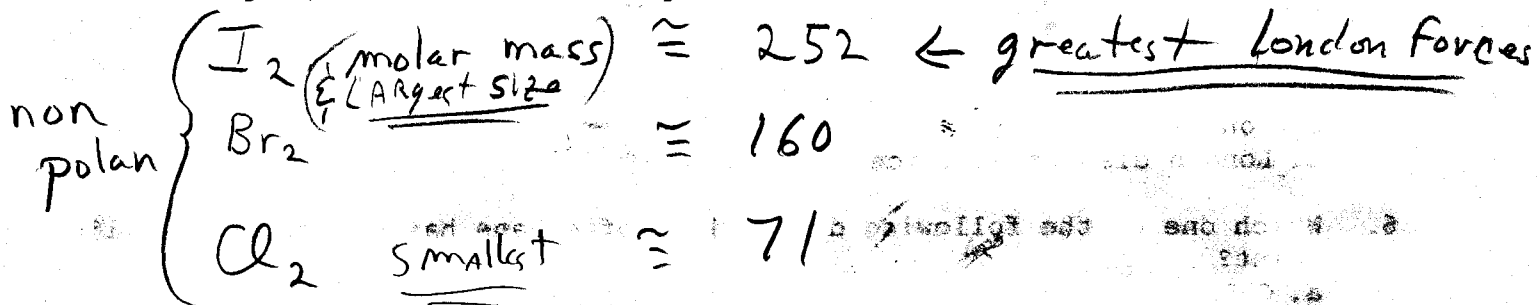


$PV = nRT$ $P_1V_1T_2 = P_2V_2T_1$ $R = 0.0821 \text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K} = 62.4 \text{ L}\cdot\text{torr}/\text{mol}\cdot\text{K}$

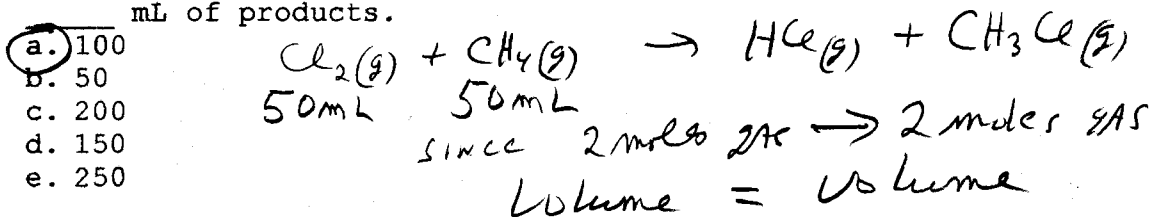
1. Explain why, at room temperature, iodine is a solid, bromine is a liquid, and chlorine is a gas.



2. The volume of a balloon is _____ L at a depth of 50 feet if its volume on the surface of the water was 2.84 L. Thirty feet of water equals one atmosphere. Assume constant temperature.

a. 1.70 $P_1 = 1 \text{ atm}$
 b. 4.74 $P_1 V_1 = P_2 V_2$
 c. 1.06 $V_1 = 2.84 \text{ L}$
 $V_2 = \frac{P_1 V_1}{P} = \frac{(1 \text{ atm})(2.84 \text{ L})}{(1 + \frac{50}{30}) \text{ atm}}$
 d. 3.05 $T_1 =$
 e. 0.939 $P_2 = 1 \text{ atm} + \frac{50}{30} \text{ atm}$
 $V_2 = 1.06 \text{ atm}$

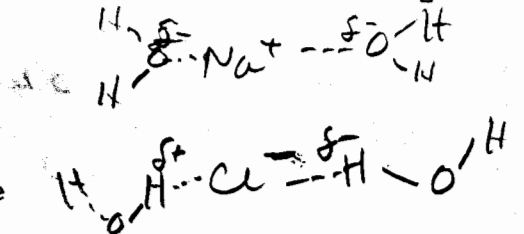
3. The law of combining volumes says that at a given temperature and pressure, the reaction of 50 mL of Cl_2 gas with 50 mL of CH_4 gas via the equation: $Cl_2(g) + CH_4(g) \rightarrow HCl(g) + CH_3Cl(g)$ will produce a total of _____ mL of products.



4. The principal source of the difference in the normal boiling points of ICl (97°C ; molecular mass 162 amu) and Br_2 (59°C ; molecular mass 160 amu) is _____.
 a. London-dispersion forces
 b. dipole-dipole interactions
 c. hydrogen bonding
 d. both hydrogen-bonding and dipole-dipole interactions
 e. both dipole-dipole interactions and London dispersion forces
- They have \approx London dispersion forces, but ICl is polar.

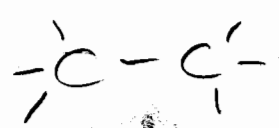
5. When NaCl dissolves in water, aqueous Na⁺ and Cl⁻ ions result. The force of attraction that exists between Na⁺ and H₂O is called a(n) _____ interaction.

- a. dipole-dipole
- b. ion-ion
- c. hydrogen bonding
- d. ion-dipole**
- e. London dispersion force



6. Which one of the following derivatives of ethane has the highest boiling point?

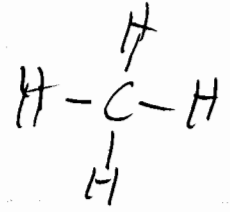
- a. C₂Br₆
- b. C₂F₆
- c. C₂I₆**
- d. C₂Cl₆
- e. C₂H₆



Isomolecular (same structure) but (c) is largest with strongest London dispersion forces.

7. Of the following substances, only _____ has London dispersion forces as its only intermolecular force.

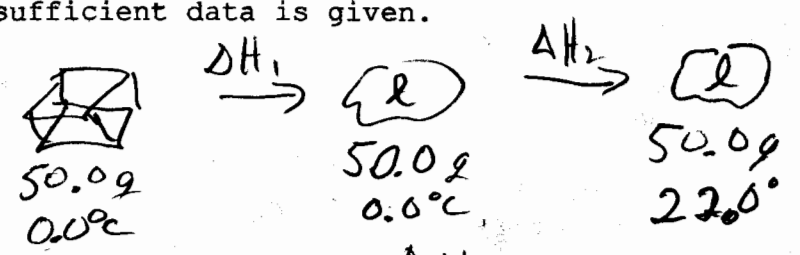
- a. CH₃OH *H-bonding*
- b. NH₃ *H-bonding*
- c. H₂S *polar*
- d. CH₄**
- e. HCl *polar*



tetrahedral geometry

8. The heat of fusion of water is 6.01 kJ/mol. The heat capacity of liquid water is 75.2 J/mol-K. The conversion of 50.0 g of ice at 0.0°C to liquid water at 22.0°C requires _____ kJ of heat.

- a. 3.8 x 10²
- b. 21.3**
- c. 17.2
- d. 0.469
- e. Insufficient data is given.



$$\Delta H = \Delta H_1 + \Delta H_2$$

$$\Delta H = \frac{6.01 \text{ kJ}}{\text{mol}} \left| \frac{50.0g}{18.0g} \right| + \frac{75.2 \text{ J}}{\text{mol} \cdot K} \left| \frac{50.0g}{18.0g} \right| \frac{22.0K}{10^3}$$

$$\Delta H = 16.7 \text{ kJ} + 4.60 \text{ kJ}$$

$$\Delta H = 21.3 \text{ kJ}$$