

## CHEMISTRY

# Nylon Used to Make Paper And Fabrics Water-Proof

## Chemical Material Made From Coal, Air and Water Now Used To Coat Leather to Produce "Patent Leather"

**A** NEW patent just issued by the U. S. Patent Office reveals that the new nylon material—chemical wonder made basically from coal and air and water—can be used to coat paper, leather, cloth and wire mesh to produce oilproof paper containers, a superior patent leather, long-wearing, flexible, water-proof clothing and a sturdy, transparent kind of window glass.

The new patent is No. 2,188,332 just issued posthumously to the late Dr. Wallace H. Carothers, chemist of the E. I. du Pont de Nemours & Co.; the man who obtained the basic patents on nylon. The patent is assigned to du Pont.

The new Carothers patent describes how to use the chemical material nylon in its new coating form. Paper impregnated with the chemicals, says the patent, was very greaseproof and "showed no visible penetration of a colored turpentine solution after 240 minutes of contact."

By pressing the chemicals, known as polyamides, into goat's leather a glossy finish was obtained that resembled patent leather but which resists wear and cracking, due to flexing, many, many times over ordinary patent leather.

Applied to cotton broadcloth the chemicals produced a flexible cloth that strongly resisted tearing and was water-proof.

When spread over wire mesh the materials formed a transparent, clear, strong "glass" transmitting ultraviolet light.

The nylon coating, with its greaseproof and water-proof properties, can be applied to "wire mesh, metal sheets, silk, artificial leather, regenerated cellulose, teal, duck and various papers," claims the Carothers patent. These bases for the coating can be in the form of sheets, filaments, foils, yarns or fabrics.

Nylon is the name coined for the chemical material which has now been developed from the Carothers patents of 1938. Nylon stockings, giving Japan headaches because they compete with silk stockings in looks but possess very superior wearing qualities, are the most

recent form in which nylon is now known to the public. But tooth brush bristles, fish line leaders, surgical thread for operations, and strings for tennis racquets are only a few other uses of this polyamide that is made from coal tar derivatives and comes basically from coal, air and water. (See page 106)

The polyamides used in this newest patent of Dr. Carothers is a combination of materials with jaw-breaking names. For some of his coatings, Dr. Carother's patent describes the material as being composed of a mixture of hexamethylene diammonium adipate and decamethylene diammonium sebacate.

Particularly stressed in the new patent for coating materials, is that films are very flexible, have exceptionally good adhesion to the base materials, are durable and possess very superior elastic qualities. It is this elasticity, in fact, which probably accounts for many of their superior qualities for it permits the coating film to expand and contract with the base materials at will. Most cracking of coating comes from lack of this ability.

When applied to paper in sheet form, or in containers, the nylon coatings offer possibilities of tapping a great field now served by the tin can and glass bottles industries, the packaging of greases and oils.

When applied to fabrics the new coating produces superior shower curtains, window shades, washable table cloths and rain coats.

On leather the coatings give the "patent leather" shine but without the objectionable cracking handicaps.

On wire mesh sheets of transparent material for windows are created.

*Science News Letter, February 17, 1940*

## CHEMISTRY

## Gas From Oil Refineries Important in Industry

**G**AS plays an important part in American industry, not just the kind of gas piped into our homes for cooking and heating, but gas by the millions of tons produced as a by-product of the gigantic petroleum industry.

Between 7 and 8 per cent by weight of the total crude oil processed in American refineries becomes gas—940,000,000 cubic feet a day, or 14,000,000 tons per year.

One company alone is making commercially more than a hundred synthetic chemicals from ethylene, propylene, and the butylenes in the refinery gases. Even drinkable and industrially useful ethyl alcohol is synthesized from cracked gas, a synthetic chemical invasion of the time-honored making of alcohol by fermentation. Other major chemicals similarly made are ethylene glycol, familiar as auto anti-freeze, and isopropyl alcohol, used to make the solvent acetone.

Bottled gas for cooling and heating in rural areas is compressed propane from refinery gases, a gas also important in manufacturing lubricating oils.

Latest use of refinery gases is for conversion into high octane fuels for automobiles and airplanes, promising more load-carrying with less fuel utilization.

*Science News Letter, February 17, 1940*

Scientists are ingeniously tagging all sizes of creatures, from moths to whales, to track their wanderings, and for starfish they find harmless blue dye most useful.



### RARE EVENT

*This view taken in the Hayden Planetarium of the American Museum of Natural History, shows the unusual line-up of five naked-eye planets that can be seen at the end of February for the first time in many lifetimes. Still another planet will be in the same location in the sky and may be seen with the aid of a small telescope. See map on facing page.*