Biochemistry

Proteins-2

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البروتينات-٢

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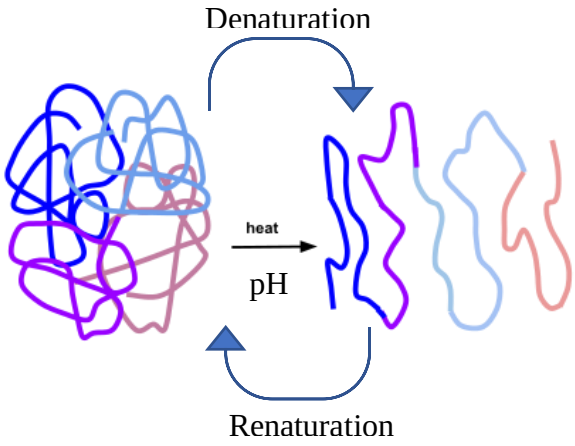
Protein denaturation

Denaturation of the protein occurs when some external stress applied, such as overheating, very acidic or alkaline conditions. Under such a way, the protein will no longer have its 3-dimentional structure and will not be able to do its cellular functions. The denaturation affected the quaternary and tertiary structure of the protein, but sometimes even the secondary structure is affected by the following harsh conditions:

1. Heat: It affects the weak interactions (such as hydrogen and van der Waals bonds) within the structure and causes a gradual misfolding of the protein into its secondary or primary structure, see Figure 1. The protein in the egg (albumin) is coagulated during cooking due to denaturation process.



2. pH: Proteins can also be misfolded by extreme pH, where the net charge on the protein will be changed, which causes an electrostatic repulsion and the disruption of some hydrogen bonding and S-S bonding, see Figure 1.

3. organic solvents such as alcohol or acetone, or by detergents. Each of these denaturing agents are disrupting the hydrophobic interactions that stabilizes the core of globular proteins and causes precipitation of the

protein. Some protein could retain its structure and function by removing the denaturation agent and the process is called “renaturation”, Figure 1.