

Chapter 2: Gasses

1. A U.S. Weather Bureau forecast cited the atmospheric pressure at sea level as having a value of 768.2 mm Hg. Expressed in kilopascals (kPa) what would the value be?

(1 atm = 101325 Pa = 760 torr = 760 mm Hg)

- a. 778.4 kPa
- b. 102.4 kPa
- c. 100.3 kPa
- d. 91.62 kPa
- e. 1024 kPa

2. A sample of a gas in a cylindrical chamber with a movable piston occupied a volume of 6.414 liters when the pressure was 850 torr and the temperature was 27.2 °C. The pressure was readjusted to 4423 torr by moving the piston. What was the volume occupied by the sample under the new conditions if the temperature remained constant throughout?

- a. 0.837 L
- b. 0.937 L
- c. 1.23 L
- d. 1.53 L
- e. 3.34 L

3. A sample of a gas in a cylindrical chamber with a movable piston occupied a volume of 1.40 liters when the pressure was 762 torr and the temperature was 26.9 °C. The volume of the system was readjusted to 0.150 liters by moving the piston. What was the pressure exerted on the surface of the piston, in atmospheres, by the gas if the temperature of the system remained constant?

- a. 13.4 atm
- b. 883 atm
- c. 918 atm
- d. 1020 atm
- e. 9.36 atm

4. A sample of a gas in a cylindrical chamber with a movable piston occupied a volume of 1.40 liters when the pressure was 768 torr and the temperature was 26.9 °C. The volume of the system was readjusted to 2.16 liters by changing the temperature while the load on the piston was kept constant to keep the pressure in the system constant. What was the temperature in the system at this point?

- a. 41.5 °C
- b. 41.9 °C
- c. 189.8 °C
- d. 194.7 °C
- e. 288.6 °C

5. The standard reference conditions for gases has the values

- a. temperature: 0.00 K; pressure: 1.000 standard atmosphere

- b. temperature: 0.00 °C; pressure: 1.000 standard atmosphere
 - c. temperature: 273.15 K; pressure: 1.000 Pascal
 - d. temperature: 298.15 K; pressure: 1.000 standard atmosphere
 - e. temperature: 298.15 K; pressure: 1.000 Pascal
6. A sample of a gas was isolated in a gas containment bulb on a manifold used in this type work. The volume of the bulb was 1.524 liters. The temperature was 28.40 °C, and the manifold pressure was 637.6 torr. What volume, in liters, would this gas sample occupy at STP?
- a. 1.069 L
 - b. 1.158 L
 - c. 1.412 L
 - d. 1.645 L
 - e. 2.006 L
7. How many liters of pure oxygen gas, measured at STP, are required for the complete combustion of 11.2 L of methane gas, also measured at STP?
- a. 11.2 L
 - b. 16.8 L
 - c. 22.4 L
 - d. 32.0 L
 - e. 33.6 L
8. A chemical reaction is shown: $2\text{NO}(g) + \text{O}_2(g) \rightarrow 2\text{NO}_2(g)$. How many liters of pure oxygen gas, measured at STP, are required for the complete reaction with 8.82 L of $\text{NO}(g)$, also measured at STP?
- a. 4.41 L
 - b. 8.82 L
 - c. 11.2 L
 - d. 17.6 L
 - e. 22.4 L
9. A gas sample weighing 3.78 grams occupies a volume of 2.28 L at STP. What is the molecular mass of the sample?
- a. 8.54 g mol⁻¹
 - b. 13.5 g mol⁻¹
 - c. 37.1 g mol⁻¹
 - d. 51.1 g mol⁻¹
 - e. 193 g mol⁻¹
10. Two moles of carbon dioxide gas at 35°C are heated to 250°C in a container while the volume is kept constant. The density of the gas in the container will
- a. increase.
 - b. decrease.
 - c. remain the same.
 - d. There is not enough information given to correctly answer this question.

11. What volume would 11.2 g of a gaseous compound occupy at STP if its molecular weight is 44.0 g/mole and it behaves as an ideal gas?
- 5.71 liters
 - 11.0 liters
 - 11.2 liters
 - 22.4 liters
 - 44.0 liters
12. A gas sample occupies a volume of 1.66 L when the temperature is 150.0 °C and the pressure is 842 torr. How many molecules are in the sample?
- 1.52×10^{22}
 - 2.60×10^{22}
 - 3.19×10^{22}
 - 9.01×10^{22}
 - 9.42×10^{21}
13. A gas container has a volume of 6.504 L. When filled with propane gas, C₃H₈, at 28.3 °C, the pressure is 486.3 torr. How much should the gas sample weigh?
- 4.67 g
 - 7.41 g
 - 7.52 g
 - 18.1 g
 263. G
14. A sealed glass container contains 0.2 moles of O₂ gas and 0.3 moles of N₂ gas. If the total pressure inside the container is 0.75 atm what is the partial pressure of O₂ in the glass container?
- 0.20 atm
 - 0.30 atm
 - 0.50 atm
 - 0.75 atm
 - 0.45 atm
15. A sealed glass container contains partial pressures of 0.80 atm CO₂ gas and 0.35 atm N₂ gas. What is the mole fraction of N₂ in the glass container?
- 0.35
 - 1.15
 - 0.70
 - 0.80
 - 0.30
16. A gaseous substance diffuses twice as rapidly as sulfur dioxide gas. The gas could be
- carbon monoxide
 - helium
 - hydrogen

- d. methane
- e. oxygen

17. According to the kinetic theory of gases, the average kinetic energy of the gas particles in a gas sample is directly proportional to the

- a. pressure.
- b. volume.
- c. temperature.
- d. molar mass.
- e. number of moles of gas.

18. The van der Waals equation of state for a real gas is: $\left[P + \frac{n^2 a}{V^2} \right] \left[\frac{V - nb}{1} \right] = nRT$

In this equation, the van der Waals constant, a , represents a correction for:

- a. a positive deviation in the measured value of P from that for an ideal gas due to the finite volume of space occupied by molecules of a real gas.
- b. a negative deviation in the measured value of P from that for an ideal gas due to the finite volume of space occupied by molecules of a real gas.
- c. a positive deviation in the measured value of P from that for an ideal gas due to the attractive forces between the molecules of a real gas.
- d. a negative deviation in the measured value of P from that for an ideal gas due to the attractive forces between the molecules of a real gas.
- e. a positive deviation in the measured value of P from that for an ideal gas due to the finite mass of the molecules of a real gas.

19. The van der Waals equation of state for a real gas is: $\left[P + \frac{n^2 a}{V^2} \right] \left[\frac{V - nb}{1} \right] = nRT$

At what pressure will 1.00 mole of CH_4 be in a 10.0 L container at 298 K assuming CH_4 is a **real gas**.

(van der Waals constants for CH_4 are $a = 2.253 \text{ L}^2 \text{ atm mol}^{-2}$, $b = 0.04278 \text{ L mol}^{-1}$)

- a. 2.43 atm
- b. 2.28 atm
- c. 2.51 atm
- d. 24.5 atm
- e. 0.440 atm

20. A real gas behaves most nearly like an ideal gas under conditions of

- a. low temperature and high pressure.
- b. low temperature and low pressure.
- c. high temperature and low pressure.
- d. high temperature and high pressure.
- e. Actually it will behave like an ideal gas regardless of the temperature or the pressure as long as it remains in the gaseous state.