Name _____

Period ___   Date ___/___/___

12 • Gases and Their Properties

P R A C T I C E   T E S T

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

    c) 99.3 kPa

    745 mmHg x (101.3 kPa/760 mmHg)

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

    b)   77 K   -196 + 273

3. 1.20 atm is the same pressure as:

    c) 912 mmHg   1.20 atm x (760 mmHg/1 atm)

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

    a) P, V

5. A real gas would act most ideal at

    d) 0.5 atm and 546 K

    low pressure & high temperature

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

    e)   100 °C and .500 atm

    calculated by trial and error

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.

    c) 36 mL

    31 mL x (290/310) x (720/580)

8. The coldest possible temperature of a gas is:

    d) -273 °C   (actually -273.15 °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

    c) 6.0 L   4 L x (3/1) x (1/2)

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…

    c) increase by a factor less than three.

       increase by (573 K/373 K)

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.]

    c) 734.5 mmHg P_{N2} = 750 - 15.5

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

    b)   increases   T is proportional to ave. KE

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

    a) increase

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}.

    e)   180 kPa   (2 mol He/9 mol total) x 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?

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

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?

    b) 0.981   PV=nRT   n=PV/RT

    $\qquad\qquad$ n = (.8)(30)/(.0821)(298)

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?   M of NH_4NO_2 = 64 g/mol

    403 L   128 g NH_4NO_2 = 2 moles reactant
    so, there are 6 moles of product gases.
    PV=nRT V = nRT/P = (6)(.0821)(819)/(1) = **403 L**

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

    c) 55.6 g/mol   STP means P=1 atm; T=273 K
    first, use 1.12 L at STP to calculate moles
    PV = nRT   n = PV/RT = (1)(1.12)/(.0821)(273)
    n = .04997 moles   molar mass = 2.78g/.04997 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   watch your units!
    PV=nRT   n=PV/RT = (.5)(.492)/(.0821)(300)

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

    a) greater than   smaller = faster

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

    b) 1:2 $\sqrt{(64/16)} = \sqrt{(4)} = 2$ CH_4 twice as fast as SO_2, question asks for SO_2:CH_4

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   ¼ x 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?

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

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

    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.

    c) The CH_4 is moving **faster**, but **not twice as fast** as the O_2.   faster by $\sqrt{(32/16)} = \sqrt{2}$