

# 1.2 Elements of Life

---

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 10 marks****KEY WORDS** carbon 碳 • amino acids 氨基酸 • nucleotides 核苷酸

## Objective

---

Build the skills to answer exam questions on the **elements of life** and the special role of carbon.

**You must be able to:**

- name the main elements in living matter (C, H, O, N, P, S)
- explain why **carbon** 碳 is central (four covalent bonds)
- link carbon's bonding to the diversity of biological molecules

## 1 Worked examples

---

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

### ■ The elements of life

Living matter is built mostly from a few elements: **carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur** (CHONPS). Trace elements (like iron) also matter.

### ■ Why carbon is central

**Carbon** has four valence electrons, so it forms **four stable covalent bonds**. This lets it build long chains, branches, and rings — the skeletons of all biological molecules.

### ■ Carbon's versatility

Because carbon can bond to itself and to many other elements, it produces an enormous variety of stable molecules — the basis of life's molecular diversity.

### ■ A worked link

Fatty acids, sugars, amino acids, and nucleotides all have carbon backbones; their different arrangements (built on carbon's four bonds) give them different structures and functions.

## 2 Practice

---

Now apply the methods above.

**2.1** Name four of the main elements found in living matter. [2]

---

---

**2.2** How many covalent bonds can carbon form? [1]

---

**2.3** Why can carbon build such varied molecules? [1]

---

## 3 Exam-style questions

---

**3.1** Carbon is central to biological molecules because it can form [1]

|   |   |
|---|---|
| A | B |
| C | D |

- A** one covalent bond
- B** two covalent bonds
- C** four covalent bonds
- D** ionic bonds only

**3.2** A student examines the backbones of a fatty acid, a sugar, and an amino acid.

(a) What element forms the backbone of all three? [1]

(b) Explain how carbon's bonding allows chains, branches, and rings. [2]

**3.3** Explain why carbon's ability to form four bonds contributes to the diversity of life's molecules. [2]