

Gas Laws Study Guide

Test Format:

- Multiple choice and problems

Items that will be provided for the test (read important notes at the bottom):

- Gas law equations
- The value of R
- Pressure conversion factors

* I will provide the equations on the test. You are responsible for knowing which laws the equations describe (ex: I will give you $P_1 \times V_1 = P_2 \times V_2$ and you must know that this is Boyle's Law).

- What is the name of the model we currently use to explain the behavior of gases? **kinetic molecular theory (KMT)**
- Define the kinetic molecular theory (KMT). **Gases are in constant motion with elastic collisions**
- The KMT makes many assumptions about the Size, motion, and energy of gas particles.
- According to the KMT, do gas particles experience attractive or repulsive forces? Explain why or why not. **Neither- they are too far apart**
- Completely describe the motion of gas particles according to the KMT. **Constant, Random, Straight paths, different velocity**
- Define elastic collision. **No kinetic energy is lost- just transferred between particles**
- What determines the kinetic energy of a particle? **Mass and velocity**
- In a sample of a single gas, do all particles have the same kinetic energy? Explain why or why not. **No — they have a different velocity**
- Define temperature. **Measurement of kinetic energy**
- Explain why gases have a low density. **Lots of space between particles (large volume)**
- Why are gases compressible? **Lots of empty space between particles**
- Why do gases expand to fill a container? **No attractive or repulsive forces**
- Why can gas particles flow easily past each other? **No attractive forces**
- Define diffusion. **Movement of one material through another**
- Define effusion. **Gas escapes through tiny openings**
- Describe how diffusion depends on the mass of the particles. **Diffusion is dependent on mass, so less mass more diffusion**
- Use the KMT to explain why a balloon expands as you blow air into it. **Particles are in constant motion and collide with their surroundings expanding the balloon**

Boyle's Law: Answer the following questions about Boyle's Law.

- Describe Boyle's Law in your own words. **As pressure increases, volume decreases**
- What is the formula? **$P_1V_1 = P_2V_2$**
- What are the variables? What are the possible units used in the formula? **Pressure and volume, atm, kPa, mL, L**
- What is constant? **temperature**



- Give an example to help explain the law (you should have some type of visual of your example).
- What would a graph of pressure vs. volume of a gas look like according to Boyle's Law?

Charles' Law: Answer the following questions about Charles' Law.

- Describe Charles' Law in your own words. **Increase temperature, increase volume**
- What is the formula? **$V_1/T_1 = V_2/T_2$**
- What are the variables? What are the possible units used in the formula? **Temperature and volume (kelvin, mL, L)**
- What is constant? **Pressure**
- What is very important to remember about the temperature variable when using this formula? **It must be in kelvin**
- Give an example to help explain Charles's Law (you should have some type of visual of your example).



- What would a graph of temperature vs. volume of a gas look like according to Charles's Law?

Gay-Lussac's Law: Answer the following questions about Gay-Lussac's Law.

- Describe Gay-Lussac's Law in your own words. **As pressure increases, temperature increases**
- What is the formula? **$P_1/T_1 = P_2/T_2$**
- What are the variables? What are the possible units used in the formula? **Pressure and temperature (kelvin, atm, kPa, torr)**
- What is constant? **volume**
- What is very important to remember about the temperature variable when using this formula? **It must be in kelvin**
- Give an example to help explain Gay-Lussac's Law (you should have some type of visual of your example).

Study Guide The Gas Laws

Steven S. Zumdahl, Paul B. Kelter



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that meets the learning needs of today's student better than the dense encyclopedic manner of traditional texts. This approach helps students connect the math and theory to the physical world and practical applications and apply these connections to solving problems. The text lucidly presents basic analysis techniques and addresses practical concerns and applications such as pipe flow, open channel flow, flow measurement and drag and lift. It offers a strong visual approach with photos, illustrations and videos included in the text, examples and homework problems to emphasize the practical application of fluid mechanics principles.

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