Name: Due Date:

Assignment 18.01: The Ideal Gas Law

1. What is the Ideal Gas Law, and what does each variable in the equation represent?

2. Explain how the pressure of a gas changes if the volume of the container is reduced while the temperature is held constant.

3. If the number of moles of a gas is doubled while keeping the temperature and volume constant, how does the pressure change?

4. Why does increasing the temperature of a gas at constant volume increase its pressure?

5. Under what conditions is the Ideal Gas Law most accurate, and why does it break down under extreme conditions?

6. How would the Ideal Gas Law apply to a gas in a container with a variable volume, such as a balloon?

7. Calculate the pressure of 2.0 moles of an ideal gas confined in a 10.0 L container at a temperature of 300 K.

8. Determine the temperature of 3.0 moles of an ideal gas that exerts a pressure of 5.0 atm in a 15.0 L container.

9. What volume does 1.5 moles of an ideal gas occupy at a pressure of 2.0 atm and a temperature of 350 K?

10. A gas at 1.0 atm and 273 K occupies a volume of 22.4 L. How many moles of gas are present?

11. Calculate the pressure of an ideal gas containing 2.5×10^{23} particles in a 0.1 m^3 container at a temperature of 300 K.

12. Find the temperature of a gas if it contains 3.0×10^{24} particles, occupies a volume of 0.2 m^3, and exerts a pressure of 1.5×10^5 Pa.

13. What is the volume of a gas containing 1.0×10^{25} particles at a pressure of 2.0×10^5 Pa and a temperature of 400 K? (Use

14. Determine the number of particles in a gas at a temperature of 350 K, occupying a volume of 0.05 m^3, and exerting a pressure of 2.0×10^5 Pa.

15. If the volume of a gas is tripled while keeping the temperature constant, how does the pressure change according to the Ideal Gas Law? Explain using the physics version of the equation.