TEACHER GUIDE

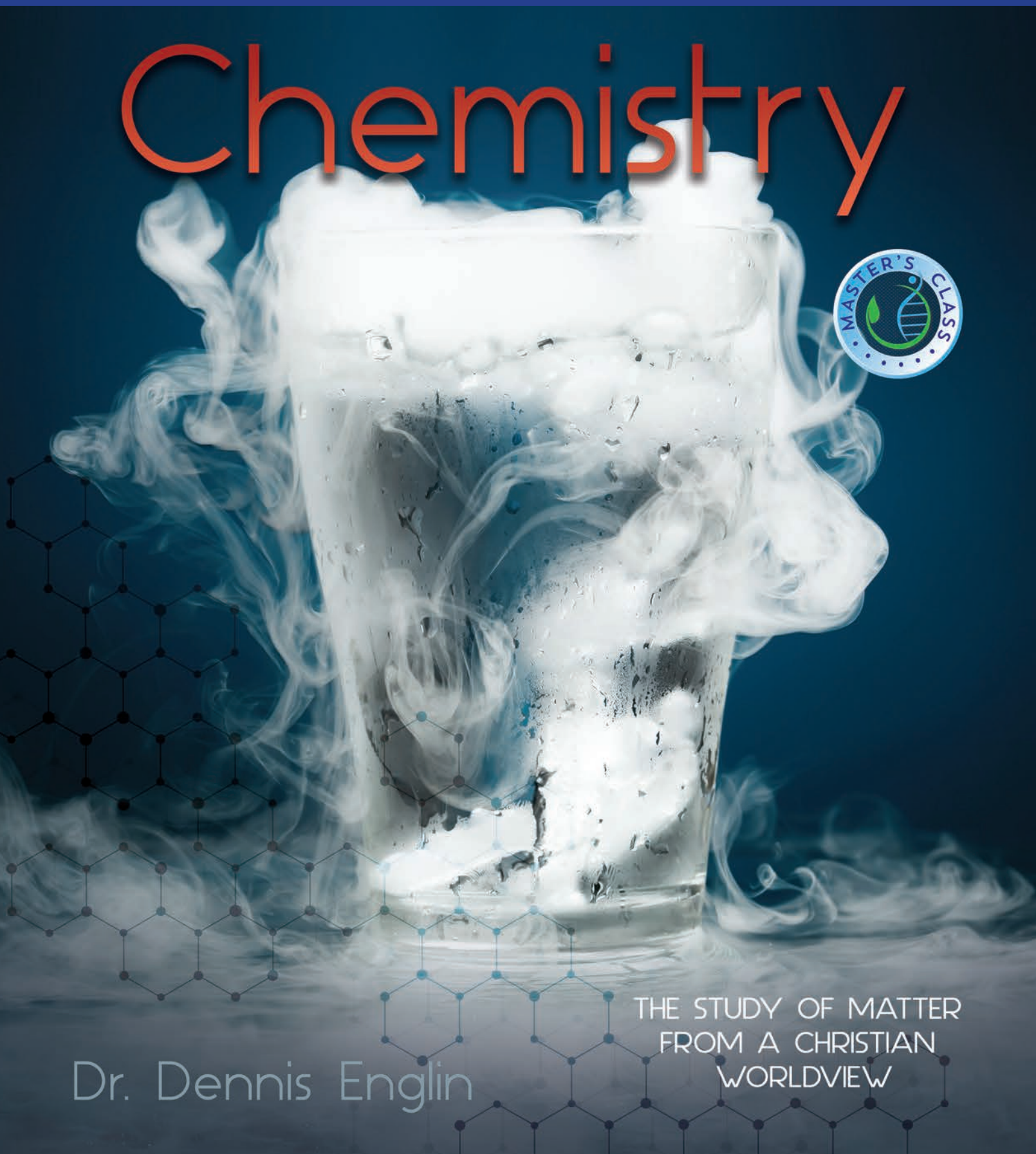
10th–12th Grade

Includes Student Worksheets

Science

- Weekly Lesson Schedule
- Labs
- Supply List
- Answer Key

Chemistry



THE STUDY OF MATTER FROM A CHRISTIAN WORLDVIEW

Dr. Dennis Englin

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Master's Class Chemistry

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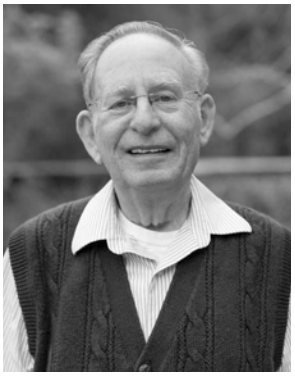
Table of Contents



Author Bio:
Dr. Dennis Englin enjoys teaching in the areas of animal biology, vertebrate biology, wildlife biology, organismic biology, chemistry, and astronomy. Memberships include the Creation Research Society, Southern California Academy of Sciences, Yellowstone Association, and Au Sable Institute of Environmental Studies. Dr. Englin's most recent publications include a text currently used in *Principles of Biology*. His research interests are in the area of animal field studies. He is a Professor of Biology at The Master's University in Santa Clarita, California.

B.A., Westmont College
M.S., California State University, Northridge
Ed.D., University of Southern California

Using This Teacher Guide

Features: The suggested weekly schedule enclosed has easy-to-manage lessons that guide the reading, worksheets, and all assessments. The pages of this guide are perforated and three-hole punched so materials are easy to tear out, hand out, grade, and store. Teachers are encouraged to adjust the schedule and materials needed in order to best work within their unique educational program.

Lesson Scheduling: Students are instructed to read the pages in their book and then complete the corresponding section provided by the teacher. Assessments that may include worksheets, activities, quizzes, and tests are given at regular intervals with space to record each grade. Space is provided on the weekly schedule for assignment dates, and flexibility in scheduling is encouraged. Teachers may adapt the scheduled days per each unique student situation. As the student completes each assignment, this can be marked with an "X" in the box.

	**Approximately five hours of course work a week**
	**Includes answer keys for worksheets, quizzes, lab reports, and exams**
	**Worksheets to help assess student learning**
	**Quizzes and exams are included to help reinforce learning and provide assessment opportunities**
	**Designed for grades 10 to 12 in a one-year course** **Prerequisites: Algebra 1**

Course Objectives: Students completing this course will

- Investigate the core concepts of chemistry, including scientific models
- Become familiar with the meanings of related scientific terms, such as density, atomic mass, Avogadro's number, mole, and molarity
- Identify the periodic table of elements and their importance to chemistry
- Distinguish between elements, compounds, and mixtures
- Learn about the conservation of matter and energy
- Study how the properties of metals are explained by the arrangements of their atoms and outer electrons
- Conduct laboratory procedures and write reports with each week of study

Course Description

This is an introductory high school level course covering the basic concepts and applications of modern chemistry. It is designed to provide a background for life skills in an age when science is increasingly involved in everyday life. As well, it provides a sound foundation for those going on to college level courses.

Matter is the "stuff" that we and everything around us are made of and chemistry is the study of the composition, structure, and properties of matter. It is through an understanding of chemistry that the products that have benefited society were discovered, and technologies to sustain the environment were put in place. In this course, students will gain a knowledge of how matter changes, giving us an insight into the origin of life so we can realize that life could only have been formed by a supernatural act of creation, not by a process of change over time. It is based on the principle that those who can understand and apply information do much better than those who simply memorize material, and it is presented through the eyes of one who has walked with the Creator and Lord of the universe for many years.

Chemistry is usually considered to be a secular study, but students will find that the precise predictability, exact quantitative nature, and intricate detail of the study of atoms and molecules are a constant testimony to God's great wisdom and omnipotent and omnipresent control. The student should be able to see God in every aspect of this course.

The goal of this study is chemistry as Christ would have us see it. We have limited understandings because we are a part of His creation. Nevertheless, He has enabled people down through the years to understand parts of His creation to show His care and love to those created in His Image. He develops our skills as we study, practice and grow. This is not a study that you can just walk through like a grassy field. Rather it has a few cliffs to climb and streams to ford. Some areas will come easier than others and some will take more time and practice. As students study each lesson, they will have to complete practice exercises and take a weekly quiz. They will also conduct a laboratory procedure and write a report dealing with that week's lesson. About every 3 or 4 weeks students will stop and review and take an examination. In everything studied, they will see God's never changing nature and absolute control of the physical universe through the natural laws.

Vocabulary Words: On the first page of every chapter in the student book vocabulary words are introduced that are bolded in that chapter's text and have brief definitions found in the glossary at the back of the book. Students are encouraged to either write these out on 3 x 5 cards or to create another useful means of reviewing these throughout their course of study. Comprehension of sometimes difficult terms and concepts is very important to completing a course in chemistry or any other complex science study.

Teacher Instruction for this Course

The teacher is the one who guides the student through the subject matter, helps the student stay on schedule and be organized, and is the source of accountability along the way. With that in mind, this guide provides additional help in guiding the student through the laboratory exercises and a list of supplies not readily available that need to be ordered. For the lessons, quizzes and examinations are provided along with the answers. Additional guidelines are included for the quizzes and examinations.

A study of this nature involves a lot of new concepts and terms. In the sciences, as well as other disciplines of life, the level of understanding grows in stages. As we progress through our education, we add layers of understanding and skills. This course is an introduction to basic terms and concepts of chemistry. It is not just intended for those going on for further studies in chemistry. It is essential to understand the sciences more in this technological age than it has been in the past. Chemistry is a tool that helps us to understand most other aspects of life. Because understandings grow in stages, a good approach is to look for patterns that may be better understood in the future. Some things in life only have to be understood by patterns. An example is the use of a computer. We learn how to do certain tasks on the computer but most of us have no clue as to what went into the software that makes it all possible. Such is also the case for chemistry for many. The lessons in this study emphasize working through procedures and problem solving by learning patterns. The vocabulary is kept at the essential level. Practice exercises are given with their answers so that the patterns can be used in problem solving. These lessons and laboratory exercises are the result of over 30 years of teaching home school high school students and then working with them as they proceed through college.

There are many principles and truths given to us in Scripture by the God that created the universe and all of the laws by which it functions. It is important to see the hand of God and His principles and wisdom as they play out in chemistry. I have tried to integrate what God has told us into the context of this study. Some have attempted this by putting Scripture verses into science texts. But unless it is in the context of the study it gives the impression that it really does not apply.

I hope as well that this study sharpens the student's ability to comprehend material, see and apply patterns, and increase the problem-solving skills. You know that you have learned to use a pattern when you can study examples and then apply what you have observed to situations that you have never seen before. Perhaps it will lead to later being able to develop new and better explanations in chemistry and living life with God's direction.

Chemistry Credits for Transcripts

This is a one-year course with two full semesters, helping a student fulfill one credit of chemistry, plus labs. High school transcripts will list the course as Chemistry with the lab implied. If questions arise from state agencies or schools, they can be referred to the course content.

Teacher Instructions for the Laboratory

This information is given so that the teacher can come alongside the student in helping line up the necessary materials for each exercise, overseeing the procedures where necessary, and evaluating the lab reports. Be sure that complete sentences are used in the reports except items where data are being recorded. This provides added writing experience, and is clearer to someone reading the report. Do not hesitate to ask someone with more background in chemistry to come alongside in areas where you may feel less confident.

Students are to use the "Laboratory" pages for taking their notes and marking general observations. The "Laboratory Report" pages (see samples on pages 11 and 12) are for the student to write out their full observations and conclusions. Any questions asked in the lab are to be answered here. The hypothesis/purpose is stated with each lab.

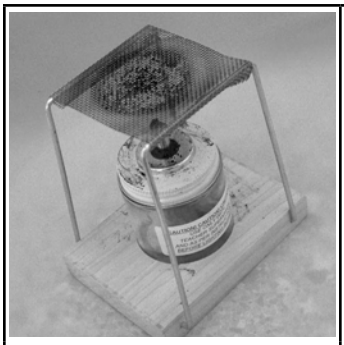
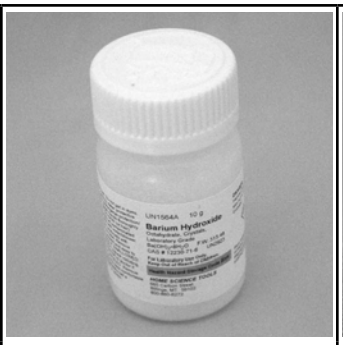
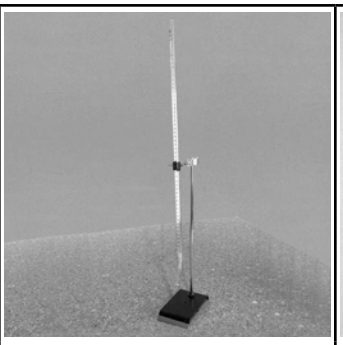
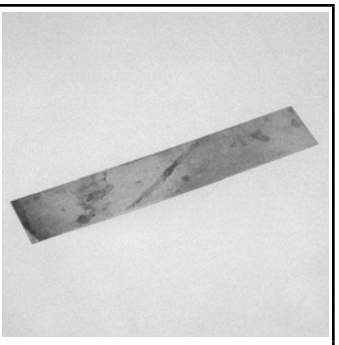
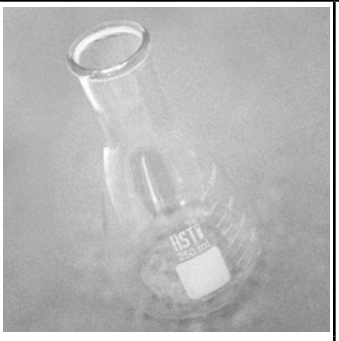
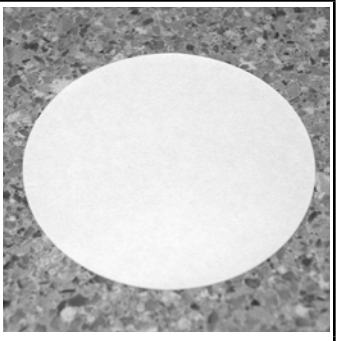
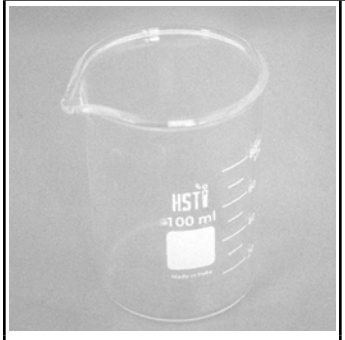
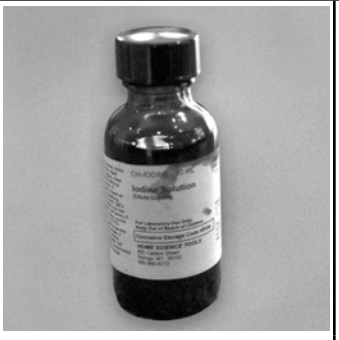
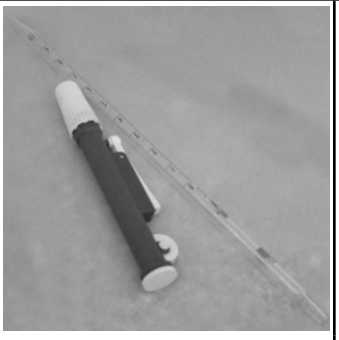
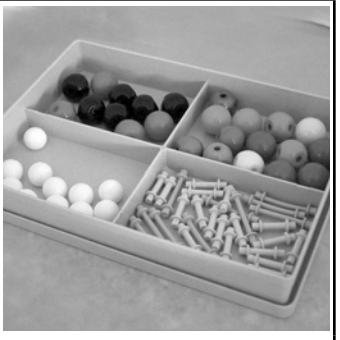
WARNING: As with any science course that includes experiments, what is created can be potentially hazardous if not handled properly. Make sure to follow all instructions very carefully:

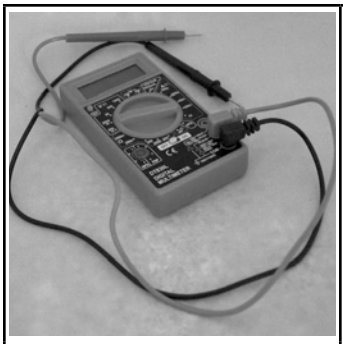
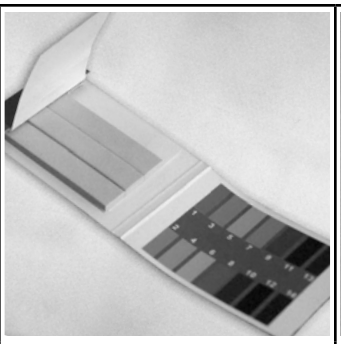
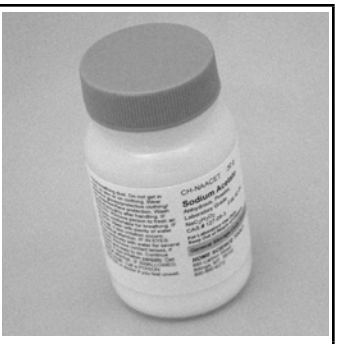
- ✔ wear proper safety equipment when needed, including safety goggles/glasses
- ✔ keep small children away from where the labs are conducted
- ✔ wash hands, surfaces, and equipment properly after each experiment
- ✔ and make sure clothing and other household surfaces are protected from staining.

Here is a list of supplies that need to be available for the labs. These are things that are not readily available outside of a science laboratory, and can be ordered online or purchased from a science supply retailer.

- ☐ Alcohol burner and stand
- ☐ Barium hydroxide (10 grams)
- ☐ Burette (50 ml capacity), burette clamp, and ring stand
- ☐ Copper metal strip (4 inches long)
- ☐ Economy pocket scale (500g x 0.1g)
- ☐ Erlenmeyer flask, glass (250 ml, 2 each)
- ☐ Eyedropper
- ☐ Filter paper, 100 sheets (11 cm diameter)
- ☐ Glass beaker (100 ml, 3 each)
- ☐ Glass beaker (250 ml)
- ☐ Glass stirring rod (10 inches)
- ☐ Graduated cylinder, glass (10 ml)
- ☐ Laboratory scoop
- ☐ Lugol's solution (30 ml)
- ☐ Mohr pipette and pipette pump (10 ml)
- ☐ Molecular model kit
- ☐ Multimeter
- ☐ Petri dish (20 pack)
- ☐ pH paper (80 pack)
- ☐ Sodium acetate (30 grams)
- ☐ Soil testing kit
- ☐ Spectroscope analysis kit
- ☐ Test tube kit (6 22 ml tubes, rack, clamp, etc.)
- ☐ Transfer pipette
- ☐ Weighing boats, aluminum (100 pack)
- ☐ Wire with alligator clips
- ☐ Zinc metal strip (4 inches long)

Note: Pipette is used for measuring. Please keep available for most labs.

 ☐ Alcohol burner and stand	 ☐ Barium hydroxide (10 grams)	 ☐ Burette (50 ml capacity), burette clamp, and ring stand	 ☐ Copper metal strip (4 inches long)
 ☐ Economy pocket scale (500g x 0.1g)	 ☐ Erlenmeyer flask, glass (250 ml, 2 each)	 ☐ Eyedropper	 ☐ Filter paper, 100 sheets (11 cm diameter)
 ☐ Glass beaker (100 ml, 3 each)	 ☐ Glass beaker (250 ml)	 ☐ Glass stirring rod (10 inches)	 ☐ Graduated cylinder, glass (10 ml)
 ☐ Laboratory scoop	 ☐ Lugol's solution (30 ml)	 ☐ Mohr pipette and pipette pump (10 ml)	 ☐ Molecular model kit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	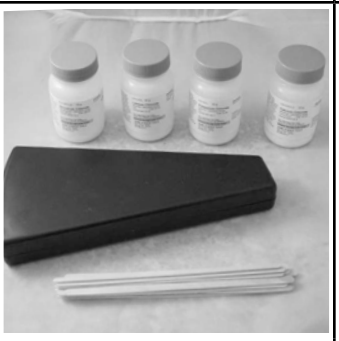	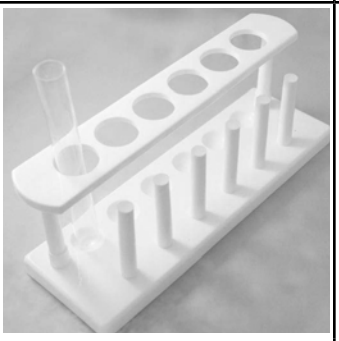	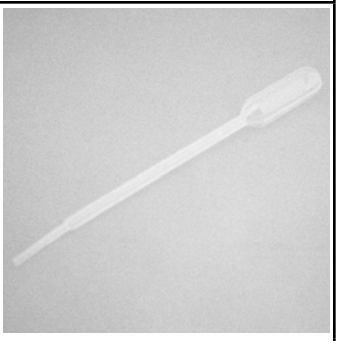
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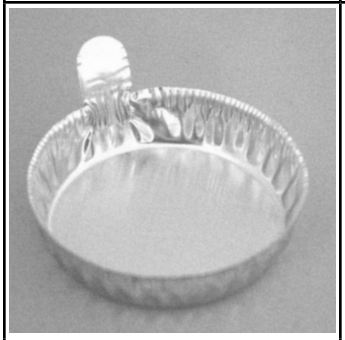	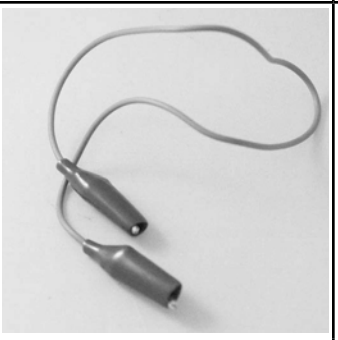	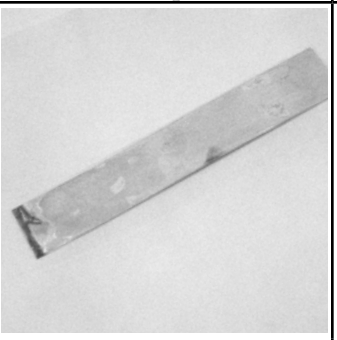	
☐ Weighing boats, aluminum (100 pack)	☐ Wire with alligator clips	☐ Zinc metal strip (4 inches long)	

Laboratory Report (20 points possible)

Hypothesis/Purpose

Evaluate object

Procedures/Results

A. I tilted the box and the object slid from one end to the other. This indicated that the object was flat on one side.

B. I rotated the box 90o and tilted it and the object slid and did not roll.

C. After rotating the box 2 more times and tilting it, the object slid in the box so it is flat on four sides.

D. The box with the object is fairly heavy so the object is heavy.

E. When I shook the box the object moved from side to side and did not break so it is not fragile.

F. I threw the box in the air and it hit the floor making a loud sound. It sounded like something shattered.

G. I shook the box again and it sound like many small objects hitting the walls of the box. This means that the object broke into many smaller parts.

Observations/Conclusion

A. The object was flat on the sides, fairly heavy and not fragile.

B. When the box hit the floor hard, the object shattered meaning that it could have been hollow or broken with strong enough force.

C. I could not see the object so I cannot describe what it actually looks like – just like an atom or molecule which I cannot see as well. I can describe how the object responds when I do various things to it just like an atom or molecule.

Sample Chemistry Lab Reports Some of the numbers have been changed from what is asked for in the lab so that the students have to do their own work.

Laboratory Report (20 points possible)

Hypothesis/Purpose

Converting metric units

Procedure/Results

1. A gas station charges 0.75 for a liter of gasoline.

   (0.75/liter) x (3.8 liters/gallon) = 2.85/gallon.

   If I traveled 15 miles, I traveled 25 km.

   15 miles x (1 km/0.6 mile) = 25 km

   If I have 5 pints of fruit juice, I have 2.37 liters.

   5 pints x (0.473 liter/pint) = 2.37 liters

2. I measured an object that is 4 inches long, 6 inches wide and 2 inches tall. It has a volume of 48 cubic inches (4 x 6 x 2).

   4 inches x (2.54 cm/inch) = 10.2 cm.

   6 inches x (2.54 cm/inch) = 15.2 cm.

   2 inches x (2.54 cm/inch) = 5 cm.

   10.2 cm x 15.2 cm x 5 cm = 775.2 cubic cm.

3. I measured 6 ml of a liquid with a graduated cylinder. I weighed a weigh boat to be 1.2 g. I weighed the weigh boat with the 6 ml of liquid and got 7.8 g. The mass of the 6 ml of liquid is (7.8 g - 1.2 g) 6.6 g. The density of the liquid is 6.6 g/6 ml = 1.1 g/ml.

Sample Chemistry Lab Reports Some of the numbers have been changed from what is asked for in the lab so that the students have to do their own work.

Teacher Instructions for Quizzes and Examinations

Teacher's Instructions for Quizzes

The quizzes are to be given at the end of the study as per the schedule of the lessons. The students are to review the text of the lesson and the practice exercises. Grade the quiz from the answers in the teacher's guide. Have the student look up any questions that were missed and explain to you what the correct answer should be and why. The quizzes are multiple choice and matching (with few exceptions) to make grading easier on your part. There are 28 quizzes with 15 points possible for each quiz. This gives a total possible of 420 points. The customary grading scale is:

90%–100% is an A;
80%–89% is a B;
70%–79% is a C;
60%–69% is a D and
59% and lower is an F.

In science studies, an A and B are very good. C is average. D or F indicates the need for more maturity, more practice, or more study. Future success is always possible with maturity, study, and practice.

This applies to each individual quiz. At the end of the course, the average of the quizzes is to be added to the average of the exams to give a final score graded according to this scale. If a student misses more than 50% on a quiz, the quiz is to be retaken after careful study. You can give the student back ½ point for each answer gotten correct the second time that was missed the first time. This can be done for up to 5 quizzes. I have found this policy to be very helpful for students that get off to a slow start. As well, I have found that a student's readiness for a study of this nature depends more upon maturity rather than age. Always encourage your student but still hold the standard and do not cut corners. That way the student will have the assurance of being able to go on to further studies and succeed.

There is no midterm or final examination because by its very nature, chemistry is comprehensive. The concepts learned earlier are used in the later lessons and labs throughout the course.

Teacher's Instructions for Administering the Examinations

In the week of an examination, the student is to study the previous quizzes and the practice exercises for the lessons covered on the exam. The exam is like an expanded version of a quiz. Each exam consists of 30 multiple choice or matching questions (with few exceptions). The questions are not verbatim from the quizzes but are similar. An examination is a sampling of the material and does not include every point covered in the lessons.

A high school transcript usually has 1 grade for science courses (lab and lecture combined) and so this would appear as 1 credit with labs in Chemistry. (Note that some states may calculate credits in a different manner.) This can be determined by making the quizzes and exams 75 percent of the grade and the lab 25 percent of the grade. To find the lab grade take the total points earned from all of the labs divided by the total possible times 100. An example of finding the total grade is if the average of the quizzes and exams are 85 percent and the labs are 97 percent:

Quiz/Exam Average _85_ x 3 = _255_ + Lab _97_ = _352_ / 4 x 100 = _88% (B+)_ **Final Grade**

Grading Sheet

Lesson	Quiz	Exam	Lab
Lesson 1	_____ / 15		_____ / 20
Lesson 2	_____ / 15		_____ / 20
Lesson 3	_____ / 15		_____ / 20
Lesson 4	_____ / 15	Examination 1 _____ / 30	_____ / 20
Lesson 5	_____ / 15		_____ / 20
Lesson 6	_____ / 15		_____ / 20
Lesson 7	_____ / 15		_____ / 20
Lesson 8	_____ / 15		_____ / 20
Lesson 9	_____ / 15	Examination 2 _____ / 30	_____ / 20
Lesson 10	_____ / 15		_____ / 20
Lesson 11	_____ / 15		_____ / 20
Lesson 12	_____ / 15	Examination 3 _____ / 30	_____ / 20
Lesson 13	_____ / 15		_____ / 20
Lesson 14	_____ / 15		_____ / 20
Lesson 15	_____ / 15		_____ / 20
Lesson 16	_____ / 15	Examination 4 _____ / 30	_____ / 20
Lesson 17	_____ / 15		_____ / 20
Lesson 18	_____ / 15		_____ / 20
Lesson 19	_____ / 15	Examination 5 _____ / 30	_____ / 20
Lesson 20	_____ / 15		_____ / 20
Lesson 21	_____ / 15		_____ / 20
Lesson 22	_____ / 15	Examination 6 _____ / 30	_____ / 20
Lesson 23	_____ / 15		_____ / 20
Lesson 24	_____ / 15		_____ / 20
Lesson 25	_____ / 15	Examination 7 _____ / 30	_____ / 20
Lesson 26	_____ / 15		_____ / 20
Lesson 27	_____ / 15		_____ / 20
Lesson 28	_____ / 15	Examination 8 _____ / 30	_____ / 20
Total Score / Percent	_____ / 420 = _____ %	_____ / 240 = _____ %	_____ / 560 = _____ %
	Quizzes _____ % + Examinations _____ % / 2 = _____ %		_____ %

Quiz/Exam Average _____ x 3 = _____ + Lab _____ = _____ / 4 x 100 = _____ **Final Grade**

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
First Semester-First Quarter					
Week 1	Day 1	Chapter 1 Introduction • Read Pages 10–15 • *Chemistry* • (CH) Complete **Lesson 1 Worksheet 1** Pages 27–29 • *Teacher Guide* • (TG)			
	Day 2	Continue the study of Chapter 1; Focus on bolded Vocabulary Words			
	Day 3	Review Chapter 1 • Complete **Quiz 1** Page 203 • (TG)			
	Day 4	Do Laboratory 1 Scientific Models Pages 16–17 • (CH)			
	Day 5	Conclude Laboratory 1 and Prepare **Lesson 1 Lab Report** Page 31–33 • (TG)			
Week 2	Day 6	Chapter 2 Metric Measurements • Read Pages 18–23 • (CH) Complete **Lesson 2 Worksheet 1** Pages 35–36 • (TG)			
	Day 7	Continue the study of Chapter 2; Focus on Vocabulary Words			
	Day 8	Review Chapter 2 • Complete **Quiz 2** Page 205 • (TG)			
	Day 9	Do Laboratory 2 The Metric System Pages 24–27 • (CH)			
	Day 10	Conclude Laboratory 2 and Prepare **Lesson 2 Lab Report** Page 37–39 • (TG)			
Week 3	Day 11	Chapter 3 Chemical Solutions • Read Pages 28–31 • (CH) Complete **Lesson 3 Worksheet 1** Page 41 • (TG)			
	Day 12	Continue the study of Chapter 3; Focus on Vocabulary Words			
	Day 13	Review Chapter 3 • Complete **Quiz 3** Pages 207–208 • (TG)			
	Day 14	Do Laboratory 3 Preparing Percent Concentration Solutions Pages 32–35 • (CH)			
	Day 15	Conclude Laboratory 3 and Prepare **Lesson 3 Lab Report** Page 43–45 • (TG)			
Week 4	Day 16	Chapter 4 Chemical Solutions • Read Pages 36–39 • (CH) Complete **Lesson 4 Worksheet 1** Pages 47–48 • (TG)			
	Day 17	Continue the study of Chapter 4; Focus on Vocabulary Words			
	Day 18	Review Chapter 4 • Complete **Quiz 4** Page 209 • (TG)			
	Day 19	Do Laboratory 4 Measuring Moles Pages 40–43 • (CH)			
	Day 20	Conclude Laboratory 4 and Prepare **Lesson 4 Lab Report** Page 49–51 • (TG)			
Week 5	Day 21	Review Lesson 1 and Lesson 1 Quiz			
	Day 22	Review Lesson 2 and Lesson 2 Quiz			
	Day 23	Review Lesson 3 and Lesson 3 Quiz			
	Day 24	Review Lesson 4 and Lesson 4 Quiz			
	Day 25	Take **Examination 1 (Lessons 1–4)** Pages 267–269 • (TG)			
Week 6	Day 26	Chapter 5 Molecular Mass and Atomic Theory • Read Pages 44–51 • (CH) Complete **Lesson 5 Worksheet 1** Page 53 • (TG)			
	Day 27	Continue the study of Chapter 5; Focus on Vocabulary Words			
	Day 28	Review Chapter 5 • Complete **Quiz 5** Page 211 • (TG)			
	Day 29	Do Laboratory 5 Chromatography Pages 52–55 • (CH)			
	Day 30	Conclude Laboratory 5 and Prepare **Lesson 5 Lab Report** Page 55–57 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 31	Chapter 6 Preparing Molar Solutions • Read Pages 56–59 • (CH) Complete **Lesson 6 Worksheet 1** Page 59 • (TG)			
	Day 32	Continue the study of Chapter 6; Focus on Vocabulary Words			
	Day 33	Review Chapter 6 • Complete **Quiz 6** Pages 213–214 • (TG)			
	Day 34	Do Laboratory 6 Preparation of Molar Solutions Pages 60–63 • (CH)			
	Day 35	Conclude Laboratory 6 and Prepare **Lesson 6 Lab Report** Page 61–63 • (TG)			
Week 8	Day 36	Chapter 7 Chemical Reactions • Read Pages 64–71 • (CH) Complete **Lesson 7 Worksheet 1** Pages 65–66 • (TG)			
	Day 37	Continue the study of Chapter 7; Focus on Vocabulary Words			
	Day 38	Review Chapter 7 • Complete **Quiz 7** Pages 215–216 • (TG)			
	Day 39	Do Laboratory 7 Evidence of a Chemical Reaction Pages 72–75 • (CH)			
	Day 40	Conclude Laboratory 7 and Prepare **Lesson 7 Lab Report** Page 67–69 • (TG)			
Week 9	Day 41	Chapter 8 Chemical Equations I • Read Pages 76–79 • (CH) Complete **Lesson 8 Worksheet 1** Page 71 • (TG)			
	Day 42	Continue the study of Chapter 8; Focus on Vocabulary Words			
	Day 43	Review Chapter 8 • Complete **Quiz 8** Pages 217–218 • (TG)			
	Day 44	Do Laboratory 8 Looking at Chemical Reactions with Molecular Models Pages 80–83 • (CH)			
	Day 45	Conclude Laboratory 8 and Prepare **Lesson 8 Lab Report** Page 73–75 • (TG)			
First Semester-Second Quarter					
Week 1	Day 46	Review Lesson 5 and Lesson 5 Quiz			
	Day 47	Review Lesson 6 and Lesson 6 Quiz			
	Day 48	Review Lesson 7 and Lesson 7 Quiz			
	Day 49	Review Lesson 8 and Lesson 8 Quiz			
	Day 50	Take **Examination 2 (Lessons 5–8)** Pages 271–273 • (TG)			
Week 2	Day 51	Chapter 9 Chemical Reactions II • Read Pages 84–91 • (CH) Complete **Lesson 9 Worksheet 1** Page 77 • (TG)			
	Day 52	Continue the study of Chapter 9; Focus on Vocabulary Words			
	Day 53	Review Chapter 9 • Complete **Quiz 9** Pages 219–220 • (TG)			
	Day 54	Do Laboratory 9 Balancing Chemical Equations with Molecular Models Pages 92–95 • (CH)			
	Day 55	Conclude Laboratory 9 and Prepare **Lesson 9 Lab Report** Page 79–81 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 3	Day 56	Chapter 10 Moles from Chemical Equations • Read Pages 96–101 • (CH) Complete **Lesson 10 Worksheet 1** Page 83 • (TG)			
	Day 57	Continue the study of Chapter 10; Focus on Vocabulary Words			
	Day 58	Review Chapter 10 • Complete **Quiz 10** Pages 221–223 • (TG)			
	Day 59	Do Laboratory 10 Estimating How Many Atoms are in a Mole Pages 102–105 • (CH)			
	Day 60	Conclude Laboratory 10 and Prepare **Lesson 10 Lab Report** Page 85–87 • (TG)			
Week 4	Day 61	Chapter 11 Finding the Grams of Reactant and Product • Read Pages 106–109 • (CH) Complete **Lesson 11 Worksheet 1** Page 89 • (TG)			
	Day 62	Continue the study of Chapter 11; Focus on Vocabulary Words			
	Day 63	Review Chapter 11 • Complete **Quiz 11** Pages 225–227 • (TG)			
	Day 64	Do Laboratory 11 Chromatography Using Different Solvents Pages 110–113 • (CH)			
	Day 65	Conclude Laboratory 11 and Prepare **Lesson 11 Lab Report** Page 91–93 • (TG)			
Week 5	Day 66	Chapter 12 Electron Configurations • Read Pages 114–121 • (CH) Complete **Lesson 12 Worksheet 1** Pages 95–96 • (TG)			
	Day 67	Continue the study of Chapter 12; Focus on Vocabulary Words			
	Day 68	Review Chapter 12 • Complete **Quiz 12** Page 229 • (TG)			
	Day 69	Do Laboratory 12 Flame Tests Pages 122–125 • (CH)			
	Day 70	Conclude Laboratory 12 and Prepare **Lesson 12 Lab Report** Page 97–99 • (TG)			
Week 6	Day 71	Review Lesson 9 and Lesson 9 Quiz			
	Day 72	Review Lesson 10 and Lesson 10 Quiz			
	Day 73	Review Lesson 11 and Lesson 11 Quiz			
	Day 74	Review Lesson 12 and Lesson 12 Quiz			
	Day 75	Take **Examination 3 (Lessons 9–12)** Pages 275–278 • (TG)			
Week 7	Day 76	Chapter 13 Electron Configurations Continued • Read Pages 126–129 • (CH) Complete **Lesson 13 Worksheet 1** Page 101 • (TG)			
	Day 77	Continue the study of Chapter 13; Focus on Vocabulary Words			
	Day 78	Review Chapter 13 • Complete **Quiz 13** Pages 231–232 • (TG)			
	Day 79	Do Laboratory 13 Diagramming Electron Orbitals Pages 130–133 • (CH)			
	Day 80	Conclude Laboratory 13 and Prepare **Lesson 13 Lab Report** Page 103–105 • (TG)			
Week 8	Day 81	Chapter 14 Periodic Table of the Elements • Read Pages 134–139 • (CH) Complete **Lesson 14 Worksheet 1** Page 107 • (TG)			
	Day 82	Continue the study of Chapter 14; Focus on Vocabulary Words			
	Day 83	Review Chapter 14 • Complete **Quiz 14** Pages 233–234 • (TG)			
	Day 84	Do Laboratory 14 Parts of the Periodic Table Pages 140–143 • (CH)			
	Day 85	Conclude Laboratory 14 and Prepare **Lesson 14 Lab Report** Pages 109–113 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 9	Day 86	Chapter 15 The Groups of the Periodic Table of the Elements • Read Pages 144–151 • (CH) Complete **Lesson 15 Worksheet 1** Page 115 • (TG)			
	Day 87	Continue the study of Chapter 15; Focus on Vocabulary Words			
	Day 88	Review Chapter 15 • Complete **Quiz 15** Page 235 • (TG)			
	Day 89	Do Laboratory 15 Groups of the Periodic Table Page 152–153 • (CH)			
	Day 90	Conclude Laboratory 15 and Prepare **Lesson 15 Lab Report** Page 117–119 • (TG)			
		Mid-Term Grade			

Second Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
Second Semester-Third Quarter					
Week 1	Day 91	Chapter 16 Ionic Bonds • Read Pages 154–159 • (CH) Complete **Lesson 16 Worksheet 1** Page 121 • (TG)			
	Day 92	Continue the study of Chapter 16; Focus on Vocabulary Words			
	Day 93	Review Chapter 16 • Complete **Quiz 16** Pages 237–239 • (TG)			
	Day 94	Do Laboratory 16 Conductivity of Ionic Solutions Pages 160–163 • (CH)			
	Day 95	Conclude Laboratory 16 and Prepare **Lesson 16 Lab Report** Page 123–125 • (TG)			
Week 2	Day 96	Review Lesson 13 and Lesson 13 Quiz			
	Day 97	Review Lesson 14 and Lesson 14 Quiz			
	Day 98	Review Lesson 15 and Lesson 15 Quiz			
	Day 99	Review Lesson 16 and Lesson 16 Quiz			
	Day 100	Take **Examination 4 (Lessons 13–16)** Pages 279–282 • (TG)			
Week 3	Day 101	Chapter 17 Covalent Bonds • Read Pages 164–169 • (CH) Complete **Lesson 17 Worksheet 1** Pages 127–128 • (TG)			
	Day 102	Continue the study of Chapter 17; Focus on Vocabulary Words			
	Day 103	Review Chapter 17 • Complete **Quiz 17** Pages 241–242 • (TG)			
	Day 104	Do Laboratory 17 Polar and Non-polar Molecules Pages 170–173 • (CH)			
	Day 105	Conclude Laboratory 17 and Prepare **Lesson 17 Lab Report** Page 129–131 • (TG) Begin Laboratory 18 Pages 180–183 • (CH)			
Week 4	Day 106	Chapter 18 Metal Atoms • Read Pages 174–179 • (CH) Complete **Lesson 18 Worksheet 1** Page 133 • (TG)			
	Day 107	Continue the study of Chapter 18; Focus on Vocabulary Words			
	Day 108	Review Chapter 18 • Complete **Quiz 18** Pages 243–244 • (TG)			
	Day 109	Do Laboratory 18 Oxidation - Reduction Pages 180–183 • (CH)			
	Day 110	Conclude Laboratory 18 and Prepare **Lesson 18 Lab Report** Page 135–137 • (TG)			
Week 5	Day 111	Chapter 19 Batteries • Read Pages 184–187 • (CH) Complete **Lesson 19 Worksheet 1** Pages 139–140 • (TG)			
	Day 112	Continue the study of Chapter 19; Focus on Vocabulary Words			
	Day 113	Review Chapter 19 • Complete **Quiz 19** Page 245 • (TG)			
	Day 114	Do Laboratory 19 Zn/Cu Galvanic Cell Page 188–189 • (CH)			
	Day 115	Conclude Laboratory 19 and Prepare **Lesson 19 Lab Report** Page 141–143 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 6	Day 116	Review Lesson 17 and Lesson 17 Quiz			
	Day 117	Review Lesson 18 and Lesson 18 Quiz			
	Day 118	Review Lesson 19 and Lesson 19 Quiz			
	Day 119	Review Lessons 17–19			
	Day 120	Take **Examination 5 (Lessons 17–19)** Pages 283–285 • (TG)			
Week 7	Day 121	Chapter 20 Acids and Bases I • Read Pages 190–195 • (CH) Complete **Lesson 20 Worksheet 1** Page 145 • (TG)			
	Day 122	Continue the study of Chapter 20; Focus on Vocabulary Words			
	Day 123	Review Chapter 20 • Complete **Quiz 20** Page 247 • (TG)			
	Day 124	Do Laboratory 20 pH and $NaHCO_3$ Pages 196–199 • (CH)			
	Day 125	Conclude Laboratory 20 and Prepare **Lesson 20 Lab Report** Page 147–149 • (TG)			
Week 8	Day 126	Chapter 21 Acids and Bases II • Read Pages 200–205 • (CH) Complete **Lesson 21 Worksheet 1** Pages 151–152 • (TG)			
	Day 127	Continue the study of Chapter 21; Focus on Vocabulary Words			
	Day 128	Review Chapter 21 • Complete **Quiz 21** Pages 249–250 • (TG)			
	Day 129	Do Laboratory 21 pH of Various Liquids Pages 206–209 • (CH)			
	Day 130	Conclude Laboratory 21 and Prepare **Lesson 21 Lab Report** Page 153–155 • (TG)			
Week 9	Day 131	Chapter 22 Weak Acids and Bases • Read Pages 210–215 • (CH) Complete **Lesson 22 Worksheet 1** Page 157 • (TG)			
	Day 132	Continue the study of Chapter 22; Focus on Vocabulary Words			
	Day 133	Review Chapter 22 • Complete **Quiz 22** Pages 251–252 • (TG)			
	Day 134	Do Laboratory 22 Acid-Base pH and Titration Pages 216–219 • (CH)			
	Day 135	Conclude Laboratory 22 and Prepare **Lesson 22 Lab Report** Page 159–163 • (TG)			
Second Semester-Fourth Quarter					
Week 1	Day 136	Review Lesson 20 and Lesson 20 Quiz			
	Day 137	Review Lesson 21 and Lesson 21 Quiz			
	Day 138	Review Lesson 22 and Lesson 22 Quiz			
	Day 139	Review Lessons 20–22			
	Day 140	Take **Examination 6 (Lessons 20–22)** Pages 287–289 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
	Day 141	Chapter 23 Buffers • Read Pages 220–225 • (CH) Complete **Lesson 23 Worksheet 1** Page 165 • (TG)			
	Day 142	Continue the study of Chapter 23; Focus on Vocabulary Words			
Week 2	Day 143	Review Chapter 23 • Complete **Quiz 23** Pages 253–254 • (TG)			
	Day 144	Do Laboratory 23 Preparing and Testing Buffers Pages 226–227 • (CH)			
	Day 145	Conclude Laboratory 23 and Prepare **Lesson 23 Lab Report** Page 167–169 • (TG)			
	Day 146	Chapter 24 Chemistry of Carbon • Read Pages 228–233 • (CH) Complete **Lesson 24 Worksheet 1** Pages 171–172 • (TG)			
	Day 147	Continue the study of Chapter 24; Focus on Vocabulary Words			
Week 3	Day 148	Review Chapter 24 • Complete **Quiz 24** Pages 255–256 • (TG)			
	Day 149	Do Laboratory 24 Models of Carbon Compounds Page 234–235 • (CH)			
	Day 150	Conclude Laboratory 24 and Prepare **Lesson 24 Lab Report** Page 173–175 • (TG)			
	Day 151	Chapter 25 Organic Chemistry • Read Pages 236–241 • (CH) Complete **Lesson 25 Worksheet 1** Pages 177–178 • (TG)			
	Day 152	Continue the study of Chapter 25; Focus on Vocabulary Words			
Week 4	Day 153	Review Chapter 25 • Complete **Quiz 25** Page 257 • (TG)			
	Day 154	Do Laboratory 25 Fat and Water Soluble Compounds Page 242–243 • (CH)			
	Day 155	Conclude Laboratory 25 and Prepare **Lesson 25 Lab Report** Page 179–181 • (TG)			
	Day 156	Review Lesson 23 and Lesson 23 Quiz			
	Day 157	Review Lesson 24 and Lesson 24 Quiz			
Week 5	Day 158	Review Lesson 25 and Lesson 25 Quiz			
	Day 159	Review Lessons 23–25			
	Day 160	Take **Examination 7 (Lessons 23–25)** Pages 291–293 • (TG)			
	Day 161	Chapter 26 Biochemistry • Read Pages 244–249 • (CH) Complete **Lesson 26 Worksheet 1** Page 183 • (TG)			
	Day 162	Continue the study of Chapter 26; Focus on Vocabulary Words			
Week 6	Day 163	Review Chapter 26 • Complete **Quiz 26** Page 259 • (TG)			
	Day 164	Do Laboratory 26 Comparative Nutritive Values of Foods Page 250–251 • (CH)			
	Day 165	Conclude Laboratory 26 and Prepare **Lesson 26 Lab Report** Page 185–187 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 7	Day 166	Chapter 27 Rates of Chemical Reactions • Read Pages 252–257 • (CH) Complete **Lesson 27 Worksheet 1** Page 189 • (TG)			
	Day 167	Continue the study of Chapter 27; Focus on Vocabulary Words			
	Day 168	Review Chapter 27 • Complete **Quiz 27** Page 261 • (TG)			
	Day 169	Do Laboratory 27 Reactions with and without Catalysts Pages 258–261 • (CH)			
	Day 170	Conclude Laboratory 27 and Prepare **Lesson 27 Lab Report** Page 191–193 • (TG)			
Week 8	Day 171	Chapter 28 Environmental Chemistry • Read Pages 262–267 • (CH) Complete **Lesson 28 Worksheet 1** Page 195 • (TG)			
	Day 172	Continue the study of Chapter 28; Focus on Vocabulary Words			
	Day 173	Review Chapter 28 • Complete **Quiz 28** Page 263 • (TG)			
	Day 174	Do Laboratory 28 Soil Testing Pages 268–271 • (CH)			
	Day 175	Conclude Laboratory 28 and Prepare **Lesson 28 Lab Report** Pages 197–200 • (TG)			
Week 9	Day 176	Review Lesson 26 and Lesson 26 Quiz			
	Day 177	Review Lesson 27 and Lesson 27 Quiz			
	Day 178	Review Lesson 28 and Lesson 28 Quiz			
	Day 179	Review Lessons 26–28			
	Day 180	Take **Examination 8 (Lessons 26–28)** Pages 295–296 • (TG)			
		Final Grade			

Worksheets

and

Laboratory Reports

Complete the following experiment

Try this experiment. Take two equal volumes of water (½ cup) and dissolve about ½ of a teaspoon of table salt in one of them. Place them both in the freezer and see which one freezes first. Try to explain what happened by thinking about what happens when the salt molecules get in between the water molecules as they are trying to form ice crystals. Use the space below to write a brief hypothesis for the differences in the two containers.

Circle the correct answers

1. As a branch of science, chemistry is the study of _____.
   A. Weather
   B. Matter
   C. Gravity
   D. where life came from
2. The amount of matter in something is its _____.
   A. Density
   B. Weight
   C. Mass
   D. Volume
3. The amount of space occupied by a sample of matter is its _____.
   A. Density
   B. Weight
   C. Mass
   D. Volume
4. A chemical reaction is best described as when _____.
   A. The atoms in a molecule are rearranged
   B. Its temperature changes
   C. It changes color
   D. It goes BOOM

5. The density of an object is the amount of _____ in a certain volume.
   A. Weight
   B. Heat
   C. Air
   D. Mass
6. The density of an object is calculated by dividing the _____ by its _____.
   A. Weight, Mass
   B. Mass, Volume
   C. Volume, Weight
   D. Speed, Time
7. An object of _____ density will float above an object of _____ density.
   A. Less, Greater
   B. Greater, Less
   C. Less, Less
   D. Greater, Greater
8. An attempted explanation of observations is called a _____.
   A. Hypothesis
   B. Hypotenuse
   C. Theory
   D. Great idea
9. A hypothesis can be shown to be _____ but cannot be shown to be _____.
   A. True, False
   B. False, True
10. When testing a hypothesis, the observations have to be _____.
   A. Interesting
   B. Have been made in the last few days
   C. Repeatable
11. When a hypothesis is rejected, it _____.
   A. Becomes a theory
   B. Is still kept if it is popular
   C. Is replaced with another hypothesis that better explains the observations

12. When a hypothesis is consistent with new observations and experiments and is favored by many experts in the field, it becomes _____.
    A. A fact
    B. A theory
    C. An opinion
13. Theories and hypotheses are _____ replaced.
    A. Always
    B. Never
    C. Sometimes
14. God's Word in the scriptures is _____ replaced.
    A. Always
    B. Never
    C. Sometimes
15. Science is a very good tool but _____ have the same authority of the scriptures.
    A. Does not
    B. Does

Laboratory 1: Scientific Models

REQUIRED MATERIALS

☐ Small Box
☐ Random item that fits in the box

INTRODUCTION

A **scientific model** is a description of the **behavior** of something that you have no means of ever seeing with current technologies. You cannot see an atom but you can see the effects of many atoms. You cannot see a proton, and you cannot see an electron. But there is something there that is identified by these names. This is a difficult concept because it is contrary to our everyday way of thinking. Can you imagine getting into and riding in an invisible car? Kind of silly, isn't it? But that is what we do with many things in science. We have a model that is a description of something that would behave just like something that we cannot see. The model of an atom is not an actual description of what an atom looks like. It cannot be because we do not know what an atom looks like. The description is the description of something that would behave just like an atom. From this model, we can predict what an atom would do under other circumstances. Our goal is not to describe what an atom actually looks like, but rather what it will do.

PURPOSE

This lab exercise is designed to demonstrate how scientific models are designed and used to understand things that cannot be directly observed, such as atoms and molecules.

PROCEDURE

This lab is an exercise in constructing a scientific model. Perhaps this will give you a better idea of what a model is and its limitations. You have a sealed box. It has an object in it. You can do almost anything to your box except alter, destroy, or open it. You are not at any time to state or guess what you think is in the box. You will not be shown what is in the box. That is the way it is with atoms and their parts. You are to describe as many properties of the object as you can — but never to identify it! For example, tilt the box and determine if the object slides or rolls in the box. How fast does it roll or slide? What if you tilt it the other way? Does it respond differently? As you hold the box, does the object feel heavy?

Remember that your description cannot have anything to do with what you might think is in the box. Describe at least 6 procedures you perform with the box, your observations and conclusions. Always use complete sentences. You are not just writing this report for yourself. One of the purposes of the laboratory reports is to improve your writing skills. Part of the grade on the report is how well you follow instructions. At the end of the report, summarize the properties that you can identify for the object in the box. Your report will also be graded on how neat and well organized it is. It can be hand written, but it must be clear.

LABORATORY REPORT

NOTE: All observations and conclusions about the lab are to be written on the Laboratory Report provided. Lab Report samples are provided at the beginning of this Teacher Guide. This section may be used for the student's notes.

Scientific models

Give a unique name to the object in the box even though you do not know what it is.

For each procedure: describe the procedure and state your observations and conclusions.

Summarize the properties of the object in the box. Remember — do not try to identify what is in the box.

How do you think that this is similar to the way atoms and molecules are studied?

Laboratory Report (20 points possible)

Provide all lab assessments and evaluations here.

Hypothesis / Purpose:

Procedures / Results:

Observations / Conclusions:

Complete the following exercise

Do the following exercise to test your understanding of density. Liquid A has a density of 1.05 g/ml; Liquid B has a density of 1.10 g/ml; Liquid C has a density of 0.97 g/ml and Liquid D has a density of 1.00 g/ml. When all 4 liquids are poured together into a tall glass, they do not mix and but they settle out forming 4 layers.

Liquid A ..... 1.05 g/ml

Liquid B ..... 1.10 g/ml

Liquid C ..... 0.97 g/ml

Liquid D ..... 1.00 g/ml

Which liquid will be on the bottom? Which one will be second, floating on the bottom layer? Which liquid will be third up from the bottom and which one will be on top?

Form a hypothesis (a principle or explanation that you make from your observations) explaining how you came up with your answer. Afterwards, and not before, compare your answer to the one given on the answer key.

Match the correct answers

_____	1. Unit of length	A.	milligram/milliliter
_____	2. Unit of volume	B.	gram
_____	3. Unit of mass	C.	liter
_____	4. Unit of density	D.	meter

_____	5. 1/10 meter	A.	ml
_____	6. 1/100 gram	B.	mg
_____	7. 1/1,000 gram	C.	dm
_____	8. 1/1,000 liter	D.	mm
_____	9. 1/1,000 meter	E.	cg

_____ 10. 1/100 meter	A. liter
_____ 11. 1/10 gram	B. cm
_____ 12. 1,000 meters	C. km
_____ 13. 100 cm	D. dg
_____ 14. 1,000 ml	E. m

Laboratory 2: The Metric System

REQUIRED MATERIALS

- ☐ Square or rectangular object
- ☐ Ruler with measurements in inches
- ☐ Graduated cylinder (10 ml)
- ☐ Weighing boat
- ☐ Scale

INTRODUCTION

The metric system was developed on the basis of the number 10. The following prefixes are commonly used:

- *milli* meaning 1 thousandth
- *centi* meaning 1 hundredth
- *deci* meaning 1 tenth
- *kilo* meaning 1 thousand

The meter is the metric system's unit of **length**. It is equivalent to about 39 inches in the English system. By the list above: a decimeter is a _____ of a meter, a centimeter is a _____ of a meter and a millimeter is a _____ of a meter. A kilometer is _____ meters.

See the chart below for the units for length, volume, mass, and force in both the metric and English systems.

Quantity	Metric Unit	English Unit
length	meter	foot (12 inches)
volume	liter	gallon
mass	gram	slug
force (weight)	newton	pound

PURPOSE

This exercise is designed to familiarize you with the use of metric units. The sciences exclusively use metric standards of measurement.

PROCEDURE

You will find the following English — metric conversions helpful for this exercise.

English		Metric
1 inch	=	2.54 cm (centimeters)
1 gallon	=	3.8 liters
1 km (kilometer, 1,000 meters)	=	0.6 mile
1 pint	=	0.473 liter

1. Solve the following:
   A. If a gas station charges $1.25 for a liter of gasoline, how much is it for a gallon of gasoline?

   B. If you travel 10 miles, how many kilometers have you traveled?

   C. If you have 3 pints of fruit juice, how many liters do you have?

2. Find a square or rectangular object.
   A. Measure its length, width, and height in inches.

   B. What is its volume in cubic inches? (length x height x depth)

   C. Convert each of the measurements into cm.

   D. What is the volume of the object in cubic centimeters (cc)?

   E. A cubic centimeter is exactly the same as a milliliter (ml). What is the object's volume in milliliters and liters?

3. Mass / Density Measurements
   A. Measure out 5 ml of a liquid other than water with a 10 ml graduated cylinder.

   B. Place a weighing boat on a scale and find its mass in grams.

   C. Add the 5 ml of liquid to the weighing boat and find the mass of the 5 ml of liquid including the mass of the weighing boat.

   D. Calculate the mass of the liquid by subtracting the mass of the weighing boat from the combined mass.

   E. Divide the mass of the liquid in g by the volume in ml. This gives you the density of the liquid in units of g/ml.

Laboratory Report (20 points possible)

Provide all lab assessments and evaluations here.

Hypothesis / Purpose:

Procedures / Results:
1.

2.

3.

Observations / Conclusions:

Answers to Worksheets, Laboratory Reports, Quizzes and Exams

Chemistry Worksheet and Lab Report Answer Keys

Lesson 1
Worksheet

1. B
2. C
3. D
4. A
5. D
6. B
7. A
8. A
9. B
10. C
11. C
12. B
13. C
14. B
15. A

Lesson 1
Lab Report

1. Place in a small box an object unknown to the student. Seal up the box so that the student cannot tell what is contained in the box. At no time is the student to open the box to see what is inside. The purpose of the exercise is to identify traits of the object by manipulating the box but never opening it. Many things in science are not observable but we can test for their properties and their effects upon other things. This indirect description is called a model. In this exercise, the student is to treat the object as an object that cannot be observed but can only be studied indirectly — such as by shaking or tilting the box.
2. Read the procedure descriptions, observations and conclusions in the student report. Were complete sentences used? Are they clearly written? Are they complete? Possible 10 points.
3. Is the final description of the object clearly written? Is it a description of what the object could look like and not an attempt to identify the object? Did the student clearly indicate how it resembles the study of atoms and molecules? Possible 10 points.

Assign the points received with a total of 20 points possible.

Lesson 2
Worksheet

The bottom layer is B because it has the greatest density (1.10 g/ml). On top of B is liquid A (1.05 g/ml). On top of A is liquid D (1.00 g/ml) and liquid C is the top layer with the lowest density (0.97 g/ml).

1. D
2. C
3. B
4. A
5. C
6. E
7. B
8. A
9. D
10. B
11. D
12. C
13. E
14. A

Lesson 2
Lab Report

1. The solutions to these problems are …
   A. $1.25/liter x 3.8 liters/gallon = $4.75/gallon. That is expensive gasoline.
   B. 10 miles x 1 km/0.6 mile = 16.7 km
   C. 3 pints x 0.473 liter/pint = 1.42 liters.

2. The student is to measure a square or rectangular shaped object in inches
   A. Are the length, width, and height accurately measured and in inches?
   B. Is the calculation of volume correct? (length x height x depth)
   C. Were the measurements correctly converted (each dimension converted individually)

      1 inch = 2.54 centimeters (cm).

      If you had 5 inches for a dimension, it would be 5 inches x 2.54 cm/inch = 12.7 cm.
   D. Did the student find the volume in cc by multiplying each converted dimension correctly? (length x height x depth)
   E. The volume in ml will be the same as the volume in cc. The volume in liters is the volume in milliliters divided by 1,000. For example, a volume of 450 ml is 450ml x 1 liter/1,000 ml = 0.45 liter.
3. The student is to find the mass of a liquid other than water by measuring 5 ml of liquid, weighing the weigh dish, weighing the weigh dish with 5 ml of liquid and subtracting the mass of the dish from the mass of the liquid and the dish. The mass of the liquid in grams divided by the volume of the liquid (5 ml) is the density of the liquid in units of g/ml.

The report for this lab is to include written descriptions with complete sentences of each procedure followed and the answers to the problems. The student is to show the work in solving each problem.

Part 1 is worth 10 points, part 2 is worth 5 points part 3 is worth 5 points. This gives a total possible of 20 points.

Lesson 3
Answers to the Practice Exercises

1. Add 15 grams of sucrose to 85 ml (grams) of water. 15 grams of sucrose plus 85 grams of water equal 100 grams of solution. 15/100 x 100% = 15%. This gives 85 ml of 15 percent sucrose solution.
2. Add 25 grams of NaCl to 75 ml (grams) of water. 25 grams of NaCl plus 75 grams of water equal 100 grams of solution. 25/100 x 100% = 25%. This gives 75 ml of 25 percent NaCl solution. If you need twice as much solution, double the amounts. 50 grams of NaCl plus 150 grams of water gives 200 grams of solution. 50/200 x 100% = 25%. You have 150 ml of 25 percent NaCl solution.
3. Add 5 grams of KCl to 95 grams (ml) of water. 5 grams of KCl plus 95 grams of water is 100 grams of solution. This gives 95 ml of 5 percent KCl solution. 5/100 x 100% = 5%.

Lesson 3
Lab Report

1. The percent concentration of the solution prepared by the student is …

   (1 gram NaCl + 9 grams H_2O) = 10 grams of solution

   1 gram NaCl/10 grams of solution x 100% = 10% NaCl

   To prepare twice the volume of 10 percent NaCl, add 2 grams of NaCl to 18 grams of H_2O.
2. The concentration of NaCl prepared in this procedure is …

   4 grams of NaCl + 16 grams of H_2O = 20 grams of solution.

   4 grams of NaCl/20 grams of solution x 100% = 20% NaCl
3. For this procedure weigh out 15 grams of sucrose (table sugar) and dissolve it into 85 ml (milliliters) of H_2O. 85 ml of H_2O is the same as 85 grams of H_2O. So 85 grams of H_2O and 15 grams of sucrose gives 100 grams of solution that is 15 out of 100 or 15 percent sucrose. The student is to prepare this solution.
4. In this procedure the student is to add NaCl to 100 ml of H_2O until no more dissolves. The student is to weigh the weigh dish plus NaCl and then again after pouring out NaCl until no more dissolves into the H_2O. By subtracting the weight of the dish after pouring out some of the NaCl from the weight of the dish with the NaCl

E	*Chemistry*	Scope: Chapters 1–4	Day 25	Exam 1	Total score: ____ / 30 = ____ %	Name

Circle the correct answers

A calculator may be used while taking this exam.

Use the following atomic masses while taking this quiz.

H = 1 g/mole	C = 12 g/mole	O = 16 g/mole
Na = 23 g/mole	Cl = 35.5 g/mole	K = 39 g/mole

1. Knowledge from science _____.
   A. Is different but as trustworthy as the Bible
   B. Proves hypotheses and theories to be true
   C. Needs to keep improving
2. A scientific model _____.
   A. Is a miniature of a larger object
   B. Is a hypothesis
   C. Describes the behavior of something that cannot be seen
3. The mass of an object is its _____.
   A. Amount of matter
   B. Weight
   C. Volume
4. Liquid 1 has a density of 0.8 mg/ml, liquid 2 has a density of 1.1 mg/ml and liquid 3 has a density of 1.0 mg/ml. If all 3 liquids are placed in a test tube, liquid ____ will be on the bottom.
   A. 1
   B. 2
   C. 3
5. A centiliter is a liter divided by _____.
   A. 1
   B. 10
   C. 100
   D. 1,000
6. To make a 10 percent solution of NaCl, you add 10 grams of NaCl to _____ ml of water.
   A. 10
   B. 90
   C. 100

7. 25 grams of NaCl added to 75 ml of water makes a _____ percent NaCl solution.
   A. 5
   B. 12
   C. 25
   D. 33
8. 50 grams of NaCl added to 150 ml of water makes a _____ percent NaCl solution.
   A. 12.5
   B. 25
   C. 50
   D. 66
9. A 2 M NaCl solution has _____ moles of NaCl in a liter of solution.
   A. 1
   B. 2
   C. 4
10. A 2 M NaCl solution has _____ molecules of NaCl in a liter of solution.
   A. 3.01×10^{11}
   B. 6.02×10^{11}
   C. 9.03×10^{23}
   D. 12.04×10^{23}

Match the correct answers

_____ 11. Molarity	A. 18 g/mole
_____ 12. Atomic mass	B. mg/ml
_____ 13. Density	C. 56 g/mole
_____ 14. Molecular mass of KOH	D. g/mole
_____ 15. Molecular mass of H_2O	E. moles/liter

_____ 16. Solute	A. how well something dissolves
_____ 17. Solvent	B. KOH
_____ 18. Solution	C. 12 percent $C_{12}H_{22}O_{11}$
_____ 19. Solubility	D. KOH + H_2O
_____ 20. Concentration	E. H_2O

_____ 21. Millimeter	A. meter/100
_____ 22. Decimeter	B. meter/1,000
_____ 23. Kilometer	C. meter/1,000,000
_____ 24. Micrometer	D. meter/10
_____ 25. Centimeter	E. meter x 1,000

_____ 26. Volume	A. atoms bonded together
_____ 27. Molecule	B. suggested explanation
_____ 28. Weight	C. amount of space something occupies
_____ 29. Chemical reaction	D. atoms rearranged
_____ 30. Hypothesis	E. force of gravity

Chemistry Exam Answer Keys

Exam # 1 (Lessons 1–4)

1. C
2. C
3. A
4. B
5. C
6. B
7. C
8. B
9. B
10. D
11. E
12. D
13. B
14. C
15. A
16. B
17. E
18. D
19. A
20. C
21. B
22. D
23. E
24. C
25. A
26. C
27. A
28. E
29. D
30. B

Exam # 2 (Lessons 5–8)

1. E
2. C
3. D
4. A
5. B
6. D
7. C
8. E
9. A
10. B
11. B
12. B
13. C
14. B
15. A
16. C
17. A
18. B
19. C
20. A
21. B
22. C
23. C
24. E
25. A
26. B
27. D
28. C
29. A
30. C

Exam # 3 (Lessons 9–12)

1. C
2. B
3. B
4. C
5. B

Match the correct answers

_____ 1. Model	A. floats
_____ 2. Molecule	B. suggested explanation
_____ 3. Hypothesis	C. atoms bonded together
_____ 4. Theory	D. behavior of something that you cannot see
_____ 5. Lower density	E. very well supported hypothesis

_____ 6. Mass	A. atoms are rearranged
_____ 7. Weight	B. amount of matter
_____ 8. Volume	C. smallest particles that are still an element
_____ 9. Chemical reaction	D. amount of space something occupies
_____ 10. Atom	E. force of gravity

Circle the correct answers

11. Knowledge from science _____.
    A. Needs to keep improving
    B. Proves theories to be true
    C. Can be trusted like the Bible
12. All observations in science are _____.
    A. Reproducible
    B. Of the same value
    C. Not always reproducible
13. A hypothesis is formed to try to _____.
    A. Describe something
    B. Explain what is observed
    C. State a fact
14. A scientific model _____.
    A. Describes something that cannot be seen
    B. Is a miniature of a larger object
    C. Is a well-supported hypothesis
15. A theory is a _____.
    A. Scientific model
    B. Fact
    C. Well supported hypothesis

Chemistry Quiz Answer Keys

Lesson 1
Introduction

1. D
2. C
3. B
4. E
5. A
6. B
7. E
8. D
9. A
10. C
11. A
12. C
13. B
14. A
15. C

Lesson 2
Metric Measurements in Chemistry

1. C
2. B
3. B
4. C
5. C
6. B
7. A
8. E
9. C
10. D
11. D
12. B
13. E
14. C
15. A

Lesson 3
Chemical Solutions — Percent Concentrations

1. C
2. D
3. B
4. E
5. A
6. B
7. B
8. A
9. B
10. C
11. A
12. B
13. A
14. C
15. B

Lesson 4
Chemical Solutions — Molarity

1. D
2. E
3. A
4. C
5. B
6. C
7. A
8. E
9. D
10. B
11. E
12. C
13. A
14. D
15. B