

Introduction

To the layman, the world of perfumery conjures up images of glamour, dreams, romance, expensive oils extracted from exotic plants and so on. The names that spring to mind are those of the great perfumers and fashion houses such as Jean Patou, Francois Coty, Chanel, Christian Dior and so on. These names and images are part of our fascinating industry but, in addition, behind all of this allure, is a modern industry with a strong scientific basis and the core science is chemistry. Ernest Beaux, the perfumer who created *Chanel No. 5*, said “One has to rely on chemists to find new aroma chemicals creating new, original notes. In perfumery, the future lies primarily in the hands of chemists.” And his words are as true today as in 1921 when he created his famous masterpiece. Many Nobel prizewinners mentioned fragrance chemistry in their prizewinning lectures. It is also significant that the times of strongest growth of a fragrance company are associated, more often than not, with the presence of a first rate, practicing chemist in a senior position. Thus to the names of the perfumers above, we can add great chemists such as Yves-Rene Naves (Givaudan), Ernst Theimer (IFF), Leopold Ruziča (Firmenich), Ernst Günther (Fritsche, Dodge and Olcott), Ernest Polak (Polak’s Frutal Works), Paul-José Tesseire (Roure-Bertrand Dupont), Günther Ohloff (Firmenich) and George Fráter (Givaudan) as key figures in the history of perfumery. Not everyone needs to be a chemist of such a caliber as these, but for all of those individuals working in the fragrance business and in the consumer goods industries that it serves, knowledge of chemistry is invaluable in understanding how fragrance is produced, how it works and the factors that control its performance in products.

Perfume molecules are compounds of carbon and hence come under the general heading of organic chemistry. Our bodies are also composed of organic chemicals and so are most of the components of consumer goods such as soaps and detergents. This book therefore concentrates on those aspects of organic chemistry, which are of particular importance to the fragrance industry. It is intended for those who have little or no previous training in chemistry and who would like to know enough in order to improve their understanding of perfume and its interactions with the wide variety of products in which it is used.

Chapter 1 covers the nature of matter, the building blocks from which it is made and how these building blocks are held together.

Chapter 2 describes the basic concepts of how carbon atoms join together to form the backbones of organic chemicals. It also describes the various short-hand methods that chemists use to indicate the composition of materials and the structure of their molecules and so will enable participants to make sense of

the “fried eggs and spiders” that chemists draw. It also gives an insight into the language that chemists use and the names they give chemicals.

Chapter 3 introduces organic materials that contain oxygen, nitrogen or sulphur as well as carbon and hydrogen. The vast majority of fragrance ingredients fall into this class.

Chapter 4 describes the three states of matter and how one may be converted into another. It also describes how surface active agents behave at interfaces between immiscible liquids and this behavior leads on to cover the basis of detergency and the structure of mammalian cell walls.

In order to analyze and manipulate materials, it is important to be able to isolate them from mixtures and obtain them in pure form. The various methods by which purification can be achieved both for analytical and manufacturing purposes are described in **Chapter 5**.

Chapter 6 concerns the methods used to identify and characterize perfume molecules, an activity of vital importance for everything from purchasing of raw materials to studying the fate of fragrance materials after use.

Chapter 7 outlines the factors controlling chemical reactivity and provides a basis for understanding of the chemistry to be described in the subsequent chapters.

The chemistry of acids and bases and the relevance of this chemistry to perfume chemistry is the subject of **Chapter 8** while **Chapter 9** covers oxidation and reduction reactions.

Chapter 10 describes the structure of a fragrance and the effects of this on performance in consumer goods. **Chapter 11** discusses the chemical interactions that occur between perfume ingredients and the other materials present in consumer goods.

Chapter 12 gives a very basic introduction to the chemistry of living organisms and this paves the way for a discussion of the mechanism of olfaction in **Chapter 13**.

Chapter 14 moves on describe the variety of chemicals made by plants and animals and, in particular, those that constitute the essential oils and other fragrant extracts.

Chapter 15 follows on by describing how we copy and improve upon the perfume ingredients of nature in order to provide the perfumera with the palette available to them today.

The last chapter, **Chapter 16**, provides a brief introduction to chemical literature and it also contains a list of recommended reading. Thus it serves as a guide for the reader who wishes to pursue the subject in more detail.