AP CHEMISTRY CHAPTER 5 PRACTICE TEST

1. When the average kinetic energy of a gaseous system is increased, the average molecular velocity of the system
2. increases and the molecular mass increases
3. decreases and the molecular mass increases
4. increases and the molecular mass remains the same
5. decreases and the molecular mass remains the same
6. What is the total number of molecules in 11.2 liters of N2 gas at STP?
7. 3.01 x 1023
8. 6.02 x 1023
9. 14.0
10. 28.0
11. At STP, which gas will effuse most rapidly?
12. NH3
13. CO
14. He
15. Ar
16. At STP, the volume occupied by 32 g of gas is 11.2 liters. The gram molecular mass of this gas is closest to
17. 8.0 g
18. 16 g
19. 32 g
20. 64 g
21. A 20. mL sample of gas is at 546 K and has a pressure of 6.0 atmospheres. If the temperature is changed to 273 K and the pressure to 2.0 atmospheres, the new volume of the gas will be
22. 3.3 mL
23. 13 mL
24. 30. mL
25. 120 mL
26. One reason that a real gas deviates from an ideal gas is that the molecules of the real gas have
27. a straight line motion
28. no net loss of energy on collision
29. a negligible volume
30. forces of attraction for each other

The next two questions refer to the following: Three 1.00 L flasks at 25oC and 725 torr contain the gases CH4 (flask A), CO2 (flask B), and C2H6 (flask C).

1. In which flask is there 0.039 mole of gas
2. flask A
3. flask B
4. flask C
5. all
6. none
7. In which single flask do the molecules have the highest kinetic energy, the greatest mass, AND the greatest average velocity?
8. flask A
9. flask B
10. flask C
11. all
12. none
13. The volume of a sample of gas is 650. mL at STP. What volume will the sample occupy at 0.0oC and 950.torr?
14. 476 mL
15. 520. mL
16. 568 mL
17. 650. mL
18. none of these
19. C2H4 reacts with O2 according to the following equation:

C2H4(g) + 3O2(g) → 2CO2(g) + 2H2O(g)

What volume of oxygen at STP is needed to react with 1.50 moles of C2H4?

1. 4.50 L
2. 33.6 L
3. 101 L
4. 67.2 L
5. not enough information is given to solve the problem
6. Air has an average molar mass of 29.0 g/mol. The density of air at 1.00 atm and 30.oC is
7. 29.0 g/L
8. 40.0 g/L
9. 1.17 g/L
10. 1.29 g/L
11. 12 g/L
12. The total pressure of a mixture of gases is
13. obtained by multiplying the individual pressures by the number of moles and averaging
14. the sum of the partial pressures of the components
15. dependent only upon the pressure of the gas which is present to the greatest extent
16. the product of the individual pressures
17. none of these
18. A 275.0 mL sample of O2  is collected over water at 60.0oC. The total pressure is 755 torr. What is the volume of the O2 at STP? The vapor pressure of water at 60oC is 149 torr.
19. 180. mL
20. 224 mL
21. 244 mL
22. 333 mL
23. none of these
24. Which of the following is NOT a postulate of the kinetic molecular theory of gases?
25. The molecules possess a volume that is negligibly small compared to the volume of the container.
26. Gases consist of discrete particles that are in constant chaotic motion
27. The average kinetic energy of the molecules is directly proportional to eh absolute temperature
28. The pressure and volume of a gas are directly related
29. All of the above are postulates of the kinetic molecular theory
30. Order the following in increasing rate of effusion:

F2, Cl2, NO, NO2, CH4

1. Cl2 < NO2 < F2 < NO < CH4
2. Cl2 < F2 < NO2 < CH4 < NO
3. CH4 < NO2 < NO < F2 < Cl2
4. CH4 < NO < F2 < NO2 < Cl2
5. F2 < NO < Cl2 < NO2 < CH4
6. An excess of sodium hydroxide is treated with 1.1 L of dry hydrogen chloride measured at STP. What is the mass of sodium chloride formed?
7. 0.50 g
8. 1.8 g
9. 2.0 g
10. 2.9 g
11. 22 g
12. A 4.40 g piece of solid CO2 (dry ice) is allowed to sublime in a balloon. The final volume of the balloon is 1.00 L at 300. K. What is the pressure of the gas?
13. 2.46 atm
14. 246 atm
15. 0.122 atm
16. 122 atm
17. none of these
18. A student collected a sample of hydrogen gas by the displacement of water. The following data was collected.

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| --- | --- |
| VOLUME OF SAMPLE | 90.0 mL |
| TEMPERATURE | 25OC |
| ATMOSPHERIC PRESSURE | 745 mm Hg |
| VAPOR PRESSURE OF WATER AT 25OC | 23.8 mm Hg |

1. Calculate the number of moles of hydrogen collected
2. Calculate the number of molecules of water vapor in the sample of gas
3. Calculate the ratio of the average speed of hydrogen molecules to the average speed of the water vapor in the sample
4. A sample of dolomitic limestone containing only CaCO3 and MgCO3 was analyzed
5. When a 0.2800 g sample of this limestone was decomposed by heating, 75.0 mL of CO2 at 750. mm Hg and 20.oC were evolved. How many grams of CO2 were produced?
6. Write equations for the decomposition of both carbonates described above
7. It was determined that the initial sample contained 0.0448 g of calcium. What percent of the limestone by mass was CaCO3?
8. How many grams of magnesium containing product were present in the sample in (a) after it had been heated?