equation,

$$p \times V = n \times R \times T$$

From this equation,

$$R = \frac{p \times V}{n \times T}$$

Now, at NTP conditions(Normal temperature and pressure)
P = 101325 Pa
V = 22.4 L = 0.0224 m^3
T = 273K
n = 1 mole.

Plugging these values in we get

$$R = \frac{101325\ Pa \times 0.0224\ m^3}{1\ mol \times 273\ K} = 8.313\ \frac{Pa \times m^3}{K \times mol}$$