Answers - Review Probs Exam 2 (Tro 6th)

1. a. K_2S potassium sulfide
   b. $MgCl_2$ magnesium chloride
   c. BaI_2 barium iodide
   d. CBr_4 (nonmetals) carbon tetrabromide
   e. Al_2S_3 aluminum sulfide
   f. Na_3P sodium phosphide
   g. $HClO_4$ perchloric acid (contains ClO_4^- perchlorate)
   h. AgF silver fluoride
   i. Cr_2O_3 chromium (III) oxide (Cr^{3+}, O^{2-})
   j. $SnBr_4$ tin (IV) bromide (Sn^{4+}, Br^-)
   k. CrO chromium (II) oxide (Cr^{2+}, O^{2-})
   l. P_4O_{10} (nonmetals) tetraphosphorus decoxide
   m. $BaCrO_4$ barium chromate
   n. $HClO$ hypochlorous acid (contains ClO^- hypochlorite)
   o. $Hg(ClO)_2$ mercury (II) hypochlorite
   p. $Pb(HSO_4)_2$ lead (II) hydrogen sulfate
   q. $Co_3(PO_4)_2$ cobalt (II) phosphate
   r. HI hydroiodic acid
   s. $Cr(C_2H_3O_2)_3$ chromium (III) acetate
   t. $(NH_4)_2SO_3$ ammonium sulfite
   u. S_2Cl_2 (nonmetals) disulfur dichloride
   v. $Cu(OH)_2$ copper (II) hydroxide
   w. K_2CO_3 potassium carbonate
   x. NaH_2PO_4 sodium dihydrogen phosphate
   y. $Zn(CN)_2$ zinc cyanide
   z. H_2SO_3 sulfurous acid (contains SO_3^{2-} sulfite)
   aa. HCl hydrochloric acid
   bb. $Fe(NO_2)_3$ iron (III) nitrite

p.2

2. a. Al^{3+}, F^- AlF_3

b. Na^+, I^- NaI

c. Li^+, S^{2-} Li_2S

d. contains PO_4^{3-} H_3PO_4

e. Cr^{3+}, SO_4^{2-} $Cr_2(SO_4)_3$

f. OF_2

g. Sn^{4+} $C_2H_3O_2^-$ $Sn(C_2H_3O_2)_4$

h. K^+ HCO_3^- $KHCO_3$

i Hg^{2+}, Br^- $HgBr_2$

j. contains chlorate ClO_3^- $HClO_3$

K. Fe^{3+}, SO_3^{2-} $Fe_2(SO_3)_3$

l. $SiCl_4$

m. Ca^{2+}, Cl^- $CaCl_2$

n. Cu^{2+}, HSO_4^- $Cu(HSO_4)_2$

o. Hg^{2+} S^{2-} HgS

p. Cr^{3+} ClO^- $Cr(ClO)_3$

q. H_2S

r. Au^{3+} NO_3^- $Au(NO_3)_3$

s. IBr

t. Cu^+ HSO_4^- $CuHSO_4$

u. Sn^{2+} MnO_4^- $Sn(MnO_4)_2$

v. Mg^{2+} OH^- $Mg(OH)_2$

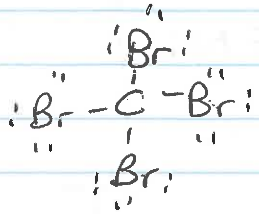
w. contains ClO_2^- $HClO_2$

x. Na^+ $Cr_2O_7^{2-}$ $Na_2Cr_2O_7$

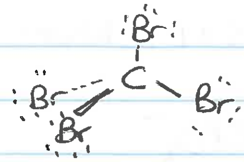
y. NF_3

z Pb^{4+} CO_3^{2-} $Pb(CO_3)_2$

3. a. CBr_4

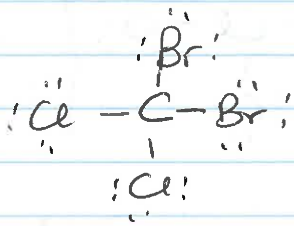


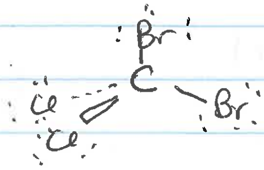
4. tetrahedral 109.5°



nonpolar (symmetric)

b. CBr_2Cl_2

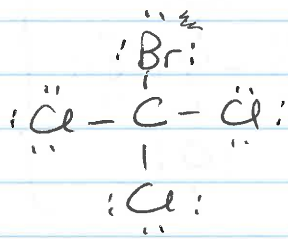


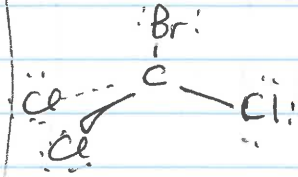


tetrahedral 109.5°

polar
dipoles don't cancel

c. $CBrCl_3$



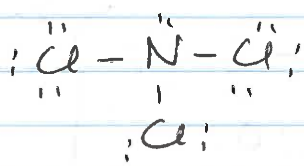


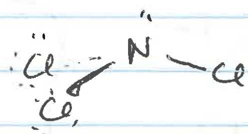
tetrahedral 109.5°

polar
dipoles don't cancel

d. NCl_3

$5 + 3(7) = 26ve^-$

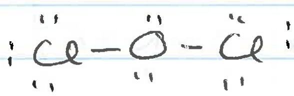


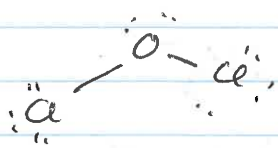


trigonal pyramid
< 109.5°

polar
not symmetric

e. Cl_2O $2(7) + 6 = 20ve^-$



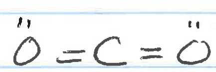


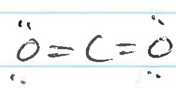
bent
< 109.5°

polar
not symmetric

f. CO_2

$16ve^-$



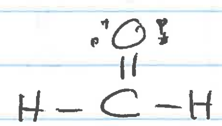


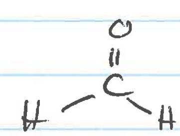
linear 180°

nonpolar
symmetric

g. CH_2O

$4 + 2 + 6 = 12ve^-$



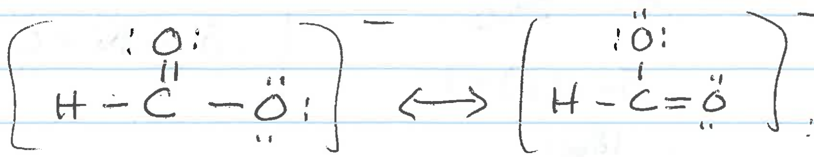


trigonal planar
120°
polar

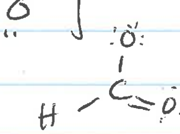
h. CHO_2^-

$4 + 1 + 2(6) + 1$

$18ve^-$



(resonance structures)

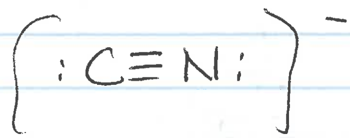


4h trigonal planar
120°
polar / ionic

p. 4

3 i. CN^-

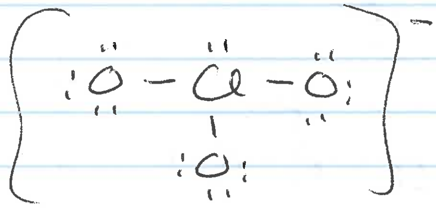
$4+5+1 = 10ve^-$

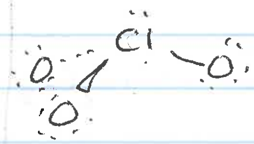


linear
polar (but really an ion)

j. ClO_3^-

$7+3(6)+1$
$= 26ve^-$

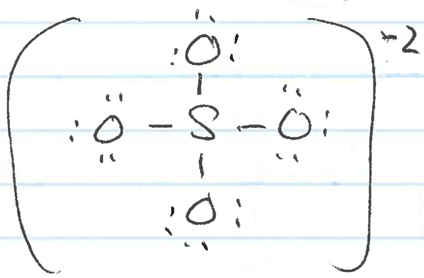


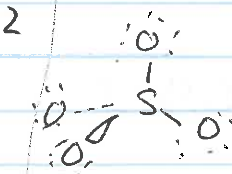


trigonal pyramid
$<109.5°$
polar (but an ion)

K. SO_4^{2-}

$6+4(6)+2$
$= 32ve^-$



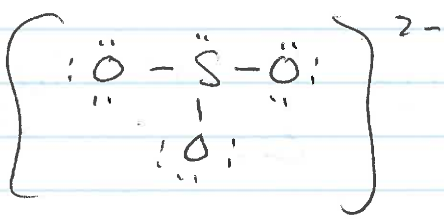


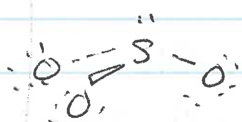
tetrahedral
109.5°
(ionic)
symmetric

l. SO_3^{2-}

$6+3(6)+2$

$26\ ve^-$



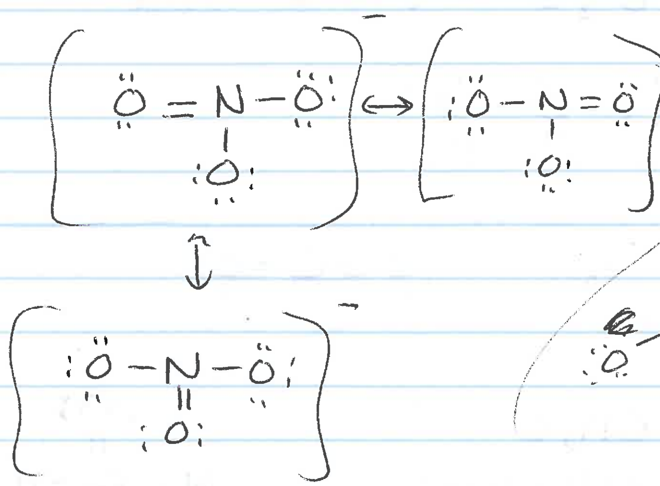


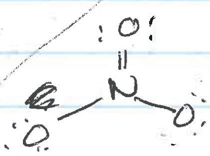
trigonal pyramid
$< 109.5°$
(ionic)
asymmetric

m. NO_3^-

$5+3(6)+1 = 24ve^-$

resonance structures



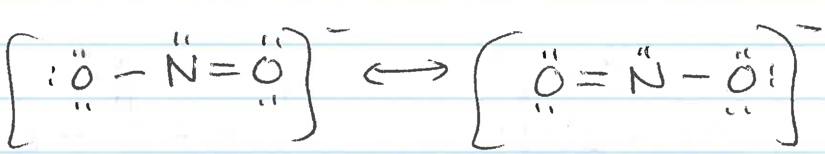


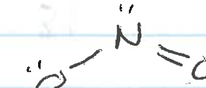
trigonal planar
120°
(ionic)
symmetric

n. NO_2^-

$5+2(6)+1$
$18ve^-$

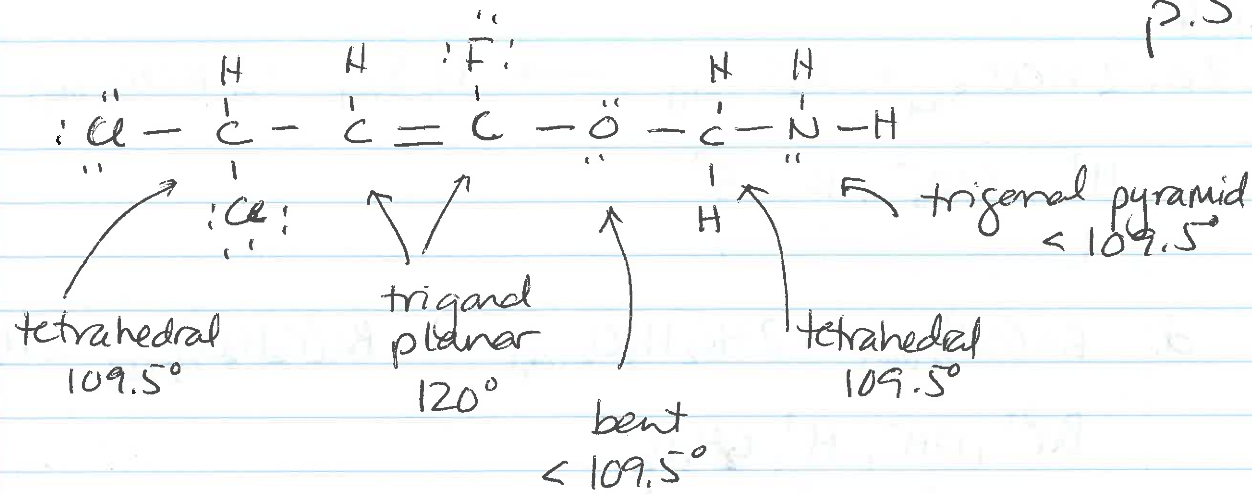
resonance structures





bent
$<120°$
not symmetric

5.



6. a. $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$ redox, & single replacement

b. $6K + N_2 \rightarrow 2K_3N$ redox, combination

c. $SOCl_2 + H_2O \rightarrow SO_2 + 2HCl$

d. $C_5H_{12}O_2 + 7O_2 \rightarrow 5CO_2 + 6H_2O$ redox, & combustion

e. $2C_{10}H_{22} + 31O_2 \rightarrow 20CO_2 + 22H_2O$ redox, combination

f. $4NH_3 + 3F_2 \rightarrow 3NH_4F + NF_3$ redox

g. $2Al + 3H_2SO_4 \rightarrow 3H_2 + Al_2(SO_4)_3$ single replacement, redox

7. a. $Pb(NO_3)_{2\,(aq)} + 2KI_{(aq)} \rightarrow PbI_{2\,(s)} + 2KNO_{3\,(aq)}$

Pb^{2+}, NO_3^-, K^+, I^-

b. $H_2SO_{4\,(aq)} + 2NaOH_{(aq)} \rightarrow 2H_2O_{(l)} + Na_2SO_{4\,(aq)}$

H^+, SO_4^{2-}, Na^+, OH^-

p. 6

7c. $2\,HClO_{3\,(aq)} + K_2S_{(aq)} \longrightarrow H_2S_{(g)} + 2\,KClO_{3\,(aq)}$

$H^+,\ ClO_3^-,\ K^+,\ S^{2-}$

d. $Ba(OH)_{2\,(aq)} + 2\,HC_2H_3O_{2\,(aq)} \longrightarrow Ba(C_2H_3O_2)_{2\,(aq)} + 2\,H_2O_{(l)}$

$Ba^{2+},\ OH^-,\ H^+,\ C_2H_3O_2^-$

e. $3\,Hg(NO_3)_{2\,(aq)} + 2\,Na_3PO_{4\,(aq)} \longrightarrow Hg_3(PO_4)_{2\,(s)} + 6\,NaNO_{3\,(aq)}$

$Hg^{2+},\ NO_3^-,\ Na^+,\ PO_4^{3-}$

f. $MgCO_{3\,(s)} + 2\,HNO_{3\,(aq)} \longrightarrow H_2O_{(l)} + CO_{2\,(g)} + Mg(NO_3)_{2\,(aq)}$

$Mg^{2+},\ CO_3^{2-},\ H^+,\ NO_3^-$

g. all are double-displacement reactions.

a. precipitation
b. acid-base
c. gas-forming
d. acid-base
e. precipitation
f. gas-forming.

8a. $BaCl_{2\,(aq)} + 2\,AgNO_{3\,(aq)} \rightarrow Ba(NO_3)_{2\,(aq)} + 2\,AgCl_{(s)}$

(molecular)

$Ba^{2+},\ Cl^-,\ Ag^+,\ NO_3^-$

total ionic $\quad Ba^{2+} + 2Cl^- + 2Ag^+ + 2NO_3^- \longrightarrow Ba^{2+} + 2NO_3^- + 2AgCl_{(s)}$

$2Cl^- + 2Ag^+ \longrightarrow 2AgCl_{(s)}$

can reduce coefficients

net ionic $\quad Cl^- + Ag^+ \longrightarrow AgCl_{(s)}$

precipitation

8abc - all are double displacement and precipitation.

8 b. $6\,KOH_{(aq)} + Cr_2(SO_4)_{3(aq)} \longrightarrow 2\,Cr(OH)_{3(s)} + 3\,K_2SO_{4\,(aq)}$

$K^+, OH^-, Cr^{3+}, SO_4^{2-}$

total ionic $6K^+ + 6OH^- + 2Cr^{3+} + 3SO_4^{2-} \longrightarrow 2\,Cr(OH)_{3(s)} + 6K^+ + 3SO_4^-$

$6OH^- + 2\,Cr^{3+} \longrightarrow 2Cr(OH)_{3\,(s)}$ can reduce $\div 2$ to get lowest whole # ratio

net ionic $3OH^- + Cr^{3+} \longrightarrow Cr(OH)_{3\,(s)}$ precipitation

c. $3\,Na_2CO_{3\,(aq)} + 2\,Fe(ClO_3)_{3\,(aq)} \longrightarrow 6\,NaClO_{3(aq)} + Fe_2(CO_3)_{3\,(s)}$

$Na^+, CO_3^{2-}, Fe^{3+}, ClO_3^-$

total ionic $6Na^+ + 3CO_3^{2-} + 2Fe^{3+} + 6ClO_3^- \longrightarrow 6Na^+ + 6ClO_3^- + Fe_2(CO_3)_{3(s)}$

net ionic $3CO_3^{2-} + 2Fe^{3+} \longrightarrow Fe_2(CO_3)_{3\,(s)}$ precipitation

9. a. $C_3H_8 + 5\,O_{2\,(g)} \longrightarrow 3\,CO_{2\,(g)} + 4H_2O_{(g)}$

b. $C_7H_{16}O_3 + O_{2(g)} \longrightarrow 7\,CO_{2\,(g)} + 8\,H_2O_{(g)}$

22 - 3 = 19 odd $\quad$ 14 + 8 = 22 O even $\quad$ double

$2\,C_7H_{16}O_3 + 19\,O_{2\,(g)} \longrightarrow 14\,CO_{2\,(g)} + 16\,H_2O_{(g)}$

44 O − 6 = 38 O → 19 $\quad$ 28 O + 16 O = 44 O

c. $2\,C_8H_{18} + 25\,O_{2\,(g)} \longrightarrow \cancel{8}\,16\,CO_{2\,(g)} + \cancel{9}\,18\,H_2O_{(l)}$

			full	noble gas notation
p. 8 10.	Al	13e⁻	$1s^2 2s^2 2p^6 3s^2 3p^1$	[Ne] $3s^2 3p^1$
	Mn	25e⁻	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$	[Ar] $4s^2 3d^5$
	P	15e⁻	$1s^2 2s^2 2p^6 3s^2 3p^3$	[Ne] $3s^2 3p^3$
	Ba	56e⁻	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$	~~[Kr]~~ [Xe] $6s^2$
	Cd	48e⁻	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10}$	[Kr] $5s^2 4d^{10}$

11. O $1s^2 \underbrace{2s^2 2p^4}_{\text{valence e-}}$

↑↓	↑↓	↑	↑
2s	2p		

P $1s^2 2s^2 2p^6 \underbrace{3s^2 3p^3}_{\text{valence e-}}$

↑↓	↑	↑	↑
3s	3p		

Co [Ar] $4s^2 3d^7$

↑↓	↑↓	↑↓	↑	↑	↑
4s	3d				

12. F is F^- when it forms an ion.
Ca^{2+}
Na^+
O^{2-}

13. H_2, N_2, O_2, F_2, Cl_2, Br_2, I_2

14\. a. $3\,MnO_2 + 4\,Al \rightarrow 3\,Mn + 2\,Al_2O_3$

b. single-replacement rxn (and redox)

c. $(10.0\,g\ MnO_2)\left(\frac{1\ mol\ MnO_2}{86.94\ g\ MnO_2}\right) = 0.115\ mol\ MnO_2$

d. $(25.0\,g\ Al_2O_3)\left(\frac{1\ mol\ Al_2O_3}{101.96\ g\ Al_2O_3}\right)\left(\frac{6.022\times10^{23}\ particles}{1\ mol\ Al_2O_3}\right) = 1.48\times10^{23}$ formula units

e. $(7.50\ mol\ Al_2O_3)\left(\frac{101.96\,g\ Al_2O_3}{1\ mol\ Al_2O_3}\right) = 765\ g\ Al_2O_3$

f. $(4.0\ mol\ Al)\left(\frac{3\ mol\ MnO_2}{4\ mol\ Al}\right) = 3.0\ mol\ MnO_2$

g. $(10.0\ mol\ Al_2O_3)\left(\frac{4\ mol\ Al}{2\ mol\ Al_2O_3}\right) = 20.0\ mol\ Al$

h. $(5.0\ mol\ MnO_2)\left(\frac{2\ mol\ Al_2O_3}{3\ mol\ MnO_2}\right) = 3.3\ mol\ Al_2O_3$

i. $(25.0\,g\ MnO_2)\left(\frac{1\ mol\ MnO_2}{86.94\,g\ MnO_2}\right)\left(\frac{3\ mol\ Mn}{3\ mol\ MnO_2}\right)\left(\frac{54.94\,g\ Mn}{1\ mol\ Mn}\right) = 15.8\,g\ Mn$

j. $(5.00\,kg\ Al)\left(\frac{1000\,g\ Al}{1\ kg\ Al}\right)\left(\frac{1\ mol\ Al}{26.98\,g\ Al}\right)\left(\frac{2\ mol\ Al_2O_3}{4\ mol\ Al}\right)\left(\frac{101.96\,g\ Al_2O_3}{1\ mol\ Al_2O_3}\right) = 9447.7\,g$

$= 9.45\times10^3\,g$ or $\div 1000 \Rightarrow 9.45\ kg\ Al_2O_3$

15\. a. combination and oxidation-reduction

$16\,Cr + 3\,S_8 \rightarrow 8\,Cr_2S_3$

b. $(50.0\,g\ Cr_2S_3)\left(\frac{1\ mol\ Cr_2S_3}{200.21\,g}\right)\left(\frac{3\ mol\ S_8}{8\ mol\ Cr_2S_3}\right)\left(\frac{256.56\,g\ S_8}{1\ mol\ S_8}\right) = 24.0\,g\ S_8$

c. $(15.0\,g\ S_8)\left(\frac{1\ mol\ S_8}{256.56\,g\ S_8}\right)\left(\frac{8\ mol\ Cr_2S_3}{3\ mol\ S_8}\right)\left(\frac{200.21\,g\ Cr_2S_3}{1\ mol\ Cr_2S_3}\right) = 31.2\,g\ Cr_2S_3$

16. $2KClO_3 \rightarrow 2KCl + 3O_2$

a. decomposition and redox.

b. $\left(50.0\,g\ KClO_3\right)\left(\frac{1\ mol\ KClO_3}{122.55\,g\ KClO_3}\right)\left(\frac{2\ mol\ KCl}{2\ mol\ KClO_3}\right)\left(\frac{74.55\,g}{1\ mol\ KCl}\right) = 30.4\,g\ KCl$

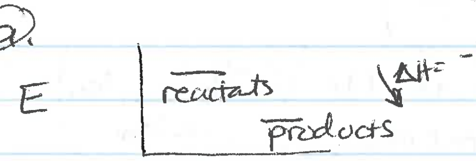
c. $\left(30.0\,g\ KClO_3\right)\left(\frac{1\ mol\ KClO_3}{122.55\,g\ KClO_3}\right)\left(\frac{3\ mol\ O_2}{2\ mol\ KClO_3}\right)\left(\frac{32.00\,g\ O_2}{1\ mol\ O_2}\right)\left(\frac{1\ L\ O_2}{1.31\,g\ O_2}\right) =$ $8.97\ L\ O_2$

d. $\left(175\,mL\ O_2\right)\left(\frac{1\ L\ O_2}{1000\,mL}\right)\left(\frac{1.31\,g\ O_2}{1\ L\ O_2}\right)\left(\frac{1\ mol\ O_2}{32.00\,g\ O_2}\right)\left(\frac{2\ mol\ KClO_3}{3\ mol\ O_2}\right)\left(\frac{122.55\,g\ KClO_3}{1\ mol\ KClO_3}\right) =$ $= 0.585\,g\ KClO_3$

e. $\left(10.0\,mg\ KClO_3\right)\left(\frac{1\,g\ KClO_3}{1000\,mg}\right)\left(\frac{1\ mol\ KClO_3}{122.55\,g\ KClO_3}\right)\left(\frac{3\ mol\ O_2}{2\ mol\ KClO_3}\right)\left(\frac{6.022\times10^{23}\ molecules}{1\ mol\ O_2}\right)$ $= 7.37\times10^{19}\ molecules\ O_2$

17. $2NO + O_2 \rightarrow 2NO_2 \quad \Delta H = -27.3\,kcal$

a. exothermic



b. reactants have higher energy

c. products are more stable

d. $\left(25.0\,g\ NO\right)\left(\frac{1\ mol\ NO}{30.01\,g\ NO}\right)\left(\frac{-27.3\ kcal}{2\ mol\ NO}\right) = -11.4\ kcal$ (given off)

e. given off

f. $\left(-100.\ kcal\right)\left(\frac{2\ mol\ NO}{-27.3\ kcal}\right)\left(\frac{30.01\,g\ NO}{1\ mol\ NO}\right) = 220.\ g\ NO$

$\left(-100.\ kcal\right)\left(\frac{1\ mol\ O_2}{-27.3\ kcal}\right)\left(\frac{32.00\,g\ O_2}{1\ mol\ O_2}\right) = 117\ g\ O_2$

18. $4Fe + 3O_2 \rightarrow 2Fe_2O_3$

a. combination and redox.

b. $\left(7.92\,g\ Fe\right)\left(\frac{1\ mol\ Fe}{55.85\,g\ Fe}\right)\left(\frac{2\ mol\ Fe_2O_3}{4\ mol\ Fe}\right)\left(\frac{159.70\,g\ Fe_2O_3}{1\ mol\ Fe_2O_3}\right)$

$= 11.3234\,g$

$= 11.3\,g\ Fe_2O_3$

18 c. $\% \text{ yield} = \frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{10.7\text{ g } Fe_2O_3 \text{ actual}}{11.3234\text{ g } Fe_2O_3 \text{ theoretical}} \times 100 = 94.5\%$ yield.

19. $6\,K + N_2 \rightarrow 2\,K_3N$

a. combination and redox

11.19437 g

b. $(10.0\text{ g K})\left(\frac{1\text{ mol K}}{39.10\text{ g K}}\right)\left(\frac{2\text{ mol } K_3N}{6\text{ mol K}}\right)\left(\frac{131.31\text{ g } K_3N}{1\text{ mol } K_3N}\right) = 11.2\text{ g } K_3N$

$(12.0\text{ g } N_2)\left(\frac{1\text{ mol } N_2}{28.02\text{ g } N_2}\right)\left(\frac{2\text{ mol } K_3N}{1\text{ mol } N_2}\right)\left(\frac{131.31\text{ g } K_3N}{1\text{ mol } K_3N}\right) = 112\text{ g } K_3N$

K is the LR - it makes the smallest amount of product.
11.2 g K_3N will be formed.

c. 93.2% yield means $\frac{93.2\text{ g actual}}{100\text{ g theoretical}}$

$(11.19437\text{ g } K_3N \text{ theoretical})\left(\frac{93.2\text{ g actual}}{100\text{ g theoretical}}\right) = 10.433\text{ g actual} = 10.4\text{ g actual}$

20. $C_7H_{10}O_3 + 8\,O_2 \rightarrow 5\,H_2O + 7\,CO_2$

a. combustion and redox

b. $(50.0\text{ g } C_7H_{10}O_3)\left(\frac{1\text{ mol } C_7H_{10}O_3}{142.15\text{ g } C_7H_{10}O_3}\right)\left(\frac{7\text{ mol } CO_2}{1\text{ mol } C_7H_{10}O_3}\right)\left(\frac{44.01\text{ g } CO_2}{1\text{ mol } CO_2}\right) = 108\text{ g } CO_2$

$(75.0\text{ g } O_2)\left(\frac{1\text{ mol } O_2}{32.00\text{ g } O_2}\right)\left(\frac{7\text{ mol } CO_2}{8\text{ mol } O_2}\right)\left(\frac{44.01\text{ g } CO_2}{1\text{ mol } CO_2}\right) = 90.3\text{ g } CO_2$

smaller

O_2 is the limiting reactant. 90.3 g CO_2 forms.

21. $Pb_3(PO_4)_2$ MM = 3(207.2) + 2(30.97) + 8(16.00) = 811.5̄4 g/mol

$\%Pb = \dfrac{3(207.2)\text{ g Pb}}{811.5\bar{4}\text{ g }Pb_3(PO_4)_2} \times 100 = 76.5\bar{9}51\% = 76.60\%\text{ Pb}$

$\%P = \dfrac{2(30.97)\text{ g P}}{811.5\bar{4}\text{ g }Pb_3(PO_4)_2} \times 100 = 7.632\%\text{ P}$

$\%O = \dfrac{8(16.00)\text{ g O}}{811.5\bar{4}\text{ g }Pb_3(PO_4)_2} \times 100 = 15.77\%\text{ O}$

Check!
76.60
+ 7.632
15.77
100.002 %
yay!

22. 57.7 % C by mass means $\dfrac{57.7\text{ g C}}{100\text{ g total (compound)}}$

a. $(36.0\text{ g compound})\left(\dfrac{57.7\text{ g C}}{100\text{ g compound}}\right) = 20.\bar{7}72\text{ g C} = 20.8\text{ g C}$

b. $(45.0\text{ g C})\left(\dfrac{100\text{ g compound}}{57.7\text{ g C}}\right) = 77.\bar{9}896\text{ g compound}$

78.0 g compound

23. $(10.8\text{ g }NCl_3)\left(\dfrac{1\text{ mol }NCl_3}{120.36\text{ g }NCl_3}\right)\left(\dfrac{6.022\times10^{23}\text{ molecules }NCl_3}{1\text{ mol }NCl_3}\right) = 5.40\times10^{22}$ molecules NCl_3

$(5.4\bar{0}36\times10^{22}\text{ molecules }NCl_3)\left(\dfrac{3\text{ atoms Cl}}{1\text{ molecule }NCl_3}\right) = 1.62\times10^{23}\text{ atoms Cl}$

24. $(4.0\times10^{21}\text{ molecules }C_2H_6)\left(\dfrac{1\text{ mole }C_2H_6}{6.022\times10^{23}\text{ molecules}}\right)\left(\dfrac{30.068\text{ g }C_2H_6}{1\text{ mol }C_2H_6}\right) = 0.1\bar{9}972\text{ g}$

$= 0.20\text{ g }C_2H_6$

25. g $AlBr_3$ → mol $AlBr_3$ → mol Br → g Br

$(3.65\text{ g }AlBr_3)\left(\dfrac{1\text{ mol }AlBr_3}{266.68\text{ g }AlBr_3}\right)\left(\dfrac{3\text{ mol Br}}{1\text{ mol }AlBr_3}\right)\left(\dfrac{79.90\text{ g Br}}{1\text{ mol Br}}\right) = 3.28\text{ g Br}$

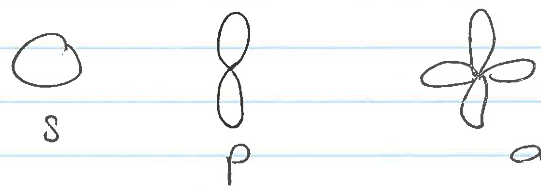
26. kg C → g C → mol C → mol $C_6H_{14}O_3$ → g $C_6H_{14}O_3$

$$\left(5.75\ \text{kg C}\right)\left(\frac{1000\ \text{g C}}{1\ \text{kg C}}\right)\left(\frac{1\ \text{mol C}}{12.01\ \text{g C}}\right)\left(\frac{1\ \text{mol } C_6H_{14}O_3}{6\ \text{mol C}}\right)\left(\frac{134.172\ \text{g } C_6H_{14}O_3}{1\ \text{mol } C_6H_{14}O_3}\right) =$$

$$= 10706.2\ \text{g } C_6H_{14}O_3$$

$$\left(10706.2\ \text{g}\right)\left(\frac{1\ \text{kg}}{1000\ \text{g}}\right) = 10.7\ \text{kg } C_6H_{12}O_3$$

27.



28. Larger n, larger orbital. 4p is larger than 2p.

29. Larger n, e- further away from nucleus. 3d

30. Elements in the same group have similar electron configurations and the same number of valence electrons.
example: Li [He] $2s^1$ Na [Ne] $3s^1$ K [Ar] $4s^1$

31. small → large H, P, Zn, Fe

32. most to least metallic: Rb, Mn, Ni, Al, S

33 a. IE: energy needed to remove the outermost electron.
d. small to large IE: Ca, Fe, Br, F
easiest to remove - hardest to remove -

34. a formula unit is the smallest particle of an ionic compound. (similar to a molecule)