**Table 1—Development of synthetic fibres in W Europe ('000 tons)**

| | 1968 | 1970 | 1975 |
|---|---|---|---|
| Polyamide | 520 | 700 | 1,100 |
| Polyester | 310 | 450 | 1,100 |
| Acrylics | 270 | 375 | 750 |

The dominant position of polyamides, however, was deteriorating: the annual growth rate, amounting to 16 per cent in 1968/70 and 9.5 per cent in 1970/75, being much smaller than that of polyester fibres (20.5 per cent and 17 per cent) and acrylic fibres (18 per cent and 15 per cent). It is estimated that production of polyamides in 1968-75 would double from 520,000 tons to 1 million tons.

The two main products, nylon 6 and nylon 66 would retain their share of the market in coming years, ie 57 per cent nylon 66 to 43 per cent nylon 6, in W Europe. (Table 2.)

**Table 2—Polyamide fibres in W Europe ('000 tons)**

| | 1968 | 1970 | 1975 |
|---|---|---|---|
| Nylon 66 | 296 | 400 | 640 |
| Nylon 6 | 224 | 300 | 460 |
| Polyamide fibres | 520 | 700 | 1,100 |

In the US, the share of nylon 66 amounted to 74 per cent, nylon 6 to 26 per cent. No considerable changes were expected here until 1975.

Caprolactam, main raw material for nylon 6, was based on three petrochemical raw materials in W Europe—cyclohexane, phenol and toluene (Table 3).

**Table 3—Caprolactam raw materials production W Europe (per cent)**

| | 1968 | 1970 | 1975 |
|---|---|---|---|
| Cyclohexane | 59 | 64 | 64 |
| Phenol | 39 | 34 | 34 |
| Toluene | 2 | 2 | 2 |

The requirements for cyclohexane in the years under review would therefore be: 152,000 tons in 1968; 221,000 tons in 1970; and 338,000 tons in 1975. Total demand for cyclohexane, taking into account cyclohexane for caprolactam production, which is exported and not made into nylon 6 in W Europe, and cyclohexane for production of adipic acid and AH salt for nylon 66 is shown in Table 4. The 1968 deficit of 315,000 tons could be covered by imports, nearly exclusively from the US. However, W Europe's cyclohexane capacity was growing. Theoretically it would be possible by further expansion of capacity to achieve a balance of supply and demand but future supply would not only depend on the willingness of the petrochemical industry to set up cyclohexane capacities but also on the availability of cheap hydrogen for hydrogenation of benzene.

**Table 4—Cyclohexane in W Europe ('000 tons)**

| | 1968 | 1970 | 1975 |
|---|---|---|---|
| Cyclohexane for fibres | 660 | 920 | 1,330 |
| Total demand | 750 | 1,060 | 1,500 |
| Surplus or | 135 | 780 | 1,330 |

**Table 5—Benzene in W Europe ('000 tons)**

| | 1968 | 1970 | 1975 |
|---|---|---|---|
| For fibres | 485 (24%) | 815 (26%) | 1,380 (29%) |
| For others | 1,515 | 2,335 | 3,380 |
| Total demand | 2,000 | 3,150 | 4,760 |
| Production | 1,730 | 3,150 | 4,700-5,000 |
| Cyclohexane imports for fibres expressed in benzene | 300 | 240 | 190 |

Present demand for phenol in W Europe for nylon 6 production could be covered by existing capacities, employing 75-85 per cent of capacity. This also applied to 1975, given adequate expansion of capacities.

Toluene demand for production of caprolactam amounted to about 12,000 tons; until 1975 this was expected to remain constant. However, the share of fibres in the total demand for toluene only amounted to 2 per cent.

Turning to nylon 66, Mr Marx said that the starting material, adipic acid, depended on the two petrochemical raw materials, cyclohexane and phenol. Both these were obtained from benzene. The share of benzene needed for fibres in W Europe amounted to 24 per cent in 1968, 26 per cent in 1970 and 29 per cent in 1975 (Table 5).

After 1970 a balance would replace the deficit in benzene, which had previously been covered by imports.

Although the figures showed that in the course of 1970 supply and demand for benzene in W Europe would be in balance, obviating the need for imports, nevertheless, said Mr Marx, it was probable that in the field of petrochemical products, particularly aromatics, imports would continue.

## Polypropylene growth continues in 1970s

'Polypropylene, yesterday, today and tomorrow' by Dr Luigi Mangini, Montecatini-Edison, also delivered at the Wiesbaden annual meeting of the European Petrochemical Association, described world production of polypropylene in 1968 as reaching 880,000 tons, an increase of about 25 per cent compared with 1967. The same increase is expected to continue for several years, with all producing countries, including newcomer Spain, planning to expand capacity.

Within two or three years, the world market would have 2 million tons of available polypropylene capacity.

**Table 1—World consumption of polypropylene ('000 tons)**

| | |
|---|---|
| 1966 | 420 |
| 1967 | 500 |
| 1968 | 880 |
| 1969 (forecast) | 1,070 |
| 1970 | 1,300 |
| 1971 | 1,600 |
| 1972 | 1,900 |
| 1973 | 2,200 |

## Interest in bromine based flame retardants

The news this week that Berk Ltd are to invest £200,000 in a new plant to produce BROMINE-BASED COMPOUNDS gives some indication as to the anticipated market growth in these chemicals. The main influence will undoubtedly come from the increasing interest in flame retardants.

Although methyl bromide was one of the first chemicals to be used as a flame retardant the bromine group as a whole has taken only second place over recent years to chlorinated paraffins and inert resins. Berk entered this type of market about five years ago with their bromine-based Flammex retardants.

These have since made some encouraging inroads into the plastics industry. Today Berk concentrate most of their effort on major polymer producers although at the same time they maintain some interest in the synthetic fibre industry.

The size of the current demand for bromine-based flame retardants is difficult to calculate, but since Berk are the sole producer in this field it is likely the market is approaching 1,000 tons/year. Until recently demand was fairly small, but during the last year Berk have seen a substantial increase; the Flammex range has been accepted commercially and is now being ordered in bulk quantities by the plastics and textile industries.

In addition to their own range, Berk also plan to make Michigan Chemicals' Firemaster additives at the new plant. These, however, will be marketed under their Flammex label in the UK.

Main areas of growth for these retardants is in polystyrene, polyurethane and polyester formulations. Other areas where flame retardants are finding more uses are in aircraft and car manufacture. So far these outlets are comparatively small and are being met by products already established on other markets. The future in these areas, however, could show substantial growth and may require new and more specialised types of flame retardants to be developed.

Not all the output from Berk's new plant will be limited to the flame retardant compounds. The plant has been designed as a multi-purpose unit with an anticipated production of about 75 per cent flame retardant and 25 per cent organic and inorganic bromine compounds. Contract for supply of bromine raw material has been signed by Berk with Associated Octel, the only UK producer.

Output of bromine at Hayle, the plant of Associated Octel, has been running at a steady pace over the past few months. The company so far has been able to meet all bulk commitments, which accounts for about 70 per cent of the production. This is currently averaging 400 tons/month.

DSW 199823

STLCOPCB4057887