cylinder that has a volume of 80.0 L, what pressure will the CO_2 exert on the cylinder?

The Ideal Gas Law: Chap. 11, Sec. 3

277. Use the ideal-gas-law equation to calculate the unknown quantity in each of the following sets of measurements. You will need to convert Celsius temperatures to Kelvin temperatures and volume units to liters.

P	*V*	*n*	*T*
a. 1.09 atm	? L	0.0881 mol	302 K
b. 94.9 kPa	0.0350 L	? mol	55°C
c. ? kPa	15.7 L	0.815 mol	−20.°C
d. 0.500 atm	629 mL	0.0337 mol	? K
e. 0.950 atm	? L	0.0818 mol	19°C
f. 107 kPa	39.0 mL	? mol	27°C

278. A student collects 425 mL of oxygen at a temperature of 24°C and a pressure of 0.899 atm. How many moles of oxygen did the student collect?

Applications of the Ideal Gas Law

279. A sample of an unknown gas has a mass of 0.116 g. It occupies a volume of 25.0 mL at a temperature of 127°C and has a pressure of 155.3 kPa. Calculate the molar mass of the gas.

280. Determine the mass of CO_2 gas that has a volume of 7.10 L at a pressure of 1.11 atm and a temperature of 31°C. Hint: Solve the equation for *m*, and calculate the molar mass using the chemical formula and the periodic table.

281. What is the density of silicon tetrafluoride gas at 72°C and a pressure of 144.5 kPa?

282. At what temperature will nitrogen gas have a density of 1.13 g/L at a pressure of 1.09 atm?

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283. Use the ideal-gas-law equation to calculate the unknown quantity in each of the following sets of measurements.

P	*V*	*n*	*t*
a. 0.0477 atm	15 200 L	? mol	−15°C
b. ? kPa	0.119 mL	0.000 350 mol	0°C
c. 500.0 kPa	250. mL	0.120 mol	?°C
d. 19.5 atm	?	4.7×10^4 mol	300.°C

284. Use the ideal-gas-law equation to calculate the unknown quantity in each of the following sets of measurements.

P	*V*	*m*	*M*	*t*
a. 0.955 atm	3.77 L	8.23 g	? g/mol	25°C
b. 105.0 kPa	50.0 mL	? g	48.02 g/mol	0°C
c. 0.782 atm	? L	3.20×10^{-3} g	2.02 g/mol	−5°C
d. ? atm	2.00 L	7.19 g	159.8 g/mol	185°C
e. 107.2 kPa	26.1 mL	0.414 g	? g/mol	45°C

285. Determine the volume of one mole of an ideal gas at 25°C and 0.915 kPa.

286. Calculate the unknown quantity in each of the following sets of measurements.

P	*Molar Mass*	*Density*	*t*
a. 1.12 atm	? g/mol	2.40 g/L	2°C
b. 7.50 atm	30.07 g/mol	? g/L	20.°C
c. 97.4 kPa	104.09 g/mol	4.37 g/L	? °C
d. ? atm	77.95 g/mol	6.27 g/L	66°C

287. What pressure in atmospheres will 1.36 kg of N_2O gas exert when it is compressed in a 25.0 L cylinder and is stored in an outdoor shed where the temperature can reach 59°C during the summer?

288. Aluminum chloride sublimes at high temperatures. What density will the vapor have at 225°C and 0.939 atm pressure?

289. An unknown gas has a density of 0.0262 g/mL at a pressure of 0.918 atm and a temperature of 10.°C. What is the molar mass of the gas?

290. A large balloon contains 11.7 g of helium. What volume will the helium occupy at an altitude of 10 000 m, where the atmospheric pressure is 0.262 atm and the temperature is −50.°C?

291. A student collects ethane by water displacement at a temperature of 15°C (vapor pressure of water is 1.5988 kPa) and a total pressure of 100.0 kPa. The volume of the collection bottle is 245 mL. How many moles of ethane are in the bottle?

292. A reaction yields 3.75 L of nitrogen monoxide. The volume is measured at 19°C and at a pressure of 1.10 atm. What mass of NO was produced by the reaction?

293. A reaction has a theoretical yield of 8.83 g of ammonia. The reaction gives off 10.24 L of ammonia measured at 52°C and 105.3 kPa. What was the percent yield of the reaction?

294. An unknown gas has a density of 0.405 g/L at a pressure of 0.889 atm and a temperature of 7°C. Calculate its molar mass.

295. A paper label has been lost from an old tank of compressed gas. To help identify the unknown gas, you