20-4   Pressure, Temperature, and RMS Speed

20-04

Question 301   0.55-36%

Oxygen gas at 20 degrees Celsius is confined in a cube. What is the translational average kinetic energy per molecule?
(a)   9.1*10**-24 J
(b)   6.1*10**-21 J
(c)   4.1*10**-22 J
(d)   5.2*10**-21 J
(e)   2.1*10**-22 J

20-04

Question 302   0.43-36%

The mass of an oxygen molecule is 16 times that of a hydrogen molecule. At room temperature, the ratio of the rms speed of an oxygen molecule to that of a hydrogen molecule is:
(a)   1/4
(b)   16
(c)   1/16
(d)   1
(e)   4

20-04

Question 303

The mass of a hydrogen molecule is 3.3*10**(-27) kg. If 1.0*10**23 hydrogen molecules per second strike 2.0 cm**2 of wall at an angle of 55 degrees with the normal when moving with a speed of 1.0*10**3 m/s, what pressure do they exert on the wall?
(a)   0.9*10**3 Pa.
(b)   2.8*10**3 Pa.
(c)   8.6*10**3 Pa.
(d)   5.7*10**3 Pa.
(e)   1.9*10**3 Pa.

20-04

Question 304

Find the rms speed of nitrogen molecules (M=28 g/mole) at 0 degree-C.
(a)   1.7*10**2 m/s.
(b)   4.9*10**2 m/s.
(c)   3.9*10**2 m/s.
(d)   3.2*10**2 m/s.
(e)   zero.

20-04

Question 305   0.20-71%

The average translation kinetic energy of an ideal gas of helium atoms at room temperature (300 Kelvin) is 5.54*10**(-21) J. The average translation kinetic energy of the ideal argon gas at room temperature is: [Atomic mass of helium = 2.0 Kg/Kmole, Atomic mass of argon = 8.0 Kg/Kmole]
(a)   1.40*10**(-21) J.
(b)   5.54*10**(-21) J.
(c)   2.21*10**(-20) J.
(d)   2.77*10**(-21) J.
(e)   1.11*10**(-20) J.