

# Solved Exercise

## (Nature of Science in Chemistry)

### Short Question Answers

#### 1. How does chemistry help a doctor to know about the chemical nature of medicine?

Chemistry enables doctors to understand the molecular structure of medicines and how they interact with the human body. For example, biochemistry helps doctors learn how drugs are absorbed, metabolized, and eliminated, which is essential for proper medication use, determining the correct dosage, and identifying potential side effects.

#### 2. In what ways does technological innovation help to understand the development of new materials?

Technological advancements such as nanotechnology, computational chemistry, and spectroscopy allow scientists to analyze materials at the atomic level. These innovations help in the design of new materials like superconductors, biodegradable plastics, and medical implants, which have unique properties for specific applications.

#### 3. Differentiate between geochemistry and astrochemistry.

Geochemistry studies the Earth's composition, focusing on rocks, minerals, and the interaction of chemical elements in our planet's environment. Astrochemistry, however, deals with the chemical processes in space, studying the formation of molecules like water and organic compounds in stars, planets, and interstellar clouds.

#### 4. Correlate the use of science, technology, and engineering with an example.

An example of the correlation between science, technology, and engineering is the development of synthetic polymers, such as nylon. Chemistry provides the foundational knowledge necessary to create these polymers, while advancements in technology enable their large-scale production. Engineering then applies these synthetic materials across various industries, including textiles, automotive, and medical devices.

#### 5. Compare and contrast organic and inorganic chemistry.

**Organic Chemistry:** This branch focuses on carbon-containing compounds, which are vital for life processes and have significant industrial applications, including pharmaceuticals and plastics.

**Inorganic Chemistry:** This area studies non-carbon compounds such as metals, salts, and minerals, with applications in catalysts, construction, and environmental science.

#### 6. What are the uses of nuclear chemistry?

Nuclear chemistry has significant applications, such as in **medicine** (radiation therapy and diagnostic imaging), **energy** (nuclear reactors providing electricity), and **industry**

(using radioisotopes to track materials or sterilize equipment). It also plays a role in understanding radioactive decay and nuclear reactions.

### **7. How does geochemistry help solve problems such as pollution and climate change?**

Geochemistry helps solve problems like pollution and climate change by studying the movement of chemicals through soil, water, and air. It tracks pollutants such as heavy metals and industrial chemicals, aiding in pollution control. Additionally, geochemistry is essential for understanding the carbon cycle, which is key to managing greenhouse gases and developing strategies to mitigate climate change.

### **8. How is organic chemistry applied in medicines, biochemistry, and industrial science?**

Organic chemistry is vital in **medicine** for developing new drugs, in **biochemistry** for studying molecules like DNA and enzymes essential for life, and in **industry** for creating materials such as polymers, fuels, and dyes that are foundational to many products

---

---

### **1. Define chemistry and its interactions with other matter and energy.**

**Answer:** Chemistry is the branch of science that studies the composition, properties, and changes of matter. It explores how different substances interact with each other and with energy. For example, when you burn wood, it reacts with oxygen (matter) and produces heat (energy) along with new substances like ash and gases.

---

### **2. Describe the applications of inorganic chemistry and its importance in our daily lives.**

**Answer:** Inorganic chemistry focuses on substances that don't contain carbon-hydrogen bonds, like metals, minerals, and salts. It's important because:

- **In construction**, we use cement and metals.
  - **In healthcare**, we use salts like iodine in medicines.
  - **In agriculture**, fertilizers contain inorganic compounds that help plants grow. These examples show how inorganic chemistry helps in everyday life.
- 

### **3. With the help of a few examples, highlight the relation between science, technology, and engineering.**

**Answer:** Science, technology, and engineering are connected:

- **Science** gives us knowledge about the natural world (e.g., chemistry explains how batteries work).
- **Technology** uses scientific knowledge to create useful tools (e.g., making batteries for phones).

- **Engineering** applies both science and technology to design and build things (e.g., engineers create devices using batteries). They work together to improve our daily lives, like making phones, computers, and cars.
- 

#### 4. Evaluate the role of chemistry in environmental science.

**Answer:** Chemistry plays a big role in understanding and solving environmental problems:

- It helps us study pollution, like how gases from cars cause air pollution.
  - It's used to clean water by removing harmful chemicals.
  - Chemistry helps in the creation of eco-friendly materials, like biodegradable plastics. Overall, chemistry helps protect the environment by finding ways to reduce and clean up pollution.
- 

#### 5. How does geochemistry help us solve problems such as pollution and climate change?

**Answer:** Geochemistry is the study of the Earth's chemical composition and processes. It helps solve pollution and climate change by:

- Analyzing soil and water to detect harmful pollutants.
  - Studying the composition of gases in the atmosphere to understand climate change.
  - Helping scientists track the sources of pollution and find ways to reduce its impact on the Earth.
- 

#### 6. How is organic chemistry applied in medicines, biochemistry, and industrial science?

**Answer:** Organic chemistry studies carbon-based compounds and is important in:

- **Medicines:** It helps create drugs that treat diseases, like antibiotics and painkillers.
  - **Biochemistry:** Organic chemistry explains the molecules in our bodies, like proteins, carbohydrates, and DNA.
  - **Industrial Science:** It's used to make plastics, fuels, and synthetic fibers used in clothing and packaging. Organic chemistry is essential for advancements in health, biology, and industry.
-