Welcome to AP Chemistry!

Google classroom code: : wmpichv

In order to ensure the best start for everyone come fall, I have prepared a **summer assignment** that reviews **basic chemistry concepts**. Why summer assignment? Just a much needed head start in preparing for the course, more about like getting familiarized with the material. Since many students plan on taking this course without prior knowledge of full year chemistry it can be a challenge to assimilate all the facts that are needed at the beginning of the school year. It will be effective for students to know a few topics thoroughly so that the transition can be smooth. Assignment completion must be spaced and not just be done in a day or two. Put emphasis on knowing/understanding about these topics rather just answers the questions without having grasp of the material.

There is multitude of tremendous online chemistry resources that are available for completing the assignment. The classroom reference text book as part of AP course will be "Chemistry-The central science" by LeMay, Brown, Burstein. The book can be collected before the end of the school year.

For those students who have already taken a high school chemistry course, much of the material in the summer packet should be familiar to you. For those students who will be taking AP Chemistry as your first high school chemistry course, the problems will help you build a foundation in chemistry and insure all students are on a relatively even plane. It will be important for everyone to come to class **the first day** prepared. While I review, extensive remediation is not an option as we work towards our goal of being 100% prepared for the AP Exam currently scheduled for **May 7th Friday,2021**. There will be a **test** that will cover the summer assignment concepts sometime in the first ten days after school reopens. You can expect a quiz in naming compounds, identifying ions any day starting school year. If students tend to complete the assignment without actually having a grasp of the material, It can be a huge problem.

I think for most students this could be their first AP level class at our high school. Every AP class comes with its own challenges; it is up to the students to figure out the amount of time and effort that is needed to perform at the highest potential possible. Each one of you needs to plan, organize and take responsibility for the course work. There are always a selective number of students who can manage time well and prioritize things, I was not one of them in my school days so I can relate and understand the stress it can bring if we don't plan ahead of time. It can result in lower grade and make the class less motivated. So plan ahead and participate in class discussions, bring your questions up front and prepare at home, practice as many questions as possible. This generation of students has the luxury of using extensive technology and resources to be better in the learning process.

The course grades mainly depend on your summative assessment scores. There will other opportunities but focus on the tests big time. There are **no RETAKE tests**. **Do not expect any grade curves or 'fluff' assignments** in this class. **Be aggressive in pursuit of knowledge and it should lead to better grades**. **Prioritize your learning process, do not procrastinate** until the last minute, get help in class, participate in class discussions and seek support before grades sink

below once expectations. I believe this class offers a lot to build your study skill set that can help you in future.

You may contact me by **email: (rbulusu@mtsd.us)** this summer. I will do my best to answer your questions **ASAP**. **Use the google classroom code: wmpichv** to access materials and information.

You are all certainly **fine** students, and with **plenty** of motivation and hard work you should find AP Chemistry a successful and rewarding experience. Finally, I recommend that you spread out the summer assignment. AP Chemistry is considered to be **equivalent to Introductory Chemistry** in college. Taking a college level course **in high school can be difficult for most**, it **requires dedication** likewise it is a **great investment** in your education so prepare yourself and arrive ready to learn.

All completed work must be submitted by the due date AUGUST 5th,2020. For convenience purpose submit all your work electronically on google classroom. Late work will not fetch full points. Let me know if you come across any trouble in submitting the assignment on time. Please plan ahead based on vacations and other reasons that can be predicted.

A list of books prescribed by the College Board has been provided for your reference. You do not need all the books to complete the assignment. Any basic chemistry text-book can help you find the information needed to complete the summer assignment. These websites can be added resource for you. Let me know if this links do not work..

If you want specific information about AP chemistry from College Board use this link:

http://www.collegeboard.com/ap/students/chemistry/index.html

Utilize Internet Resources to complete the following problems. The URLs below represent a fraction of the available chemistry addresses available. Please feel free to expand the list and find other web sites that help prepare you for the coming year. We recommend that you complete as many online quizzes as possible, take detailed notes, and practice the items indicated in the packet.

http://highschoolhub.org/hub/chemistry.cfm ; www.chemmybear.com http://www.chemtopics.com/lectures.html https://www.chemteam.info/ChemTeamIndex.html http://www.bozemanscience.com/chemistry https://www.youtube.com/playlist?list=PL8dPuuaLjXtPHzzYuWy6fYEaX9mQQ8oG <u>r</u> http://www.chem.purdue.edu/gchelp/howtosolveit/howtosolveit.html I will have additional video links that can give a brief explanation of the topics on google classroom.

Show work for all the problems. (Hand written or typed solutions will be accepted) Questions cover topics from general chemistry to basic Mole concepts. Most importantly know the concepts. It is not all about solving the problem and just completing the assignment. Have a great summer and enjoy learning chemistry. AB

USE SIGNIFICANT DIGITS in problems. DUE DATE AUG 5th 2020. Make sure to answer all the questions on different set of papers. Show clear work with units. Please write clearly. Use clean paper and space the answers. Upload either the images or the file.

- 1. What does it mean by "significant numbers"? Why is important to consider significant numbers / digits in calculations in sciences? Provide examples
- 2. Write the **most common guidelines** to determine significant figures (digits) provide an example? How does it differ in math operations like multiplication/division/ addition/subtractions?
- 3. What does uncertainty in numbers imply in scientific data collection? What determines these uncertainties? Can you explain using any lab from previous years.
- Use factor labeling / dimension analysis method to convert the following: Use significant digits to express the final answer. Check online for unit conversation.
 - a. 430 meters = ____ mm.
 - b. 5678020 cm = ____miles
 - c. 3450 kilometers into meters
 - d. 45671 milligrams into pounds
- 5. Select the smaller member of each pair.
 - a. 4.56 g/L or 4.56 g/cm 3
 - b. 4250 mm or 4.25 x 10⁻³ Km
 - c. 24 cm³ or 0.024m³
- 6. Classify each of the following as units of mass, volume, length, density, energy, or pressure.

a.	Kg.m ² /s ²	b. Liter	c. mm	of mercury	d. mm	e. kg/m³
f.	pascal	g. atm	h. cal.	I. Joule	j. Nano me	ter

7. Certain substance X has a melting point of 234^oC. Convert this into

b. K

a. ⁰F

- 8. A day on Mars is 8.864 x 10⁴ seconds long and a year is 5.935 x 10⁷ seconds long. Use factor labelling to solve problems)
 - a. How many earth days are there in one Mars day?
 - b. How many earth days are there in one Mars year?
- **9.** A cylinder rod formed from an element X is 180.0 cm long and has a mass of 2.0 kg. The density of element X is 6.540 g/cm³. What is the diameter of the cylinder? **Use factor label method wherever possible**
 - 10. Record the following in correct scientific notation:
 - a. 302 cm b. 0.03456 Å c. 1256748920 atoms d. 43560021 km e. 0.0000000120300 m
 - 11. Calculate the following to the **correct number** of significant figures.
 - a. $76589 \text{ g} / 3.456 \text{ cm}^3$
 - b. 3456 g + 1.457 g
 - c. 100.0 x 8.932 x 4.56
 - d. 1001-25.35-0.4 1.23 =
 - e. 3.72 x 10⁻⁸ + 0.211 x 10⁻⁷ = _____
 - f. 4. $3.72 \times 10^{-8} 0.211 \times 10^{-7} =$
 - 12. Use factor labelling method: During earlier times in England, the land was measured in units such as fardels, nooks, yards, and kides.

4 fardells= 1 nooke , 8 nookes= 1 yard, 10 yards = 1 kide Now find

- a. 6.00 kides= _____ fardels
- b. 15 nookes = ____ kides
- c. 20 nookes = _____ fardels

13. A 25 cm candle is being burned at both ends. One end burns at the rate of one cm per hour; the other end burns at one-half cm per hour. How far from the center of the candle will the burning ends meet?

- 14. A wooden cube six cm on edge is placed inside a cube box that is four cm on edge. How much free space is in the box?
- 15. One type of antiperspirant uses aluminum chlorohydrate as its active ingredient. This compound is made up of 30.93 % Al, 45.86 % O, 2.89% H, and 20.32 % Cl. How many grams of each element are there in one Ounce of this compound?
- 16. Because of the rapid rise in the price of copper, the Bureau of the Mint in 1982 changed the composition of the penny. The new penny is now an alloy of 97.6 % Zn and 2.4 % Cu. Pre 1982 pennis has a mass of 2.507grams. How many grams of each metal are there in the new Penny?

- 17. A solid with an irregular shape weighing 20.78 g is added to the flask with a volume of 20.35 cm³. It is found that 10.45 g benzene (d= 0.879 g/cm³) must be added to the metal to fill the flask. What is the density of the metal?
- 18. Air is 21% Oxygen by volum. Oxygen has a density of 1.31 g/L. What is the volume in liters of a room that holds enough air to contain 75 kg of Oxygen?
- 19. A pycnometer is a device used to determine density. It weighs 20.455g empty and 31.486 g when filled with water(d= 1.000 g/cm³). Pieces of an alloy are put into the empty, dry pycnometer. The mass of the alloy and Pycnometer is 28.695 g. Water is added to the alloy to exactly fill the pycnometer. The mass of the pycnometer, water, and alloy is 38.689 g. What is the density of the alloy?
- 20. Define and give examples of : Who proposed these laws:
 - a. Law of conservation of mass. b. Law of multiple proportion.
- 21. Give the **chemical symbols** for the following elements:

h. chloride

g.Potassium

a. Carbon	b. Xenon	c. Krypton	d. Fluorine	e. lead	f. Arsenic
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j. Mercury

k. lead I. Beryllium

22. Write **the latin** names for each of the elements symbols:

i. Iron

- a. Na b. Au c. Ag d. Sn e. Fe f. Hg g. K h. Pb
- 23. Mercury (II) oxide, a red powder, can be decomposed by heating to produce liquid Mercury and Oxygen gas. When a sample of this compound is decomposed, 3.87 g of oxygen and 48.43 g of mercury are produced. In the second experiment, 15.68 grams of mercury is allowed to react with excess of Oxygen: 16.93 grams of red Mercury(II) Oxide is produced. Show that these results are consistent with the Law of constant composition.
- 24. Ethane and Ethene are two gases containing only hydrogen and carbons atoms. In a certain sample of Ethane, 4.53 grams of hydrogen is combined with 18.0 grams of carbon. In a sample of ethane, 7.25 grams of hydrogen is combined with 43.20 grams of carbon.
 - a. Show how this data illustrates the law of multiple proportions.
- 25. What is the stock system? What are its advantages over the older system of naming cations?
- 26. Define a physics change and chemical change. Label each of the following as either a **physical process** or a **chemical process**.
 - a. Cutting a piece of aluminum metal.
 - b. Melting of wax.
 - c. Pulverizing ice.
 - d. Frying onion or(potato).
 - e. Explosion of nitroglycerin.
 - f. Electrolysis of water.

- 27. What is the main difference between element, compound, and mixture? Draw a particle diagram to show the difference.
- 28. Name some of the common separation methods for pure **substances and mixtures**? Use examples to show how they work.
- 29. State the postulates of Dalton's atomic theory. What were the drawbacks and explain why.
- 30. Usually the elements whose name ends with –ium are metals. potassium is one such example. Now Identify a nonmetal whose name ends with –ium.
- 31. The chemical formula of HCl can represent two different chemical systems. Explain

32. Write the formula of the fol	Write the formula of the following compounds?					
a. Magnesium Acetate.	b. Ammonium Pho	c. Lead(II) Nitrite				
d. potassium perchlorate.	e. Barium Oxide	f. Zinc	(II)sulfate.			
g. Sodium Per bromate	I. Strontium Iodide	J. G	allium(III) Carbonate.			

28.Define the words: **atomic number, atomic mass, mass number, molecular formula, structural formula, empirical formula, isotopes, cation, anion, metalloid, and allotrope**, isoelectronic.

29.Determine number of protons and neutrons in each of the following.

a. K_{19}^{39} b. ${}^{23}_{11}$ Na. c. ${}^{208}_{82}$ Pb²⁺ d. ${}^{33}_{15}$ P³⁻

30. Classify the following into diatomic molecule, molecular compound, ionic compound, Atomic element.

a. F_2 b. Cl_2 c. C d. NaCl e. KF f. CO_2 g. H_2 h. Ag i. Rust (Fe_2O_3) j. MgO k. O_2 l. I_2 m.CO n. K_2CO_3

31. State the contribution of the following people.. briefly include their hypothesis or experiment/ or results .. anything that is valid today from their study .

- a. Democritus b. Mendeleev c. Henry Becquerel d. Roentgen
- e. J.J Thompson plum pudding modelf. Rutherford gold foil experimentg. Chadwickh. Millikan oil drop methodi. Proustj. Cavendish
- k. Madam Curie

32. What is the difference between a. Sulfide and Nitride ion b. Phosphorus atom and Phosphide ion. C. Calcium atom and calcium ion.

33. Why do we call the formula $Mg(NO_3)_2$ as magnesium nitrate, but we call $Ni(NO_3)_2$ has Nickel(II) nitrate?

34. How many atoms of Hydrogen and how many moles of Ethane are present in 80.0 grams of propane gas? (C_3H_8) (USE factor labeling method)

35. Fermentation is a complex chemical process of wine making in which glucose is converted into ethanol and carbon dioxide: C6H12O6 \rightarrow 2 C2H5OH + 2 CO2

glucose ethanol

Starting with 500.4 g of glucose, what is the maximum amount of ethanol in grams and in liters that can be obtained by the process? (Density of ethanol is 0.789 g/mL)

36. Calculate the mass in grams of each of the following:

a. 4.05×10^{10} atoms of lodine gas b. 2.35×10^{23} formula units of Mgl₂.

37. In an experiment, a student gently heated a hydrated copper compound to remove the water of hydration. The following data was recorded:

- 1. Mass of crucible, cover, and contents before heating 23.4 g.
- 2. mass of empty crucible and cover
- 3. mass of crucible, cover, and contents after heating to constant mass 20.94 g.

18.82 g.

Calculate the experimental percent of water in the compound.

38. An **extensive property** is one that depends on the amount of the sample. Which of the following properties are extensive?

a. volume b. density c. temperature d. energy e. melting point. F. pressure

39.A hydrated compound has an analysis of 18.29% Ca, 32.37% Cl, and 49.34% water. What is its Empirical formula?

40. Name the types of general inorganic reactions with example of each?

41. Define an Arrhenius Acid, Arrhenius base and salt? Give some examples of each.

42. What mass of Iron is required to replace silver from 25.00g of silver nitrate dissolved in water?

 $Fe(s) + AgNO_3 \rightarrow Fe(NO_3)_2 + Ag.$

43. $4NH_3 + 5O_2 \rightarrow 4NO + 6 H_2O$

What mass of water will be produced when 50.0g of ammonia is reacted with excess oxygen?

If the reaction in the previous problem is done with 20.0g of each reactant, which would be the limiting factor?

44.Strontium consists of four isotopes with masses and their percent abundance of 83.9134 amu (0.5%), 85.9094 amu (9.9%) , 86.9089 amu (7.0%) , and 87.9056 amu (82.6%). Calculate the atomic mass of Sr ?

45.Nitrogen has two isotopes, N-14 and N-15, with atomic masses of 14.00031 amu and 15.001 amu, respectively. What is the percent abundance of N-15?

46.The molecular formula of morphine, a pain-killing narcotic, is C₁₇H₁₉NO₃.

a.What is the molar mass?

b.What fraction of atoms in morphine is accounted for by carbon? c.Which element contributes least to the molar mass?

47. The hormone, thyroxine is secreted by the thyroid gland, and has the formula: $C_{15}H_{17}NO_4I_4$. How many milligrams of lodine can be extracted from 6.00 Grams of thyroxine?

48. Arsenic reacts with chlorine to form a chloride. If 1.587 g of arsenic reacts with 3.755 g of chlorine, what is the simplest formula of the chloride?

49. Washing soda is a hydrate of sodium carbonate. Its formula is Na_2CO_3 . x H_2O . A 2.714 g Sample of washing soda is heated until a constant mass of 1.006 g of Na_2CO_3 is reached. What is x ?

50. Explain clearly the terms heat and temperature. Are they related in any way..

51.Determine the empirical and molecular formula of each of the following substances: a.Ibufuren, a headache remedy contains 75.6 % C, 8.80 % H , and 15.5 % O by mass and has a molar mass about 206 g/mol.

52. What are the types of inorganic reactions. Write a **balanced equation** for the following: a.Reaction of boron trifluoride gas with water to give liquid hydrogen fluoride and solid boric acid,(H₃BO₃).

b.Reaction of magnesium Oxide with Iron to form Iron (III) Oxide and Magnesium.

c.The decomposition of dinitrogen Oxide gas to its elements.

d.The reaction of Calcium Carbide solid with water to form calcium hydroxide and acetylene (C_2H_2) gas.

e. The reaction of solid calcium cyan amide (CaCN $_2)$ with water to from calcium carbonate and ammonia gas.

f.Ethane burns in air (Oxygen).

g.Hydrogen reacts with oxygen to from Water.

h.Nitrogen gas reacts with Hydrogen to form Ammonia. i.Hydrogen reacts with Iodine gas to form Hydrogen Iodide.

j. Sodium reacts with lodine gas to form Sodium lodide.

k.Carbon dioxide combines with water to form carbonic acid.

I.Magnesium and nitrogen gas combine to form magnesium nitride.

m.Conc. Hydrochloric acid reacts with Conc. Sodium hydroxide to form sodium chloride and water.

53. Balance the following equations with classification into the type of the reactions.

a.
$$C_6H_6 + O_2 \rightarrow H_2O + CO_2$$

b. ___KI + ___Pb(SO₄)₂ \rightarrow ___PbI₄ + ___K₂SO₄

c.__ $NH_3 + __ O_2 \rightarrow __ NO + __ H_2O$

d.__ Cu(OH)₃ \rightarrow __ Cu₂O₃ + __ H₂O

e.
$$HNO_3 + Mg(OH)_2 \rightarrow H_2O + Mg(NO_3)_2$$

f. __ H₃PO₄ + __ NaBr
$$\rightarrow$$
 __ HBr + __ Na₃PO₄

g. __ C + __ $H_2 \rightarrow$ __ C_3H_8

54. DEFINE limiting reagent, theoretical yield ,and actual yield?

55.Sodium hydroxide reacts with carbondioxide as follows:

$$2 \text{ NaOH(s)} + CO_2 (g) \rightarrow Na_2CO_3 (s) + H_2O(l)$$

Which reagent is the limiting reactant when 1.85 mol of sodium hydroxide and 1.00 mol carbon dioxide are allowed to react? How many moles of sodium carbonate can be produced? How many moles of the excess reactant remain after the completion of the reaction?

56. WHEN benzene (C₆H₆) reacts with bromine (Br₂) bromobenzene(C₆H₅Br) is obtained: C₆H₆ + Br₂ \rightarrow C₆H₅Br + HBr

a.What is the theoretical yield of bromobenzene in this reaction when 30.0g of benzene reacts with 65.0 g of bromine?

b. If the actual yield of bromobenzene was 56.7 g what was the percentage yield?

57.Define exothermic and endothermic reactions. What happens to the temperature of the surrounding during endo and exothermic reactions. Explain clearly how the chemical potential energy(Bond energy) could be used to explain the difference between exothermic and endothermic reactions.

58.Define solubility. Prepare a list of solubility rules for ionic compounds in water. (online resources) (IMPORTANT) Trust me u got to know them well..

59. Using solubility rules : Characterize the following compounds as soluble or insoluble in water:

a. Ca₃(PO₄)₂ b. Mn(OH)₂ c. AgClO₃ d. Na₂S e. CaCO₃ f. ZnSO₄ g. Hg(NO₃)₂

60. Write the balanced net ionic equations for the following reactions: a. AgNO₃ (aq) + Na₂SO₄ (aq) \rightarrow

b. BaCl₂ (aq) + ZnSO₄ (aq) \rightarrow

c. (NH₄)₂ CO₃ (aq) + CaCl₂ (aq) \rightarrow

61.Define **Oxidation and reduction**. Provide at least **four** examples of oxidation and reduction with chemical reactions using oxidation numbers. (Example: Rusting of Iron; $4Fe + 3O_2 \rightarrow 2Fe_2O_3$)

63. Define strong electrolyte, weak electrolyte? Provide examples.

64. What is an Activity series of metal? How does it help us in studying properties of elements?

65. Define the terms: Exothermic, endothermic reactions? Provide an example of each

66.What is a solute and solvent? Define Molarity, Molality, mole-fraction and Mass percent of a solution?

67.Calculate the molarity of a solution that contains 0.2 mol NH₄Br in exactly 200 ml of solution?

68. Calculate the molarity of a solution that contains 20.0 grams of sodium hydroxide in 200 ml?

69. How many grams of solute are present in 50.0 ml of 0.360 M sodium chloride?

70.A 2.25 g sample of scandium metal is reacted with excess hydrochloric acid to produce 0.1502 g hydrogen gas. What is the formula of the scandium chloride produced in the reaction?

71. Heating 2.40 grams of the oxide of metal X(Molar mass of X = 55.9 g/mol) in carbon monoxide(CO) yields the pure metal and carbon dioxide. The mass of the metal product is 1.68 grams. Show that the simplest formula of the oxide is X₂O₃ and write the balanced equation for the reaction.

72. A 21.496 grams sample of magnesium is burned in air to form magnesium oxide and magnesium nitride. When the products are treated with water, 2.813 grams of gaseous ammonia are generated. Calculate the amounts of magnesium nitride and magnesium oxide formed?

COMPLETE THE FOLLOWING CHART: (Section is followed by naming ions)

AP CHEMISTRY (Com	imon mono, di & po	lyatomic ions.)					
Group:	Family Name:	Common Charge for Family					
IA							
II A							
III A							
IVA							
VA							
VI A							
VII A							
VIII A							
Common	Common ions of transition elements						
Ion Name		lon					
a) Chromium(III)							
b) Manganese(II)							
c) Iron(II) or Ferrous							
d) Iron(III) or Ferric							
e) Cobalt(II)							
f) Nickel(II) or nickel							
g) Copper(II) or Cupric							
h) Zinc							
i) Silver							
j) Cadmium							
k) Mercury(II) or mercur	ric						

Write the representations for the **Common Polyatomic Ions** Name Formula Name Formula a) Acetate b) Ammonium c) Carbonate d) Chlorate e) Chlorite f) Chromate g) Cyanide h) Dichromate i) Dihydrogen Phosphate j) Dihydrogen Phosphate k) Hydrogen Carbonate I) Hydrogen Sulfate m) Hydrogen Sulfite n) Hypochlorite p) Nitrate o) Hydroxide q) Nitrite r) Oxalate s) Perchlorate t) Permanganate u) Perioxide v) Phosphate w) Sulfate x) Sulfite y) Thiosulfate Formula Common Acids Formula Common Acids Hydrochloric Acid Phosphoric acid Acetic Acid Perchloric acid Carbonic acid Sulfurous Acid

Some of the common prescribed textbooks for AP CHEM.

Nitrous acid

Chlorous Acid

Nitric Acid

We follow the highlighted book below at MHS for the AP Course.

We use an Older Version, if you want to buy a personal copy for this summer see if you can find any version that is cheaper. I think the most recent version is the 14th.

Sulfuric Acid

Chloric Acid

Hypochlorous Acid

Brown, Theodore E., H. Eugene LeMay, and Bruce E. Bursten. *Chemistry: The Central Science*. Upper Saddle River, NJ: Prentice Hall.

Bell, Jerry. Chemistry. Bedford, NJ: W. H. Freeman.

Brady, James E., and Fred Senese. *Chemistry: Matter and Its Changes*. New York: John Wiley & Sons.

Chang, Raymond, and Brandon Cruickshank. Chemistry. New York: McGraw-Hill.

Hill John W., Ralph H. Petrucci, Terry W. McCreary, and Scott S. Perry. *General Chemistry: An Integrated Approach*. Upper Saddle River, NJ: Pearson/Prentice Hall.

Kotz, John C., Paul M. Treichel, Gabriela C. Weaver. *Chemistry & Chemical Reactivity*. Pacific Grove, CA: Brooks/Cole Thomson Learning.

Masterton, William L., and Cecile N. Hurley. *Chemistry: Principles and Reactions*. Pacific Grove, CA: Brooks/Cole Thomson Learning.

Moore, John W., Conrad L. Stanitski, and Peter C. Jurs. *Chemistry: The Molecular Science*. Pacific Grove, CA: Brooks/Cole Thomson Learning.

Olmsted, John A., and Gregory M. Williams. Chemistry. New York: John Wiley & Sons.

Silberberg, Martin. The Molecular Nature of Matter and Change. New York: McGraw-Hill.

Spencer, James N., George M. Bodner, and Lyman H. Rickard. *Chemistry: Structure and Dynamics*. New York: John Wiley & Sons.

Zumdahl, Steven, and Susan Zumdahl. Chemistry. Boston: Houghton Mifflin

Additional information Visit <u>www.collegeboard.com</u> .

All the best and see you in September 2020.

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