CHAPTER 1

Introduction

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Welcome to this 'novice's guide' – at last, a book that explains the real science behind the cosmetics you use. We are assuming nothing about you, the reader, your background or expertise. The fact that you are reading this introduction suggests that you are interested in finding out more! Which is why we had the idea of putting these chapters together. We guessed that there may be quite a few of you wanting to find out what some of those strange-sounding chemicals listed on your shower gel are doing in a product, and why. Or maybe you want to settle an argument about what cosmetics actually do. We'd like to think that there are lots of teachers or journalists needing to know more about a subject you'd like to communicate to others. Students or others

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wanting to find out if this is the career for you – we'd love to encourage you by sharing the authors' many years of scientific knowledge. Or you may simply like the front cover! Whatever the case, we have plenty of science for you to discover. This introductory chapter aims to set the scene and start you thinking about the science and concepts that you'll come across in the subsequent chapters of this book. Let's start by asking you a question.

1.1 HOW MANY COSMETIC PRODUCTS DO YOU USE IN THE DAY?[†]

Do you shower first thing? Or clean your teeth? Or rub oil into your beard? Or put dry shampoo on your hair because you are in a hurry? All of these activities will involve some kind of cosmetic product. How do all these products work? Why might they be needed? Are they all 'hype'? To answer these and other questions, we'll try to use a gentle approach, giving you a 'guided journey' through the different product types.

You'll see from the Contents list that we have approached this journey by stopping off at each of the 'core technologies' and the product areas they support. Then we've added some important destinations – showing you the science behind safety – before ending up by dispelling some of the myths that find their way into the public domain. In reality, a cosmetic scientist developing a product will need a broad understanding of all of these topics in their daily work.

Reading this book, you'll discover that, while cosmetic products often sit on the surface, they are not as superficial as often thought. We think that you will learn that there's some amazing science behind them – we will go into this in some detail in places, but you won't need a PhD to understand the science. We shall also point out some interesting facts on our way, uncovering some of the truths behind the myths. Look out for Boxes in the chapters where authors either explain things in more detail or go off on an interesting side road during your journey of discovery. We've also pointed you in the direction of

[†]Most people say it's around 5 or 6 – soap, shampoo, toothpaste, deodorant and moisturizer. But Figure 1.1 shows that it could easily become 20 or more!

further reading if you want to know more. We know you'll have lots of questions to ask and we will try to pre-empt these if we can.

To set the scene, we suspect your next question may be ...

1.2 WHAT IS A 'COSMETIC'?

The word 'cosmetic' shares its origin with 'cosmos', from the Greek '*kosmos*', their word describing 'order' or 'ornament'. This second meaning has led to 'cosmetic' being used to describe the outer appearance. This focus on surface or superficial matters has also led to the interpretation that cosmetic *products* are somehow trivial or lacking depth; we think you'll change your mind after reading this book. This 'ornamentation' definition also leads many to think that the term cosmetic *product* just applies to 'makeup'. Makeup, sometimes called colour cosmetics or decorative cosmetics, is indeed one class of cosmetic product. However, there are many different classes used by millions of consumers every day. Why? Well, mostly to help keep themselves clean and hygienic, looking and feeling fresh and maintaining a healthy appearance. Generally, then, the definitions of cosmetics and personal care products around the world are similar. They focus on the 'appearance' of the outer body surfaces – the skin, hair and teeth – keeping them clean, perfuming or correcting body odours. Definitions also include *changing* the appearance of these surfaces, protecting them and keeping them in good condition, or, as in the other meaning of '*kosmos*', in good 'order'. It is these aims that all cosmetic science is designed to achieve.

Figure 1.1 gives some examples of the myriad of products covered by the term 'cosmetic'.

Each area of the world will have its own legal definition of 'cosmetic product'. Although there are many commonalities, some products classified as cosmetic in the UK and European Union (EU) are classed as different product types in other jurisdictions. For example, sunscreens, which are cosmetic products in the UK and EU, are classed as over-the-counter (OTC) medicines in the USA; hair dyes are cosmetic products in Europe and the USA but are classed as 'quasi-drugs' in Japan.

Figure 1.1 Diagram showing the range of types of cosmetic products organised and colour coded in their 'families'. This useful reference should help guide you through the coming chapters.
Reproduced with permission from Cosmetics Europe (https://cosmeticseurope.eu/cosmetic-products).

The main purpose of the laws governing the manufacture and sale of cosmetic products is consumer safety. Companies making and selling cosmetic products, and the regulatory bodies charged with implementing and policing the legislation, have a duty of care to ensure that human health is not compromised. You will find out some of the ways in which this works in practice, and the science behind it, in Chapter 10.

However, wherever a cosmetic product is placed on the market in the world, the core science and technologies are the same.

1.3 WHAT GOES INTO A COSMETIC PRODUCT?

Hopefully, by now you are eager to know more about this; once you get into the later chapters, you'll find out more. However, there may be one feature of your cosmetic products you're already aware of – the list of ingredients, often seen on the back of a pack. This legal requirement is designed to help people identify, and so avoid, products with ingredients that they know they are sensitive or allergic to. Although there are minor differences around the world, the European markets implemented the International Nomenclature of Cosmetic Ingredients naming system, known as INCI, and this has also been adopted by many countries worldwide. INCI names are based on chemical identity and structure and you'll discover some of these as you read on (for more on naming conventions see Section 1.4). However, we will try not to overload you with too many of these. We can't possibly cover them all, but we've tried to give you some insights into what is used and why (see Box 1.1). So here we can start by talking about the different roles that ingredients play in the product.

When cosmetic scientists talk to each other about ingredients, they may use terms such as 'base', 'workhorse' or 'chassis' to describe some ingredients. We suspect you'll guess what these are – the unsung heroes of every product. In Chapter 2 you'll be introduced to one such class – surfactants – and learn what these are and why this class of ingredients is so important; so important that they appear again in Chapters 3 and 4 and, although they get called emulsifiers, again in Chapters 5 and 6 – yes, we know we said this would be gentle; stick with us!

There are many other classes of ingredients that are used across all types of product. Some, such as polymers, may be there to stabilize a product but also contribute to the 'feel' of the product in use. Others, such as glycols and alcohols, may be there to keep an ingredient soluble in the product or give a particular feel on the skin. Yet others, such as fats and oils (common examples of chemicals known as 'lipids') used in cosmetics, can add lubricity – to help the product spread while in use – in addition to performing functions you'll discover in

BOX 1.1 INCI LISTINGS

Table 1.1 shows two simple products and their INCI listings. In this case we also show the function of the ingredients in the products. For several reasons it is not possible to show all this information on a product INCI listing – that's not the purpose of the listing, some ingredients may have more than one function and space on the label is often limited. Even these very simple products have a long list of ingredients that must be declared and, as you will see, many different functions.

Table 1.1 INCI listings for body wash and body lotion.

Body wash		Body lotion	
INCI name	Function	INCI name	Function
Aqua	Solvent	Aqua	Solvent
Sodium laureth sulfate	Surfactant	*Butyrospermum parkii* butter	Skin conditioning
Cocamidopropyl betaine	Surfactant	Dimethicone	Emollient
Sodium chloride	Viscosity controlling	Cetyl alcohol	Emollient/emulsion stabilizer
Phenoxyethanol	Preservative	Stearic acid	Emulsifier
Benzophenone-4	UV filter	C12–C15 alkyl benzoate	Emollient
Salix nigra bark extract	Skin protecting	Sorbitol	Humectant
Benzoic acid	Preservative	Phenoxyethanol	Preservative
Dehydroacetic acid	Preservative	PEG-100 stearate	Emulsifier
Citric acid	pH adjusting	Olus oil	Emollient
Hexylene glycol	Solvent	Glyceryl stearate	Emollient/emulsion stabilizer
Sodium citrate	Buffering, chelating	Caprylyl glycol	Preservative
Acid Violet 43	Cosmetic colourant	Magnesium aluminium silicate	Viscosity controlling
CI 42090	Cosmetic colourant	Carbomer	Emulsion stabilizer
CI 16035	Cosmetic colourant	Tocopheryl acetate	Antioxidant
CI 47005	Cosmetic colourant	Sodium hydroxide	pH adjusting
		Panthenol	Skin conditioning
		Olea europaea fruit oil	Emollient
		Alcohol	Solvent
		CI 42090	Cosmetic colourant

Many companies, however, *do* provide more information on their websites, describing some of the ingredients that they use and why.

We will not go into every item here – keep on reading this book and you'll find out more about the functions and chemistry of surfactants, emulsifiers, emollients, colourants, preservatives and so much more. However, there are a few important things to pick out, as follows.

Aqua – Water! Why is it given a Latin name? – well, it is short and commonly understood around European countries where INCI names were intended to be used. You will also notice here, and in the majority of products, that aqua is the main ingredient as a solvent.

More Latin names – Salix nigra bark extract; *Butyrospermum parkii* butter; *Olea europaea* fruit oil. These are all plant materials commonly used for many years in cosmetic products – willow bark, shea butter and olive oil, respectively. However, using the botanical (Latin) name for the plant *and* the part of the plant is important. Common names of plants differ around the world; different parts of a plant contain different chemical compounds, some of which could be toxic. This scientific naming convention ensures a universal understanding of the part of the plant being used and its safety profile.

Alcohol – You'll see this term twice in the body lotion. 'Alcohol' is class of chemicals that have a carbon backbone and an OH (hydroxyl) group. 'Alcohol' in an INCI list means ethyl alcohol (ethanol), with its solvent and cooling properties – chemically the same as the alcohol in wine, beer, *etc.* Cetyl alcohol is a 'bigger' alcohol in molecular size – it has more carbons in its chain – and that makes it a waxy solid rather than a liquid. Just to make life really interesting there are other names in these INCI lists that end in '-ol', *e.g.* phenoxyethanol; hexylene glycol; caprylyl glycol; panthenol. The '-ol' indicates that these chemicals have a hydroxyl group in their structure. For those of you who know Sweden, you may recognise the term 'öl', being Swedish for beer!

More than one function – You will see here that some ingredients are given more than one function in the product. One of the many wonders of chemistry is that one molecular

structure can confer several properties – you only have to think of the many uses of water to understand this. Formulators choosing cetyl alcohol know that its waxy nature leaves a softening, emollient effect on the skin *and* that it also forms part of the emulsion structure. This can help stabilize the product – see Chapter 5 for more on this.

Another thing that you'll notice is that, unlike a cooking recipe, there is no indication of the proportions used. This is for good reason. First, it is not a recipe; INCI lists inform the user of anything they might want to avoid using. Second, companies want to keep their special creations to themselves – in some cases this goes as far as patenting their intellectual property. However, companies follow two conventions of INCI listing:

1. The ingredients used at greater than 1% are listed in order of concentration; those at less than 1% can be included in any order. A top tip when trying to assess which are the lesser ingredients is to look for common preservatives – benzoic acid; parabens; phenoxyethanol – or buffering chemicals – citric acid; sodium hydroxide – or fragrance (parfum). These are usually (but not always) used at less than 1%.
2. If you or anyone else reacts so badly to a product that they end up seeing a dermatologist, companies will release the full details, including levels of use, to help healthcare professionals assess what has happened. Once any intolerance or allergy has been diagnosed, the INCI list allows the individual to avoid this ingredient in the future.

Chapter 5. What this demonstrates is that one ingredient type can have a number of uses, even in the same product. So, unlike medicines, where an active ingredient, or ingredient combination, is responsible for the therapeutic effect, several cosmetic ingredients are blended together to provide a combination of sensorial and functional benefits. This is worth remembering whenever you hear or read a self-appointed 'expert' talking about

the importance of 'the latest must-have *ingredient*' – if it isn't in an appropriate formula it may not be doing what you are told it is doing. This is why testing the finished product is important – as you'll discover in Chapter 9.

On the topic of 'active ingredients', Chapter 8 will explain the role of some common examples. Here again, the term 'active' is how cosmetic scientists describe them, to differentiate them from the 'chassis' ingredients. Once the press hear cosmetic scientists talk with pride about their latest product, with the latest 'active ingredient', this term gets into public conversation. We suspect that if you've stuck with us this far you've probably heard the term 'active ingredient' yourself! Once again, remember that it is the whole product you are using, not simply one ingredient, and a lot of thought and scientific understanding has gone into the combination of ingredients in the products you use.

We think that you will also quickly discover while reading these pages that it is not just about the science of *ingredients* and the *products*. The science behind skin, hair, nails and teeth also goes into the product. Understanding how the biology and chemistry interact is an important part of the process of creating a cosmetic product. When you then add in the physics – for example, how light illuminates and bounces off the skin and hair to create their familiar colour and appearance – you'll begin to understand how many aspects of science are covered in this book. You may even rediscover facts about science that you learned in school or college.

As a final thought about 'what goes into a product', it may not have escaped your notice that words such as 'looking' and 'feeling' keep cropping up. Despite some of the more extreme headlines announcing (once again) the best 'miracle anti-ageing moisturizer', all cosmetic scientists recognize that users look for the sensation of using a product as much as they look for 'an effect'. In fact, these 'sensorial' properties – touch, taste, appearance, smell (and even sound!) – are important 'effects' in their own right when it comes to us choosing a product. A lot of work goes into this, from the selection of ingredients based on their physical chemistry and aesthetics to the testing of the product's sensorial effects in trials with consumers. The importance of sensorial properties cannot be understated – if a

product wasn't pleasurable to use it might not stand a chance of achieving *any* effect – the user will quickly bin a product that feels awful. This is worth remembering as you read through this book; it will be mentioned from time to time but especially in Chapter 5, where you will discover why touch is so important in skin and skincare products. In Chapter 7, you'll discover the important role that fragrance can play in ensuring the acceptability of a product and in providing sensorial benefits in the product. We will introduce you to the basic science behind all these senses in this book, but the topic deserves a whole book to itself. For anyone wanting to find out more details on these properties, we suggest dipping into *Sensory Evaluation: A Practical Handbook*.[1]

1.4 THE IMPORTANCE OF THE IDENTITIES AND STRUCTURES OF CHEMICAL COMPOUNDS

Now for 'the science bits'. We promised that you wouldn't need a PhD to understand the scientific facts and concepts in this book; neither do we want to talk down to you. So, as part of our 'gentle approach', we'd like to confirm some of the common scientific terms that you'll come across, to make sure we are 'all on the same page'. We'll revisit many of these in certain chapters where necessary, sometimes in some detail, but here are some concepts and descriptions to start you off.

Scientists need a common language to ensure that *we* are all on the same page too. INCI names are part of that language but, at another level, chemical names communicate the identities and structures of compounds. There are no rules on how the INCI names are printed on pack (font, size, capitalization) or referred to in ingredient literature. Since this is essentially a science book, whether referring to chemicals identities or INCI names we have followed the convention for naming chemicals where capital letters are not commonly used. For the cosmetic chemist, the names also hint at the behaviours of the ingredients that we want to put into products. Ingredient solubilities, whether they are liquid or solid, how stable they are, what they may react with (intentionally or unintentionally) and sometimes their potential toxicity can often be deduced from their chemical names.

1.4.1 Organic and Inorganic Chemistry

We can consider this to be the most fundamental distinction in chemistry. You may have heard about the Periodic Table of the Elements – in 2019 we celebrated 150 years since its inception. It shows how the atomic structures of the different elements help define their chemical behaviour.

Inorganic chemistry refers to these elements and their various permutations in chemical compounds such as common salt (NaCl) found on potato chips or silica (SiO_2) found in microprocessor chips.

Organic chemistry refers to complex combinations of carbon and hydrogen and their compounds also containing nitrogen, oxygen and chlorine and, less frequently, sulfur or phosphorus.

The majority of cosmetic ingredients are organic but, as you will see in Box 1.1 and on many occasions in this book, understanding the interactions between organic and inorganic materials is an essential skill for the cosmetic chemist.

The term 'organic' often creates confusion in communicating the science behind cosmetics. The 'organic movement' is a totally separate concept created by organizations wanting to describe crops farmed without the use of synthetic pesticides and fertilizers.

1.4.2 Carbon Chains and Carbon Rings

The structure of organic chemicals can be based on a backbone of chains of carbon atoms – such as those found in oils and waxes – or based on a carbon ring structure – such as sugars and cellulose. The molecular size – the number of 'carbon units' – and the complexity of their arrangements – for example, chain branching or 'substitution' of carbons by other atoms such as nitrogen and oxygen in the structure – give endless permutations of form and function. Fortunately, the naming conventions help us to understand how to use them effectively.

Why Is This Important? These structural factors have an impact on the physical properties and interactions with skin, hair and oral cavity surfaces, which are themselves complex chemical structures. On one level, they can determine an ingredient's sensory properties; on another level, structural factors can also determine an ingredient's interactions with the biological surfaces in a beneficial or detrimental way.

The forces holding the compounds together also play a role, which brings us to the importance of how chemical compounds are held together.

1.5 THE IMPORTANCE OF HOW CHEMICAL COMPOUNDS ARE HELD TOGETHER

All chemical structures, including those in skin, hair and oral cavity, are held together by a number of different forces. This 'bonding' between the different elements within a compound helps to hold the structures together. You may come across a number of these in this book. Here are just a few.

1.5.1 Did You Know That Some Ingredients in Cosmetic Products Have an Electrical Charge?

Let us take common table salt as an example. Salt (sodium chloride, NaCl) is made up of sodium and chlorine. Because the sodium part has a positive charge and the chloride part has a negative charge, they are attracted together (just like magnets). Because they have an electrical charge, they are known as 'ions'. The positive sodium ion is known as a 'cation' and the negative chloride ion as an 'anion'. When positive and negative charges attract they form strong bonds – just think how hard it can be to pull magnets apart! In cosmetic products, strong bonds can also be formed between ingredients and this can help to keep the product stable, or help it to do what it was designed to do! You'll read more about this in Chapter 2 when we look at the surfactants in cleansing products. If you look at INCI lists on product packs, you may often find common salt in your products.

Why Is This Important? Many body surfaces carry a charge – you only have to rub a balloon against your clothing, then hold it to your head and see how the hair stands up to understand this. Cationic materials in particular will be attracted to body surfaces, which is great if you want to leave a layer on the surface.

1.5.2 Did You Know That Some Ingredients in Cosmetic Products Have 'Polarity'?

Just like inorganic compounds can have ionic charge, many organic compounds can have 'polarity'. Some have no polarity at all – 'non-polar' – whereas others have strong polarity – 'polar'.

Once again, these are like the poles of a magnet, with attraction between opposite poles and repulsion between similar poles. Although these forces are far less powerful than magnets, at small molecular distances they play important roles in many chemical and biological systems.

Why Is This Important? Polarity is important in many biological systems – for example, it determines how cell membranes function. A more practical implication for cosmetic science is that 'like dissolves like' – a polar liquid will dissolve a polar substance. Water and alcohol are common polar solvents in cosmetic products. Mineral oil is non-polar and can solubilize other non-polar substances. Many natural oils comprise mixtures of polar and non-polar compounds, offering the best of both worlds when it comes to solubilizing other oils. As you will learn later, many non-polar materials can be chemically modified to make them more polar – a process common in creating surfactants and emulsifiers.

1.5.3 Did You Know That Some Compounds Are Held Together More Strongly Than Others?

With so many different ways in which a compound can be held together, it is not surprising that some are more stable than others and some more reactive.

Why Is This Important? You will discover in Chapter 9 that products need to be stable and undergo testing to ensure that this is achieved. Before that testing happens, the cosmetic chemist needs to understand the relative stabilities or reactivities of the ingredients they are dealing with to reduce the risk of the products falling apart. A lot of the time, effort and expense can be saved by thinking ahead. Once a product has passed its stability test, a cosmetic chemist gets a great sense of achievement, and if there are failures, understanding why and how they can be prevented next time can be a very satisfying learning experience too.

Which brings us to the importance of how chemical compounds fall apart.

1.6 THE IMPORTANCE OF HOW CHEMICAL COMPOUNDS FALL APART

You will know from your own experience of food and drink that most things eventually 'go off'. Whether it is the browning of a

cut apple or butter going rancid, Nature has a way of gradually falling apart. Both of these processes are examples of 'oxidation', a very important force in cosmetic science – whether it is helping to create desirable effects such as hair colouring or an important mechanism in the undesirable effects of skin ageing.

You will also know that there are ways of slowing these processes. For example, lemon juice slows the browning of a cut apple by an 'antioxidant' mechanism; you'll discover more in Chapter 8. Keeping butter in a refrigerator slows rancidity. Temperature is important in most chemical reactions, including the process of oxidation.

Why Is This Important? The choice of starting material is clearly an obvious way of preventing a problem in the first place, as was hinted at above. It is important to understand the factors that contribute to compounds falling apart – extremes of temperature, extremes of pH and ultraviolet light exposure are just a few of the factors. The basic chemical structure can be a guide – for example, unsaturated fatty acids, beneficial in the diet and in cosmetics, are more prone to oxidation than saturated fatty acids. It is important that cosmetic scientists understand how to control these potentially destabilizing factors to keep the product formulation in its intended state of quality during its lifetime of use. An essential part of this is understanding what happens to the ingredients during the manufacturing process. Simple things such as the order or timings of addition of an ingredient can make a real difference.

1.7 PREPARED TO READ ON?

In this introduction to cosmetic science, we have tried to prepare you for the scientific terms that you will come across in the following chapters, and many more will be explained as they arise in the text. If these explanations still leave you needing to know more, we hope that this means we have triggered your interest. To pursue this, apart from the further reading we have suggested, there are a number of good science dictionaries and the more reliable Internet sources that you can delve into.

As a final aid to your discovery, we thought it would be useful to illustrate some units of measure that might stretch your

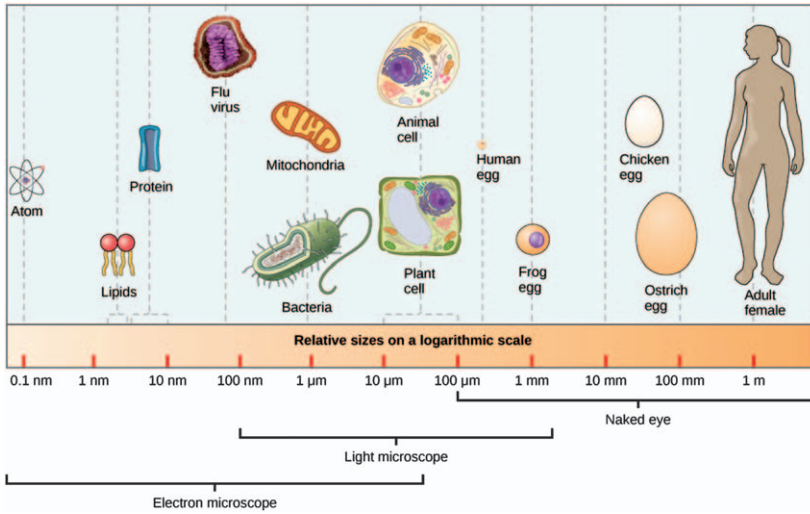

Figure 1.2 Diagram showing the range of dimensions on a logarithmic scale with illustrative examples of structures at a given size and the limits of visibility with the naked eye and various microscopes. A human hair is about 100μm wide – a similar size to a human egg. Emulsion droplets in skin-care lotion are about 1 μm wide – similar to bacterial cells.
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everyday experience of size. Figure 1.2 shows the different scales of measure of structures you will come across in this book – everything from lipid molecules to the full organism.

In this book, chapters have been written by an experienced authority on a topic, and in many cases they have paired up with someone who has recently started out on their career. This is intended to reflect their own journey of discovery and to help bring out some of the common questions that you, as a 'novice' reader, may also want to ask.

For those of you interested in finding out what a cosmetic scientist can end up doing, Box 1.2 contains a short interview with one of our own 'novice' authors.

Appendix 1 of this book provides a broader description of career opportunities. Whatever their scientific background, a cosmetic scientist will also have a passion for science and how it

BOX 1.2 WHAT DOES A COSMETIC SCIENTIST DO?

Here's an interview with one of the authors of Chapter 10, Rachael Polowyj.

What Is Your Job Title and What Do You Do?

I'm an Account Manager at an ingredient supplier where we source cosmetic ingredients from around the world for our clients. Our clients range from small indie brands to large multinationals, so it's important to service each of these accounts to the same high standard of ingredients.

What Are the Main Characteristics of Your Day-to-Day Work?

My day-to-day work usually starts by answering emails to new and existing clients. Mostly, brands contact me looking to create a product and they want to know how to make it. I will use my past formulation experience to suggest ingredients. I'll also work with our laboratories around the world to create some formulation samples for our clients. They can then try out our materials in a finished product before purchasing them.

What Is the Best Bit of Your Job?

One of my favourite parts of the role is that I get a first sight of the latest ingredients. Not only is that exciting in itself, but I enjoy the in-depth training on various scientific breakthroughs from the scientists who invent the novel ingredients. I then travel all over the country meeting with brands and manufacturers, teaching them about our innovative ingredients. It's quite rewarding when a customer selects your materials and goes on to claim them as 'hero' ingredients across their packaging. Another part I enjoy is working with my favourite brands and receiving free samples when their products are launched!

How Do You Use Your Scientific Training in Your Job?

As a trained cosmetic chemist, I get to use my formulation knowledge every day. I look after approximately 100 cosmetic companies so there are questions every day. The main queries involve practical advice on how to make formulas, but there can be many others. Why is my formula unstable? How can I make my self-tan last longer? How do I make my shower gel milder? – the list goes on! I would say within formulation, I use surface chemistry quite frequently to understand how

surfactants are affecting surface tension between two substances. This is commonly where stability issues arise in my customers' formulations, causing them to separate.

What Other Departments/Professions Do You Work With?

I mainly work with research and development chemists, but also with marketing departments from brands. I find that marketing teams are increasingly important to work with as they are the team who communicate the ingredients to the end consumer. It is vital to explain the science behind the ingredient fully so that brands create a clear message for their consumers; there are so many horror stories in the media that are so misleading and untrue. Linked to this, I also work with journalists to discuss ingredients from a scientist's perspective.

How Would You Summarize Your Career Path So Far?

Now you ask – unbelievable! I graduated only three years ago, then started as a chemist in the laboratory and now somehow I've managed to land myself a job at management level! I just find it astonishing that massive brands ask me for advice and I completely love what I do. It's been a complete whirlwind – I've had my Masters research project published in one of the largest scientific magazines in our industry. I've won awards from the CTPA, the SCS Laura Marshall Award for the most innovative cosmetic product. I've had my research on display at the International Federation of Cosmetic Chemists in Germany. I have my own column in a global magazine where I review finished products on the market, and now of course I'm helping to write a chapter in this book! All in three years – I told you it was unbelievable!

Are There Any Specific Skills Essential to the Job You Do?

Undoubtedly, a passion for science and cosmetics is key. It's also useful to be creative and experimental as practical laboratory experience helps. I believe that trust is a very important thing in business, not just in the science but in building professional relationships. Confidence is equally important – in the science and understanding of your role. This comes in handy when you have to present new ingredients to a room full of experienced chemists or buyers.

What Qualifications Are Needed to Do Your Job? Which of Your Qualifications Do You Find Useful in Your Job?

A degree is important, preferably in a scientific subject. I have a Masters degree in Cosmetic Science, which covers a variety of sciences such as chemistry, microbiology, physics and biochemistry. I find that having an understanding of so many sciences is extremely helpful in my career. I use maths quite often for negotiating pricing with clients, so a general knowledge is fine.

Is There Anything You Wished You'd Studied When Younger That Would Be Useful Now?

I wish that I learned more languages at a higher level. I travel around Europe every few months meeting suppliers and, although I am very lucky that most people speak English, it has made me lazy and I've forgotten the basic language skills I once knew!

contributes to products. The authors of the chapters in this book pass on some of this in their writing.

Happy reading.
The Editors.

REFERENCE

1. S. E. Kemp, T. Hollowood and J. Hort, *Sensory Evaluation: A Practical Handbook*, Wiley-Blackwell, 2011.