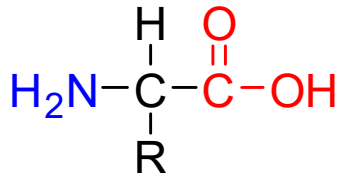


WA1 – Amino Acids

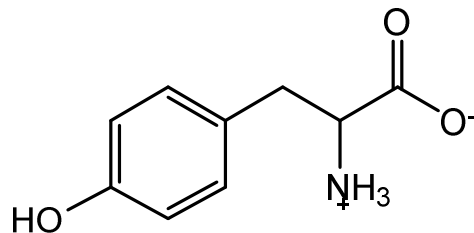
Name:

Date:

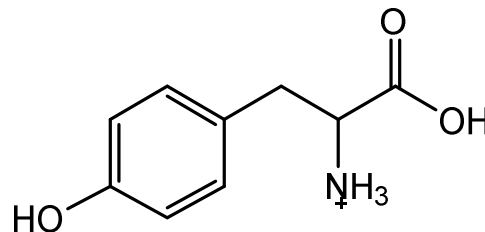
1. What is the name of the type of bond which forms between amino acids?
Peptide bond, as it produces a peptide. Although it is chemically an amide bond.
2. Draw out the general structure of an amino acid.



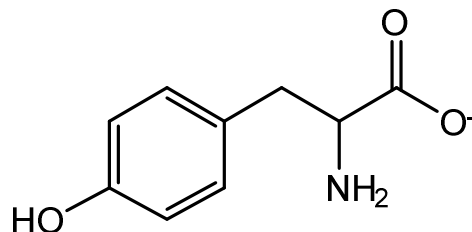
3. Using the PDBe database (<http://www.ebi.ac.uk/pdbe-srv/pdbechem/>) search for the amino acid 'tyrosine' under the field Molecule Name. Using the structure of tyrosine, draw the molecule as it would exist in:
 - a) neutral solution.



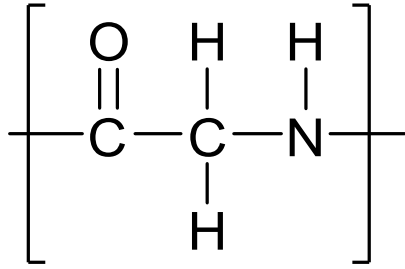
b) pH 2



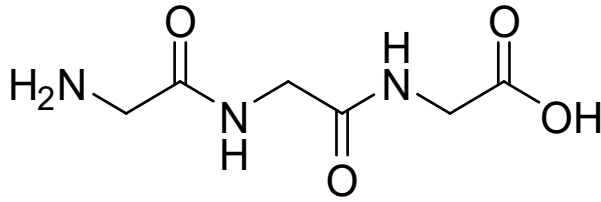
c) pH 12



4. Using the PDBe database, as above, load glycine. Draw the repeating unit of a polyamide of glycine.



5. As above, draw a tripeptide of glycine.



6. Using the PDBe website (<https://www.ebi.ac.uk/pdbe/>), search for the entry 1ubq. This is a structure of the protein ubiquitin. Click on the entry, and select the Structure analysis tab. Scroll down to the PDB Sequence Viewer, and select the Expanded view. This will show the sequence of amino acids in the protein, given as their one-letter codes. Write down the first 10 amino acids in the protein, by their one-letter codes.

MQIFVKLTG

7. Use the 3D Visualisation tool to explore the protein. What type of protein structures does this protein have? Explain your answers.

Primary Structure: As this is the **sequence of amino acids** in the polypeptide chain.

Secondary Structure: The **α-helices** and **β-sheets** are visible.

Tertiary Structure: This is the **overall 3D structure** of the protein.

8. Using your answers from Q7, which two types of bonding are **definitely** in the protein? Explain your choices.

- Hydrogen bonding
- Ionic bonding
- Covalent bonding
- Disulfide bonding

✓ **Hydrogen bonds:** These interactions hold the secondary structures in place.

✗ **Ionic bonding:** They may be there, but this depends on the specific amino acid residues.

✓ **Covalent bonding:** These hold the polypeptide backbone in place. These are the 'standard' bonds.

✗ **Disulfide bonding:** They may be there, but this depends on the specific amino acid residues.