**Unit 6: Gases Review Sheet**

**Gas Laws**

* Boyle’s Law
	+ ↑Pressure ↓Volume or ↓Pressure ↑Volume
	+ At constant temperature, the volume of a gas is *inversely* proportional to pressure.
	+ As volume decreases, (the number of gas particles remains the same), there are more collisions with the container. The increased number of collisions causes the increase in pressure.
	+ As volume increases, (the number of gas particles remains the same), there are less collisions with the container. The decreased number of collisions cases the decrease in pressure



* Charles’ Law
	+ ↑Volume ↑Temperature or ↓Volume ↓Temperature
	+ At constant pressure, volume is directly proportional to Kelvin (absolute) temperature. Temperature **MUST BE IN KELVIN** and this may require a Celsius to Kelvin conversion.
		- Kelvin = Celsius + 273 (on Table T on Reference Table)
	+ Temperature is the same as average kinetic energy so as temperature increases, average kinetic energy increases, the particles move faster. When temperature is decreased, average kinetic energy decreases and the particles move slower.
	+ As the particles move faster and faster with the increased temperature, there are more collisions with the container and because pressure is held constant, the container can expand and vice versa.



* Gay-Lussac’s Law
	+ ↑Pressure ↑Temperature or ↓Pressure ↓Temperature
	+ At constant volume, temperature and pressure are directly related
	+ As temperature increases, the average kinetic energy increases and the particles move faster. With a fixed volume, and the increased number of collisions with the sides of the container, pressure increase and vice versa.



* The Combined Gas Law
	+ All three laws are combined to form one equation.
	+ List out all of your givens and figure out what you are looking for
	+ Remember STP means something – check Table A
		- Standard Temperature = 273 K or 0 C
		- Standard Pressure = 1 atm or 101.3 kPa
	+ If something is held constant, or not mentioned in the question, ignore it from the equation
	+ Remember temperature must be in Kelvin

**The Kinetic Molecular Theory**

* The KMT predicts behavior of ideal gas molecules: pressure, volume, temp., velocity, frequency & forces of collisions.
	+ - 1. Gas particles are in constant, random straight-line motion
			2. Gas particles collide w/ each other & the walls of its container. These collisions are what create **pressure**. The collisions are also *elastic*, meaning there is *no loss of energy*.
			3. Gas particles have no intermolecular forces of attraction, therefore they do not attract or repel each other.
			4. Gas particles have mass but no volume. They are very far apart from each other & relative to their small size, have volume that is negligible
* “Real gases” deviate from the “ideal gas laws” above. **These deviations show how “real gases” are different from those described in KMT.**
	+ **Point 3 Deviation:** Gas particles do have forces of attraction.
	+ **Point 4 Deviation:** The volume of gas particles is significant. Gas particles do have some volume.
* Conditions for a real gas to act as close to an ideal gas are ***low pressure*** and ***high temperature*** *(particles far apart from each other and moving very fast)* **PLIGHT**
	+ **P**ressure **L**ow **I**deal **G**as **H**igh **T**emperature
* Real gases exhibit ***high pressure*** and ***low temperature*** *(particles are close together and moving slowly by one another)*
* **Hydrogen** and **Helium** are the two real gases that act most ideal, they are the lightest
* **Avogadro’s Hypothesis:** Equal volumes of all gases under the same conditions of temperature and pressure have equal numbers of molecules.