CHEMISTRY

'New Field of Chemistry' Offered by Compound

➤ A NEW CHEMICAL COMPOUND, reported for the first time in Madison, Wis., could lead to improved rubber in car tires as well as many improved forms of plastic. Its discovery may open up a whole new field of chemistry.

The compound, called perlithiopropyne, was synthesized by Dr. Robert West, University of Wisconsin professor of chemistry, and a graduate student at the university, Miss Priscilla A. Carney of Hyannisport, Mass. Miss Carney has recently discovered that the compound can be obtained in a solid form of red-brick color as well as in the previously acquired solution.

The new compound is unusual in that all four of its hydrogen atoms have been replaced with lithium atoms. Lithium, a light metal, is related to sodium and potassium in the alkali metal group. Lithium compounds are known for their reactivity. Because they react explosively with water and burst into flame when exposed to air, research must be carried on in an inert atmosphere such as one of argon or nitrogen gas.

Prof. West reported the discovery at an international symposium on organometallic chemistry. Perlithiopropyne is the first compound produced in which lithium replaces every hydrogen atom.

Perlithio compounds are expected to be used to produce not only car tire rubber but the plastics for squeeze bottles, films and food packaging materials. Research laboratories of oil and rubber companies are already studying possible applications.

The starting material was methylacetylene, which contains three carbon atoms and four hydrogen atoms. It reacts with one lithium atom to form a compound in which the lithium replaces one of the hydrogen atoms. The Wisconsin chemists found that, under the right conditions, this reaction continues until every one of the hydrogen atoms is replaced by a lithium atom, giving perlithiopropyne.

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PHYSICS

Cold Tin Sandwich Found To Send out Radio Waves

➤ AN EXTREMELY COLD "sandwich" made of tin will broadcast radar waves, scientists at the University of Pennsylvania have found.

The three-layer sandwich, microscopic in size, works only at temperatures near absolute zero, which is 459.7 degrees below zero F. The miniature microwave broadcasting "station" is formed by two layers of superconducting tin separated by a very thin sheet of tin oxide.

It sends out microwaves in a frequency range previously difficult to obtain. Radar waves at 9,000 megacycles have been detected from the tin sandwich at a power output of only a hundred-billionth of a watt.

Observations of the radiation and the recipe for the sandwich result from more than a year's study of what physicists call "Josephson junctions" at the University of Pennsylvania.

Development of the device, which may well provide a new kind of microwave generator for communications, is reported in Physics Today.

The ultracold tin sandwich should also help in development of new maser materials for the far infrared region, since radiation for studying these materials is now easily available. The device has, in addition, several potential applications in computers.

Drs. Donald N. Langenberg, Douglas J. Scalapino and Barry N. Taylor, with Robert E. Eck, performed the experiments. Related work has been done by I. K. Yanson, V. M. Svitunov and I. M. Dmitrenko of the Ukrainian Academy of Sciences.

Another possible application for the three tin layers is in the development of a "passive" radar that might detect objects by sensing the thermal radiation they reflect and emit. Such a radar system could not be jammed.

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ZOOLOGY

Desert Ground Squirrel Needs Blue for Life

➤ THE ANTELOPE GROUND SQUIRREL of the southwestern deserts looks at the world through built-in, yellow-tinted "sun glasses," but his very life may depend upon how he reacts to the color blue.

Dr. Joan Pollack, research zoologist at the University of California at Los Angeles, has conducted experiments with the striped desert animals to study their color vision.

The antelope ground squirrel has only one type of visual cell in its retina. This is the cone, which in human beings is involved primarily in color vision. The other type of visual cell found in the human retina is the rod and is primarily concerned with black and white.

The experimental ground squirrel has a yellow-tinted lens, presumably "prescribed" by nature to screen out ultraviolet in the bright sunlight of his desert habitat.

Dr. Pollack has demonstrated a marked response in the animal to blue light. "We have not been able to show a response to green or orange, the only two other colors we have tried," she says. "It is possible that the animal sees other colors, but we have no evidence of it yet."

The UCLA scientist speculated that discrimination of this color might be vital to the tiny ground squirrel in spotting its mortal enemy, the hawk, against the blue desert sky.

The star performer in the experiment, aptly named "Mr. Blue," responds to blue light 90% of the time in test runs. He is trained to respond to blue with a food reward. The blue light is randomly exchanged with other colors at either end of the test cage.

The experiment is part of a long-term study of the basic mechanisms of color vision.

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IN SCIENC

PUBLIC SAFETY

Pesticide Labels Will Not Compromise Safety

➤ PESTICIDES are either poisonous or safe for people and animals and the U.S. Department of Agriculture will have no "ifs, ands or buts" on labels, such as "safe when used as directed."

A new interpretation to provide greater protection to users of pesticides is reported in the Federal Register. The USDA declares in this statement that labels may say "nontoxic to humans and pets" if the request for such labeling is supported by specific data.

The data must show that no toxicity warning or caution statements are necessary on the product's labeling; an acceptable safety margin exists between dosages causing detectable poisonous effects and the dosages recommended for effective use; and experience has proved that humans and/or animals will not be injured by the chemical under any reasonably foreseeable circumstances.

Labeling bearing nonpoisonous claims must be printed in type bearing a "reasonable relationship" to other print on the label. By law, all pesticides moving across state lines must be registered with the Secretary of Agriculture.

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PUBLIC HEALTH

Virus From Sick Child Causes Cancer in Animals

➤ A VIRUS THAT CAUSES severe respiratory disease in children has caused cancer in hamsters.

Adenovirus type 3 has been estimated to affect well over 50% of the world's children before they are 10 years old. There is no evidence, however, that adenoviruses cause cancer in humans.

Scientists in Bethesda, Md., reported that five human adenoviruses have induced tumors in laboratory animals. These viruses fall into two distinct antigenic categories. Adenoviruses types 3 and 7 are common causes of respiratory diseases in man, but the other types, which are adenovirus 12, 18 and 31, have not been shown to cause much, if any, human disease.

The cancer-causing properties of adenovirus type 3 are of special concern, since infants and young children are especially susceptible to it.

These findings were reported in the Proceedings of the National Academy of Sciences, August 1965, by Drs. R. J. Huebner, M. J. Casey and R. M. Chanock of the National Institute of Allergy and Infectious Diseases, and by Dr. K. Schell of Microbiological Associates, Bethesda.

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E FIELDS

PHYSICS

Australian Bath Drain Has Clockwise Whirl

➤ THE SWIRL OF WATER leaving the bath drain has a clockwise whirl in Australia.

The long-held theory that water draining from a tub rotates clockwise in the Southern Hemisphere has been confirmed in experiments at the University of Sydney in New South Wales, Australia.

Five scientists there undertook tests of the direction of a drain's whirl in the Southern Hemisphere after scientists had confirmed a counterclockwise vortex for a draining tank in the Northern Hemisphere.

The difference in swirling directions is due to the coriolis force, which is very weak. Its effects are easily overwhelmed by slight temperature changes or by air currents.

One trick in scientifically determining the effect of the coriolis force is to let the water stand very still for at least 18 hours, preferably longer. It is also essential that no air currents disturb the water's surface and that the temperature remain constant throughout the experiment.

Such precautions helped the Australian scientists determine that "liquid drainage from a tank will show clockwise rotation" if careful experiments are done in the Southern Hemisphere. Details of their tests were reported in Nature, 207:1084, 1965.

The coriolis effect results from the fact that any object moving above the earth with a constant velocity is deflected relative to the surface of the earth, to the right in the Northern Hemisphere, to the left in the Southern Hemisphere.

The Australian scientists who reported the experiments are Lloyd M. Trefethen, R. W. Bilger, P. T. Fink, R. E. Luxton and R. I. Tanner, all of the University of Sydney.

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DENTISTRY

Do-It-Yourself Denture Repairs Prove Costly

➤ ATTEMPTS to tighten loose dental plates with over-the-counter preparations should be avoided. Harm to the mouth may be irreparable.

This is the advice of a team of dental professors at the University of Ohio, Columbus, who reported what happens in the Journal of the American Dental Association September 1965.

Ill-fitting dentures can even cause cancer, the researchers warn. A spreading malignancy, which was painless, was discovered by a California dentist in the lower part of a patient's mouth. The patient had been using a home method reliner on his denture, which had a bulky edge in the region of the cancer. He was entirely unaware of the malignancy, and had come to the dentist only because the denture had broken.

A 22-year-year-old man who came to the University dental clinic asking to have two "missing front teeth bridged in below" had been gluing his upper denture together every week since it had broken nine months previously. He had to use increasing amounts of adhesive powder to retain the denture, but he was pleased with his "corrections." A benign growth of a type that might have become cancerous was found on the man's hard palate, however, making considerable dental work necessary before the dentist could proceed with the bridging of the front teeth.

"A longer than normal wearing period for complete dentures is encouraged by the sale of over-the-counter denture adhesives, cushions, pads, reliners and repair kits," the Ohio researchers said.

Drs. Julian B. Woelfel and Chester M. Winter, with Robert L. Curry, reported the study.

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NEUROLOGY

TV Distortion Compared To Symptoms of Palsy

➤ WHY BRAIN SURGERY for Parkinson's disease, or shaking palsy, relieves the symptoms of tremor has been explained in Vienna by a comparison with television sound and picture distortion when an airplane passes overhead.

Dr. Raymond N. Kjellberg of the Harvard Medical School and Massachusetts General Hospital, Boston, said that surgery, which may involve electric currents, chemicals or radiation probes, reduces the size of the thalamus, the mass of tissue at the base of the brain that relays sensation and other stimuli to the cerebral cortex.

The analogy of the television receiver and the aircraft illustrates that there is no disorder in either the brain or the TV set, but that informaion items or bits are "indiscriminately scattered into motor performance in a nonuseful way."

By reducing the size of the thalamus, Dr. Kjellberg believes the rejection function is no longer overloaded and thus there is no overflow of digital information bits.

"The traditional explanation," Dr. Kjellberg said, "attributes these abnormal movements to a so-called extrapyramidal motor system which assumes that deep in the brain there exists a hidden place, a tremorgenic (tremor-starting) zone, from which emerge abnormal impulses that cause certain persons afflicted with Parkinson's or other similar diseases to stiffen, shake, twist, etc."

The thalamus may store information in terms of billions of digital ("on" or "off") bits such as learned skills, alarm stimuli and emotional responses, all of which influence motion control. If the thalamus, however, is unable to decode the information supplied to it, and rejects it, nonuseful information is passed on.

Dr. Kjellberg, who is a neurological surgeon, reported the new proposition at the eighth meeting of the International Congress of Neurology in Vienna.

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GENERAL SCIENCE

Three Space Scientists Receive Prize for Work

➤ THREE INTERNATIONALLY known space scientists received the Smithsonian Institution's Hodgkins prize during a symposium on aeronomy held at the Smithsonian Astrophysical Observatory in Cambridge, Mass.

The awards were presented to Dr. Sydney Chapman of the Geophysical Institute of the University of Alaska for joining theoretically the sun's atmosphere to the earth's atmosphere and for discovering relationships between the earth's magnetic field and the high atmosphere; to Dr. Joseph Kaplan of the department of physics of the University of California at Los Angeles for inspiring laboratory experiments that have opened the way to increased understanding of the observed radiations from the upper atmosphere; to Prof. Marcel Nicolet of the National Center for Space Research in Brussels, Belgium, for major contributions to the understanding of chemical radiative and diffusion phenomena in the high atmosphere. All three men were cited for their contributions to the International Geophysical Year (IGY), which was held from July 1, 1957 to Dec. 31, 1958.

The presentations were the first in 39 years, having been given only twice before in history, once in 1899 and again in 1902.

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CHEMISTRY

Wood Alcohol Seen As Electricity Source

➤ ELECTRICITY in the future may be produced efficiently and quietly by a fuel cell that operates on methanol or wood alcohol.

Dr. K. R. Williams, head of the Electrochemical Research Division of Shell Research Ltd., told the British Association for the Advancement of Science in Cambridge, Eng., that it is now technically possible to make electrical power units in which methanol is the chief liquid fuel. Either methanol may be converted to hydrogen, which is then fed to a hydrogen-air fuel cell, or the methanol may be used directly in a suitable low-temperature fuel cell. Presently the amount of platinum metals used in such fuel cells limits their utilities.

A special fuel cell was used as a power source in the recent Gemini flight.

Fuel cells are one of the chemical methods of storing energy, said Dr. A. B. Hart and P. S. K. Eaves of Britain's Central Electricity Research Laboratories. They discussed the principles of energy storage and its relevance to the major fuel and power industries. By converting energy into forms more conveniently stored and utilized and more conveniently exported by the consumer, the endeavor in the future will be to make electricity more effectively available. Some of the storage states for energy are heat, pumped water and compressed air.

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