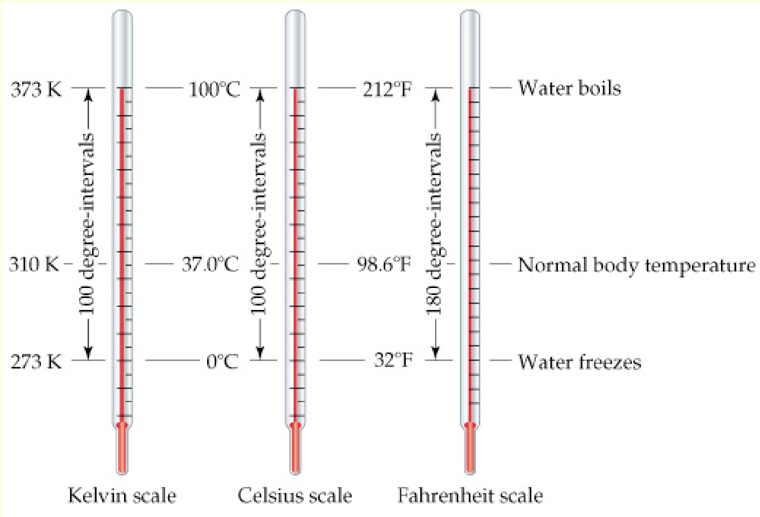
Gases and KM Theory:

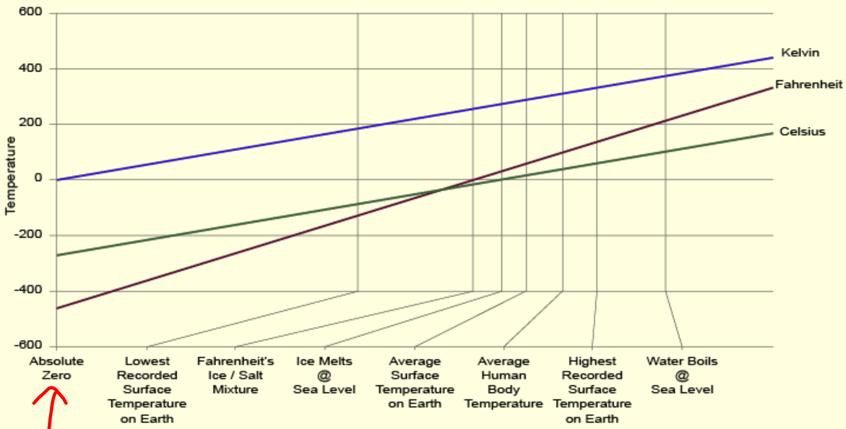
Assumptions of the kinetic-molecular theory:

- Gases consist of very large numbers of tiny spherical particles that are far apart from one another compared to their size.
- Gas particles are in constant rapid motion in random directions.
- Collisions between gas particles and between particles and the container walls are elastic collisions.
- There are no forces of attraction or repulsion between gas particles. (very little)
- The average kinetic energy of gas particles is dependent upon the temperature of the gas.

Comparing Temperature Scales

°Fahrenheit
°Celcius (centigrade)
Kelvin

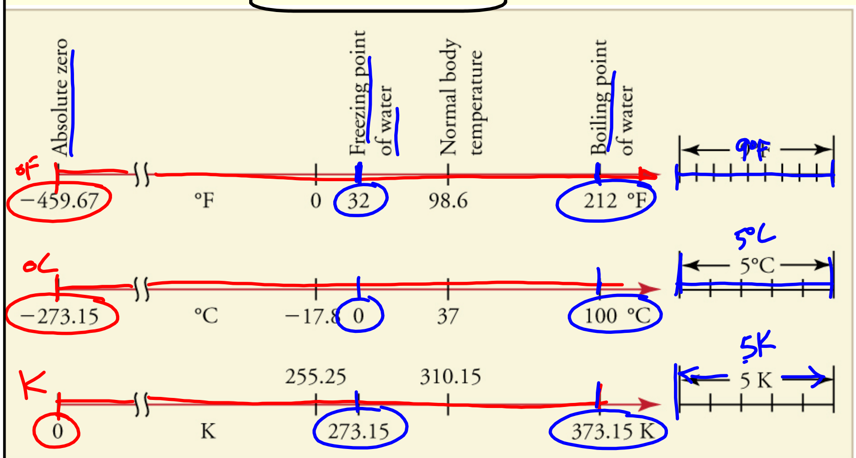




slope of K = slope of °C

273° difference

K = °C + 273.15

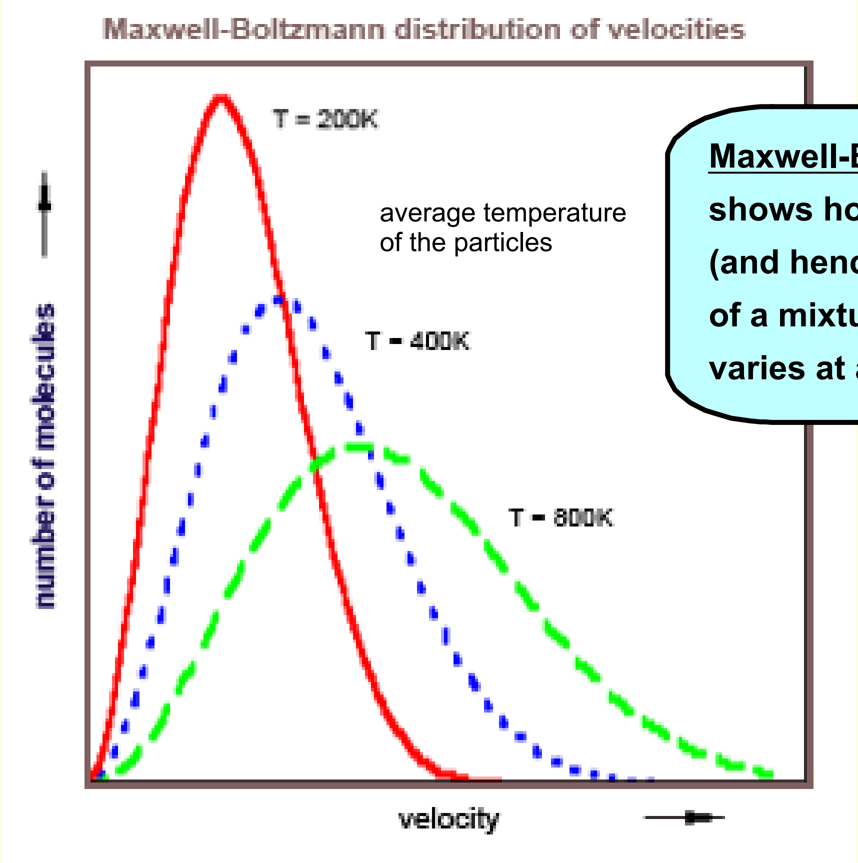


°C = (°F − 32) × 5/9

°F = °C × 9/5 + 32

Temperature

is the measure of velocity of the particles



<u>Maxwell-Boltzmann Distribution</u>
shows how the speeds
(and hence the energies)
of a mixture of moving particles
varies at a particular temperature.

Ave. Kinetic Energy is the temperature

KE is dependent on speed of particles

$KE=1/2\ mv^2$

In any particular mixture of moving molecules, the speed will vary a great deal, from very slow particles (low energy) to very fast particles (high energy).
Most of the particles however will be moving at a speed very close to the average.
The Maxwell-Boltzmann distribution shows how the speeds (and hence the energies of a mixture of moving particles varies at a particular temperature.

KE is dependent on speed of particles
(Temperature)

$KE = \frac{1}{2}mv^2$

If these gases are at same temperature, which particles are moving faster?

He O_2 CO_2

use $KE = \frac{1}{2}mv^2$

KE is the same if temp is the same

mass of each gas is different

so velocities are different

These gases are at same temperature: (same KE)

Which particles are moving faster?

	He	O_2	CO_2
mass:	4	32	44

use $KE = \frac{1}{2}mv^2$

He, (smaller mass, higher velocity)