

CARBOHYDRATES



Carbohydrates are the **sugars**, **starches** and **fibers** found in **fruits**, **grains**, **vegetables** and **milk** products. They are called carbohydrates because at the chemical level, they contain carbon, hydrogen and oxygen.

NUTRITION FACTS

Serving size 1 Large Apple

Amount Per Serving

Calories 130 Calories from Fat 0

Total Fat 0g

Saturated Fat 0g

Trans Fat 0g

Cholesterol 0g

Sodium 0g

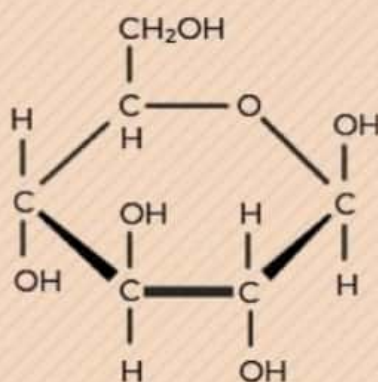
Total Carbohydrate 34g

Dietary Fiber 5g

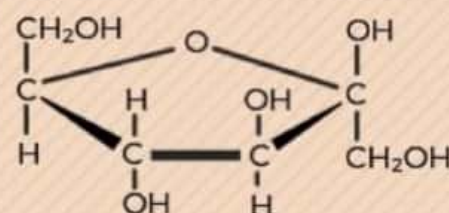
Sugars 5g

Protein 1g

GLUCOSE



FRUCTOSE



SIMPLE CARBOHYDRATES

Sources of Carbohydrates

- Fruits
- Candy
- Milk
- Sugary Beverages

CARBOHYDRATES BENEFITS

- Mental health
- Weight loss
- Good source of nutrients
- Heart health

COMPLEX CARBOHYDRATES

Grains: Grains are good source of fiber, as well as **potassium**, **magnesium** and **selenium**. Choose less processed, whole grains such as quinoa, buckwheat, and whole-wheat pasta.

Fiber-Rich Fruits: Such as **apples**, **berries**, and **bananas** (avoid canned fruit, as they usually contain added syrup).

Fiber-Rich Vegetables: Eat more of all your veggies, including **broccoli**, **leafy greens**, and **carrots**.

Beans: Aside from **fiber**, these are good sources of folate, iron, and potassium.

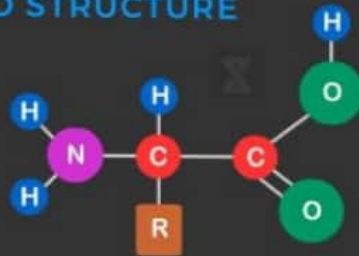
FUNCTION OF CARBOHYDRATES

Carbohydrates provide fuel for the central nervous system and energy for working muscles. They also prevent protein from being used as an energy source and enable fat metabolism.

AMINO ACIDS

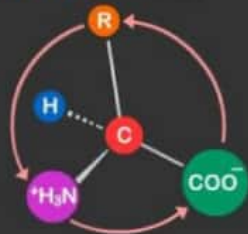
GENERAL AMINO ACID STRUCTURE

At **physiological** condition, the head group is positively charged and the tail group is **negatively charged**.



AMINO ACID STEREOCHEMISTRY

Most natural amino acids have the S or L stereochemistry about the α carbon. Notice the direction of the arrows from the highest atomic number atoms to the lowest. This is the same direction as when you would write the top part of the letter **S** or the direction that you would write an **L**.



PERIODIC CHART OF AMINO ACIDS

● Basic

● Non-Polar (hydrophobic)

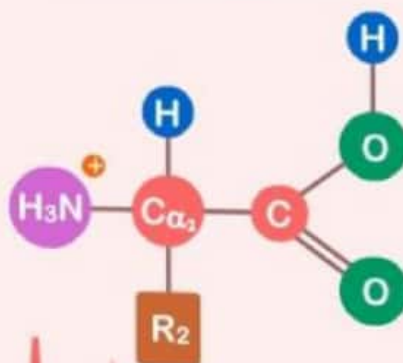
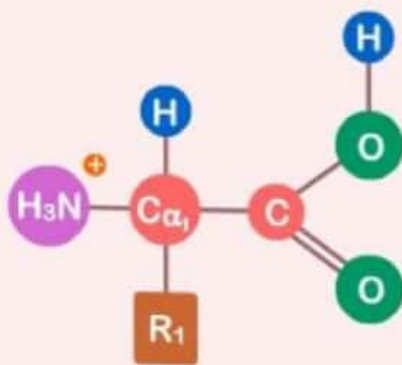
● Polar, Uncharged

● Acidic

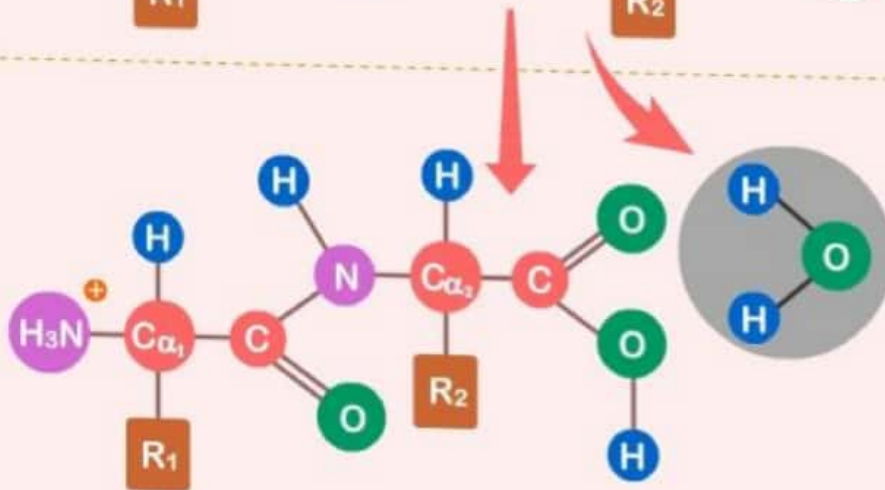
H 155.16 $C_6H_7N_3O_2$ His 137.14 Histidine	Arg 174.20 $C_6H_{14}N_4O_2$ Arginine	Phe 165.19 $C_9H_9NO_2$ Phenylalanine	Ala 89.09 $C_3H_7NO_2$ Alanine	Cys 121.16 $C_3H_7NO_2S$ Cysteine	Gly 75.07 $C_2H_5NO_2$ Glycine	Gln 146.15 $C_7H_9NO_3$ Glutamine	Asp 133.10 $C_4H_7NO_4$ Aspartic Acid
Lys 146.19 $C_6H_{12}N_2O_2$ Lysine	Leu 131.17 $C_6H_{13}NO_2$ Leucine	Met 149.21 $C_5H_9NO_2S$ Methionine	Asn 132.12 $C_4H_8N_2O_3$ Asparagine	Ser 105.09 $C_3H_7NO_3$ Serine	Tyr 181.19 $C_9H_9NO_3$ Tyrosine	Thr 119.12 $C_4H_9NO_3$ Threonine	Glu 147.13 $C_5H_9NO_4$ Glutamic Acid
Ile 131.17 $C_6H_{13}NO_2$ Isoleucine	Trp 204.23 $C_{11}H_{13}N_2O_2$ Tryptophan	Pro 115.13 $C_5H_9NO_2$ Proline	Val 117.15 $C_6H_{11}NO_2$ Valine	<div> 1 letter amino acid code ← S Relative molecular mass ← 105.09 Molecular formula ← $C_3H_7NO_3$ </div> <div> Ser → 3 letter Amino acid code → 87.08 → $C_3H_7NO_3$ → MW-H₂O Molecular weight in water → → Chemical structure → Serine → Chemical name </div>			



THE PEPTIDE BOND

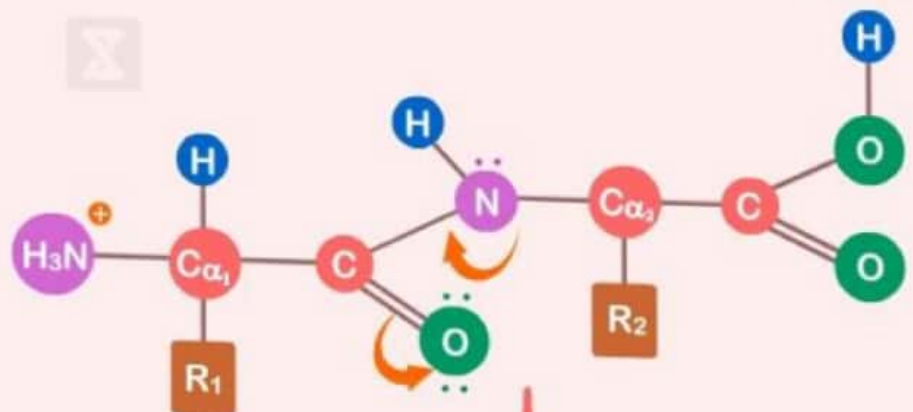
Amino acid α_1 Amino acid α_2 

When two amino acids come together, a reaction can occur between the carboxylic tail of the leading end with the amine head of the trailing end.



Each amino acid gives up a part of itself in a dehydration reaction and the product of their interaction is the peptide bond.

The new bond enjoys a type of resonance that strengthens it as the electrons about the nitrogen and oxygen delocalize producing a partial double bond.



The result of this resonance makes this bond difficult to rotate since the newly formed electron clouds are stabilized and do not like to bump into things.

Peptide bonds form a rigid backbone for the many proteins it is a part of.

