**Gas Laws (Chapter 10 of Brown and LeMay)**

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| --- | --- |
| Formula | comments |
| P1V1 = P2V2  Boyle’s law |  |
| =  Charles’ Law |  |
| =  Law of Gay-Lussac |  |
| =  Avogadro’s Law |  |
| PV = PV  T1 T2  Combined gas law  And general gas law |  |
| PV = *n*RT  Ideal gas law |  |
| D=PM  and M = DRT  RT P |  |
| Ptotal = PA + Pb + …  Dalton’s law of partial pressure |  |
| Pa = aPtotal |  |
| KE= ½ mv2 |  |

How is an atom different in the gas state then in either the liquid or solid state?

1. The above chart explained *how* gases behaved. In 1857 Rudolf Clausius put together a theory to explain *why* they behaved this way. He called this theory “Kinetic Molecular Theory” or KMT. This theory is a hugely important and hugely tested concept in AP Chemistry—know, understand, and be able to apply this concept *in your sleep*!

The Kinetic Molecular Theory of Gases

* 1. All gas molecules are small and far apart
  2. they are in constant random motion
  3. combined volume of all molecules of the gas is negligible relative to the total volume in which the gas is contained
  4. Gas molecules experience no attraction or repulsion for other gas molecules
  5. collisions are perfectly elastic—no energy loss (at constant temp)
  6. KE= 3/2RT since heat is energy=--their energy is proportional to their temperature.
  7. (Continuation of #6) all gases molecules have the same KE at a given temp (KE= ½mv2)

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1. KMT assumes “ideal” gas behavior. What is meant by an “ideal” gas?
2. What type of gases would by their nature most likely follow ideal behavior, which would most likely deviate from ideal behavior?
3. What situations would help gases follow ideal behavior, what situations would hinder gases from following ideal behavior? Explain

**Lesson 2 (Theory)**

* 1. Use the KMT to explain the following gas laws:

Boyles

Charles

Gay Lussac

Avogadro

Dalton’s

Grahams

* 1. Arrange the following gases in order of increasing deviation from ideality: H2O, CH4, Ne. Justify your answer
  2. Which of the noble gases will deviate the most from ideal behavior? Explain your reasoning.
  3. Discuss the units used with the gas laws. What unit is a MUST and why?

This Maxwell--Boltzmann Distribution curve demonstrates how the speed of a gas sample is determined.

**Important points**



