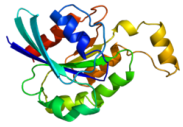
Chem 331 Biochemistry

Thermodynamics

Learning Objectives, Study Guides



Learning Objectives

- Understand the application of enthalpy to biochemical systems
- Relate the entropy and enthalpy contributions to protein folding
- Understand and interpret van't Hoff Plot
- In both descriptive and mathematical approaches, determine if a reaction is favorable at standard state and non-standard state conditions. Be able to calculate Keq and Gibbs free energy
- Predict if a process is favorable for coupled reactions
- Understand and explain the two means reactions can be coupled to make an enzyme catalyzed reaction(s) thermodynamically favorable
- Mathematically and chemically define what makes PEP a high energy molecule
- Be able to analyze a biochemical to determine if there is a high energy bond within the structure
- Explain why ATP is the energy currency of the cell and relate how the standard state Gibbs free energy for hydrolysis of ATP is only half that of three other biomolecules
- Recognize ATP and be able to chemically demonstrate the features that provide a negative Gibbs free energy of hydrolysis.
- Know the two main methods by which cells can make ATP (oxidative phosphorylation and substrate level phosphorylation)

G&G 5th Ed questions: 1, 3, 6, 7, 8,10,11,12,13,18, 20

Study Notes from Dr P: *This chapter is really two parts. The first part is to understand the contributions of enthalpy and entropy to predict biochemical functions. You will have questions that you have to explain thermodynamic principles AND calculate Gibbs free energy. The second half of this chapter focuses on biochemical molecules and their role in energy transfer. Know what (in both descriptive and molecular terms) what makes a high-energy bond. Pay attention to what and how the book describes group transfer potential.*