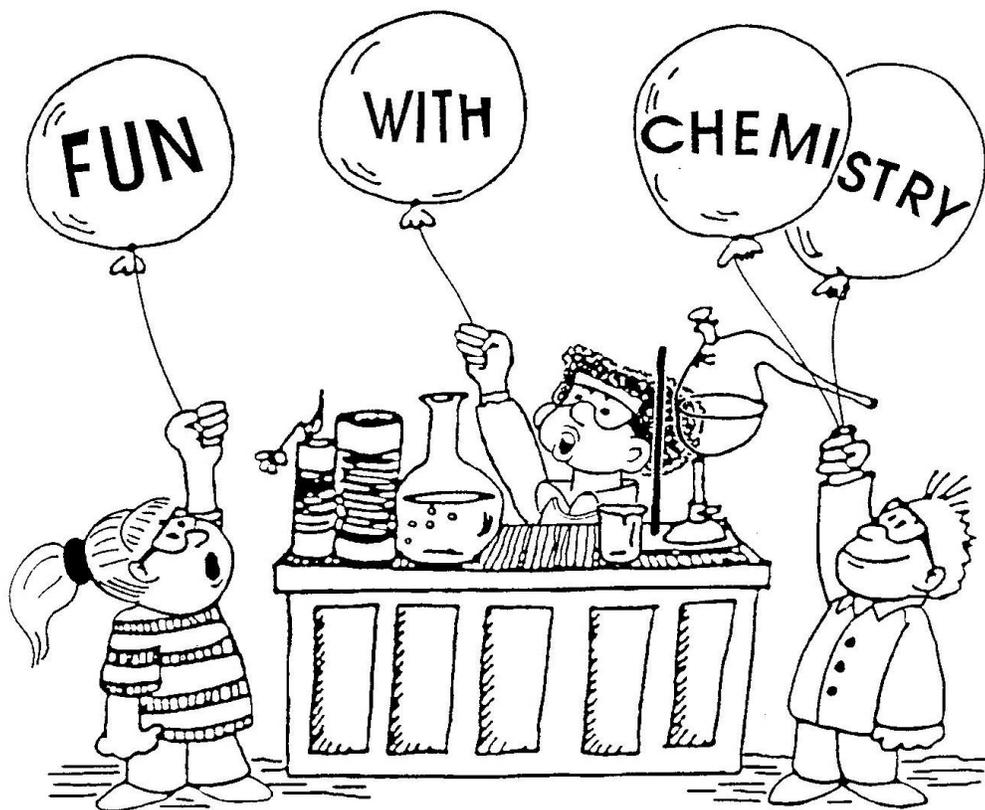


Summer School **CHEMISTRY** **MANUAL**



2015 Summer School Chemistry

1st Semester 8:00 AM June 1st → 9:30 AM June 22nd

(1st semester final will be given 8 AM – 9:30 AM June 22nd)

2nd Semester 9:30 AM June 22nd → 12:15 PM July 10th

(2nd Semester final and presentation of projects will occur on July 10th)

NO SCHOOL ON FRIDAY, JULY 3rd

COURSE DESCRIPTION

Chemistry is an experimental science concerned primarily with the search for and acquisition of knowledge about the fundamental nature and characteristics of the materials of which the universe is composed. The course based on lecture, experimentation and observation and stresses the understanding of the basic theoretical concepts as well as the descriptive aspects of chemistry. Application of basic chemical principals will be given to everyday life situations. This course is quantitative in nature and requires intermediate math skills.

COURSE OBJECTIVES

Upon completion of this course of chemistry students will be able to:

- demonstrate proper use of lab equipment and techniques
- make and record accurate observations
- organize information, evaluate, interpret and communicate experimental results
- write balanced equations in terms of atoms, molecules, and moles
- exhibit skill in the use of the periodic table in the following ways:
 - classifying elements according to their properties
 - predicting and writing chemical reactions
 - writing electron configurations and showing intermolecular forces
 - determining the subatomic make-up and mass of elements
- demonstrate through problem solving and correct use of nomenclature an understanding of the following:
 - scientific notations and significant figures
 - conservation of mass and energy (stoichiometry)
 - thermodynamics and kinetics
 - gas reactions
 - acid-base reactions
 - chemical equilibrium
 - solution concentrations
 - oxidation-reduction reactions
- show proficiency in drawing and identifying organic compounds as well as applying their use to everyday life (consumer chemistry)
- develop and in-depth knowledge of the origin and use of radioactivity in our growing world of energy needs (citizen responsibility)

TEXTBOOK: We will be using the textbook, Chemistry for Christian Schools, 2nd edition, published by BJU Press. Textbook and lab fees are included in the tuition cost for the summer course. The textbook will be passed out the first day of class.

COURSE OUTLINE

1st Semester

- I. The History of Chemistry - Scientific Method
- II. Mathematics in Chemistry - Significant Figures
- III. Classification of Matter
- IV. Atomic Structure
- V. The Periodic Table
- VI. Chemical Bonding - Intermolecular Forces
- VII. Chemical Composition - Forming and Naming Compounds
- VIII. Chemical Reactions - Predicting Products and Balancing Equations
- IX. The Gas Laws
- X. Descriptive Chemistry - Physical and Chemical Properties – Part I

2nd Semester

- X. Descriptive Chemistry – Physical and Chemical properties – Part II
- XI. Solutions and Colloids - Concentrations and Properties
- XII. Thermodynamics - Enthalpy and Entropy Calculations
- XIII. Kinetics - Reaction Rates
- XIV. Chemical Equilibrium
- XV. Acids, Bases and their Salts
- XVI. Oxidation and Reduction Reactions - Electrochemistry
- XVII. Organic Chemistry
- XVIII. Biochemistry
- XIX. Nuclear Chemistry

ATTENDANCE

Because summer school treats the study of chemistry in a condensed form, more than a week's worth of material will be covered every day. It is important that students plan to attend every day of the session.

Over 2 absences (excused or unexcused) in a summer school course results in no credit for the course.

For students who plan to be gone for a day from summer school, please know that ALL homework assignments and tests that are due during the time you are absent MUST be turned in BEFORE you leave.

COME TO CLASS PREPARED

Bring to class **EVERYDAY**: Calculator, notebook, paper, pen or pencil, iPad, textbook, and your homework.

Your classmates are not responsible for furnishing you with calculators, books, paper, or pencils. **BRING YOUR OWN MATERIALS!**

HOMEWORK

All homework assignments will be turned in on paper.

In order to receive full credit, you must follow the instructions on each worksheet

Some questions are asked to be answered in COMPLETE SENTENCES.

Example: Magnetism is a physical property of matter.

All Math questions must show WORK, with each number having a UNIT.

Example: $\frac{3 \text{ molecules CO}_2}{1} (44.0 \text{ grams}) = 132 \text{ grams CO}_2$
(molecule CO₂)

You may use pen (never use RED ink) or pencil on your homework. You may write on both sides of your notebook paper, if you wish.

All homework is due at the BEGINNING of the period on the day following its assigning, unless otherwise directed. If you will be gone from class for reasons other than illness, you must turn in your homework BEFORE GOING to your activity.

NO LATE WORK IS ACCEPTED FOR A DAILY GRADE, however, each piece of homework is required to be done. Any late work is to receive the instructor's initials on the paper, as well as on the chapter outline. Having your homework done, late or not, and in your notebook will count towards your notebook grade. Each piece of missing homework will be a 3% deduction from your notebook grade.

Homework is to be an individual effort. Any copy work turned in will be given an F, along with the paper off of which it was copied.

DO NOT LOAN YOUR HOMEWORK TO ANY OTHER STUDENT!

NOTEBOOKS

You are to have your notebook in class with you EVERYDAY. It is to be kept neat and orderly, so that you may be able to look up any topic that may be called on for review.

Notebooks are fashioned so that when the course is over, you will be able to take it with you to college and use it as an effective reference tool. Many past students have reported that their notebooks were very helpful to them in college.

Notebooks will be officially collected and graded at the END OF THE COURSE. The notebook grade will be given the value of one test score and will be graded on neatness and completeness.

CHECKLIST FOR YOUR NOTEBOOK

- ** Is your notebook a 3-ring binder type with 1 ½ to 2 inch rings?
- ** Is this class manual in the very front of the notebook?
- ** Are your daily outlines for the course in the front of the notebook? These outlines serve as a table of contents.
- ** Does every space in the grade column of your outlines have either a grade recorded, an official happy face placed there by the teacher, or the teacher's initials indicating a missed assignment was complete after the due date? **A deduction of 3% is given for each missing assignment in the notebook.**
- ** Do you have **3 dividers** with these sections:
NOTES, GRADED WORK, REVIEW SHEETS
Papers belong in one of these three sections. Do not stuff papers in the front of back flaps of your notebook.
- ** Is each divided section kept in chronological order?
- ** Is your notebook in good condition? Your notebook must not be ripped, have graffiti or have pages torn out from the rings. Use reinforcements!

UNIT EXAMS

The questions on the chapter exams will be given in a variety of formats. You will experience multiple choice, matching, true and false, fill in the blank, identification, calculations, and short answer (essay).

You will be required to answer your essays in complete sentences, using proper grammar. You will also be required to show all of your work, including the proper use of units, when doing your calculations. You will not receive full credit if you do not use sentences or show your work with units!

Calculators will be permitted on exams. Students are responsible for bringing their own calculator to class on exam day. Be familiar with how to use your calculator.

HOW TO PREPARE FOR TESTS

- *Be aware of the test dates. These dates are shown on the daily assignment sheets.
- *Be aware of the material the tests will cover. Review sheets have been provided for you.
Extra credit quizzes will help you practice the types of questions/problems that will be on the test.
- *Go over the graded homework and the correct responses for the questions.
- ***READ** the textbook and class notes (It helps to read text loud!)

WHEN TAKING THE TEST

Be sure and read the questions carefully and respond to what the question is asking.

FINALS

The first semester final, covering UNITS 1 – 10, will be given on Day 16 of the course. This final will contain 110 questions and will be taken on a scantron sheet. Pencils are required for use on the final exams. **The first semester final will be worth 20% of the semester grade. The other 80% of your semester grade comes from your 1st semester daily work (homework and labs) and chapter tests.**

The second semester final, covering UNITS 11 – 19, will be given on Day 29 of the course. This final will contain 110 questions and will be taken on a scantron sheet. Pencils are required for use on the final exams. **The second semester final will be worth 20% of the semester grade. The other 80% of your semester grade comes from your 2nd semester daily work (homework and labs) and chapter tests.**

Students are provided with a review sheet for each semester at the beginning of the course.

GRADING

Your course grade will be determined by your homework and test scores.

- 50% of your grade will be made up from your homework, labs and quizzes
- 50% of your grade will be from your test scores.

THE MONTE VISTA GRADING SCALE

A	=	92.5% or higher	C	=	72.5% - 76.49%
A-	=	89.5% - 92.49%	C-	=	69.5% - 72.49%
B+	=	86.5% - 89.49%	D+	=	66.5% - 69.49%
B	=	82.5% - 86.49%	D	=	62.5% - 66.49%
B-	=	79.5% - 82.49%	D-	=	59.5% - 62.49%
C+	=	76.5% - 79.49%	F	=	below 59.5%

Each student will be responsible to check their grade on FOCUS. If there is a discrepancy, please see the course instructor immediately!

LAB SAFETY

The lab safety regulations have been set forth by the state of California. These regulations are described on the Student Safety Contract. This contract must be signed and on file with the chemistry instructor BEFORE the student is allowed to perform lab work. The law requires the class instructor to remove from the lab any person that is not following the regulations. If a student is asked to 'sit out' from the lab because of disregard to the safety of themselves or others, it will affect their grade for the lab. The best this student can do would be a dry lab. This dry lab is due the same time all the other students are to have their lab reports turned in. No extra time is given.

MAKE-UP LABS

(DRY LABS)

The purpose of the dry lab is to give students an opportunity to master the concepts covered in each experiment, even though the hands-on component of the lab is missing. The questions asked in the dry lab are not intended to be identical to the questions posed on the actual hands-on lab. The dry lab questions will guide the students through the "thought process" of what was going on during the experiment. It may require research to adequately answer the dry lab questions.

Use your own piece of notebook paper to write up your Dry Lab. Be sure and include all four parts of the Dry Lab write up

Your name _____

Assignment # _____

TITLE OF THE LAB

- I. State, in sentence form, the PURPOSE or OBJECTIVE for doing the lab.
- II. In paragraph form, explain how you would go about setting up and doing the experiment.
- III. Make a drawing of how you would assemble your apparatus for doing the experiment.
- IV. Questions - For this section, ask your instructor for the questions to be answered.

KNOW THESE!

COMMON ELEMENTS USED IN HIGH SCHOOL CHEMISTRY

<u>NAME OF ELEMENT</u>	<u>SYMBOL</u>	<u>COMMON OXIDATION * NUMBER (VALENCE)</u>
Aluminum	Al	+3
Antimony	Sb	+3, +5
Arsenic	As	+3, +5
Barium	Ba	+2
Bismuth	Bi	+3
Bromine	Br	-1, +5
Calcium	Ca	+2
Carbon	C	+2, +4
Chlorine	Cl	-1, +5, +7
Chromium	Cr	+2, +3, +6
Cobalt	Co	+2, +3
Copper	Cu	+1, +2
Fluorine	F	-1
Gold	Au	+1, +3
Hydrogen	H	-1, +1
Iodine	I	-1, +5
Iron	Fe	+2, +3
Lead	Pb	+2, +4
Magnesium	Mg	+2
Manganese	Mn	+2, +3, +4, +6, +7
Mercury	Hg	+1, +2
Nickel	Ni	+2, +3
Nitrogen	N	-3, +3, +5
Oxygen	O	-2
Phosphorus	P	+3, +5
Platinum	Pt	+2, +4
Potassium	K	+1
Silicon	Si	+4
Silver	Ag	+1
Sodium	Na	+1
Strontium	Sr	+2
Sulfur	S	-2, +4, +6
Tin	Sn	+2, +4,
Titanium	Ti	+3, +4
Tungsten	W	+6
Zinc	Zn	+2

* The oxidation numbers listed are only the common numbers.
There could be other oxidation numbers for each element.

COMMON ELEMENTAL IONS USED IN HIGH SCHOOL CHEMISTRY

NAME OF ION SYMBOL AND CHARGE

Aluminum ion	Al^{3+}
Barium ion	Ba^{2+}
Calcium ion	Ca^{2+}
Bromide ion	Br^{1-}
Fluoride ion	F^{1-}
Magnesium ion	Mg^{2+}
Potassium ion	K^{1+}
Sodium ion	Na^{1+}
Iodide ion	I^{1-}
Sulfide ion	S^{2-}
Silver ion	Ag^{1+}
Zinc ion	Zn^{2+}
Chloride ion	Cl^{1-}
Oxide ion	O^{2-}
Peroxide ion	O_2^{1-}
Hydride ion	H^{1-}
Hydrogen ion	H^{1+}
Cadmium ion	Cd^{2+}

*NOTICE: All negative elemental ions end in the suffix “ide”.

COMMON METAL IONS HAVING MORE THAN ONE OXIDATION NUMBER

NAME OF METALLIC ION SYMBOL AND CHARGE

Chromium (II) ion	Cr^{2+}
Chromium (III) ion	Cr^{3+}
Manganese (III)	Mn^{3+}
Iron (III), Ferric ion	Fe^{3+}
Iron (II), Ferrous ion	Fe^{2+}
Cobalt (III), Cobaltic ion	Co^{3+}
Cobalt (II), Cobaltous ion	Co^{2+}
Nickel (III), Nickelic ion	Ni^{3+}
Nickel (II) Nickelous ion	Ni^{2+}
Copper (II), Cupric ion	Cu^{2+}
Copper (I), Cuprous ion	Cu^{1+}
Gold (III), Auric ion	Au^{3+}
Gold (I), Aurous ion	Au^{1+}
Mercury (II), Mercuric ion	Hg^{2+}
Mercury (I), Mercurous ion	Hg_2^{2+}
Tin (IV), Stannic ion	Sn^{4+}
Tin (II), Stannous ion	Sn^{2+}
Lead (IV), Plumbic ion	Pb^{4+}
Lead (II), Plumbous ion	Pb^{2+}

COMMON POLYATOMIC IONS

NAME OF ION SYMBOL AND CHARGE

Ammonium	$(\text{NH}_4)^{1+}$
Acetate	$(\text{C}_2\text{H}_3\text{O}_2)^{1-}$
Hydroxide	$(\text{OH})^{1-}$
Hydronium	$(\text{H}_3\text{O})^{1+}$
Nitrate	$(\text{NO}_3)^{1-}$
Nitrite	$(\text{NO}_2)^{1-}$
Carbonate	$(\text{CO}_3)^{2-}$
Hydrogen Carbonate (Bicarbonate)	$(\text{HCO}_3)^{1-}$
Permanganate	$(\text{MnO}_4)^{1-}$
Manganate	$(\text{MnO}_4)^{2-}$
Sulfate	$(\text{SO}_4)^{2-}$
Sulfite	$(\text{SO}_3)^{2-}$
Chromate	$(\text{CrO}_4)^{2-}$
Dichromate	$(\text{Cr}_2\text{O}_7)^{2-}$
Thiosulfate	$(\text{S}_2\text{O}_3)^{2-}$
Phosphate	$(\text{PO}_4)^{3-}$
Phosphite	$(\text{PO}_3)^{3-}$
Hydrogen Phosphate	$(\text{HPO}_4)^{2-}$
Dihydrogen Phosphate	$(\text{H}_2\text{PO}_4)^{1-}$
Oxalate	$(\text{C}_2\text{O}_4)^{2-}$
Perchlorate	$(\text{ClO}_4)^{1-}$
Chlorate	$(\text{ClO}_3)^{1-}$
Chlorite	$(\text{ClO}_2)^{1-}$
Hypochlorite	$(\text{ClO})^{1-}$
Cyanide	$(\text{CN})^{1-}$
Thiocyanate	$(\text{SCN})^{1-}$
Amide	$(\text{NH}_2)^{1-}$
Borate	$(\text{BO}_3)^{3-}$
Silicate	$(\text{SiO}_3)^{2-}$
Iodate	$(\text{IO}_3)^{1-}$
Bromate	$(\text{BrO}_3)^{1-}$
Bromite	$(\text{BrO}_2)^{1-}$