

Contents

Case Study Answers

1

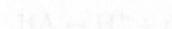
Index

1	Acid-Base Concepts	1
2	Structure and Properties of Biologic Molecules	7
3	Protein Structure and Function	19
4	Enzymes and Energetics	29
5	Membranes and Intracellular Signal Transduction	39
6	Glycolysis and Pyruvate Oxidation	49
7	Citric Acid Cycle, Electron Transport Chain, and Oxidative Phosphorylation	57
8	Gluconeogenesis and Glycogen Metabolism	67
9	Minor Carbohydrate Pathways: Ribose, Fructose, and Galactose	75
10	Fatty Acid and Triglyceride Metabolism	81
11	Metabolism of Steroids and Other Lipids	89
12	Amino Acid and Heme Metabolism	99
13	Integration of Carbohydrate, Fat, and Amino Acid Metabolism	109
14	Purine, Pyrimidine, and Single-Carbon Metabolism	119
15	Organization, Synthesis, and Repair of DNA	125
16	RNA Transcription and Control of Gene Expression	137
17	Protein Synthesis and Degradation	149
18	Recombinant DNA and Biotechnology	161

Hydrophobic molecules have low solubility in water because they form few or no hydrogen bonds with water. This causes them to aggregate to minimize the disruption of water structure, as illustrated by the coalescence of oil droplets floating on a water surface. The process of forcing hydrophobic molecules together by water plays a major role in determining the three-dimensional structure of macromolecules and biologic membranes.

Electrolytes

Electrolytes dissociate into cations (positive charge) and anions (negative charge) when added to water; this permits water to conduct an electric current. Strong electrolytes such as HCl and NaCl dissociate completely. Weak electrolytes do not dissociate completely. Instead they establish an equilibrium between an undissociated form (the conjugate acid or protonated form, HA) and a dissociated form (conjugate base, A⁻):



Weak electrolytes are generally organic acids; phosphoric acid and carbonic acids are also in this category.



The hydrogen ion (proton) concentration in a solution of a weak acid is dependent on the equilibrium constant (K_{eq}) for the dissociation reaction:



The K_{eq} is unique for each conjugate pair (Table 1-1). Conjugate pairs make good buffers (i.e., solutions that act to resist change in pH), since they always try to reestablish equilibrium when adding either acid or base. Increasing acidity (adding protons) "pushes" the equilibrium toward the undissociated form (HA) to reduce the proton concentration. Similarly, decreasing acidity (adding base, or OH⁻) "pulls" the equilibrium away from the HA form to restore the proton concentration.

Contents

19	Nutrition	171
20	Tissue Biochemistry	181
	Case Studies	193
	Case Study Answers	199
	Index	205