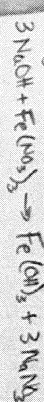


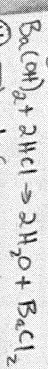
WB Chem 7+8 Comp Rev. 2018

① Calcium reacts with chlorine to form calcium chloride. What mass of CaCl_2 is formed from 8.5g Ca with 14g Cl_2 ?

② Write the net ionic equation:



③ Write the net ionic equation:



④ Identify the ppt:



⑤ What is the molarity of a soln that is 44g KOH in 2L?

⑥ 10g bromine reacts with 10g sodium iodide to produce iodine and sodium bromide.

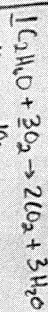
a) bal equation

b) Find L.R

c) calc theoretical mass NaBr

d) Find mass other reactant used.

⑦ Given:



10g 10g

a) Find LR

b) Calc mass CO_2 formed.

c) Calc mass remaining reactant

⑧ 10g H_2S reacts with 10g iron(III) hydroxide to form Fe_2S_3 and water.

a) balanced equation

b) Calc theoretical mass iron(III) sulfide

c) Calc mass other reactant used by LR.

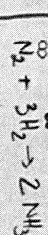
⑨ 1g sodium metal reacts with 1g water. A soln results that turns red litmus blue and a gas bubbles out of soln. The gas ignites in the presence of a flaming splint.

a) bal equation

b) LR

c) Calc mass of the non-gas compound.

⑩ Given:



The following proportion of reactants are mixed:

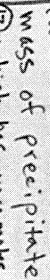


Draw the box that represents the situation after the rxn.

⑪ 20g silver nitrate is combined with 15g of calcium chloride. Calc. mass of precipitate.

⑫ which has more moles, 24g C or 23g Na?

⑬ Identify the family where this element is found:



⑭ Chem 7 skip this: 3g of a gas is in 3L at 800K and P is 158 atm. Calc Mm of gas.

⑮ A hydrocarbon contains 20.876278g C and 2.629425g H. The Mm is 54.04. Find EF+MF.

⑯ In the lab, H_2 can be produced by adding which of the following to HCl?

NH_3 , Zn, NaOH, NaHCO_3

⑰ A soln was treated with NaCl. A white ppt formed and was filtered. The filtrate was tested with KI and a neon yellow ppt formed. The anions are:

$(\text{Ag}^+, \text{Ba}^{2+})$, $(\text{Ag}^+, \text{Pb}^{2+})$, $(\text{Ba}^{2+}, \text{Pb}^{2+})$

⑱ 0.1M Na_2SO_4 conducts electricity better than 0.1M NaCl. Why?

⑲ which compound is not soluble in H_2O ?

$(\text{NH}_4)_2\text{SO}_4$, KMnO_4 , BaCO_3 , $\text{Zn}(\text{NO}_3)_2$, Na_3PO_4

⑳ Chem 7 skip this one: The good year blimp holds 496x10³ L of He. If the gas is at 23°C and 1 atm, what mass He is in blimp?

㉑ Select the larger atom: C or F

㉒ Given: Cl, Ar, Si, Al, S

Rank using arrows and words increasing ionization energy.

㉓ Given: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

1 mole O_2 is combined with excess CH_4 . Use a fraction to show how many CO_2 are produced.

㉔ An oxide of nitrogen is 30.45% N. The Mm of the compound is 90 ± 5g.

The compound only contains N and O. Find EF and MF.

㉕ 1g $\text{Cu}(\text{NO}_3)_2$ contains X molecules NO_3^- . Calc X.

㉖ Calc Al atoms in 1g Al_2O_3 .

㉗ Atom A has 2 valence e⁻ and atom B has 5 valence e⁻. The most likely chem. formula for the compound is _____.

㉘ 0.6g of a powder that contains some NaOH is dissolved in 20mL H_2O . 22.1mL of 0.054M HCl is used to titrate the sample to the green point. Calc moles NaOH in 0.6g sample.

㉙ 6g Al reacts with 6g HCl to produce aluminum chloride and hydrogen gas.

a) bal eq

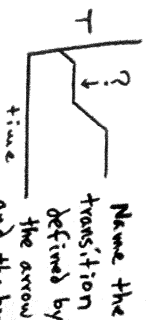
b) L.R

c) Find theoretical mass AlCl_3

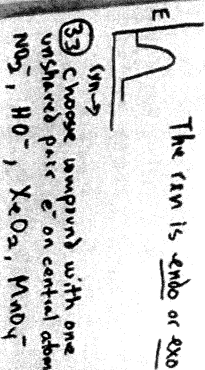
d) Calc mass remaining

32) A sample of SF_6 gas is in a 1L at 198°C. Assuming P is constant, what T in °C is needed to reduce the volume to 2.5L?

33) A sample of aluminum is heated giving the data:



32) $NaOH$ is dissolved in H_2O : $NaOH(s) \rightarrow Na^+(aq) + OH^-(aq)$
The van profile is:



34) The dominant IMF in CH_3COOH is _____.

35) H_2O has a higher bp than acetone, CH_3COCH_3 . Use IMF to explain why.

36) A sample of chlorine gas is confined in 5L at 328 torr and 37°C.

Calc waxes.

37) How many grams of $KClO_3$ decompose to KCl and $638 mL O_2$ at 752 torr and 752 torr?

38) $2KClO_3 \rightarrow 2KCl + 3O_2$

39) The density of an unknown gas is 4.73 g/L at 34 atm and 127°C. Calc Mm.

40) Which compound is not soluble in H_2O ?
(NH₄)₂SO₄, KMnO₄, BaCO₃, Zn(NO₃)₂, Na₃PO₄

41) A 0.03 mole sample of $NH_4NO_3(s)$ is placed in a 1L flask and heated to decompose the substance by: $NH_4NO_3(s) \rightarrow 2H_2O(g) + N_2O(g)$

The final temp. is 400K. The gas goes to 100%. Calculate the P.

42) 10 mL of 0.1M barium hydroxide is combined with 1g Na₂SO₄ given:

$Ba(OH)_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaOH$
a) Find L.R
b) Calc mass ppt
c) Calc mass remaining reactant.

Start Here
chem 7 skip this:
3g of a gas is in 3L at 800K and P is 158 atm. Calc Mm of gas.

43) A hydrate contains 20.836278g and 2.429425g H₂O. The Mm is 54.04. Find EF and MF.

44) In the lab, H₂ can be produced by adding which of the following to HCl?

NH₃, Zn, NaOH, NaHCO₃

45) A soln was treated with NaCl. A white ppt formed and was filtered. The filtrate was tested with KI and a brown yellow ppt formed. The anions are:

Ag^+ , Fe^{2+} , (Ag^+, Pb^{2+}) , (Ba^{2+}, Pb^{2+})

46) 0.1M Na₂SO₄ conducts electricity better than 0.1M NaCl. Why?
47) Which compound is not soluble in H_2O ?
(NH₄)₂SO₄, KMnO₄, BaCO₃, Zn(NO₃)₂, Na₃PO₄

48) Chem 7 skip this one: The goodyear blimp holds 496 x 10³ L of He. If the gas is at 23°C and 1 atm, what mass He is in blimp?

49) Select the larger atom: C or F

50) Given:

Cl, Ar, Si, Al, S

Rank using arrows and words increasing ionization energy.

51) Given:

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

1 mole O_2 is combined with excess CH_4 . Use a reaction to show how much CO_2 are produced.

52) An oxide of nitrogen is 30.45% N. The Mm of the compound is 70 ± 5g. The compound only contains N and O. Find EF and MF.

53) 1g $Cu(NO_3)_2$ contains X molecules NO_3^- . Calc X.

54) Calc Al atoms in 1g Al_2O_3 .

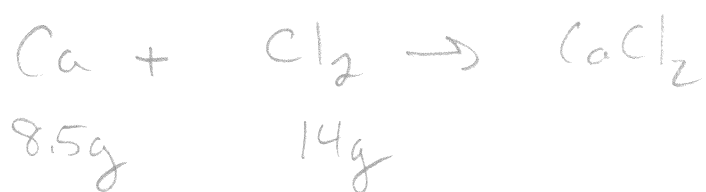
55) Atom A has 2 valence e⁻ and atom B has 5 valence e⁻. The most likely chem. formula for the compound is _____.

56) 0.6g of a powder that contains some NaOH is dissolved in 20 mL H_2O . 22.1 mL of 0.054 M HCl is used to titrate the sample to the green point. Calc moles NaOH in 0.6g sample.

57) 6g Al reacts with 6g HCl to produce aluminum chloride and hydrogen gas. a) bal eq b) L.R c) Find theoretical mass $AlCl_3$ d) Calc mass remaining

0.212 moles Ca, 0.197 moles Cl_2

calcium reacts with chlorine to form calcium chloride, what mass of CaCl_2 is formed from 8.5g Ca and 14g Cl_2 ?



$$8.5\text{g Ca} \times \frac{1}{40} = 0.212 \text{ moles Ca} \times \frac{1 \text{ CaCl}_2}{1 \text{ Ca}} \times \frac{110.9\text{g}}{\text{mole}} =$$

$$\begin{array}{l} 14\text{g Cl}_2 \times \frac{1}{70.9} = 0.197 \text{ mole Cl}_2 \times \frac{1 \text{ CaCl}_2}{1 \text{ Cl}_2} \times \frac{110.9\text{g}}{\text{mole}} \\ \text{LR} \end{array}$$

$$= 21.85\text{g CaCl}_2$$

2 write the net ionic equation:



3 write net ionic equation:



4 Identify the ppt:



5 What is the molarity of a solution that is 44g KOH in 2L?

$$44\text{g KOH} \times \frac{1\text{mole}}{56.1\text{g}} = \frac{0.784\text{mole}}{2\text{L}} = 0.392\text{M}$$



$$0.662578 \text{ mole Br}_2 - 0.033355 \text{ mole Br}_2 = 0.629223 \text{ mole Br}_2 \text{ Remains}$$

~~1. 10g of dimethyl ether, (CH₃OCH₃), is combusted in air. 10g of CH₃OCH₃ is reacted with 10g of oxygen. (1) calc L.R. (2) calc Theo yield of CO₂. (3) Calc remaining excess. ?~~

Dimethyl ether, (CH₃OCH₃), is combusted

in air. 10g of CH₃OCH₃ is reacted with

10g of oxygen. (1) calc L.R. (2) calc

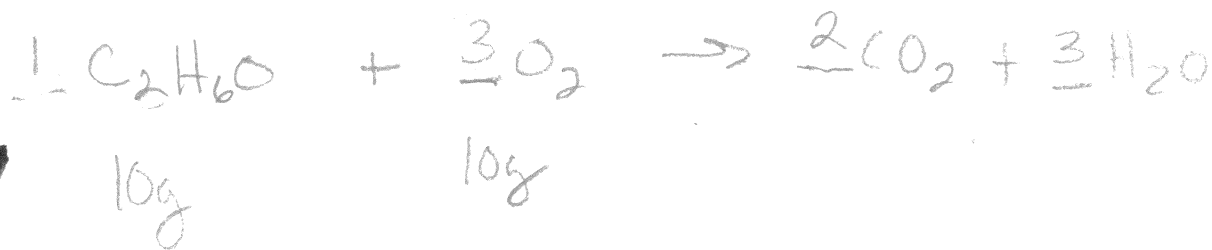
Theo yield of CO₂. (3) Calc remaining

excess. ?

12

8-0

6-0



$$(1) 10\text{g C}_2\text{H}_6\text{O} \times \frac{1}{46.07} = 0.217061 \text{ mole C}_2\text{H}_6\text{O} \times \frac{2 \text{ CO}_2}{1 \text{ C}_2\text{H}_6\text{O}} = 0.434122 \text{ moles CO}_2$$

$$10\text{g O}_2 \times \frac{1}{32} = 0.3125 \text{ mole O}_2 \times \frac{2 \text{ CO}_2}{3 \text{ O}_2} = 0.20833 \text{ CO}_2$$

~~O₂ limiting~~

$$(2) 0.20833 \text{ CO}_2 \times \frac{44.01\text{g}}{\text{mole}} = 9.1686\text{g CO}_2$$

$$(3) 0.3125 \text{ moles O}_2 \times \frac{1 \text{ C}_2\text{H}_6\text{O}}{3 \text{ O}_2} = 0.104166 \text{ moles C}_2\text{H}_6\text{O} \times 46.07 = 4.80\text{g used}$$

Remains 8 0.217061 mole - 0.104166 = 0.11289 moles C₂H₆O

$$\times 46.07\text{g} = 5.2\text{g C}_2\text{H}_6\text{O}$$



$$\frac{10\text{g H}_2\text{S}}{34.076} = 0.29346 \text{ moles H}_2\text{S} \times \frac{\text{Fe}_2\text{S}_3}{3\text{H}_2\text{S}} = 0.09782 \text{ moles Fe}_2\text{S}_3$$

$$\begin{array}{c}
 \text{lim} \\
 \frac{10\text{g Fe}(\text{OH})_3}{106.874} = 0.093568 \text{ moles Fe}(\text{OH})_3 \times \frac{\text{Fe}_2\text{S}_3}{2\text{Fe}(\text{OH})_3} = 0.046784 \text{ moles Fe}_2\text{S}_3 \\
 \times 207.869618 = 9.725\text{g Fe}_2\text{S}_3
 \end{array}$$

$$0.093568 \text{ moles Fe}(\text{OH})_3 \times \frac{3\text{H}_2\text{S}}{2\text{Fe}(\text{OH})_3} =$$

$$= \left(0.140352 \text{ mole H}_2\text{S USED} \times \frac{34.076\text{g}}{\text{mole}} = 4.7826\text{g USED} \right)$$

$$0.29346 - 0.140352 = 0.15311 \text{ mole H}_2\text{S}$$

$$\times 34.076 = \text{mole}$$

5.22g H₂S Remains

181

- 4 9



R

O. A.

18.

$$0.04349 \text{ moles NaOH} \times \frac{40 \text{ g}}{\text{mole}}$$

2Na

H₂O used

C. If the rxn produces $24.7g CO_2$,
calculate the % yield.

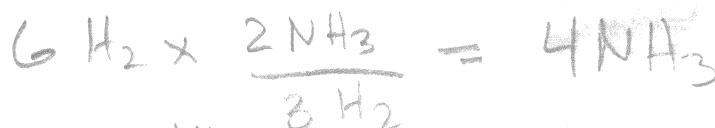
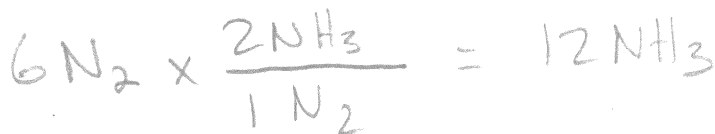
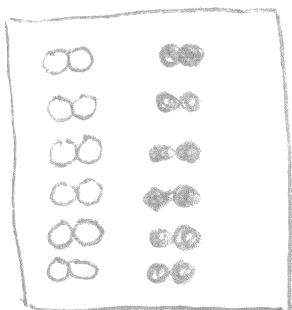
72.9%



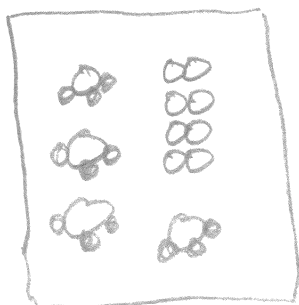
~~10~~

Nitrogen gas and hydrogen gas are
mixed in a container forming ammonia

4-21 by the following rxn: N_2 = open circle
 H_2 = closed circle



a. Draw the box that depicts the
correct number of NH_3 and molecules
of remaining reactant.



20g of ~~33~~ ~~4~~ ~~5~~ ~~6~~ ~~7~~ ~~8~~ ~~9~~ ~~10~~ ~~11~~ ~~12~~ ~~13~~ ~~14~~ ~~15~~ ~~16~~ ~~17~~ ~~18~~ ~~19~~ ~~20~~ ~~21~~ ~~22~~ ~~23~~ ~~24~~ ~~25~~ ~~26~~ ~~27~~ ~~28~~ ~~29~~ ~~30~~ ~~31~~ ~~32~~ ~~33~~ ~~34~~ ~~35~~ ~~36~~ ~~37~~ ~~38~~ ~~39~~ ~~40~~ ~~41~~ ~~42~~ ~~43~~ ~~44~~ ~~45~~ ~~46~~ ~~47~~ ~~48~~ ~~49~~ ~~50~~ ~~51~~ ~~52~~ ~~53~~ ~~54~~ ~~55~~ ~~56~~ ~~57~~ ~~58~~ ~~59~~ ~~60~~ ~~61~~ ~~62~~ ~~63~~ ~~64~~ ~~65~~ ~~66~~ ~~67~~ ~~68~~ ~~69~~ ~~70~~ ~~71~~ ~~72~~ ~~73~~ ~~74~~ ~~75~~ ~~76~~ ~~77~~ ~~78~~ ~~79~~ ~~80~~ ~~81~~ ~~82~~ ~~83~~ ~~84~~ ~~85~~ ~~86~~ ~~87~~ ~~88~~ ~~89~~ ~~90~~ ~~91~~ ~~92~~ ~~93~~ ~~94~~ ~~95~~ ~~96~~ ~~97~~ ~~98~~ ~~99~~ ~~100~~

(4.) Silver nitrate is reacted with 15g of calcium chloride.

A. write balanced equation



B. Calc mass AgCl

$$20\text{g AgNO}_3 \times \frac{1\text{mole}}{169.87} = 0.117737\text{ moles AgNO}_3 \times \frac{2\text{AgCl}}{2\text{AgNO}_3} = 0.117737\text{ moles AgCl}$$

$$15\text{g CaCl}_2 \times \frac{1\text{mole}}{110.98} = 0.135159\text{ moles CaCl}_2 \times \frac{2\text{AgCl}}{\text{CaCl}_2} = 0.270318\text{ moles AgCl}$$

$$\begin{array}{r} \text{AgCl} \\ \times 143.32\text{g} \\ \hline \text{mole} \end{array} = 16.87\text{g AgCl}$$

C. Mass Remaining Reactant

$$0.117737\text{ moles AgNO}_3 \times \frac{1\text{CaCl}_2}{2\text{AgNO}_3} = 0.05886\text{ moles CaCl}_2 \text{ used}$$

$$\begin{array}{r} \text{(got)} \\ 0.135159\text{ moles CaCl}_2 - 0.05886\text{ used} = 0.07629\text{ CaCl}_2 \text{ Remains} \\ \times 110.98\text{g CaCl}_2 \end{array}$$

$$= 8.46\text{g CaCl}_2 \text{ Remains}$$



$$\frac{2\text{g}}{44.094\text{g}}$$

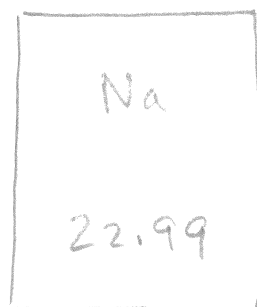
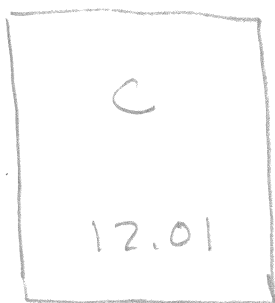


$$0.04536 \text{ mole C}_3\text{H}_8 \times \frac{-2045 \text{ KJ}}{\text{mole}} = -92.76 \text{ KJ}$$

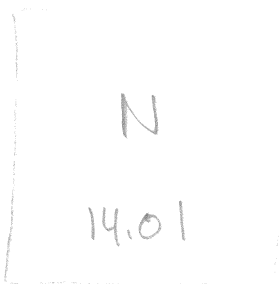
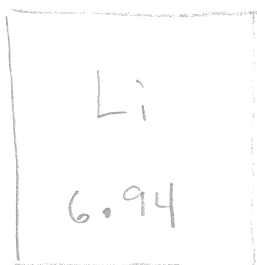
$$0.04536 \text{ mole C}_3\text{H}_8 \times \frac{5\text{O}_2}{1\text{C}_3\text{H}_8} = 0.2268 \text{ mole O}_2 \text{ used}$$

$$0.2268 \text{ mole O}_2 \times \frac{-2045 \text{ KJ}}{5 \text{ mole O}_2} = -92.76 \text{ KJ}$$

~~11~~
12



which has more particles, 24g C or 23g Na?



which has more particles, 14g Li or 14g N?

13

Identify the family of this
element: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$

Se, 6A

An unknown hydrocarbon, C_xH_y , exists as two isomers at 298 K; one is a gas, the other is a liquid.

- (A) When 3.90 grams of this hydrocarbon is placed in a 3.00 liter container and heated to 800. K, no liquid remains and the pressure becomes 1.58 atm. What is the molar mass of this hydrocarbon?
- (B) When the hydrocarbon is burned in oxygen, the only products formed are water and carbon dioxide. The mixture of products is 76.5% by mass $CO_{2(g)}$. What is the empirical formula of this hydrocarbon?
- (C) What is the molecular formula of this hydrocarbon? ~~What is the IUPAC name of this hydrocarbon?~~ Write the balanced equation for the complete combustion of this hydrocarbon.

(A) $PM_m = dRT$

$$M_m = \frac{(3.9g)}{3L} \left(\frac{0.0821 L \cdot atm}{mole \cdot K} \right) (800K)$$

14

$$M_m = \frac{54.04g}{mole}$$

$$76.5g CO_2 \times \frac{12.01}{44.01} = 20.876278g C \times \frac{1}{12.01} = 1.7382406 mole C$$

$$23.5g H_2O \times \frac{2.016}{18.016} = 2.629625g H \times \frac{1}{1.008} = 2.608792 mole H$$

15 (B) $EF = C_2H_3$

$$\# = \frac{54.04}{27.044} = 2$$

(C)



- ~~3~~ 4
- ④ At what T would CO_2 molecules have an rms speed equal to that of H_2 molecules at 20°C ?

~~4~~ ~~29~~

$$\mu_{\text{CO}_2} = \mu_{\text{H}_2} @ 20^\circ\text{C}$$

$$\sqrt{\frac{3RT}{M_{\text{CO}_2}}} = \sqrt{\frac{3RT}{M_{\text{H}_2}}}$$

$$T_{\text{CO}_2} = 6396 \text{ K} \Rightarrow 6120^\circ\text{C}$$

- ~~12~~ ~~30~~ ~~4~~ ~~5~~
- ⑤ Select the element or compound that has an average rms speed closest to the N_2 molecule at STP.

20	131	32	28	30
Ne	Xe	O_2	<u>CO</u>	NO

- ~~16~~
- ⑥ Select the ----- the greatest density

Xe

- ~~24~~ ~~37~~
- ⑦ Select the ----- effusion rate through a pin hole

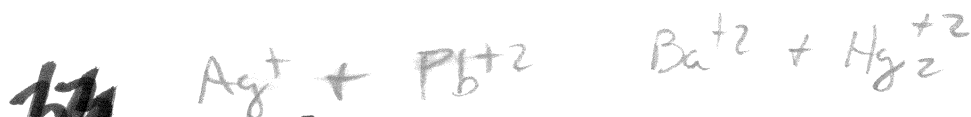
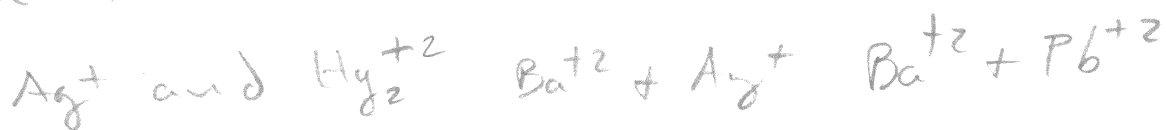
Ne

- ~~16~~
- ⑧ In the laboratory, H_2 can be produced by adding which of the following to 1M HCl ?

1M NH_3 / Zn NaHCO_3 NaOH

~~17~~ 17

⑨ A sample solution of an unknown mixture was treated with HCl. A white ppt was formed and filtered. A few drops of KI soln was added to filtrate and a yellow ppt formed. The white ppt caught by filter dissolved in ammonia, what two ions are present in the unknown?



~~ba~~ ~~19/6~~ ~~ba~~

16) A 0.1M soln Na_2SO_4 is a better conductor of elec than NaCl. Explain.

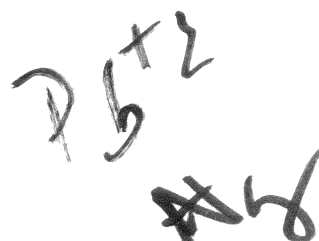
18 (Na_2SO_4 produces more ions)

~~15~~ ~~19/11~~

what is the mole fraction of ethanol, $\text{C}_2\text{H}_5\text{OH}$, in aqueous soln that is 46% EtOH by mass?

~~16~~ ~~19/11~~

$0.25 = X_{\text{EtOH}}$



19

BaCO₃

~~19~~ 20 The good year blimp holds $4.96 \times 10^6 \text{ L}$ of He.
If the gas is at 23°C and 1 atm , what mass He is in the blimp?

$$PV = nRT$$

$$n = \frac{PV}{RT} = \frac{(1 \text{ atm})(4.96 \times 10^6 \text{ L})}{\left(\frac{0.0821 \text{ L} \cdot \text{atm}}{\text{mole} \cdot \text{K}}\right)(296 \text{ K})}$$

$$= 204102 \text{ moles} \times \frac{4 \text{ g}}{\text{mole}}$$
$$= \del{816,407 \text{ g}}$$

$$\del{816,407 \text{ g}}$$

$$816407 \text{ g}$$

~~25~~ ~~20~~ ~~50~~ ~~42~~ ~~42~~ ~~42~~
Select the larger atom

~~27~~ ~~45~~ C, F ~~21~~

~~28~~ ~~51~~ ~~8~~ ~~21~~
rank the following atoms in order
of increasing ionization energy
using arrows and words.

~~24~~ ~~22~~

~~24~~ Cl, Ar, Si, Al, S ~~13~~

less $\longrightarrow$ more

~~25~~ ~~25~~ ~~25~~ ~~25~~ ~~25~~ ~~25~~
Al Si S Cl Ar

~~28~~ ~~28~~ ~~28~~ ~~28~~ ~~28~~ ~~28~~
select the large atom

~~24~~ Cu, V ~~14~~

~~23~~ ~~51~~ ~~23~~ ~~23~~
select the pair of atoms
closest in size.

~~28~~ Kr, Ga, Ni, Br

~~28~~

Kr Br



1 mole O_2 is combined with excess CH_4 . what is the mole ratio needed to find the moles CO_2 produced?

$$1 \text{ mole } \text{O}_2 \times \left(\frac{1 \text{ CO}_2}{2 \text{ O}_2} \right)$$



If 2 mole Ag is produced in the decomp. rxn, what is the mole ratio needed to find the Ag_2O that reacted?

$$2 \text{ mole } \text{Ag} \times \frac{2 \text{ Ag}_2\text{O}}{4 \text{ Ag}} \left(\frac{1}{2} \right)$$

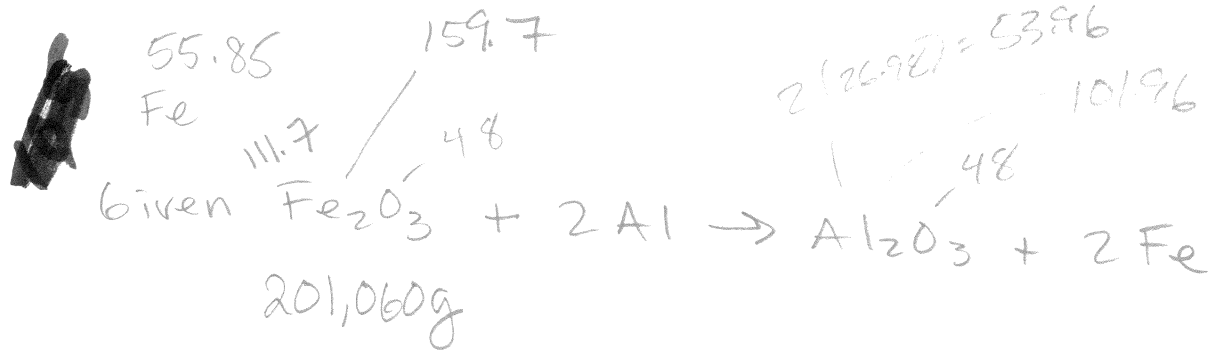


1 mole NaBr is combined with 1 mole CaF_2 . (a) find L.R. (b) Calc moles CaBr_2 produced.

L.R.

$$1 \text{ mole } \text{NaBr} \times \frac{\text{CaBr}_2}{2 \text{ NaBr}} = 0.5 \text{ mole } \text{CaBr}_2$$

$$1 \text{ mole } \text{CaF}_2 \times \frac{\text{CaBr}_2}{\text{CaF}_2} = 1 \text{ mole } \text{CaBr}_2$$



Calc mass Al_2O_3 produced and Al used in the rxn.

$$201,060g \text{Fe}_2\text{O}_3 \times \frac{1 \text{ mole}}{159.7g \text{Fe}_2\text{O}_3} = 1259 \text{ mole Fe}_2\text{O}_3$$

$$1259 \text{ mole Fe}_2\text{O}_3 \times \frac{1 \text{ Al}_2\text{O}_3}{1 \text{ Fe}_2\text{O}_3} = 1259 \text{ mole Al}_2\text{O}_3 \times \frac{101.96g}{\text{mole}} = 128,368g \text{ Al}_2\text{O}_3$$

$$1259 \text{ mole Fe}_2\text{O}_3 \times \frac{2 \text{ Al}}{1 \text{ Fe}_2\text{O}_3} = 2518 \text{ mole Al} \times \frac{26.98g \text{ Al}}{\text{mole}} = 67,936g \text{ Al}$$

24

An oxide of nitrogen contains 30.45% N. The Mm of the compound is 90 ± 5 g/mole and the compound only contains N and O. Find EF and MF.

$$100 - 30.45 = 69.55g \text{ O}$$

$$30.45g \text{ N} \times \frac{1}{14.01} = \frac{2.173447}{2.17} = \text{N}$$

$$69.55g \text{ O} \times \frac{1}{16} = \frac{4.346875}{2.17} = 20$$

$$\text{EF} = \text{NO}_2 - 46.01 \quad \frac{90}{46.01} = 2$$



~~9/11~~ Given $1g$ $Cu(NO_3)_2$, calculate moles of NO_3 .

$$1g(Cu(NO_3)_2) \times \frac{1 \text{ mole}}{187.56g} = 0.00533 \text{ mole } Cu(NO_3)_2$$

$$0.00533 \text{ mole } Cu(NO_3)_2 \times \frac{2 \text{ mole } NO_3^-}{Cu(NO_3)_2} =$$

$$= 0.01066 \text{ mole } NO_3^-$$

$$\cancel{1.6 \times 10^{21}} \\ 6.42 \times 10^{21}$$

~~11/11~~

A compound contains 0.170 moles B and 0.255 moles O. Find EF.

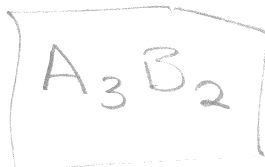
$$\frac{0.170 \text{ mole B}}{0.170} = B \times 2 = B_2O_3 = EF$$

$$\frac{0.255 \text{ mole O}}{0.170} = 1.5 - O \times 2$$

Calc Al atoms in $1g Al_2O_3$.

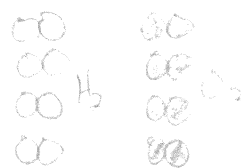
$$\begin{aligned} 26 \quad 1g Al_2O_3 \times \frac{1 \text{ mole}}{101.96g} &= 0.00981 \text{ mole } Al_2O_3 \times \frac{2 Al}{1 Al_2O_3} = \\ &= 0.01962 \text{ mole } Al_2O_3 \times \frac{6.022 \times 10^{23} \text{ particles Al}}{\text{mol}} = \\ &= 1.18 \times 10^{22} \text{ atoms Al} \end{aligned}$$

~~16~~ ~~12~~ ~~14~~ ~~31~~ ~~28~~ **27**
 Atom A has 2 valence electrons, and atom B has 5 valence electrons. What is the most likely compound that can form between A and B?

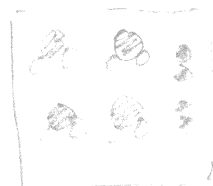
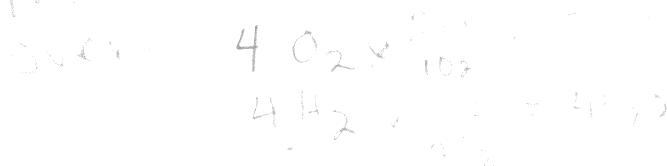


~~16~~ ~~37~~ ~~19~~ ~~43~~ x^{+2}
 In the compound XS , the element x could be:
 Ar, Al, Sr, Cs

~~30~~ ~~14~~ ~~15~~
 The diagram below shows a mixture of hydrogen ($\circ$) and oxygen ($\bullet$) molecules. Oxygen and hydrogen react by the following unbalanced equation:



Draw the diagram that represents the mixture after the rxn is over.



~~16~~ 24

A chunk of heated metal is placed in a 60g calorimeter and the temp increases from 25 to 29.8°C.

Calc. ΔH_{metal} . $C_{p_{H_2O}} = \frac{1 \text{ cal}}{1 \text{ cc g}}$

$$\Delta H_{\text{cal}} = (60)(1)(29.8 - 25) = \underline{288 \text{ cal}}$$

$$\boxed{\Delta H_{\text{metal}} = -288 \text{ cal}}$$

~~23~~ 28

28

0.6g of NaOH is dissolved in 20mL of H_2O and titrated with 22.1mL of a 0.054M HCl soln to green end point. Calc. moles of base in original sample.

$$0.0221 \text{ L} \times 0.054 \text{ M}_{\text{HCl}} = \underline{0.00119 \text{ moles } H^+} \\ = OH^-$$

20 ~~21~~ ~~22~~ 29
 116
 116
 6g aluminum metal reacts with 6g hydrochloric acid to produce aluminum chloride and hydrogen gas.

- (a) balanced equation
- (b) L.R
- (c) calc mass hydrogen gas
- (d) calc mass remaining reactant
- (e) write EC of Al^{+3} and Cl^{-}
- (f) Is it easier to remove an e^{-} from Al or Cl? Must cite P. trends.



$$6g Al \times \frac{1}{26.98} = 0.2224 \text{ mole Al} \times \frac{3H_2}{2Al} = 0.3336 \text{ mole } H_2$$

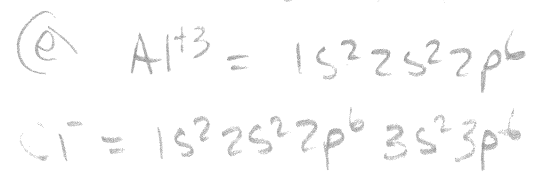
$$6g HCl \times \frac{1}{36.458} = 0.16457 \text{ mole HCl} \times \frac{3H_2}{6HCl} = 0.0823 \text{ mole } H_2$$

L.R

$$\times \frac{2AlCl_3}{6HCl} = 0.054856 \text{ mole } AlCl_3 \times \frac{2.016g}{\text{mole}} = 0.1659g H_2$$

$$\times 133.33 = 7.3g AlCl_3$$

$$0.16457 \text{ mole HCl} \times \frac{2Al}{6HCl} = 0.05485 \text{ mole Al} \times \frac{26.98g}{\text{mole}} = 1.48g Al \text{ used}$$



(f) Al easier.
 IE increases $\rightarrow$ R
 IE decreases down
 Al is left
 Al remains = $6g - 1.48g = 4.52g Al$
 Remain

30



A sample of sulfur hexafluoride gas is in 9.10 L at 198°C . Assuming P constant, what T in $^\circ\text{C}$ is needed to reduce the volume to 2.5 L.

n, P con ; T, V change

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

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

$$198^\circ\text{C} \rightarrow \underline{471\text{K}} = T_1$$

$$T_2 = \frac{(V_2)(T_1)}{V_1} = \frac{(2.5\text{L})(471\text{K})}{9.1\text{L}}$$

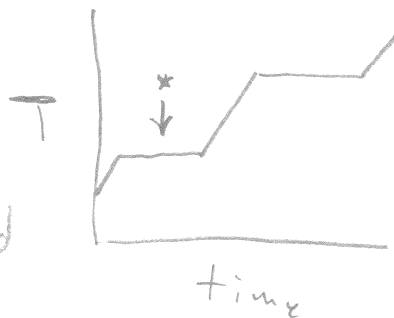
$$T_2 = 129.4\text{K}$$

$$T_2 = -143.6^\circ\text{C}$$

31

A sample of aluminum is heated giving the following data:

Name the transition defined by arrow and the type of bond broken.



metallic, mp

32

NaOH is dissolved in H_2O . The rxn vessel becomes hot. The rxn profile for the ionization of NaOH ($NaOH \rightarrow Na^+ + OH^-$) is:



33

choose the compound with one pair of e^- on the central atom:



34

The dominant IMF of CH_3COOH is H-bond.
Draw structure



35

H_2O has a higher Bp than acetone, $CH_3\overset{\overset{\text{O}}{\parallel}}{\text{C}}-CH_3$.
Use IMF to explain why!

H-bond vs dipole

36

A sample of chlorine gas is confined in a 5L container at 328 torr and 37°C.
 Calc moles.

$$\downarrow$$

$$0.4316 \text{ atm}$$

$$\downarrow$$

$$310 \text{ K}$$

$$PV = nRT$$

$$n = \frac{PV}{RT} = \frac{(0.4316 \text{ atm})(5 \text{ L})}{R (310 \text{ K})} =$$

$$n = 0.085 \text{ mole}$$

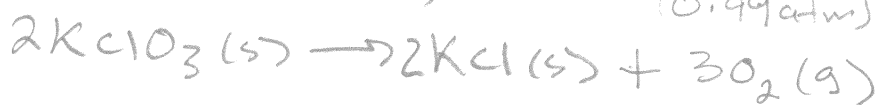
37

How many grams of KClO_3 decompose to KCl and 638 mL O_2 at 128°C and 752 torr?

$$0.638 \text{ L}$$

$$(401 \text{ K})$$

$$(0.99 \text{ atm})$$



$$n_{\text{O}_2} = \frac{(0.99 \text{ atm})(0.638 \text{ L})}{R (401 \text{ K})} = 0.019 \text{ mole}$$

$$0.019 \text{ mole } \text{O}_2 \times \frac{2\text{KClO}_3}{3\text{O}_2} = 0.013 \text{ mole } \text{KClO}_3$$

$$\times 122.55 = 1.6 \text{ g } \text{KClO}_3$$

~~17.15~~ 38

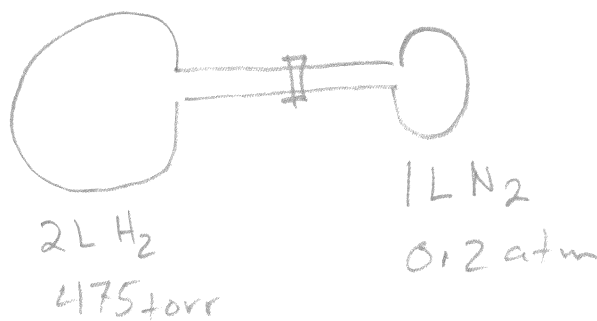
17. The density of an unknown gas is 4.2g per liter at 3atm and 127°C.

Calc Mm.

$$M = \frac{46g}{mol}$$

Consider the flask with the following

two gas:



what are the final partial pressures once stopcock is opened.

For H₂

$$P_1 = 475 \text{ torr} = 0.625 \text{ atm}$$

$$V_1 = 2L$$

$$P_2 = ?$$

$$V_2 = 3L$$

$$P_2 = \frac{P_1 V_1}{V_2} = \frac{(0.625 \text{ atm})(2L)}{3L}$$

$$P_2 = 0.4166 \text{ atm H}_2$$

For N₂

$$P_1 = 0.2 \text{ atm}$$

$$V_1 = 1L$$

$$P_2 = ?$$

$$V_2 = 3L$$

$$P_2 = \frac{(0.2)(1L)}{3}$$

$$P_2 = 0.0666 \text{ atm N}_2$$

13 which of the following compounds is least soluble in water? 39

~~13~~ ~~14~~ ~~15~~ ~~16~~ ~~17~~ ~~18~~ ~~19~~
~~20~~ ~~21~~ ~~22~~ ~~23~~ ~~24~~ ~~25~~ ~~26~~ ~~27~~ ~~28~~ ~~29~~ ~~30~~ ~~31~~ ~~32~~ ~~33~~ ~~34~~ ~~35~~ ~~36~~ ~~37~~ ~~38~~ ~~40~~ ~~41~~ ~~42~~ ~~43~~ ~~44~~ ~~45~~ ~~46~~ ~~47~~ ~~48~~ ~~49~~ ~~50~~
 (NH₄)₂SO₄, KMnO₄, BaCO₃, Zn(NO₃)₂, Na₃PO₄

40
 14 A 0.03 mol sample NH₄NO₃(s) is placed in a 1L evacuated flask, which is sealed & then heated. The ammonium nitrate decomposes completely. The total pressure in the flask at 400K is closest to which of the following.



0.03

$$0.03 \text{ mole NH}_4\text{NO}_3 \times \frac{2 \text{ H}_2\text{O}}{1 \text{ NH}_4\text{NO}_3} = 0.06 \text{ mole H}_2\text{O}$$

$$= 0.03 \text{ mole N}_2\text{O}$$

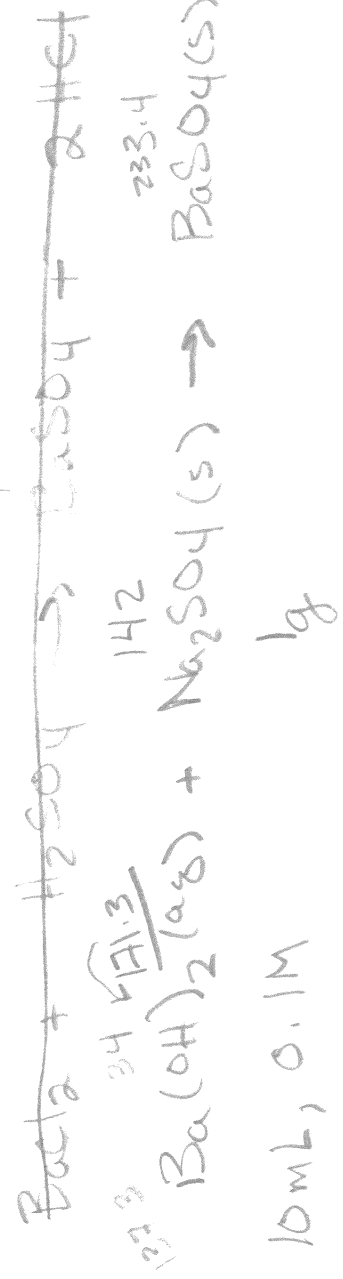
$$n_T = 0.09 \text{ mole}$$

$$P_T = \frac{n_T R T}{V} = \frac{(0.09)(R)(400K)}{1L} = 2.9556 \text{ atm}$$

3 atm, 1 atm, 0.5 atm, 0.1 atm, 0.03 atm

Q1

is



$$0.01 \text{ L} \times 0.1 \text{ mol/L} = 0.001 \text{ mole}$$

$$\text{L.R. } 0.001 \text{ mole Ba(OH)}_2 \times \frac{1 \text{ BaSO}_4}{1 \text{ Ba(OH)}_2}$$

$$1 \text{ g Na}_2\text{SO}_4 \times \frac{1 \text{ mole}}{142 \text{ g}} = 0.007 \text{ mole Na}_2\text{SO}_4 \times \frac{1 \text{ BaSO}_4}{1 \text{ Na}_2\text{SO}_4}$$

excess

$$= 0.001 \text{ mole BaSO}_4 \times 233.4 \frac{\text{g}}{\text{mole}} = 0.2334 \text{ g BaSO}_4$$

$$\Delta \rightarrow 0.001 \text{ mole Ba(OH)}_2 \times \frac{1 \text{ Na}_2\text{SO}_4}{1 \text{ Ba(OH)}_2} = 0.001 \text{ mole Na}_2\text{SO}_4 \times 142 = 0.142 \text{ g Na}_2\text{SO}_4$$

excess used

$$1 \text{ g} - 0.142 \text{ g Na}_2\text{SO}_4 = 0.858 \text{ g}$$

Na₂SO₄
remains