ELLIS HORWOOD SERIES IN
APPLIED SCIENCE AND INDUSTRIAL TECHNOLOGY

INTRODUCTION TO PERFUMERY

Tony Curtis
David G. Williams

INTRODUCTION TO PERFUMERY

Tony Curtis and David G. Williams

ELLIS HORWOOD
NEW YORK LONDON TORONTO SYDNEY TOKYO SINGAPORE

First published 1994 by
Ellis Horwood Limited
Campus 400, Maylands Avenue
Hemel Hempstead
Hertfordshire, HP2 7EZ
A division of
Simon & Schuster International Group

Printed and bound in Great Britain by
Hartnolls Limited, Bodmin, Cornwall

Library of Congress Cataloging-in-Publication Data

Available from the publisher

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN 0-13-491614-X

1 2 3 4 5 98 97 96 95 94

INTRODUCTION TO PERFUMERY

ELLIS HORWOOD SERIES IN APPLIED SCIENCE AND INDUSTRIAL TECHNOLOGY

Series Editor: Dr D. H. SHARP, OBE, former General Secretary, Society of Chemical Industry; former General Secretary, Institution of Chemical Engineers; and former Technical Director, Confederation of British Industry

This collection of books is designed to meet the needs of technologists already working in the fields to be covered, and those new to the industries concerned. The series comprises valuable works of reference for scientists and engineers in many fields, with special usefulness to technologists and entrepreneurs in developing countries.

Students of chemical engineering, industrial and applied chemistry, and related fields, will also find these books of great use, with their emphasis on the practical technology as well as theory. The authors are highly qualified chemical engineers and industrial chemists with extensive experience, who write with the authority gained from their years in industry.

Published and in active publication

PRACTICAL USES OF DIAMOND
A. BAKON, Research Centre of Geological Technique, Warsaw, and A. SZYMANSKI, Institute of Electronic Materials Technology, Warsaw

NATURAL GLASSES
V. BOUSKA *et al.*, Czechoslovak Society for Mineralogy & Geology, Czechoslovakia

MEASURING COLOUR: Second Edition
R. W. G. HUNT, Visiting Professor, The City University, London

LABORATORIES: Design, Safety and Project Management
Editor: T.J. KOMOLY, ICI Engineering, Winnington, Cheshire

PAINT AND SURFACE COATINGS: Theory and Practice
Editor: R. LAMBOURNE, Technical Manager, INDCOLLAG (Industrial Colloid Advisory Group), Department of Physical Chemistry, University of Bristol

HEALTH PROTECTION FROM CHEMICALS IN THE WORKPLACE
Editor: Dr P. LEWIS, Senior Executive, Occupational Health, Chemical Industries Association, London

FERTILIZER TECHNOLOGY
G.C. LOWRISON, Consultant, Bradford

REPROCESSING OF TYRES AND RUBBER WASTES: Recycling from the Rubber Products Industry
V.M. MAKAROV, Head of General Chemical Engineering, Labour Protection, and Nature Conservation Department, Yaroslav Polytechnic Institute, Russia, and VALERIJ F. DROZDOVSKI, Head of the Rubber Reclaiming Laboratory, Research Institute of the Tyre Industry, Moscow, Russia

ACCIDENTAL EXPLOSIONS: Volume 1: Physical and Chemical Properties
LOUIS A. MEDARD, formerly Head of the Laboratory in the French Government Explosive Branch

ACCIDENTAL EXPLOSIONS: Volume 2: Types of Explosive Substances
LOUIS A. MEDARD, formerly Head of the Laboratory in the French Government Explosive Branch

COLOUR DYNAMICS AS A SCIENCE
ANTAL NEMCSICS, Professor at the Technical University of Budapest, Hungary

QUALITY ASSURANCE: The Route to Efficiency and Competitiveness, Third Edition
L. STEBBING, Quality Management Consultant

QUALITY MANAGEMENT IN THE SERVICE INDUSTRY
L. STEBBING, Quality Management Consultant

INDUSTRIAL PAINT FINISHING TECHNIQUES AND PROCESSES
G.F. TANK, Educational Services, Graco Robotics Inc., Michigan, USA

MODERN BATTERY TECHNOLOGY
Editor: C.D.S. TUCK, Alcan International Ltd, Oxon

COSMETICS AND TOILETRIES: Development, Production and Use
Editor: WILFRIED UMBACH, Director, Chemical Research, Henkel KGaA, Dusseldorf, Germany

HOW TO TURN ROUND A MANUFACTURING COMPANY
BRIAN HALFORD WALLEY, Former Finance and Site Director, Ferodo Ltd

Preface

Over the last 25 years there has been a growing interest in perfumes and fragranced products. However the serious new student has been faced with advanced and expensive texts and monographs. In this book we provide a wide ranging introduction to the art, science, technology and business context of perfumery without any assumption of expert prior knowledge.

Introduction to Perfumery is intended to be ideal for all introductory courses in Perfumery and Cosmetic Science at undergraduate level. Professional scientists and business professionals entering or changing roles in the industry will also find the text of value.

The heart of perfumery lies in the creation of fragrance, a technology-based art dedicated to communication through the sense of smell. A specific framework of odour vocabulary is developed in this book, with detailed description of key perfumery materials. The process of perfume creation is discussed from both the technical and business context, and the key concepts of chemistry and business needed to understand the creative process are presented. As this text is intended as an introduction, many references have been included to guide the reader to the advanced texts and research literature.

Both perfumery and chemistry are experimental subjects. Throughout the text, for those who have appropriate facilities, study experiments have been included. Students wishing to perform these experiments should read and apply the safety notes at the end of the introduction.

A practitioner's view of Perfumery has been taken, and common names have been used for aroma chemicals. In some cases these are 'trade names' and their use in this text is indicative only of their everyday use in the industry.

This book would not have been possible without valuable discussions with, and support from, many individuals and learned societies within the industry. The authors acknowledge the help received from the British Society of Perfumers, International Fragrance Association, Society of Cosmetic Scientists, International Federation of

Essential Oils and Aroma Trades and the British Standards Institution. The preparation of the text would have not been possible without the understanding and professional skill of Andy and Mike.

David Williams and Tony Curtis, April 1994

Table of contents

1

Introduction: the business of perfumery

The purpose of this book is to introduce the reader to the business and technology of perfumery without the assumption of any prior knowledge of perfume chemistry or business studies. In this chapter the basic structure of the perfumery industry is given.

As with any industry, there is a vertical structure between the consumer of the finished products and the primary producers of the raw materials. At each level of the vertical structure there is horizontal diversification, where certain organisations focus on specific activities or products.

The range of fragranced products is vast, from fashion fragrances, cosmetics, toiletries and soaps, to more utility products such as toilet blocks and detergents. To fragrance such a diverse range of products requires a breadth of aroma materials with appropriate odour profiles, stability, performance and price characteristics. Fig. 1.1 shows the broad outline of the fragrance industry. The raw materials of perfumery can be divided into those of natural origin (essential oils, absolutes etc), materials of synthetic origin from the chemical industry and perfumer-created fragrance bases.

The natural materials of perfumery are obtained from a wide range of botanical and a few animal sources from both temperate and tropical zones. Given the fragmented production of some natural products and consequent quality variations, the processors of natural products are of the greatest importance to the industry. These processors collect 'lots' or parcels of essential oils from the various producers and by blending, distillation and other techniques provide products of more consistent quality than would otherwise be possible. This is important to the fragrance compounders as without this standardisation every batch of a perfume would require experimentation and adjustment to gain a uniform effect. Apart from general quality improvement, the processors of essential oils may also alter the properties of the natural product to fit specific needs of the perfumer for differing formulation demands. Natural bergamot oil contains a group of materials called bergaptenes which can cause skin irritation problems when used in formulations such as after-shaves. Skilful processing of the oil can remove the offending