

Chapter 13 – Bioenergies and Biochemical Reaction Types

13.1 Bioenergies and Thermodynamics

The following sub-sections are important:

- The Introduction
- Biological Energy Transformations Obey the Laws of Thermodynamics
- Cells Require Sources of Free Energy
- Standard Free-Energy Change is Directly Related to the Equilibrium Constant
- Actual Free-Energy Changes Depend on Reactant and Product Concentrations
- Standard Free-Energy Changes are Additive

13.2 Chemical Logic and Common Biochemical Reactions

The following sub-sections are important:

- The Introduction and all Reactions

13.3 Phosphoryl Group Transfers and ATP

The following sub-sections are important:

- The Introduction
- The Free-Energy Change for ATP Hydrolysis Is Large and Negative
- Other Phosphorylated Compounds and Thioesters Also Have Large Free Energies of Hydrolysis
- ATP Provides Energy of Group Transfer, Not by Simple Hydrolysis
- ATP Donates Phosphoryl, Pyrophosphoryl, and Adenylyl Groups

13.4 Biological Oxidation-Reduction Reactions

The following sub-sections are important:

- The Introduction
- The Flow of Electrons Can Do Biological Work
- Oxidation-Reduction Can be Described as Half-Reactions
- Biological Oxidation Often Involved Dehydrogenation
- A Few Types of Coenzymes are Proteins Serve as Universal Electron Carriers
- NADH and NADHP Act as Dehydrogenases as Soluble Electron Carriers
- NAD has Important Functions in Addition to Electron Transfer
- Dietary Deficiency of Niacin, the Vitamin Form of NAD and NADP Causes Pellagra
- Flavin Nucleotides and Tightly Bound in Flavoproteins