

## Answer on Question#37555, Physics, Mechanics

### Question:

At what temperature will the root-mean-square speed of oxygen molecules have the value of 640 m/s? 1 kilomole of oxygen has a mass of 32kg.

### Answer:

The root mean square velocity can be expressed as:

$$v = \sqrt{\frac{3RT}{M}}$$

where  $R$  is ideal gas constant  $R = 8.3145 \frac{J}{K \cdot mol}$ ,  $T$  is absolute temperature in Kelvin,  $M$  is mass of a mole of the gas in kilograms.

Therefore, temperature equals:

$$T = \frac{v^2 M}{3R} = \frac{640^2 \cdot 0.32}{3 * 8.31} = 5258 K$$

Answer: 5258 K