

CHEMISTRY



Third Edition

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1A Section Objectives

After finishing this section, you should be able to

- list five reasons a Christian should study chemistry.
- define the Creation Mandate and the image of God in man and explain their significance to studying chemistry.
- define scientific modeling and contrast science and Scripture as paths to truth.
- compare and contrast a naturalistic worldview with a Christian worldview.
- explain how a career in chemistry can be of service to God.



1-1 A biblical worldview, like these lenses, allows you to see the world in focus.

"Today biologists are beginning to understand the origins of life's complexity—the exquisite optical mechanism of the eye, the masterly engineering of the arm, the architecture of a flower or a feather, the choreography that allows trillions of cells to cooperate in a single organism. The fundamental answer is clear: in one way or another, all these wonders evolved."

This quotation demonstrates the power of a person's worldview. The secularist and the Christian study the same marvelously complex world. But the secularist is moved to admire evolution, while the Christian praises God.

1A Why Study Chemistry?

1.1 Chemistry in Biblical Focus

If you have experienced God's saving grace, you have insight many experienced chemists lack. We cannot properly study chemistry unless we approach it from a Christian perspective. To many people, that statement sounds controversial—even nonsensical. After all, what does Scripture have to do with chemistry? What Bible verses explain the structure of atoms or the nature of chemical bonds?

True, the Bible is not a chemistry textbook. But the Bible confronts humans with a distinct **worldview**, a perspective from which to see and interpret all of life. Like a corrective lens, the Bible brings into focus every part of the world, including chemistry. As we look at chemistry through the lens of Scripture, we find that the best reasons to study chemistry are biblical ones.

1.2 Declaring the Glory of God

Why is the universe here? Why are we here? Romans 11:36, one of the most important verses in the Bible, answers these questions: "For of him [God], and through him, and to him, are all things; to whom be glory for ever. Amen." God made the world to declare His greatness. Even the study of chemistry shows us God's glory. As we look at the most basic components of matter, we should be amazed at the intelligence and power of the Creator. It's easy to admire people who can shape clay into beautiful pottery, steel into automobiles, petroleum into chairs, or soybeans into hormones. How much more should we marvel at the One Who created our universe with simply the word of His mouth?

The whole world is God's cathedral of praise, and chemistry is one of its stained-glass windows. This window is too vast and intricate for us to comprehend or re-create, but we can and must admire its beauty and the wisdom of its Maker. If you make an A in chemistry class but never lift your heart to God in worship during your study, you have failed to really understand chemistry. All things exist to declare God's glory. If we fail to see the glory of God in chemistry, we have missed the point.

1.3 Genesis and a Proper View of Chemistry

In its first chapter, the Bible begins to give us the proper worldview for science. Genesis 1 reveals that God made man as His great masterpiece. We are the only creation made in the **image of God** (Gen. 1:26–27). Being created in God's image means that we are like God in every way that it is appropriate for a creature to be like the Creator. This image makes us precious in His sight. We are in His faithful care (1 Pet. 4:19).

How does God's image in us affect what we do and how we act? Christ closely associates the **first commandment** with the **second commandment**: "And thou shalt love the Lord thy God... this is the

¹Carl Zimmer, "A Fin is a Limb is a Wing," *National Geographic*, November 2006, 114.

first commandment. And the second is like, namely this, Thou shalt love thy neighbor as thyself" (Mark 12:30–31). God deserves our total devotion because He is God, our Maker, Master, and Savior. Humans deserve our love because they are image bearers of God.

Soon after creating man in His own image, God gave His first command to mankind. The **Creation Mandate** (Gen. 1:26, 28) reveals why God made humans. He wants us to exercise good and wise dominion over the earth by managing and using His world and its resources.

Both the image of God in man and the Creation Mandate should motivate and guide our study of chemistry. The world God has given us to manage is made of chemicals. As soon as we seriously consider our calling to have dominion, we will ask questions that drive the study of chemistry. As we learn about the chemical composition of the world around us, we become more able to enrich the lives of God's image bearers. Useful medication, safer automobiles, and even better food packaging all depend on applications of chemistry.

Understanding that we live in a fallen world heightens the value of chemistry. The world we have been assigned to manage is not simply wild; it is severely broken. Children develop leukemia, water often carries deadly diseases, and diabetes afflicts millions. How should Christians respond to these challenges? By imitating their Lord. The Lord Jesus had compassion on people suffering in a fallen world. Compassion did not distract Him from teaching and preaching; instead, His works of mercy empowered His message of forgiveness and eternal life. Meeting humans' spiritual needs and meeting their physical needs are linked in the Bible: "And Jesus went about all Galilee, teaching in their synagogues, and preaching the gospel of the kingdom, and healing all manner of sickness and all manner of disease among the people" (Matt. 4:23). Furthermore, it would be hypocritical for us to minister the gospel without meeting people's physical needs when doing so lies within our power. "As we have therefore opportunity, let us do good unto all men, especially unto them who are of the household of faith" (Gal. 6:10).

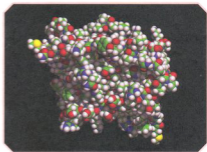
When we look at chemistry through the lens of a Christian worldview, we realize that chemistry gives us an opportunity to practice dominion science. **Dominion science** is scientific activity that exercises dominion for the glory of God and the benefit of other humans. To keep you thinking about this connection between Genesis and a correct view of chemistry, this textbook begins each chapter with a section titled "Dominion Science Problem." The section presents a real problem that humans have faced, and it invites you to solve the problem using the chemistry you will learn in the chapter. These problems let you practice studying chemistry for God's glory by obeying His most basic commands: exercising dominion and loving others (Gen. 1:28; Mark 12:30–31).

1.4 Science as Modeling

Having a proper view of science in general and chemistry in particular helps us put science in its proper context. How does knowledge gained from scientific pursuits compare to biblical truths? Science, unlike God's



1-2 The chemicals within these capsules, the capsules themselves, and even the container that holds them are all the products of careful chemistry.



1-3 Chemistry and the models it develops help us to recognize our God's greatness.

Word, does not establish truth or depict reality absolutely. Science is about modeling the world.

What comes to mind when you think of a model? You may think of a smaller physical representation of a larger object, like a model car or airplane. Some models are more than physical representations; instead, they are mental or mathematical representations. **Scientific models** are simplified representations that characterize a system or explain a phenomenon. Scientific models may be expressed as computer simulations, pictures, formulas, descriptions, and physical representations.

Richard Feynman, physicist and Nobel Prize recipient, said, "What I cannot create, I cannot understand." Scientists create models to represent reality in an effort to understand the universe. These models are simplified replicas of reality that help us understand phenomena that overwhelm our abilities to observe directly. Feynman did not use science to re-create reality but to create a visual or mathematical representation of what reality might be like.

Chemists operate under the same modeling process as physicists like Feynman. For example, the atomic model of matter, which says that all matter is composed of atoms, has been refined over the centuries to best represent experimental data. The ways in which atoms connect and interact are described by several molecular-bonding models. All these models are attempts to better understand matter and its interactions.

Modeling and Uncertainty

The modeling character of chemistry and of science in general impacts how certain one can be in science. Consider Feynman's words: "Scientific knowledge is a body of statements of varying degrees of certainty—some most unsure, some nearly sure, but none *absolutely* certain. Now, we scientists are used to this, and we take it for granted that it is perfectly consistent to be unsure—that it is possible to live and *not* know."⁴ Feynman understood that *the goal of science is not truth but workability*. Models are not constructed to match the natural world. Such models would be too complicated for a finite mind to construct or use. Models are constructed to help scientists produce workable, useful answers to the questions scientists ask. Models help us *live* in this world, not *know* this world.

Uncertainty and Faith

Christians must realize that there is uncertainty in science. Science has become a sort of religion in our culture. Centuries ago, European and American cultures derived their beliefs and values from some kind of religious authority, usually related to the teachings of the Bible. Modern civilization, however, relies on science for certainty (infallibility) and objectivity. We deem science worthy of **faith**. But science is not about truth. It is about producing workable models.

Richard Feynman (1918–88) was one of the greatest American physicists of the twentieth century. His work expanded our current understanding of quantum electrodynamics. A Nobel Prize winner in 1965, Feynman worked on the atomic bomb and was a member of the presidential committee investigating the Space Shuttle Challenger accident.



1–4 Maps represent reality just as models represent reality. They are not the reality itself.

What is **faith**? Read Hebrews 11:1–3. How does faith relate to one's presuppositions and view of science?

⁴Richard P. Feynman, *What Do You Care What Other People Think?: Further Adventures of a Curious Character* (New York: W. W. Norton, 1998), 245.

Only God and His Word are infallible and objective. His Word deserves our trust: "Every word of God is pure: he is a shield unto them that put their trust in him" (Prov. 30:5). His Word cannot be disproved: "The scripture cannot be broken" (John 10:35). His Word is truth: "Thy word is truth" (John 17:17). Scripture's teachings, though not specifically scientific, affect how science is conducted.

As we grapple with the nature of science, we realize the foolishness of using science to disprove the Bible. Since science is concerned with modeling and workability, it cannot test a book filled with final answers and ultimate truths. To do so would be like trying to measure the height of the Empire State Building using a ruler; the tool does not fit the purpose. This world belongs to God; therefore, every part of it testifies to His existence and truthfulness. When someone claims that chemistry (or any other science) disproves the Bible, he is in fact claiming that his model contradicts biblical reality. There is always another way to interpret the evidence so that it glorifies God and is consistent with His Word.

Usefulness of Modeling

The model-making nature of science should not keep us from taking it seriously. It certainly did not keep Richard Feynman from doing science. He participated in scientific research such as the Manhattan Project, and his scientific investigation led to important answers regarding the cause of the tragic explosion of the *Challenger* space shuttle. Scientific model making is a glorious calling for the Christian. The application of science creates opportunities to glorify God as we glimpse His creative power and to use the earth's resources to help other people.

1.5 Confronting Error

Another reason to study chemistry is that it exposes error in false worldviews. All scientists approach their work with certain presuppositions, which they derive from their worldview. A **presupposition** is an idea that a person assumes to be true without proof. The most common presuppositions concern the nature of reality and the nature of good and evil. Some chemists approach their science with the presuppositions of a Christian worldview; some with the presuppositions of a naturalistic or secular worldview. Both groups live by faith, but they have different objects for their faith. A scientist's presuppositions affect his interpretation of scientific phenomena by causing him to prefer certain conclusions over other conclusions. This preference is called **bias**.

A Naturalistic Worldview

A **naturalistic worldview** assumes that matter is all that exists and that human reason informed by science is the only reliable path to truth. Sometimes this extreme faith in reason and science is called **scientism**. Carl Sagan expressed the essence of this worldview when he said, "The cosmos [the material universe] is all there is, or was, or ever will be."

Naturalists have developed the theory of evolution to explain the chance existence of elements, plants, animals, people, and ultimately the universe. Since there is no Creator in this worldview, humans are not accountable to a God. There is no absolute code of morality. People are tiny specks in a huge, impersonal world with little to elevate their

Scripture tells us...

- why we should study chemistry.
- how and when the elements came into existence.
- our substance and significance.
- how to use chemistry.



1-5 Using science in an attempt to disprove the infallible Word of God is like trying to use a ruler to determine the height of the Empire State Building.



1-6 The Manhattan Project led to the development of nuclear weapons.

A **bias** is a person's preference for certain conclusions over other conclusions. A bias may be good or bad depending on which presuppositions it is based on.