Previous year JEE question 2

Calculate the root mean square, average and most probable speed of oxygen at 27°C.

Answer:

27°C=300 K

Root mean square speed =$(3RT/Mw)^{0.5}$)

R=8.314×107erg K−1mol−1;M=32 g mol−1;T=300 K

Substituting the values,

=323×8.314×107×300

=483.56 cm/sec

=483.56 m/sec

Average speed =$(8RT/\pi M)^{0.5}$)

=22×328×8.314×107×300×7

=445.42 cm/sec

=445.42 m/sec

Most probable speed =$(2RT/M)^{0.5}$

=322×8.314×107×300

=39482 cm/sec

=394.83 m/sec.