3055 BA SANGAM COLLEGE

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WORKSHEET 22

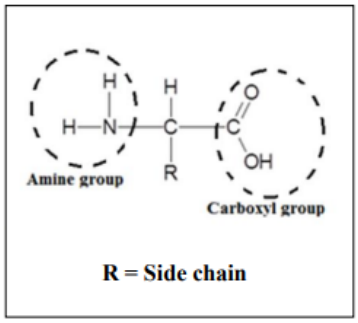
School: **Ba Sangam College** Subject: **Chemistry**

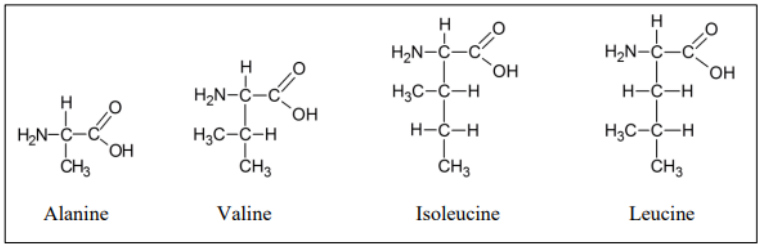
Year:**12** Name:_____

Strand	**4 Materials**
Sub strand	**5 Food Chemistry**
Content Learning Outcome	Ch 12 5.1.2 Investigate the formation, properties and uses of proteins.

Proteins

- Proteins are polymers consisting of a large number of simple building units called amino acids.
- The amino acids are bifunctional molecules consisting of both an amine group (NH2) and a carboxyl group (COOH). Due to its bi functionality, it is able to act as both an acid and as a base. Examples of amino acids include: alanine, valine, leucine, isoleucine, proline, phenylalanine, tryptophane, cysteine and methionine.



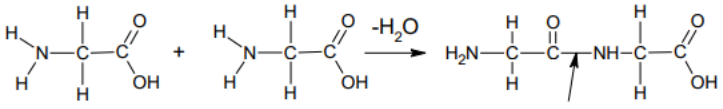


Condensation and Hydrolysis reactions

1. **Condensation**
   - A condensation reaction occurs between the amino group (-NH2) of one amino acid and the carboxyl group (-COOH) of another amino acid.
   - This reaction forms a dipeptide that is held together by a peptide bond.
   - During the process, there is loss of a water molecule.
   - Multiple amino acids can be joined together by peptide bonds to form a polypeptide chain.

Example: Formation of a dipeptide

- A dipeptide is a molecule consisting of two amino acids joined by a single peptide bond.
- Dipeptides are produced from polypeptides by the hydrolysis process.
- Dietary proteins are digested to dipeptides and amino acids, and the dipeptides are absorbed more rapidly than the amino acids, because their uptake involves a separate mechanism

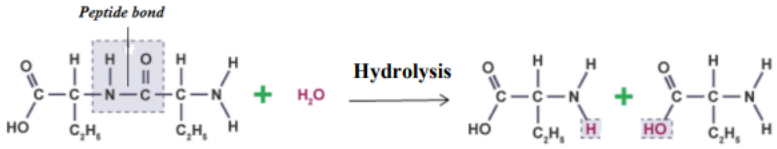


A dipeptide

2. Hydrolysis

- In the presence of acids or enzymes, peptides can be broken down into individual amino acids via hydrolysis reactions.

Example



1.4 Added Chemicals in Processed Food

Processed Foods

- The term 'processed food' applies to any food that has been altered from its natural state in some way, either for safety reasons or convenience.
- Foods that have been processed may contain added salt, sugar, fat or other chemicals.

Some added chemicals in processed food are summarised in the table below.

<table>
<tr><th>Added chemical</th><th>Description/Purpose</th><th>Examples</th></tr>
<tr><td>Preservatives</td><td>

Are a group of chemical substances which are used in food production to slow down spoilage, discoloration, or contamination by bacteria and other disease forming organisms.
The main categories of artificial preservatives are antimicrobials, antioxidants and chelating agents.

<table>
<tr><th>Preservative</th><th>Description/Purpose</th></tr>
<tr><td>Antimicrobial</td><td>✓ Helps to prevent the overgrowth of bacteria and mold.</td></tr>
<tr><td>Antioxidants</td><td>✓ Helps prevent discoloration of food.</td></tr>
<tr><td>Chelating agents</td><td>✓ Helps to bind metals, usually copper and iron to prevent the metals from oxidizing and speeding up spoilage.</td></tr>
</table>
</td><td>Antimicrobials
Benzoates (found in many beverages)
Sorbates (help to prevent mold, yeast and fungi growth in foods and beverages)
Proprionates (mold inhibitors used in baked goods)
Antioxidants
Sulphites, synthetic Vitamin E and C.
Chelating agents
Polyphosphates, citric acid.</td></tr>
</table>

Sweeteners	i. Added sugars - These are a synthetic form of natural sugars. Examples include corn syrup, fruit juice concentrate and molasses. ii. Artificial sweeteners - These are a type of sugar substitute used instead of regular table sugar (sucrose). They are synthetic sugar substitutes, but may be derived from natural substances, including herbs or sugar itself. They are found in a variety of food and beverages marketed as "sugar-free" or "diet". Common food items containing artificial sweeteners include: soft drinks, chewing gum, jellies, baked goods, candy, fruit juice, and ice cream.	*Examples of artificial sweeteners are:* Sulfame K, Aspartame, Neotame, Saccharin, Sucralose.

Added Chemical	Description/Purpose	Examples
Food dyes	• Natural and artificial dyes and coloring give the food a more appealing look or makes the food tasty. • Mostly abbreviated as 'FD&C'.	Turmeric, saffron, chlorophyllin
Carbon dioxide	• A carbonated drink is a beverage that has dissolved carbon dioxide, most often to improve the taste and/or texture of the drink.	Cola, lemonade and other fizzy drinks
Monosodium glutamate (MSG)	• Monosodium glutamate is the sodium salt of glutamic acid, one of the most abundant naturally - occurring non-essential amino acids. • MSG added to foods acts as a flavor enhancer and provides a savory, broth-like or meaty taste.	Found in noodle flavours, savories and snacks

Activity

1.What is a peptide bond? Give an illustration to support your answer. (1m)

_____

_____

_____

2. Differentiate between a dipeptide and a polypeptide. (2m)

_____

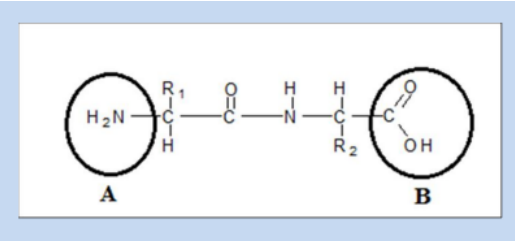
_____

_____

_____

_____

3. The structural formula of a protein which is formed from two amino acids joined together is shown below.



i.Name the functional groups labeled A and B.(1m)

ii. Draw the structures of the two amino acids used in the above reaction. (2m)

4. Amino acids can act as both an acid and a base. Briefly account for this statement.(1m)

5.Which class of added chemicals does antimicrobials and antioxidants belong to? (1m)

6.What is the specific purpose of adding such chemicals to food? (1m)

7. Explain the use of food dyes in processed foods. (1m)