

AP CHEMISTRY SUMMER ASSIGNMENT

2016

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Review Summer Assignment

This packet covers Chapters 1-3 in Chemistry: The Central Science by Brown and LeMay and Chapters 1-3 in Chemistry by Zumdahl. We will be using and LeMay in class, but Zumdahl will be signed out to you over the summer as a reference. The corresponding chapter and section numbers are provided in the packet for both textbooks. If you struggle with problems in the packet, reading the textbook is highly recommended. Kahn Academy is also a good resource if you cannot remember the material from GT Chemistry.

You will have an assessment on Chapters 1 through 3 on **Thursday, September 15 and Friday, September 16**. The assessment will include multiple choice and free response. The questions will be similar to what appears on the AP Chemistry exam.

Reading Summer Assignment

Chemistry has had a profound impact on the history of human development. Many of the compounds we take for granted today were once responsible for dramatic, fantastic and sometimes cataclysmic changes in the functions of society. European demand for the spice molecule piperine (the basic molecule of pepper) not only fueled early exploration, but also inspired the practice of buying and selling shares in the stock market. A minor housecleaning mishap and an exploding cotton apron led to the development of modern explosives and contributed to the photography and movie industries. These and many other stories are found in Napoleon's Buttons: 17 Molecules That Changed History (NB). This book gives rise to many questions about the advancement of chemistry in modern science. How many other molecules lay waiting to be discovered or created? How will they shape the future? What will we learn from their predecessors? Who will be the next great chemical minds to fashion the chemistry of tomorrow?

You will read the book Napoleon's Buttons: 17 Molecules That Changed History (NB) by Penny LeCouteur and Jay Burreson and choose two of the following five questions about which to write essays. Essays to the questions should be TYPED with the prompt at the top. Incorporate knowledge from multiple academic disciplines, personal experience, and specific examples from Napoleon's Buttons in your essay. This assignment is due **Monday, September 26**.

- The book details a number of activities that illustrate two forms of human inquiry: human exploration of the world and scientific inquiry about the world. What motivates these forms of inquiry? Are the motivations for intellectual or scientific inquiry the same as or different from other aspects of human exploration that are referred to in the book?
- Given what you know about history or the way that you have studied history, does this book present history in a way that makes you re-consider or see in a new light aspects or events in history?
- The authors present two different types of accounts. One emphasizes chemistry as underlying or motivating a number of human actions which have had far-reaching social and historical

consequences. The other shows how the pursuit of chemical knowledge and understanding has significantly changed the world in which we live. Provide an example of each of these types of accounts, and be prepared to discuss these two related by different lines of scientific inquiry.

- Many of the “leaders” discussed in the work are individuals whose leadership is expressed in connection with intellectual or scientific inquiry. Are there special characteristics of such a leader? Which individual discussed in the book shows both intellectual and worldly leadership qualities? How are intellectual and worldly leadership qualities related?
- The authors write that “a prime condition for the trading of goods is ‘highly desired molecules unevenly distributed throughout the world’” (270). Indeed, the book sometimes read like a history of human desires. But these are different kinds of desires and things are desired for different purposes. Consider what might be the differences between
 - the desire for morphine and the desire for caffeine;
 - the desire for glucose and the desire for isoeugenol;
 - the desire for norethindrone and the desire for sodium chloride.

Sample Calendar

A sample calendar has been provided. Should you choose to follow this calendar, the workload will not feel overwhelming. If you choose to wait until the night before the assessment to complete the packet and the night before the essays are due, you may feel differently.

June						
S	M	T	W	H	F	S
19	20	21	22	23	24	25
TEXT: Sections 1.1 – 1.4 NB: Intro. and Chapter 1						
26	27	28	29	30	1	2
TEXT: Sections 1.5 – 1.6 NB: Chapters 2 and 3						

July						
S	M	T	W	H	F	S
3	4	5	6	7	8	9
TEXT: Sections 2.1 – 2.4 NB: Chapters 4 and 5						
10	11	12	13	14	15	16
TEXT: Sections 2.5 – 2.7 NB: Chapters 6 and 7						
17	18	19	20	21	22	23
TEXT: Sections 2.8 – 2.9 Chapters 8 and 9						
24	25	26	27	28	29	30
TEXT: Sections 3.1 – 3.2 NB: Chapters 10 and 11						

August						
S	M	T	W	H	F	S
31	1	2	3	4	5	6
TEXT: Sections 3.3 – 3.4 NB: Chapters 12 and 13						
7	8	9	10	11	12	13
TEXT: Sections 3.5 – 3.6 NB: Chapters 14 and 15						
14	15	16	17	18	19	20
TEXT: Sections 3.7 Chapters 16 and 17						
21	22	23	24	25	26	27
TEXT: Integrative Exercises NB: Two Essays						

1.2 and 1.3 Classification and Properties of Matter (Zumdahl 1.9)

1. Classify each of the following as a pure substance or a mixture. If it is a mixture, indicate whether it is homogeneous or heterogeneous.

	Pure or Mixture	Homogeneous/Heterogeneous
Air		
Tomato Juice		
Iodine Crystals		
Sand		

2. Give the chemical symbol or name for each of the following elements as appropriate:

Carbon	_____	P	_____
Nitrogen	_____	Ca	_____
Titanium	_____	He	_____
Zinc	_____	Pb	_____
Iron	_____	Ag	_____

3. Read the following description of the element zinc and indicate which are physical properties and which are chemical properties.

Zinc is a silver-gray-colored metal that melts at 420°C. When zinc granules are added to dilute sulfuric acid, hydrogen is given off and the metal dissolves. Zinc has a hardness on the Mohs scale of 2.5 and a density of 7.13 g/cm³ at 25°C. It reacts slowly with oxygen gas at elevated temperatures to form zinc oxide.

4. A match is lit and held under a cold piece of metal. The following observations are made:
- The match burns.
 - The metal gets warmer.
 - Water condenses on the metal.
 - Soot (carbon) is deposited on the metal.

Which of these occurrences are due to physical changes, and which are due to chemical changes?

5. Three beakers contain clear, colorless liquids. One beaker contains pure water, another contains salt water, and another contains sugar water. How can you tell which beaker is which? (No tasting allowed.)

1.4 Units and Measurement (Zumdahl 1.3)

1. Use appropriate metric prefixes to write the following measurements without use of exponents:

a. 2.3×10^{-10} L _____

e. 15.7×10^3 g _____

b. 4.7×10^{-6} g _____

f. 1.34×10^{-3} m _____

c. 1.85×10^{-12} m _____

g. 1.84×10^2 cm _____

d. 16.7×10^6 s _____

2. A cube of osmium metal 1.500 cm on a side has a mass of 76.31 g at 25°C. What is the density in g/cm³ at this temperature?

3. The density of titanium metal is 4.51 g/cm³ at 25°C. What mass of titanium displaces 125.0 mL of water at 25°C?

4. The density of benzene at 15°C is 0.8787 g/mL. Calculate the mass of 0.1500 L of benzene at this temperature.

1.5 Uncertainty in Measurement (Zundahl 1.4 & 1.5)

1. Two students determine the percentage of lead in a sample as a laboratory exercise. The true percentage is 22.52%. The students' results for the three determinations are as follows:

a. 22.52, 22.48, 22.54

b. 22.64, 22.58, 22.62

Which set is more accurate based on its average? Which set is more precise based on its standard deviation?

2. Indicate the number of significant figures in each of the following measured quantities:

a. 3.774 km _____

d. 350.00 K _____

b. 205 m² _____

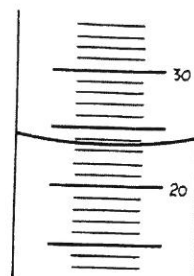
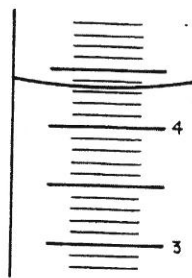
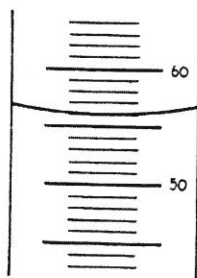
e. 307.080 g _____

c. 1,700 cm _____

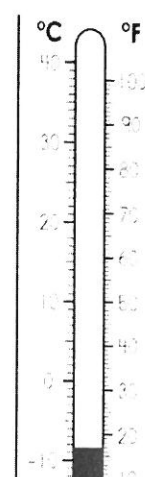
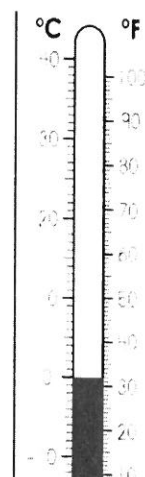
f. 1.3×10^3 m/s _____

3. The diameter of the Earth at the equator is 7926.381 mi. Round this number to three significant figures, and express it in standard exponential notation.
4. The circumference of the Earth through the poles is 40,008 km. Round this number to four significant figures, and express it in standard exponential notation.
5. Carry out the following operations, and express the answer with the appropriate number of significant figures:
- a. $320.5 - (6104.5/2.3) =$ _____
- b. $[(285.3 \times 10^5) - (1.200 \times 10^3)] \times 2.8954 =$ _____
- c. $(0.0045 \times 20,000.0) + (2813 \times 12) =$ _____
- d. $863 \times [1255 - (3.45 \times 10^8)] =$ _____

6. You have graduated cylinders that contain liquids. Write the volume of each liquid, in milliliters, using the proper number of significant figures.



7. You have thermometers measuring the temperature of different materials. Write the temperature of each material, in °C, using the proper number of significant figures.



1.6 Dimensional Analysis Unit Conversion (Zumdahl 1.6)

1. Carry out the following conversions:

a. 0.105 in to mm

b. 0.650 qt to mL

c. $8.75 \mu\text{m/s}$ to km/hr

d. 1.955 m^3 to yd^3

e. \$3.99/lb to dollars per kg

f. 8.75 lb/ft^3 to g/mL

2. If an electric car is capable of going 225 km on a single charge, how many charges will it need to travel from Seattle, Washington to San Diego, California, a distance of 1257 mi, assuming that the trip begins with a full charge?
3. If a migrating loon flies at an average speed of 14 m/s, what is its average speed in mi/hr?
4. What is the engine piston displacement in liters of an engine whose displacement is listed as 450 in³?
5. In March 1989, the *Exxon Valdez* ran aground and spilled 240,000 barrels of crude petroleum off the coast of Alaska. One barrel of petroleum is equal to 42 gal. How many liters of petroleum were spilled?

2.1 & 2.2 Atomic Theory & the Discovery of Atomic Structure (Zumdahl 2.1 – 2.4)

1. Hydrogen sulfide is composed of two elements: hydrogen and sulfur. In a experiment, 6.500 g of hydrogen sulfide is fully decomposed into its elements.

a. If 0.384 g of hydrogen is obtained in this experiment, how many grams of sulfur must be obtained?

b. What fundamental law does this experiment demonstrate?

2. In a series of experiments, a chemist prepared three different compounds that contain only iodine and fluorine and determined the mass of each element in each element in each compound:

Compound	Mass of Iodine (g)	Mass of Fluorine (g)
1	4.75	3.56
2	7.64	3.43
3	9.41	9.86

Calculate the mass of fluorine per gram of iodine in each compound. How do these numbers support the atomic theory?

2.3 & 2.4 Modern View of Atomic Structure; Atomic Weights (Zumdahl 2.5)

- Determine whether each of the following statements is true or false. If false, correct the statement to make it true.
 - The nucleus has the most and comprises most of the volume of an atom.
 - Every atom of a given element has the same number of protons.
 - The number of electrons in an atom equals the number of neutrons in the atom.
 - The protons in the nucleus of the helium atom are held together by a force called the strong nuclear force.
- Which of the following are isotopes of the same element: ${}_{16}^{31}\text{X}$, ${}_{15}^{31}\text{X}$, ${}_{16}^{32}\text{X}$? Explain your answer.

- Each of the following isotopes is used in medicine. Indicate the number of protons and neutrons in each isotope.

Isotope	Protons	Neutrons
Phosphorus – 32		
Chromium – 51		
Cobalt – 60		
Technetium – 99		
Iodine – 131		
Thallium - 201		

- Complete the following table, assuming each column represents a neutral atom.

Symbol	${}^{65}\text{Zn}$				
Protons		38			92
Neutrons		58	49		
Electrons			38	36	
Mass Number				81	235

- Rubidium has two naturally occurring isotopes: rubidium – 85 (atomic mass = 84.9118 amu; abundance = 72.15%) and rubidium – 87 (atomic mass = 86.9092 amu; abundance = 27.85%). Calculate the atomic weight of rubidium.

2.5 – 2.7 The Periodic Table; Molecules and Ions (Zumdahl 2.6-2.7)

1. Locate each of the following elements in the periodic table; give its name and atomic number, and indicate whether it is a metal, metalloid, or nonmetal.

	Name	Atomic Number	Metal/Metalloid/Nonmetal
Li			
Sc			
Ge			
Yb			
Mn			
Sb			
Xe			

2. The elements of group 4A show an interesting change in properties moving down the group. Give the name and chemical symbol of each element in the group and label it as a nonmetal, metalloid, or metal.
3. Two compounds have the same empirical formula. One substance is a gas, whereas the other is a viscous liquid. How is it possible for two substances with the same empirical formula to have markedly different properties?
4. Determine the molecular and empirical formulas of the following:
- The organic solvent benzene, which has six carbon atoms and six hydrogen atoms
 - The compound silicon tetrachloride, which has a silicon atom and four chlorine atoms
 - The reactive substance diborate, which has two boron atoms and 6 hydrogen atoms
 - The sugar called glucose, which has six carbon atoms, twelve hydrogen atoms, and six oxygen atoms
5. How many of the indicated atoms are represented by each chemical formula:
- Carbon atoms in $C_2H_5OOCH_3$
 - Oxygen atoms in $Ca(ClO_4)_2$
 - Hydrogen atoms in $(NH_4)_2HPO_4$

6. Fill in the following table:

Symbol	$^{31}\text{P}^{3-}$			
Protons		34	50	
Neutrons		45	69	118
Electrons			46	76
Net Charge		2-		3+

7. Using the periodic table, predict the charges of the ions of the following elements:

- a. Ga b. Sr c. As d. Br e. Se

8. Complete the following table by filling in the formula for the ionic compound formed by each pair of cations and anions, as shown for the first pair.

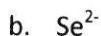
Ion	Na^+	Ca^{2+}	Fe^{2+}	Al^{3+}
O^{2-}	Na_2O			
NO_3^-				
SO_4^{2-}				
AsO_4^{3-}				

9. Which of the following are ionic, and which are molecular (covalent)?

- a. PF_5 e. FeCl_3
 b. NaI f. LaP
 c. SCl_2 g. CoCO_3
 d. $\text{Ca}(\text{NO}_3)_2$ h. N_2O_4

2.8 – 2.9 Naming Inorganic Compounds; Organic Molecules (Zumdahl 2.8)

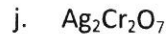
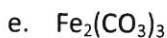
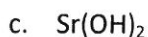
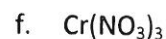
1. Selenium forms compounds analogous to sulfur. Name the following ions:



2. Give the names and charges of the cation and anion in each of the following compounds:

	Cation Name	Cation Charge	Anion Name	Anion Charge
CuS				
Ag_2SO_4				
$\text{Al}(\text{ClO}_3)_3$				
$\text{Co}(\text{OH})_2$				
PbCO_3				

3. Name the following ionic compounds:



4. Give the chemical formula for each of the following ionic compounds:

a. Sodium phosphate

e. Cobalt (II) hydrogen carbonate

b. Zinc nitrate

f. Chromium (III) acetate

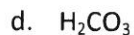
c. Barium bromate

g. Potassium dichromate

d. Iron (II) perchlorate

5. Provide the name or chemical formula, as appropriate, for each of the following acids:

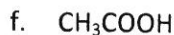
a. Hydroiodic acid



b. Chloric acid



c. Nitrous acid



6. The oxides of nitrogen are very important components in urban air pollution. Name each of the following compounds:



7. What ending is used for hydrocarbons with all single bonds?

Hydrocarbons with a double bond?

Hydrocarbons with a triple bond?

8. What prefix is used for hydrocarbons with 1 carbon atom?

Two carbon atoms?

Three carbon atoms?

Four carbon atoms?

Five carbon atoms?

Eight carbon atoms?

9. Hexane is an alkane whose structural formula has all of its carbon atoms in a straight chain. Draw the structural formula for this compound and determine its molecular and empirical formulas.

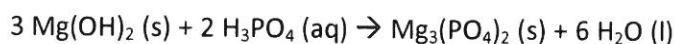
10. What do ethane and ethanol have in common? How does 1-propanol differ from propane? How does 1-propanol differ from 2-propanol?

11. Draw the structural formulas for three isomers of pentane, C_5H_{12} .

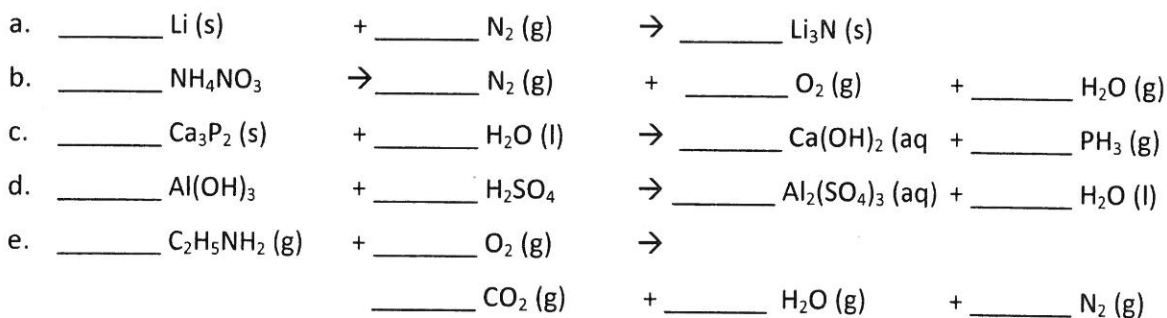
3.1 Balancing Chemical Equations (Zumdahl 3.7)

1. What is the difference between adding a subscript 2 to the end of the formula for CO to give CO₂ and adding a coefficient in front of the formula to give 2 CO?

2. Is the following equation, as written, consistent with the law of conservation of mass? Why or why not?



3. Balance the following equations:



4. Write the balanced chemical equations to correspond to each of the following descriptions:

- a. When sulfur trioxide gas reacts with liquid water, a solution of sulfuric acid forms.
- b. Solid boron sulfide reacts violently with liquid water to form dissolved boric acid and hydrogen sulfide gas.
- c. Phosphine, PH₃ (g), combusts in oxygen gas to form water vapor and solid tetraphosphorus decaoxide.
- d. When solid mercury (II) nitrate is heated, it decomposes to form solid mercury (II) oxide, gaseous nitrogen dioxide, and oxygen.
- e. Copper metal reacts with hot concentrated sulfuric acid solution to form aqueous copper (II) sulfate, sulfur dioxide gas, and water.

3.2 Patterns of Chemical Reactivity (Zumdahl 3.6)

1. Determine the chemical formula of the product formed when the metallic element aluminum combines with the nonmetallic element bromine. Write the balanced chemical equation for the reaction.
2. Write a balanced chemical equation for the combustion of liquid acetone ($\text{C}_3\text{H}_6\text{O}$) in air.
3. Indicate the type of reaction for each of the following:
 - a. $\text{PbCO}_3 (\text{s}) \rightarrow \text{PbO} (\text{s}) + \text{CO}_2 (\text{g})$
 - b. $\text{C}_2\text{H}_4 (\text{g}) + \text{O}_2 (\text{g}) \rightarrow \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{g})$
 - c. $\text{Mg} (\text{s}) + \text{N}_2 (\text{g}) \rightarrow \text{Mg}_3\text{N}_2 (\text{s})$
 - d. $\text{C}_7\text{H}_8\text{O}_2 (\text{l}) + \text{O}_2 (\text{g}) \rightarrow \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{g})$
 - e. $\text{Al} (\text{s}) + \text{Cl}_2 (\text{g}) \rightarrow \text{AlCl}_3 (\text{s})$

3.3 Formula Weights (Zumdahl 3.1 & 3.4)

- Determine the formula weights of each of the following compounds:
 - Nitrous oxide, N_2O , known as laughing gas and used as an anesthetic in dentistry
 - Benzoic acid, $\text{HC}_7\text{H}_5\text{O}_2$, a substance used as a food preservative
 - Magnesium hydroxide, the active ingredient in milk of magnesia
 - Urea, $(\text{NH}_2)_2\text{CO}$, a compound used as a nitrogen fertilizer
 - Isopentyl acetate, $\text{CH}_3\text{CO}_2\text{C}_5\text{H}_{11}$, responsible for the odor in bananas
- Calculate the percentage by mass of the indicated element in the following compounds:
 - Carbon in acetylene, C_2H_2 , a gas used in welding
 - Hydrogen in ascorbic acid, $\text{HC}_6\text{H}_7\text{O}_6$, also known as vitamin C
 - Hydrogen in ammonium sulfate, a substance used as a nitrogen fertilizer
 - Platinum in $\text{PtCl}_2(\text{NH}_3)_2$, a chemotherapy agent called cisplatin
 - Oxygen in the female sex hormone estradiol, $\text{C}_{18}\text{H}_{24}\text{O}_2$
 - Carbon in capsaicin, $\text{C}_{18}\text{H}_{27}\text{NO}_3$, the compound that gives the hot taste to chili peppers

3.4 Avogadro's Number and the Mole (Zumdahl 3.2)

- Without doing any detailed calculations (but using a periodic table to give atomic weights), rank the following samples in order of increasing number of atoms:
 - 9.0×10^{23} molecules H_2
 - 2.0 moles CH_4
 - 16 g O_2
- Calculate the following quantities
 - Mass, in grams, of 1.50×10^{-2} mol CdS
 - Number of moles of NH_4Cl in 86.6 grams of this compound
 - Number of molecules in 8.447×10^{-6} mol C_6H_6
 - Number of O atoms in 6.25×10^{-3} mol $\text{Al}(\text{NO}_3)_3$
- The molecular formula for aspartame, the artificial sweetener marketed as NutraSweet, is $\text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$.
 - What is the molar mass of aspartame?
 - How many moles of aspartame are present in 1.00 mg?
 - How many molecules of aspartame are present in 1.00 mg?
 - How many hydrogen atoms are present in 1.00 mg of aspartame?

4. A sample of the male sex hormone testosterone, $C_{19}H_{28}O_2$, contains 3.88×10^{21} hydrogen atoms.
- How many atoms of carbon does it contain?
 - How many moles of testosterone does it contain?
 - What is the mass of this sample in grams?

3.5 Empirical Formulas and Molecular Formulas (Zumdahl 3.5)

1. Determine the empirical formula of each of the following compounds if the sample contains

a. 0.104 mol K, 0.052 mol C, and 0.156 mol O

b. 5.28 g Sn and 3.37 g F

c. 87.5% N and 12.5% H by mass

d. 62.1% C, 5.21% H, 12.1% N by mass; the remainder is O

2. What is the molecular formula for each of the following compounds:

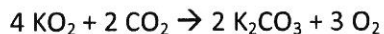
a. Empirical formula HCO_2 , molar mass = 90.0 g/mol

b. Empirical formula $\text{C}_2\text{H}_4\text{O}$, molar mass = 88 g/mol

3. Determine the empirical and molecular formulas of each of the following substances:
- Ibuprofen, a headache remedy, contains 75.69% C, 8.80% H, and 15.51% O by mass, and has a molar mass of 206 g/mol.
 - Cadaverine, a foul-smelling substance produced by the action of bacteria on meat, contains 58.55% C, 13.81% H, and 27.40% N by mass; its molar mass is 102.2 g/mol.
 - Epinephrine (adrenaline), a hormone secreted into the bloodstream in times of danger or stress, contains 59.0% C, 7.1% H, 26.2% O, and 7.7% N by mass; its MW is about 180 amu.
4. The characteristic odor of pineapple is due to ethyl butyrate, a compound containing carbon, hydrogen, and oxygen. Combustion of 2.78 mg of ethyl butyrate produces 6.32 mg of CO_2 and 2.58 mg H_2O . What is the empirical formula of the compound?
5. Nicotine, a component of tobacco, is composed of C, H, and N. A 5.250-mg sample of nicotine was combusted, producing 14.242 mg CO_2 and 4.083 mg of H_2O . What is the empirical formula for nicotine? If nicotine has a molar mass of 160 ± 5 g/mol, what is the molecular formula?

3.6 Calculations Based on Chemical Equations (Zumdahl 3.8)

1. The reaction between potassium superoxide, KO_2 , and CO_2 ,



is used as a source of O_2 and absorber of CO_2 in self-contained breathing equipment used by rescue workers.

- a. How many moles of O_2 are produced when 0.400 mol of KO_2 reacts in this fashion?

- b. How many grams of KO_2 are needed to form 7.50 g of O_2 ?

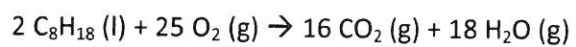
- c. How many grams of CO_2 are used when 7.50 g of O_2 are produced?

2. Calcium hydride reacts with water to form calcium hydroxide and hydrogen gas.

- a. Write a balanced equation for this reaction.

- b. How many grams of calcium hydride are needed to form 4.500 g of hydrogen?

3. The complete combustion of octane, C_8H_{18} , the main component of gasoline, proceeds as follows:

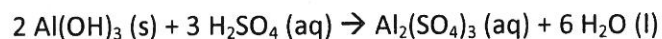


- a. How many moles of O_2 are needed to burn 1.50 moles of octane?
- b. How many grams of O_2 are needed to burn 10.0 g of octane?
- c. Octane has a density of 0.692 g/ml at $20^\circ C$. How many grams of O_2 are required to burn 15.0 gal of octane (the capacity of an average fuel tank)?
- d. How many grams of CO_2 are produced when 15.0 gal of octane are combusted?

3.7 Limiting Reactants (Zumdahl 3.9)

1. Define the terms
 - a. theoretical yield
 - b. actual yield
 - c. percent yield
2. Why is actual yield in a reaction almost always less than the theoretical yield?
3. Can a reaction ever have 110% actual yield? Why or why not?

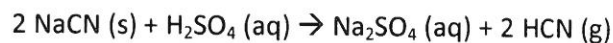
4. Aluminum hydroxide reacts with sulfuric acid as follows:



- a. Which is the limiting reactant when 0.500 mol Al(OH)_3 and 0.500 mol H_2SO_4 are allowed to react?
- b. How many moles of $\text{Al}_2(\text{SO}_4)_3$ can form under these conditions?
- c. How many moles of the excess reactant remain after the completion of the reaction?

2. Hydrogen cyanide, HCN, is a poisonous gas. The lethal dose is approximately 300 mg HCN per kilogram of air when inhaled.
- a. Calculate the amount of HCN that gives the lethal dose in a small laboratory room measuring 12 x 15 x 8.0 ft. The density of air at 26°C is 0.00118 g/cm³.

- b. If the HCN is formed by reaction of NaCN with an acid such as H₂SO₄, what mass of NaCN gives the lethal dose in the room?



- c. HCN forms when synthetic fibers containing Orlon or Acrilan burn. Acrilan has an empirical formula of CH₂CHCN, so HCN is 50.9% of the formula by mass. A rug measures 4 x 5 yd and contains 30 oz of Acrilan fibers per square yard of carpet. If the rug burns, will a lethal dose of HCN be generated in the room? Assume that the yield of HCN from the fibers is 20% and that the carpet is 50% consumed.

