SECOND EDITION

COLORING THE COSMETIC WORLD

USING PIGMENTS IN DECORATIVE COSMETIC FORMULATIONS

EDWIN B. FAULKNER | JANE C. HOLLENBERG EDITOR

WILEY

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Using Pigments in Decorative Cosmetic Formulations

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Author's Biography

Ed Faulkner graduated with a degree in chemistry from Widener University and spent 44 years in the color industry. He retired from Sun Chemical Corporation in September of 2014, where his last assignment was as General Manager – Global Cosmetics and Personal Care. During his 41 year career with the company, Ed held numerous technical, manufacturing (including stints as plant manager at factories in Staten Island, NY and Cincinnati, OH), administrative, financial, sales, regulatory, and general management positions. His responsibilities necessitated a travel schedule that included North America, South America, Europe, and Asia (~35 countries and 100 cities).

For more than 20 years, Ed was a member of the adjunct faculty at the University of Cincinnati, teaching color chemistry in the Cosmetic Science Masters program. He has had numerous articles published on organic pigments, and authored the Color Cosmetic Additives chapter in *The Chemistry and Manufacture of Cosmetics* (Allured, 2009). He served as co-editor of the 2nd edition of *High Performance Pigments* (Wiley, 2009). He has lectured on the subject of pigments in many parts of the world, including the United States, United Kingdom, France, Venezuela, Chile, Japan, the Netherlands, and China.

About the Editor

Jane Hollenberg has over 40 years' experience in the cosmetic industry, working with fillers, pigments, and color cosmetics at Coty, Revlon, and Rona. Since 1996, she has operated JCH Consulting to provide services in the formulation, scale up, and troubleshooting of pigmented cosmetics.

Jane has taught in the education programs of the US Society of Cosmetic Chemists (with Edwin Faulkner) and Fairleigh Dickenson University's Masters in Cosmetic Science program, and succeeded Edwin Faulkner teaching color in the University of Cincinnati's Masters program in Cosmetic Science. She has given many lectures at industry meetings and symposia on topics relating to cosmetic pigments and colored cosmetic formulations and holds a number of patents pertaining to pigments and pigmented formulations. She authored *Color Cosmetics: A Practical Guide to Formulation* (Allured, 2016) and wrote chapters pertaining to color cosmetics and cosmetic pigments for *Chemistry & Manufacture of Cosmetics* (Allured, 2009), *Harry's Cosmeticology* (Chemical Publishing Co., 2000), and *Surfactants in Personal Care Products and Decorative Cosmetics* (CRC Press, 2006).

Preface

It has been almost 50 years since I graduated from college and entered the world of color. Like most of my colleagues in the industry, I got into color by accident. It was the only job available to me during the 1971 recession that was even remotely related to my degree in chemistry.

I spent the first 15 years of the color life in manufacturing. During that time, I became quite familiar with the chemistry and technology of the production of colors, both dyes and pigments. In 1986, I moved to the commercial side of the business.

Very little of my manufacturing background was related to the use of color in its final application areas. Therefore, I quickly found that I had a lot to learn. I started my end use education by searching for reference books on cosmetic colors and their applications. To my surprise and disappointment, I found that very little material on the use of color in cosmetic products had been written down.

Fortunately, I had my business colleague and good friend, Joe Pisetzner, for a teacher and was, therefore, able to learn from one of the masters. I dedicate this book to him, because, without Joe's patience and willingness to share his fifty years' worth of experience with me, I would not have acquired the basic knowledge to write it. The industry is very lucky to have had people like Joe at Sun Chemical and Sam Zuckerman at H.K. Kohnstamm and Aaron Cohen at Clark Colors to develop modern cosmetic color technology.

All of this brings me to the reason for writing this book. I know that there are always new cosmetic chemists coming into the industry who would like to have a reference book

on color use, but, like me in my first years in the business, can't find one.

I hope that this book will fill the need that exists for these new cosmetic chemists in the industry. It contains information on the basic topics involved with the use of color in cosmetics and toiletries. It does not contain a large amount of technical details on the chemistry of the colorants themselves, but rather, it concentrates more on the practical use of them in the daily life of a cosmetic chemist.

Edwin B. Faulkner
February 2021

Editor: I, in turn, dedicate this updated second edition to my friend and collaborator, the author Ed Faulkner, who continued our mentors' practice of engaging and educating the users of cosmetic pigments.

Jane C. Hollenberg
February 2021

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Introduction

The use of color additives in cosmetic products to change, enhance, or improve personal appearance can be traced back to antiquity. The most notable use of this technique can be found in ancient Egypt. The Egyptians used several naturally occurring colorants to produce color cosmetics, such as Red Ochre (iron), Malachite (copper), and Galena (lead). Some of these materials would cause much consternation today because of their toxic nature. Fortunately, the colorants used in today's decorative cosmetic products must meet strict criteria for use in all major world markets. This book will concentrate on the selection of colorants for cosmetic products in today's marketplace, based on a much better scientific understanding of the safety impact of chemicals on human physiology.

The selection of color additives for use in cosmetic products can be divided into four distinct criteria, each building upon its predecessor. The first is regulations. In order for a color additive to be acceptable for use in a cosmetic product, it must meet the regulatory requirements of the country where the product will be sold. No matter how “good” it is, a color additive is useless if it is not permitted by a country's regulations.

Once it is determined that a colorant meets the regulatory requirements of a particular country, the next area to consider is stability, both chemical and physical. In order to be useful, a colorant must not interact negatively with the other chemicals in the formula, the conditions of manufacture, the finished goods package, or the environment to which the final cosmetic product will be exposed. Some of the parameters to be considered with

regard to stability are other chemicals, packaging materials, heat, light, pH, and humidity.

Third, once the regulatory and stability aspects are satisfied, color selection based on the desired color esthetics can be considered. This is where the cosmetic chemist can use his or her creativity to create unique color shades dictated by current fashion trends and demands. The fourth criterion relates to the third one and is economics. In today's very competitive market, there is always pressure on formulators to develop formulas in the most economical way, and the selection of colorants used can have a dramatic impact on the overall cost of the formula.

Chapters 2 through 5 are each devoted, respectively, to taking a deeper look at each of these criteria. The subsequent chapters deal with other aspects of color usage, along with discussions about effect and specialty pigments.

There are dozens of colorants approved for use in cosmetic and toiletry products in the United States and in other major world markets. They come in all shapes and sizes. Some are organic, some inorganic. Some natural, some synthetic. However, as a practical matter, only a small number of them are actually used on a regular basis. Regulatory restrictions, stability issues, color performance, and economics narrow the field of those used considerably. In order to focus attention on the color additives that are most frequently used, the topics covered in the chapters of this book will focus specifically on those colorants.

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