**SCH3U: U5-L9 Date:**

**Unit 5 Gases and Atmospheric Chemistry: Review**

**Key Ideas**

* States of matter
	+ Forces
	+ Kinetic molecular theory
* Boyles law
	+ Pressure and volume
* Charles Law
	+ Temperature and volume
	+ Kelvin
* Pressure temperature law
	+ Pressure and temperature
* Combined gas law – can replace all three above
	+ Pressure, volume, and temperature
	+ Understand the relationships between temperature, pressure and volume.
* Idea gas Law
	+ (These assumptions are not true in all cases especially with extreme temperatures and pressures. When we make calculations we pretend that it is a perfect world situation)
	+ Volume-temperature and pressure temperature graphs are perfectly straight lines.
	+ Gas does not condense to a liquid when it cools
	+ Gas volume = 0 at absolute zero
	+ pv = nRT
	+ Gas particles have no volume
	+ Gas particles do not attract each other
* Law of combining values
	+ When measured at the same temperature and pressure, volumes of gaseous reactants and products of chemical reactions are always in simple ratios of whole numbers
* Avogadro’s theory
	+ Equal volumes of gases at the same temperature and pressure contain equal numbers of molecules
* Molar volume
	+ The volume that one mole of a gas occupies at a specified pressure and temperature.
		- VSTP = 22.4 L/mol VSATP = 24.8 L/mol

**Terms**

|  |  |
| --- | --- |
| * Absolute zero
* Atmospheric pressure
* Boyle’s law
* Charles’ Law
* Combined gas law
* Combined gas law
* Gas constant
* Ideal gas
 | * Ideal gas law
* Kelvin temperature scale
* Kinetic molecular theory
* Pressure
* Pressure and temperature law
* Molar volume
* Partial pressure
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**Formulas**

|  |  |  |
| --- | --- | --- |
| **Type** | **Formula** | **Units** |
| Boyle’s Law | P1V1 =P2V2 | Pressure = kPa, mm Hg, atm |
| **Kelvin temperature** | TK=  tc  +  273.15   tc  =  TK  -  273.15 | K or °C |
| **Charles Law** | V1T2= V2T1  | Temperature = KVolume = L |
| **Pressure and Temperature Law** | $$\frac{p\_{1}}{T\_{1}}=\frac{p\_{2}}{T\_{2}}$$ | Pressure = kPa, mm Hg, atmVolume = L |
| Combined gas law | $$\frac{p\_{1}v\_{1}}{T\_{1}}= \frac{p\_{2}v\_{2}}{T\_{2}}$$ | Pressure = kPa, mm Hg, atmVolume = LTemperature = K |
| Ideal Gas law | $$PV=nRT$$R = **8.3143510  kPa L/mol K**  |  |
| Dalton’s Law | **Ptotal = P1 + P2 + P3 +...** | Kpa |
| Molar Volume of gas | $$n=\frac{v}{V}$$ | V = STP = 22.4 mol/L V = SATP = 24.8 mol/L |
| Pressure conversions | mm Hg to kPagiven $mm Hg x\frac{101.325kPa}{760mmHg}$kPa to mm Hg$$given kPa x\frac{760 mm Hg}{101.325 kPa}$$ | 1 atm = 101.325kPa1 atm = 760 mm Hg |

**Questions**

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