

+ $\frac{3}{3}$

Name: Vanessa Bias
10/11/18

Useful information:

$$R = 0.08206 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}}$$

Molecular weight of $\text{CO}_2 = 44.01 \text{ g/mol}$

The sublimation of dry ice (solid CO_2) occurs at temperatures above 194.65 K and is given by the following chemical equation:



You buy a party balloon with a maximum capacity of 1.50 L and place a 2.00 g piece of dry ice into the balloon at 298 K and 1.00 atm. If you tie the balloon so no gas leaks, will the balloon pop before its contents reach room temperature? Show your work.

$$PV = nRT$$

$$2.00 \text{ g} \times \frac{1 \text{ mol CO}_2}{44.01 \text{ g CO}_2} = 0.045 \text{ mol CO}_2$$

$$1 \text{ atm}(1.50 \text{ L}) = 0.045(0.08206) T$$

$$\frac{1.50 \text{ L}}{0.045(0.08206)} = T$$

$$406.2 \text{ K} = T$$

in order to pop temp must be 406.26 K

$$1 \text{ atm}(V) = 0.045(0.08206)(298 \text{ K})$$

$$V = 1.1 \text{ L}$$

at 298 K, $V = 1.10 \text{ L}$ so

balloon has not popped

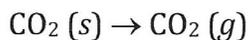
Name: Mathew Krick

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$$PV = nRT$$

$$P = 1.00 \text{ atm}$$

$$T = 298 \text{ K}$$

$$V_{\text{max}} = 1.50 \text{ L}$$

$$R = 0.08206 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}}$$

$$2.00 \text{ g CO}_2 (\text{s}) \times \frac{1 \text{ mol CO}_2}{44.01 \text{ g CO}_2} = 0.0454 \text{ mol CO}_2$$

3 sig. figs

$$V = \frac{nRT}{P} = \frac{(0.0454 \text{ mol CO}_2)(0.08206 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}})(298 \text{ K})}{1.00 \text{ atm}}$$

$$V = 1.11 \text{ L}$$

The balloon will not pop because the volume of CO_2 gas produced inside the balloon is less than the maximum volume capacity of the balloon.

Name: _____

Kearney delany

Useful information:

$$R = 0.08206 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}}$$

Molecular weight of $\text{CO}_2 = 44.01 \text{ g/mol}$

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$$V_{\text{max}} = 1.50 \text{ L} \quad 2.00 \text{ g}$$

$$T = 298 \text{ K} \quad P = 1.00 \text{ atm}$$

$$2.00 \text{ g} \times \frac{1 \text{ mol}}{44.01} = 0.04544 \text{ mol}$$

$$V_1 = \frac{nRT}{P} = (0.04544 \text{ mol})(0.08206) \left(\frac{298 \text{ K}}{1.00} \right)$$

$$V_1 = 1.1129 \text{ L}$$

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K

= " " "

$$194.65 \text{ K}$$

$$V_2 = 0.72588 \text{ L}$$

$$T_F = 194.65 \text{ K}$$

$$PV = nRT$$

The balloon will not pop because volume at both temperatures is less than the max capacity of 1.50 L

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