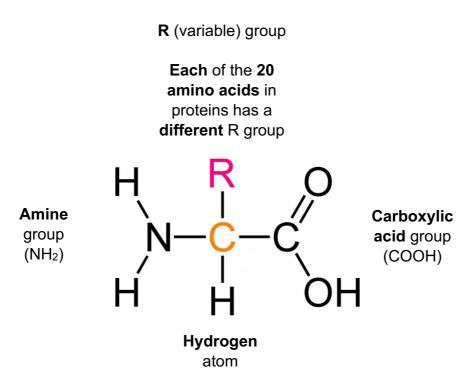
A. AMINO ACIDS

• Amino acids are joined together by condensation reactions to form a protein (polypeptide)

Structure of an amino acid



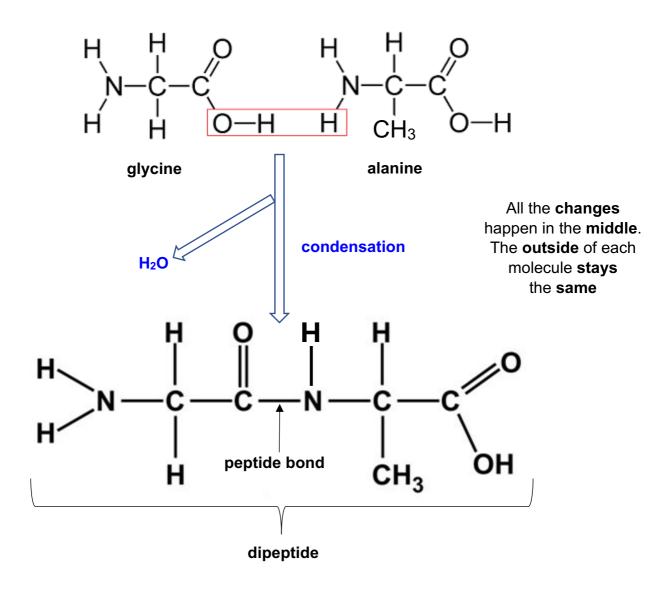
- Proteins, or polypeptides, are made by joining amino acids together
- There are 20 different amino acids, each with a different R group

A **PROTEOME** is **all the proteins** that can be **produced** by a cell, tissue or organism

Every individual has a unique PROTEOME

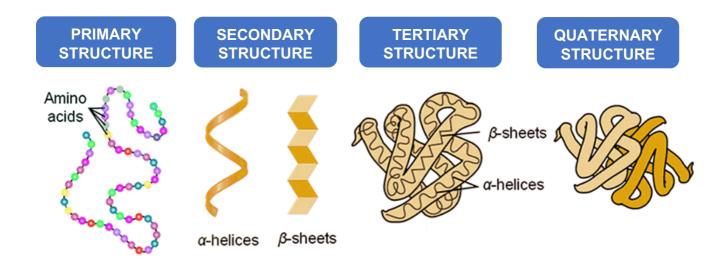
B. MAKING A DIPEPTIDE

- A dipeptide is made up of two amino acids, joined by a condensation reaction.
- The amino acid **glycine** has the R group 'H'. The amino acid **alanine** has the R group 'CH₃'.



- Proteins (polypeptides) are made by doing this several times to produce a long chain of amino acids by condensation reactions
- Amino acids can be joined together in any sequence giving a huge range of possible polypeptides
- Each protein is unique as it has a specific sequence of amino acids
- Each gene codes for production of a specific sequence of amino acids
 a protein / polypeptide

C. PROTEIN STRUCTURE



The sequence of amino acids in the polypeptide chain

This **controls how** the chain will **fold** later

The chain twists or coils to produce α-helices or β-pleated sheets

These are formed due to hydrogen bonds forming between non-adjacent NH2 and COOH groups

The chain **folds** to give the **final 3-D** structure

This is determined by the interactions and charges of different R groups

These include:

- ionic bonds
- disulphide bonds
- hydrophobic interactions

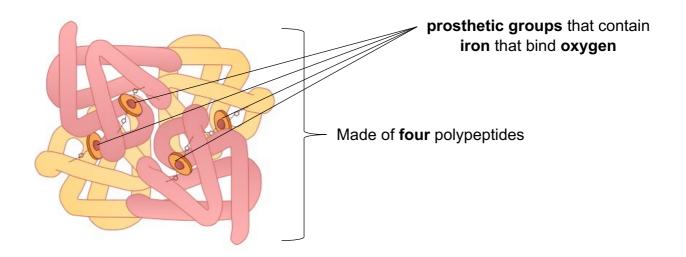
More than one polypeptide chain is linked together

OR:

The polypeptide chain contains inorganic prosthetic groups to help it function e.g. iron in haemoglobin

Not all proteins have this structure

Example of a quaternary structure - haemoglobin



D. EXAMPLES OF PROTEINS

• A popular **multiple-choice** question.

NAME	TYPE	DESCRIPTION
COLLAGEN	Structural	 It has three polypeptides wound together. This forms a rope-like shape, which gives strength. Prevents the skin from tearing Prevents bones from fracturing and gives ligaments tensile strength.
SPIDER SILK	Structural (Linear)	 It is used to make webs for catching prey and 'walking' on. It has a very high tensile strength and becomes even stronger when stretched = less chance of breaking.
INSULIN	Hormone	 Involved in lowering blood glucose concentration. It binds to receptors on liver cells and causes glucose to be converted to glycogen and stored.
IMMUNOGLOBULIN	Antibody	 They bind to antigens on pathogens. Each antibody has a different tertiary structure, specific to one antigen.
RUBISCO	Enzyme (Globular)	 Involved in photosynthesis. It fixes CO₂ to make sugars and other compounds.
RHODOPSIN	Pigment	 It makes the rod cells in the retina light-sensitive. It has a non-amino part called retinal that absorbs light and sends electrical impulses to the brain. Used for night vision.