Name _____

Period _____   Date ____/____/____

12 • Gases and Their Properties

1. A pressure of 745 mmHg corresponds to ____ kPa.

    a) 55.89 kPa   c) 99.3 kPa

    b) 0.980 kPa   d) 745 kPa

2. Liquid nitrogen has a boiling point of -196 °C this corresponds to…

    a) - 469 K   c) 153 K

    b)   77 K   d) 469 K

3. 1.20 atm is the same pressure as:

    a) 1.2 mmHg   d) 850 mmHg

    b) 760 mmHg   e) 358 mmHg

    c) 912 mmHg

4. For an ideal gas, which pair of variables are inversely proportional to each other (if all other factors remain constant)?

    a) P, V   c) V, T

    b) P, T   d) n, P

5. A real gas would act most ideal at

    a) 1.0 atm and 273 K

    b) 10 atm and 546 K

    c) 10 atm and 273 K

    d) 0.5 atm and 546 K

    e) 0.5 atm and 273 K

6. One mole of hydrogen, H_2, occupies 61.2 L at

    a) 100 °C and 1.00 atm

    b) 200 °C and 1.00 atm

    c) 0 °C and 0.500 atm

    d) 50 °C and 0.500 atm

    e) 100 °C and .500 atm

7. A 31.0 mL sample of gas is collected at a temperature of 37 °C and pressure of 720 mmHg. What is its volume at 17 °C and 580 mmHg.

    a) 23 mL   d) 41 mL

    b) 27 mL   e) 58 mL

    c) 36 mL

8. The coldest possible temperature of a gas is:

    a) 0 °C   b) 273 K   c) -273 K   d) -273 °C

9. The pressure of 4.0 L of an ideal gas in a flexible container is decreased to one-third of its original pressure and its absolute temperature is decreased by one-half. The volume then is

    a) 1.0 L   b) 4.0 L   c) 6.0 L   d) 8.0 L   e) 24 L

10. A given mass of gas in a rigid container is heated from 100 °C to 300 °C. Which of the following best describes what will happen to the pressure of the gas? The pressure will…

    a) decrease by a factor of three.

    b) increase by a factor of three.

    c) increase by a factor less than three.

    d) decrease by a factor greater than three.

11. What is the pressure exerted by some nitrogen gas collected in a tube filled with water on a day when the room temperature is 18.0 °C and the room pressure is 750.0 mmHg? [The partial pressure of water at 18 °C is 15.5 mmHg.]

    a) 15.5 mmHg   d) 760.0 mmHg

    b) 750.0 mmHg   e) 732.0 mmHg

    c) 734.5 mmHg

12. As the average kinetic energy of the molecules of a sample increases, the temperature of the sample

    a) decreases   c) remains the same

    b) increases

13. If a gas that is confined in a rigid container is heated, the pressure of the gas will…

    a) increase   c) remain the same

    b) decrease

14. A mixture of gases at 810 kPa pressure contains:

    > 3.0 moles of oxygen gas,
    > 2.0 moles of helium gas, and
    > 4.0 moles of carbon dioxide gas.

    What is the partial pressure of helium gas, P_{He}.

    a) 405 kPa   d) 81.0 kPa

    b) 1620 kPa   e) 180 kPa

    c) 810 kPa

15. If a gas has a pressure of 2.0 atm, which one of the following equations will express its pressure after...

    - the number of moles has been increased to three times the original amount,
    - the absolute temperature (K) has been reduced to half, and
    - the volume has been tripled?

    a) $P_2 = 2.0 \text{ atm} \times \dfrac{1}{3} \times \dfrac{2}{1} \times \dfrac{4}{1}$

    b) $P_2 = 2.0 \text{ atm} \times \dfrac{3}{1} \times \dfrac{1}{2} \times \dfrac{1}{3}$

    c) $P_2 = 2.0 \text{ atm} \times \dfrac{3}{1} \times \dfrac{2}{1} \times \dfrac{1}{3}$

    d) $P_2 = 2.0 \text{ atm} \times \dfrac{1}{3} \times \dfrac{1}{4} \times \dfrac{3}{1}$

16. A sample of gas occupies 30.0 L at 0.800 atm and 298 K. How many moles of gas are in the sample?

    a) 22.4   b) 0.981   c) 1.02   d) 2.23

    e) none of these

17. When ammonium nitrite undergoes decomposition, only gases are produced according to the equation:

    $$NH_4NO_2(s) \rightarrow N_2(g) + 2H_2O(g)$$

    What is the total volume of gases produced at 819K and 1.00 atm pressure when 128 g of ammonium nitrite undergoes the above decomposition reaction?

    _____

18. At STP, it was found that 1.12 L of a gas had a mass of 2.78 g. Its molar mass is

    a) 2.78 g/mol   c) 55.6 g/mol

    b) 27.8 g/mol   d) 111 g/mol

19. A mixture of gases, nitrogen, oxygen, and carbon dioxide at 27 °C and 0.50 atmospheres pressure occupied a volume of 492 mL. How many moles of gas are there in this sample?

    a) 0.010   c) 7.6

    b) 1/9   d) 10

20. At a given temperature, gaseous ammonia molecules (NH_3) have a velocity that is _____ gaseous sulfur dioxide molecules (SO_2).

    a) greater than   c) equal to

    b) less than   d) more inf. needed

21. The ratio of the average velocities of $SO_2(g)$ to $CH_4(g)$ at 300 K is

    a) 1:4   c) 4:1

    b) 1:2   d) 2:1

22. A sealed flask contains 1 molecule of hydrogen for every 3 molecules of helium at 20 °C. If the total pressure is 400 kPa, the partial pressure of the hydrogen is…

    a) 100 kPa   c) 300 kPa

    b) 200 kPa   d) 400 kPa

23. A given mass of a gas occupies 5.00 L at 65 °C and 480 mmHg. What is the volume of the gas at 630 mmHg and 85 °C?

a) $5.00 \times \dfrac{65}{85} \times \dfrac{480}{630}$

b) $5.00 \times \dfrac{338}{358} \times \dfrac{480}{630}$

c) $5.00 \times \dfrac{358}{338} \times \dfrac{480}{630}$

d) $5.00 \times \dfrac{358}{338} \times \dfrac{630}{480}$

e) $5.00 \times \dfrac{338}{358} \times \dfrac{630}{480}$

24. Which statement best explains why a confined gas exerts pressure?

a) the molecules are in random motion
b) the molecules travel in straight lines
c) the molecules attract each other
d) the molecules collide with the container walls

25. CH_4 gas and O_2 gas are together in a container. Which statement correctly describes the **velocities** of the two molecules.

a) The two molecules have the **same** average velocity.
b) The CH_4 is moving **twice** as fast as the O_2.
c) The CH_4 is moving **faster**, but **not twice as fast** as the O_2.
d) The O_2 is moving **faster** than the CH_4.

South Pasadena • AP Chemistry

Name _____

Period ____ Date ___/___/___

9 • Properties of Gases

Please use **CAPITAL** letters:

1. _____
2. _____
3. _____
4. _____
5. _____

6. _____
7. _____
8. _____
9. _____
10. _____

11. _____
12. _____
13. _____
14. _____
15. _____

16. _____
17. _____
18. _____
19. _____
20. _____

21. _____
22. _____
23. _____
24. _____
25. _____

Useful Information

STP = 0°C = 273 K and
1 atm = 760 torr = 760 mmHg
= 101.3 kPa = 14.7 psi
$= 14.7 \dfrac{\text{lb}}{\text{in}^2}$

Ideal Gas Constant, R
$= 62.4 \dfrac{\text{L} \cdot \text{mmHg}}{\text{mol} \cdot \text{K}}$
$= 0.0821 \dfrac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}}$
$= 8.31 \dfrac{\text{L} \cdot \text{kPa}}{\text{mol} \cdot \text{K}}$