

Herbert S. Gutowsky

Herbert S. Gutowsky (November 8, 1919 - January 13, 2000) was an American chemist who was a Professor of Chemistry at the University of Illinois at Urbana-Champaign. His pioneering work made nuclear magnetic resonance spectroscopy one of the most effective tools in chemical and medical research.

Birth and education

Herbert S. Gutowsky was born on November 8, 1919, on a produce farm in Bridgman, Michigan. He was the son of Otto and Hattie Neyer Gutowsky. He claimed that his childhood experiences taught him the importance of hard work, which carried over to his scientific life. He was a quiet, kind and thoughtful man who focused on science and who worked very closely with all his research associates. He was also an avid bicyclist in his early life, and also bird-watcher who later became very interested in growing roses in his own garden.

Gutowsky received a bachelor's degree from Indiana University in 1940, and after a four-year interruption for military service, he was awarded a master's degree from UC-Berkeley in 1946. Gutowsky earned his Ph.D. in chemistry from Harvard University under George Kistiakowsky.

Academic career

He joined the faculty of the University of Illinois at Urbana-Champaign in 1948. He became a full professor in 1956. His research interests as a young faculty member included molecular and solid-state structure by infrared (IR) and radio frequency spectroscopy, including both nuclear magnetic resonance and electron paramagnetic resonance.

Research on Nuclear Magnetic Resonance

Herbert S. Gutowsky was the first to apply the nuclear magnetic resonance method to chemical research. His experimental and theoretical work on the chemical shift effect and its relation to molecular structure has provided the chemist with working tools to study molecular conformation and molecular interactions in solutions. Gutowsky's pioneering work on the spin-spin coupling effect developed this phenomenon into a 'finger print' method for the identification and characterization of organic compounds. He was also the first to observe the effect of dynamic processes on the lineshape of high resolution nuclear magnetic resonance spectra, and exploited it for the studies of hindered rotation in molecules. Simultaneously with others he discovered the effect of the scalar and dipolar interaction with unpaired electrons in solutions of paramagnetic ions^[1].

He was awarded the Wolf Prize in Chemistry in 1983/84 for "his pioneering work in the development and applications of nuclear magnetic resonance spectroscopy in chemistry"^[2]. More specifically, the latter prize committee cited explicitly his truly outstanding physical chemistry research results as follows: "*Professor Herbert S. Gutowsky was the first to apply the nuclear magnetic resonance method to chemical research. His experimental and theoretical work on the chemical shift effect and its relation to molecular structure has provided the chemist with working tools to study molecular conformation and molecular interactions in solutions. Gutowsky's pioneering work on the spin-spin coupling effect*

developed this phenomenon into a 'finger print' method for the identification and characterization of organic compounds. He was also the first to observe the effect of dynamic processes on the lineshape of high resolution nuclear magnetic resonance spectra, and exploited it for the studies of hindered rotation in molecules, Simultaneously with others he discovered the effect of the scalar and dipole-dipole interaction with unpaired electrons in solutions of paramagnetic ions."

Later years

He became head of the Department of Chemistry at the University of Illinois at Urbana-Champaign in 1967, and in 1970 he oversaw the creation of the School of Chemical Sciences, which included the departments of chemistry and chemical engineering. He served as Director of the School of Chemical Sciences from 1970 to 1983.

During 1976--1986 he published in collaboration with a photosynthesis research group in the Biophysics Department the results of a series of NMR, fluorescence, pulsed light/oxygen evolution studies of biomembranes-- including photosynthetic plant membranes/thylakoids^[3] ^[4] ^[5] and living, green algae^[6] --investigating the complex physico-chemical mechanisms of photosynthesis involving Mn^{+2} , Mn^{+3} , Cl^- and Br^- ionic effects in photosynthetic oxygen evolution and photosynthetic water oxidation by photosystem II (PS-II) in the oxygen evolving complex (OEC)^[7].

After 1983 he focused on teaching and research, moving into a 'third research career' in Fourier-transform microwave spectroscopy studies of small, weakly bonded molecules in the gas phase. He died on January 13, 2000 in Urbana.

References

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External links

- Biography of Herbert S. Gutowsky (http://chemistry.illinois.edu/about/illini_chemists/Herbert_Gutowsky.html)
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