

BOOK REVIEWS

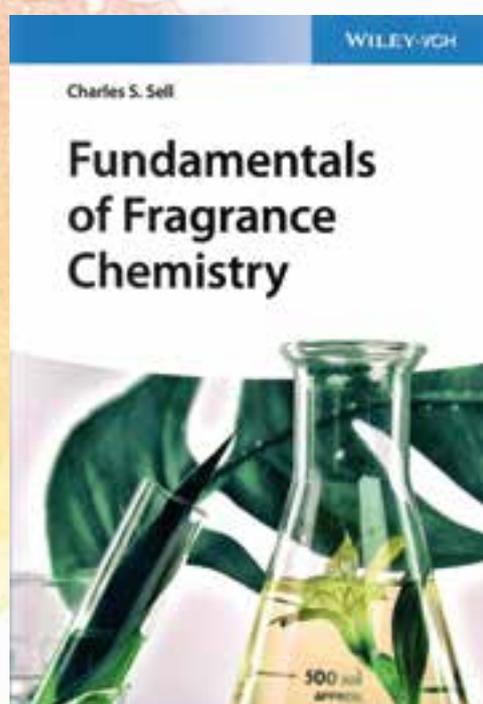
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FUNDAMENTALS OF FRAGRANCE CHEMISTRY

Charles S. Sell

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For many years Charles Sell's book 'Understanding Fragrance Chemistry' has been a bedrock of required reading for serious students of Perfumery. 'Fundamentals of Fragrance Chemistry' is the successor to this book. This is more than just a new edition; it embraces new developments and issues and is set to continue to be a cornerstone for students building their knowledge and understanding of our science and industry.

As always, I find it invidious to have to select specific chapters for comment when every one is so worthy of discussion. The Editor gives me space for three samplings of this outstanding addition to our bookshelves.

I have recently become interested in photography. My favourite book on the subject is my dogeared Langford's 'Basic Photography: The guide for Serious Photographers'. This does not start with mega-pixels but on fundamental

issues such as perspective, how images are captured and perceived etc. 50 years ago, when I started my research career in the Aroma Trades, we had nothing. We played chemical roulette and made new molecules and hoped we would hit the olfactory jackpot. Charles in a paper¹ explains we still are not able to odour design molecules. However, our knowledge of how we smell molecules has exploded in the 21st century. Charles provides an informed snapshot of our current state of understanding and knowledge.

In my public lectures an often-asked question is 'Do people, perceive odours in the same way?' I live dangerously in such lectures and often do a live audience experiment. You give every member of the audience a smelling strip dipped with eugenol. The question you ask is not 'Can they identify the odour' but 'What do you feel about this odour?' In the UK (if it works – this is a live

experiment!) around 50% will say they do not like it. It reminds them of Dentists. The other 50% will say they like it and it reminds them of Christmas, mulled wine, Christmas pudding and spiced apple pie. Eugenol is of course a major constituent of clove oil. This is a nature – nurture type of experiment. Here we will set aside the nurture aspect. To consider the question 'Do you smell what I smell?' Chapter 13 -The Mechanism of Olfaction explains, in an accessible way, why we do not necessarily smell a material in the same way as another person.

The chapter also investigates another experiment I have seen conducted by John Ayres in his Fragrance Creation Workshops. The way he expressed it was $1 + 1 \neq 2$. You give people two smelling strips of rose and jasmine. You then give them a mixture (the trick is to get the proportions right!) and the perception is not either of rose or jasmine but muguet. This is analogous to the mixing of primary colours to get the colour perception of green. 50 years ago, we had not the slightest idea why we observed this effect: just how accords work. We still do not have a complete picture but we now have some understanding of how odour receptors work (we do not all have the same set – we do not necessarily smell what others individuals smell) and the signal process in the brain of their output to perceive an overall olfactory effect. We are on our way to better understandings!

Almost every day we read of concerns about 'fake news'. A Google search will bring up a storm of hits on almost any subject you can think of. Any researcher or student needs to have a mechanism of managing this mountain of material to dig out relevant accurate information. Chapter 16: 'Chemical Information' addresses this issue. Charles signposts the more reliable peer reviewed sources. For the newcomer to Chemistry he explains how the mystical CAS Number will guide, like a laser, to specific molecular information. I particularly applaud his comment that though laser searches are fine that:

Browsing in original journals takes time, but it is the only way for a researcher [or student] to see everything there is there and to make up their own mind on its relevance or otherwise for their work.

Past readers of my reviews will remember I almost always end up with a plea to readers to spend a little of their precious time reading around the subject. In the end it is always rewarding to gain the broader perspective and greater insight that this brings. In a past edition of the ICATS News Letter I reviewed (on its 50th anniversary of its publication) the seminal work that ignited the green movement: Rachel Carson's 'Silent Spring'. A particular feature of her work was the meticulous attention to provide firm evidence for the [then] conventional standpoint [that persistent pesticides were a major danger to the environment]. This area is now plagued with 'fake news'. On one side we have the 'Global warming is an

invention. Let's burn as much fossil fuel as we like!' and the alarmist 'Unnecessary fragrances are polluting our world', on the other you do not need facts or evidence; you just have to shout loud enough and Twitter away! Charles brings some much-needed perspective in Chapter 17 'Towards a Sustainable Future'. This year, as we have investigated such things as registering the ICATS Trade Mark (now successfully completed), I have often been heard to say 'The devil is in the detail'. I now want to add another axiom to discourse 'The devil is in the definition!'. Do not enter into a debate until you have an agreed definition. As a Scientist I would also add 'Having defined, how do we measure?'. This chapter is an essential read for everyone concerned with the broader issues of the Aroma Trades (both Flavours and Fragrance), whatever their point of view. The chapter starts on precisely the right note with its introduction 'What is Sustainability?'. To go along with my Scientists' assertion, you have to measure and bring numbers in, I especially appreciated the observation in the section 'Synthetic Fragrance Ingredients B: Environment Impact':

To put the industry in context the total volume of fragrance oil produced annually is about 300,000 tonnes, just enough to half-fill a super tanker, whereas trees are estimated to release 100,000 000 tonnes of isoprene into the atmosphere each year.

To go back to Rachel Carson's critical point this would still be a major problem if fragrance materials were POPs (Persistent Organic Pollutants). Aroma materials that are found to be POPs are IFRA prohibited. To enter into a debate in this arena one must have an understanding of environmental fate and biodegradation routes. It is then possible to enter into a debate as to what are problematic materials and how the issue can be resolved. In the section 'Synthetic Fragrance Ingredients D: Finding the Balance' Charles provides a good overview. I can think of no better way to conclude this book review than with his comment in this section:

For any activity to be sustainable, it must take into consideration economic, social and environmental factors, and it is always difficult to decide where the best balance lies between various courses of action.

This is a student affordable book at £65.99. It is not only of value to students but with parts such as Chapter 17 it provides a good review of developing aspects of our industry that all professionals in the industry must be conversant with. I will repeat my plea to our readers – do read round the subject – it is always rewarding! To make decisions and to debate one must be informed.

1. Sell, C.S. (2006), On the unpredictability of odour. *Angew. Chem. Int. Ed.* 45 (38): 6254 – 6261