KineticTheoryofGas

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Kinetic theory of Gas

The Kinetic Theory of Gas is a model to explain the behavior of gases. There are four part to the theory:

- Gas particles do not interact with each other {i.e. they have no intermolecular forces (IMF)}
- A gas consists of molecules moving in constant straight line motion until they hit another molecule or the wall of the container. The average of the kinetic energy in all the molecules is the temperature.
- All collisions between gas molecules (and wall of container) are perfectly elastic. Perfectly elastic means that all the energy in the system before collision exists after collision, only re-distributed differently. An analogy playing pool. A perfect elastic collision is when the cue ball hits the "still" object ball and after collision, the cue ball is "still" and the object ball moves away with the exact amount of kinetic energy that the cue ball had before the collision.
- The actual volume of particle is significantly smaller than the volume of the gas (i.e. volume of the gas container). This allows us to assume that all gases (no matter the actual size) occupy the same volume if you have the same number of gas particles (i.e. same number of moles).

Using this theory and the gas parameters (GasParameters), you can calculate Gas Law Problems (GasLaws).

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- Ideal Gas Condition
  - To simplify the concept & mathematics, these conditions hold true.
- Real Gas condition
  - These conditions do not hold true. (collision are perfectly elastic & $V_{container} >> V_{particles}$ & all gas particles have same volume)
- Every gas is BOTH REAL & IDEAL

GasParameters

Gas Parameters

When you are looking at problems dealing with gases, visualizing a balloon is a good starting point. There are four basic ways to change (or parameters) the balloon. These are:

1. Volume, V, usually has units of Liter, defined as volume occupied by gas particles

2. Temperature, T, degree C or Kelvin (K), can be thought of as "relative speed" of particles. **In all gas law calculations, T must be in K**

    - To convert from degree C to K use following equation: degree C + 273 = K

3. Pressure, P, usually in atm, can be thought of as the number of hits on the wall of the container (from all the particles). Others units and their equivalence to atmospheric pressure are:

    - 1.00atm = 760.mmHg = 101.3 kPa = 14.7psi = 33ft H_2O = 760. torrs

4. Number of moles of gas particles, n, units of moles

GasPressure

- [Notes for Gas Pressure]
- Pressure Unit Conversion Factor
    - 1atm = 101.3kPa = 760.mmHg = 14.7psi = 1.01325bars = 29.9in Hg = 33.9 ft H_2O