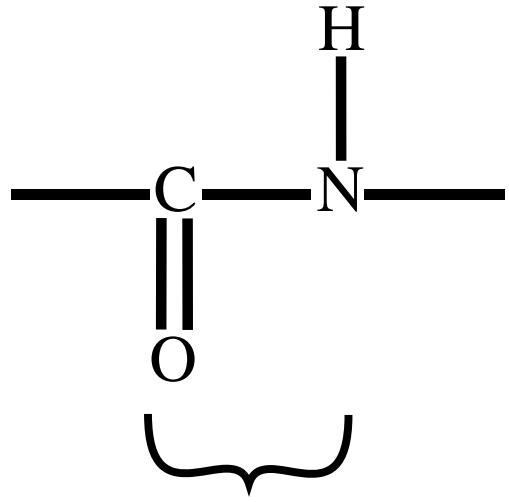
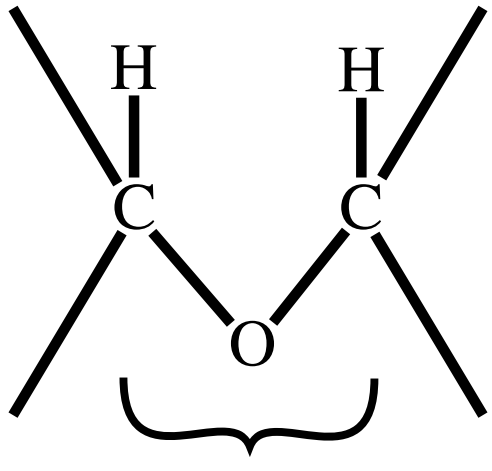
# Polymer Bonds

A Level

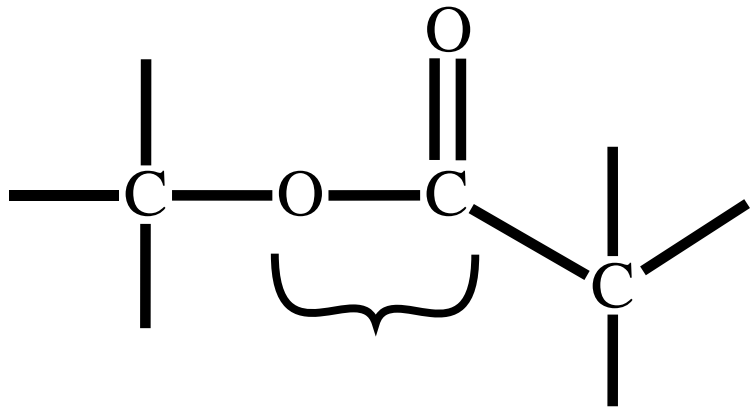
The images below show different types of bonds present in biological polymers.



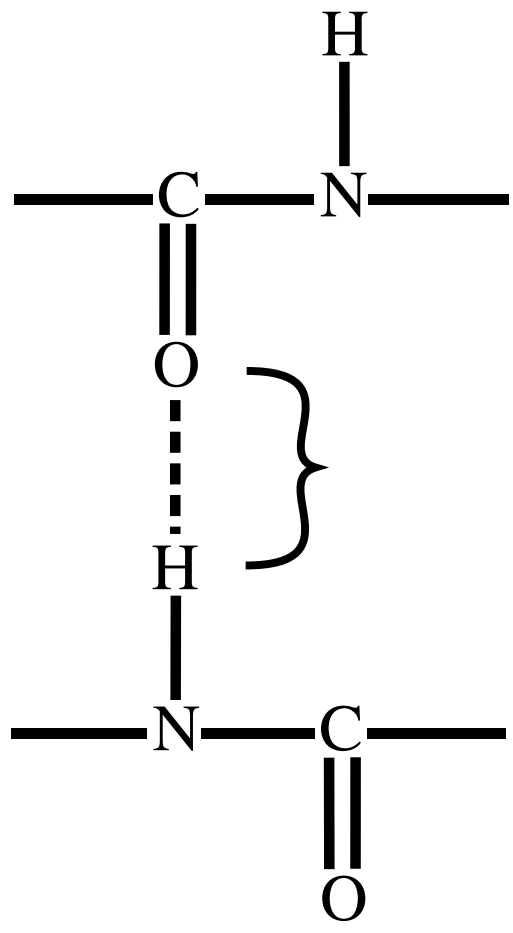

A



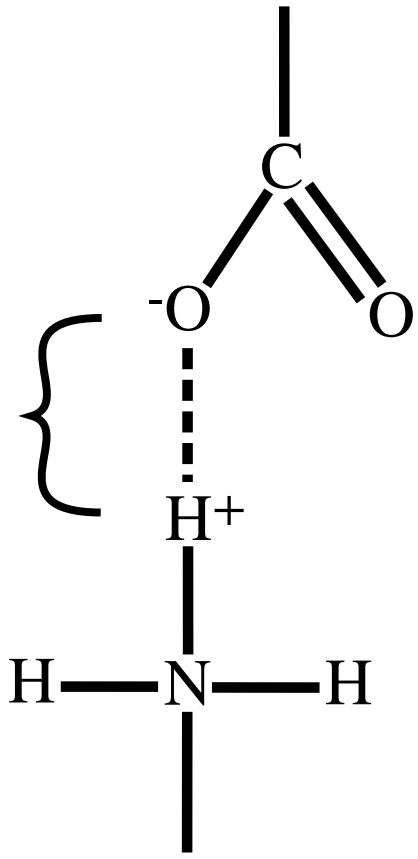

B



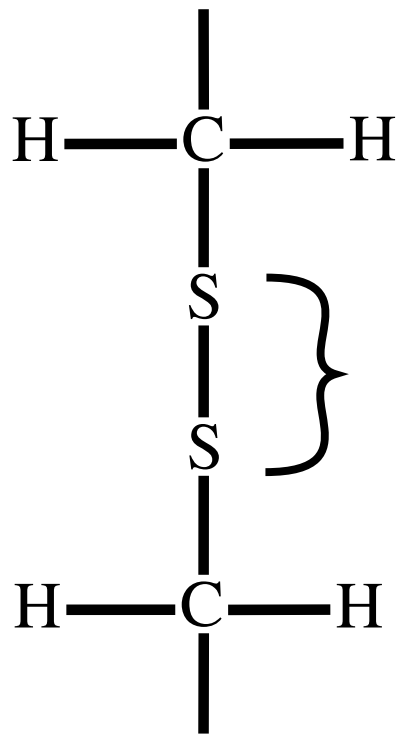

C



D



E




F

## Part A Bond types

Match the bond type to the image above.

| Image | Bond type |
|---|---|
| A | |
| B | |
| C | |
| D | |
| E | |
| F | |

Items:

**disulfide** **ionic** **peptide** **hydrogen** **phosphodiester** **ester** **glycosidic**

## Part B Carbohydrates

Which of the bond types above is part of disaccharides and polysaccharides? Select all that apply.

- [ ] A
- [ ] B
- [ ] C
- [ ] D
- [ ] E
- [ ] F

## Part C Lipids

Which of the bond types above is part of triglycerides and phospholipids? Select all that apply.

- [ ] A
- [ ] B
- [ ] C
- [ ] D
- [ ] E
- [ ] F

## Part D Proteins - primary structure

Which of the bond types above is part of the primary structure of proteins? Select all that apply.

- [ ] A
- [ ] B
- [ ] C
- [ ] D
- [ ] E
- [ ] F

## Part E Proteins - secondary structure

Which of the bond types above is/are responsible for maintaining the secondary structure of proteins? Select all that apply.

- [ ] A
- [ ] B
- [ ] C
- [ ] D
- [ ] E
- [ ] F

## Part F Proteins - tertiary structure

Which of the bond types above is/are responsible for maintaining the tertiary structure of proteins? Select all that apply.

- [ ] A
- [ ] B
- [ ] C
- [ ] D
- [ ] E
- [ ] F

Adapted with permission from OCR A Level January 2002, Biology Foundation, Question 1

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# Enzyme Reaction Variables

A Level

C C C

**Figure 1** below shows the same enzyme-controlled reaction performed in three different conditions.

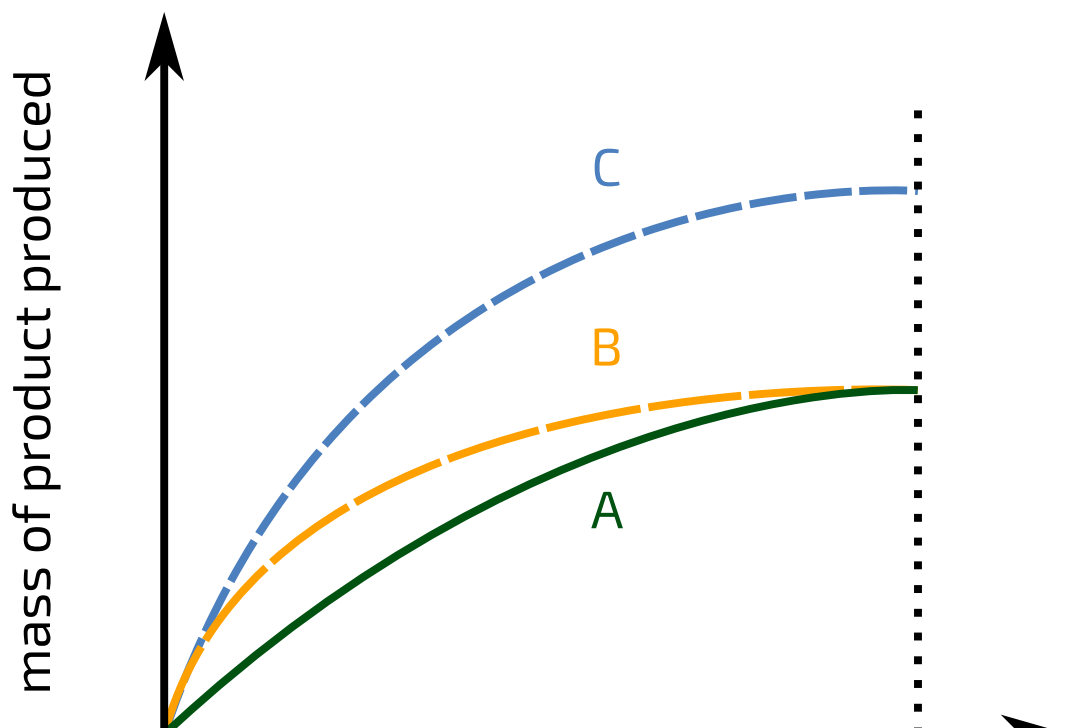


**Figure 1:** Mass of product produced over time for an enzyme-controlled reaction in three different conditions: A, B, and C. In all three conditions, no more product is being produced after time T.

## Part A A versus B

Which of the following could explain the differences between A and B? Select all that apply.

- [ ] Condition B is a higher temperature than condition A.
- [ ] Condition B is a lower temperature than condition A.
- [ ] Condition B is a higher $\mathrm{pH}$ than condition A.
- [ ] Condition B is a lower $\mathrm{pH}$ than condition A.
- [ ] Condition B has a higher substrate concentration than condition A.
- [ ] Condition B has a lower substrate concentration than condition A.
- [ ] Condition B has a higher enzyme concentration than condition A.
- [ ] Condition B has a lower enzyme concentration than condition A.

## Part B A versus C

Which of the following could explain the differences between A and C? Select one option.

- ( ) Condition C has a higher substrate concentration than condition A.
- ( ) Condition C has a higher enzyme concentration than condition A.
- ( ) Condition C has a lower enzyme concentration than condition A.
- ( ) Condition C has a lower substrate concentration than condition A.

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# Biochemical Test Results

A Level

Most of the major types of molecules found in cells can be detected using simple biochemical tests.

In each part below, identify the molecules present in the solution based on the information given.

## Part A Solution A

Four test tubes, each containing solution **A**, were each used in a different biochemical test. The results are shown in the table below.

| **Test performed** | Benedict's test | Biuret test | Iodine test | Emulsion test |
|---|---|---|---|---|
| **Appearance of solution after test** | Colour: blue | Colour: purple | Colour: blue/black | No emulsion formed |

Which of the following molecules could be present in solution **A**? Select all that apply.

- [ ] glucose
- [ ] fructose
- [ ] galactose
- [ ] starch
- [ ] proteins
- [ ] triglycerides
- [ ] none of the above

## Part B Solution B

Four test tubes, each containing solution **B**, were each used in a different biochemical test. The results are shown in the table below.

| **Test performed** | Benedict's test | Biuret test | Iodine test | Emulsion test |
|---|---|---|---|---|
| **Appearance of solution after test** | Colour: yellow/orange | Colour: blue | Colour: yellow/brown | Emulsion formed |

Which of the following molecules could be present in solution **B**? Select all that apply.

- [ ] glucose
- [ ] fructose
- [ ] galactose
- [ ] starch
- [ ] proteins
- [ ] triglycerides
- [ ] none of the above

## Part C Solution C

Four test tubes, each containing solution **C**, were each used in a different biochemical test. The results are shown in the table below.

| **Test performed** | Benedict's test | Biuret test | Iodine test | Emulsion test |
|---|---|---|---|---|
| **Appearance of solution after test** | Colour: blue | Colour: blue | Colour: yellow/brown | No emulsion formed |

A fifth tube of solution **C** was heated and dilute hydrochloric acid was added. After a few minutes, an alkaline solution was added, and Benedict's test was performed again. This time, the solution turned red.

Which of the following molecules could be present in solution **C**? Select all that apply.

- [ ] glucose
- [ ] fructose
- [ ] galactose
- [ ] maltose
- [ ] sucrose
- [ ] lactose
- [ ] proteins
- [ ] triglycerides
- [ ] none of the above

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# Base Proportions

A Level

C C C

One strand of a section of DNA has the following sequence of bases:

AATCGGTCTTGCGGCCAAGGCCCTT

The complementary strand is not shown.

## Part A Adenine

For this section of DNA, what percentage of bases are adenine?

## Part B Thymine

For this section of DNA, what percentage of bases are thymine?

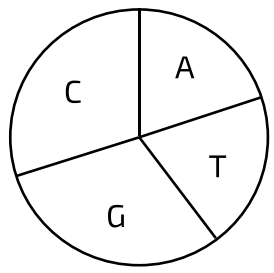
## Part C Cytosine

For this section of DNA, what percentage of bases are cytosine?

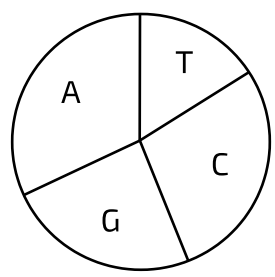
## Part D Guanine

For this section of DNA, what percentage of bases are guanine?

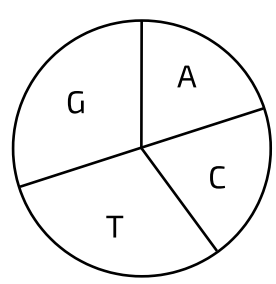
## Part E Pie chart proportions



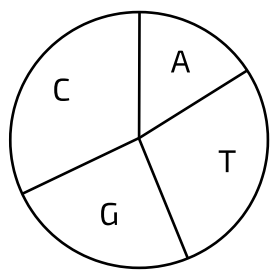

A



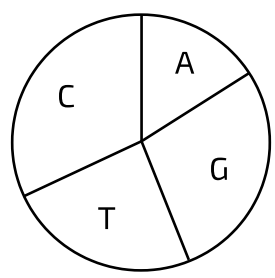

B



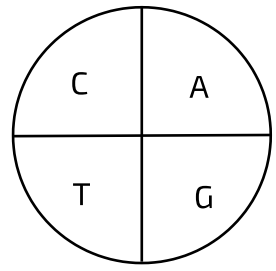

C




D




E




F

Match the pie chart to the proportion.

- Proportion of bases in the single-strand sequence: ☐
- Proportion of bases in the double-stranded DNA sequence: ☐

Items:

A B C D E F

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# Comparing Nucleic Acids

A Level

## Part A Structures

Complete the table below.

| | DNA | RNA |
|---|---|---|
| name of sugar present | | |
| no. of carbon atoms in sugar | | |
| no. of polynucleotide chains present in the molecule | | |
| nitrogenous bases present | adenine, cytosine, guanine, and | adenine, cytosine, guanine, and |

Items:

**thymine** **uracil** **ribose** 6 5 1 **deoxyribose** 2

## Part B Functions

Match the nucleic acid to its function in the table below.

| Nucleic acid | Function |
|---|---|
| | brings amino acids together into the correct sequence |
| | together with proteins, is part of the structure of a ribosome |
| | carries the protein-coding sequence from the nucleus/nucleoid to a ribosome |
| | a highly stable template for proteins which is replicated and inherited by daughter cells during cell division |

Items:

**messenger RNA (mRNA)** **ribosomal RNA (rRNA)** **transfer RNA (tRNA)** **DNA**

Adapted with permission from OCR A Level June 1999, Science Modular Central Concepts in Biology, Question 3a

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# Nucleic Acid Processes

A Level

The figures below show three different processes involving nucleic acids.

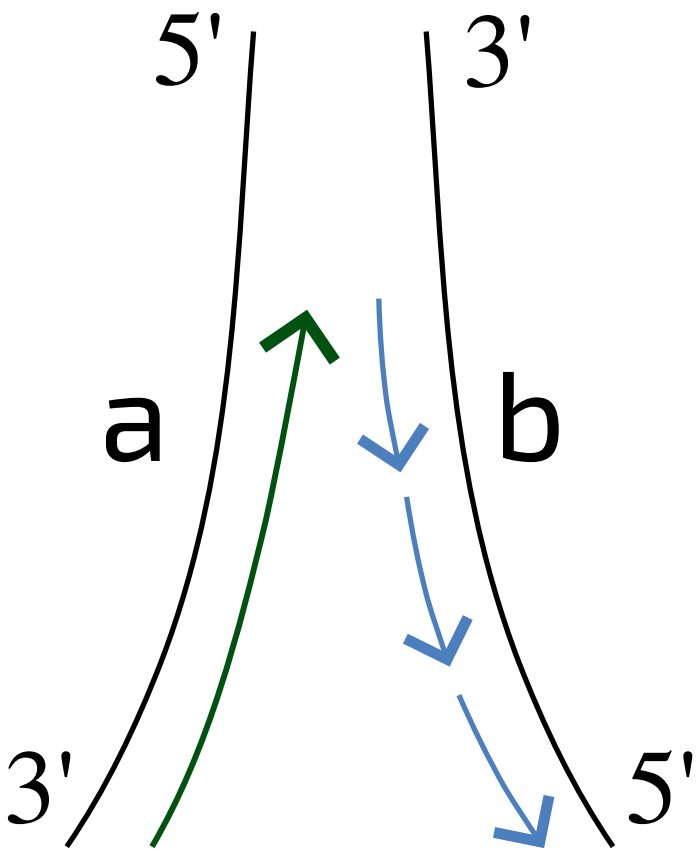


**Figure 1:** A molecule containing two nucleic acid strands is unzipping, and two new strands are forming.

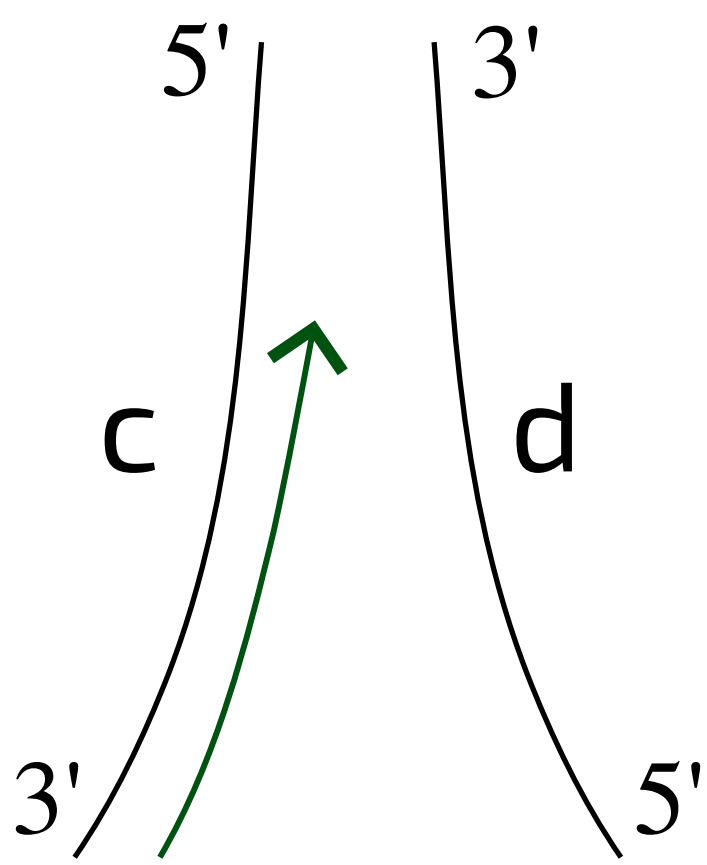

**Figure 2:** A molecule containing two nucleic acid strands is unzipping, and one new strand is forming.

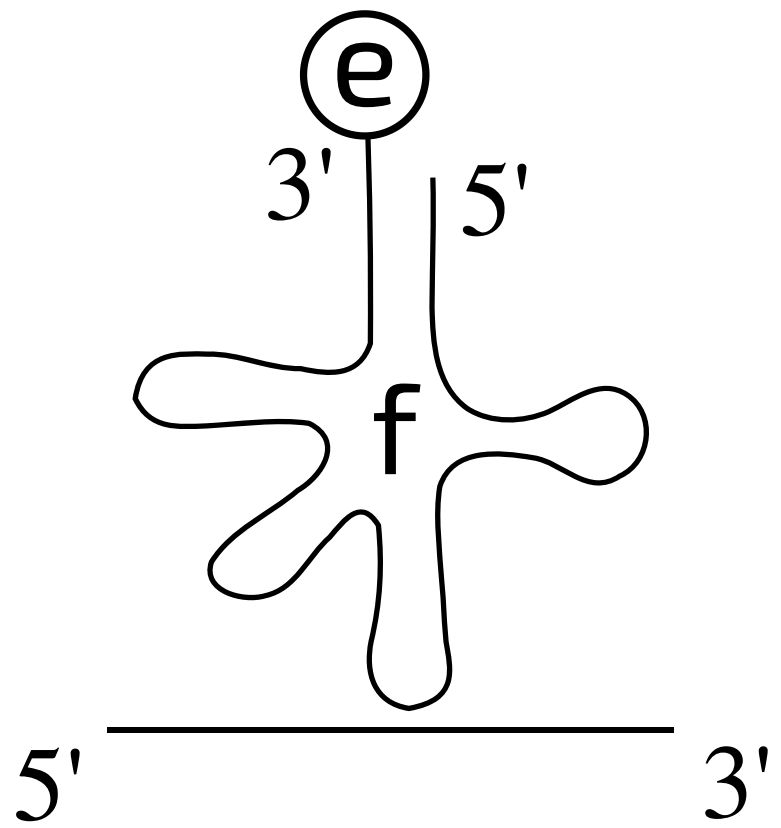


**Figure 3:** A nucleic acid with a complex two-dimensional structure is bound at one end to a non-nucleic-acid molecule, and bound at the other end to a linear nucleic acid.

## Part A Processes

Match the figure above to the process in the table below.

| Figure | Process |
|---|---|
| 1 | |
| 2 | |
| 3 | |

Items:

**DNA replication** **post-transcriptional modification** **mutation** **chromatin condensation** **translation** **transcription**

## Part B Strands (a) & (b)

What is the name given to strand (a) in the process shown in Figure 1?

What is the name given to strand (b) in the process shown in Figure 1?

## Part C Strands (c) & (d)

What is the name given to strand (c) in the process shown in Figure 2?

What is the name given to strand (d) in the process shown in Figure 2?

## Part D Molecules (e) & (f)

Match the molecule to the label in Figure 3.

- Molecule (e): [ ]
- Molecule (f): [ ]

Items:

**amino acid** **DNA** **protein** **transfer RNA (tRNA)** **messenger RNA (mRNA)** **ribosomal RNA (rRNA)**

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