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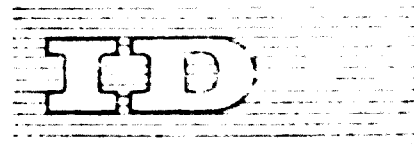
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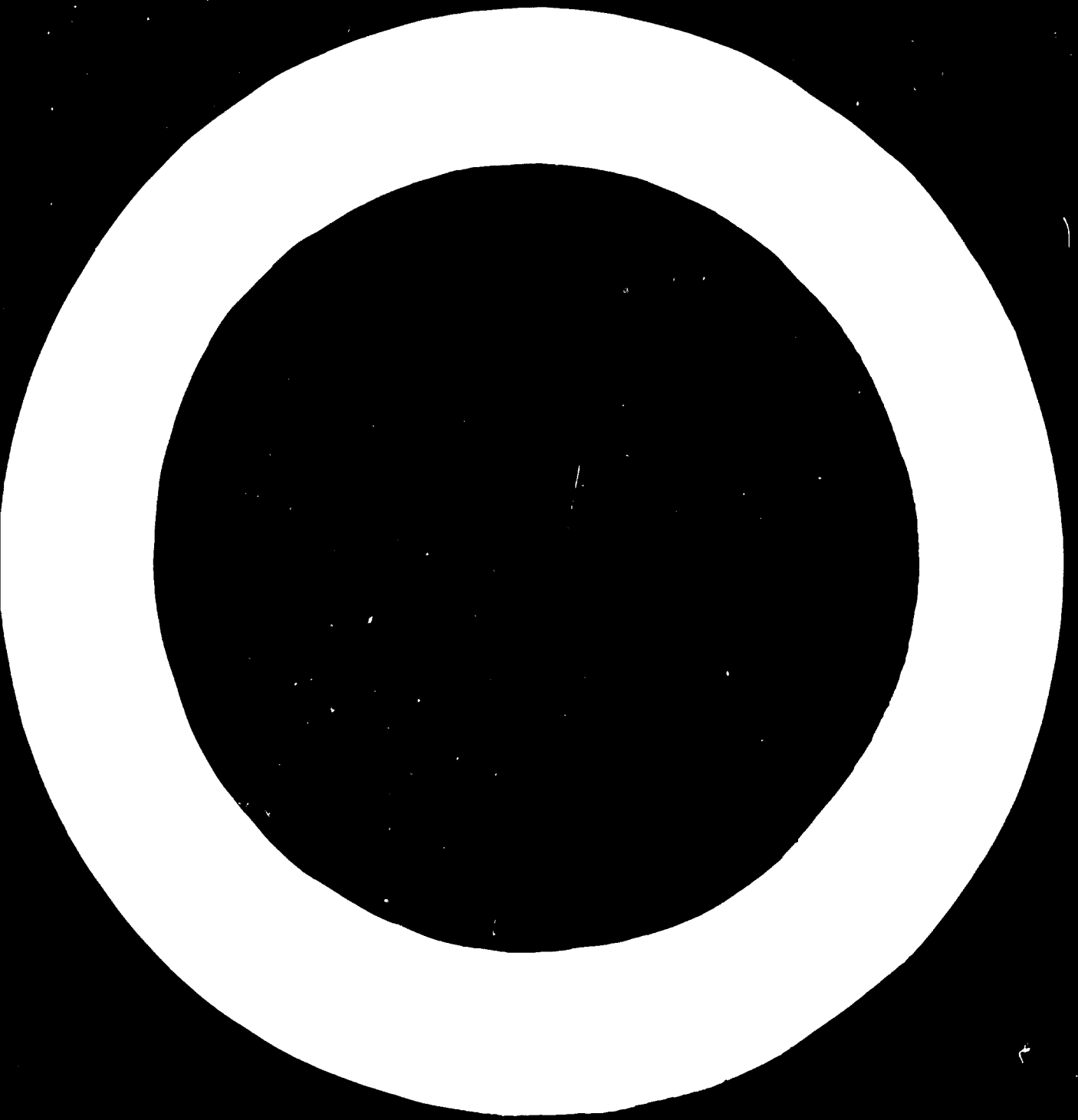
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DEVELOPMENT OF THE PETROCHEMICAL INDUSTRY
IN SPAIN

by

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1. INDUSTRIAL DEVELOPMENT
The industrial sector which has emerged since 1960, 16 years after it had started to develop, has brought forth inevitable created a number of problems which have had to be solved by the Government. The intensive effort to industrialize the country has required adequate later development.

It is only fair to acknowledge that the credit for the vigorous effort which has given the country its phenomenal economic growth is due to the policy to equalize it. It would have been impossible to reach the present position in so short a period without the technical and financial help of other countries.

If the country's industrial industry continues at the rate planned, as we hope, Spain will be in a position in the not-distant future to export larger quantities of products than hitherto to other countries, a development which takes into account the country's geographical situation vis-à-vis potential markets as well fitted.

2. INDUSTRIAL DEVELOPMENT IN THE PETROCHEMICAL INDUSTRY

Chemical industries are the most important basic products contributing to the development of the petrochemical industry.

2.1 Overview

Production of oil derivatives started in 1966 with the 90,000-tonne/year plant located at Puertollano by the Empresa Nacional Hidrocarburos (ENH). Additionally, the first plant for the recovery of aromatics was that installed by ENPS at its Barcelona refinery, though from the industrial point of view this was of slight interest.

In face of the country's growing need, it became evident that the capacity of the ENH plant was insufficient and that its output should be equal to that of the plants constructed in Europe in the 1962-1964 period. The construction, efficient first at output of some 200,000 tonnes/year would have product in costs of about 20 per cent, greater to exceed that of a capacity in excess of 300,000 tonnes/year. In respect of this project, now at the assembly stage, will be operative in 1974.

The second ethylene plant was built at Tarragona by Industrias Químicas Asociadas (IOA) for a capacity of 67,000 tonnes/year and came on stream in 1967. As this plant is located in a region - Catalonia - where consumption is high, consideration has been given to either enlarging the existing plant or erecting a new large-capacity unit in the region in the near future. Authorization has recently been given for the construction of a refinery capable of treating 5 million tonnes/year of crude, and a 200,000 tonnes/year olefin plant (among others) is projected to take advantage of this facility.

With these plants and projects national requirements will be entirely covered at least until 1975.

2.2 Aromatics

The aromatics sector presents a different aspect. There are two plants producing aromatics from petroleum: the SIDA plant at Algeciras, producing more than 200,000 tonnes/year of BTEX, and the RIG GILF plant at Huelva producing 82,000 tonnes of benzene and 40,000 tonnes of cyclohexane.

The first began operations in 1965 and the second, now at an advanced stage of construction, will start producing by the end of this year. Both plants are of a capacity in line with those of other countries at the time of their coming into service. As output will exceed domestic demand for some years it will be necessary to export the surplus, which may be considered a notable achievement for the Spanish petrochemicals industry.

The main petrochemicals producing and secondary processing plants already in existence in Spain are shown in table I.

Table II shows the trend of external trade in petrochemical products, and makes it clear that this trend is broadly favourable.

The impact of the new producing plants has been highly significant; but petrochemicals are still being imported as the increase in consumption has been so pronounced that it is still higher than production in many cases.

3. FUTURE PROSPECTS

The chemical industry in Spain has shown an imbalance between basic production (mainly petrochemicals) and processing. This has been due mainly to the extensive markets open to the processing industries which have expanded at an

increasing rate without heavy investment. The basic petrochemical industry, however, the cornerstone of development in chemicals, has not been attractive enough to raise the large amount of capital needed nor has it had adequate prepared plant, technology resources or sufficiently trained technical staff.

Fortunately, the entry into production of the petrochemical plants described in the preceding section has brought about a spectacular improvement in the Spanish chemical industry.

Furthermore, the plants being built or projected (tables III and IV) will contribute greatly to the improvement of the chemical picture in the very near future. It is therefore possible to look to the subsequent development of the industry with some confidence, when the increase in production will even out existing imbalances and consequently reduce our foreign trade deficit in the sector.

Current planning includes, among other projects, the extension of plants for basic products like ethylene and propylene, where the initial capacity was determined on too cautious a basis.

4. PROBLEMS

The absence of any fundamental basic industry, creating a serious disorganization in the structure of the sector, coupled with the anticipated heavy and growing demand for finished products from 1960 onwards (a growth confirmed by developments), made it necessary to establish a petrochemical industry geared primarily to supplying the domestic market and thus to import-substitution leading to substantial currency savings over the last few years. The foreign market, which was considered to be very difficult in the first stage, was discarded as a short-term possibility.

The fact of supplying a market that was really small, despite its growth without apparent cause, led to problems that were difficult to solve. To this there had to be added the constantly increasing volume necessitated by technology in other countries, in contrast with the relatively small volume of our installations.

All this has led to a series of initial problems that we shall briefly quote below:

(a) The inadequacy of independent research and technology

As the petrochemical industry is only in its early stages and owing to the lack of suitable research methods, we are faced with an almost total lack of petrochemical technology. The gap has had to be bridged by importing technology from other countries that are more advanced in this field; this has naturally produced an increase in costs of production, as the payment of licences and royalties must be included in these costs.

(b) The lack of sufficient financial resources

As the large amount of capital necessary to finance a petrochemical industry and suitable technology have not been available, it has been necessary to enlist the co-operation of enterprises from other countries, which has led to foreign participation in our petrochemical industry, as can be seen from table V.

(c) The inadequacy of the capital goods industry

The fact that Spain had no suitable capital goods industry was at the beginning a serious drawback since a large percentage of the equipment necessary for the installation had to be imported, with a consequent increase in costs.

Fortunately, this problem has been largely overcome and today the Spanish capital goods industry can supply most of the equipment required.

(d) Inadequate size of the plants

The fundamental reason for this is that the national market is not large enough to absorb the production of the gigantic installations that for some years have predominated throughout the world. Since our installations have to be of sufficient volume to be competitive, it is necessary to export the surpluses produced. In this direction, Spain is at the moment making a great effort to seek markets in which to place its products.

(e) Anomalous location of raw materials in relation to the manufacture of basic, intermediate and final products

An attempt is being made to solve this initial problem by the planning of new installations.

(i) The lack of deposits of petroleum and natural gas

Although the lack of natural sources of raw materials is not an insoluble difficulty - as is shown by other countries that are in the same position but which in fact have a petrochemical industry that is in the vanguard of progress - the existence of such resources would have reduced the problem of developing the industry.

V. TECHNICAL ASSISTANCE

All of the above remarks indicate the type of assistance that Spain might need for the development of its petrochemical industry.

In broad outline, this assistance can be grouped up under two aspects: technology and finance.

Technical assistance has been indispensable for the birth and development of this industry in Spain, since we had not a suitable tradition of research or technology in our country. Today it can be said that Spain has a growing number of technicians with sufficient experience in this field. On the other hand, research has been begun which, though modest at the moment, can be a starting point for more ambitious projects.

The technological development that characterizes the chemical industry and the petrochemical industry in particular makes necessary continuous contact with those countries that are in the forefront of progress in this field. The development of processes, engineering, technology, new products and applications is the technical assistance that Spain would need in order to keep its installations and, in fact, its petrochemical industry up to date. Many leading international enterprises are participating in Spanish companies so that this aspect of the problem is partially solved. However, at the same time, Spain should be able to acquire technology of its own and will require external aid to create and develop such technology.

Another type of assistance, not technical but just as necessary, is financial assistance. The large scale capital investment needed for the establishment of petrochemical plants large enough to be profitable entails great financing problems that are difficult to solve with only the resources of one country which, although it is advanced in its industrial development has not yet reached the desired objective.

Table 1

PETROCHEMICAL PRODUCTS

Installations existing in Spain

<u>Product</u>	<u>Proprietary company</u>	<u>Capacity t/year</u>	<u>Location</u>	<u>Date of going on stream</u>
Ethylene	I.Q.A.	67,000	Tarragona	1967
Ethylene	ENHASC	60,000	Fuertollano	1966
Propylene	I.Q.A.	25,000	Tarragona	1967
Propylene	ENHASC	40,000	Fuertollano	1966
Butadiene	CALATRAVA	7,700	Fuertollano	1967
Benzene	CEPSA	50,000	Algeciras	1968
Toluene	CEPSA	29,000	Algeciras	1968
O-xylene	CEPSA	23,000	Algeciras	1968
Xylenes	CEPSA	50,000	Algeciras	1968
Polyethylene, low density	ALCOPIA	45,000	Fuertollano	1966
Polyethylene, low-density	DOU-URQUINENA	25,000	Tarragona	1967
Polyethylene, high-density	CALATRAVA	18,000	Fuertollano	1967
Ethylene oxide	I.Q.A.	10,000	Tarragona	1967
Ethylene oxide	ALCOPIA	11,000	Fuertollano	1968
Octanol	I.Q.A.	10,000	Tarragona	1967
Acetic acid	I.Q.A.	13,000	Tarragona	1967
Acetaldehyde	I.Q.A.	28,000	Tarragona	1967
Polypropylene	PAULAB	12,000	Fuertollano	1966
Isopropanol	I.Q.A.	13,500	Tarragona	1967
Acetone	I.Q.A.	7,500	Tarragona	1967
Dodecylbenzene	PETROSA	50,000	Algeciras	1967
Caprolactam	ESSO	20,000	Castellon	1969
Cyclohexanol	ESSO	14,000	Castellon	1969
Cyclohexanone	ASSA	50,000	Sevilla	1968
Methanol	PETROSA	50,000	Algeciras	1967
Linear paraffins				
Synthetic rubber	CALATRAVA	40,000	Santander	1967
Lampblack	CALATRAVA	22,500	Santander	1967
Lampblack	CABOT	20,000	Bilbao	1969
Lampblack	CARBESA	15,000	Algeciras	1969

Table II

PETROCHEMICAL PRODUCTS

Market Situation
(1960)

Products	Consumption tonnes/year	Production t	Imports t	Exports t
Ethylene	81,250	81,250	-	-
Propylene	27,700	27,800	-	-
Butadiene	18,011	5,713	12,298	-
Benzene	11,156	20,000	1	8,845
Toluene	25,362	4,500	20,862	-
Xylenes	15,087	-	15,087	-
Polyethylene	102,019	62,170	41,226	477
Ethylene oxide	6,210	5,900	310	-
Vinyl chloride	77,394	55,000	22,394	-
Octanol	no figures	4,650	no figures	-
Butanol	7,377	3,960	3,417	-
Acetic acid	13,600	13,600	no figures	-
Acetaldehyde	30,521.1	30,400	121.1	-
Polypropylene	no figures	5,300	no figures	-
Isopropanol	16,424	10,000	6,494	-
Acetone	5,423.7	3,900	1,525	1.3
Propylene oxide	200	-	200	-
Acrylonitrile	5,000	-	5,000	-

Table III

PETROCHEMICAL PRODUCTS

Installations under construction

<u>Product</u>	<u>Proprietary company</u>	<u>Capacity t/yr</u>	<u>Location</u>	<u>Date of going on stream</u>
Ethylene	ENCASO	200,000	Puertollano	1970
Propylene	ENCASO	80,000	Puertollano	1970
Benzene	RIO GULF	83,000	Badajoz	1970
Polyethylene, low-density	ALCUDIA	15,000	Puertollano	1971
Polyethylene, low-density	CALATRAVA	12,000	Puertollano	1971
Vinyl chloride	VINICLOR	60,500	Barcelona	1971
Polyvinyl chloride	VINICLOR	30,000	Barcelona	1971
Vinyl chloride	MONSANTO	150,000	Tarragona	1971
Cyclohexane	RIO GULF	40,000	Badajoz	1970

Table IV

PETROCHEMICAL PRODUCTS

Projected installations

<u>Product</u>	<u>Proprietary company</u>	<u>Capacity t</u>	<u>Location</u>	<u>Date of going on stream</u>
Oxo alcohols	BASF	20,000	Tarragona	1971
Phthalic anhydride	BASF	14,000	Tarragona	1971
Plasticizers	BASF	10,000	Tarragona	1971
Di-isocyanates	BAYER K. INDUSTRIAL	12,000	Tarragona	1971
Styrene	MOBILCO	30,000	Puertollano	1971
Propylene oxide	MOBILCO	30,000	Puertollano	1971

Table V

Foreign Participation in the Petrochemical Industry

<u>Enterprise</u>	<u>Foreign Participation</u>	<u>Participation</u>
Levsa	British Petroleum ¹ M. J. M. J. (British) Ltd.	50% 50%
CALATRAVA	ENI (Italy)	31%
ALONDA	British Petroleum (British)	47%
DOW-BRQUINOSA	Dow (USA)	52%
PAZAR	ENI (Italy)	50%
IBERISA	ENI (Italy)	50%
PRODUCTOS QUIMICOS BASF	BASF (USA)	75%
ASMA	M. J. M. J. (British)	20%
CABOT	CABOT (USA)	100%
INDUSTRIAL QUIMICA	BASF (Germany)	75%
NOFORO	AMIA (USA) M. J. M. J. (USA)	33.33% 33.33%
BAYER	Bayer (Germany)	57.5%
CARBOSA	AMIA (USA) COMERCIAL (USA)	33.33% 33.33%
VINICOR	COMAR (Belgium)	-
MOISATE IBERICA	NOF (USA)	50%
RIC GULF PETROQUIMICA	BP (USA)	50%





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