

Answer on Question #44318-Physics-Molecular Physics-Thermodynamics

When temperature of gas become twice by heating then the gas dissociated from molecular form to atomic form . What will be effect on root mean square velocity

Answer

Root-mean-square speed is given by the formula

$$v_{rms} = \sqrt{\frac{3kT}{m}},$$

where m is the mass of one molecule of the gas, k is the Boltzmann constant, T is the temperature in kelvin.

The effect on root mean square velocity is various for various gases, but it will be grow.

For example, if we consider O_2 (oxygen), N_2 (nitrogen), etc., we can see that

$$v'_{rms} = \sqrt{\frac{3k \cdot 2T}{\frac{m}{2}}} = 2 \sqrt{\frac{3kT}{m}} = 2 \cdot v_{rms}.$$

So, the root mean square velocity was doubled.