

Name _____ Period _____ Teacher _____

GAS LAW PRACTICE PROBLEMS

Chapter 12

1. A high altitude balloon contains 30.0 L of helium gas at 103 kPa. What is the volume when the balloon rises to an altitude where the pressure is only 25.0 kPa? (Assume that the temperature stays the same.)
2. The pressure on 2.50 L of anesthetic gas changes from 105 kPa to 40.5 kPa. What will be the new volume if the temperature remains constant?
3. A gas with a volume of 4.00 L at a pressure of 205 kPa is allowed to expand to a volume of 12.0L. What is the pressure in the container if the temperature remains constant?
4. A balloon inflated in a room at 24 °C has a volume of 4.00 L. The balloon is then heated to a temperature of 58 °C. What is the new volume if the pressure remains constant?
5. If a sample of gas occupies 6.80 L at 325 °C, what will be its volume at 25 °C if the pressure does not change?

11. A gas at 155 kPa and 25 °C occupies a container with an initial volume of 1.00 L. By changing the volume, the pressure of the gas increases to 605 kPa as the temperature is raised to 125 °C. What is the new volume?
12. A 5.00 L air sample at a temperature of -50 °C has a pressure of 107 kPa. What will be the new pressure if the temperature is raised to 102 °C and the volume expands to 7.00 L?
13. You fill a rigid steel cylinder that has a volume of 20.0 L with nitrogen gas (N_2)(g) to a final pressure of 2.00×10^4 kPa at 28 °C. How many moles of N_2 (g) does the cylinder contain?
14. When the temperature of a rigid hollow sphere containing 685 L of helium gas is held at 621 K, the the pressure of the gas is 1.89×10^3 kPa. How many moles of helium does the sphere contain?
15. What pressure will be exerted by 0.450 mol of a gas at 25 °C if it is contained in a 0.650 L vessel?

16. A deep underground cavern contains 2.24×10^6 L of methane gas (CH_4)(g) at a pressure of 1.50×10^3 kPa and a temperature of 42°C . How many kilograms of CH_4 does this natural-gas deposit contain?
17. A child has a lung capacity of 2.20 L. How many grams of air do her lungs hold at a pressure of 102 kPa and a normal body temperature of 37°C ? Air is a mixture, but you may assume an average molar mass of 29 g/mol for air because air is about 20% O_2 (molar mass 32) and 80% N_2 (molar mass 28).
18. What volume will 12.0 g of oxygen gas (O_2) occupy at 25°C and a pressure of 52.7 kPa?
19. Determine the volume (in L) occupied by 0.202 mol of a gas at standard temperature and pressure (STP).
20. What is the volume occupied by 0.250 mol of a gas at STP?

21. What volume does 0.742 mol of argon gas occupy at STP?
22. How many oxygen molecules are in 3.36 L of oxygen gas at standard temperature and pressure (STP)?
23. How many nitrogen molecules are in 5.12 L of the gas at STP?
24. What volume is occupied by 4.02×10^{22} molecules of helium gas at STP?
25. Determine the volume (in L) occupied by 14.0 g of nitrogen gas at STP.
26. What is the volume of a container that holds 8.80 g of carbon dioxide at STP?
27. A container holds 6.92 g of hydrogen gas at STP. What is the volume of the container?

28. Air contains oxygen, nitrogen, carbon dioxide, and trace amounts of other gases. What is the partial pressure of oxygen (P_{O_2}) at 101.3 kPa of total pressure if the partial pressure of nitrogen, carbon dioxide, and other gases are 79.10 kPa, 0.040 kPa, and 0.94 kPa, respectively?
29. Determine the total pressure of a gas mixture that contains oxygen, nitrogen, and helium if the partial pressures of the gases are as follows: $P_{He} = 18.0$ kPa, $P_{N_2} = 36.7$ kPa, and $P_{CO_2} = 36.7$ kPa.
30. A gas mixture containing oxygen, nitrogen, and carbon dioxide has a total pressure of 52.9 kPa. If $P_{O_2} = 3.6$ kPa and $P_{N_2} = 42.0$ kPa, what is P_{CO_2} ?