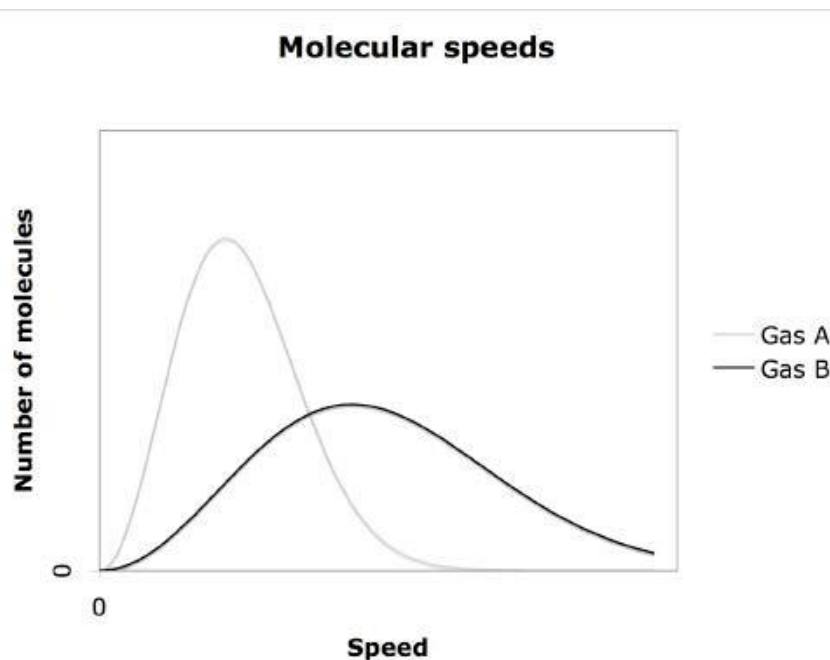1.

Two gases in thermal equilibrium are observed to have the following distributions for the speeds of their molecules. Which of the following must be true?

Molecular speeds

Gas A has a lower temperature than gas B.

The molecules in gas A are heavier than those in gas B.   A

Gas A is monatomic and gas B is diatomic.

Gas A is at lower pressure than gas B.

The molecules in gas A are bigger in size than those in gas B.

2.

The temperature of low pressure hydrogen is reduced from 100 degree Celsius to 20 degree Celsius. The RMS speed of its molecules decreases by approximately:

80%

89%

46%

29%

11%   A

3.

The mass of oxygen molecule is 16 times that of hydrogen molecule. At room temperature, the ratio of the RMS speed of an oxygen molecule to that of a hydrogen molecule is:

16

4

2

1/4   A

1/16

4.

Maxwell-Boltzmann law is for the _____

Distinguishable particles   A

Indistinguishable particles

Particles with half integral spin

Particles with integral spin

Mass-less particles

5.

The Maxwell-Boltzmann law is given by the expression _____

$1/e^{E/kT}$

$1/e^{(1+E/kT)}$

$1/e^{(\alpha+E/kT)}$ A

$1/e^{(\alpha+nE/kT)}$

$1/(1+e^{E/kT})$

6.

The ratio of rms velocity to most probable velocity is _____

sqrt(2)/sqrt(3)

3/2

2/3

sqrt(3)/sqrt(2)   A

sqrt(2)*sqrt(3)

7.

The average kinetic energy associated with each degree of freedom is _____

(3/2)kT

2kT

3kT

kT/2   A

kT/4

8.

The density of molecules is maximum at which speed?

v_average

v_RMS

v_peak   A

v_instantaneous

v_average/2

9.

What would be the most probable velocity for one Oxygen molecule at 300 K?

612 m/s

714 m/s   A

798 m/s

821 m/s

575 m/s
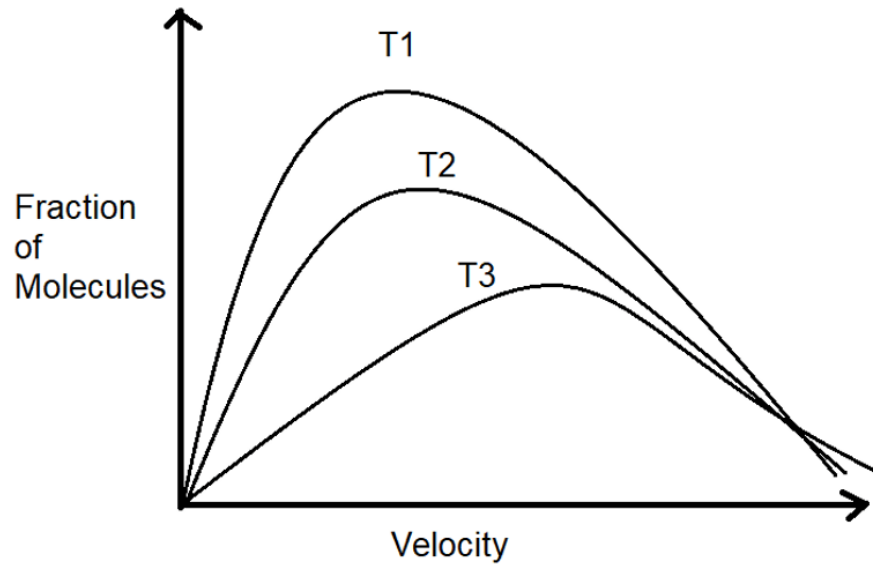
10.

From the figure, what is the highest temperature?

T1

T2

T3   A

Insufficient information

All are at the same temperature

11.

What is the Kinetic Energy of 2 g of oxygen at -73°C?

186.2 J

194.86 J

201.45 J

256.32 J

155.88 J   A

12.

The units of probability density function f(speed)=f(v) is:

Unitless

m/s

s/m   A

J/kelvin

1/m^3

Hz

13.

How does a higher temperature affect the probability distribution curve of gas particles?

It makes the curve taller.

It makes the peak of the curve smaller but staying at the same position.

It makes the curve wider or fatter, while the peak stays at the same position.

It shifts the peak of the curve toward lesser speed.

It shifts the peak of the curve toward higher speed.   A