

Simple Gas Laws Review:

(Boyle's Law, Charles' Law, Gay-Lussac's Law)

name: SOLUTIONS

Use Significant Figures in your answers.

- 1) A gas has a pressure of 0.370 atm at 50.0 °C. What is the pressure at standard temperature?

$$\frac{P_1}{T_1} = \frac{P_2}{T_2} \quad \frac{0.370}{323} = \frac{P_2}{273}$$

$$\underline{\underline{P_2 = 0.313 \text{ atm}}} \quad (3 \text{ sig Figs})$$

- 2) A balloon contains 7.2 L of He at a temperature of 35°C. The pressure is reduced to 2.00 atm and the balloon expands to occupy a volume of 25.1 L at the same temperature. What was the initial pressure exerted on the balloon?

$$P_1 V_1 = P_2 V_2$$
$$P_1 (7.2) = (2.00)(25.1)$$

$$\underline{\underline{P_1 = 6.9 \text{ atm}}} \quad (2 \text{ sig figs})$$

- 3) A container holds 50.0 mL of nitrogen at 25° C and a pressure of 736 mm Hg. What will be its volume if the temperature increases by 35° C?

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

$$\frac{50.0}{298} = \frac{V_2}{333}$$

$$\underline{\underline{V_2 = 55.9 \text{ mL}}} \quad (3 \text{ sig figs})$$

- 4) A 5.00 L gas sample is collected at 122 K and then allowed to expand to 20.0 L. What must the change in temperature (in °C) be in order to facilitate this change ?

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

$$\frac{5.00}{122} = \frac{20.0}{T_2}$$

$$T_2 = 488 \text{ K}$$

(3 sig figs)

$$T_2 - T_1$$

$$488 - 122$$

$$= 366 \rightarrow 93^\circ\text{C}$$

(0 decimal) 93°C

- 5) A sample of neon occupies a volume of 461 mL at STP. What will be the volume of the neon when the pressure is reduced to 93.3 kPa?

$$P_1 V_1 = P_2 V_2$$

$$(101.3)(461) = (93.3) V_2$$

$$V_2 = 500.52 \text{ mL}$$

↓

$$\underline{\underline{501 \text{ mL (3 sig figs)}}}$$

- 6) If a gas in a closed container is originally pressurized to 15.0 atm at ambient temperature, What would the final temperature (in °C) of the gas be if the pressure is increased to 16.0 atm ?

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{15.0}{298} = \frac{16.0}{T_2}$$

$$T_2 = 317.86$$

(3 sig figs)

↓
25°C
↓
298°C

(0 deci) (0 deci)

$$317.86 - 273$$

$$= 44.86 \rightarrow \underline{\underline{45^\circ\text{C}}}$$