

CHEMISTRY

Orlon, New Synthetic Yarn

This new treatment of familiar fibers stands up better under sunlight. First commercial production is planned for next year.

By ANN E. EWING

See Front Cover

➤ ORLON, the new synthetic yarn made from natural gas, and oxygen and nitrogen from the atmosphere, will team up next year with such familiar fibers as nylon, rayon, silk and wool for shirts, undergarments, curtains and even men's suits. First commercial production—next year—however, will go largely to industrial users.

Particularly resistant to sunlight, materials of this new fiber lose only about one-fourth of their strength in tests where nylon, silk, wool and rayon fail completely.

Look for Orlon to be outstanding for umbrellas, awnings, sails, convertible tops and other jobs where fabrics must stand up under severe outdoor exposure. Not only sunlight, but moisture, fungus and insects normally will attack these items over a period of time. They will not do so if the articles are made of Orlon.

Orlon approaches nylon in its strength and lightness. In most of its other properties including the final estimated cost, Orlon falls somewhere between nylon and rayon. Unlike nylon, however, which is rather cold and clammy to touch when wet, Orlon has a warm, friendly feeling, either wet or dry.

War Development

Orlon was first developed during the war as a possible product for use in the South Pacific. There other materials, excepting nylon, rotted away in hours or days.

Low specific gravity gives Orlon a high covering and bulking power, permitting the manufacture of lighter weight fabrics than usually obtained. These fabrics, however, have the appearance of appreciably heavier materials.

Orlon will not replace nylon for stockings, underthings and similar uses, although it will be made into woven lingerie, either in white or light pastel shades. This material is known as tricot because of the style in which it is knit. Orlon will supplement rather than compete with nylon in many fields.

The most important industrial uses for this new fiber, which will not be in commercial production until late 1950, are as filter cloths, nets for dyeing nylon hose, marine cordage and as dust filter bags. Orlon will be chosen not only because it is more successful in resisting weathering, but also in resisting alkalis and acids.

Orlon fiber in a continuous filament, that is one long thread, feels like silk. On the other hand, when Orlon is in the form of staple, it feels much like wool.

At first glance, a bit of Orlon staple looks quite like a tuft of cotton. Actually, it is made up of short lengths of thread which have been given a permanent wave.

Some Orlon staple has been made in experimental quantities. Production of a synthetic yarn in staple form is necessary to adapt it to machinery in existing plants.

Crimping gives to the staple the mass cohesion that is essential for good spinning in the wool, worsted and cotton mills now using the traditional fibers. No samples of Orlon staple are yet available, but they are expected after commercial production has started.

Orlon fiber is made from polyacrylonitrile. This is a plastic formed by the polymerization, that is linking together to form long molecules, of acrylonitrile. Acrylonitrile is made from such basic materials as limestone, coal, petroleum, natural gas, water and air.

Acrylonitrile is one of the intermediate products in making a certain kind of synthetic rubber. Known for its resistance to oil, this type became well known during the war as Hycor, Perbunan, Butaprene or Chemigum.

Because the quantity of synthetic rubber made in the United States each year is steadily increasing, the supply of acrylonitrile is ample. It is even possible that the production of Orlon from acrylonitrile will reduce the price of synthetic rubbers.

Making Acrylonitrile

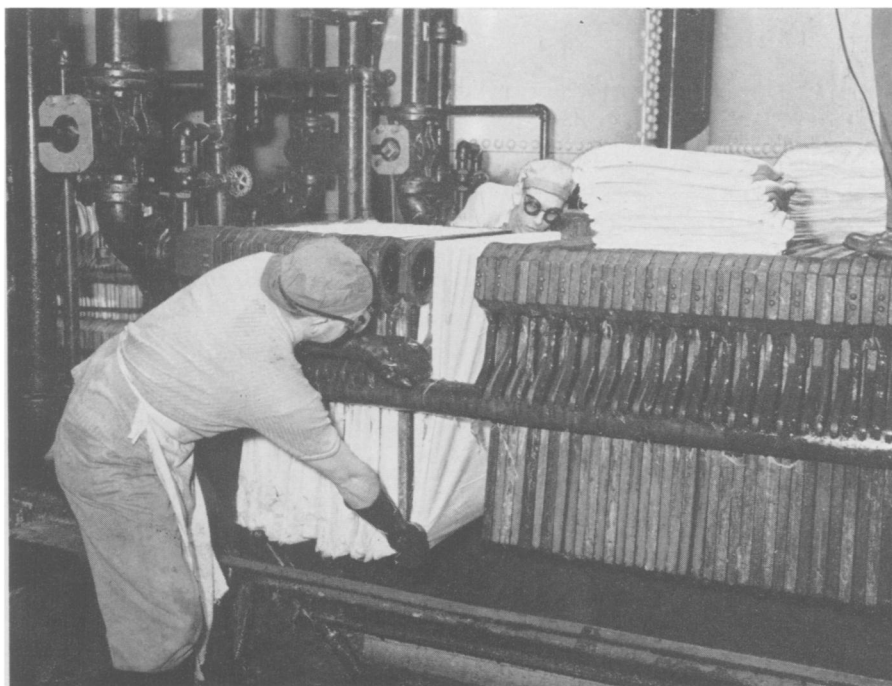
There are several ways to make acrylonitrile. One method is to start with ethylene, which is familiar as an anesthetic and as a compound used to hasten the ripening of fruits and vegetables. By reaction with oxygen from the air and hydrocyanic acid (prussic acid), the ethylene gas is changed into acrylonitrile monomer, which is a fairly volatile liquid.

Under the influence of catalysts, compounds which do not enter into reaction themselves but which help to make the reactions go, the acrylonitrile forms polyacrylonitrile.

Orlon as a fiber is quite similar to the fibers obtained when vinyl chloride, vinyl acetate and vinyl alcohol are polymerized



NEW ORLON PRODUCTS—Fine marquisette for curtains which will not fade in sunlight, weather proof sail cloth, filter cloth, and strong, tough rope are some of the products which can be made of Orlon.



ON THE PRODUCTION LINE—Two men are adjusting the tension on Orlon filter cloths in this picture.

either by themselves or with each other.

Unlike wool, rayon or cotton, the entirely synthetic fibers usually absorb little or no moisture and are nearly as strong when wet as when dry. This property is particularly important in fabrics used outdoors.

Its low moisture absorption also makes Orlon fabrics easier to clean. Dirt does not become imbedded in the fiber and is, therefore, easier to remove.

The problem which now prevents even more widespread experimental use of Orlon is the difficulty of dyeing the fiber. Because it is chemically inert, it does not take too well to ordinary dyes and dyeing methods.

Only Pastel Shades

Orlon can be dyed, but the colors obtained are not too light-fast, and only pastel shades are available at the present time. The chemists at E. I. duPont de Nemours & Company, the company which developed Orlon, believe that by the time full scale production is achieved, the techniques of dyeing this new fabric will have been mastered.

This same difficulty with dyeing was encountered when the only other two all-synthetic fibers now in general use, nylon and Vinyon N, were first produced.

Synthetic fibers account for only one percent of the overall textile uses. Last year over seven billion pounds of fibers were consumed in the United States. Seventy percent of the total textile and cordage products are cotton.

Before considering the use of Orlon as a consumer fabric, the toxic properties of both the polymer from which the yarn is prepared and the yarn itself were thoroughly investigated. They have both been classified as non-hazardous, that is, no dermatitis or skin eruptions developed from the customary patch tests on hundreds of people.

At first, Orlon is expected to make its biggest impression on the curtain industry. It is highly resistant to light, smoke, and soot and gases from industrial plants as well as from heating units in the home itself.

When Orlon is in general use for curtains, the curtain stretcher can be put to good use training climbing rose bushes in the garden. Orlon retains its shape and friendly feel either wet or dry.

Protective work clothing is another field where Orlon is expected to find immediate acceptance. Workers in chemical process industries, rayon plants, garages and gasoline stations are seeking acid-resistant fabrics which will give better protection and safety to the worker and which will last longer. Tests have shown that Orlon answers these needs.

Men's shirts, both business and sports types, should last longer and be more easily washable in the home when made of Orlon, due to the fact that it is quick drying and needs no ironing. Shrinking will be a forgotten thing, since Orlon, like nylon, can be "heat set."

Decorative striping for the pin-stripes in men's woolen and worsted suits are, at the

present time, often made of acetate rayon. This fiber, however, has low strength and abrasion resistance. Orlon filament yarns, not colored by dye, would be an interesting substitute for acetate rayon in pin stripes, and would not have these disadvantages.

One of the greatest difficulties in making Orlon fiber was to find a suitable solvent for polyacrylonitrile. Materials now used are organic compounds with such complicated names as dimethyl methoxyacetamide, tetramethylene cyclic sulfone, and meta and para nitrophenols.

The name Orlon as applied to a fiber does not refer merely to a single fiber or yarn but rather to various types of Orlon acrylic fibers. All of these fibers possess many of the properties of the original Orlon but have also distinctive characterizations of their own.

Science News Letter, October 1, 1949

ASTRONOMY

Soviets Discover New Comet, Fifth This Year

➤ SOVIET astronomers bulletined to the world discovery of a new comet at the same time that President Truman announced an atomic explosion in the USSR.

The new comet, fifth this year, was discovered by Dr. P. Shajn of Simeis Observatory in the Crimea. It is too faint to be seen with the naked eye, being thirteenth magnitude, with a short tail.

The discovery was confirmed by Dr. D. J. Martynoff of Kasan Observatory, also in Russia, before it was reported to the Copenhagen clearing house for astronomical news and thence to Harvard Observatory for relaying to American observatories.

First American observation of comet 1949e was by Astronomer Ernest G. Reuning at the U. S. Naval Observatory at Washington Sept. 23.

Located in the constellation of Cetus, the Whale, the comet is high in the night sky near the point where the ecliptic crosses the equator. It is moving slowly south. (On Sept. 24, 5:18.5 GMT, R.A. 5 min. 48.4 sec. Dec. South 2 deg. 7 min. 32 sec.)

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