Key portion of AOCS' history

From Soaps to Detergents

"If you buy a cake of soap in Australia or New Zealand, very likely it is made of penguin oil. If you buy a cake of soap in Chicago, it may be made from animal fat by-products of the packing industry. Bought in Paris, it may be made from cocoanut oil, in London from soybean oil, in Copenhagen from fish oil, in Barcelona from olive oil. Or it may be made of tallow, lard, cotton oil, peanut oil or palm oil. . . ."
—James Collins, *Oil & Fat Industries*, January 1928

When AOCS was founded in 1909 as the Society for Cotton Products Analysts, four main types of soaps were available—milled toilet soaps, white floating soaps, white laundry bars and yellow laundry bars. Soap was the sodium salt of fatty acids prepared in kettles with or without the recovery of glycerine. Only a few analytical methods—for free alkali and water—were necessary.

Some AOCS members already had made important contributions to the soap industry. At the turn of the century, Archibald Campbell of Globe Soap Co. developed the first commercial fluffy light gravity soap powder in which the soda ash was hydrated. This contrasted to the dusty, high-ash, low-moisture heavy powders then in use. H. J. Morrison developed a formula for white laundry soaps while working for Procter & Gamble.

The advent of commercial laundries created a demand for quickly soluble, concentrated bulk soap chips and flakes of 88% anhydrous soap content. By 1926, soap chips, soap powders, laundry, scouring, shaving, shampoo, medicated, liquid, mechanic's, textile and automotive soaps were available.

Large scale introduction of spray dryers in the soap industry during the 1920s, together with the development of soap-blowing towers, hydrolyzers and continuous crutchers (mixing devices), required many more analytical methods for quality control, product specifications and cost control.

"Not only has the boiling of soaps been perfected in recent years, but also the conversion of the boil of solid soaps to cakes for both grained soaps and toilet soaps," K. O. Löffl wrote in 1926.

During H. J. Morrison's term as AOCS president (1924-1925), the society added a detergent committee. Committee members included the American Chemical Society's Sampling and Analysis of Soap and Allied Products Committee, and representatives of large soap manufacturers, the Bureau of Standards and several major institutional soap consumers. Archibald Campbell, first chairman of the A.C.S. committee, and during whose term the first official A.C.S. soap methods were adopted, was named committee chairman.

Early work by the detergent committee included scrutinizing A.C.S. soap methods. These were presented to the uniform methods committee for adoption by AOCS. Committee members chose developing and standardizing methods of testing for detergency as the most pressing tasks.

A subcommittee on detergency evaluation was formed during the May 1925 meeting. Subcommittee members agreed "that the detergent value of soaps and soap products was of so complex a nature and involved so many factors and variables that it could not be properly judged by criteria such as lathering power, surface tension or other physical measurements." Instead, they selected a laboratory washing test and machine described by A. K. Church of Lever Brothers. This was the start of continuing efforts to measure and evaluate this important property.

James Collins, in the January 1928 *Oil & Fat Industries*, wrote, "A few years ago, (soapmaking) was a rule-of-thumb craft, controlled by observation only, and in no way aided by the skill of the chemist or physicist. The ever-growing increase in demand for soap, and the encroachment upon the soapmaker's raw materials by other manufacturers, made it necessary to send the industry

to college. The soapmaker had been throwing his glycerine away. He learned how to save it as raw material for explosives, medicines, confectionery, cosmetics and other purposes. As the solid fats were taken away from him, he learned to use the soft oils by catalytic hydrogenating processes."

An AOCS soap section was organized at the fall 1928 meeting in New York. According to *Oil & Fat Industries,* "On the afternoon of October 25, a group of chemists particularly interested in the chemistry of oils and fats as applied to the manufacture of soap and other detergents and the recovery of, and development of, uses for glycerine met in the Board of Managers' room of the New York Produce Exchange to discuss the formation of a Soap Chemistry Section of the American Oil Chemists' Society."

Section organizers discussed improving analytical methods for soap, preparing soap and glycerine samples for checking analytical results among laboratories, and certifying commercial laboratories as referees on soap and glycerine analysis. A. K. Church was appointed section chairman.

Procter & Gamble and Lever Brothers donated 300 pounds of soap and a drum of crude glycerine, respectively, for the soap section to distribute for cooperative check analyses. All soap and glycerine chemists were invited to participate.

"It is my belief that in the near future the Soap Section will develop standard methods of analysis of glycerine, fatty acids, pitch and other soap by-products and intermediates. I have every reason to believe that what the American Oil Chemists' Society has been and is to the oil industry, the Soap Section will be to the soap industry," A. W. Putland said in his 1929 president's address.

In 1930, AOCS president W. H. Irwin told the membership, "It is my thought that we should broaden the powers of the Referee Board if necessary, and grant certificates to Referee Chemists not only on vegetable and animal fats and oils, but also on soap and soap products."

Soap's importance to the fats and oils industry was emphasized during the term of A. S. Richardson, of Procter & Gamble, as AOCS' president. In 1931, when the society's publishing arrangement was revamped, *Oil & Fat Industries* became *Oil & Soap,* a title the society's journal retained until 1947 when it became the *Journal of the American Oil Chemists' Society.*

Archibald Campbell, who had been AOCS president in 1917, succeeded A. K. Church as soap section chairman in 1930. His term ran through 1933. Campbell was followed by Madison L. Sheely of Armour and Co., who served as abstract editor for the soap section of *Oil & Soap,* and, in 1937, as AOCS president. William A. Peterson, society president in 1955, was soap section secretary from 1928 to 1932.

The Soap Analysis Committee was organized as part of the soap section in 1930. Its chief task was to review the American Chemical Society's official soap-analysis methods then in general use by soap manufacturers.

During 1931 and 1932, the committee worked on a revised method for determining unsaponified and unsaponifiable matter in soap, drew up a proposal for determining moisture and volatile matter in soap through distillation and promised further study of the method for determining free acid or alkali in soap.

As a result, AOCS tentatively adopted a set of soap-analysis methods during its fall 1933 meeting. These methods, with several exceptions, included many of those adopted by the American Chemical Society in 1919 and revised in 1922.

Other important developments in the industry occurred during this time. By the early 1930s, phase diagrams had been worked out for the more important kettle-soap formulas. However, to produce consistently high-quality soap was still difficult. This prompted development of high-speed continuous processes to replace the batch-type process.

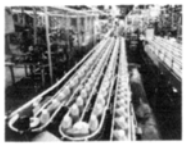
In 1933, AOCS member John W. Bodman, employed by Lever Brothers, obtained a patent for improving the solubility, texture, feel and shape stability of floating soaps. This method eventually became known as the Bodman process.

Meanwhile, the need for a product that worked satisfactorily in hard as well as soft water prompted the development of "synthetic detergents." These were created by converting fatty acids to alcohols, which then were sulfated and neutralized to produce alkyl sulfates. Sodium and ammonium lauryl sulfates proved to be highly efficient detergent and wetting agents that formed more soluble calcium and magnesium salts in hard water.

Dreft, the first American detergent packaged for household use, reached grocers' shelves in 1932. It was a free-flowing powder comprised of 40% sodium lauryl sulfate, from coconut oil, with sodium sulfate and moisture. Detergents, meanwhile, already were being developed for use in the textile industry. The new products required new standard analytical methods.

The society held its fall 1935 meeting in Cincinnati. Acting on soap committee recommendations, the society made official the soap-analysis methods adopted as tentative in October 1933 and accepted volatile hydrocarbon and screen analysis methods as tentative.

World War II, with increased military demands for fats and oils, accelerated the development of additional detergents. In 1947, all-purpose granulated synthetic laundry detergents were introduced into the general household market. In that year, synthetics represented only 10% of the total



surfactant market. Six years later, they passed soaps in annual sales.

AOCS was affected by these happenings. Fall meetings regularly included special sessions devoted to the soap and detergent industry. AOCS members, such as senior member B. H. Thurman, were among those developing new products and processes. *JAOCS,* meanwhile, recorded these changes through monthly patent and abstract listings, as well as in an annual review of the scientific literature.

Developments included continuous and semi-continuous soap processes, spray-drying equipment for soap powders, antioxidants, polyphosphate and optical brightening agents, color stability and perfume purity in toilet soaps. By 1948, liquid hand cleaners had become popular. Detergents for automatic washing machines were devised. Alkylbenzene sulfonate (ABS) quickly became the most popular surface-active agent in detergents. Cationic surfactants were also developed. The growing use of builders—and later use of whiteners and other additives—was creating a need for more analytical methodology.

During the 1940s, the society said no further division of AOCS into sections representing industries should take place. A committee reviewing the topic said, "Even the present soap section had served its purpose and ought not to continue as a specific section in the society organization." Consequently, the soap section as such disappeared, although technical sessions in the field continued to be organized at society meetings. By-laws adopted in 1948 eliminated the fourth vice-president position, which had formerly represented the soap section.

By 1950, soap and detergent mixtures were available in paste form, flakes and bars. Bactericidal and deodorant soaps using hexachlorophene appeared. Nonionic detergents received more attention.

During the 1950s, the AOCS Fat Analysis Committee, enlarged and divided into task groups, began collaborating with ASTM's D-12 committee on analytical methods for soaps and detergents.

In 1952, AOCS sponsored a 5-day short course on soap and synthetic detergents at Rutgers University and a 1956 short course centered on unit processes in the fatty oil, soap and detergent industries. The fall 1956 meeting in Chicago also included the society's first symposium on synthetic detergents (syndets). Two years later, a short course was held on syndets and soaps. By then, syndets outsold soaps about 2.5 to 1. R. A. Duncan of Procter & Gamble, at the 1959 spring meeting, reported that synthetics comprised 75% of detergent-product sales. By then, detergent bars had been developed and marketed.

In the 1950s and leading into the 1960s, alkylbenzene sulfonate detergents were blamed in part for the growing foaming and frothing problems seen in U.S. rivers, sewage and water treatment systems. This prompted the development of linear alkylbenzenes and the detergent industry switched to sulfonates of this type (LAS). The 1963 short course on advances in soaps and detergents included, for the first time, a symposium on the biodegradability of detergents. In 1964, soap and detergent industry spokesmen said a voluntary program to replace ABS by LAS detergents would be completed by the end of 1965.

Other AOCS activities focusing on the industry included a 1967 short course on advances in soaps and detergents and a symposium on the same topic at the 1968 meeting, a 1971 short course on detergents and raw materials, a 1975 short course on Detergents in the Changing Scene, a Detergents Eight-0 short course in 1980 and a world conference on soaps and detergents in 1977 in Montreux, Switzerland. Another world conference on soaps and detergents is slated for 1986.

The 1977 world conference on soaps and detergents renewed efforts by the society to focus more attention on the industry. As a result, the society agreed to include a separate section devoted to soaps and detergents in *JAOCS* beginning with the February 1978 issue. For this, a soap and detergent advisory committee for *JAOCS* was set up. This committee was revamped in 1981, with Arno Cahn as chairman. Aims of the committee are to focus specifically on programs for national meetings, short courses and world conferences, and publication of technical articles and news of the industry in *JAOCS.*

During the society's 1983 meeting in Chicago, the soaps and detergents group of the society decided "Surfactants and Detergents" would be a more apt title. The July 1983 journal reflected this change.

In the past decade, the industry faced new challenges. During the 1970s, some local government agencies, concerned with environmental effects, banned phosphate-containing detergents, an action prompting the sale of new phosphate-free detergents. Hexachlorophene, long accepted as safe, effectively was banned from over-the-counter products during 1972 because of health concerns. By 1983, public dissatisfaction with the performance of detergents with no or reduced phosphate levels encouraged the industry to switch back to normal phosphate levels in heavy-duty products wherever permissible. Meanwhile, detergent manufacturers, who had voluntarily removed enzymes from laundry detergent formulations during the early 1970s, began using them again. Government regulations, environmental concerns, toxicological problems, energy concerns, raw-material costs and availability and new chemical technology all have had impact on the soap and detergent industry during recent years.