

Chemistry CP

Name: _____

Ideal Gas Law Problems

Date: _____

The ideal gas law is even more useful than the combined gas law! It not only states a relationship among pressure, volume, and temperature of a gas (as does the combined gas law), but it also relates these quantities to the number of gas particles present.

$$PV = nRT$$

where R is the universal gas constant

$$R = 0.0821 \text{ L atm /mol K}$$

or

$$R = 8.31 \text{ L kPa/mol K}$$

1. A sample of gas containing 0.089 mol is put into a 10.00 L container at a temperature of 30.0°C. What pressure (in kPa) does the gas exert on the container? (22 kPa)

2. How many moles of gas are contained in a 50.0 liter cylinder at a pressure of 100.0 atm and a temperature of 35°C? (198 moles)

3. What would be the volume of 2.76 g of NH₃ at 21.0°C and 756 torr? (3.93 L)

4. Calculate the volume of 1.0 g of oxygen gas at STP. (0.69 L)

5. A 1.60 gram sample of an unknown gas occupies a volume of 1.41 L at 25°C and 101.3 kPa. Use this information to find the gram formula mass of the gas. (27.8 g/mol)
6. Calculate the density of carbon dioxide at 15°C and 1.2 atm. Assume you have 1 mole of the gas. (2.2 g/L)
7. What mass of oxygen gas is contained in a 3.50 L tank where the temperature is 50.0°C and the pressure is maintained at 4.5 atm? (19 g O₂)
8. A 0.670 gram sample of an unknown gas filled a 0.500 L flask at 0°C and 1.00 atm. Which of the following could the gas be, and why? N₂, O₂, NO or CO (NO)