Solutions and Tests For Exploring Creation With Chemistry

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Exploring Creation With Chemistry

Solutions and Tests

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Exploring Creation With Chemistry

Thank you for choosing *Exploring Creation With Chemistry*. I designed this modular course specifically to meet the needs of the homeschooling parent. I am very sensitive to the fact that most homeschooling parents do not know chemistry very well, if at all. As a result, they consider it nearly impossible to teach to their children. This course has several features that make it ideal for such a parent.

1. The course is written in a conversational style. Unlike many authors, I do not get wrapped up in the desire to write formally. As a result, the text is easy to read and the student feels more like he or she is *learning*, not just reading.

2. The course is completely self-contained. Each module includes the text of the lesson, experiments to perform, problems to work, questions to answer, and a test to take. The solutions to the problems and questions are fully explained, and the test answers are provided. The experiments are written in a careful, step-by-step manner that tells the student not only what he or she should be doing, but also what he or she should be observing.

3. The chemicals for the experiments are all readily available at either the grocery or hardware store. In addition, nearly all of the experiments can be performed with household equipment such as glasses, measuring cups, spoons, etc. If you wish to perform every experiment contained in the module, however, I suggest that you purchase a set of equipment that is an optional part of the course. A list of the equipment and the cost involved is presented at the beginning of the student text.

4. Most importantly, this course is Christ-centered. In every way possible, I try to make the science of chemistry glorify God. One of the most important things that you and your student should get out of this course is a deeper appreciation for the wonder of God's creation!

I hope that you and your student enjoy taking this course as much as I have enjoyed writing it.

Pedagogy of the Text

(1) There are three types of exercises that the student is expected to complete: "on your own" problems, review questions, and practice problems.

- The "on your own" problems should be solved as the student reads the text. The act of working out these problems will cement in the student's mind the concepts he or she is trying to learn. The solutions to these problems are included as a part of the student's text. The student should feel free to use these solutions to help understand the problems.

- The review questions are conceptual in nature and should be answered after the student completes the module. They will help the student recall the important concepts from the reading. As your student's teacher, you can decide whether or not your student can look at the solutions to these questions. They are located in this book.

- The practice problems should also be solved after the module has been completed, allowing the student to review the important quantitative skills from the module. As your student's teacher, you can decide whether or not your student can look at the solutions to these problems. They are located in this book.

(2) In addition to the problems, there is also a test for each module in this book. **I strongly recommend that you administer each test once the student has completed the module and all associated exercises. The student should be allowed to have only a calculator, pencil, paper, and a copy of the periodic chart (provided in module #3 and the appendix) while taking the test.** I understand that many homeschoolers do not like the idea of administering tests. However, if your student is planning to attend college, it is *absolutely* necessary that he or she become comfortable with taking tests!

(3) Any information that the student must memorize is centered in the text and put in boldface type. In addition, all definitions presented in the text need to be memorized. Finally, if an equation must be used to answer any "on your own" problem, practice problem, or review question, then it must be memorized for the test. In general these student exercises are meant as a study guide for the tests. Skills and knowledge necessary to complete these student exercises will be required for the test.

(4) Words that appear in bold-face type (centered or not) in the text are important terms that the student should know.

(5) The equations are numbered so that I can refer to them easily.

(6) When looking at the solutions to the students exercises and tests, you will notice that every solution contains an underlined section. That is the answer. The rest is simply an explanation of how to get the answer. For questions that require a sentence or paragraph as an answer, the student need not have *exactly* what is in the solution. The basic message of his or her answer, however, has to be the same as the basic message given in the solutions.

Experiments

The experiments in this course are designed to be done as the student is reading the text. I recommend that your student keep a notebook of these experiments. This notebook serves two purposes. First, as the student writes about the experiment in the notebook, he or she will be forced to think through all of the concepts that were explored in the experiment. This will help

the student cement them into his or her mind. Second, certain colleges might actually ask for some evidence that your student did, indeed, have a laboratory component to his or her chemistry course. The notebook will not only provide such evidence but will also show the college administrator the quality of the chemistry instruction that you provided to your student. I recommend that your student performs the experiments in the following way:

- When your student gets to the experiment during the reading, have him or her read through the experiment in its entirety. This will allow the student to gain a quick understanding of what he or she is to do.

- Once the student has read the experiment, he or she should then start a new page in his or her laboratory notebook. The first page should be used to write down all of the data taken during the experiments and perform any calculation explained in the experiment.

- When the student has finished the experiment, he or she should write a brief report in his or her notebook, right after the page where the data and calculations were written. The report should be a brief discussion of what was done and what was learned. The report should be written so that someone who had never read the experiment in the text could understand the basics of what was done and what was learned. It needn't be incredibly detailed, but it should be written clearly and with good grammar.

- **PLEASE OBSERVE COMMON SENSE SAFETY PRECAUTIONS. The experiments are no more dangerous than most normal, household activities. Remember, however, that the vast majority of accidents do happen in the home. Chemicals should never be ingested; hot beakers and flames should be regarded with care; and OSHA recommends that all chemistry experiments be performed while wearing some sort of eye protection such as safety glasses or goggles.**

Question/Answer Service

For all those who use my curriculum, I offer a question/answer service. If there is anything in the modules that you do not understand - from an esoteric concept to a solution for one of the problems - just contact me via any of the methods listed below. This is my way of helping you and your student to get the maximum benefit from my curriculum.

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A Word About Grading

The physical sciences are, by far, the most difficult of all subjects to study. As a result, students often perform significantly worse in courses like chemistry and physics than they do in all other subjects, including math. This often makes the student feel that he or she is not talented in the sciences, because that's where the student gets his or her lowest grades. Often, however, this is not the case. Some of the best chemists and physicists I know received lower grades in chemistry and physics than in any of their other courses. In fact, my own *lowest* GPA in college was my chemistry GPA. Thus, just because a straight-A student gets B's or C's in this course, they should not be discouraged from taking more physical science courses.

Public schools have long recognized this fact, so they implement strategies that tend to "boost" their students' grades in the physical sciences. For example, all public schools give their students grades on their labs and homework. Since labs and homework are always performed with the help of the teacher and fellow students, the grades on these assignments are usually quite high. This tends to boost the lower test scores, allowing students to have grades that are comparable to their other courses. Since all public schools do this, and since college admissions people (or job interviewers) will be comparing your student to publicly-schooled students, you should probably do the same. Here are my suggestions on how to grade your student:

1. Give the student a grade for each lab that is done. This grade should not reflect the accuracy of the student's results. Rather, it should reflect how well the student followed directions and how well he or she wrote up the lab in his or her lab notebook.

2. Give the student a grade for each test. If a test problem contains multiple parts, it should be worth more points than other test questions that do not. As a general rule, I would say that every answer that a student must write down is worth one point. That way, their percentage grade can be calculated as total number of correct answers divided by the total number of answers given. Additionally, you can give partial credit. If a student plowed through the entire problem correctly but just messed up on the calculator, the student should receive 3/4 of a point. If the student got the first couple of steps correct and messed up after that, they should receive 1/2 of a point. Of course, this grading technique requires that you learn the subject right along with the student. This is, of course, what I recommend that you do to begin with!

3. The student's overall grade in the course should be weighted as follows: 35% lab grade, 65% test grade. A straight 90/80/70/60 scale should be used to calculate the student's letter grade. This is typical for most public schools.

Finally, I must tell you that I pride myself on the fact that this course is user-friendly and reasonably understandable. At the same time, however, *it is not EASY*. This is a tough course. I have designed it so that any student who gets a "C" or better on the tests will be VERY well prepared for college.