

Name: _____ Class: _____ Date: _____

ID: A

As you work these problems, consider and explain:

- A. What type of question is it?
- B. How do you know what type of question it is?
- C. What information are you looking for?
- D. What information do they give?
- E. How will you go about solving this?
- F. Show how to solve the problem.
- G. Be able to answer for a different reaction, number, set of conditions etc.

CHM 111 Unit 5 Sample Questions

1. What kind of density do gases have? Why?
2. How is pressure defined?
3. A glass column is filled with mercury and inverted in a pool of mercury. The mercury column stabilizes at a height of 729 mm above the pool of mercury. What is the pressure of the atmosphere?
4. A physics experiment is conducted at a pressure of 14.4 kPa. What is this pressure in mmHg?
5. Boyle's law states that:
6. Charles's law states that:
7. A gas sample is held at constant pressure. The gas occupies 3.62 L of volume when the temperature is 21.6°C. Determine the temperature at which the volume of the gas is 3.42 L.
8. Gaseous chlorine is held in two separate containers at identical temperature and pressure. The volume of container 1 is 1.30 L, and it contains 6.70 mol of the gas. The volume of container 2 is 2.33 L. How many moles of the gas are in container 2?
9. Consider a sample of gas in a container on a comfortable spring day. The Celsius temperature suddenly doubles, and you transfer the gas to a container with twice the volume of the first container. If the original pressure was 12 atm, what is a good estimate for the new pressure?

10. You have a certain mass of helium gas (He) in a rigid steel container. You add the same mass of neon gas (Ne) to this container. Which of the following best describes what happens? Assume the temperature is constant.
 - A) The pressure in the container doubles.
 - B) The pressure in the container increases but does not double.
 - C) The pressure in the container more than doubles.
 - D) The volume of the container doubles.
 - E) The volume of the container more than doubles.

- ____ 11. You are holding four identical balloons each containing 10.0 g of a different gas. The balloon containing which gas is the largest balloon?
- A) H₂
 - B) He
 - C) Ne
 - D) O₂
 - E) All have the same volume.
- You have two samples of the same gas in the same size container, with the same pressure. The gas in the first container has a Kelvin temperature four times that of the gas in the other container.
12. The ratio of the number of moles of gas in the first container compared to that in the second is
13. A gas sample is heated from -20.0°C to 57.0°C and the volume is increased from 2.00 L to 4.50 L. If the initial pressure is 0.140 atm, what is the final pressure?
14. You fill a balloon with 2.50 moles of gas at 22°C at a pressure of 1.62 atm. What is the volume of the balloon?
15. A 3.60-L sample of carbon monoxide is collected at 55°C and 0.869 atm. What volume will the gas occupy at 1.05 atm and 25°C?
16. What volume is occupied by 21.0 g of methane (CH₄) at 27°C and 1.25 atm?
- ____ 17. Which conditions of *P*, *T*, and *n*, respectively, are most ideal?
- A) high *P*, high *T*, high *n*
 - B) low *P*, low *T*, low *n*
 - C) high *P*, low *T*, high *n*
 - D) low *P*, high *T*, high *n*
 - E) low *P*, high *T*, low *n*
18. A sample of 35.1 g of methane gas has a volume of 3.11 L at a pressure of 2.70 atm. Calculate the temperature.
19. A sample of gas is in a 50.0-mL container at a pressure of 645 torr and a temperature of 25°C. The entire sample is heated to a temperature of 35°C and transferred to a new container whose volume is 98.7 mL. The pressure of the gas in the second container is about:

- ____ 20. For an ideal gas, which pairs of variables are inversely proportional to each other (if all other factors remain constant)?
1. V and T
 2. T and n
 3. n and V
 4. P and T
- A) 1 and 2 only
B) 3 and 4 only
C) 2 only
D) 1 and 3 only
E) 1, 3, and 4 only
21. The temperature of a specific amount of gas in a sealed container changes from 20.0°C to 40.0°C. If the volume remains constant, the pressure will change from 755 mmHg to (use units mmHg)
22. The mass of 1.12 liters of gas Y at STP is found to be 6.23 g. The molar mass of gas Y is
23. It is found that 250. mL of a gas at STP has a mass of 0.700 g. What is the molar mass?
24. A 3.54 gram sample of a certain diatomic gas occupies a volume of 3.30-L at 1.00 atm and a temperature of 45°C. Identify this gas.
25. Calculate the density of nitrogen at STP.
- ____ 26. A mixture is prepared from 15.0 L of ammonia and 15.0 L chlorine measured at the same conditions; these compounds react according to the following equation:
- $$2\text{NH}_3(g) + 3\text{Cl}_2(g) \rightarrow \text{N}_2(g) + 6\text{HCl}(g)$$
- When the reaction is completed, what is the volume of each gas (NH_3 , Cl_2 , N_2 , and HCl , respectively)? Assume the final volumes are measured under identical conditions.
- A) 0.00 L, 5.00 L, 7.50 L, 45.0 L
 - B) 5.00 L, 0.00 L, 5.00 L, 30.0 L
 - C) 0.00 L, 0.00 L, 7.50 L, 45.0 L
 - D) 0.00 L, 0.00 L, 5.00 L, 30.0 L
 - E) 0.00 L, 10.0 L, 15.0 L, 90.0 L
- ____ 27. A 1.00-g sample of a gaseous compound of boron and hydrogen occupies 0.820 L at 1.00 atm and 3°C. What could be the molecular formula for the compound?
- A) BH_3
 - B) B_2H_6
 - C) B_4H_{10}
 - D) B_3H_{12}
 - E) B_5H_{14}

Zinc metal is added to hydrochloric acid to generate hydrogen gas, which is collected over a liquid whose vapor pressure is the same as pure water at 20.0°C (18 torr). The volume of the gas mixture is 1.7 L and its total pressure is 0.810 atm.

28. Determine the partial pressure of the hydrogen gas in this mixture. (use units of torr)
29. Determine the number of moles of hydrogen gas present in the sample.

CHM 111 Unit 5 Sample Questions

Answer Section

1. low density
2. defined as the force per unit area
3. 0.959 atm
4. 108 mmHg
5. The volume of a fixed amount of gas is inversely proportional to its pressure at constant temperature.
6. The volume of a fixed amount of gas is directly proportional to its temperature in Kelvin at constant pressure.
7. 278 K
8. 12.0 mol
9. 6.4 atm
10. B
11. A
12. 1:4
13. 0.0811 atm
14. 37.4 L
15. 2.71 L
16. 25.8 L
17. E
18. 46.8 K
19. 338 torr
20. C
21. 807 mmHg
22. 125 g/mol
23. 62.7 g/mol
24. N₂
25. 1.25 g/L
26. B
27. B
28. 598 torr
29. 0.056 mol