

*The Principles And Practice of*  
*Perfumery*  
*And Cosmetics*

George Howard

in association with W. E. Arnould-Taylor

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# **The Principles and Practice of Perfumery and Cosmetics**

by

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# Foreword

The main part of this textbook is the work of my friend and longtime colleague, George Howard.

His name is well known in the chemical industry as the author of the revised versions of Volumes I and III, and the editor of Volume II, of the well known books *Pouchers Perfumes, Cosmetics and Soaps* – often referred to as “The Bible” of this branch of chemistry.

This textbook is not primarily written for chemists and pharmacists, although no doubt many of them will gain from reading it. It is, in the first instance, created for students and graduates in the fields of beauty and therapy in which a knowledge of materials used on the skin, and the processes of their manufacture, will help them to a better understanding of their physiological action.

Over the past 50 years cosmetics has been a rapid growth industry and with the public demanding particular brand names in response to heavy advertising it is often not practical for a salon or clinic to produce their own cosmetics. It is, however, hoped that this book will help the beautician or therapist to take an informed and intelligent interest in the materials he or she uses.

Even a casual perusal of the text will reveal that nowadays cosmetics and perfumes reflect a highly scientific industry,

but it was not always so. Without being able to comment on the efficacy of some of the old remedies, it will be obvious that the correctness of their formulation left more than a little to chance.

A few examples from the past, given in the following pages, will serve to illustrate the big differences between then and now, but will also show that demand in the field of cosmetology made people inventive – especially with the materials available to them.

A number of the formulae quoted in this book will be reproducible by the student or practitioner but others will not on account of unavailability of some materials in the small quantities required – or, in the case of some formulae, the lack of the sophisticated apparatus involved. It is hoped, however, that the material, descriptions and product formulations will give an understanding of some of the processes and qualities of modern cosmetics.

W. E. Arnould-Taylor

1987

## SOME OLD REMEDIES

### OVID'S MUD PACK

Learn from me the art of imparting to your complexion a dazzling whiteness when your delicate limbs shake off the trammels of sleep. Divest from its husk the barley brought by our vessels from the Libyan fields. Take two pounds of this barley with an equal quantity of bean flour and mix them with hens' eggs. When these ingredients have been dried in the air have them ground, then add the half pound of harksharn, of that which falls in Spring. When the wheat has been reduced to a fine flour pass it through the sieve and complete the preparation with 21 narcissus bulbs pounded in a mortar, 2 oz of gum balsam, as much fuscine seed and 18 oz of honey.

Every woman who spreads this on her face becomes more brilliant than her mirror.

### A VERY GOODLY WATER TO TAKE AWAY SPOTS, LINTELS OR RED PIMPLES

Take green lizards quicke and boil them until the third part be consumed. Strain this, put with white wax and make thereof an ointment.

*The Secrets of Master Alexis the Piedmontese (1555)*

### TO CURE REDNECKS AND FIERY PIMPLES IN THE FACE

Blood letting is exceedingly goodly, chiefly in the median vein in both arms, some days being interposed, then in the vein of the forehead, afterwards in the neck – you may also apply leeches to the cheeks and chin to evacuate the blood that is amassed under the skin.

*Jameson, Artificial Embellishments (1665)*

*COSMETIC TAKING AWAY FRECKLES AND MORPHEW*

Take water of nightshade, lettuce, lillies and sorrel, of each 2 oz. Mix them together and dissolve white ceruse 3 drachms, camphor 1 scruple, set it in the sun for some days, shaking it often, then let it settle and filter or strain it.

The author recommends this highly not only to beautify and whiten the face but that it is of a smoothing nature and that it will make a wrinkled brow smooth.

G. Hartman, *The True Preserver* (1682)

*TO TAKE AWAY FRECKLES FROM THE FACE*

Wash the face in the wane of the moon with a sponge, morning and evening, with the distilled water of elder leaves, letting the same dry into the skin. Your water must be distilled in May. This from a traveller who has cured himself thereby.

Sir Hugh Platt, *Delights for Ladies* (1609)

*TO MAKE THAT HAIRS SHALL NOT GROW*

Take the skins or husks of green beans and make a plaster of them and lay upon the places where you will the hair not grow; they will fall off and grow no more.

*CHINESE MUD PACK*

Mix tea oil and rice flour. After removing this mask, powder the face and place carmine on cheeks, lips and nostrils and tip of the tongue.

E. Rimmel, *Book of Perfume* (1864)

#### OINTMENT FOR REMOVING WRINKLES

Take 2 oz of juice of onions, the same quantity of white lily, the same of Narbonne honey and 1 oz of white wax. Heat till wax is melted and stir till the ointment is cold. It must be applied at night when going to bed and not wiped off till morning.

A. Carron, *Lady's Toilet* (1808)

#### WATER TO MAKE THE FACE YOUNG

Take 1 oz of origanum, 1 oz of myrrh and 5 drachms of amber; powder and mix these together then mix with rose water. Distil this and keep this water in a well stopped vessel. When you wish to use it soak a linen cloth in the water and wash the face with it before sleeping. In the morning wash with rain and fountain water. The face will be very beautiful and clean so that everyone will admire it and wish to kiss it.

A. J. Whecker, *Les Secrets Merveilles* (1660)

#### CHANGING THE COLOUR OF THE EYES TO MAKE BLACK

1 oz of lapis lazuli, 5 oz of antimony that has been washed and dried, 3 drachms of musk and camphor, 2 oz of frankincense and  $\frac{1}{2}$  oz of saffron. Make these into a fine powder. At night put a little into the eyes, in the morning they will be black as if they had been so naturally.

Jameson, *Artificial Embellishments* (1665)



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# Introduction

During the last 10 to 15 years there have been extensive developments in the perfumery, cosmetics and toiletries industries. This has led to a greater interest in the subject by the public in general and in certain sections in particular.

The object of this book is to provide an introduction to the "how and why" of perfumery and cosmetics – a framework for the beginner, the student and the beauty practitioner, and for those contemplating a career in either the perfumery or the cosmetics industry. The book is also designed to be of interest to many who have no knowledge of chemistry, and where certain aspects of chemistry are desirable these are presented in a straightforward way. Many of the basic raw materials used in the perfumery and cosmetics industries are described, and formulations illustrate how these are used to prepare perfumes and cosmetic products.

The raw materials used in formulations can be solids which are weighed, or liquids which can either be weighed or measured by volume. The metric system of weights and measures has been used for this purpose for many years in both the perfumery and the cosmetics industries. The standard weights used in the metric system are as follows:

- |             |   |
|-------------|---|
| 1 kilogram  | written kilo or kg,                           |
| 1 gram      | written g = 1000th part of 1 kilogram,<br>and |
| 1 milligram | written mg = 1000th part of 1 gram.           |

Examples of the range of metric weights available are:

1 mg	=	0.001 g
5 mg	=	0.005 g
500 mg	=	0.5 g
1000 mg	=	1.0 g
1 kg	=	1000 g

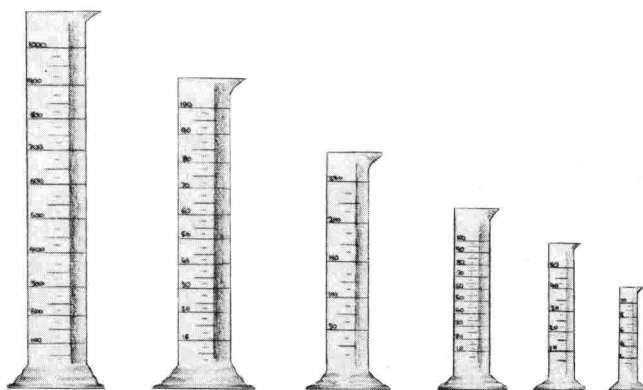
The standard measure of capacity or volume measure of the metric system is the *millilitre*, generally abbreviated to ml and also referred to as the *cubic centimetre*, abbreviated and written cc.

Cylindrical measures used for accurate work are available in small sizes of 2 ml, 5 ml and 10 ml, each being graduated in divisions of 0.1 ml. Larger measures are available, either in cylindrical or conical form, and graduated in divisions of 10 ml and up to a capacity or volume of 1 litre. It is more conventional to use conical measures when accuracy is not too important.

In order to understand a formulation involving different quantities of materials it is desirable to be able to compare the proportions of each material, and this means expressing the quantities in percentage terms. Percentage means "per hundred" or "in each hundred parts", and is written as per cent or simply %.

Ingredients used in formulations in perfumery and cosmetics are generally weighed – with the possible exception of water. One millilitre (ml) of water, however, weighs 1 gram (g) and 1 millilitre of any other liquid weighs either more or less than 1 g. Water is therefore used as a standard and is said to have a *specific gravity* of 1.0. Specific gravity is generally written as S.G.

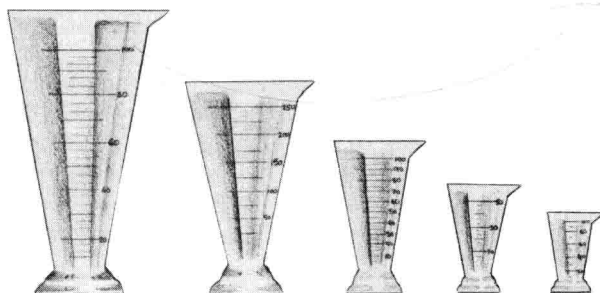
1 ml of glycerin weighs 1.26 g; in other words the specific gravity of glycerin is 1.26. 1 ml of alcohol weighs 0.834 g, and alcohol therefore has a specific gravity of 0.834.



(a) Graduated cylindrical measures.

Left to right

1 litre    500 ml    250 ml    100 ml    50 ml    10 ml



(b) Graduated conical measures.

Formulae are generally expressed in numbers as shown in the following formula for a solution of glycerin in water:

	Glycerin	10
	Water	<u>90</u>
This might mean	Glycerin	10 g (by weight)
	Water	<u>90</u> g (by weight)
or	Glycerin	10 ml (by volume)
	Water	<u>90</u> ml (by volume)

and each solution would be of a different strength.

To illustrate a percentage formula boric acid is included in the solution of glycerin given above, as follows:

Boric acid	1
Glycerin	10
Water	<u>90</u>

Since boric acid is a solid and the other two ingredients are liquids, the formula could be interpreted as

Boric acid	1 g
Glycerin	10 ml
Water	<u>90 ml</u>

Assuming the total volume of the solution is 100 ml it now contains

1.0% boric acid (by weight)  
and 10.0% glycerin (by volume)

The content of solid is weighed in g and referred to in percentage terms as *weight in volume* (w/v) = 1% w/v. The content of glycerin is in volume measured in ml and in percentage terms as *volume in volume* (v/v) = 10% v/v.

In cosmetic formulations all ingredients are weighed with the exception of water, but since water has a specific gravity of 1, this does not affect the correct interpretation of a formula.

The correct interpretation of the boric acid/glycerin formula is therefore

Boric acid	1 g
Glycerin	10 g
Water added to prepare	<u>100 ml</u>

and the solution contains

1 per cent (by weight) of boric acid, and  
5 per cent (by weight) of glycerin  
in 100 ml (by volume) of water

so that the percentages are expressed as weight/volume.

If another solution were prepared to the following formula:

Boric acid	1 g
Glycerin	5 g
Water added to prepare	<u>100 ml</u>

and the two lotions were applied to the skin, it would be possible to compare the effects of using either 5 per cent or 10 per cent of glycerin, and to make a decision as to which is most suitable for use.

This is a simple illustration of the way the perfumery or cosmetic chemist carries out experiments with raw materials in order to obtain a product with the properties which are required. In some cases very small alterations to the proportions of ingredients will make quite noticeable differences to the end product.

The formulae given in other sections of this book have all been tested in this way to determine the correct proportions of raw materials required.

# Perfumery

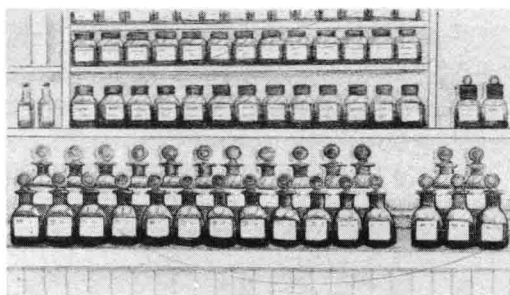
A perfume is composed of *volatile* substances; this means that they evaporate easily, converting into a vapour. In so doing they emit an agreeable aroma or odour impression on our sense of smell. Volatile materials are constantly evaporating, losing odour molecules which are carried up the nasal passages until they reach a sensitive region at the back of the nose known as the *olfactory epithelium*. In this respect a perfume differs from a flavour, which relates to all the sensory impressions of aroma and taste.

A large proportion of the basic raw materials used in perfumery do not smell very pleasant on their own; in fact some of them smell decidedly unpleasant and can even cause headaches due to their stimulatory effect on the nervous system. This is on account of their high concentration. The oils of jasmin, rose and neroli (orange flowers) are typical examples, and it is only when these and similar materials are diluted that they give the attractive and delicate odours which are associated with the flowers from which they were obtained.

A perfumer blends the concentrated raw materials together to achieve the particular effect required, and the more skilfully these materials are blended, the better the effect. This concentrated blend, which is a complex mixture of materials, represents the art of the perfumer and is referred to in the trade as a *perfume compound* or a *perfume concentrate*.



Perfumers also create compositions known as *perfume bases* which may be named, for example, as a "lilac base" or a "floral base". They are usually prepared by manufacturers of raw materials and are available as speciality products. In some cases they may be used on their own to create a perfume or, more often, a perfumer will use speciality products when creating his or her own individual perfume compounds.



A perfumer's 'work bench' consisting of an arrangement of tiered shelving with bottles containing a selection of natural and synthetic raw materials available to the creative perfumer.

The bottle of perfume which is purchased by the consumer consists of a perfume compound or perfume concentrate dissolved in alcohol, and these can be divided into two main groups consisting of either concentrated alcoholic solutions or dilute alcoholic solutions.

Perfumes in the expensive category are prepared with a high concentration of alcohol and contain from 20 to 25 per cent of perfume compound. Exclusive perfumes may contain up to 30 per cent of perfume compound.

The second group comprises colognes and lavender waters and includes lotions and so-called toilet waters – incorrectly named because they are also alcoholic solutions. Colognes may contain from 1 to 3 per cent of perfume concentrate