KMT: Kinetic Molecular Theory

GASES

1. Gas particles are in constant, random motion.
2. Gas particles are separated by relatively large distances.
3. When gas particles collide, they do not transfer kinetic energy.
4. Gas particles have no attractive or repulsive forces between them.
5. The kinetic energy of a gas is dependent on the temperature of the gas.

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PROPERTIES OF GASES

- Low density: few particles per volume
- Compression: squeeze particles into smaller space
- Expansion: move to fill space
- Diffusion: from high concentration to low concentration
- Effusion: moving from a puncture to a vacuum

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TEMPERATURE CONVERSIONS

Temperature (T) must be in units of Kelvin (K) for all gas law calculations.

- K = °C + 273
  - example: 25°C = 298 K
- C = K - 273
  - example: 305 K = 32 °C

Kelvin is always bigger

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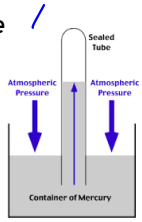
GAS PRESSURE

- Pressure = force/area and comes from particle collisions
- COLLSIONS CAUSE PRESSURE
- Barometer: used to measure air pressure
  - Gravity
  - Force of air on the surface of mercury
- Increase in air pressure = Hg rises
- Decrease in air pressure = Hg lowers

mm Hg



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UNITS OF PRESSURE

- Pascal (SI unit):
  - Pascal = 1 N/m²
  - 1,000 Pa = 1 kPa
- millimeters of Mercury (mm Hg)
- Torr (1 torr) = 1 mm Hg
- 1 Atmosphere (atm) = 760 mm Hg = 101.3 kPa *
- Standard Temperature and Pressure (STP)
  - P = 760 mm Hg or 1 atm or 101.3 kPa
  - T = 273K or 0°C

* conditions

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CONVERTING UNITS OF PRESSURE

1. Convert 1.5 atm to kPa.

$$1.5\,atm \times \frac{101.3\,kPa}{1\,atm} = 151.95\,kPa$$

2. Convert 755 mmHg to atm.

$$755\,mmHg \times \frac{1\,atm}{760\,mmHg} = .99\,atm$$

3. Convert 98.5 kPa to mmHg.

$$98.5\,kPa \times \frac{760\,mmHg}{101.3\,kPa} = 739\,mmHg$$

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