CHEMISTRY

Free Radicals' Energy

➤ STUDIES of free radicals in the infrared region of the spectrum are being made by Dr. George C. Pimentel and his colleagues at the University of California at Berkeley.

In addition to their importance in technology dependent upon high temperatures, it has been suggested that free radicals, trapped and frozen, may, upon warming, provide a new energy source in the future.

Free radicals are fragments of molecules born when stable molecules are torn apart by great heat, by interaction with light and even by some of the chemical reactions taking place in plants and animal bodies.

"Chemists know relatively little about these transitory and unstable chemical species," Dr. Pimentel states. "Most of what we know is based on a knowledge of what we put into a chemical reaction and what we get out. What happens in between, where free radicals are formed, we fill in with what we hope are shrewd inferences. The spectral study of free radicals opens the way to direct observation of these 'in-between' steps."

Dr. Pimentel produces free radicals by passing gas through an electrical discharge tube, then freezing the molecular fragments at the temperature of liquid helium, minus 452 degrees Fahrenheit. Scientists at other laboratories, using the same freezing technique, have studied free radicals in the visible and ultraviolet spectrum.

Dr. Pimentel, however, has made successful studies in the infrared. This is a more difficult experiment, but the results are more easily interpreted, hence more rewarding. Dr. Pimentel has deduced a complex chain of intermediate chemical reactions on the basis of identification of free radicals studied in the infrared.

The infrared data provide a wealth of information about the geometry of the atomic arrangement and the bond strengths of the free radicals. The work points a new direction for the study of free radicals.

By gathering the basic data about free radicals, scientists can hope to bring about improvements in the efficiencies of high temperature systems.

Dr. Pimentel's colleagues include Drs. Eric Whittle, David Dows, Edwin Becker, and Matthias Van Thiel.

Other pioneering researchers on free radicals include Dr. George Porter of Sheffield University in England, Dr. Paul Giguere of Laval University in Quebec, Dr. F. O. Rice of Catholic University in Washington, D. C., and Dr. Herbert Broida of the National Bureau of Standards, Washington, D. C.

Science News Letter, May 11, 1957

BIOLOGY

Brain Wave Timer Found

➤ BRAIN WAVES, the electrical discharges which are continually given off by the human brain, are timed by an as yet unidentified "pacemaker" deep in the brain and between the two halves, researchers at the University of California Medical Center in San Francisco have reported.

Evidence of this pacemaker, believed to lie in or near the hypothalamus or brain stem, came from studies of brain waves made with an oscilloscope and a high speed camera. This technique can detect differences as slight as a thousandth of a second in the timing of discharges from the left and right halves of the brain surface.

It has been believed that a disturbance caused by a localized area of damage in the brain tissue might spread to other parts of the brain by direct communication between the two halves of the brain. But the high speed camera has shown the disturbance seems to spread indirectly, through the damaged area's effect on the pacemaker.

Ink tracings of brain waves made by an electroencephalograph (EEG) almost always look the same whether they are taken from the right side or a corresponding point on the left. Even when disease or brain damage produces abnormal EEG tracings, the abnormalities are usually similar and simultaneous on both sides of the head.

The major exception is in patients with a localized lesion such as a tumor, abscess or scar. The tracings from a point just over these will usually be unlike that from a corresponding point on the other side, but other more generalized EEG disturbances usually exist at other points on the skull and these are usually the same on both sides.

The high speed camera showed that in many of these patients the abnormal "spiking" of the tracing happened at the same instant on both sides, rather than the diseased side spiking first and touching off the other side, as had been expected.

The research was done by Drs. Robert P. Aird and Bill C. Garoutte, of the University, and Dr. Thoma E. Ogden now in the U. S. Army.

Science News Letter, May 11, 1957

SEISMOLOGY

Ground Differences Affect Quake Shaking

➤ DIFFERENCES in ground structure at locations less than one mile apart can affect the amount of shaking after earthquakes, the National Academy of Sciences meeting in Washington was told.

Dr. B. Gutenberg of California Institute of Technology reported that on the soft silt known as alluvium, strong shaking lasts a few times as long as on crystalline rock. Usually, he said, strong shaking from any one earthquake decreases with decreasing thickness of the alluvium.

His findings are based on comparisons of readings taken from five identical seismographs placed at about 20 locations near Pasadena with those from the Institute's Pasadena Seismological Laboratory.

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