physical sciences notes

PHYSICAL CHEMISTRY

Dense Gas Chromatography

The properties of dense gases can range continuously between the extremes of ordinary liquids and ideal gases. Since liquids are approximately 1,000 times denser than gases at atmospheric pressure, compression of gases to roughly 1,000 atmospheres yields fluids whose properties are liquid-like.

Working at pressures of up to 2,000 atmospheres, more than ten times higher than in previous gas chromatography, three scientists from the chemistry department of the University of Utah have used the solvent power of dense gases to separate for chromatographic studies substances having molecular weights as high as 400,000.

Carotenoids, corticol steroids, sterols, amino acids, carbohydrates and several polymers have been caused to migrate, and been detected in ammonia and carbon dioxide carrier gases at temperatures of 140 and 40 degrees C., just above their respective critical points.

Dense gas chromatography will probably prove even more useful in the future for studies of materials difficult to separate by previous methods, Drs. Lilian McLaren, Marcus N. Myers and J. Calvin Giddings predict in the Jan. 12 SCIENCE.

RADIO PHYSICS

Radiation of Satellite Antennas

Antennas carried by both rockets and satellites are frequently used to make measurements within the earth's atmosphere, so scientists need to know how the ionosphere affects the radiation and other properties of antennas.

Dr. A. D. Wunsch of Harvard College Observatory has devised a formula for calculating the radiation properties of a dipole antenna placed perpendicular to the magnetic field in an ionized medium. He reports in Harvard College Observatory's Reprint 750 that for low frequencies the radiation resistance decreases as the antenna becomes longer, while for high frequencies, the reverse is true.

MICROSCOPY

Infrared Color Photography

Microscopists trying to view microorganisms in their natural habitat, such as soil or marine muds, have difficulty because of their inability to distinguish between microorganisms and other particles of similar size.

Dr. L. E. Casida Jr. of Pennsylvania State University's department of microbiology has devised a way to overcome discrimination difficulty by using Ektachrome Infrared Aero film, type 8443, to photograph unstained organisms as wet mounts in their natural habitats. The procedure can be used for either living or dead microorganisms, he reports in the Jan. 12 SCIENCE.

The material to be examined is either suspended in water on a microscope slide and covered, or allowed to dry on the slide before resuspension and covering. The slide is photographed through a microscope having apochromatic objectives and a 12-volt conventional light source, with a green filter placed in the light path beneath the condenser.

Bacteria in the color transparencies appear in red "false" color, while all other inorganic and organic materials appear in contrasting false colors. The technique, Dr. Casida notes, "presents interesting possibilities beyond its use for ecological studies of soils and comparable environments."

OPTICS

Normal Foveal Center Found Blind to Blue

Nearly centered on the visual axis of the human eye is a shallow depression in the retina known as the fovea, which can measure up to one and a half millimeters in diameter. It contains some 10,000 cone receptors concentrated toward the center, and rod receptors in its outer parts.

Many of the cone receptors are blue sensitive, but experiments by Nobelist George Wald of Harvard University show that virtually all of the cones in the very center of the fovea are insensitive to blue light. In the wavelength interval from 4,000 to 5,000 angstroms, he found, the foveal center is only about one-seventieth as sensitive as it is just slightly off center.

Dr. Wald's explanation, reported in the January SKY AND TELESCOPE, is that the eye avoids using shorter wavelength light. The foveal center governs the eye's fixation, on which depends the orientation of each eye, the alignment of both eyes in binocular vision and depth estimation.

Dr. Wald suggests that some congenital forms of color blindness might result, not from lack of one or another of the color vision pigments, but from the expansion of the normally color blind zones.

OPTICS

Luminescent Properties of Rocks

Two British scientists who have studied the luminescent properties of rocks bombarded by protons from the Atomic Energy Research Establishment's synchrocyclotron at Harwell have found that granites show an intense red thermoluminescence at 140 degrees below zero C.

The observations suggest an explanation of the transient red glow seen on regions of the moon believed to be prone to upheavals. In such active regions, cold subsurface granites could sometimes be suddenly exposed to solar radiation, Drs. I. M. Blair of the Harwell Establishment and J. A. Eddington of the University of London report in the Jan. 13 NATURE.

The sudden exposure to solar radiation could cause granitic material to luminesce, thus accounting for the lunar red flashes.

EDUCATION

New Magazine of Popular Astronomy

PLANETARIUM is the title of a new magazine of popular astronomy. The illustrated, 28-page quarterly is published from the Armagh Planetarium in Ireland.

The first issue includes articles on satellite tracking, Saturn's new moon, Leonid meteors and galaxies, as well as star maps and book reviews. The magazine is edited by Patrick Moore of The Planetarium, Armagh, Northern Ireland.