

5. (a) We solve the ideal gas law  $pV = nRT$  for  $n$ :

$$n = \frac{pV}{RT} = \frac{(100 \text{ Pa})(1.0 \times 10^{-6} \text{ m}^3)}{(8.31 \text{ J/mol} \cdot \text{K})(220 \text{ K})} = 5.47 \times 10^{-8} \text{ mol} .$$

- (b) Using Eq. 20-2, the number of molecules  $N$  is

$$N = nN_A = (5.47 \times 10^{-8} \text{ mol}) (6.02 \times 10^{23} \text{ mol}^{-1}) = 3.29 \times 10^{16} \text{ molecules} .$$