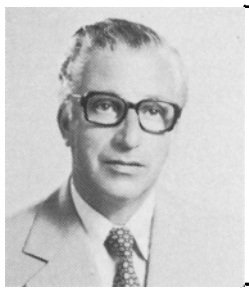

Trends in the Soap and Detergent Industry in Israel

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ABSTRACT

The soap and detergent industry in Israel is reviewed showing that (a) the largest selling item is laundry powder for washing machines; (b) LABS is the main active constituent of most cleaning products; and (c) toilet bars are evenly divided between natural and synthetic.

For reasons certainly beyond my control, my knowledge of the Middle East soap and detergent market is limited to Israel only, a tiny fraction of the Middle East – ca. 2% of the total population and less than 0.5% of the total area. It is rather pretentious to present Israel as part of this series of discussions, when each of the others covers whole continents. However, the Israeli market, to some extent, compensates for quantity and size by its variety, composed of people originating from more than a hundred countries, with backgrounds ranging from the most backward to the most sophisticated, with every intermediate facet represented.

A kibbutz was among the pioneers, if not the first, to exploit SO_3-sulfonation commercially some 20 years ago. The original semicontinuous unit is still in operation today. On the other hand, a few years ago while visiting one of the numerous small olive oil processing facilities in a rural area, I saw manufacturing methods that reminded me of movies of the Middle Ages. All operations were manual. The kettle was heated by burning presscake. It took 5 days to complete boiling of a batch of 5 cubic meters. Completion point was determined visually and by tasting.

The consumers vary between the same extremes as the manufacturing methods. A 63% washing soap is still used, especially by the tradition bound rural population and so are soap flakes. However, urban population is predominant, with above 78% of the population of pre-1967 Israel living in centers of above 10,000 inhabitants.

Washing machines are very common indeed; more than 65% of the nearly 800,000 families own one. Most machines are of the compact European type, fully automatic, with front- or top-loaded revolving drums.

Water in most parts of the country is delivered from the National Water Carrier, with a hardness of about 400 ppm as $CaCO_3$.

Fabrics for clothes are predominantly polyester-cotton blends and there is a tendency for these to be used also for bed linen and tablecloths. Practically no polyamide is used, which incidentally simplifies the formulation of optical brightener blends for laundry powders. I do not expect fire resistance of fabrics to become an important consideration, if at all; there are unfortunately more imminent dangers to the life of the Israeli citizen.

The largest selling powders today are highly alkaline, low-foaming machine washing powders. The trend will be to lower pH, medium duty powders or liquids, if machines with appropriate dispensers come onto the market. Powders for machine washing of fine fabrics will also appear on the market, and the portion of hand washing powders will surely diminish.

Dishwashing is still mostly manual, the hands of the husband are frequently involved. Mechanical dishwashers are comparatively rare, but their use is increasing as proved by the variety of imported dishwashing powders – there is only one domestic product – on the shelves of the supermarkets in well-to-do areas. As the laundry washing machine is so common that it will hardly spread much more, one of the next status symbols – with all due respect to its functionality – will be the mechanical dishwasher.

However, for the foreseeable future, the main hand dishwashing agent will remain an anionic paste. This paste is a somewhat unique Israeli invention; I have heard of few countries that use a similar product. The popularity of the paste depends on its functionality to suit the Israeli dishwashing habits. Dishes are practically exclusively washed under running water, using a pad or a rag dipped onto the paste as such or diluted. No high quality liquids are marketed, and the use of the existing low quality ones is decreasing. Double kitchen sinks, that have started to appear in new apartments, might create a demand for better washup liquids. I would not, however, put my money on this assumption and would believe that the sophisticated liquid stage will be bypassed by dishwashing machines, and the paste will remain the popular hand-dishwashing agent.

A synthetic soap bar is also sometimes used for washing of dishes, although it is more a general purpose heavy duty detergent. This soap, quantitatively more inorganic than organic – it contains ca. 35% active material – has, during its 25 years on the market, gained a faithful consumer circle. Surprisingly enough, its annual consumption reaches ca. 0.5 kg/person, compared to 8-10 kg powder and 3 kg paste.

Other consumer detergents are of less interest. Hypochlorite bleach is very popular indeed, like in all Mediterranean countries. Floor cleaners are plain formulations, as most floors are terazzo tiles. Real floor-care products are marketed only as specialties. Some vinyl flooring is currently being installed, but for the future I expect wall-to-wall carpeting to become popular before vinyl flooring and sealants and waxes have had a chance to develop.

The importance of commercial laundries, that 10-15 years ago were still very common, is steadily decreasing. This is a result of the changing fabrics and the extent of ownership of household washing machines. Institutional laundries, on the other hand, are growing both in importance and in size and sophistication. The Ministry of Defence, hospitals, and hotels are good examples, and the 200-250 kibbutz steam-laundries are very constant and regular users of washing powders and specialty laundry aids.

The toilet soap market is a rather interesting one, as it is divided into practically equal portions of natural and synthetic types. The most popular brand is a fully synthetic soap, in the upper price range, closely followed by a natural cake considerably cheaper than its synthetic rival. The reason for the popularity of the synthetic soap lies probably partly in the hardness of the local water, but this is not the main reason – especially as showering is much more common than bathing and thus at least the visual effect of the hard water is less evident. A more probable reason is the ease of perfuming of the synthetic soap and the fact that all natural soap is manufactured from imported fatty acids as

splitting of fats is not considered economical. The color and rancidity problems encountered when fatty acids are imported in drums have surely contributed to the development of synthetic bars.

Although the chemical industry as developed considerably since Independence in 1948, it is mainly centered around available raw materials and heavy and agricultural chemicals. Only recently has the petroleum industry diversified toward petrochemicals. Rock phosphate, phosphate fertilizers, some phosphate salts, sulfuric acid, ammonia, bromine, and their derivatives are the main products made. There is also a relatively small amount of low-tonnage inorganic and organic chemicals.

The petrochemical industry, in addition to fuels and basic oils, manufactures only certain plastic raw materials like ethylene and vinyl chloride and their downstream products, but no variety of intermediates that would allow for a secondary petrochemical industry to develop. The lack of ethylene oxide and propylene oxide is badly felt and has prevented domestic manufacture of nonionics and polyethers.

Generally speaking, Israel, as a small, not too far away market, enjoys in a buyer's market all the benefits of marginal pricing, usually also when dealing with large suppliers and long-term contracts. Conversely, when the market changes to short supply, prices paid for imported raw materials skyrocket well above world market prices. Considering lead times, purchasing becomes quite a logistic exercise – it can take up to 3 months from mailing the order until the material is delivered to the plant warehouse.

Most raw materials are imported – from detergent alkylate to optical brighteners; from soda ash to folding boxboard. In fact, almost every raw material except caustic soda, chlorine, perborate, and tripolyphosphate is imported, mostly by the manufacturing plant itself.

The workhorse of the detergent industry is still LABS, to which the country switched in 1975, when hard alkylate was banned in washing liquids, pastes, and powders. The use of hard alkylate is still permitted in solid heavy duty soaps and in industrial and agricultural emulsifiers.

If LABS is practically the only active ingredient in liquids and pastes, nonionic surfactants are gaining ground in laundry powders; the leading washing machine powder has indeed been based on a nonionic system for many years. Today's consumption of nonionics is probably around 2,500 TPA, the largest single use being for washing machine powders, but also for other cleaners, industrial detergents, and agricultural and industrial emulsifier blends. The commonly used nonionics are based on nonyl- or dinonylphenol. The use of ethoxylated alcohols is considerably smaller.

Cationic detergents are used in rather modest quantities. There is only one large-scale selling fabric softener on the market and its use is growing comparatively slowly. The sole raw material used is dimethyl-distearyl ammonium chloride, although imidazolines have been tested. Alpha olefins are not available, even if pilot quantities have been sulfonated and tested for various end uses. Paraffin sulfonates have never been imported. Phosphate esters for specialties are manufactured and also sulfosuccinates, mainly for synthetic and combination toilet soap.

The only detergent builder manufactured is tripolyphosphate. The acid used is wet process acid, the product – a heavy drum-dried salt. This polyphosphate is marketed on a 51-53% P_2O_5 basis, since the sulfate is not removed completely before neutralization. Most end formulations do in any case contain Na_2SO_4. The detergent industry has agreed to use this quality, and there is also some export of it.

A new plant using the IMI Solvent Extraction Phosphoric Acid Process is under construction. The product is to be spray dried. All other raw materials are imported, mostly from Europe and to some extent from the U.S.

For the future I believe LAB and nonylphenol derivatives will remain the dominating surfactants. LABS still satisfies both functionally and economically the requirements of the end products in which it is used. Its position is not threatened by any other anionic surfactant currently available. As long as nonylphenol ethoxylates will be available at competitive prices, they will be preferred to other nonionic surfactants.

Ecological problems connected with biodegradation of nonylphenol adducts have not become a factor. I also believe that the use of phosphates will continue, possibly with certain formulations containing NTA, which never was banned. Zeolites have had preliminary testing but their incorporation into formulations will still take a long time.

The raw materials for most natural toilet soap are tallow fatty acid and coconut fatty acid, both imported in drum quantities. One of the larger manufacturers uses vegetable oil raw materials only and substitutes the TFA with various acids of vegetable origin.

As to soap and detergent technology, no original technological innovation has been made in Israel except for the commercialization of SO_3-sulfonation. Currently sulfonation is carried out in three different ways, using SO_3, oleum, or chlorosulfonic acid. There are two plants for each. Chlorosulfonation is used for alcohols and alcohol ethers for hair shampoo and synthetic toilet soaps. One of the oleum sulfonation plants is in the lucky position of purchasing the oleum from a next-door neighbor and returning the spent acid for use in the manufacture of superphosphate.

Powder manufacturing is as varied as sulfonation. Each of the three major manufacturers uses different technology. There is one spray-drying plant, that has recently been complemented with after-blending facilities, mainly for the incorporation of larger amounts of nonionic surfactants, but also for other additives. The second manufacturer uses spray-mixing equipment, that has been modified and improved on the original. The largest manufacturer produces powders by dry blending with facilities for spraying of liquids onto the blend.

One of the considerations of the producer of dry-blended powders is conservation of energy. The philosophy is to use the saving on energy for improving the formulation chemically, even, to some extent, at the expense of a less attractive texture, slower solubility, and smaller packages. Likewise, the after-blending facilities installed in the spray-drying plant are also energy saving. However, generally speaking, the Israeli detergent industry is too small and not basic enough to be of any importance in an energy conservation program.

Environmental considerations are still in their infancy. This can be clearly seen when looking down Mt. Carmel toward Haifa Bay and the coastal plain. The stacks of the power plant, the cement works, the petroleum plants, and the heavy chemical industry produce a sad blend of air pollutants. Tel-Aviv has its problems partly caused by a power station but mainly caused by motor cars. In the Beer-Sheba region a whole complex of chemical plants has been transferred from the city limits into the desert, to reduce pollution – at least of the city air.

Only now are actions being started to reduce pollution and then principally only of the air. Tetrapropylenebenzene was indeed banned because of foaming of water in purification equipment and of the resulting purified water used by industry as cooling water.

Chemical pollutants may, to some extent, penetrate into ground water. There is very little surface water. There are no real rivers, the Jordan is a few meters wide in summer, somewhat wider in winter, its lower half flowing into the Dead Sea with its 30% salt content. The only other lake, the Lake of Tiberias, is so located that the inflow of water from population centers is small, its main source of supply

being from the Dan, the Banias, and the Hasbani rivers. Eutrophication has not proved to be a problem.

Disregarding rather frequent work disputes and strikes, the most important labor problem in Israel, like in other Western countries, is the movement of workers from production to services. There is a shortage of skilled and even semi-skilled labor in industry, whereas unskilled labor can make a better and even easier living as stevedors, porters, etc. Labor cost, with social benefits reaching above 50% of pay, is also comparatively high, especially when considering that productivity is lower than in most West European countries, not to mention the U.S.

On the other hand, there is sufficient professionally trained manpower available, both for industry and for research institutes.

A creeping devaluation of the Israeli pound, at the rate of 2% per month, compounded with world inflation, has caused an annual inflation of 30-40% and bank interest of ca. 30%. The choice between mechanization at current cost of capital or ever increasing cost for labor is a hard one. Every case has to be judged on its merits, but generally speaking, the trend is to reduce labor requirements by modernizing.