Reviews and Resources

BOOK

Antisepsis, Disinfection, and Sterilization: Types, Action, and Resistance


Antisepsis, disinfection, and sterilization are crucial tasks to be performed by all kinds of professionals working in settings in which people can be exposed to infectious agents. These settings include, for example, microbiology and public health laboratories, hospitals, the medical device and the pharmaceutical industry, food processing and water treatment plants, and, last but not least, physician, dentist, and veterinarian offices. The ultimate goal is to kill infectious agents or at least inhibit them in order to minimize their destructive effects. Yet, and surprisingly, we often find only fragmented information about the types, actions, and resistance of these methods in a single source. Author Gerald McDonnell recognized this shortcoming and prepared a comprehensive book that provides the reader with “all there is to know” about these important methods of infection prevention and contamination control.

McDonnell developed a useful table of contents and a comprehensive index, making it easy for the reader to quickly find specific information. The bulk of the text contains a total of eight chapters that are divided into an introduction (Chapter 1), disinfection methods (Chapters 2 and 3), antisepsis issues (Chapter 4), sterilization techniques (Chapters 5 and 6), actions of antiseptics and other biocidal agents (Chapter 7), and mechanisms of microbial resistance (Chapter 8). The author provides a further reading section at the end of each chapter.

The first chapter includes definitions of key terms used throughout this book, such as “aseptic processing,” “disinfection,” “depyrogenation,” “fumigation,” “sanitization,” and “sterilization.” This section is followed by a well-written and illustrated primer on general microbiology, covering bacteria, viruses, fungi, algae, protozoa, and helminths, as well as prions and toxins. Furthermore, there is an introductory discussion of some key considerations for biocidal applications.

Chapter 2 describes the various types of physical disinfection techniques, while Chapter 3 is about chemical disinfection. Each of these chapters includes discussions about the types, applications, spectra of activity, advantages and disadvantages, and modes of action. The author points out that although filtration is not a true biocidal process, it is included in the discussion about physical methods because it is one of the oldest and most widely used techniques for the pretreatment, disinfection, or sterilization of liquids and gases.

In Chapter 4, McDonnell talks about antisepsis and antiseptic products. He provides definitions specific to antiseptics (e.g., antimicrobial soap, persistence [of a biocide], and substantivity) and describes specific biocides used as antiseptics. What makes this chapter excellent are additional sections about the structure of the skin, skin microbiology, and skin hygiene, as well as pretreatment of skin prior to surgical interventions, treatment of skin or wound infections, and treatment of oral and other mucous membranes.

Chapters 5 and 6 are about the various physical and chemical sterilization methods, respectively. These chapters are similar in format to the chapters on disinfection. McDonnell describes, for example, physical sterilization techniques such as those by steam, dry-heat, and radiation. He also outlines developing methods, including sterilization accomplished by plasma, pulsed light, supercritical fluids, and pulsed electric fields. The chapter on chemical sterilization discusses epoxides, low-temperature steam-formaldehyde (LTSF) systems, high-temperature formaldehyde-alcohol, and hydrogen peroxide, among many others.

The seventh chapter addresses the specific mechanisms of biocidal action on microorganisms. The modes of action of various antifungal, antiviral, and antiparasitic drugs. The author discusses four general groups with similar mechanisms of action: oxidizing agents, cross-linking or coagulating agents, substances that act by transfer of energy, and other structure-disrupting agents. In the final chapter (Chapter 8), McDonnell emphasizes the growing concern about microbial resistance to biocides. He looks at biocide-microorganism interactions as well as intrinsic-resistance and acquired-resistance mechanisms. The discussion includes specific mechanisms of resistance in bacteria, viruses, fungi, helminths, and prions.

This book is not an introductory text to biocides but rather one that is designed to provide the reader with in-depth knowledge of biocide agents and methods of antisepsis, disinfection, and sterilization. I believe this book can serve as a very useful resource for many professionals working in this area. Based on my own experience, it can also be used to supplement information found in microbiology books to enrich lecture materials. In conclusion, this is a book that demands attention. It is worth every cent of the purchase price.

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