

Key - spring 2019 Honors Chemistry Final Review

Scientific method

- observation - using your 5 senses to notice things
- hypothesis - testable explanation of observations
- experiment - step by step procedure for testing the hypothesis
- data / analysis - information gathered from experiment / calculations done on data
- theory / scientific law - explanation of why the phenomena occurs / explanation of what phenomena occurs

1. (a) observation - honeybee populations are dying
- (b) hypothesis - a pathogen is killing the honeybees
- (c) experiment - Have 2 healthy honeybee hives in identical conditions, same access to food, shelter, & water. Introduce a pathogen to one hive and observe
- (d) If the hypothesis is true, the hive w/ the pathogen would die while the other hive would remain healthy
- (e) If the hypothesis is not true, either both hives would be healthy or both would be dead

Lab Safety

2. (a) so clothes, hair, or jewelry do not get chemicals on them or knock any chemicals over
- (b) to protect the eyes from flying glass or spilled chemicals
- (c) so no injuries occur from spilled chemicals or dropped glassware
- (d) so you don't eat/drink anything contaminated
- (e) so you don't knock anything over or break anything

Lab Equipment

- | | | |
|--------------------|--------------------|-------------------|
| 3. beaker | thermometer | funnel |
| graduated cylinder | electronic balance | Beaker the Muppet |
| | | Erlenmeyer flask |

Scientific Notation

- 4(a) 0.00000678 s = $6.78 \times 10^{-6} \text{ s}$
- (b) 19100000 J = $1.91 \times 10^7 \text{ J}$
- (c) 0.0005409 = 5.409×10^{-4}
- (d) $12110000000 \text{ }^{\circ}\text{C}$ = $1.211 \times 10^{10} \text{ }^{\circ}\text{C}$
- (e) $8.76 \times 10^4 \text{ atm}$ = 87600 atm
- (f) $3.42 \times 10^{-4} \text{ mol}$ = 0.000342 mol

(1)

Nuclear Chemistry

5. nuclear fission - splitting a large atom into smaller particles
nuclear fusion - combining smaller particles into a larger atom

 - (a) fusion creates elements
 - (b) fission is used in reactors
 - (c) fusion is in stars
 - (d) fusion requires high temperatures

States of matter

4. (1) b. liquid
(2) c. gas ≠ d. plasma
(3) a. solid
(4) d. plasma
(5) a. solid
(6) c. gas ≠ d. plasma
(7) b. liquid

7. (a) physical
(b) chemical
(c) physical
(d.) physical
(e) chemical
(f) chemical
(g) physical
(h) chemical

8. (a) copper - element (b) lucky charms - hetero. mixture
(c) air - homogeneous mix. (d) oxygen - element
(e) carbon monoxide - compound (f) hot coffee - homogeneous mixture

9. (a) burning tire - chemical
(b) freezing ice - physical
(c) density - physical
(d) rubidium/fire - chemical
(e) silvery white - physical
(f) dissolving - physical

10. Gallium is a liquid at human body temperature (37°C)

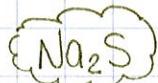
Nomenclature

11. (a) sodium sulfide

is a metal, so it's ionic.
criss-cross charges

$+1 \quad -2$

Na S



(b) HCl

it is an acid, a binary acid since there is no oxygen

hydrochloric acid

(c) gold (III) fluoride

is a metal, so it's ionic

$\text{Au}^{+3} \quad \text{F}^{-}$



(d) Na₂O₅

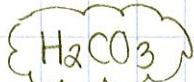
2 nonmetals, its covalent.
Use prefixes!

dinitrogen pentoxide

(e) carbonic acid

all acids start w/ H⁺
-ic means carbonate

$\text{H} \quad \text{CO}_3$



(f) Ca(NO₃)₂

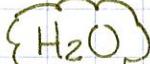
is a regular metal

calcium nitrate

(g) dihydrogen monoxide

prefixes? 2 nonmetals

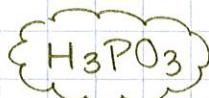
means covalent - no criss-crossing



(h) H₃PO₃

H 1st means acid, it's an oxyacid because it has an oxygen. PO₃ is phosphorous acid

$\text{H}^{+1} \quad \text{PO}_3^{-3}$



(i) lead (IV) sulfate

is a transition metal, so it's ionic.

$\text{Pb}^{+4} \quad \text{SO}_4^2-$

$\text{Pb}_2(\text{SO}_4)_4$
simplify



(j) Fe₂(C₂O₄)₃

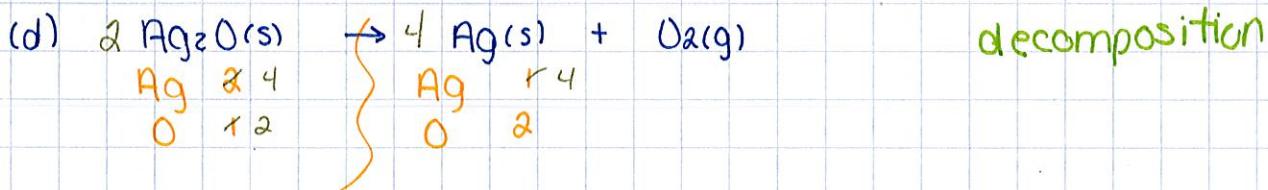
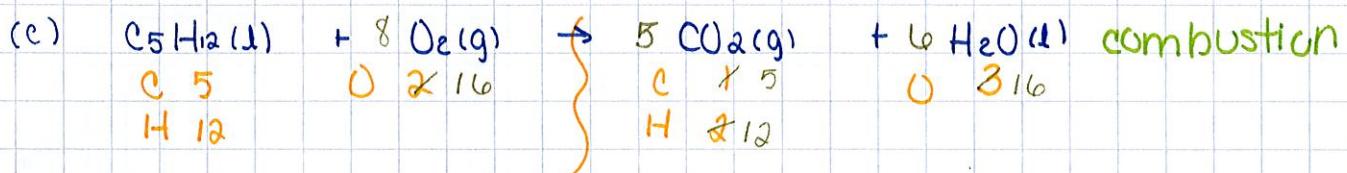
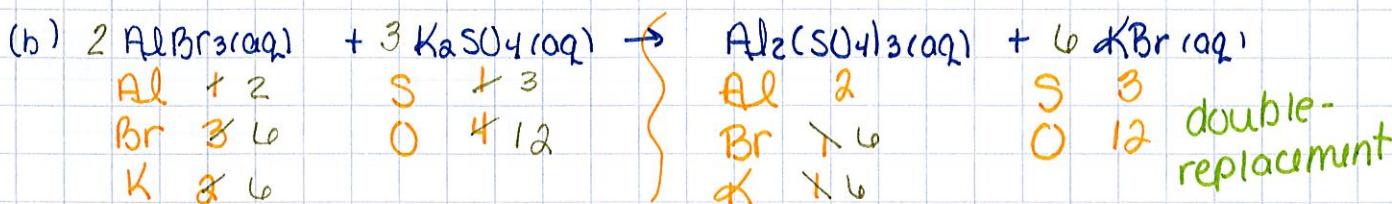
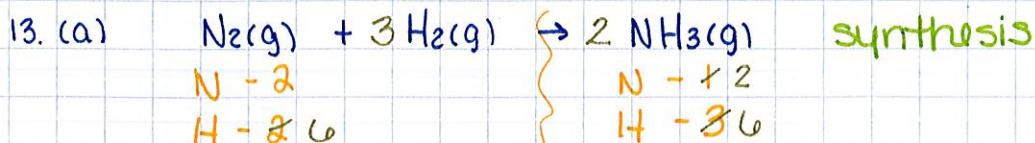
transition metal, need to use Roman numerals for Fe's charge

iron (III) oxalate

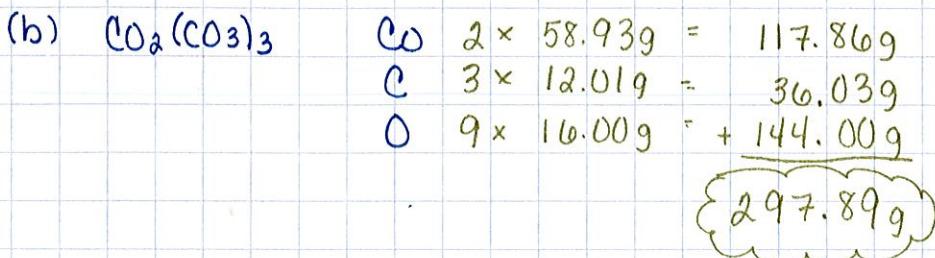
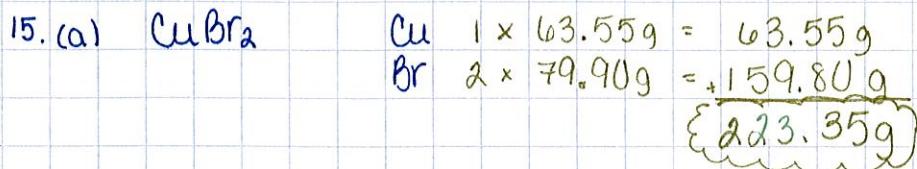
Chemical Reactions

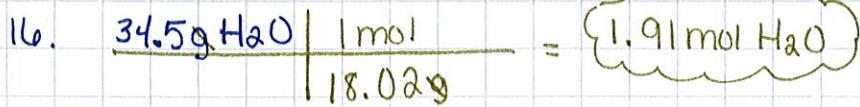
12. (a) $\text{NaCl(s)} + \text{F}_2\text{(g)} \rightarrow \text{NaF(g)} + \text{Cl}_2\text{(g)}$
 (b) ~~$\text{KUO}_3\text{(s)} \rightarrow \text{KCl(s)} + \text{O}_2\text{(g)}$~~
 (c) $\text{S}_8\text{(s)} + \text{O}_2\text{(g)} \rightarrow \text{SO}_3\text{(g)}$
 (d) $\text{HCl(aq)} + \text{CaCO}_3\text{(s)} \rightarrow \text{CaCl}_2\text{(aq)} + \text{H}_2\text{O(l)} + \text{CO}_2\text{(g)}$
 (e) $\text{C}_3\text{H}_8\text{(l)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + \text{H}_2\text{O(g)}$

(14)
 single-replacement
 decomposition
 synthesis
 $\text{CO}_2\text{(g)}$ double-repl.
 combustion

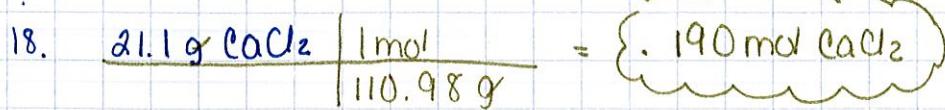
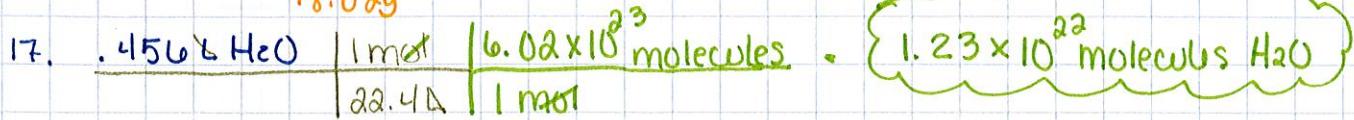


moles

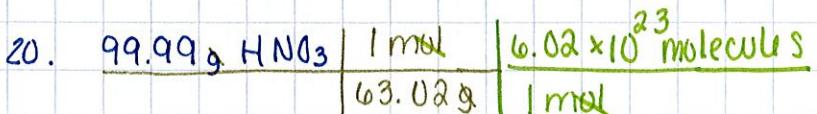
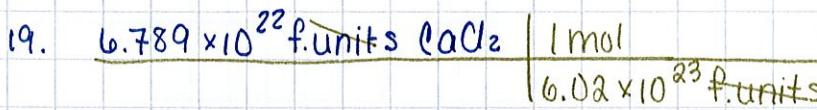




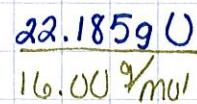
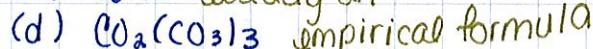
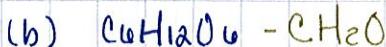
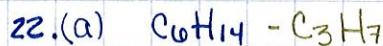
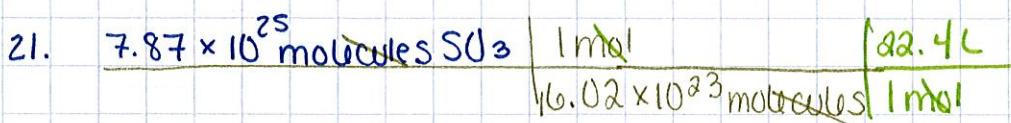
$$\begin{aligned} \text{H} & 2 \times 1.01 \text{ g} = 2.02 \text{ g} \\ \text{O} & 1 \times 16.00 \text{ g} = \underline{\underline{16.00 \text{ g}}} \\ & \quad 18.02 \text{ g} \end{aligned}$$



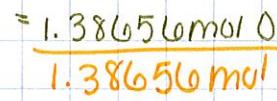
$$\begin{aligned} \text{Ca} & 1 \times 40.08 \text{ g} = 40.08 \text{ g} \\ \text{Cl} & 2 \times 35.45 \text{ g} = \underline{\underline{70.90 \text{ g}}} \\ & \quad 110.98 \text{ g} \end{aligned}$$



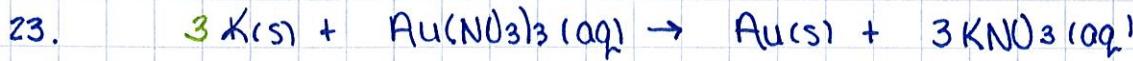
$$\begin{aligned} \text{H} & 1 \times 1.01 \text{ g} = 1.01 \text{ g} \\ \text{N} & 1 \times 14.01 \text{ g} = 14.01 \text{ g} \\ \text{O} & 3 \times 16.00 \text{ g} = \underline{\underline{48.00 \text{ g}}} \\ & \quad 63.02 \text{ g} \end{aligned}$$



$$\begin{aligned} &= \frac{5.54629 \text{ mol C}}{1.38656 \text{ mol}} \\ &\text{Divide by smallest answer} \\ &= \frac{11.09307 \text{ mol H}}{1.38656 \text{ mol}} \end{aligned}$$



Stoichiometry



$$(a) \frac{21.0 \text{ mol K}}{3 \text{ mol K}} \left| \begin{array}{c} 3 \text{ mol KNO}_3 \\ 1 \text{ mol Au} \end{array} \right| = \left\{ \begin{array}{c} 7.00 \text{ mol KNO}_3 \\ 1 \text{ mol Au} \end{array} \right\}$$

$$(b) \frac{1.50 \text{ mol K}}{3 \text{ mol K}} \left| \begin{array}{c} 1 \text{ mol Au} \\ 196.97 \text{ g Au} \end{array} \right| = \left\{ \begin{array}{c} 98.5 \text{ g Au} \\ 1 \text{ mol Au} \end{array} \right\}$$

$$(c) \frac{50.00 \text{ g Au(NO}_3)_3}{383.00 \text{ g Au(NO}_3)_3} \left| \begin{array}{c} 1 \text{ mol Au(NO}_3)_3 \\ 1 \text{ mol Au} \end{array} \right| \frac{3 \text{ mol KNO}_3}{1 \text{ mol Au(NO}_3)_3} \left| \begin{array}{c} 101.11 \text{ g KNO}_3 \\ 1 \text{ mol KNO}_3 \end{array} \right| = \left\{ \begin{array}{c} 39.60 \text{ g KNO}_3 \\ 1 \text{ mol KNO}_3 \end{array} \right\}$$

AU $1 \times 196.97 \text{ g} = 196.97 \text{ g}$
 N $3 \times 14.01 \text{ g} = 42.03 \text{ g}$
 O $9 \times 16.00 \text{ g} = 144.00 \text{ g}$
 $\frac{196.97 \text{ g} + 42.03 \text{ g} + 144.00 \text{ g}}{383.00 \text{ g}} = 0.600 \text{ mol Au(NO}_3)_3$

$$(d) \frac{30.00 \text{ mol K}}{3 \text{ mol K}} \left| \begin{array}{c} 1 \text{ mol Au} \\ 196.97 \text{ g Au} \end{array} \right| - 1970.9 \text{ g Au}$$

$$\frac{9.00 \text{ mol Au(NO}_3)_3}{1 \text{ mol Au(NO}_3)_3} \left| \begin{array}{c} 1 \text{ mol Au} \\ 1 \text{ mol Au} \end{array} \right| \frac{196.97 \text{ g Au}}{1 \text{ mol Au}} = 1773 \text{ g Au}$$

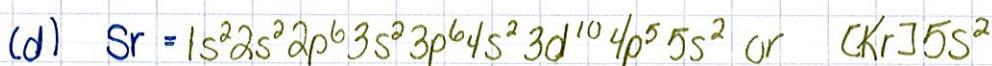
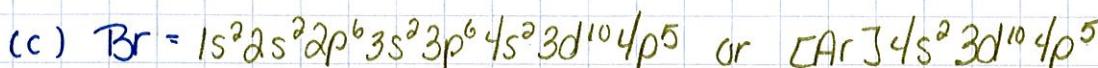
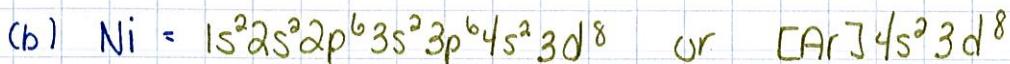
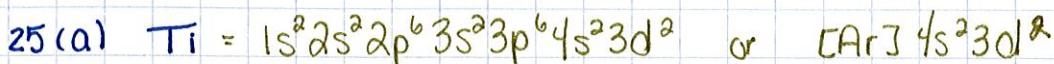
L.R. = $\text{Au(NO}_3)_3$
 because it produces
 the lowest amount
 of product

$$(e) \frac{1173 \text{ g K}}{39.10 \text{ g K}} \left| \begin{array}{c} 1 \text{ mol Au} \\ 1 \text{ mol Au} \end{array} \right| \frac{196.97 \text{ g Au}}{1 \text{ mol Au}} = 1970.9 \text{ g Au}$$

$$\frac{3447 \text{ g Au(NO}_3)_3}{383.00 \text{ g Au(NO}_3)_3} \left| \begin{array}{c} 1 \text{ mol Au(NO}_3)_3 \\ 1 \text{ mol Au} \end{array} \right| \frac{1 \text{ mol Au}}{1 \text{ mol Au(NO}_3)_3} \frac{196.97 \text{ g Au}}{1 \text{ mol Au}} = 1773 \text{ g Au}$$

24.

Element	atomic #	mass #	# p ⁺	# e ⁻	# n ⁰
sulfur	16	32	16	16	$32 - 16 = 16$
cadmium	48	$48 + 64 = 112$	48	48	64
tantalum	73	181	73	73	$181 - 73 = 108$
einsteinium	99	$153 + 99 = 252$	99	99	153



26. violet light, $\lambda = 4.00 \times 10^{-7} \text{ m}$ $C = \lambda \cdot \nu$

$$C = 3.00 \times 10^8 \text{ m/s}$$

$$\lambda = 4.00 \times 10^{-7} \text{ m}$$

$$\nu = ?$$

$$\frac{3.00 \times 10^8 \text{ m/s}}{4.00 \times 10^{-7} \text{ m}} = \frac{(4.00 \times 10^{-7} \text{ m}) \cdot \nu}{4.00 \times 10^{-7} \text{ m}}$$

$$\{ 7.50 \times 10^{14} \text{ 1/s} \} = \nu$$

$$E = h\nu$$

$$E = ?$$

$$h = 6.626 \times 10^{-34} \text{ J.s}$$

$$\nu = 7.50 \times 10^{14} \text{ 1/s}$$

$$E = (6.626 \times 10^{-34} \text{ J.s})(7.50 \times 10^{14} \text{ 1/s})$$

$$E = 4.97 \times 10^{-19} \text{ J}$$

27. $C = \lambda \cdot \nu$

$$C = 3.00 \times 10^8 \text{ m/s}$$

$$\lambda = 1.00 \times 10^1 \text{ m}$$

$$\nu = ?$$

$$\frac{3.00 \times 10^8 \text{ m/s}}{1.00 \times 10^1 \text{ m}} = \frac{(1.00 \times 10^1 \text{ m}) \cdot \nu}{1.00 \times 10^1 \text{ m}}$$

$$\{ 3.00 \times 10^7 \text{ 1/s} \} = \nu$$

$$E = h\nu$$

$$E = ?$$

$$h = 6.626 \times 10^{-34} \text{ J.s}$$

$$\nu = 3.00 \times 10^7 \text{ 1/s}$$

$$E = (6.626 \times 10^{-34} \text{ J.s})(3.00 \times 10^7 \text{ 1/s})$$

$$E = 1.99 \times 10^{-26} \text{ J}$$

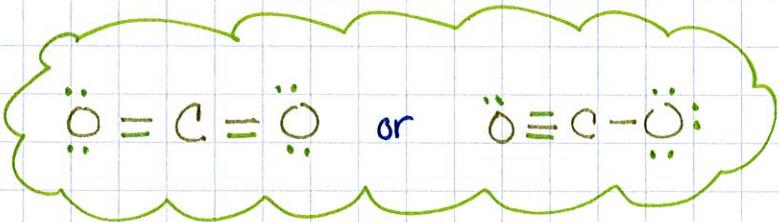
Chemical Bonds

28. (a) CO_2 - covalent (2 non-metals)

$$(1 \times 4e^-) + (2 \times 6e^-)$$

$$4e^- + 12e^- = \frac{16e^-}{2} = 8 \text{ prs}$$

-2 b. prs
16 lone prs



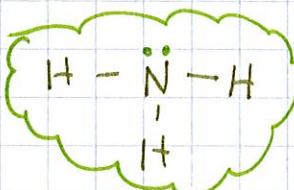
(b) FeF_2 - ionic (metal + nonmetal)

(c) NH_3 - covalent (2 nonmetals)

$$(1 \times 5e^-) + (3 \times 1e^-)$$

$$5e^- + 3e^- = \frac{8e^-}{2} = 4 \text{ prs}$$

-3 b. prs
1 lone pr



(d) CaBr_2 - ionic (metal + nonmetal)

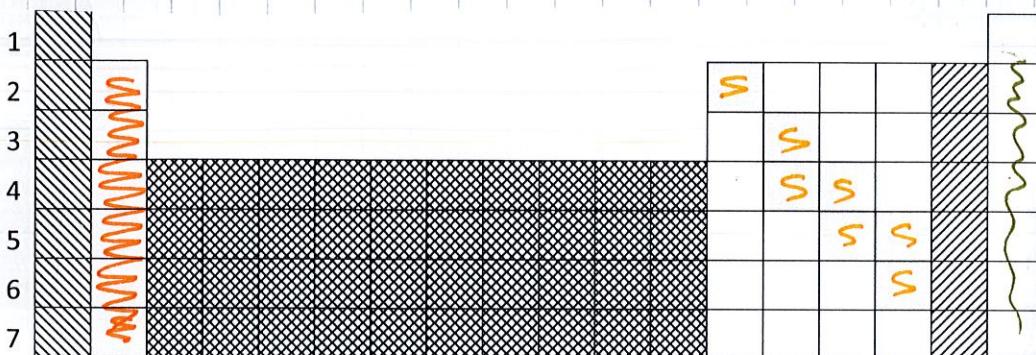
(e) MgSO_4 - both (ionic-bond b/w Mg & SO₄, covalent-bonds b/w S & O)

(f) $\text{KCl}_2\text{H}_3\text{O}_2$ - both (ionic-bond b/w K & C₂H₃O₂,

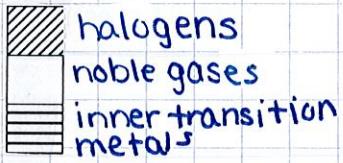
covalent-bonds b/w C, H, & O)

29. IMFs - intermolecular forces are attractions between molecules
- London dispersion forces - temporary attractions between molecules caused by shifting e⁻
 - Dipole-dipole forces - attractions between 2 polar molecules, the positive side of one molecule is attracted to the negative side of another molecule
 - H bonding - strong attraction b/w a hydrogen on one molecule and a N, O, or F on another molecule.

30.



legend



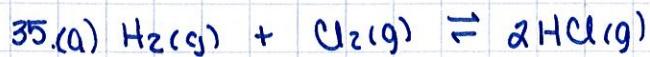
31. groups - vertical columns of elements on the Periodic Table. All elements in a group have similar properties because they have the same # of valence e⁻. There are 18 groups.

32. periods - horizontal rows of elements on the Periodic Table

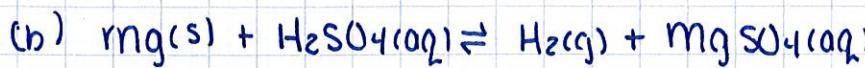
33. (a) increasing radius : Br, Ni, Sc
 (b) decreasing radius : Sc, Ni, Br
 (c) increasing ionization energy : Sc, Ni, Br
 (d) decreasing electronegativity : Br, Ni, Sc

34. (a) increasing radius : F, Se, Pb
 (b) decreasing radius : Pb, Se, F
 (c) increasing ionization energy : Pb, Se, F
 (d) decreasing electronegativity : F, Se, Pb

Equilibrium

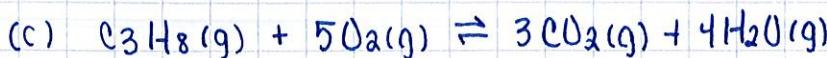


$$K_{\text{eq}} = \frac{[\text{HCl}]^2}{[\text{H}_2] \cdot [\text{Cl}_2]}$$

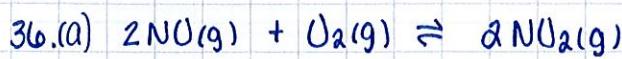


As a solid, it cannot be part of the equilibrium expression.

$$K_{\text{eq}} = \frac{[\text{H}_2] \cdot [\text{MgSO}_4]}{[\text{H}_2\text{SO}_4]}$$



$$K_{\text{eq}} = \frac{[\text{CO}_2]^3 \cdot [\text{H}_2\text{O}]^4}{[\text{C}_3\text{H}_8] \cdot [\text{O}_2]^5}$$



$$K_{\text{eq}} = \frac{[\text{NO}_2]^2}{[\text{NO}]^2 \cdot [\text{O}_2]}$$

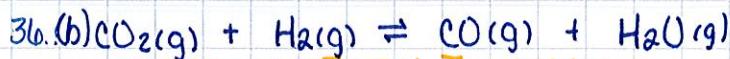
$[\text{NO}] = .106\text{M}$

$[\text{O}_2] = .122\text{M}$

$[\text{NO}_2] = .129\text{M}$

$$K_{\text{eq}} = \frac{[.129\text{M}]^2}{[.106\text{M}]^2 \cdot [.122\text{M}]} = \frac{.016641\text{M}^2}{(.011236\text{M}^2 \cdot .122\text{M})}$$

$$K_{\text{eq}} = \frac{.016641\text{M}^2}{(.001370792\text{M}^3)} = 12.1 \text{ M}$$



$\text{+ypo: } [\text{CO}] = [\text{H}_2] = .044\text{M}$

$$K_{\text{eq}} = \frac{[\text{CO}] \cdot [\text{H}_2\text{O}]}{[\text{CO}_2] \cdot [\text{H}_2]}$$

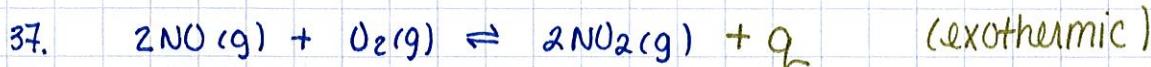
$[\text{CO}] = .044\text{M}$

$[\text{H}_2] = .044\text{M}$

$[\text{CO}_2] = .056\text{M}$

$[\text{H}_2\text{O}] = .041\text{M}$

$$K_{\text{eq}} = \frac{[.044\text{M}] \cdot [.041\text{M}]}{[.056\text{M}] \cdot [.044\text{M}]} = .73$$



(i) when NO is added

shifts right (to use up extra NO)

(ii) $T \downarrow$

shifts right (to increase temp.)

(iii) when a catalyst is added

no shift (catalysts don't affect equilibrium)

(iv) $[\text{O}_2] \uparrow$

shifts right (to use up extra O₂)

(v) $[\text{NO}_2] \uparrow$

shifts left (to use up extra NO₂)

(vi) $V \uparrow$

shifts left (if V↑, P↓, goes to side w/more mol/s of gas to increase P)

(vii) $P \uparrow$

shifts right (goes to side w/less mol/s of gas to decrease P)

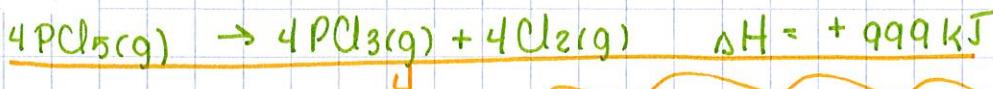
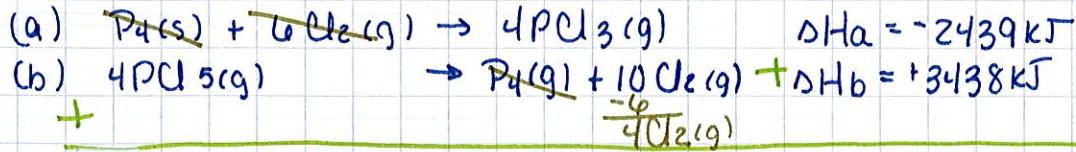
Heat

- 38.(a) exothermic - hot chocolate is releasing heat
 (b) endothermic - your hands are absorbing heat

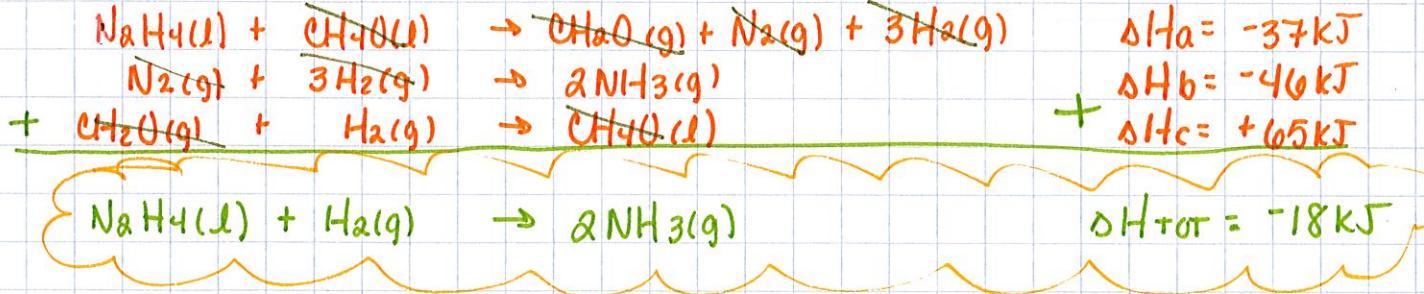
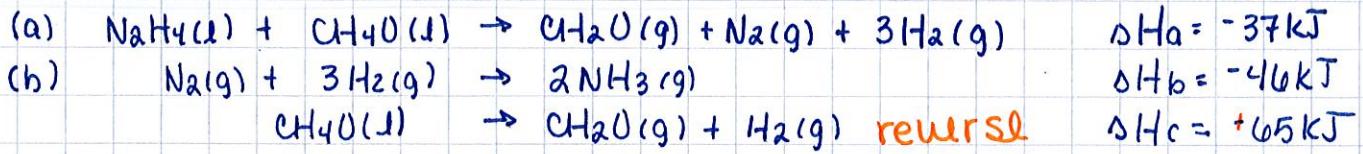
39. exothermic - releasing heat

40. endothermic - absorbing heat

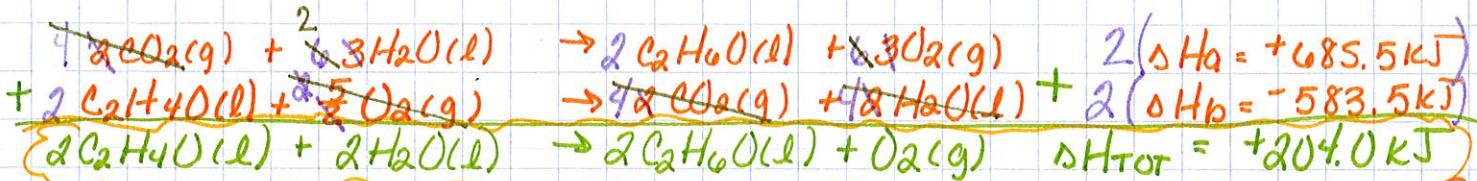
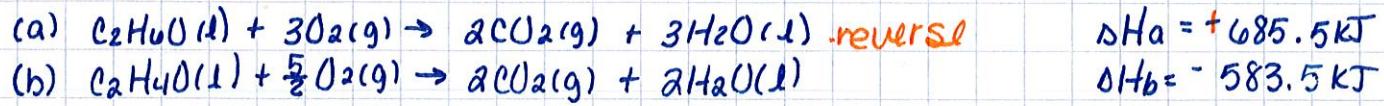
41. calculate ΔH for: $\text{PCl}_5(\text{g}) \rightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ from



42. calculate ΔH for $\text{NaH}_4(\text{l}) + \text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$ from



43. calculate ΔH for $2\text{C}_2\text{H}_4\text{O}(\text{l}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{C}_2\text{H}_6\text{O}(\text{l}) + \text{O}_2(\text{g})$ from



44 $q_r = mC\Delta T$

$$q_r = +1086.75 \text{ J}$$

$$m = 15.75 \text{ g}$$

$$C = ?$$

$$\Delta T = 175^\circ\text{C} - 25^\circ\text{C} = 150^\circ\text{C}$$

$$C = \frac{q_r}{(m \cdot \Delta T)}$$

$$C = \frac{1086.75 \text{ J}}{(15.75 \text{ g} \cdot 150^\circ\text{C})} = \frac{1086.75 \text{ J}}{2362.5 \text{ g}^\circ\text{C}}$$

$$C = .416 \text{ J/g}^\circ\text{C}$$

45. $q_r = ?$

$$m = 2300.9$$

$$C = .90 \text{ J/g}^\circ\text{C}$$

$$\Delta T = 16^\circ\text{C} - 2^\circ\text{C} = 14^\circ\text{C}$$

$$q_r = mC\Delta T$$

$$q_r = (2300.9)(.90 \text{ J/g}^\circ\text{C})(14^\circ\text{C})$$

$$q_r = 29000 \text{ J}$$

46. $q_r = ?$

$$m = 454 \text{ g}$$

$$C = .386 \text{ J/g}^\circ\text{C}$$

$$\Delta T = 28.0^\circ\text{C} - 96.0^\circ\text{C} = -68.0^\circ\text{C}$$

$$q_r = mC\Delta T$$

$$q_r = (454 \text{ g})(.386 \text{ J/g}^\circ\text{C})(-68.0^\circ\text{C})$$

$$q_r = -11900 \text{ J}$$

Solutions

- Factors that affect the rate a solute will dissolve in a solvent & why
 - 1. stirring - more contact/collisions between solute & solvent
 - 2. increasing surface area of solute - more solute is available to collide w/ the solvent
 - 3. increasing heat - raising the temperature means the particles (solute & solvent) have more kinetic energy so they move faster & hence collide more often)

47 $M = \frac{n}{V}$

$$M = ?$$

$$n = \frac{15.0 \text{ g Mg(OH)}_2}{58.33 \text{ g}} \cdot 1 \text{ mol} = .257 \text{ mol}$$

$$V = 400 \text{ mL} = .400 \text{ L}$$

$$\begin{aligned} \text{Mg} & 1 \times 24.31 \text{ g} = 24.31 \text{ g} \\ \text{O} & 2 \times 16.00 \text{ g} = 32.00 \text{ g} \\ \text{H} & 2 \times 1.01 \text{ g} = 2.02 \text{ g} \\ & \hline & 58.33 \text{ g} \end{aligned}$$

$$M = \frac{.257 \text{ mol}}{.400 \text{ L}}$$

$$= .643 \text{ mol/L}$$



48. $M = .76 \text{ mol/L}$
 $n = \frac{5.00 \text{ g HCl}}{36.46 \text{ g}} | 1 \text{ mol} = .137 \text{ mol}$

$H = 1 \times 1.01 \text{ g} = 1.01 \text{ g}$
 $\text{Cl} = 1 \times 35.45 \text{ g} = 35.45 \text{ g}$



$V = ?$

$$V = \frac{n}{M} = \frac{.137 \text{ mol}}{.76 \text{ mol/L}} = .18 \text{ L}$$

49. $M = 1.23 \text{ mol/L}$
 $n = M \cdot V = (1.23 \text{ mol/L})(1.00 \text{ L}) = 1.23 \text{ mol NH}_3$

$n = ?$

$V = 1.00 \text{ L}$

$$\text{mass} = \frac{1.23 \text{ mol NH}_3}{1 \text{ mol}} | 17.04 \text{ g} = 21.0 \text{ g NH}_3$$

$$\begin{array}{r} N: 1 \times 14.01 \text{ g} = 14.01 \text{ g} \\ H: 3 \times 1.01 \text{ g} = 3.03 \text{ g} \\ \hline 17.04 \text{ g} \end{array}$$

50. $M_1 V_1 = M_2 V_2$

$M_1 = .856 \text{ M}$

$V_1 = 1.20 \text{ L}$

$M_2 = ?$

$V_2 = 2.00 \text{ L}$

$$(.856 \text{ M})(1.20 \text{ L}) = M_2 (2.00 \text{ L})$$

$$\frac{1.0272 \text{ M} \cdot \text{L}}{2.00 \text{ L}} = \frac{M_2 (2.00 \text{ L})}{2.00 \text{ L}}$$

$$.514 \text{ M} = M_2$$

Colligative Properties

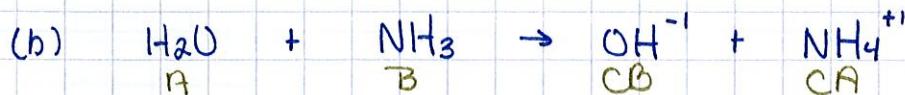
- Boiling Point Elevation - adding a solute to a solvent raises the boiling point of the solution because dissolved solute particles block solvent particles from escaping to the gas phase. Therefore more kinetic energy must be given to the solvent particles (raising the temperature) to give them enough energy to push past the solute particles and become a gas.
- Freezing Point Depression - adding a solute to a solvent lowers the freezing point of the solution because the solute particles interfere w/ the formation of the crystal structure when the solvent freezes. Therefore the temperature must be lower to force the structure to form.

51. (a) the boiling point will increase even more
 (b) the freezing point will decrease even more

Acids & Bases

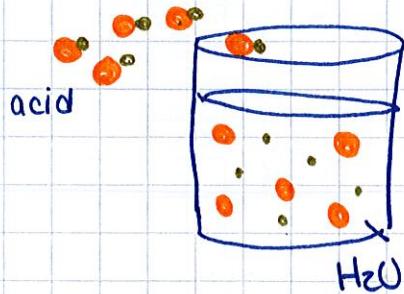
52. Arrhenius acid - substance that releases H^{+} in solution
 Arrhenius base - substance that releases OH^{-} in solution

53. Brønsted-Lowry acid - donates H^{+} in solution
 conjugate base - what remains of the substance after donating H^{+}
 Brønsted-Lowry base - accepts H^{+} in solution
 conjugate acid - what the base becomes after gaining H^{+}



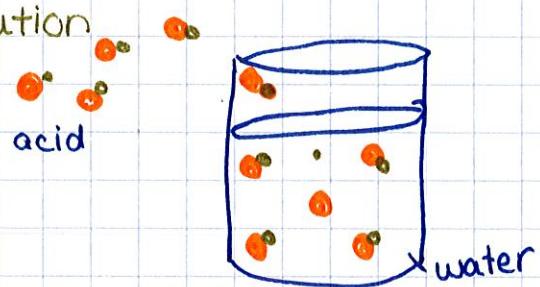
55. strong acid

- dissociates 100% in solution



weak acid

- dissociates 10% or less in solution



7 strong acids

hydrochloric	- HCl
hydrobromic	- HBr
hydroiodic	- HI
nitric	- HNO_3
chloric	- $HClO_3$
perchloric	- $HClO_4$
sulfuric	- H_2SO_4

8 strong bases

Lithium hydroxide	- $LiOH$
sodium hydroxide	- $NaOH$
potassium hydroxide	- KOH
rubidium hydroxide	- $RbOH$
cesium hydroxide	- $CsOH$
calcium hydroxide	- $Ca(OH)_2$
strontium hydroxide	- $Sr(OH)_2$
barium hydroxide	- $Ba(OH)_2$

- 56 (a) pH = 10.5 basic
 (b) pH = 6.7 acidic
 (c) pH = 4.6 acidic
 (d) pH = 7.2 basic

$$57.(a) \quad M_A V_A = M_B V_B$$

$$M_A = .85M$$

$$V_A = .0250L$$

$$M_B = .75M$$

$$V_B = ?$$

$$(.85M)(.0250L) = (.75M)V_B$$

$$\frac{.02125M \cdot L}{.75M} = \frac{(.75M)V_B}{.75M}$$

$$.028L = V_B$$

$$(b) \quad M_A = 1.23M$$

$$V_A = ?$$

$$M_B = .990M$$

$$V_B = 45.0mL = .0450L$$

$$(1.23M)V_A = (.990M)(.0450L)$$

$$\frac{(1.23M)V_A}{1.23M} = \frac{(.990M) \cdot L}{1.23M}$$

$$V_A = .0362L$$