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