Petrochemical Industry in 1962*

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Expansions of Installation

In 1961 there were four petrochemical centers: Iwakuni (Mitsui Petrochemical Industries, Ltd.), Kawasaki (Nippon Petrochemicals Co., Ltd.), Yokkaichi (Mitsubishi Petrochemical Co., Ltd.) and Niihama (Sumitomo Chemical Co., Ltd.), and a new center was born at Kawasaki (Tonen Sekiyu Kagaku K.K.) this year. Expansions of installations in 1962 were remarkable around these centers.

Annual production capacity of ethylene in 1961 was 132,500 tons by the above four centers, but in 1962 it has reached 305,000 tons, a little over the double of the previous year, i.e. with increasing amounts of 60,000 t/y at Mitsui Petrochemical Industries, 25,000 t/y at Sumitomo Chemical Co., 38,000 t/y at Mitsubishi Petrochemical Co., 10,000 t/y at Nippon Petrochemicals Co., and new 40,000 t/y at Tonen Sekiyu Kagaku K.K. respectively.

In accordance with the increase of ethylene production capacity, propylene production which was 96,000 t/y in 1961 has attained to 224,000 t/y in 1962, an increase of 128,000 tons over the preceding year.

In conformity with the increase in these olefine productions, installations for their derivatives have been remarkably expanded.

As for polyethylene manufacture, in 1961 high pressure process was in operation at two companies (Mitsubishi Petrochemical Co. having a production capacity of 25,000 t/y and Sumitomo Chemical Co., 26,000 t/y), and middle or low pressure process was also available at three companies (Mitsui Petrochemical Industries, whose production capacity is 14,000 t/y, Showa Yuka K.K., 10,000 t/y and Furukawa Chemical Co., 9,000 t/y). Their total production capacity was 84,400 t/y. However, in 1962 in addition to each existing capacity, 25,000 t/y in Mitsubishi

Petrochemical Co., 24,000 t/y in Sumitomo Chemical Co. (both utilizing the high pressure process), and 7,200 t/y in Mitsui Petrochemical Industries (utilizing the low pressure process) were increased respectively. Moreover, new companies were established, i.e., Nitto Unicar Co. (a Nitto Chemical-Union Carbide Chemical joint corporation) to yield a production of 27,000 t/y of polyethylene, and Mitsui Polychemical Co. (a Mitsui Petrochemical-Du Pont Chemical joint corporation) which has a production capacity of 24,500 t/y, both utilizing the high pressure process. Therefore, total polyethylene production is rated at 192,100 t/y. The reason why the production capacity by the high pressure process has made notable increase as compared with that by the middle or low pressure one is entirely due to the concentrated erection of high pressure plants not due to the poor growth of polyethylene demand produced by other processes. Extension of plants applying middle and low pressure processes was being planned, but as its completion is expected to be in 1963 or later, increase in the production capacity has never been made.

As for styrene monomer, capacities of units in 1961 were 33,000 t/y in Mitsubishi Petrochemical Co. and 18,000 t/y in Asahi-Dow Chemical Co. The latter being doubled this year, the total production capacity attained to 69,000 t/y.

Polystyrene production capacities in 1961 were 17,800 t/y at Asahi-Dow Chemical Co., 14,400 t/y at Mitsubishi Monsanto Chemical Co., and 6,000 t/y at Kokan Chemical Industry Co. totaling 38,200 t/y, but in 1962 Asahi-Dow installed a plant of 7,200 t/y of polystyrene capacity and Yuka-BASF Co. (a Mitsubishi Petrochemical-BASF joint corporation) also erected a plant to produce 3,600 t/y of expandable polystyrene, and thus the total production capacity grew 49,000 t/y.

As for polypropylene production, introduction of the foreign techniques was brought into sensational talk, and the installations were completed this year: Mitsui Petrochem-

* Received December 21, 1962.

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ical Co. having a production capacity of 10,000 t/y, Sumitomo Chemical Co., 6,500 t/y, and Mitsubishi Petrochemical Co., 10,000 t/y, all of which were licensed to apply Montecatini's process for polypropylene production, and Shin-Nihon Chisso Hiryo K.K. introduced the process from AviSun to yield 13,000 t/y polypropylene. The total production capacity in 1962 was 39,500 t/y. Additional installation is being planned to produce 3,500 t/y polypropylene in Sumitomo.

As for alkylbenzene which was almost dependent on the import, Nippon Petrochemical Detergent Co. and Mitsubishi Kasei Co. installed each of 15,000 t/y plants this year.

Acetaldehyde and acrylonitrile, which were derived from carbide-acetylene, have been synthesized by the petrochemical process since this year. Plants were built in March, 1962 to produce 24,000 t/y of acetaldehyde by Mitsui Petrochemical Industries, and in June for the production of 5,000 t/y of acrylonitrile by Asahi Kasei Kogyo Co.

Chief installations completed during the year 1962 were described in the above, investment in which made a total of about 70 billion yen.

Production State of Petrochemicals

Production of petrochemicals in 1961 was about 84 billion yen, which is anticipated to exceed 120 billion yen in 1962 (see Table 1).

Production of petrochemicals was increased markedly in 1962, especially that of polyethylene increased by 2.5 times that in the preceding year, which is the most conspicuous. Demand of polyethylene in 1961 was approximately 100,000 tons (shortage between production and demand was imported), which is estimated to reach about 150,000 tons in 1962 (about 10,000 tons being imported). Production of synthetic resins of our country was greatly increased and ranked third in the world after U.S.A. and West Germany. It entirely owed to the rapid increase in the production of vinylchloride, which was about 300,000 tons in 1961, about 40% of the total synthetic resin production. The second largest is the production of urea resins which corresponds to about half of that of vinylchloride. However, this expansion rate of vinylchloride production has been retarded in a recent few years. Judging from the rapid progress in polyethylene demand mentioned in the above, it will not be too long before production of polyethylene marches to the citadel of vinylchloride pro-

duction, surpassing urea resins production.

Polystyrene is also one of the promising synthetic resins. Its production in 1962 increased by 40% over the previous year. Its demand in 1961 was 38,000 tons, of which 10,000 tons were imported, others being produced in the domestic. The import is estimated to be about 8,000 tons this year, so demand is about 50,000 tons. Consequently, extension of the demand is about 30% which is lower than that of polyethylene, 50%, but much higher than that of general synthetic resins.

Demand of terephthalic acid in 1962, as a raw material for synthetic polyester fiber "Tetoron", increased by 70% over the preceding year reflecting the active demand for Tetoron.

As for synthetic rubbers produced in Japan, there are three kinds: styrene-butadiene, high styrene, and nitrile rubbers, of which styrene-butadiene rubber occupies a greater part of production. Demand of styrene-butadiene rubber is growing swiftly for the substitute of natural rubber as well as for reducing the import of natural rubber.

Production state of major petrochemicals were described in the above, and the other products are illustrated in Table 1.

Further, we must pay attention to the fact that the utilization of olefines for synthetic purposes is still very insufficient in the present petrochemical industry in Japan. Ethylene is all made from cracking of naphtha with the co-manufacture of about 70% of propylene to ethylene yield. Very small amount of propylene has so far been utilized as chemical raw materials for propylene oxide or phenol by the cumene process, the greater part being consumed as fuel (L.P.G.). Utilization of propylene as chemical raw materials is an important problem for our petrochemical industry to solve from the viewpoint of balanced uses of olefines.

As the installations for polypropylene and acrylonitrile were completed this year, effective utilization of propylene may be promoted.

Prices of Petrochemicals

Prices of petrochemical products are going down every year, some of which lowering monthly. This is partly because of the severe import offensive from overseas, and partly because of the recent active investment in the installations, which induced tentatively excessive installations, i.e., demand is under

Table 1. Petrochemicals productions

Products	Unit	1961		1962		62/61	
		thousand tons	million yen	thousand tons	million yen	in amount	in money
Ethylene oxide		22.7	3,830	28.3	4,360	1.25	1.14
Ethylene glycol		20.4	3,100	23.9	3,280	1.17	1.06
Polyethylene glycol		1.6	400	1.9	440	1.18	1.09
Styrene monomer		47.2	7,030	66.7	9,680	1.41	1.38
Polystyrene		28.5	7,360	42.0	10,300	1.42	1.40
Polyethylene		58.2	15,960	139.9	29,800	2.40	1.86
Propylene oxide		6.7	1,010	12.1	1,770	1.82	1.75
*Propylene glycol		6.4	1,020	11.7	1,790	1.84	1.75
Isopropyl alcohol		5.5	600	6.7	690	1.22	1.15
Synthetic acetone		13.8	1,220	17.2	1,380	1.25	1.13
Synthetic butanol		10.2	1,280	10.2	1,240	1.00	0.97
Synthetic octanol		6.2	1,490	10.3	1,980	1.65	1.33
Methyl ethyl ketone		4.6	640	5.9	790	1.26	1.23
Benzene		25.9	1,320	53.4	2,140	2.06	1.62
Toluene		55.1	1,710	74.2	2,300	1.35	1.35
Xylene		42.2	1,430	55.0	1,870	1.30	1.31
Terephthalic acid		27.8	7,870	47.8	12,500	1.72	1.59
Alkylphenol		2.9	630	2.9	600	1.02	0.95
Synthetic rubber		52.1	10,800	68.0	14,100	1.30	1.30
Synthetic phenol	unknown			unknown			
Butadiene		35.2	14,230	46.4	19,000	—	—
Ethylene		107.2		231.2			
Aromatic solvent		35.3	1,130	42.2	1,220	1.19	1.08
Alkylbenzene		0	0	unknown	unknown	—	—
Polypropylene		0	0	"	"	—	—
Acrylonitrile		0	0	"	"	—	—
Total			84,000		121,200		

- Note: 1. Some figures in 1962 are estimations.
 2. Mark * includes polypropylene glycol.
 3. Productions of polypropylene and acrylonitrile in 1962 are unknown owing to the lack of statistics.

the increase of the capacity of installations. Contrary to the overall elevation of wages and prices of goods, the prices of petrochemicals have cut down. This will greatly influence the petrochemical industry which is in the developing stage and requires a colossal sum of investment in the installation. The petrochemical industry which started in the brilliant limelight is now giving an impression that it is an unprofitable industry. Nevertheless there still remains the general understanding that the organic chemical industry cannot be growing without the development of the petrochemical industry, and the concerned parties hold their volition as of old to raise the international competitive power with the enlargement of scale and so forth. As is understood from Table 1, all of the products in 1962 show lower rate than

those in 1961, which means the cut-down of prices to that extent.

For instance, price of polystyrene which had been ¥249/kg in January this year was reduced to ¥203/kg in September. Also, benzene from ¥44/kg to ¥38/kg; and terephthalic acid from ¥272/kg to ¥257/kg. Prices of polystyrene and synthetic rubber were following a crablike course this year, but they had been also lowered very much before now.

Import and Export of Petrochemicals

Import

The imports of petrochemicals in 1961 are shown in Table 2. The total import was 28.9 billion yen which was equivalent to 34% of the domestic production, 84 billion yen. In general, it remained on the same level this

Table 2 Imports of petrochemicals

Petrochemicals	Unit		1962 (Jan.—Aug.)	
	1961			
	ton	million yen	ton	million yen
Ethylene glycol	8,303	730	9,809	728
Polyethylene glycol	421	99	1,340	113
Polystyrene	9,891	1,881	4,996	702
Polyethylene	42,602	8,478	18,620	2,088
Propylene glycol	1,201	141	—	—
Acetone	647	36	—	—
Methyl-ethyl-ketone	187	15	113	11
Methyl-isobutyl-ketone	8,644	992	4,939	516
Benzene	8,192	326	—	—
Toluene	—	—	1,903	53
Xylene	49,752	2,461	11,846	412
Alkylbenzene	26,027	2,387	19,652	1,931
Synthetic rubber	44,559	11,342	33,573	7,800
Total		28,888		14,354

year. Import of polyethylene decreased every month from the beginning of the year 1962, and in August it approached naught. In the previous year, the domestic production capacity of polyethylene was under the required demand; considerably cheap polyethylene was imported from abroad, and polyethylene makers, having started its production this year, imported it to open a new market. Such being the case, a great amount of polyethylene was imported. Gradual decrease in import this year is that the existing makers enlarged their capacity and new makers completed installations, which gave full scope in the production capacity; that prices were lowered to the competitive extent against the import; and that there was no need for the development of markets.

Besides the above, import of polystyrene was decreased very much, and that of xylene was also reduced owing to the increase of self-supplying power in the domestic. By the great reduction of the import, petrochemicals import is estimated about 20 billion yen. This is a decrease of about 9 billion yen over the preceding year, and corresponds to 17% of the domestic production, i.e. half of the previous year.

Export

As for the export of petrochemicals, it is very little compared with the import. As shown in Table 3 the export in 1961 was 844

Table 3 Exports of main petrochemicals

Petrochemicals	Unit		1962 (Jan.—Sep.)	
	1961			
	ton	million yen	ton	million yen
Synthetic rubber	4,579	718	4,104	586
Polyethylene	456	105	6,397	906
Polystyrene	86	17	801	114
Total		840		1,606

million yen which is only 1% of the domestic petrochemicals production. Major exports are synthetic rubber, polyethylene and polystyrene. The export of polyethylene has made remarkable increase this year. It is 700 tons on the monthly mean this year (January~September), which was about 40 tons last year. Exports of synthetic rubber and polystyrene are steadily increasing compared with last year. Export of this year is anticipated to be more than thrice that of last year.