

Gas Laws WS

Charles' Law #1

Name: _____

Period: _____ Date: _____

- 1) **Charles' Law** states that with a constant amount of gas at a constant pressure, there is a relationship between the _____ and _____ of a gas. The two quantities are _____ proportional, which means that as one of them gets bigger, the other one gets _____. The mathematical equation for the law is:

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

- 2) There are two formulas for changing temperatures back and forth between the three different measurements.
- What is the formula for converting between Celsius and Fahrenheit?
 - What is the formula for converting between Celsius and Kelvin?
- 3) Convert the following temperatures to Kelvin
- | | | |
|------------------------------|-----------|-------------------|
| a. Standard Temp. (0°C) | d. 150°C | g. -10°F |
| b. Room Temp. (25°C) | e. -250°C | h. 212°F |
| c. Absolute Zero (-273°C) | f. 100°F | i. One million °F |
- 4) A 4.4 L sample of hydrogen at 20°C is heated up to 60°C. What will the new volume be?

- 5) A 35 m³ balloon of carbon monoxide at -10°C is cooled to -60°C. How big will the balloon be at the new temperature?
- 6) A 4 L sample of oxygen is compressed into a new container that is half as large, but with no change in the pressure. If the beginning temperature was 41°C, what is the new temperature inside the container in Celsius?
- 7) An 85 L balloon containing argon has a temperature of 67°C. If the temperature is heated up to 199°C, what size must the balloon be able to expand to for it not to pop?
- 8) A 9 L balloon at 40°C will have what Celsius temperature if the volume changes to 25 L?
- 9) Your car pistons compress the vapor of the gasoline (Octane) in your engine down to 2.4 L, at room temperature before it igniting it at 220°C. What volume do the pistons in the engine have to expand to accommodate this temperature at constant pressure?
- 10) When you place your bag of popcorn in the microwave, the temperature of the gas within the bag increases from room temperature up to the boiling point of water at 100°C. If the bag contains 250 mL of air before going in the microwave, how big will the bag expand when popped?