

Name: _____

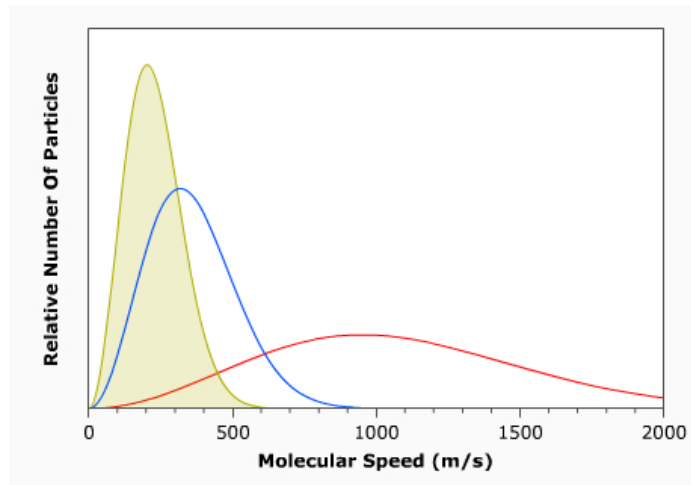
POST-LAB QUIZ #6 (10pts)

The most probable speed of molecules in a gas, the velocity value at the peak of the distribution, is

$$v_{mp} = \sqrt{\frac{2kT}{m}}, \tag{1}$$

where m is the mass of an individual atom, T the temperature, and k is Boltzmann’s constant. The figure below shows the distribution of speeds for 3 different gases at a temperature of $T = 100\text{K}$. The relative masses of the three different gases are:

- Water, $m_{H_2O} = 18$, Hydrogen, $m_{H_2} = 2$, Carbon Dioxide, $m_{CO_2} = 44$.



1. Label on the graph which curve corresponds to which gas, Water, Hydrogen and Carbon Dioxide.
2. If the escape velocity of the planet is $v_{esc} = 700\text{m/s}$, what would the composition of the atmosphere be, which gas(es)?
3. The most probable speed for for the gas with the tallest peak is $v_{mp} = 250 \text{ m/s}$ at $T = 100\text{K}$. If the gas is heated up to the higher temperature of $T = 400\text{K}$, will v_{mp} now be higher, lower, or the same. What will be new most probable speed for this gas at $T = 400\text{K}$?