Chunk #1 - spring final

CLASS COPY

DO NOT TAKE!

Correct your work with GREEN PEN! Make sure you are not just correcting the answer, but also make sure you are fixing your work so you understand how to do the problem!

1. 1.485×10^4
2. 3.87×10^{-4}
3. 52800
4. 0.00875
5. K - kilo
6. c - centi
7. KHDBdcm

   29.4

   294000
8. KHDBdcm

   3405.2

   0.034052
9. $\frac{4\ mi}{1\ hr} \left| \frac{1.609\ km}{1\ mi} \right| \frac{1000\ m}{1\ km} \left\| \frac{1\ hr}{60\ min} \right| \frac{1\ min}{60\ sec} = 1.79\ \frac{m}{sec.}$
10. $\frac{19.2\ mi}{1\ min} \left| \frac{1.609\ km}{1\ mi} \right| \frac{1000\ m}{1\ km} \left\| \frac{60\ min}{1\ hr.} \right. = 1853568\ \frac{m}{hr}$
11. $\frac{52\ m}{1\ sec.} \left| \frac{1\ km}{1000\ m} \right| \frac{1\ mi}{1.609\ km} \left\| \frac{60\ sec}{1\ min} \right| \frac{60\ min}{1\ hr.} = 116.3\ \frac{mi}{hr}$
12. no change to the components - same molecules when done
13. change to the componets - new substance when done

(14) melting, bending, freezing, crushing, cutting

(15) burning, rotting, digesting, cooking

(16) protons plus neutrons

(17) number of protons

(18) Ag = 47p, 61n, 47e^-

(19) Cl = 17p, 18n, 17e^-
Ba = 56p, 81n, 56e^-
C = 6p, 6n, 6e^-
Ne = 10p, 10n, 10e^-

(20) Mg

(21) 8n, 6p, 6e^-
6n, 6p, 6e^-

(22) an area an e^- is most likely to be found
a probability cloud
only 2 e^- per orbital

(23)


(24) 2, 6, 10, 14

(25)

3p ↑↓ ↑ ↑ — 3p ↑↓ ↑↓ ↑
3s ↑↓ — 3s ↑↓
2p ↑↓ ↑↓ ↑↓ — 2p ↑↓ ↑↓ ↑↓
2s ↑↓ — 2s ↑↓
1s ↑↓ — 1s ↑↓
sulfur — Chlorine

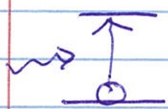
26. Ge

27. K

28. H = $1s^1$
He = $1s^2$
K = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
Ca = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
Zn = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$
I = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^5$
Kr = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$

Chunk #2 - Spring Final

1. to get a full valence shell

2. 
energy in, e⁻ goes up a level to "excited state"

3. 
e⁻ falls back down to "ground state" & energy is released.

4.

α	β	γ
+2	−1	∅
neg.	pos.	neither

5. α^{4}_{2} OR He^{4}_{2} , β^{0}_{-1} or e^{0}_{-1} , γ^{0}_{0}

6. alpha, gamma, beta

7. $^{99}_{44}Ru$

8. $^{4}_{2}He$ or $^{4}_{2}\alpha$

9. $AE = As * 0.5^{t/h}$
$AE = 1.75 * 0.5^{(243.5/44.5)} = 3.94 \times 10^{-2}\ g$

10. $AE = 85 * 0.5^{(35/35)} = 42.5g$ 5wks = 35days

11. yes, no

12. they are on the outside

13. the e⁻ in the last filled orbital

14. 1, 1, 2, 7, 6, 6, 4, 3

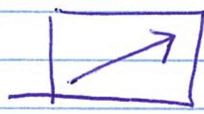
15. see your notebook!

Chunk #2

16) Li, Ca
O, F
Si, Ge
Fe, Cu

17) lose 2, gain 2, gain 1, gain 3

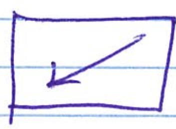
18) +1, +2, -1, ∅

19) 

20) Fr, Ca, Na, Fe, S, F

21) 

22) Fr, Ca, Na, Fe, S, F

23) 

24) F, S, Fe, Na, Ca, Fr

25) ionic, covalent, metallic

26) ionic = m-nm
covalent = nm-nm
metallic = m-m

27) ionic, covalent, metallic, ionic

28) cation first then anion,
same name - change end to -ide
most transition metals need roman numerals

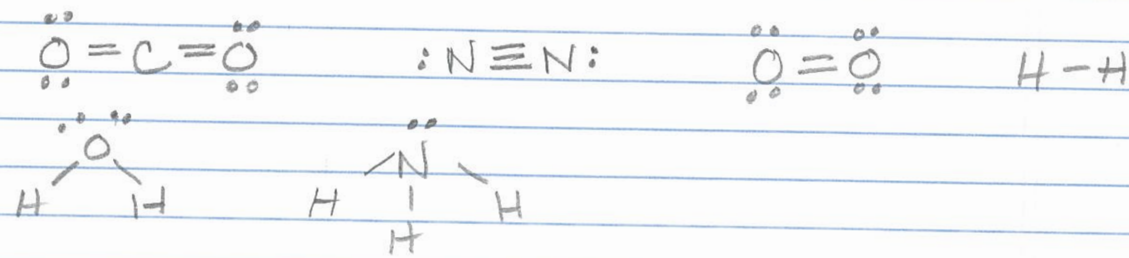
29) use prefixes! except no mono for first element, and last element ends in -ide, careful w/ some double vowels

Chunk #2 (3)

(30) copper (II) chloride
potassium sulfide
alumenum oxide
calcium oxide
sodium sulfate

(31) phosphorous pentachloride
dihydrogen monoxide
carbon tetrahydride
hexa carbon dodecahydrogen hexoxide

Spring Final - Chunk #3 KEY

1. Ga_2O_3 $CaCl_2$ $NaNO_3$ $Ca_3(PO_3)_2$ FeF_3
2. CCl_4 N_2H_5 PI_3
3. most elements want 8 valence e^-
4. H, B, P, S
5. 
6. single - H_2, H_2O, NH_3
   double - CO_2, O_2
   triple - N_2
   lone pairs
   $CO_2 = 4$
   $N_2 = 2$
   $O_2 = 4$
   $H_2O = 2$
   $NH_3 = 1$
7. 
   single, triple, triple
8. London, dipole-dipole, hydrogen bonding
9. CH_4, H_2 london; HCl, CO dipole; H_2O, NH_3 hydrogen bond
10. DNA, proteins
11. Hbond, London, HBond, HBond, dipole, london, dipole
12. Hbond, dipole, london } inteR; Ionic, Covalent } intra

Chunk #3

13. unequal e⁻ distribution

H – Cl
δ^+ δ^-

14. polar, polar, non, non, non, polar, non

15. because it makes it polar if its bent

16. CH_4 < CH_3OCH_3 < CH_3OH

17. CH_3CH_2OH b/c H bond vs. CH_3OCH_3 only dipole

18. see your notebook!

19. ionic lattice, metallic, network covalent

20. very high

21. diamond, graphite

22. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

23. $2Al(OH)_3 \rightarrow Al_2O_3 + 3H_2O$

24. double Repl. Single Repl.
Synth. Combustion

25. Na_2O + Ca

26. $CO_2 + H_2O$

27. Na_2S $CaSO_4$

28. 174.3 g/mol 241.2 g/mol

29. $\frac{5.9\,g \mid 1\,mol}{\mid 39.95\,g}$ = 0.148 mol

Chunk #3

(30) $\frac{12.65\,g}{} \Big| \frac{1\,mol}{18\,g} = 0.703\,mol$

(31) $\frac{2.07 \times 10^{41}\,atoms}{} \Big| \frac{1\,mol}{6.02 \times 10^{23}\,atoms} \Big| \frac{58.69\,g}{1\,mol}$

$= 2.63 \times 10^{19}\,g$

(32) $\frac{50\,mL}{} \Big| \frac{1\,g}{1\,mL} \Big| \frac{1\,mol}{18\,g} \Big| \frac{6.02 \times 10^{23}\,molec.}{1\,mol} \Big| \frac{3\,atoms}{1\,molec.}$

$= 5.02 \times 10^{24}\,atoms$

Spring Final - Chunk #4

(1) 3.8 mol N_2 | 2 mol NH_3 / 1 mol N_2 = 7.6 moles

(2) $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

6 mol O_2 | 4 mol H_2O / 5 mol O_2 = 4.8 moles

(3) 60.4 g H_2 | 1 mol H_2 / 2.02 g H_2 | 2 mol NH_3 / 3 mol H_2 | 17.03 g NH_3 / 1 mol NH_3 = 339.5 g

(4) 12.5 g C_2H_4 | 1 mol C_2H_4 / 28.05 g | 2 mol CO_2 / 1 mol C_2H_4 | 44 g / 1 mol CO_2 = 39.2 g

(5) 9.6×10^{31} molecules Cl_2 | 1 mol Cl_2 / 6.02×10^{23} molecules Cl_2 | 1 mol H_2 / 1 mol Cl_2 = 1.59×10^{8} moles

(6) exo (7) endo (8) exo

(9) endo = melting, boiling

exo = freezing, burning

(10) Q = (4.3)(0.87)(39 - 20) = 71.08 J

(11) 480 = (10)(0.18)(ΔT) = ΔT = 266.7°

(12) 190 = (5)(C)(90 - 30) C = 0.63 J/g°C

(13) Q_1 = (20)(2.09)(0 - -30) = 1254 J

Q_2 = (20)(333) = 6660 J

Q_3 = (20)(4.18)(50 - 0) = 4180 J

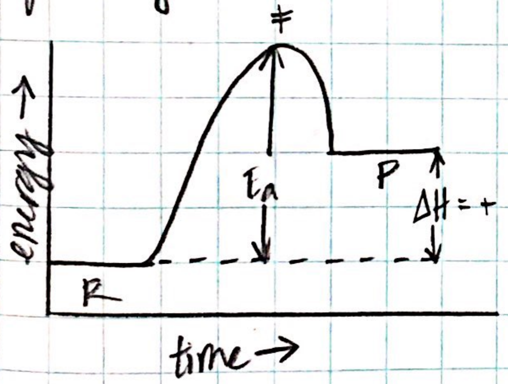
$Q_T = Q_1 + Q_2 + Q_3$ = 12094 J

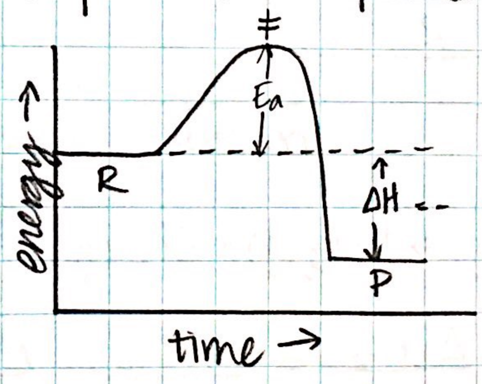
Chunk #4 Cont

14. $Q_1 = 40g \times 334 \frac{J}{g} = 13360 J$
$Q_2 = 40g \times 4.18 \frac{J}{g \cdot °C} \times 100°C = 16720 J$
$Q_3 = 40g \times 2260 \frac{J}{g} = 90400 J$
$Q_4 = 40g \times 1.87 \frac{J}{g \cdot °C} \times 30°C = 2244 J$
$Q = 122724 J$

15. $Q_1 = 3g \times 2.09 \frac{J}{g \cdot °C} \times 15°C = 94.05 J$
$Q_2 = 3g \times 334 \frac{J}{g} = 1002 J$
$Q_3 = 3g \times 4.18 \frac{J}{g \cdot °C} \times 100°C = 1254 J$
$Q_4 = 3g \times 2260 \frac{J}{g} = 6780 J$
$Q_5 = 3g \times 1.87 \frac{J}{g \cdot °C} \times 50°C = 280.5 J$
$Q = 9410.55 J$

16. Thermo involves the study of reaction heat and the direction that the heat moves with regards to systems and surroundings. The energy in these reactions are studied to determine whether or not the reaction will take place. Kinetics studies the speed of the reaction and how quickly reactants are used while products are formed.

17. 

18. 

19. Factors that can speed up / slow down rxn:
- Temperature
- Concentration
- Surface Area
- Catalyst

20. $\frac{10g\ Na_2S}{200\ mL\ soln} \times \frac{1\ mol\ Na_2S}{78.05g\ Na_2S} \times \frac{1000\ mL}{1\ L} =$ **$0.641\ M\ Na_2S$**

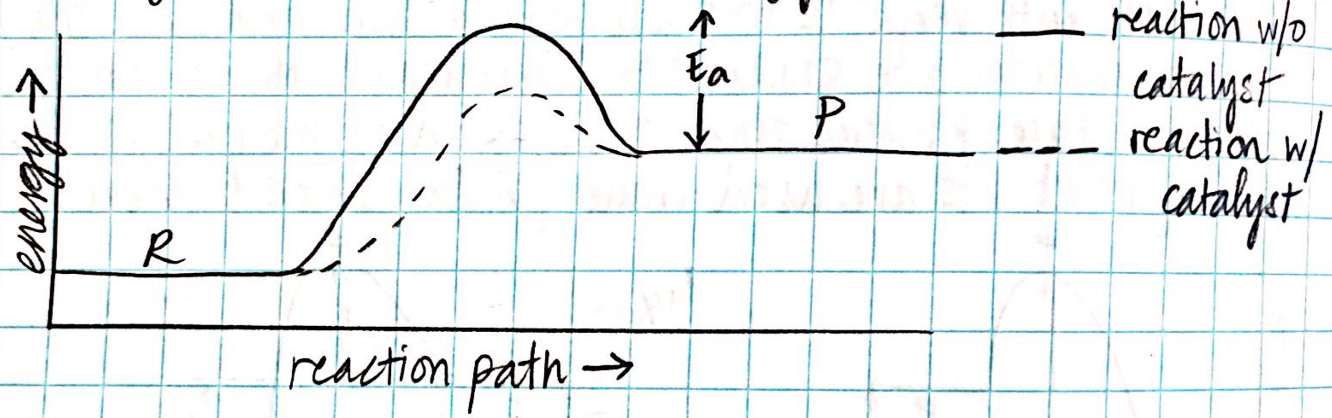
21. $\frac{30g\ K_2SO_4}{100\ mL\ soln} \times \frac{1\ mol\ K_2SO_4}{174.27\ g\ K_2SO_4} \times \frac{1000\ mL}{1\ L} =$ **$1.72\ M\ K_2SO_4$**

22. $390\ mL \times \frac{1\ L}{1000\ mL} \times \frac{0.587\ mol\ CaCl_2}{1\ L} \times \frac{110.98\ g\ CaCl_2}{1\ mol\ CaCl_2} =$ **$25.407\ g\ CaCl_2$**

23. Collision theory states that reactants must collide in order to react and must have "effective collisions." This means that the particles must be moving fast enough and have correct orientation.

24. When you change Temp and [conc], the particles change in speed and in the number of possible effective collisions. ↑ temp and ↑ [conc] will cause rates to also ↑, while ↓ temp and ↓ [conc] will cause rates to ↓.

25. Catalysts are chemicals added to a rxn that do not get used up during the rxn. They help orient molecules to reach transition state faster, so you don't need as much energy.



26. $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$

SKIP #26, 27, 28

$$Rate = -\frac{\Delta[PCl_5]}{\Delta t} = \frac{\Delta[PCl_3]}{\Delta t} = \frac{\Delta[Cl_2]}{\Delta t}$$

$2HI(g) \rightarrow H_2(g) + I_2(g)$

$$Rate = -\frac{\Delta[HI]}{2\Delta t} = \frac{\Delta[H_2]}{\Delta t} = \frac{\Delta[I_2]}{\Delta t}$$

$2NO(g) + H_2(g) \rightarrow N_2O(g) + H_2O(g)$

$$Rate = -\frac{\Delta[NO]}{2\Delta t} = -\frac{\Delta[H_2]}{\Delta t} = \frac{\Delta[N_2O]}{\Delta t} = \frac{\Delta[H_2O]}{\Delta t}$$

27. $P_4(s) + 5O_2(g) \rightarrow P_4O_{10}(s)$ $\text{Rate} = -\frac{\Delta[P_4]}{\Delta t} = -\frac{\Delta[O_2]}{5\Delta t} = \frac{\Delta[P_4O_{10}]}{\Delta t}$

$$\text{Rate} = -\frac{\Delta[O_2]}{\Delta t} = -\frac{(0.000\ M - 0.400\ M)}{(20s)} = \boxed{0.02\ M/s}$$

28. $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$ $\text{Rate} = -\frac{\Delta[H_2]}{\Delta t} = -\frac{\Delta[Cl_2]}{\Delta t} = \frac{\Delta[HCl]}{2\Delta t}$

$$\text{Rate} = \frac{\Delta[HCl]}{\Delta t} = \frac{(1.500\ M - 0.000\ M)}{(5.42\ s)} = \boxed{0.277\ M/s}$$

Chunk # 5

1. Equilibrium is the state at which the rate of the forward reaction and the rate of the backwards reaction are equal.

2. Rates are equal at equilibrium, but not necessarily concentrations.

3. Factors that can shift an equilibrium:
   - Temperature
   - Concentration (of gases and solutions) } excludes solids and liquids!
   - Pressure (of gases and solutione)

4. ←

5. ←

6. increases

7. decreases

8. no change

9. decreases

10. increases