

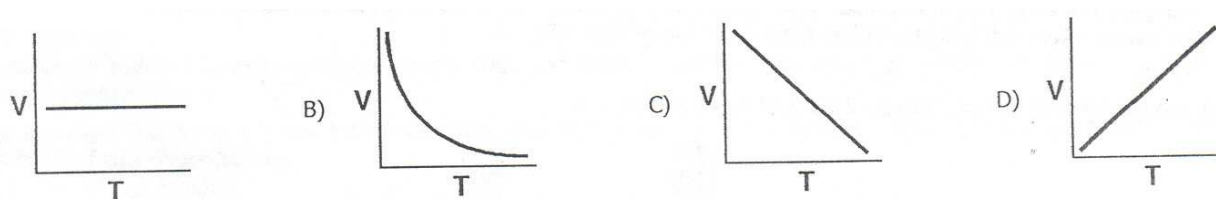
54 Gas Problems name: _____

Please plan to do all of these questions. They will be done in class, for homework, and for review. Answers to them ALL are on our website.

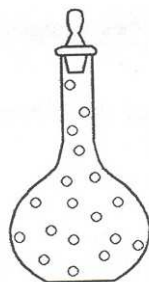
They are grouped by types of problems, and should be your guide as to what is required of you for this section of chemistry. SHOW ALL FORMULAS and WORK!!!

1. At constant temperature, the pressure on 8.0 liters of a gas is increased from 1.0 atm. to 4.0 atm. What will be the new volume of this gas?
2. 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?
3. 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?
4. 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?
5. 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?
6. 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?
7. The volume of a sample of hydrogen gas at STP is 1.00 liters. As the temperature decreases, the pressure remains constant, PROVE that the volume of this gas will ____.
8. 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?
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 36.0 mL space at STP. If the pressure changes to 0.250 atm what is the new volume on the gas if temperature is 0.00°C?
11. A sample of gas is at 10.0°C. If pressure remains constant, the volume will increase when the temperature is changed to: 283K or 273K or 293K or 263K ?
12. At constant pressure, 205 mL of argon is at 10.0°C is heated to 27.0°C. The new volume of the gas in mL, is equal to ____?
13. hahaha gas law is excellent stuff
14. Under the same conditions of temperature and pressure, which gas would behave most like an ideal gas? helium, ammonia, carbon dioxide, or chlorine
15. Which gas will most closely resemble an ideal gas at STP?
ammonia, chlorine, hydrogen or sulfur dioxide

16. 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
17. A gas that behaves exactly as predicted by the kinetic theory of gases is called an ideal gas. The behavior of real gases differs slightly from the kinetic theory. Name the real gas that behaves most like an ideal gas. Give 2 reasons why the behavior of this gas comes closest to the predictions of the kinetic molecular theory of gases.
18. A real gas behaves most like an ideal gas at high temperature and low pressure. Explain in two complete sentences.
19. Which gas is LEAST likely to obey the ideal gas laws at very high temperature and very low pressures? neon, krypton, helium, xenon
20. At constant pressure, which graph shows the correct relationship between the volume of a gas and its temperature?



21. The particle diagram below represents a sample of gas sealed in a 1.0 liter flask. The sample was heated gently and the pressure measured over a range of temperatures as reported in the data table. State the relationship between temperature and pressure of a gas when the volume remains constant.

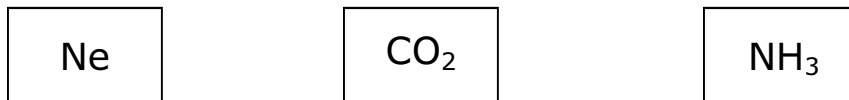


Temp, Kelvin	Pressure kPa
300	101.3
310	104.7
320	108.1
330	111.4

22. 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
23. 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
24. Equal volumes of gases at the same temperature and pressure contain equal numbers of
 A. electrons B. protons C. atoms D. particles

25. A sample of H_2 and N_2 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 volumes

26. The three boxes below represent three 1-Liter containers of gas, all are at STP.



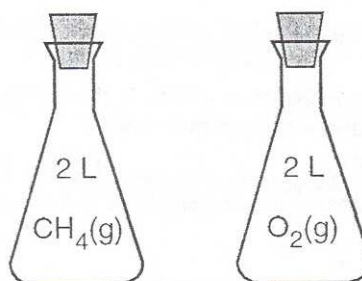
Which of the following statement correctly interprets the gas chemistry here?

- A. container B has the most atoms
 B. all three containers have the same number of particles
 C. container C has the most molecules
 D. container B has the most atoms
27. A one liter flask of carbon dioxide gas and another one liter flask of hydrogen gas are both at STP. The ratio of the number of molecules of CO_2 to the number of molecules of H_2 in these flasks is: A. 1:3 B. 2:3 C. 1:1 D. 3:2
28. At STP, 3.0 liters of hydrogen gas and 3.0 liters of helium gas have the same
 A. number of atoms B. mass C. number of particles D. density

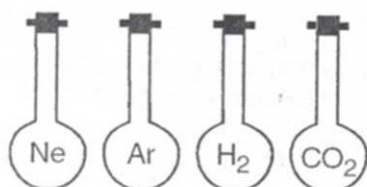
29. Each stoppered flask shown here contains 2.0 liters of a gas, methane and oxygen, at STP.

Each gas sample has the same

- A. number of atoms B. mass
 C. density D. number of particles



30. 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
31. As the temperature of a sample of gas increases at constant pressure, the volume of the gas
 A. remains the same B. increases C. decreases
32. 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



33. 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
34. Will the volume of a 2.50 liter sample of gas at STP change in the Kelvin temperature and pressure are both DOUBLED? Explain with show MATH to prove your answer.
35. 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
36. 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
37. 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
38. Explain in terms of the Kinetic Molecular Theory of gases, the increase in pressure of a sample of gas when the gas is heated from 273 Kelvin to 298 Kelvin.
39. A sample of gas is at STP. As the pressure decreases and the temperature increases, the volume of the gas
- A. increases
 - B. decreases
 - C. remains the same
40. A sample of gas A was stored in a container at 50°C and 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
41. 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
42. This question was omitted
43. 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
44. Which change must result in an increase in the average kinetic energy of the molecules of a given sample of nitrogen gas?
- A. temperature change from 20 to 30 degrees centigrade
 - B. pressure change from 0.50 to 1.0 atm
 - C. density change from 2.0 to 2.5 g/L
 - D. volume change from 1.0 to 2.0 liters
45. This question has been removed for good reason. Go ahead to the next one.

46. 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
47. 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?
48. 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?
49. At a temperature of 273K, a 409 mL gas sample has a pressure of 101.3 kPa. If the pressure is changed to 50.65 kPa, at what temperature will the gas sample have a volume of 609 mL?
50. A gas has a volume of 1400 mL at 20.0 K and 101.3 kPa. What will be the volume when the temperature changes to 40.0 K and pressure is changed to 50.65 kPa?
51. One reason that a real gas deviates from an ideal gas is that the molecules of a real gas have
- A. a negligible volume
 - B. no net loss of energy upon collision
 - C. a straight line motion
 - D. forces of attraction for each other
52. Which gas under high pressure and low temperature will behave most like an ideal gas?
- A. CO₂
 - B. O₂
 - C. NH₃
 - D. H₂
53. State 2 reasons (of many) why real gases are NOT ideal.
54. Omitted question.
55. 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