

AP Chem Ch.5 Intro

Name: CALVIN

Date:

Hour:

compressibility
partial pressure
effusion
diffusion

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

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? *$V \downarrow P \uparrow$ (Boyle's)*

8. If a balloon is squeezed, what happens to the pressure of the gas inside the balloon? *$V \downarrow P \uparrow$ (Boyle's)*

9. What happens to the temperature of a gas when it is compressed? *$P \uparrow T \uparrow$ (G-L's)*

10. What happens to the pressure of a gas inside a container if the temperature of the gas decreases? *$T \uparrow P \uparrow$ (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 is higher $H \rightarrow L$*

13. List ³ 4 ways to increase the PRESSURE in a container:

$\downarrow V$, $\uparrow T$, add more gas

14. The volume of a gas is doubled while the temperature is held constant. How does the gas pressure change?

15. Boyle's law states that A.

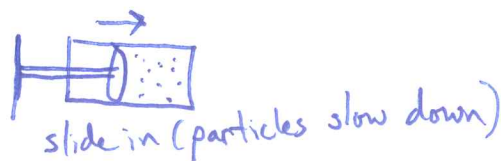
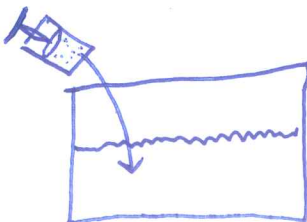
- a. the volume of a gas varies inversely with pressure
- b. the volume of a gas varies directly with pressure
- c. the temperature of a gas varies inversely with pressure
- d. the temperature of a gas varies directly with pressure

Cuts in half

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

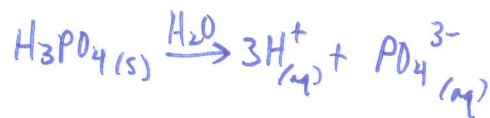
17. If a sealed syringe is plunged into cold water, in which direction will the syringe piston slide?



12) Phosphoric acid, H_3PO_4 , is a triprotic acid. What is the total number of moles of H^+ available for reaction in 2.50 L of 0.700 M H_3PO_4 ?

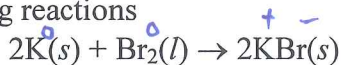
- A) 0.233 mole
- B) 2.10 mole
- C) 0.583 mole
- D) 3.00 moles
- E) 5.25 moles

$$M = \frac{n}{L}$$

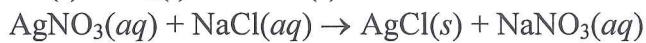


$$n = M \cdot L = (0.700 \frac{\text{mol}}{\text{L}})(2.50 \text{ L}) = 1.75 \text{ mol} \times 3 = \boxed{5.25 \text{ mol}}$$

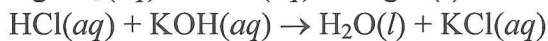
13) The following reactions



Redox



precip.



Acid/Base

are examples of

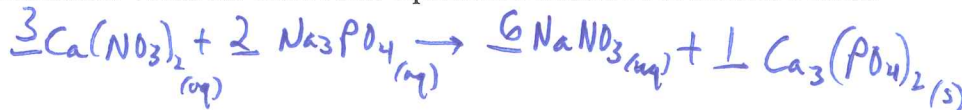
- A) precipitation reactions
- B) redox, precipitation, and acid-base, respectively
- C) precipitation (two) and acid-base reactions, respectively
- D) redox reactions
- E) none of these

14) Consider an aqueous solution of calcium nitrate added to an aqueous solution of sodium phosphate. What is the formula of the solid formed in the reaction?

- A) $\text{Ca}(\text{PO}_4)_2$
- B) CaPO_4
- C) $\text{Ca}_3(\text{PO}_4)_2$
- D) $\text{Ca}_3(\text{PO}_3)_2$
- E) none of these

15) Consider an aqueous solution of calcium nitrate added to an aqueous solution of sodium phosphate. Write and balance the equation for this reaction to answer the following question. What is the sum of the coefficients when the molecular equation is balanced in standard form?

- A) 4
- B) 5
- C) 7
- D) 11
- E) 12



16) The oxidation state of chlorine in ClO^- is:

- A) 0
- B) +1
- C) -1
- D) +3
- E) -3

18. What happens when a piston is used to decrease the volume of a contained gas?
- Fewer gas particles exert a force on the piston.
 - The piston's pressure on the gas becomes greater than the pressure exerted by the gas on the piston.
 - Gas particles become compressed.
 - Gas particles leak out of the container.

19. A gas occupies a volume of 4.2 L at 16.3 kPa. What volume will the gas occupy at 64.8 kPa?

$$\begin{aligned}
 V_1 &= 4.2 \text{ L} \\
 P_1 &= 16.3 \text{ kPa} \\
 P_2 &= 64.8 \text{ kPa} \\
 V_2 &=?
 \end{aligned}$$

$$\frac{P_1 V_1}{P_2} = \frac{P_2 V_2}{P_2}$$

$$V_2 = \frac{P_1 V_1}{P_2} = \frac{(16.3 \text{ kPa})(4.2 \text{ L})}{(64.8 \text{ kPa})} = \boxed{1.1 \text{ L}}$$

20. A sample of gas occupies 7.00 mL at -121°C . What volume does the sample occupy at 90.0°C ?

$$\begin{aligned}
 V_1 &= 7.00 \text{ mL} \\
 T_1 &= -121^\circ\text{C} \rightarrow 152 \text{ K} \\
 T_2 &= 90.0^\circ\text{C} \rightarrow 363 \text{ K} \\
 V_2 &=?
 \end{aligned}$$

$$\frac{V_1 T_1}{T_2} = \frac{V_2 T_2}{T_2}$$

$$V_2 = \frac{V_1 T_2}{T_1} = \frac{(7.00 \text{ mL})(363 \text{ K})}{(152 \text{ K})} = \boxed{16.7 \text{ mL}}$$

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.

$$\frac{3.10 \text{ atm}}{1 \text{ atm}} \times 101.3 \text{ kPa} = \boxed{314 \text{ kPa}}$$

26. Give conditions at STP

$0^\circ\text{C}, 1 \text{ atm}$

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?

$$P_{\text{Tot}} = P_1 + P_2 + P_3 \dots$$

$$680 = 110 + 110 + 200 + X$$

$$X = \boxed{260 \text{ mmHg}}$$

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 ?

$$T_1 = -15^\circ\text{C} \rightarrow 258 \text{ K}$$

$$P_1 = 1.8 \text{ atm}$$

$$P_2 = ?$$

$$T_2 = 16.0^\circ\text{C} \rightarrow 289 \text{ K}$$

$$\frac{P_1 T_1}{T_2} = \frac{P_2 T_2}{T_2}$$

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

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?

$$T_1 = 11.0^\circ\text{C} \rightarrow 284\text{K}$$

$$P_1 = 710\text{ mmHg}$$

$$V_1 = 14.8\text{ mL}$$

$$V_2 = ?$$

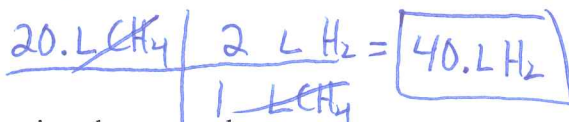
$$T_2 = 20.0^\circ\text{C} \rightarrow 293\text{K}$$

$$P_2 = 740\text{ mmHg}$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

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

31. The equation for the production of methane is $\text{C} + 2\text{H}_2(\text{g}) \rightarrow \text{CH}_4(\text{g})$. How many liters of hydrogen are needed to produce 20. L of methane?



32. The gas pressure inside a container decreases when

- the number of gas molecules is increased.
- the number of gas molecules is decreased.
- the temperature is increased.
- 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.

$$n = 0.500\text{ mol}$$

$$T = 18.0^\circ\text{C} \rightarrow 291\text{K}$$

$$P = 2.20\text{ atm}$$

$$V = ?$$

$$R = 0.0821\text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K}$$

$$PV = nRT$$

$$V = \frac{nRT}{P} = \frac{(0.500\text{ mol})(0.0821\text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K})(291\text{K})}{(2.20\text{ atm})} = \boxed{5.43\text{ L}}$$

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

35. Which is an example of effusion?

- air slowly escaping from a pinhole in a tire
- the aroma of a cooling pie spreading across a room
- helium dispersing into a room after a balloon pops
- 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

- in approximately five minutes.
- closer to the end that held the heavier gas.
- closer to the end that held the lighter gas.
- 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

Go Vikings!!