ELASTOMERS AND PLASTOMERS

THEIR CHEMISTRY, PHYSICS, AND TECHNOLOGY

Edited by

R. HOUWINK

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CHAPTER 1

ECONOMIC ASPECTS *

by

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§ 1. Introduction.

In this chapter an attempt is made to give a survey of the economic position of plastics, but the difficulty arises that complete details are not available for most of the countries which produce and consume plastics.

The reasons for this are:

1. The secrecy of statistical data which was necessary in many countries during the recent war. These figures will not be published for a considerable time to come.

2. In many countries the plastics industry has only developed during recent years.

3. In many countries the plastics industry is still so small, compared with other fields of industry, that statistical data are not available.

4. Such important industrial countries as Russia and Japan, which undoubtedly produce and use plastics, are more or less hermetically sealed from the rest of the world.

In collecting these figures it was necessary to concentrate mainly on America. The plastics industry of the United States developed very rapidly, particularly once the U.S.A. entered the war as a belligerent. The great chemical industry of this country, with its extensive laboratories, began a very active development of plastics, and produced considerable improvements in many of the existing compounds. There is a tendency to give the major credit for the rapid development of the plastics industry during the war years to the scarcity of various other materials. In some cases indeed, the change to plastics was caused by this shortage, and this was certainly the case more in Germany than in America. The real cause of the great development of the plastics industry is to be found, however, in the *superior properties* of the plastics as compared with the materials used previously. Furthermore, possibilities were created which had not existed previously. The enormous development schemes of the U.S.A. chemical industry, and the many plans in all other countries of the world, seem to support this conclusion.

It is fortunate that the development of the plastics industry in the U.S.A. and Britain can be illustrated with extensive statistical details. Interesting deductions can, doubtless, be made from these figures, but it must not be forgotten that there is still a worldwide shortage of every conceivable product, including plastics.

* Where quantities in tons are mentioned, metric tons are meant and only for rubber and synthetic rubber are long tons used.

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At the time of writing there is still a sellers' market, but when all the various projected expansions are realized the buyers' market will rapidly return. A quick return of this market in some fields can already be forecast.

Only when the demand for the various plastics is completely satisfied will it be possible to see whether plastics can survive, and whether the great increase of production capacity for the various plastics is justified.

Development of plastics, especially that of high polymers, was greatly stimulated during the war years. Most illustrative was the development of synthetic rubber, in face of the loss of almost all the sources of natural rubber (except Japan).

The expansion of the synthetic resin industry was mainly a result of the application of materials which were already known. Plastics are employed in practically every branch of industry, and, as such, are indispensable to modern society.

With regard to the application of synthetic rubber, it should be noted that this type of rubber has been used for nearly every purpose for which natural rubber was formerly used. These applications were largely reconsidered after the war, as is illustrated, more extensively, in Volume 2 Chapter 12.

Fig. 1 illustrates the development of world production of some polymers.

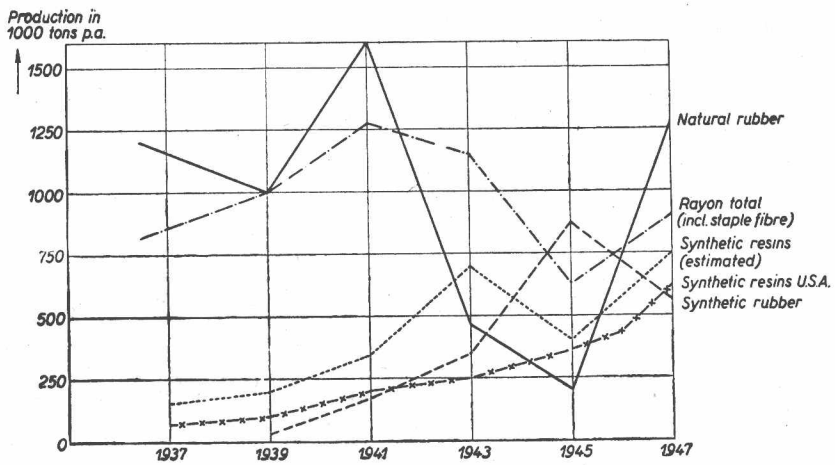

Fig. 1. World production of some polymers.

Accompanying the decrease in natural rubber production after Pearl Harbour, was the great increase in the production of synthetic rubber during the years 1940 to 1944.

In 1942 synthetic rubber production was 120 000 tons.

In 1944 it was 900 000 tons. (1 ton = 2240 lbs.). In 1945 the production of natural rubber increased and for this reason, the peak of the production of synthetic rubber was reached in 1944. Synthetic rubber production in 1947 dropped to 560 000 tons in view of the increase of natural rubber production to 1 270 000 tons.

Rayon production reached a peak of 1 200 000 tons in 1942 with a steep decline after that. In 1946 rayon (fibre and yarn) production was only 750 000 tons.

However, all signs point to the fact that this was only a temporary interruption to the devolopment of production, and there will certainly be an increase in rayon production in the immediate future.

The development of synthetic resins has increased ever since 1936 and it is possible that synthetic resin production will expand still further during the coming years.

The data in Figure 2 show the use of the various plastics during 1947[1]. Although these figures only apply to the U.S.A., it can be assumed that a similar ratio will soon apply to different parts of the world.

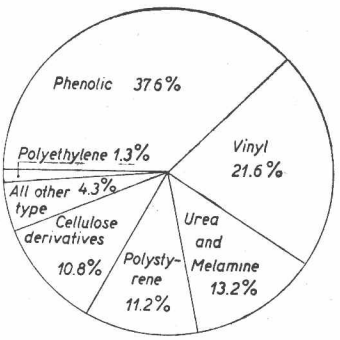

Fig. 2. U.S.A. Consumption of Plastics Materials in 1947, grouped according to classes in percent of total consumption.

	IN TONS
Phenolic resins	143750
Vinyl resins	82750
Urea and Melamine	50500
Polystyrene	43000
Cellulose-derivatives	41500
Polyethylene	5000
All other types	16500
Total	383000

The figures in Table 1 show the relative position of plastics with respect to other chemicals. As in Table 1 the paint and lacquer-industry is mentioned separately, we have to take into account that a part of the consumption of chemicals included under that heading has to be included in the figures mentioned for plastics.

The rough survey of Table 1 is to some extent reproduced in Table 2, but detailed in a different way. In this table the plastics are compared with a number of well-known organic and inorganic mass products. From Table 2 we learn that, with respect to the quantities produced, plastics compare with products such as methanol and formaldehyde. In comparison with the dollar value the plastics rise far above those inorganic chemicals, such as sulphuric acid, chlorine and sodium hydroxide, which are produced in very large quantities.

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