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06797

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Distribution
LIMITED

ID/WG.217/11
17 October 1975

Original: ENGLISH

United Nations Industrial Development Organization

Second Training Programme on the Production
and Application of Synthetic Fibres

Vienna, Austria, 29 September - 30 October 1975

**PRESENT STATUS AND FUTURE PLANS OF THE
DEVELOPMENT OF THE SYNTHETIC FIBRE INDUSTRY
IN LIBYA**

by

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GENERAL INTRODUCTION

As man-made fibres nowadays become very common in every country, very few people are aware of the work carried out by many scientists that led to the development of these fibres.

It is therefore appropriate to mention briefly the historical background surrounding their development.

As regenerated fibres differ from synthetic fibres in sense that latter are composed of giant molecules synthesized from quite simple monomers, we refer to each group individually.

I. Regenerated Fibres:

During the 19th century silk was very popular in Europe the yarns or fabrics were imported from countries such as India and China. This led some scientist in thinking of producing artificially fibres like silk.

In 1853 Swan prepared continuous threads of cellulose nitrate by dissolving the substance in a mixture of alcohol and ether, and forcing the solution through fine orifices into a warm atmosphere where the solvent rapidly evaporated. This was only a pilot experiment, but in 1884 Chardonnet manufactured nitro cellulose yarn commercially. Schweitzer's later discovered that cellulose can be dissolved,

by a solution of copperhydroxide in ammonia and Pauly in 1897 was the first to work the process on a commercial scale, However Bombay in 1919 took the matter up again and succeeded as he introduced the method of stretch spinning and infact cuprammonium rayon is still prepared by this method. Although very few countries do produce these type of fibres a few thousand tons produced mainly by W. Germany are consumed every year as shown in table I.

Beavan while carrying out extensive research into the chemistry of cellulose was able to produce viscose rayon, which later became a very popular fibre, and many firms sprung all over the world and the total out-put has been increasing ever since (table I.).

In 1894 Cross and Beavan described a commercially practical way of making the Triacetate which consisted essentially of treating cellulose with acetic anhydride in the presence of sulphuric acid, however cellulose triacetate did not meet much success because of its solubility in dangerous solvents such as chloroform. However, in 1975 Miles showed that by addition of water to the solution of triacetate in acetic anhydride a secondary acetate was produced.

The 1914 - 18 war created a great demand for solution of secondary acetate dissolved in acetone known as "dope" which was used as a protective coat for the fabric wings of aeroplanes.

II Synthetic Fibres

In 1927 the Du-pont company took a very far reaching decision. They came to the conclusion that to ensure the continuing prosperity of their company, they would have to commit themselves to fundamental research. With a brilliant team headed by W.H. Corothers, the condition under which condensation polymerisation is achieved was established.

When the theory received recognition an intense research for appropriate monomers was set in motion.

At that time the most suitable known reaction was condensation between adipic acid and hexamethylene diamine to Nylon 66.

With the break of the second world war the production of Nylon doubled nowadays thousands of tons of staple and single filament are produced yearly (see table I).

Few years later polyester fibres were produced in both the U.S.A. and Great Britain. Infact, most developed and some underdeveloped countries do manufacture polyamides and polyester fibres.

The Man-Made Fibres Industries in the LIBYAN ARAB REPUBLIC.

At present no such industries exist in the Libyan Arab Republic but since the present Government came to power, and their intention is to establish a petro chemical industry. Infact as part of a five year plan, a petro chemical complex is being built at an approximate cost of 250 million dinars, and when completed in 1980, LIBYA will be able to produce one hundred thousand tons of polyester and polyamide. Thus becoming self-sufficient with man fibres and in the same time exporting to African and Asian countries.

No problem of shortage of raw materials or an increase in the price of oil would effect the running or the set price of the production, consequently these plants will be able to compete favourably with other reputable firms.

The demand for synthetic fabrics has been growing over the past six years (fig I). This would increase yearly as the standard of living increases also the influx of foreign works into the country would also have bearing on the consumption. But it is expected to level up once the industrialization program is completed in two years time.

At present there are large mills, one at Si-marg producing dyed woolen yarns, and the other at Ganzour producing dyed and printed 100% cotton fabrics. The Ganzour mill has the capacity to produce 11 million metres per year and has been geared to cope with synthetic fibre once these plants go into production. It has been planned that production will double by 1980.

The Ministry of scientific research in the Libyan Arab Republic has established a research centre in Tripoli, and have already send graduates abroad to specialise in Textiles, Polymer and Petrochemical technology.

The aim of the research centre, beside carrying out academical research, is to assist the appropriate industries in their development programmes and solve any problems which could arise in production.

The research centre will run jointly by Libyans and expatriates who will act as technical advisors. The research centre is at present playing a role in establishing a quality control system in conjunction with the technologist at Ganzour mill. Also a scheme has been laid where by the centre will carry out tests on the Ganzour mill products and to compare their results with those of the testing laboratories at the mill.

The UNIDO can undoubtedly help by offering a scholarships for graduates to visit other mills or man-made fibre plants in different countries or attend courses at western universities.

As Technology was not part of the Libyan society an acute shortage of skilled and semiskilled workers exist in the country. The UNIDO can assist in this respect by establishing training centre and pilot plants where operatives after a suitable time of training can immediately participate in production.

Also already mentioned no problem of shortage of raw-materials can occur, but to be able to market the products, they have to be of good quality comparable with other manufacturer.

This will require a good quality control system and undoubtedly the UNIDO can provide the expertise to establish and supervise the application of that system.

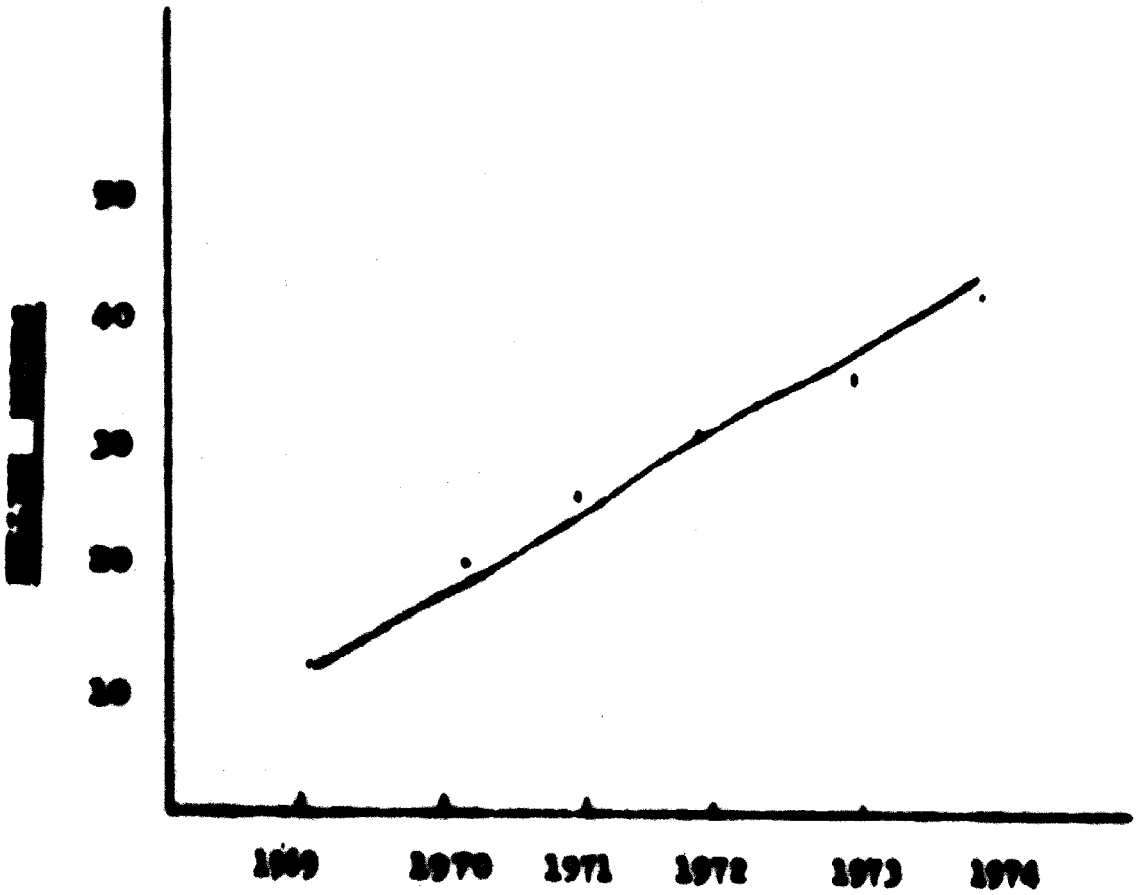
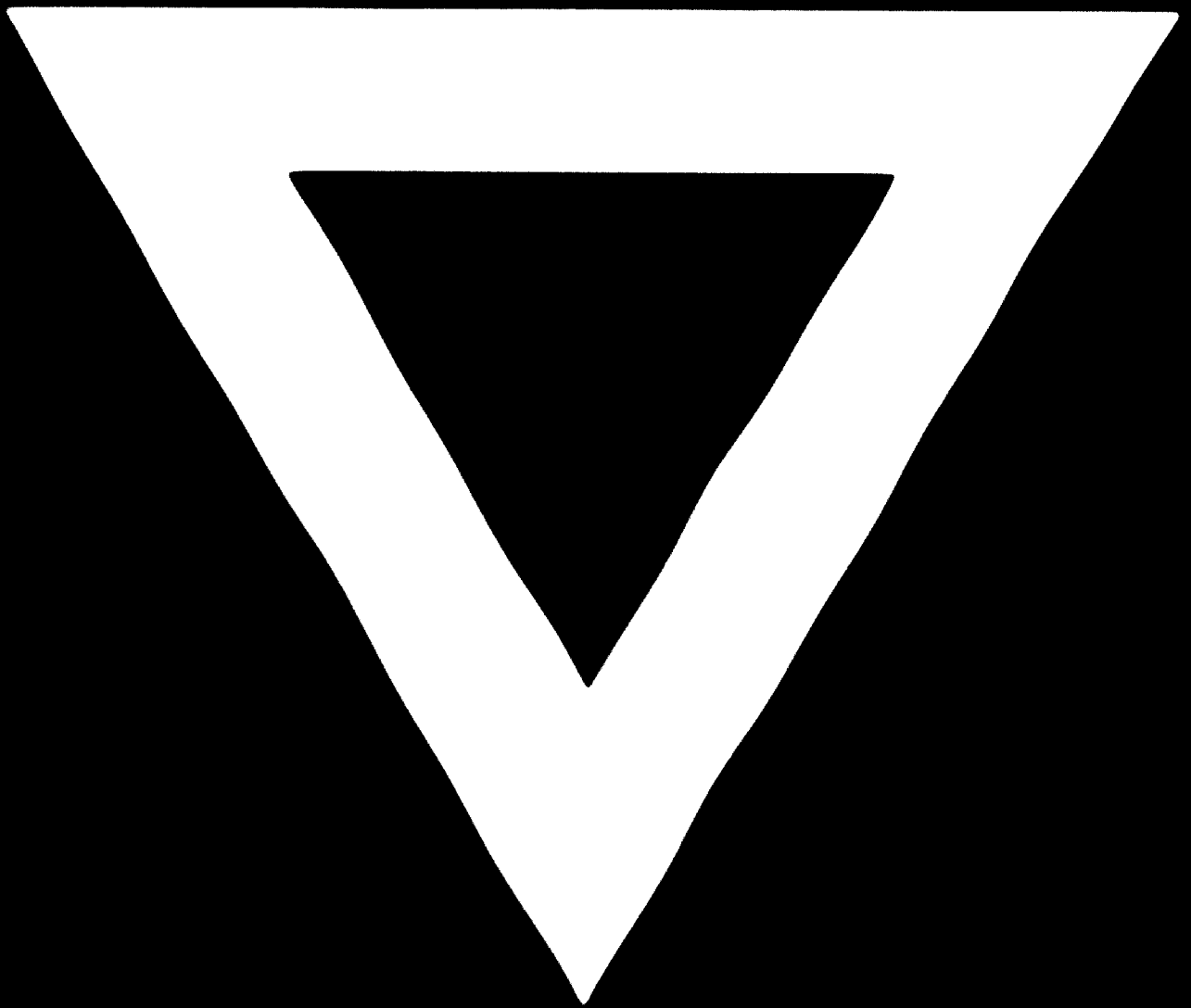


FIG 1

TYPE OF FIBRE	TOTAL PRODUCTION (IN THOUSANDS TONS 1974)
Viscose rayon	250
Secondary Acetate	150
Tri - acetate	220
Cuprammonium rayon	20
Nylon	450
Polyester	447

TABLE I





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