Gay-Lussac's Law Worksheet Key

Assume that the volume and the amount of gas are constant in the following problems.

1. A gas in a sealed container has a pressure of 125 kPa at a temperature of 30.0°C. If the pressure in the container is increased to 201 kPa, what is the new temperature?

P_1 125 kPa
T_1 303 K
P_2 201 kPa
T_2 ?

$$\frac{125\text{kPa}}{303\text{K}} = \frac{201\text{kPa}}{T_2}$$

$$\frac{(201)(303)}{125} = \boxed{487.2\text{K}}$$

2. The pressure in an automobile tire is 1.88 atm at 25.0°C. What will be the pressure if the temperature warms up to 37.0°C?

P_1 1.88 atm
T_1 298 K
P_2 ?
T_2 310 K

$$\frac{(1.88\text{atm})(310\text{K})}{298\text{K}} = \boxed{1.96\text{atm}}$$

3. Helium gas in a 2.00 L cylinder is under 1.12 atm pressure. At 36.5°C that same gas sample has a pressure of 2.56 atm. What was the initial temperature of the gas in the cylinder?

(not mentioned again)

P_1 1.12 atm
T_1
P_2 2.56 atm
T_2 309.5 K

$$\frac{1.12\text{atm}}{T_1} = \frac{2.56\text{atm}}{309.5\text{K}}$$

$$\frac{(1.12)(309.5)}{2.56} = \boxed{135.41\text{K}}$$

4. If a gas sample has a pressure of 30.7 kPa at 0.00°C, by how much does the temperature have to decrease to lower the pressure to 28.4 kPa?

P_1 30.7 kPa
T_1 273
P_2 28.4 kPa
T_2 ?

$$\frac{(28.4\text{kPa})(273)}{30.7\text{kPa}} = -252.55\text{K}$$ ← not final answer

$$273 - 252.55 = \boxed{20.45\text{K}}$$ decrease by

5. A rigid plastic container holds 1.00 L methane gas at 0.9 atm pressure when the temperature is 22.0°C. How much more pressure will the gas exert if the temperature is raised to 44.6°C?

(not mentioned again)

P_1 0.9 atm
T_1 295 K
P_2 ?
T_2 317.6 K

$$\frac{(0.9\text{atm})(317.6\text{K})}{295\text{K}} = 0.97\text{atm}$$

$$0.97 - .9 = \boxed{.07\text{ atm more}}$$