A FORMULARY OF COSMETIC PREPARATIONS

COMPILED BY

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PREFACE

The growth of the cosmetic industry in the U.S.A. is a prime example of the dynamics of industry. From 1914 to 1966 the retail cosmetic sales within the U.S.A. went from almost $40 million to well over $3 billion. Part of the reason for this upsurge can be attributed to the increased interest shown by men in cosmetic products such as various shaving creams, colognes, hair tonics and conditioners.

Because of the importance of this field of chemical science, it seemed pertinent to produce a chemical formulary specializing in cosmetic preparations of all types.

The formulas and data in this book have all been contributed within the past twelve months by the companies listed on page iv They are printed as contributed and thus there are variations in manner of presentation. The formulas included here are of an experimental nature and are intended to be used as starting points for the industrial chemist, and for those who wish to experiment in their own right. Many of the formulas can serve as successful products without any alterations required. However, once the chemist has familiarized himself with the formulas as they stand, the adventure of individual experimentation begins.

All data is based on U.S. Specification and practice, but readers in other countries should not find it difficult to adapt the formulas for their own use.

IMPORTANT

The use of FD & C Red No. 2 has been banned in some countries. Check for an appropriate legal substitute.

ABBREVIATIONS

°C. . . . . degrees Centigrade
ca. . . . . approximately
cc. . . . . cubic centimeters
cps. . . . . cycles per second
cs. . . . . centistokes
°F . . . . . degrees Fahrenheit
fl. oz. . . . . fluid ounces
ft. . . . . feet
g. . . . . grams
gal. . . . . gallon
lb. . . . . pound
mg. . . . . milligrams
min. . . . . minutes
ml. . . . . milliliters
m.p. . . . . melting point
NF. . . . . National Formulary
oz. . . . . ounces
%. . . . . percent
pH. . . . . hydrogen ion concentration
psig . . . . . pounds per square inch gauge
pt. . . . . pint
q.s. . . . . quantity sufficient to make
qt. . . . . quart
r.p.m. . . . . revolutions per minute
sol'n. . . . . solution
tsp. . . . . teaspoon
tbsp. . . . . tablespoon
USP. . . . . United States Pharmacopoeia
visc. . . . . viscosity

INTRODUCTION

The History of Cosmetics

The preparation and use of cosmetics dates back to earliest recorded history and most probably to prehistoric times. Its use was not limited to personal beautification — it was often intermingled with religious ritual and medical practices.

The major portion of historical information about cosmetics has come from ancient Egypt. Unguent pots and kohl (used as eye shadow) vases were found in the tombs of Menes (the first pharoah of the First Dynasty (3000 B.C.). Similar evidence appeared in the tombs of Tutankhamen of the Eighteenth Dynasty (1350 B.C.). The kohl that was found was composed of either lead sulfide, malachite, copper compounds, charcoal, lampblack, or soot.

It was the responsibility of the Egyptian priests to apply cosmetics to the eyes of their idols. Egyptian women blackened their eyelids and eyelashes with kohl while applying green pigment (comprised of malachite) to the area below their eyes. Henna — a reddish-brown dye extracted from the leaves of the Henna plant (Lawsonia inermis) was used to color fingernails and the palms of the hands. Egyptian women also used wrinkle removers (made of oil, wax, incense, and cypress berries), hair cosmetics, and hair restorers.

The Babylonians, dating back as far as the fifth century B.C., applied body perfumes, painted their faces with vermillion and white lead, and became profficient in the use of eye makeup.

The ancient Greeks dyed their hair, used the root of the perrenial plant alkanet (which yields a red dye) to color their lips and cheeks, and applied fucus (red or purple paint obtained from rock lichen) to their faces and eyebrows.

Through their conquest of the Greeks, Egyptians, and other Eastern peoples, the Romans became familiar with the use of cosmetics. Once introduced to the art, the Romans practiced and expanded it — even making use of pumice as a toothpaste. Fashionable Roman women used female slaves called "ornatrix" who were skilled cosmeticians.

Little is known about the use of cosmetics after the fall of the Roman Empire. However, it is known that prior to the Renaissance soldiers and pilgrims returning from the Crusades acquainted Europeans with Eastern cosmetic practices.

The popularity of cosmetic products throughout history has been met by either adamant approval or sharp censure depending on the moral or religious climate of the times. In 1770, a bill was introduced to the British Parliament which declared that if any woman used cosmetics, false hair or teeth, or other deceiving accessories to seduce a man into marriage, she would have the penalty of the law against witchcraft applied to her and the marriage would be declared null and void. The bill was not passed; however, it is significant to see how truly incensed some people became over the use of cosmetics.

Modern society's dependence on cosmetics is graphically demonstrated by the abundance and variety of these products — each of which is represented by a multiplicity of brands on the market. Some important innovations that have amplified the cosmetic market in the last one-hundred years have been: the collapsible tube (1890s), chemicals in hair wave preparations (1920s), soapless shampoos and the cold-permanent wave (1930s), the aerosol container (1940s), improved, less hazardous hair colorants and fluoride toothpaste (1950s).

Cosmetic use today is a product of the twentieth century technology explosion. The incredible number of and future potential for endless consumer products has naturally included cosmetics, and probably as long as our culture continues to grow more complex and specialized so too will the cosmetics market. The feeling of many who want to return to a more simple, pastoral — "natural" existence is exuberantly exploited

by industry, which for the past few years has created a whole market and technology predicated on making our lives more "natural." The cosmetics industry, of course, enjoys a prominent role in the current "back to nature" trend. It is difficult not to laugh at the paradoxical irony of someone applying makeup to look natural — but the significance of this absurdity seems to be that no matter what trend our culture finds itself enveloped in at any given future period — there will probably be a commensurate reflection of that society in its everpresent cosmetic practices.

Manufacturing Cosmetic Products

A major portion of cosmetic products can be manufactured by using relatively inexpensive laboratory equipment as many of the formula procedures only require some combination of mixing, pulverizing, and heating. The chemist can therefore experiment with a variety of formulas without a substantial outlay of money.

The Appendix of this book includes a section on laboratory equipment. Refer to this section for both fundamental and more elaborate laboratory equipment. In the section of the Appendix "Where to Buy Materials," there is a list of general laboratory supply companies that can provide catalogues and current price lists for the equipment.

Whether the cosmetic being formulated is simple or complex, it is important to practice good housekeeping in the laboratory to keep the ingredients and the final product unadulterated. If the product requires a preservative, use an adequate amount so that the cosmetic is not made impractical by having too short a shelf life.

Choosing an appropriate package for the product is a practical consideration. The decision should be based on the nature of the product itself and where it is going to be used. If it is going to be carried in a handbag or used at a dressing table, the container should possess some aesthetic qualities. If the product is highly perishable the container should incorporate the protective qualities that are essential to the product's maintenance.

Legal Considerations

In the United States, cosmetic manufacture and trade were brought under government regulation for the first time by the Federal Food, Drug, and Cosmetics Act of 1938, which today under the Federal Trade Commission and the Food and Drug Administration protects the consumer against the sale of adulterated, dangerous, or mislabeled cosmetics.

The Food and Drug Administration regulates the use of cosmetic pigments (organic and inorganic colorants). If an organic colorant is labeled D & C certified colorant, it can't be used in food or areas on or around the eyes. It can be used in lipstick, rouge, face powder, nail lacquer, and liquid makeup. If an inorganic colorant is provisionally approved and listed by the Food and Drug Administration for cosmetic use, they can be included in all the cosmetic products already mentioned and also in eye preparations.

Example of How to Use One of the Included Formulas

In order to clarify any questions that might arise as to the preparation of the formulas included in this book, a sample formula will be explained step by step:

Antiperspirant Stick

A	Sodium Aluminum Chlorhydroxy Lactate (40% w/w aqueous solution), Chloracel®	50.00
	Alcohol, SD-40	39.15–39.50
B	SORBO	4.00
C	Sodium Stearate	6.00
D	Stearyl Alcohol	0.5–0.75
E	Perfume	q.s. 1.00

Procedure:

Heat (A) to 65 to 70°C. Add (B) to (A). Dissolve (C) in (A, B) and mix until clear. Add (D). Perfume. Pour into molds.

If you decide to make an antiperspirant stick, it would be best to begin by making a sample batch. The ingredients are listed in the left hand column and unless otherwise specified the amounts to the right of them are listed as parts by weight. If you choose to use ounces as the unit of weight then use ounces for all the ingredients in the formula.

First, collect all the ingredients to be used in the formula. In this formula, Chloracel® is the tradename for Sodium Aluminum Chlorhydroxy Lactate. Mix 50 oz. of Chloracel® with 39.15–39.50 oz. of SD-40 Alcohol. Apply heat to this mixture until it reaches a temperature of 65–70°C. If you have only a Fahrenheit thermometer, check the Conversion Tables in the Appendix to find out the corresponding Fahrenheit temperature. Add 4 oz. of SORBO to this mixture. Then add 6 oz. of Sodium Stearate and mix until there is no particulate matter in the solution. Then, add 1/2 to 3/4 oz. of Stearyl Alcohol. Add enough perfume to bring the amount of this product up to 100 oz. Choose the shape of the mold you require and pour the solution into these forms. Allow enough time for them to set.

Chapter I

ANTIPERSPIRANTS AND DEODORANTS

Antiperspirants and deodorants are cosmetic products intended to reduce underarm odor. **Antiperspirants** inhibit the flow of perspiration. Because of their low pH, they may also arrest the bacterial decomposition of perspiration, preventing development of malodor. **Deodorants** inhibit formation of malodors in perspiration by suppressing bacterial growth or cover the malodor with a more pleasing one. Many products have both antiperspirant and deodorant action.

Composition and Function

Antiperspirant and deodorant products are formulated as clear liquids for direct, spray or aerosol application, powder sprays, sticks, creams and lotions.

Clear liquid formulations, suitable for use directly or as sprays or aerosol formulations, usually contain about 50% alcohol, about 1% to 10% polyol for body and smooth application characteristics, and water, in addition to the deodorant or antiperspirant active. A hydrophilic surfactant may be used to carry perfume oils into the aqueous product. Some aerosol concentrates may be alcohol free. For aerosols, the propellant of choice is a blend of Propellants 11 and 12.

Stick antiperspirant and deodorant products are often based on a sodium stearate gelled alcohol system containing a humectant. Fatty alcohols may be used to increase firmness of the gel. If the product is an antiperspirant, a soap compatible

active ingredient must be selected. Deodorant sticks are sometimes formulated by adding the active ingredient to an oil-wax blend or blended waxes which will form a stick.

Personal deodorant powder sprays in the simplest form consist of adsorptive powders and the deodorant active ingredient dispersed in a propellant mixture which contains an emollient and a nonionic surfactant as a valve lubricant.

Antiperspirant and deodorant cream and lotion formulas are emulsions formulated to provide a dry film on application to the skin. Most of these formulations will contain fatty acids or fatty alcohols (8–20%) as the basic ingredients and emollient modifiers such as isopropyl palmitate, lanolin, mineral oil, petrolatum, glycerin and propylene glycol in lesser concentrations, usually 1% to 5%. The emulsifiers used in cream and lotion antiperspirants and deodorants are usually nonionic because of their low irritation potential and wide compatibility.

Deodorant active ingredients include zinc oxide (1–15%), boric acid, hexachlorophene (0.25–0.5%), antibiotics, ion-exchange resins, and quaternary ammonium compounds (2%).

The salts of aluminum and zinc are usually used as antiperspirant active ingredients. Sulfates, chlorides and phenolsulfonates are all effective. The most widely used antiperspirant salt is aluminum chlorhydroxide complex. It is usually used as a 50% aqueous solution at a level of 36–50% of the total formulation.

Water-in-Oil Deodorant Cream

A	Mineral Oil	20.00
	Petrolatum	8.50
	Ceresin Wax	6.00
	Lanolin	4.50
	ARLACEL 83	4.00
B	Magnesium Sulfate	0.15
	Water	21.85
C	Zinc Oxide	15.00
	Zinc Stearate	10.00
D	Aluminum Phenolsulfonate	10.00
E	Perfume	q.s.

Procedure:

Heat (A) to 80°C, (B) to 80°C. Add (B) to (A) with stirring. Continue to stir until emulsion reaches 50°C. Add (C) slowly with stirring and cool slowly to 40°C, stirring during the cooling process. Add (D) slowly with stirring, then add (E).

Oil-in-Water Deodorant Cream

A	Stearic Acid (triple pressed)	19.0
	Isopropyl Myristate	4.0
	MYRJ 52	2.0
	TWEEN 60	8.0
	Hexachlorophene	0.5
B	Water	66.5
	Preservative	q.s.
C	Perfume	q.s.

Procedure:

Heat (A) to 70°C, (B) to 72°C. Add (B) to (A) slowly with agitation. Continue agitation until set up. Perfume and pack.

Deodorant Powder

FORMULA NO. 1

Talcum	105
Sodium Bicarbonate	60
Magnesium Oxide	15
Starch	5
Perfume	To suit

Procedure:

Mix well in a high-speed mixer. This powder is very effective, will not injure clothing, and is nonirritating.

NO. 2

Talcum Powder	11 lb.
Cornstarch, Powdered	1.40 lb.
Aluminum Sodiumsulfate, Powdered	4.50 lb.
Salicylic Acid, Powdered	11.25 oz.
Boric Acid, Powdered	11.25 oz.

Procedure:

Blend the powders thoroughly, and put the mixture through silk of at least 120 mesh. Use a modern mixing and sifting apparatus for this operation.

Aerosol Deodorant Powder

A	Talc	11.65
	Zinc Oxide	0.80
	Magnesium Stearate	1.20
B	Isopropyl Myristate	0.50
	ARLACEL 83	0.50
	Hexachlorophene	0.25
	Propellant 11	55.05
C	Propellant 12	30.05

Procedure:

Mix ingredients of (A). Dissolve hexachlorophene in warm isopropyl myristate. Cool and add ARLACEL 83 and Propellant 11. Add (A) to (B) with constant stirring to form a slurry. Cold or pressure fill with (C) using powder spray head on container.

Deodorant Aerosol

FORMULA NO. 1

Diaphene	0.1 oz.
Aluminum Chlorhydroxy Allantoinate	0.2 oz.
Propylene Glycol	1.0 oz.
S.D. Alcohol #40 (90 proof)	40.7 oz.
Aluminum Sulfocarbolate	2.0 oz.
Fiorodor 50504	1.0 oz.
Freon 12/114 (40/60)	50.0

Procedure:

Dissolve the Aluminum Chlorhydroxy Allantoinate in water with heat. Add the S.D. Alcohol, then dissolve the other ingredients with heat. q.s. to 50 oz. with S.D. Alcohol. Package.

NO. 2

		% in Aerosol
Concentrate:		40.0
1. SDA 40 Anhydrous	93.20	
2. Zinc Phenolsulfonate	4.25	
3. Hexachlorophene	0.30	
4. Propylene Glycol USP	2.00	
5. Perfume	0.25	
Propellent:		60.0
Isotron 12	40.00	
Isotron 114	60.00	

Procedure:

Dissolve ingredients in alcohol. Cold or pressure fill.

Package: Lined tinplate container with deodorant-type valve.

Directions for Use: Hold about 6 inches from under-arm.

Precautions: Warning: Contents under pressure. Do not puncture. Exposure to heat or prolonged exposure to sun may cause bursting. Do not throw into fire or incinerator. Keep from children. Do not apply to broken skin.

NO. 3

(Spray)

A	Zinc Sulfocarbolate	1.00
	BRIJ 30	0.50
	Alcohol, SD-40	53.00
	Perfume	q.s.
B	Propellant 11	16.00
	Propellant 12	29.50

Procedure:

Mix (A) to dissolve the Zinc Sulfocarbolate. Add Propellant 11. Cool and add Propellant 12 to can equipped with spray actuator.

NO. 4

(Liquid)

A	Hexachlorophene	0.50
	Zinc Sulfocarbolate	1.00
	BRIJ 30	0.50
	Alcohol, SD-40	53.00
B	Propellant 11	15.75
	Propellant 12	29.25

Procedure:

Mix (A) to yield a solution. Add Propellant 11. Cool and add Propellant 12 to can equipped with spray head.

NO. 5

(Spray for Men)

PVP K-30	0.5
Deodorant 8846	0.5
Propylene Glycol	1.0
"Emcol" E-607	0.1
Ethanol (85%)	58.0
Above Concentrate	50%
Propellant 12/114 (40/60)	50%

†n-(Acylcolaminoformylmethyl) Pyridinium Chloride

Clear Liquid Deodorant

Benzalkonium Chloride	2
SORBO	5
Alcohol, SD-40	50
Water	43

Procedure:

Mix the ingredients.

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