GASES NOTES
HONORS CHEMISTRY

Directions: This packet will serve as your notes for this chapter. Follow along with the PowerPoint presentation and fill in the missing information. Important terms / ideas are in all capitals and bolded!

• Characteristics of Gases

1) Gases consist of hard, ________________ particles (atoms or molecules)

2) Particles are ___________ and do have ___________

3) Large amounts of _____________________

4) Easily ___________________ and ___________________

5) Move ________________ and ___________________

• Kinetic Theory of Gases

-Explains the ________________ of gases and why they ____________ the way they do...

CONSTANT ______________ WHICH IS ____________ AND ____________ (ALLOWS FOR COMPRESSIBILITY AND PRESSURE) WITH __________________!!

• GAS PRESSURE:

-Due to simultaneous ________________ of ________________ of rapidly moving particles

- BAROMETER:

-Atmospheric pressure exists due to the _______ exerted by _____ molecules striking other objects

• Units of Pressure

1 atm = _______ mm Hg

1 atm = _______ torr

1 atm = _______ kPa

STP = _____ °C and _____ atm

-Example: Express __________ mm Hg in atm.
• **Gas Laws**

  - Factors including _____________, _____________, _________________, and _______________ will affect a gas

  - How a gas will _____________ to these changes can be predicted using certain ______________

• **BOYLE’S LAW**

  Pressure _______________, then volume _______________
  (_____________ relationship)

  - Equation:

  - Real World Examples:

    - Example: A balloon is filled with _____ L of air at _____ atm pressure. If the pressure is changed to 1140 mm Hg, what is the new volume?

• **CHARLES’ LAW**

  Volume _______________, as the temperature _______________
  (_____________ relationship)

  - Equation:

  - Real World Examples:

    - Example: What is the temperature of a gas expanded from _____ L at 25°C to _____ L at constant pressure?
• **GAY-LUSSAC'S LAW**

  Pressure _______________, as the temperature _______________
  
  (_________________ relationship)

  - Equation:

  - Real World Examples:

    - Example: What is the pressure inside a 0.250 L can of deodorant that starts at _____°C and 1.2 atm if the temperature is raised to ______°C?

• **COMBINED GAS LAW**

  Boyle's, Charles', and Gay-Lussac's Laws ________________!

  - Equation:

  - Example: A _____ L cylinder of gas at 486 kPa pressure and _____°C is heated to 75°C and compressed to ____ atm. What is the new volume?

• Practice

  - Example: Bacteria produce methane gas in sewage-treatment plants. If a bacterial culture produces ______ mL of methane gas at 700.0 mm Hg, what volume (in L) would be produced at 760.0 mm Hg?
Example: A pressure cooker raises the temperature of its contents by keeping the contents under pressure. The volume of the cooker is 4.0 L. Steam at 100.0°C and 1.00 atm usually cooks the food. If the cooker is placed at _____ atm, what will the temperature of the steam be in °C?

**Ideal Gas Law**

Includes all _______ factors that can affect a gas!

- Equation:
  
  \[ n = \]
  
  \[ R = \]

- **Ideal Gas**: follows gas laws at _____ conditions of pressure and temperature... assumes particles have no ___________ and no attractive forces (These don't really ________!)

- **Real Gas**: have ___________ and attract to each other and will only be ideal at very _____ pressures or _______ temperatures

- Limitations of the Ideal Gas Law:
  1) Works well at _____ pressures and ______ temperatures (that's when real gases act ideally)
  2) Most gases do not behave ideally above __________ pressure
  3) Does not work well near ________________ conditions of a gas

*Ideal gases don't _________ because molecules do take up __________ and attractive forces exist otherwise __________ would not form... _________ easier and close approximation so we assume gases are ideal!

Example: Determine the volume occupied by _______ grams of carbon dioxide gas at STP.

Example: If I have ____ moles of a gas held at a temperature of _____°C and in a container with a volume of 45,000 mL, what is the pressure of the gas?
• **DALTON’S LAW**

Total pressure of a ___________ of gases is equal to the _____ of the ___________________________________ of the component gases!

-Equation:

-Example:

-Example: N₂, He, Ne, and Ar are placed into a container. The partial pressures of each are as follows: N₂ = ____ kPa, He = 73 kPa, Ne = ____ kPa and Ar = 108 kPa. What is the total pressure in the container?

• **Diffusion vs. Effusion**

-**DIFFUSION:** gas molecules will _______ to fill an area until the ______________ are __________ spread out

-**EFFUSION:** when a gas is confined to a ______________ that has a __________________, molecules will ____________ encounter the _____________ and pass through it

-**GRAHAM’S LAW OF EFFUSION:** Rate at which a gas will effuse is ______________ proportional to the ______________ of the gas’s ______________

  - Equation:

  *When comparing effusion rates for gases… the ____________ the molar mass, the ____________ the gas will effuse!!*

![Graph showing time vs. square root of molecular weight for various gases]