
Preface

To the Student

What do your professors do at the end of a day at college? Many, the authors included, will enjoy a craft brew and discuss the day's successes and opportunities for improvement. Thus began the discussion for the beginnings of this book. "Wouldn't it be awesome," we thought, "if we could highlight the science that goes into brewing? The students would just love a brewing science class!" We spent the next weeks and months designing and planning a course that would illustrate the interdisciplinary nature of brewing science.

The result is what you will find here. This text represents the topics that are taught in our courses on an Introduction to Brewing. These courses are very popular at our institutions and attended by students from almost every major. We have tried to write from your perspective and provide not only the processes that you will encounter in the brewery, but also provide the reasons why those processes are completed and the science behind them. And we have written the text with no assumptions as to what courses you have previously taken. As topics are introduced, we also introduce the science behind them starting from the basics. As we have found, teaching "just in time" provides useful examples for you to use to help you understand the background and the topic in question.

Every few pages, you will find CHECKPOINT boxes. These are designed to provide you with a chance to take a break and confirm that you have gathered the key topics of the discussion to that point. This is also how we have constructed the images that accompany the discussion. When images and tables appear in the text, it is important to take a break from reading and examine them in detail. Understand why each is included in the chapter, and why each is presented in the way it is. (Some professors, the authors included, find great quiz and test questions by looking at the figures.)

We sincerely hope that you enjoy your studies of this exciting topic. One thing you will note from the start, brewing science requires an understanding of a nearly endless range of topics from biology to chemistry to physics to history to almost every subject taught on campus. The purpose of the book is not to make you, the student, a physical chemist or a fluids engineer, but it will give you a sense of what is possible in the brewery. And, it will provide you with an understanding behind

why things are done the way that they are in the brewery. Brewing science can be very technical, but our hope is that you find the subject just as fascinating as we do.

To the Instructor

The first incarnation of the course described by the topics in this text was directed at the general studies level. The science discussed in that type of course is descriptive and general in nature. We found that the class attracted a wide range of majors with varying interest levels. This class is still taught at the University of Nebraska Kearney. However, we have found that the class also attracted those with more than a passing interest in brewing and wanted to dive deeper into the rich science that surrounds the craft brewing industry. So, we have included the detail that is appropriate for those courses that do this, such as the course taught at the University of Northern Colorado.

This text is written from a process-centric approach to uncovering the principles behind brewing science. Instead of a discussion of brewing from the perspective of the four main ingredients (water, malt, hops, and yeast), this text is formatted and written from the viewpoint of the steps taken to manufacture beer (malting, milling, mashing, boiling, etc.). The topics are focused more on the technical aspects and design principles of brewing. As the students uncover the process of mashing, they explore the background chemistry needed to fully develop their understanding. As we explore wort chilling, we dive into the background in thermodynamics that explains this process. Thus students learn what they need to know as they need to know it. We have found this process of “just in time” teaching to be very effective. It produces opportunities to introduce examples, increase motivation, and set high bars for achievement.

We hope, as well, that this text will provide you, the instructor, with the greater detail needed behind each of the processes in the brewery and the insight into the interrelationships between topics in brewing science. We realize that there are parts of the book that may be mathematically challenging to a general audience. But, the language of science is mathematics—and with practice and motivation to be successful, the general audience can succeed.

Within each chapter are CHECKPOINT questions that provide key questions that students should be able to accomplish by studying the material preceding them. At the end of each chapter are questions that expand upon these in-chapter questions. The summary section at the end of the chapter is also helpful in directing students as they move through the text.

Finally, each chapter contains at least one laboratory experiment that can help explain the material in the chapter. Both of the author’s courses in this subject have related laboratories that we have noted are extremely useful in developing student interest and motivation and providing confirmation of topics in the course. Additional “laboratory experiments” can be obtained by modifying the laboratory tests found in the American Society of Brewing Chemists Methods of Analysis resource.

It is our sincere hope that you, the instructor, find the information in this text to be helpful to you and your students irrespective of the level of your introductory course in brewing science. As a standalone text, or used in conjunction with handouts and additional readings, the material inside should be helpful to your students. Whether they are beginning their studies for a Diploma in Brewing from the Institute of Brewing and Distilling, satisfying a general studies requirement, or reading for interest, the student is sure to find interest in this topic.

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