

Introduction

Welcome to the third edition of *Biochemistry For Dummies!* We're certainly happy you've decided to delve into the fascinating world of biochemistry. Biochemistry is a complex area of chemistry, but understanding biochemistry isn't really complex. It takes hard work, attention to detail, and the desire to know and to imagine. Biochemistry, like any area of chemistry, isn't a spectator sport. You must interact with the material, try different explanations, and ask yourself why things happen the way they do.

If you work hard, you can get through your biochem course. More important, you may grow to appreciate the symphony of chemical reactions that take place within a living organism, whether it's a one-celled organism, a tree, or a person. Just like each individual instrument contributes to an orchestra, each chemical reaction in an organism is necessary, and sometimes its part is quite complex. However, when you combine all the instruments and each instrument functions well, the result can be a wonder to behold. If one or two instruments are a little out of tune or aren't played well, the orchestra still functions, but things are a little off. The sound isn't quite as beautiful as it might be, or the listener might have a nagging sensation of something being wrong. The same is true of an organism. If all the reactions occur correctly at the right time, the organism functions well. If a reaction or a few reactions are off in some way, the organism may not function nearly as well. Genetic diseases, electrolyte imbalance, and other problems may cause the organism to falter. And what happens then? Biochemistry is often the field in which researchers find ways of restoring the organism to health and seek cures for many modern medical maladies.

About This Book

Biochemistry For Dummies is an overview of the material covered in a typical college-level biochemistry course. In this third edition, we update the content and correct the errors and omissions that crept into the first two editions. We hope that this edition is of even more help than the second. We've made every attempt to keep the material as current as possible, but the field is changing ever so quickly. The basics, however, stay the same, and that's where we concentrate our efforts. We also include information on some of the applications of biochemistry

that you read about in your everyday life, such as forensics, cloning, gene therapy, genetic testing, and genetically modified foods.

We've organized the text in a logical progression of topics that may be used in a biochemistry course. Along the way, we use the following conventions to make the presentation of information consistent and easy to understand:

- » When we introduce new terms, they appear in *italics*.
- » We use **bold text** to highlight keywords in bulleted lists.

We also make extensive use of structures and reactions. While reading, try to follow along with the associated figures.

While you flip through this book, you can see a lot of chemical structures and reactions. Much of biochemistry revolves around knowing the structures of the molecules involved in biochemical reactions. Function follows form. If you're in a biochemistry course, you've probably had at least one semester of organic chemistry. You might recognize many of the structures, or at least the functional groups, from your study of organic chem. You can see many of those mechanisms that you loved (and hated) here in biochemistry.

If you're taking a biochemistry course, use this rather inexpensive book to supplement that very expensive biochemistry textbook. If you bought this book to gain general knowledge about a fascinating subject, try not to get bogged down in the details. Skim the chapters. If you find a topic that interests you, stop and dive in. Have fun learning something new. You don't have a whole lot of money invested in this book, so don't feel obligated to read everything. When you're done, you can put it on your bookshelf alongside *Chemistry For Dummies*, *The Doctor Who Error Finder*, and *A Brief History of Time* as a conversation piece.

Foolish Assumptions

We assume — and we all know about the perils of assumptions — that you're one of the following:

- » A student taking a college-level biochemistry course
- » A student reviewing your biochemistry for some type of standardized exam (the MCAT, for example)

- » An individual who wants to know something about biochemistry
- » A person who's been watching way too many forensic TV shows

If you fall into a different category, we hope you enjoy this book anyway.

Icons Used in This Book

If you ever read a *For Dummies* book before (such as the wonderful *Chemistry For Dummies*, by one of this book's authors, John T. Moore), you can recognize most of the icons used in this book, but here are their meanings anyway:



REAL
WORLD

The Real World icon points out information that has a direct application in the everyday world. These paragraphs may also help you understand the bigger picture of how and why biochemical mechanisms are in place.



REMEMBER

This icon is a flag for those really important points that you shouldn't forget while you go deeper into the world of biochemistry.



TIP

We use this icon to alert you to a tip on the easiest or quickest way to learn a concept. Between the two of us, we have almost 70 years of teaching experience. We've learned a few tricks along the way, and we don't mind sharing.



WARNING

The Warning icon points to a procedure or potential outcome that can be dangerous. We call it our Don't-Try-This-At-Home icon.

Beyond the Book

As if this book wasn't already chock full of helpful information, we provide you with a handy online Cheat Sheet that includes basic biochemical structures and genetic patterns. To access this Cheat Sheet, simply go to www.dummies.com and type **Biochemistry For Dummies Cheat Sheet** in the search box.

Where to Go from Here

The answer to where you should start really depends on your prior knowledge and goals. Like with all *For Dummies* books, this one attempts to make all the chapters discrete so that you can pick a chapter that contains material you're having difficulty with and get after it, without having to read other chapters first. If you feel comfortable with the topics covered in general and organic chemistry, feel free to skip Part I. If you want a general overview of biochemistry, skim the remainder of the book. Dive deeper into the gene pool when you find a topic that interests you.

And for all of you, no matter who you are or why you're reading this book, we hope that you have fun reading it and that it helps you increase your understanding of biochemistry.

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Setting the Stage: Basic Biochemistry Concepts