# Physical Sciences Notes

BIOCHEMISTRY

## Low Temperature Purine Creation

New evidence suggests that the formation of life may have begun at quite low temperatures—about 14 degrees F.

Reporting to the American Chemical Society convention in Miami Beach, Dr. James P. Ferris of the Salk Institute for Biological Studies in San Diego said that low temperatures were found to be necessary for the producton of purines from weak solutions of hydrogen cyanide. Purines are one of the three critical groups of compounds present in living cells.

Many scientists believe that the earth's atmosphere in early times contained mostly methane in addition to nitrogen and water. When this mixture is subjected to electric discharges, hydrogen cyanide, cyanoacetylene and cyanogen are formed.

With concentrated solutions of these compounds, it is possible to form purines. But the solutions present at the time life was formed are believed to have been very dilute.

Dr. Ferris discovered that the necessary concentrations could be built up through freezing and thawing processes in the temperature range of about 14 degrees F.

MATERIALS RESEARCH

## Photochromism for Computers

Photochromic materials, which change color upon exposure to ultraviolet light and then return to their original color when the light source is removed, have potential value for the development of computers in the future.

Such materials could be used to store information because they can be changed from one color to another by visible light. A color memory for a computer has the advantage of being potentially very compact, so that millions of bits of information could be stored in one square inch. This is possible because the color change for some compounds is a molecular phenomenon.

Dr. S. M. Rubens and his co-workers in the UNIVAC Division of Sperry-Rand Corp., St. Paul, Minn., reported details of their search for improved photochromic materials to the Optical Society of America. Their studies show that halogenated salicylidene anilines were strongly photochromic.

PHOTOSYNTHESIS

## Gap in Understanding Narrowed

The mysterious process of photosynthesis is closer to solution because of studies of fluorescence in plant chlorophyll at the University of Illinois.

Dr. Eugene Rabinowitch and his colleagues reported to the American Chemical Society meeting in Miami Beach that light energy is absorbed in the chlorophyll of a plant's leaves apparently in two sequential steps. The production of the enzymes necessary to extract hydrogen from water occurs between the steps. Hydrogen must be present to allow the sequence of reactions by which a plant turns carbon dioxide into sugars.

PHYSICAL CHEMISTRY

## Research in Corrosion Prevention

Corrosion is a major problem, plaguing modern industry to the tune of billions of dollars annually for maintenance and replacement of equipment.

Scientists at the National Bureau of Standards have for many years been studying how, why, when and where corrosion occurs. An important area of this research has been the investigation of the formation of a protective film over a metal, such as iron.

Now, Dr. Jerome Kruger and Joan P. Calvert have devised a new technique for studying this film growth in the first few tenths of a second after it occurs. They followed film growth using the optical method of ellipsometry, which gives a direct, nonelectrochemical measure of film thickness.

INFRARED CYROGENICS

## Deep Cold Analysis of Air Pollution

A refinement of infrared gas analysis with application to air pollution control was described April 12 at the American Chemical Society convention in Miami Beach.

The process, according to Dr. Mark M. Rochkind of the Bell Telephone Laboratories, involves low temperature equipment available to chemistry laboratories.

Gas samples would be treated with infrared light and observed to see how the energy is absorbed. Each chemical substance has a unique way of absorbing such energy, depending on its molecular structure.

At normal temperatures, the energy absorption patterns are complex and difficult to interpret. But at minus 423 degrees F, the molecules are slowed down to the point that their absorption patterns are much simpler.

Patterns for hundreds of chemicals could be stored in a computer. Quick analysis of local air conditions could be fed into a central facility to keep a running check on pollution problems at various locations.

According to Dr. Rochkind, the technique could also be used to analyze atomsphere of other planets. The simplicity of the data would make it easy to relay the information back to earth from a space probe sent to land on, or orbit, another planet, he says.

ACOUSTICS

## Fish Hearing Likened to Human Smell

As far as telling the location of a sound source is concerned, a fish is in about the same predicament as a man trying to determine the source of an odor, the Acoustical Society of America meeting in New York was told by Prof. Willem van Bergeijk of the Center for Neural Sciences at Indiana University.

Because humans have only one nose, the only way they can detect the direction of a smell is by "sniffing it out," trying here and then there until stumbling upon the source. Dr. van Bergeijk believes fish have the same problem locating the direction of a sound since fish have only one middle ear.

Fish can locate a sound source if they are close to it, but they do this through their lateral line—tiny sensory buds spread over the body—sensitive not to sound but to the small water currents near the sound source, such as those caused by a wriggling worm.