

44 Gas Problems

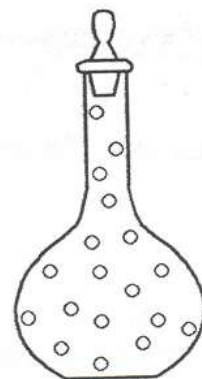
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Do your work on white paper. Staple your work onto this handout. No work = no points.

1. At constant temperature, the pressure on 8.0 liters of a sample of gas is increased from 1.0 atm. to 4.0 atm. What will be the new volume of this gas?
2. A gas at STP has a volume of 22.4 liters. If the volume is held constant but the temperature changes to 373K, what is the new pressure on this gas in kilopascals?
3. Which of these real gases will most closely resemble an ideal gas at STP — and why?
Butane (C_4H_{10}), Ammonia (NH_3), or Argon (Ar)
4. Under what conditions does a real gas behave most like an ideal gas?
A. high temp and low pressure B. low temp and high pressure
C. high temp and high pressure D. low temp and low pressure
5. When the average kinetic energy of a gaseous system is increased, the average molecular velocity of the system
A. increases and the molecular mass increases
B. increases and the molecular mass remains the same
C. decreases and the molecular mass increases
D. decreases and the molecular mass remains the same
6. A sample of carbon monoxide occupies 15.0 liters at 4.00 atm and 300.Kelvin. What is the new volume of the CO if the pressure changes to 2.00 atm and the temperature is increased to 400.Kelvin?
7. At 273K, a 409 mL gas sample has a pressure of 101.3 kPa. If the pressure changes to 50.65 kPa, at what temperature will the gas sample have volume of 609 mL?
8. If the pressure on 36.0 milliliters of neon at standard pressure is changed to 0.250 atm. at constant temperature, what will be the new volume of the neon?
9. A sample of gas occupies 6.00 liters at a temperature of 200. Kelvin. if the pressure is held constant while the temperature is raised up to 600. Kelvin, the new volume would be ___?
10. A bottle of radon gas fills a 86.5 L space at STP. If the pressure changes to 1.25 atm what is the new volume on the gas if temperature is 35.0°C?
11. The pressure on 200. liters of xenon is decreased at constant temperature from 130. kPa to 120. kPa, what is the new volume of xenon in liters?
12. The volume of a given mass of an ideal gas at constant pressure is
A. inversely proportional to Celsius Temp B. inversely proportional to Kelvin Temp
C. directly proportional to Celsius Temp D. directly proportional to Kelvin Temp
13. Skip

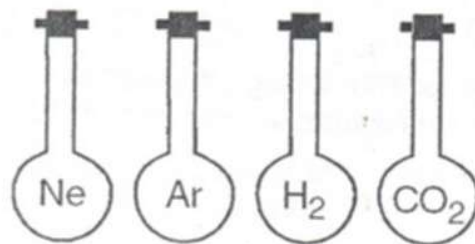
14. In theory, one reason that gases do not lose energy is because they
- A. can be compressed greatly
 - B. exhibit elastic collisions
 - C. get measured only in Kelvin
 - D. move only in straight lines, at high velocity
15. When a sample of gas is heated at constant pressure, the average kinetic energy of its molecules
- A. increases and the volume of the gas decreases
 - B. decreases and the volume of the gas increases
 - C. decreases and the volume of the gas decreases
 - D. increases and the volume of the gas increases
16. A gas has a volume of 1400 mL at 20.0 K and 101.3 kPa. What will be the volume if temperature changes to 40.0 K and pressure is changed to 50.65 kPa?
17. When a gas is heated at constant pressure, the average kinetic energy of its molecules
- A. increases & the volume of the gas decreases
 - B. decreases & the volume of the gas increases
 - C. decreases & the volume of the gas decreases
 - D. increases & the volume of the gas increases
18. A gas has a pressure of 40.0 kPa, a temperature of 400. Kelvin and a volume of 50.0 mL. What volume will the gas have at a pressure of 20.0 kPa and 200. Kelvin?
19. The pressure on 200. liters of xenon is decreased at constant temperature from 130. kPa to 120. kPa, what is the new volume of xenon in liters?
20. At constant pressure, 205 mL of Ar is at 10.0°C is heated to 27.0°C. What's the new volume of the gas?
21. The pressure on 150 milliliters of nitrogen gas at constant temperature is changed from 50.65 kPa to 101.3 kPa. What is the new volume of nitrogen?
22. Under the same conditions of temperature and pressure, which gas would behave most like an ideal gas? helium, ammonia, carbon dioxide, or chlorine
23. If the pressure on a given mass of gas in an enclosed system is decreased and the temperature remains constant, the volume of the gas will
- A. remain the same
 - B. increase
 - C. decrease
24. At STP, 3.0 liters of oxygen gas and 3.0 liters of helium gas have the same
- A. number of atoms
 - B. mass
 - C. number of particles
 - D. density
25. A 1.00 liter flask of CO₂ gas and another one liter flask of hydrogen gas are both at STP. The ratio of the number of molecules of CO₂ to the number of molecules of H₂ in these flasks is:
- A. 1:3
 - B. 2:3
 - C. 1:1
 - D. 3:2
26. What pressure, in atmospheres, is equal to 152 kPa?
- A. 1.50 atm
 - B. 1.00 atm
 - C. 0.670 atm
 - D. 2.00 atm
27. A sample of gas A was stored in at 50°C + 0.50 atm. Compared to a gas B, stored at STP, gas A had a
- A. lower temp and higher pressure
 - B. lower temp and lower pressure
 - C. higher temp and lower pressure
 - D. higher temp and higher pressure
28. A 114.5 liter sample of oxygen is held at standard temperature while the pressure is changed from normal to just 560. mm of Hg. What is the new volume in liters?
29. The volume of a sample of hydrogen gas at STP is 1.00 liters. At constant pressure, the temperature decreases. PROVE with MATH that the volume of this gas will also decrease.

30. A gas at STP has a volume of 1.0 liters. If the pressure is doubled and the temperature remains constant, the new volume of the gas will be A. 4.0 L B. 0.25 L C. 0.50 L D. 2.0 L
31. The average kinetic energy of the molecules of an ideal gas is directly proportional to
A. pressure at standard temp B. volume occupied by the individual gas molecules
C. temperature in Kelvin D. number of moles of gas present
32. Which change must result in an increase in the average kinetic energy of the molecules of a $N_{2(g)}$?
A. temperature change from 20 to 30 degrees centigrade B. pressure change from 0.50 to 1.0 atm
C. temperature change from 355 K to 299 K D. volume change from 1.0 to 2.0 liters
33. A sample of gas has a volume of 6.0 liters at 0°C and 50.65 kPa.
What will be its volume when the pressure is changed to 101.3 kPa at constant temperature?
34. A real gas behaves most like an ideal gas at high temperature and low pressure. Explain this.
35. If this gas sample on the right is heated up the bottle holding it might explode. Using the KMT, explain why that happens. Use the words “directly proportional” in your answer.



36. Samples of SO_2 and N_2 contain equal numbers of molecules. If the gases are at STP, the samples have
A. equal number of atoms B. the same density C. equal volumes D. same mass
37. State 2 reasons (of many) why real gases are NOT ideal.
38. As the pressure on a given sample of gas increases at constant temperature, the mass of the sample of gas
A. increases B. decreases C. remains the same
39. Equal volumes of sulfur dioxide gas and nitrogen monoxide gas at the same temperature and pressure would have the same A. number of atoms B. number of molecules C. density D. mass
40. A sample of H_2 and N_2 both at STP contain the same number of molecules. Each sample must have
A. same volume and same mass B. neither same volume or same mass
C. same volume and different mass D. same mass but different volume
41. Write out Avogadro's Hypothesis.
42. Explain in terms of the Kinetic Molecular Theory, why the pressure of a gas increases when its temperature changes from 273 Kelvin to 298 Kelvin.

43. The diagram below represents four 500 mL flasks containing the gases neon, argon, hydrogen and carbon dioxide, at STP. Each flask contains the same number of
- A. atoms but different numbers of molecules
 - B. atoms only
 - C. molecules only
 - D. particles



44. At constant pressure, which graph shows the correct relationship between gas volume + temperature?

