

Answer on Question #71653, Chemistry / General Chemistry

Question:

A gas canister can tolerate internal pressure up to 318 atmospheres. If a 1.2 L canister holding 3.5 moles of gas is heated to 1050°C, will the canister explode?

Solution:

The ideal gas law:

$$PV = nRT$$

$$\rightarrow P = nRT / V$$

Calculating data in the standard units (SI):

$$T = 1050^{\circ}\text{C} = 1323 \text{ K}$$

$$V = 1.2 \text{ L} = 0.0012 \text{ m}^3$$

$$R = 8.314 \text{ Jmol}^{-1}\text{K}^{-1} \text{ (gas constant)}$$

$$\text{So, the pressure: } P = (3.5 \cdot 8.314 \cdot 1323) / 0.0012 = 32081647.5 \text{ Pa}$$

$$1 \text{ atm} = 101325 \text{ Pa}$$

$$\text{So the pressure in atm: } P = 32081647.5 / 101325 = 316.6 \text{ atm}$$

This is less than 318 atm

Answer:

The canister **will not** explode