The A.O.C.S. and the Inedible Oil Industry

THE PROCESSING of fats and oils for non-food uses represents one of the oldest applications of chemical technology. The principal early uses in fuel, lubricants, and soap antedate history but still form bases for important segments of today's industry. On the other hand, significant changes have taken place, especially in the last few decades. It is important to the oil chemist to consider the implications of these changes.

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With the development of the petroleum industry and electric power the use of triglyceride oils as a source of heat and light was limited to the most primitive societies. From the points of view of both economics and performance there has been no contest in this area. Also the field of lubricants largely belongs to the petroleum industry, with a few important reservations. Soaps, or more broadly speaking, surface-active agents present quite a different picture. A brief review of some of the developments in the field of surfactants will serve to emphasize several points which are vital to the progress of the inedible oil industry.

Soap-making is one of the oldest chemical processes to be applied on a broad scale. Potassium soaps were first prepared from wood ashes and oils. Disadvantages of these soft soaps were overcome through conversion to hard sodium soaps by the use of salt. With the availability of sodium hydroxide later, sodium soaps were produced directly. Thus we see a modified and, with respect to many applications, an improved product replacing one which is less satisfactory. As is generally the case, the history of the inedible oil industry reveals a constant search for new or improved products to fit specific needs.

In some applications soaps are unsurpassed; in others serious disadvantages are encountered. Lime-soap precipitation is a problem in textile processing. A solution to this problem was first found in the sulfonated oils produced through the interaction of unsaturated oils with sulfuric acid. Introduced more than 100 years ago, sulfonated oils marked the beginning of a trend in the industrial oil industry toward improved surface-active agents through the chemical processing of fats and oils.

Probably the greatest impact on the soap industry resulted from the introduction of the higher alkyl sulfates approximately 25 years ago. Through chemical modification of the fatty-acid molecule a product was obtained which in some respects is much superior to soap. Although soaps maintain their superiority in certain areas of application, the alkyl sulfates and other synthetic detergents clearly demonstrate the potential in a new product possessing a unique advantage. There is no need to elaborate on the effect of the introduction of synthetic detergents. Unfortunately, from the point of view of the fat producer, all are not derived from his product.

MORE RECENTLY, almost within the last decade, another major class of surface-active agents has developed. This new class of compounds, the cationics, differs from soaps, sulfates, and sulfonates in electrical character. Whereas in the latter the portion of the molecule which is responsible for high surface activity carries a negative charge, that in the new class is positively charged. Cationics result from modification of the fatty-acid molecule by the introduction of basic nitrogen-containing groups. In terms of adsorptive properties they are more powerful surface-active agents than anionics because most surfaces carry a negative charge. As with the synthetic detergents, the unique properties of the cationics have resulted in broadly expanded areas of application of fat-derived chemicals.

Among the important uses of cationic surface-active agents the following are prominent: mineral flotation agents, antiseptics and germicides, emulsifying agents, corrosion inhibitors, metal cutting and drawing compounds, oil and grease additives, anti-static agents, textile assistants, mold release agents. This incomplete list gives some indication of the expanding areas of application of fatty chemicals.

In addition to surface-active agents, which also include a third major class, the non-ionics, other fatty chemicals have been developed in recent years, including esters, ketones, nitriles, amides, and dibasic acids. These are finding applications in a variety of fields such as lubricants, plastics, protective coatings, printing inks, waxes, etc. It is difficult to name a consumer product which has not involved the use of a fat-derived material at some stage in its manufacture.

Thus we see that an important segment of the inedible oil industry has developed through a search for improved products which fit specific needs. Such a search whereby new materials are produced and tested we know as the research process; without it an industry cannot survive the competitive situation which prevails today. Through research on fats a more effective and a wider use of these raw materials is accomplished to the ultimate advantage of industry as a whole and of the inedible oil industry specifically.

To members of the American Oil Chemists' Society this all adds up to an expanding concern with almost all aspects of chemical technology. This trend is clearly reflected in programs of the Society meetings and in papers published in its Journal. It is to the best interests of the Society and the industry which composes its membership to recognize and encourage the trend to greater complexity, which is the inevitable result of modern technology and our competitive economy.

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