

Chapter 6

2. a) ionic interactions - such as $\text{Na}^+ + \text{Cl}^-$

b) ion-dipole interactions - such as Na^+ w/ H_2O (dipole)

c) dipole-dipole interactions - such as H_2O (dipole) w/ H_2O (dipole)

d) dispersion forces - temporary dipoles

7. H-bonding would be significant in b + d. Both have H-bonded to an electronegative atom and unshared electrons on the electronegative atom.

8. Br_2 only has dispersion forces. $\text{HF} + \text{HCl}$ are polar

9. HCl exhibits dipole interactions because it is polar.
 Br_2 is nonpolar + NaCl is ionic

12. a + d are ionic and should dissolve in water
b + c are non-ionic and nonpolar and should dissolve in benzene.

15. $P_1 V_1 = P_2 V_2$

a) $(150 \text{ atm})(60.0 \text{ L}) = (0.987 \text{ atm})(x \text{ L})$

$$x = \frac{(150 \text{ atm})(60.0 \text{ L})}{0.987 \text{ atm}} = 9118.5 \text{ L} = \underline{\underline{9120 \text{ L}}}$$

b) $9120 \text{ L} \cdot \frac{1 \text{ min}}{8.00 \text{ L}} = \underline{\underline{1140 \text{ minutes}}}$

$$18 \quad \frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$\therefore V_1 = 5.90 \text{ L}, T_1 = 26^\circ\text{C} + 273 = 299 \text{ K}$$

$$V_2 = ?, T_2 = 78^\circ\text{C} + 273 = 351 \text{ K}$$

$$\therefore V_2 = \frac{V_1 T_2}{T_1} = \frac{5.90 \text{ L} \cdot 351 \text{ K}}{299 \text{ K}} = \underline{\underline{6.93 \text{ L}}}$$

$$25 \quad a) \frac{2.12 \text{ g}}{1 \text{ L}} \cdot \frac{22.4 \text{ L}}{1 \text{ mol}} = 47.49 \text{ g/mol}$$

$$b) \frac{2.97 \text{ g}}{\text{L}} \cdot \frac{22.4 \text{ L}}{1 \text{ mol}} = 66.53 \text{ g/mol}$$

28. a) volume will decrease

b) volume will decrease

c) volume will increase

30. a) A will have higher density

b) densities will be the same

c) B will have higher density

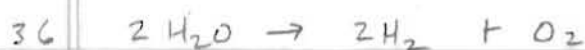
$$31 \quad pV = nRT \Rightarrow V = \frac{nRT}{p} \quad \text{or} \quad p = \frac{nRT}{V}$$

$$a) \quad V = \frac{1.12 \text{ mol} \cdot \left(0.0821 \frac{\text{L atm}}{\text{mol K}}\right) \cdot 335 \text{ K}}{0.870 \text{ atm}} = 35.4 \text{ L}$$

$$b) \quad p = \frac{4.64 \text{ mol} \cdot \left(0.0821 \frac{\text{L atm}}{\text{mol K}}\right) \cdot 302 \text{ K}}{3.96 \text{ L}} = \underline{\underline{29.1 \text{ atm}}}$$

$$34 \quad PV = nRT \Rightarrow n = \frac{PV}{RT}$$

$$n = \frac{(1.03 \text{ atm})(0.745 \text{ L})}{(0.0821 \frac{\text{L atm}}{\text{mol K}})(309 \text{ K})} = 0.0302 \text{ mol CO} \cdot \frac{28.01 \text{ g CO}}{1 \text{ mol CO}} = \underline{\underline{0.847 \text{ g CO}}}$$



$$\frac{1000 \text{ g H}_2\text{O}}{18.00 \text{ g H}_2\text{O}} \cdot \frac{1 \text{ mol}}{1} \cdot \frac{2 \text{ mol H}_2}{2 \text{ mol H}_2\text{O}} = 55.55 \text{ mol} \cdot \frac{22.4 \text{ L}}{1 \text{ mol}} = \underline{\underline{1244 \text{ L H}_2}}$$

$$40 \quad PV = nRT$$

$$n = \frac{PV}{RT} = \frac{(0.500 \text{ atm})(4.48 \text{ L})}{(0.0821 \frac{\text{L atm}}{\text{mol K}})(273 \text{ K})} = 0.10 \text{ mol}$$

$\therefore$ a & d are incorrect

$$0.10 \text{ mol} \cdot \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = 6.02 \times 10^{22} \text{ molecules} \quad \therefore \text{c is correct}$$

$$0.10 \text{ mol} \cdot \frac{17.01 \text{ g}}{1 \text{ mol}} = 1.70 \text{ g} \quad \therefore \text{b is incorrect}$$

$$44 \quad PV = nRT \quad p = 760 \text{ mm Hg} = 1 \text{ atm}, V = 8.00 \text{ L}, T = 298 \text{ K}$$

$$n = \frac{PV}{RT} = \frac{(1 \text{ atm})(8.00 \text{ L})}{(0.0821 \frac{\text{L atm}}{\text{mol K}})(298 \text{ K})} = 0.327 \text{ mol}$$

$$\frac{14.4 \text{ g}}{0.327 \text{ mol}} = 44.0 \text{ g/mol} = \text{molar mass}$$