CHEMISTRY
& ECOLOGY

Properties of Atoms & Molecules

1:1 Answers IN GENESIS™

GOD'S DESIGN®

4th Edition

by Debbie & Richard Lawrence

God's Design® for Chemistry and Ecology is a complete chemistry and ecology curriculum for grades 3–8. The books in this series are designed for use in the Christian school and homeschool, and provide easy-to-use lessons that will encourage children to see God's hand in everything around them.

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The publisher and authors have made every reasonable effort to ensure that the activities recommended in this book are safe when performed as instructed but assume no responsibility for any damage caused or sustained while conducting the experiments and activities. It is the parents', guardians', and/or teachers' responsibility to supervise all recommended activities.

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Welcome to GOD'S DESIGN®

CHEMISTRY & ECOLOGY

You are about to start an exciting series of lessons on chemistry and ecology. *God's Design® for Chemistry & Ecology* consists of three books: *Properties of Atoms & Molecules*, *Properties of Matter*, and *Properties of Ecosystems*. Each of these books will give you insight into how God designed and created our world and the universe in which we live.

No matter what grade you are in, third through eighth grade, you can use this book.

3rd–5th grade

Read the lesson.

- Do the activity in the light blue box (worksheets will be provided by your teacher).
- Test your knowledge by answering the **What did we learn?** questions.
- Assess your understanding by answering the **Taking it further** questions.

Be sure to read the special features and do the final project.

There are also unit quizzes and a final test to take.

6th–8th grade

Read the lesson.

- Do the activity in the light blue box (worksheets will be provided by your teacher).
- Test your knowledge by answering the **What did we learn?** questions.
- Assess your understanding by answering the **Taking it further** questions.
- Do the Challenge section in the light green box. This part of the lesson will challenge you to do more advanced activities and learn additional interesting information.

Be sure to read the special features and do the final project.

There are also unit quizzes and a final test to take.

When you truly understand how God has designed everything in our universe to work together, then you will enjoy the world around you even more. So let's get started!

UNIT 1

Atoms & Molecules

- **Identify** and **describe** the parts of an atom using diagrams.
- **Use** the periodic table to determine the characteristics of atoms.
- **Describe** the relationship between atoms and molecules.

1

Introduction to Chemistry

The study of matter and molecules

What is chemistry?

Words to know:

chemistry chemist

matter

Chemistry may sound like a big word and a difficult subject to study, but it's not. **Chemistry** is simply the study of matter, and **matter** is anything that has mass and takes up space. Some examples of matter are water, wood, air, food, paper, your pet skunk, or your little brother. So if you are interested in learning more about anything around you, then you are ready to learn about chemistry.

Chemists are scientists who study what things are made of, how they react to each other, and how they react to their environment. Chemistry is the study of the basic building blocks of life and the world.

In chemistry you will learn about atoms and molecules. You will learn about how substances combine to make other substances. You will find out how a substance changes form and you will discover that God created our world with such intricate designs that we may never fully understand how everything works.

God has established laws that govern how chemicals react and how matter changes. Many of these laws seem mysterious because they happen on an atomic level. Although these changes cannot be seen with the naked eye, the results of these laws can be seen all around us. As you study atoms and molecules you will begin to understand these laws and appreciate the beauty of God's design on the atomic level.

What did we learn?

- What is matter?
- Does air have mass?
- What do chemists study?

Taking it further

- Would you expect to see the same reaction each time you combine baking soda and vinegar?

Chemistry is fun

As you will learn in the upcoming lessons, some materials are very stable and do not change easily. Other materials are very reactive and easily combine with other substances to make a new substance.

Purpose: To see a chemical reaction

Materials: baking soda, drinking cup, vinegar

Procedure:

1. Place 1 teaspoon of baking soda in a drinking cup.
2. Pour 1 tablespoon of vinegar into the cup. Now watch the reaction!

Conclusion: Vinegar is an acid and baking soda is a base. Acids and bases easily combine together to form salts. In this reaction they also produce a gas. Can you guess what that gas might be? It is carbon dioxide.

Soda fountain

For an even more impressive reaction, you can make a Mentos and diet soda fountain. This chemical reaction is very messy so this experiment must be done outside. This experiment happens quickly so you want to have everything ready before you start. Read through the directions below before you try the experiment so you know what to do.

Purpose: To make a diet soda fountain

Materials: 2-liter bottle of diet cola, heavy paper, tape, toothpick, Mentos® mints

Procedure:

1. Remove the cap from a 2-liter bottle of diet cola.
2. Make a tube to hold the mints: roll a piece of heavy paper into a tube that just fits around the mouth of the soda bottle. Tape the paper so it stays rolled up.
3. Use a toothpick to punch holes through the bottom of the tube just above the mouth of the bottle so that the toothpick goes through the tube and holds the mints in place.
4. Load up your tube with four or more mints.
5. Quickly remove the toothpick and step back so you don't get sprayed. You should see a fountain of soda. Be sure to clean up your mess when you are done.

Conclusion: This reaction is partially a chemical reaction and partially a physical reaction between the mints and the soda. Soda contains a gas called carbon dioxide. This gas is trapped between the liquid molecules. The mints have many tiny pits on their surfaces which allows the gas to collect very quickly and escape the liquid. There is also a chemical reaction between the mints and soda that further allows the gas to escape quickly producing a fountain of foam. Now, don't you think chemistry is fun?