



## Trends in the Soap and Detergent Industry in Asia/Japan

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### ABSTRACT

In Asia, except in a few countries where the soap and detergent industry is well developed, the production and consumption of soaps and detergents are low as compared with those in Western Europe and North America, and the ratio of detergent to soap is also low. But there are opportunities for future development and expansion of the industry. The course of future development, however, may differ from country to country depending on the national situation and the standard of living. The development of soaps and detergents in Asia should be made by closely relating their forms and formulas to the way of washing, the lifestyle, and customs in each country. As for the trend and situation in Japan, the problems confronted by soap and detergent makers are essentially the same as those faced by makers in Europe and America.

### THE TREND IN ASIA

Asia consists of more than twenty countries with about 2,100 million people, more than one half of the world population, having different lifestyles and customs. Many Asian countries are at an early stage of development from the viewpoint of today's chemical industry. This situation means information on the soap and detergent industry in such countries is not easily obtainable, and this in turn makes it difficult to grasp the trend in a practical and statistical way. With such background in mind, and based on the data and information I gathered, I will discuss the trend in Asia.

Regarding the production and consumption of soaps and detergents in Asia, I referred in part to the data published by Henkel. The average annual consumption of soap and detergent per capita in Asia is a little over 1 kilogram, which is quite small as compared with 10 to 20 kilograms in North America and Western Europe. However, annual consumption per capita in such countries as Japan, Taiwan, the Philippines, Hong Kong, Singapore, and Malaysia is comparatively high. It is also noted that several countries are able to supply their own needs and others are dependent on imports from Europe, America, and Japan. The total production (or consumption) of soaps and detergents in Asia is estimated as ca. 2.4 million tons per year, which accounts for only 13% of the production in the

world.

For the past several years, the ratio of detergent to soap has been increasing, but as a whole, soap is still in larger volume than synthetic detergents. In addition, in Asia, excluding Japan, soap is much more widely used than detergent (78% soap and 22% detergent). In Japan soap accounts for only 16% and detergents 84% of the market.

In many countries of Asia, laundering is done by hand, and washing machines are used only in a few countries or in certain urban areas. Reflecting such lifestyles, bar- and paste-type detergents other than powder are widely used for laundering. For instance, the bar-type is popular in the Philippines, whereas the paste-type is widely used in Indonesia. The hardness of water in Asia is generally lower than the hardness in Europe and America, although it differs from one country to another and from area to area.

Regarding matters related to safety of detergent and environmental problems, regulations have been put in force only in a few countries. Take for example laundry detergent. The surfactant used as its main component is still mostly hard type alkylbenzene sulfonate. However, even in such countries, people are beginning to show some concern for the safety of surfactants and the eutrophication caused by phosphate in detergent.

I hope you understand by now that because of the background I have explained so far, the detergents used in many parts of Asia are not very diverse and sophisticated, and their formulations are not complex either. Table I shows some examples of laundry powder detergents in Asia. This is only an example in each country. As you see in the table, the formulas are relatively simple with hard alkylbenzene sulfonate and tripolyphosphate as main components.

### THE TREND IN JAPAN

Among Asian countries, Japan is one of the big industrialized countries with a well-developed soap and detergent industry. Development of synthetic detergents started when alkylbenzene sulfonate was introduced in 1951 (from which laundry powder detergent was manufactured). Since then, the detergent industry has made great progress along with the remarkable development of the petrochemical industry and the increased use of washing machines.

In 1976 soaps accounted for 16% or 130,000 short tons of which three quarters was toilet soap. The soap market is in a steady state and not much market growth is expected

TABLE I

Examples of Formulations of Laundry Powder Detergents in Asia

Component	China	Indonesia	Korea (South)	Philippines	Singapore	Taiwan	Thailand
ABS	26	30	21	25	25 <sup>a</sup>	30	25
Nonionic Soap	—	2	—	—	—	—	—
STPP	28	15	—	33	25	25	30
Silicate	8	1	12	6	9	8	7
Carbonate	1	—	12	3	2	1	4

<sup>a</sup>Soft type.

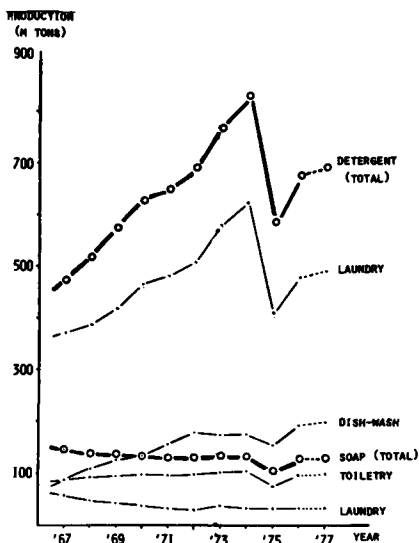


FIG. 1. Changes in production of soaps and detergents in Japan.

in the future. As for detergents, which comprised 84% of the market and 680,000 tons, they were roughly classified into laundry (58%), dishwashing (23%), and all-purpose (3%) detergents. Incidentally, in Japan dishwashing detergent is not used for washing fine fabrics such as silk and wool.

As seen in Figure 1, until 1972 both production and consumption had been increasing linearly. However, after the oil crisis in 1973-74, a temporary demand boosted the total production of detergents up to 830,000 tons in 1974. As a reaction to this big temporary demand, the production in 1975 dropped drastically to 590,000 tons. This drop was partly due to housewives' awareness of saving detergent in connection with the recent recession. Future growth in the market, when 1976 is taken as a basis, is estimated to be 2-3%, slightly over the rate of increase in the number of the households.

General laundering conditions in Japan are shown in Table II. Most of the washing machines for household use are the so-called top-loading type, and their degree of penetration is 98% of the households. The water used for laundering is relatively soft with average 3-4 °DH, which is much lower than in Europe or America, and washing is generally done with cold water at high liquor ratio. Detergents in Japan are formulated to fit such laundering conditions.

Typical formulations of heavy duty detergents in Japan are shown in Table III. There are two types of powder detergents; one is the conventional type and the other is the condensed type whose degree of condensation is ca. 50% in volume and 40% by weight. The condensed type detergents

TABLE II

Japan's General Laundering Conditions	
Washing machines for household use	Owned by 98% households Top-loading pulsator type twin tub owned by ca. 85%
Laundering conditions	Fully automatic owned by ca. 15%
	Detergent: High-foaming powder (or liquid)
	Detergent concentration: 0.8-1.3 G/L
	Water temperature 5-25 C
	Hardness of water: 3-4° DH (50-70 ppm CaCO <sub>3</sub> )
	Bath ratio: 1~1.5:30
	Washing time: 10-15 min

were developed to meet the material-saving and energy-saving national goal adjusted after the oil crisis. Liquid type heavy duty detergents were introduced into the market about 10 years ago, but at that time they did not succeed, probably because they were more expensive than powder detergents. However, since their reintroduction in 1976, they have captured 8-10% share, probably due to changes in textile material and in consumers' preference for detergents. This has been forming a new market pattern.

Phosphate used in laundry powder detergents is said to be related to environmental problems. The eutrophication caused by phosphate is a matter of controversy in Japan, too. Although not regulated by the government, the industry voluntarily regulates the phosphate content in detergent; the upper limit was fixed at 15% as P<sub>2</sub>O<sub>5</sub> in 1975, and then further lowered to less than 12%, which corresponds to 5.3% as P, in 1976. As a result, the consumption of phosphate in detergent decreased significantly, as shown in Figure 2. The regulation of phosphate content has caused changes in detergent formulations, and it has also changed the mix of surfactants. However, linear alkylbenzene will continue to be a strong workhorse as a main surfactant in detergents; but in view of the phosphate regulation, alcohol-derived surfactants such as alkylethoxylate and alkylethoxysulfate are expected to become more important with their good hard water resistibility. Olefin sulfonate and paraffin sulfonate are also of interest. People have been working to develop a replacement of phosphate, but satisfactory replacements seem difficult to find. For the time being, therefore, surfactants derived from higher alcohol, having good hard water resistance will be used to compensate for the reduction of washing power caused by low phosphate formulation. As shown in Figure 2, the use of higher alcohol has in fact increased remarkably.

Development of new technology is essential at all times.

TABLE III

Typical Formulations of Laundry Detergents in Japan

	Powder				
	Conventional type <sup>a</sup>		Condensed type <sup>b</sup>	Liquid	
	LAS-based	LAS/AES-based		LAS/AEO-based	AES/AEO-based
Surfactant					
LAS	15-20	8-15	10-18	15-20	
AES		4-10	7-15		15-20
AEO				20-30	20-30
Soap	1-3	1-3	1-3	1-3	
STPP	14-19	14-19	14-24		
Alkali builders	5-15	5-15	10-25		2-5

<sup>a</sup>Standard amount used 40G/30L.

<sup>b</sup>Standard amount used 25G/30L.

TABLE IV

Saving in Energy and Raw Materials by Condensed Type Detergent (Trial) <sup>a</sup>			
	Material	Amount saved	% Decrease <sup>b</sup>
Manufacturing	Electricity	1.9 x 10 <sup>8</sup> (KWH)	37
	Heavy oil		
	Water	1.4 x 10 <sup>7</sup> (ton)	49
	Paper	5.3 x 10 <sup>4</sup> (ton)	49
Maker's physical distribution	Warehouse capacity	1.5 x 10 <sup>6</sup> (M <sup>3</sup> )	53
	Truck (11 ton loading)	3.0 x 10 <sup>4</sup>	41
	Light oil	3.4 x 10 <sup>3</sup> (KL)	41

<sup>a</sup>If all laundry powder detergents were switched from conventional to condensed type.

<sup>b</sup>The degree of condensation is assumed to be 50% in volume.

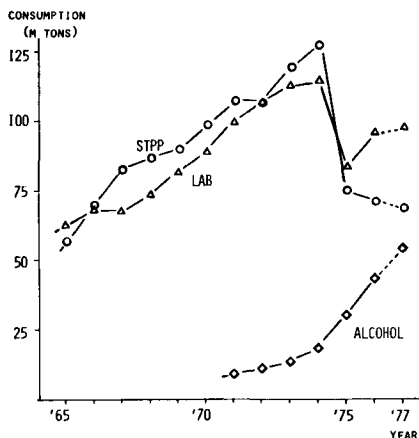


FIG. 2. Changes in consumption of major raw materials for detergent in Japan.

At the present time important problems to solve are safety for humans and environmental protection as well as saving in energy and raw materials. Take, for example, environmental considerations. The phosphate content in detergent, the biodegradability of surfactant, the treatment of waste smoke and water in detergent plants are major concerns to which appropriate steps have been taken. These concerns have also called for efforts to improve manufacturing technology with the result that the technology in this area has progressed considerably during the past 10 years, especially the development of the continuous sulfation/sulfonation process with anti-pollution measures of waste smoke and water. As for new technology relating to saving in energy and raw materials, some noticeable results have been obtained by means of rationalization of production and physical distribution, especially fuel-saving in the production

TABLE V

An Example of Japanese Industrial Standard (JIS) on Laundry Powder Detergent

Surfactant	15 - 30%
Phosphate (P <sub>2</sub> O <sub>5</sub> )	Less than 12%
Silicate (SiO <sub>2</sub> )	More than 2%
pH (use concentration)	9.0 - 10.6
Surface tension	Less than 40 dyne/cm
Biodegradability	More than 90%
Washing power <sup>a</sup>	Same or higher than reference detergent

<sup>a</sup>Pair comparison method by Scheffe using naturally soiled collars.

process, labor-saving by automation, and active utilization of computers.

Condensation or compacting of laundry powder detergent is also expected to contribute to the saving of energy and raw materials. Table IV shows expected results when all the laundry powder detergents in Japan are presumably switched from the conventional to the condensed type. As you see here, at least 40% saving would be possible. However, we have to cope with the problem of consumer acceptance of this type of detergent because the apparent volume is one half of the conventional type. According to the data in 1976, in urban areas the condensed type accounts for 40-50% of laundry detergents, but is only 26% on a national basis. This suggests that there is still plenty of room available for penetration in the future.

I wish to discuss just one more topic relating to detergents in Japan — that is the Japanese Industrial Standard (JIS) of laundry powder detergents that was made last year. One of the features of this standard is that it requires a test on washing power as shown in Table V. For the test, pieces of naturally soiled collar cloth are used, and the washing power of a sample detergent is compared with the reference detergent by a modified Scheffé method.