

Book Review

HARRY'S COSMETICOLOGY, 9th edition, in 3 volumes, by Meyer R. Rosen, editor-in-chief (Chemical Publishing Co., Los Angeles, CA). Price: \$999.00. 2371 pp.

Ralph Gordon Harry wrote his classic text, *Cosmetics: Their Principles and Practices*, in the 1950s. Harry, a true pioneer, recognized the multidisciplinary nature of cosmetic product development even then. Succeeding editions of his book (now called *Harry's Cosmeticology*) have reflected changes in the industry, scientific knowledge, regulatory considerations, and demands of consumers.

The ninth edition is a monumental undertaking, with multiple authors and a total of 2371 pages. The front section of each volume has a complete and detailed listing of all the chapters, even those in other volumes. In addition to hardcover books, the publisher can supply an e-book version (see http://www.chemical-publishing.com/category_s/44.htm for details). The book attempts to respond to many changes that have taken place in the world of cosmetics and is both a review of where we are and an indication of what the future may bring.

The chapters are arranged in major sections, called parts, to separate and organize the various aspects of the subject matter. Obviously, there is some overlap, which is not necessarily a bad thing. Some of the chapters contain a glossary of terms used for the benefit of those new to the field. Here is the breakdown of the major sections:

VOLUME 1

- Part 1 In the Beginning (Marketing)
- Part 2 Regulatory
- Part 3 The Substrates

VOLUME 2

- Part 4 Ingredients
- Part 5 Anti-Aging

VOLUME 3

- Part 6 Formulating Cosmetics and Personal Care Products
- Part 7 Sensory Characterization
- Part 8 Delivery Systems
- Part 9 Nutricosmetics
- Part 10 Nanocosmetics
- Part 11 Testing
- Part 12 Sustainability and Eco-Responsibility
- Part 13 Cosmetic Manufacturing
- Part 14 Packaging

Volume 1 essentially covers the marketing, legal and biological aspects of cosmetic science. Part 1 consists of four chapters. (In *Harry's*, individual chapters are also labeled as "parts"; for consistency, I am following this designation.)

Part 1.1, "Marketing Concepts to Empower Technical People", is an overview of aspects of marketing and suggests that marketing is everyone's concern. Part 1.2, "Creating the Right Fragrance for Your Personal Care Product" provides an excellent review of the subject of fragrances and an in-depth discussion of many of the

important issues involved in choosing a suitable fragrance. However, there is only a single reference making it difficult for the reader to obtain further information. This is followed by (a slim) Part 1.3, "Fragrance Packaging Design: A Multi-Sensory Experience from Concept to Consumer" which extols the benefits of fragrance and calls attention to links with other senses. "... fragrance transforms the moment, awakens the senses, creates indelible memories, and captivates the people in a room."

The next chapter, Part 1.4, is an introduction to molecular cell biology and gene analysis. Various biological markers are indicators of normal function (or its absence) and may be targets for active agents. It is worthwhile to be acquainted with the general principles involved and understand some of the technical terms in common use.

Part 2 deals with regulatory requirements and intellectual property (IP).

Following a brief introductory chapter, Part 2.2.2, "An Overview of the Changing Regulatory Landscape in the U.S and the E.U. and how to Deal with them" is a comprehensive review of the current state of regulations and is required reading for anyone new to global marketing or development. The references in this chapter are to web sites which make it possible to search for updated information as time goes on.

Parts 2.3.1, 2.3.2, and 2.3.3 contain specific information on regulations in Russia, Saudi Arabia, and China, respectively. They are followed by a chapter (Part 2.3.4) on global regulatory and safety issues with "nanomaterials". The first part of this chapter deals with definitions, which vary from place to place. This is a timely topic as nanoscale materials become more widely used. Chapters in other parts of the book deal with various issues involving nano-sized particles.

Part 2.4 provides an overview and highlights the importance of IP. While many IP issues may be of interest chiefly to the legal department, everyone should be aware of

them. Patents and patentability are of particular importance in research and development, and the bench chemist should be on the lookout for possibilities to turn a lab breakthrough into a patented invention.

Part 3, "Substrates", is the largest section of Volume 1. The substrates include skin, hair, nails, nose (in relation to olfaction and fragrances), and mouth.

The chapters on skin structure (Part 3.1.1) and compromised skin in the elderly (Part 3.2.4) are comprehensive, up to date, well written and thoroughly documented. They represent useful summaries of the field and could profitably be read and referred to by anyone involved with skin products. Further useful information is found in the chapters on global classification of skin and issues with skin of certain ethnic groups. This type of information is useful even for marketers of products confined to the United States, which contains a sampling of all the world's ethnic groups.

The chapters on hair structure, hair aging, and changes in shape are also excellent. They are broad in scope, thoroughly researched, and would be useful to anyone who wants to learn about hair and its physical characteristics. The same can be said of the chapters on the nose and mouth.

Volume 2 contains two major sections, cosmetic ingredients (Part 4) and aging (Part 5). In Part 4, some of the ingredient chapters are classified by chemistry, some by function. Part 4.1.1 is a superficial summary of surfactants and their functions. This is followed by a detailed chapter on lipstick ingredients. The physical properties and cosmetic applications of hyaluronic acid are explored in Part 4.1.3. Two chapters that follow summarize probiotics and ingredients produced by fermentation. The chapter on multifunctional botanicals (Part 4.1.5) is an excellent review of progress that has been made in extracting, standardizing, and applying botanicals for cosmetic purposes. The list of references at the end of this chapter is extensive and very useful.

Protection against chemical degradation and microbial growth are important considerations for any cosmetic product. These topics are covered in Parts 4.1.7.1 and 4.1.7.2. The chapter on antimicrobial preservatives discusses the preservatives available, regulatory considerations, the role of water content, the presence of nutrients (for the bugs), and other issues. The chapter on antioxidants covers its topic in great detail, differentiating between primary and secondary agents. Both of these chapters provide information that would help a formulator develop a product with adequate shelf life.

The next two chapters, Parts 4.2.1 and 4.2.2, are concerned with polymers and other rheology modifiers. These chapters are, respectively, a short introduction to the topic and a comprehensive treatise that covers much of the same ground in more detail. Polymers represent a class of ingredients with many applications in cosmetic products, so these chapters have wide practical application. They are followed by two chapters dealing with silicones. Part 4.2.3.1 is especially useful because of its depth and breadth. These chapters are followed by informative chapters on skin whitening ingredients and ingredients from marine sources.

The next portion of Part 4 contains a group of ingredients useful for their antiaging properties. There is a very brief chapter on retinoids, followed by a chapter on peptides. Chapters on amino acids, micro RNAs, and alpha-hydroxy acids are exemplary reviews, loaded with literature references that make it possible to trace any subtopic of interest as far as is necessary. The final chapter in the "ingredients" section discusses antioxidants in cosmetics for their antiaging properties. The author presents a useful overview of the area and describes the role of oxidation in skin aging. He concludes that a combination of sunscreens and antioxidants will continue to serve as an important weapon in an antiaging regimen for the skin.

Part 5 of the book is entitled "Anti-Aging Pathways". This section consists of a

dozen chapters on such topics as theories of aging, causes, treatment approaches, and potential future approaches. For someone not conversant with the literature on aging, this section should be read in its entirety to get a feel for the ideas about aging being considered, the direction that research is taking, and possibilities for future antiaging approaches. While I thought all of the chapters in this group contributed to the overall goal of understanding aging, especially skin aging, I was especially taken with a chapter on "Epigenetics of Skin Aging". To fully understand where this area of research is going, it is necessary to learn a new language, the language of molecular biology.

Volume 3 contains Parts 6-14.

Part 6 begins with a brief introductory chapter that sets out the scope of the field of cosmetic formulation. The first product type discussed in detail is skin lighteners. This chapter is followed by all-too-brief chapters on sunscreens and antiperspirants/deodorants (2 pages each). The brevity of the sunscreens chapter is particularly surprising due to recent efforts to improve their efficacy and the important role they play in mitigating the damaging effects of ultraviolet light on the skin. Part 6.5 is a review on acne and comedogenicity, and identifies ingredients in makeup and other cosmetic products which may cause problems, especially in women prone to follicular clogging. After chapters on masks/scrubs and shaving preparations, Part 6.8 covers color cosmetics, particularly foundations, lipsticks, and mascaras. The final paragraphs of this chapter discuss additives, such as sunscreens, which may add a skin care benefit to these beauty products.

Part 6.9 begins a string of chapters on hair care. Part 6.10 goes into depth on shampoo ingredients, cleansing mechanisms, and shampoo evaluation. Several short chapters on hair styling are followed by a chapter on hair colorants and finally a chapter on reactive hair products. Part 6.17 contains practical

advice on product development beginning with a consideration of consumer beliefs and expectations, then moving on to marketing requirements, manufacturing requirements, considerations on handling new ingredients, shelf life, and finally arriving at a commercial product.

The last chapter in Part 6 (Part 6.18) is a complete exposition on oral health and oral health products. It includes a description of various issues related to oral care, dentifrices, mouthrinses, and various devices useful in supporting good oral hygiene.

Part 7 consists of a single chapter relating to sensory signals and sensory perception, a fascinating exploration of the use of a special language to describe sensory response to a product, such as a soap or shampoo. Lexicon development is illustrated, as is the application of a lexicon in specific examples. While measurement of sensory perception is ambiguous due to differences in perception and description, a lexicon improves uniformity of response and gives sensory evaluation a more scientific foundation.

Part 8 is a single chapter (Part 8.1) devoted to an overview of delivery systems, a good starting point for anyone seeking further information on this area. The review focuses on encapsulation methodologies such as liposomes and polymeric microspheres. Potential advantages include improved stability, reduced irritation, and enhanced bioavailability.

Part 9 consists of two chapters dealing with nutricosmetics, a term coined to describe cosmetics containing nutraceutical ingredients. Part 9.1 provides a useful introduction to the topic, describing benefits and difficulties, and several illustrative examples along with an extensive bibliography. As bioavailability is an unknown factor in many cases, clinical studies are currently the best way to obtain evidence for claim substantiation. Another chapter on multifunctional botanicals (Part 9.2) overlaps and expands an earlier chapter (Part 4.1.5) by the same authors.

Nanocosmetics (Part 10) is a fancy word for cosmetics that contain nano-sized particles, many of which are on the market today. Chapter 10.1 describes carriers such as solid lipid nanoparticles as well as actives such as titanium dioxide and zinc oxide. Applications to skin care, hair care, makeup, emollient therapy, and antiaging are well covered. This chapter can profitably be read in conjunction with Parts 2.3.4 and 8.1.

Part 11, formally titled “Testing, Characterization and Performance Claims”, contains a series of definitive chapters which cover the subjects of skin and hair testing in depth and provide many useful details and extensive references. They are measurements of skin barrier integrity (Part 11.1), imaging techniques and analysis of skin (Part 11.2), skin elasticity and topography measurement (Part 11.3), evaluation of damage, protection and repair of hair (Part 11.4), clinical testing related to skin cosmetic claims (Part 11.5), nanomaterials characterization (Part 11.6), and *in vitro* assays related to gene expression (Part 11.7). Curiously, there is no chapter in this section on physical testing of cosmetic products, e.g., physical stability testing.

Part 12, “Sustainability and Eco-Responsibility”, is a welcome addition to the book in view of current and impending concerns about limited resources and the desire to be ecologically friendly. Triggers for these concerns include the expanding global population, the increased use of botanicals and other ingredients from natural sources in cosmetic products, as well as genuine regard for the health of the planet and its people. It’s also good business.

Following a brief introduction to the topic, Part 12.1 addresses the interaction between sustainability and product development. Parts 12.2–12.4 are concerned with sustainability of plant communities used as sources of cosmetic ingredients. The benefits of cell cultures as a source of ingredients are laid out in Part 12.5. By setting

defined conditions under which cultures are grown, yield and characteristics are controlled. This results in reliable, standardized, sustainable output with little impact on the environment or indigenous people. Part 12.6 discusses plant extraction, beginning with traditional methods and describes steps that may be taken to improve the process to make it more ecofriendly.

The manufacture of cosmetics is described in detail in Part 13. Part 13.1 takes a comprehensive “unit operations” approach describing processes required in manufacture. Starting with mixing, the processes involved in producing solutions, emulsions, suspensions, and dry mixtures are laid out. There are also sections on scale-up and filling (during packaging). Part 13.2 makes the case for cold-process emulsification to produce submicron particles, in place of traditional emulsification methods. Such methodology would result in energy cost savings. Other benefits claimed are better uniformity between batches, fewer formulation problems, and increased potency of actives. However, the chapter lacks examples that illustrate these benefits.

Part 13.3 is yet another chapter dealing with extracts from natural ingredients. Some sources are reviewed and various extraction techniques are described along with a discussion of the efficiency of each technique.

Part 14 is concerned with packaging. Part 14.1 is a very informative discussion of sustainability related to packaging and the many factors that require consideration. These include the ability to recycle and reuse the packaging material. But the performance of the package in its intended role is also important and must be balanced against what happens after usage when optimizing the packaging decision.

The final chapter in the book, Part 14.2, “Aerosol Containment and Delivery” outlines the current state of the art. After an introductory section, there is a description of various aerosol types, containers, valves, actuators, propellants, and filling methods. There is also a section containing advice on formulation. Many cosmetic companies subcontract aerosol products to specialized labs expert in handling aerosols to do their formulation and manufacturing.

The editors and authors of this edition of *Harry's* took on a gargantuan task and succeeded for the most part. Most of the chapters are top notch reviews of their subject matter and the book has a forward-looking approach, bringing in topics such as sustainability and aspects of molecular biology and epigenetics. I have indicated the few instances where I feel the book falls short.

Harry's provides an overview of the entire cosmetics industry as well as a great deal of detailed information on its component sectors. It would be useful to anyone starting to work on cosmetics and would benefit experienced people who want to get up to date on recent developments. It should be in the library of every cosmetic company and school which has a cosmetic science program.

Harry's would perhaps be most useful to many in the industry as a reference source, allowing the reader to pick and choose topics of immediate interest. Unfortunately, the lack of an index in the print edition makes this difficult since more than one chapter might have to be consulted to get information on a particular ingredient, technology, or type of cosmetic. The e-book version may have an advantage in this regard. I have not examined the e-book but I assume it is searchable.—**JOEL ZATZ**—*Rutgers University*.

