

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]
