Question #81792, Chemistry / General Chemistry | for completion

How many air molecules are in a 14.5×12.0×10.0 ft room? Assume atmospheric pressure of 1.00 atm, a room temperature of 20.0 ∘C, and ideal behavior.

P= 1 atm = 101325 Pa

t= 20 oC

N-?

Solution:

1 ft = 0.305 m

T = t+273 K= 293 K

PV= nRT, n = PV/RT

V= 14.5*0.305*12*0.305*10*0.305= 49.4 m^3

R= 8.32 J/ mole* K

n = 101325*49.4/(8.31*293)=2055 moles

N = n* NA= 2055*6.02×10^23= 12371×10^23= 1.2×10^27

Answer: 1.2×10^27 molecules