



SOAPS, DETERGENTS, and SHAMPOOS

Soap and cleanliness have always been inseparable, with cleansing, be it personal hygiene or laundering, being a part of human history since the beginning of time. Even more stringent have been the guidelines set down by all the major religions with regard to the cleanliness of holy sites and the sanctification of the state of cleanliness to signify purity of body and soul.

The origins of the word “soap” and of the first chemical saponification are obscure. According to one Roman legend, soap was discovered accidentally near Mount Sapo, an ancient location for animal sacrifice not far from Rome. Mixed with wood ashes (the ancient source of alkali) and rainwater, the animal fat created an excellent soap mixture. Roman housewives noticed that the strange yellow mixture of the water of the Tiber River made their clothes cleaner and brighter than ordinary water.

Throughout the 19th and the beginning of the 20th century, physicians realized the value of soap as a medicinal agent. Perhaps the best known protagonist of soap was Ignaz Philipp Semmelweis who, in 1847, discovered the infectious etiology of puerperal fever, and thus required all the medical students to wash their hands before examining patients. He implored of them:

I am not asking anything world shaking. I am asking you only to wash... For God's sake, wash your hands”, and of new mothers “Unless everything that touches you is washed with soap and water and then chlorine solution, you will die and your child with you!

The use of soap reached its zenith at the beginning of the 20th century, and the maxim "cleanliness is next to godliness" has held sway ever since. The next two tables illustrate the definitions and the ingredients of soap. (Tables 1 & 2)

Agents	Definitions
Soaps	Cleansing agents derived from animal fats or vegetable salt.
Detergents	Cleansing agents comprised of synthetic ingredients.
Shampoos	Cleaning compounds made up of a soap or detergent and designed to remove oils and debris. from hair.

Soaps, detergents, and shampoos generally comprise a mixture of ingredients classified according to their function (Table 2).

Ingredients	Percentages of total
Surfactants	30-70
Plasticizers and binders	20-50
Lather enhancers	00-05
Fillers and binders	05-30
Water	05-12
Fragrance	00-03
Opacifying agents	00-0.3
Dyes and pigments	<01

The surfactants are the essential cleaning substances, and they determine the cleaning and lathering characteristics of the soap, as well as its mushiness, plasticity, skin compatibility and other features. Surfactants are compounds that have a dual affinity: they are both lipophilic and hydrophilic. Their molecule consists of a lipophilic tail group, which links to greasy soil, and a hydrophilic polar head group, which renders it water-soluble and helps disperse and rinse away greasy soil. The balance between hydrophobic and hydrophilic features governs the application of the surfactant as a detergent, wetter, or emulsifier.

There are four main types of surfactants, classified by the nature of their hydrophilic head:

- Anionic
- Cationic
- Amphoteric
- Nonionic

The first three are charged molecules. Anionic surfactants possess a negative charge that needs to be neutralized with an alkaline or basic material before the full detergent capacity is developed, whereas cationic surfactants are positively charged and need to be neutralized by acids. Amphoteric include both acidic (negative) and basic (positive) groups, and nonionics contain no ionic constituents. "Natural" soap is the simplest anionic surfactant and, like it, the majority of surfactants used in personal cleansing bars and shampoos contain anionic head groups.

It is noteworthy that almost all anionic surfactants are sodium or potassium salts of the negatively charged head of the hydrocarbon chains, thus the ubiquitous slogans, "alkali free" or "soapless soap" are misnomers. Most soaps and shampoos contain a mixture of 2 to 4 surfactants and lather enhancers out of thousands of synthetic surfactants that are currently available. In addition, there are innumerable plasticizers, binders, moisturizers, and fillers available for formulating syndets. Constructing the formula of a syndet is extremely complicated and, together with extensive knowledge of chemistry and engineering, it requires both imagination and inspiration.

The target of cleansing is the outermost layer of tissue of our body, e.g., the keratinizing epithelium. It is composed of a cornified cell envelope, which is an extremely tough protein/lipid polymer structure. This hard and lipophilic layer of the epidermis and outer layer of the hairs would not easily retain dirt without the intervention of an outer hydrophilic film which covers it and which picks up particles of soil. This outer natural film of lipids entraps and glues environmental dust, pollutants, smoke, greases, keratinous debris organic and inorganic compounds of the sweat, cosmetics and other substances that come in contact with it.

The process of washing consists of the removal of the outer layer of grease in which the soil (no matter what kind) is embedded. It is a complex physico-chemical phenomenon that involves the following steps:

The interaction of soaps with the skin: the bare truth

Surgeons need to scrub. Healthcare providers and people involved with the preparation of food must take precautions against the spreading of contamination. There are situations in everybody's life when the simple act of washing one's hands may not be fateful but, nevertheless, would be wise. But, at the end of the day, contemporary dermatologists agree that modern middle-class people have become obsessed with cleanliness. Less, not more, washing is better for the skin $\frac{3}{4}$ the largest organ of the body simply does not care whether it is clean or dirty. On the other hand, the irritant, toxic and harmful effects of soaps have been highly exaggerated, with too much emphasis having been placed on the negative, damaging, and hazardous effects of soaps. After all, what better way could there be to promote "mild", "non-allergenic" and "soapless" products?

The truth of the matter is that the majority of the consumers will tolerate any kind of soap for ordinary personal use and with no harm done to their skin or pocketbooks. Although washing with soap makes no major contribution to the promotion of health, with all due respect to Semmelweis, its importance lies in the feeling, the appearance, and the scent it imparts to the skin. The bottom line is that people derive enjoyment in washing: it gives them a sense of well being for hours afterwards, and there is no reason to discourage them or deny them this pleasure. And that is the essential *raison d'être* of soap $\frac{3}{4}$ spiritual, not dermatological.

And remember: the purpose of soap is to augment the cleaning capabilities of water. If a little bit is good, a whole lot is not better.

Limit the use of soap, discard the washcloth, and stop scrubbing. Once over lightly is fine.

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