

## 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.

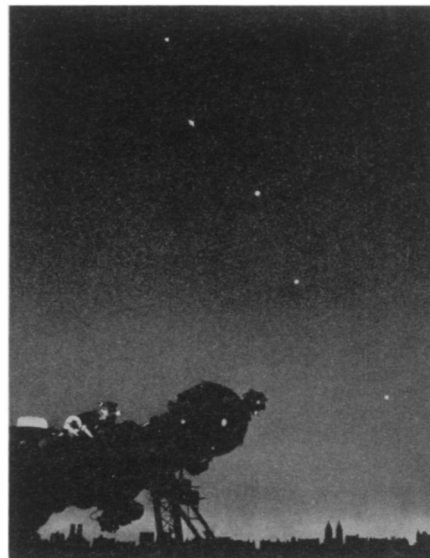
One company alone is making commercially more than a hundred synthetic chemicals from ethylene, propylene, and the butylenes in the refinery gases. Even drinkable and industrially useful ethyl alcohol is synthesized from cracked gas, a synthetic chemical invasion of the time-honored making of alcohol 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.

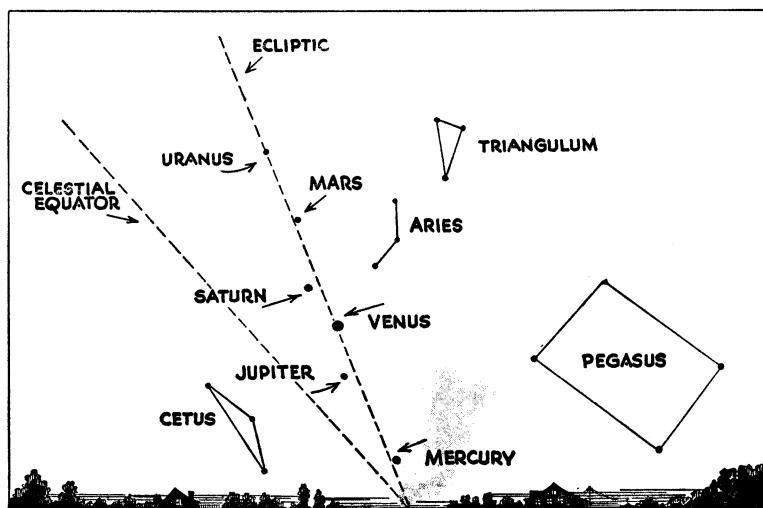
*Science News Letter, February 17, 1940*

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.*



WHERE TO LOOK

This map will aid you in identifying the various members in this month's stellar ballet. Mercury is hard to see because it is so close to the sun. Look low in the west just after sunset. From about Feb. 23 on for a few evenings you will be able to see it with bright Venus, Jupiter, Mars and Saturn. Uppermost will be Uranus, but you will need the aid of a telescope to see it. On Feb. 20 you can see a conjunction of the glorious Venus and Jupiter; they will be just a degree apart at sunset.

PHYSIOLOGY—PSYCHIATRY

## Lack of the B Vitamins May Cause Nervous Breakdown

### Fearfulness and Jittery Activity Found To Be Early Signs of Developing Pellagra; Permits Prevention

**N**ERVOUS breakdowns which transform strong, courageous men into weak, frightened creatures and drive over-tired women into constant, jittery activity are sometimes due to lack of the B vitamins, Drs. J. P. Frostig, of the University of California, and T. D. Spies, of the University of Cincinnati and Hillman Hospital, Birmingham, Ala., have discovered.

Discovery of the nerve-shattering effect of a diet lacking in these vitamins indicates that faulty diet widespread in a population may affect not only its health and strength but may break down its morale. It also provides a chemical approach to at least one group of nervous breakdowns.

The nervous symptoms which appear when the B vitamins are lacking in the diet give doctors the first signs by which they may diagnose pellagra, Drs. Frostig and Spies state. (*American Journal of Medical Sciences*, February.)

The nervous signs appear in patients who have no other symptoms of pellagra

and who might therefore be labeled neurotic or neurasthenic.

Doctors have long known that pellagra affects the nerves. Many pellagra patients in the past ended their days in insane asylums. The nervous symptoms which foretell an impending attack of pellagra, however, and which link vitamin lack with breakdown of morale, have apparently never before been noted as a sign of vitamin deficiency.

Regardless of what type of personality the patients normally have, when they begin to get pellagra, they all develop the same characteristics. They are restless, excitable, and easily frightened. Noises make them jump, odors bother them more than usual. They are tired but cannot sleep and are too "fidgety" to rest. They feel depressed and constantly expect some harm to befall them or their families. A brawny coal miner who liked to engage in prize fights said:

"I'm scared to death. If I see two men fighting with their fists, it seems to me that I will pass out."

Either of three parts of the vitamin originally known as B cures the condition. Chemically, these three B vitamins are known as thiamin, cocarboxylase, and nicotinic acid. They are all found in fresh meat, fresh vegetables, eggs, milk and yeast. When the nervous patients were given a dose of one of the three vitamins, they felt better within an hour, and within 24 hours neurological tests showed their nerves were reacting normally to touch, pain and the like.

While nervous symptoms had been seen in patients with pellagra, the exact relation between the B vitamins and nervous breakdown was established in a careful study of 60 pellagra patients here, with the support of the Rockefeller Foundation and the William C. Hogg Memorial Fund of the University of Texas.

## Lesson for Belligerents

**A** LESSON for the warring nations of Europe appears in these latest studies of pellagra patients in peaceful America. Leaders of the warring nations know the importance of keeping their armies and civil populations well nourished. But to Napoleon's famous dictum, "An army marches on its stomach," scientists now add that the kind of food, as well as the amount, is of paramount importance for morale as well as for health.

Strong men become weak—"shaky, weary and apprehensive"—even on full stomachs if they lack the B vitamins that protect against beri-beri, pellagra and similar nervous disorders. Long before beri-beri or pellagra develops to the point where other symptoms make the diagnosis clear, tell-tale nervous signs appear. In their report to fellow physicians, Drs. Frostig and Spies state:

"Nutritional deficiencies widespread in a population may not only weaken the strength, but may also break down the morale. Sub-clinical pellagra and beri-beri may be an important factor in the fighting morale of an army, supporting Napoleon's contention that 'an army marches on its stomach.'"

*Science News Letter, February 17, 1940*

A clay tablet found at Nippur shows some of the drugs and prescriptions used in Babylonia about 2600 B. C.

Popcorn that expands 20 times its size when popped will be considerably more tender than corn that expands only 10 times.