

- State the basic principles of the kinetic theory of gases
 - large space between particles
 - no intermolecular forces
 - energy is directly related to kelvin temp.
- Convert 340 kPa to mmHg. $\frac{340 \text{ kPa}}{101.3 \text{ kPa}} \times 760.0 \text{ mmHg} = 2570.8 \approx 2600 \text{ mmHg}$
- When a gas increases in volume, what happens to the temperature if the pressure is held constant?

increase

- What happens to the pressure in a balloon if the balloon is squeezed and the volume decreases?

increase

- What conditions of pressure and temperature cause more gases to remain dissolved in a liquid?

high pressure / low temp.

- What is the pressure in a bottle if it was initially at 2.51 atm and 5.4 L and the volume decreases to 1.2 L?

$$P_1 V_1 = P_2 V_2 \quad (2.51)(5.4) = P_2(1.2)$$

$$P_2 = 11 \text{ atm}$$

- If a container has 137 kPa of pressure and air is removed until the pressure is 87.3 kPa, what is the new temperature if it was initially at 45.0°C?

$$\frac{P_1 V_1}{n_1 T_1} = \frac{P_2 V_2}{n_2 T_2} \quad \frac{137}{318} = \frac{87.3}{T_2}$$

$$T_2 = 203 \text{ K or } -70.1^\circ \text{C}$$

- What mass of NO₂ is in a container with a pressure of 135 kPa at 60.7°C and a volume of 2.00 L?

$$PV = nRT$$

$$(1.33 \text{ atm})(2.00) = n(0.08206)(333.7)$$

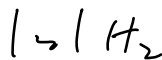
$$n = 0.0971 \text{ mol NO}_2$$

$$\frac{0.0971 \text{ mol NO}_2 \times 46.01 \text{ g/mol}}{1 \text{ mol NO}_2} = 44.7 \text{ g}$$

- In the reaction $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$

- How many liters of hydrogen gas will be formed from 1.45 moles of HCl at STP?

$$\frac{1.45 \text{ mol HCl}}{2 \text{ mol HCl}} \times \frac{1 \text{ mol H}_2}{1 \text{ mol H}_2} \times 22.4 \text{ L} = 16.2 \text{ L}$$



10. When 13.5L of a gas at STP is put under a pressure of 685.4torr and 65.9°C, what will the new volume be?

$$\frac{P_1 V_1}{n_1 T_1} = \frac{P_2 V_2}{n_2 T_2} \quad \frac{(760 \text{ torr})(13.5)}{273} = \frac{(685.4)(V_2)}{338.9}$$

11. What is the strongest intermolecular force in covalent compounds?

hydrogen bonds

12. What intermolecular forces are found in HF?

hydrogen bonds
dipole-dipole
dispersion

13. What intermolecular forces are found in CH₄?

dispersion

14. How did God design water to not kill fish?

water expands when it freezes because the hydrogen bonds create space between the molecules. this causes ice to be less dense than water so lakes freeze at the top 1st creating an insulating top so the rest of the lake doesn't freeze

15. Describe metallic bonds and explain how this makes metals good conductors of electricity.

cations line up in rows with electrons delocalized and moving freely around cations. these loosely held electrons can move creating an electric current

16. Define a solvent and a solute.

solvent = majority component

solute = minority component

17. What are colligative properties and what are some examples?

properties that depend on # of particles in solution

- vapor pressure decreases
- boiling point increases
- freezing point decreases

18. Are solutions heterogeneous or homogeneous? Explain.

homogeneous - they are evenly mixed and the components cannot be distinguished

19. What are 3 ways to speed up the rate of dissolving?

stir
heat it up
smaller grains

20. What type of substance will not dissolve in water?

non polar

21. What are two conditions at which more gases can dissolve in a liquid?

high pressure / low temp.

$$V_2 = 18.6 \text{ L}$$

22. What is the molarity of 1.34g of NaCl in 556mL of solution?

$$\frac{1.34}{59.44} = \frac{.0229 \text{ mol}}{556 \text{ L}} = .0412 \text{ M}$$

23. 54.6g of NaNO₃ must be added to what mass of water to make a 1.34m solution?

$$\frac{54.6}{84.99} = \frac{.642 \text{ mol}}{X} = 1.34 \text{ m} = .479 \text{ kg}$$

24. What is the percent by mass of 1.45kg of solution which contains 5.43g of sugar?

$$\frac{5.43 \text{ g}}{1450 \text{ g}} \times 100 = 374 \%$$

25. If 12.5g of CaCl₂ are dissolved in 125.3 g of acetone, what will the new boiling point be?

$$\frac{12.5 \text{ g}}{110.98 \text{ g}} = \frac{.113 \text{ mol}}{.1253} = .899 \text{ m}$$

$$\Delta T = K_b m P$$

$$(1.71)(.899)(3)$$

$$\Delta T = 4.61^\circ \text{C}$$

$$+ 56.2$$

$$60.8^\circ \text{C}$$