

Name \_\_\_\_\_

## Gases – Study Guide

\_\_\_\_\_ relates the pressure and volume of a gas with the relationship \_\_\_\_\_. This law explains that as the volume of a gas increases, the pressure \_\_\_\_\_. \_\_\_\_\_ relates the temperature and volume of a gas with the relationship \_\_\_\_\_. This law explains that as the temperature of a gas increases, the volume \_\_\_\_\_ (at a constant pressure). The \_\_\_\_\_ relates all 4 properties of a gas \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ with the relationship \_\_\_\_\_. R has two values depending on the units of the problem you are trying to solve.  $R = \text{_____} (\text{L}\cdot\text{kPa})/(\text{mol}\cdot\text{K})$  or  $\text{_____} (\text{L}\cdot\text{atm})/(\text{mol}\cdot\text{K})$ . Temperature must be measured in Degrees Kelvin. To convert Celsius to Kelvin use the relationship:  $\text{K} = \text{C} + \text{_____}$ . Standard temperature and pressure (STP) refers to \_\_\_\_\_ °C (\_\_\_\_\_ K) and \_\_\_\_\_ atm. A gas at STP has a volume of \_\_\_\_\_ L.

**Word Bank:** decreases, pressure, Charles's Law, moles, Boyle's Law, Ideal gas Law,  $P_1 V_1 = P_2 V_2$ , temperature,  $V_1 T_2 = V_2 T_1$ , volume,  $PV = nRT$ , 0.0821, 8.314, 22.4, 273.15, 273.15, 0, 1

In the Cartesian Diver lab, the soda bottle was sealed. When you squeezed it, the pressure inside the bottle (increases/decreases) and the diver sank. Which gas law explains this? (Boyle's/Charles's).

In the Classic Can Crush lab, the water in the can is heated up. This causes the steam and hot air to (expand/contract). When it is suddenly cooled in the tub of water the hot air/steam is forced to (expand/contract) creating a vacuum in the can and causing the can to implode. Which gas law explains this? (Boyle's/Charles's)

### Calculation

1. A gas has a pressure measured at 79,000 pascals. What is this pressure in atmospheres?
2. A sample of a gas has a volume of 200 mL when its pressure is 0.750 atm. What will the volume of the gas be at a pressure of 0.250 atm, if the temperature remains constant?
3. A sample of a gas occupies a volume of 245 mL at 25°C. What volume will the gas occupy if the temperature increases to 100°C, while the pressure remains constant?
4. Calculate the approximate volume of a 0.800 mol sample of gas at 35.0°C and a pressure of 1.25 atm.

### Honors Only

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10. An unknown gas occupies 11.2 L of volume at 298 K under 1 atm of pressure. This gas sample has a mass of 19.97 grams. Please give the molar mass, in grams per mole, of this gas.