CALVIN

Chemistry Ch.14 Review

_____ 1. a measure of how much the volume of matter decreases under pressure compressibility
_____ 2. the pressure exerted by a gas in a mixture partial pressure
_____ 3. the escape of gas through a small hole in a container effusion
_____ 4. tendency of molecules to move to regions of lower concentration diffusion

5. Why is a gas easier to compress than a liquid or a solid? less dense / further apart

6. A How does the gas propellant move when an aerosol can is used?
   a. from a region of high pressure to a region of lower pressure
   b. from a region of high pressure to a region of equally high pressure
   c. from a region of low pressure to a region of higher pressure
   d. from a region of low pressure to a region of equally low pressure

7. If the volume of a container of gas is reduced, what will happen to the pressure inside the container? V↓ P↑ (Boyle's)
8. If a balloon is squeezed, what happens to the pressure of the gas inside the balloon? V↓ P↑ (Boyle's)
9. What happens to the temperature of a gas when it is compressed? P↑ T↑ (G-L's)
10. What happens to the pressure of a gas inside a container if the temperature of the gas decreases? T↑ P↑ (G-L's)
11. If the temperature of a gas is raised five times higher, what will happen to pressure? five times higher
12. Why does air escape from a tire when the tire valve is opened? pressure inside higher than outside H→L
13. List 3 ways to increase the PRESSURE in a container:
    ↓V, ↑T, add more gas
14. The volume of a gas is doubled while the temperature is held constant. How does the gas pressure change? cuts in half
15. Boyle's law states that A.
   a. the volume of a gas varies inversely with pressure
   b. the volume of a gas varies directly with pressure
   c. the temperature of a gas varies inversely with pressure
   d. the temperature of a gas varies directly with pressure

$V_1 = 4.2\,L$, $P_1 = 16.3\,kPa$, $P_2 = 64.8\,kPa$, $V_2 = ?$

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$V_2 = \frac{P_1V_1}{P_2} = \frac{(16.3\,kPa)(4.2\,L)}{(64.8\,kPa)}$

$V_2 = 1.06\,L$

16. Charles's law states that B.
   a. the pressure of a gas is inversely proportional to its temperature in kelvins
   b. the volume of a gas is directly proportional to its temperature in kelvins
   c. the pressure of a gas is directly proportional to its temperature in kelvins
   d. the volume of a gas is inversely proportional to its temperature in kelvins
17. If a sealed syringe is plunged into cold water, in which direction will the syringe piston slide?
18. What happens when a piston is used to decrease the volume of a contained gas?
   a. Fewer gas particles exert a force on the piston.
   b. The piston's pressure on the gas becomes greater than the pressure exerted by the gas on the piston.
   c. Gas particles become compressed.
   d. Gas particles leak out of the container.

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

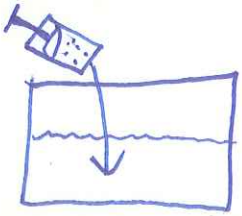
$V_1 = 7.00\,mL$, $T_1 = -121°C \rightarrow 152\,K$, $T_2 = 363\,K$, $V_2 = ?$

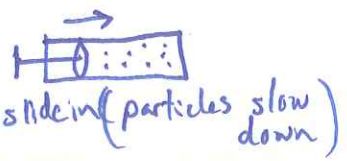
$V_2 = \frac{V_1T_2}{T_1} = \frac{(7.00\,mL)(363\,K)}{(152\,K)}$

$V_2 = 16.7\,mL$

19. A gas occupies a volume of 4.2 L at 16.3 kPa. What volume will the gas occupy at 64.8 kPa?
20. A sample of gas occupies 7.00 mL at –121°C. What volume does the sample occupy at 90.0°C?
21. The combined gas law relates which gas properties? T, P, V
22. The tendency of molecules to move toward areas of lower concentration is called diffusion
23. What does the constant bombardment of gas molecules against the inside walls of a container produce? pressure
24. Which instrument measures atmospheric pressure?

barometer





25. Convert the pressure 3.10 atm to kPa. $3.10\ \text{atm} \left| \frac{101.3\ \text{kPa}}{1\ \text{atm}} \right. = 314\ \text{kPa}$

26. Give conditions at STP 0°C, 1 atm

27. Who developed the concept that the total pressure of a mixture of gases is the sum of their partial pressures? Dalton

28. A mixture of four gases exerts a total pressure of 680 mm Hg. Gases A and B each exert 110 mm Hg. Gas C exerts 200 mm Hg. What pressure is exerted by gas D? $680 = 110 + 110 + 200 + X$ $X = 260\ \text{mm Hg}$

29. On a cold winter morning when the temperature is –15°C, the air pressure in an automobile tire is 1.8 atm. If the volume does not change, what is the pressure after the tire has warmed to 16.0°C?

30. The volume of a gas collected when the temperature is 11.0°C and the pressure is 710 mm Hg measures 14.8 mL. What is the calculated volume of the gas at 20.0°C and 740 mm Hg?

31. The equation for the production of methane is $C + 2H_2(g) \rightarrow CH_4(g)$. How many liters of hydrogen are needed to produce 20. L of methane? $20\ \text{L}\ CH_4 \left| \frac{2\ \text{L}\ H_2}{1\ \text{L}\ CH_4} \right. = 40\ \text{L}\ H_2$

32. The gas pressure inside a container decreases when
   a. the number of gas molecules is increased.
   b. the number of gas molecules is decreased.
   c. the temperature is increased.
   d. the number of molecules is increased and the temperature is increased.

33. Calculate the approximate volume of a 0.500 mol sample of gas at 18.0°C and a pressure of 2.20 atm.

34. If a gas with an odor is released in a room, it can quickly be detected across the room because it diffuses

35. Which is an example of effusion? A
   a. air slowly escaping from a pinhole in a tire
   b. the aroma of a cooling pie spreading across a room
   c. helium dispersing into a room after a balloon pops
   d. oxygen and gasoline fumes mixing in an automobile carburetor

36. Suppose that two gases with unequal molar masses were injected into opposite ends of a long tube at the same time and allowed to diffuse toward the center. They should begin to mix
   a. in approximately five minutes.
   b. closer to the end that held the heavier gas.
   c. closer to the end that held the lighter gas.
   d. exactly in the middle.

37. Gas property that allows gases to be forced into small areas: compressibility

38. Breathing is best explained by which gas law? Boyle's

29) $T_1 = -15°C \rightarrow 258\ \text{K}$
$P_1 = 1.8\ \text{atm}$
$P_2 = ?$
$T_2 = 16.0°C \rightarrow 289\ \text{K}$

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$ $\quad P_2 = \frac{P_1 T_2}{T_1} = \frac{(1.8\ \text{atm})(289\ \text{K})}{(258\ \text{K})} = 2.02\ \text{atm}$

30) $T_1 = 11.0°C \rightarrow 284\ \text{K}$
$P_1 = 710\ \text{mm Hg}$
$V_1 = 14.8\ \text{mL}$
$V_2 = ?$
$T_2 = 20.0°C \rightarrow 293\ \text{K}$
$P_2 = 740\ \text{mm Hg}$

$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$ $\quad V_2 = \frac{P_1 V_1 T_2}{T_1 P_2} = \frac{(710\ \text{mm Hg})(14.8\ \text{mL})(293\ \text{K})}{(284\ \text{K})(740\ \text{mm Hg})} = 14.7\ \text{mL}$

Go Vikings!!

33) $n = 0.500\ \text{mol}$
$T = 18.0°C \rightarrow 291\ \text{K}$
$P = 2.20\ \text{atm}$
$V = ?$
$R = 0.0821\ \frac{\text{L·atm}}{\text{mol·K}}$

$PV = nRT$

$V = \frac{nRT}{P} = \frac{(0.500\ \text{mol})\left(0.0821\ \frac{\text{L·atm}}{\text{mol·K}}\right)(291\ \text{K})}{(2.20\ \text{atm})} = 5.43\ \text{L}$