QB1 – Quaternary Structure and Functional Proteins

Name:

Date:

1. <u>Describe the quaternary structure of a protein.</u>
The structure which arises when **multiple polypeptide chains** combine and interact to form a functional protein.

2. <u>Explain why not all proteins have a quaternary structure.</u>
Some proteins are active and **can function without the need for other polypeptide chains.**

3. <u>Why is it necessary for some proteins to have a quaternary structure?</u>
Some proteins need to be made from multiple polypeptide chain so that **the overall protein structure is complex enough to perform its desired function.**

4. <u>What are the components of a conjugated protein? Give an example of a conjugated protein.</u>
A conjugated protein consists of a **standard protein bound to a prosthetic group**. An example of this is **hemoglobin** which contains a heme prosthetic group.

5. <u>Explain the difference between a fibrous and a globular protein.</u>
A fibrous protein is arranged into **long, thin fibres**. They are used typically as **structural proteins**, giving the overall **shape** and **strength** to a structure, such as the protein keratin in hair.
A globular protein is arranged into a **ball-like shape**. They are often found as **enzymes**, and have an active site.

6. <u>The diagram below shows an example of an insulin protein. With reference to this, define the following:</u>
Primary Structure: The sequence of **amino acids** which make up an individual polypeptide chain.
Secondary Structure: The **local arrangement** of the primary structure. Such as the **α-helices** present in each polypeptide chain.
Tertiary Structure: The **overall 3D structure** of a polypeptide chain, its general shape.

Quaternary Structure: The overall protein which contains **multiple polypeptide** chains, such as the 4 chains present in this structure.

Produced by Adam Stubbs at Newcastle University as part of a summer outreach project.
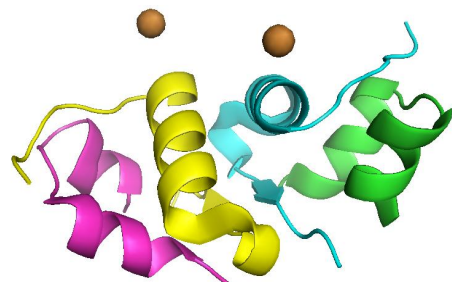
Prosthetic Group: Any **non-protein groups** involved in the overall conjugated protein structure, like the copper ions shown.