Herbert S.Gutowsky

Herbert S. Gutowsky	
 Professor Herbert S. Gutowsky, Member of the US National Academy of Sciences	
Born	November 8, 1919 Bridgman, Michigan
Died	January 13, 2000 Urbana
Citizenship	USA
Nationality	USA
Ethnicity	US
Fields	Nuclear magnetic resonance
Institutions	University of Illinois at Urbana
Alma mater	Harvard University
Doctoral advisor	George Kistiakowsky
Doctoral students	35
Known for	Solid-state NMR and NMR spectroscopy
Notable awards	Kistiakowsky prize, Wolf prize, Irving Langmuir prize, Peter Debye prize, Member of the National Academy of Sciences, USA.

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 photosytem 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.

Other Heads, Department of Chemistry, University of Illinois

Head	Years of Service	Years
A. P. S. Stewart	1868-1874	6
Henry A. Weber	1874-1882	8
William McMurtrie	1882-1888	6
J. C. Jackson	1888	1
Arthur W. Palmer	1889-1904	15
Harry S. Grindley	1904-1907	3
William A. Noyes	1907-1926	19
Roger Adams	1926-1954	28
Herbert E. Carter	1954-1967	13
Herbert S. Gutowsky	1967-1983	16
Larry R. Faulkner	1984-1989	5
Gary B. Schuster	1989-1994	5
Paul W. Bohn	1995-1999	5
Steven C. Zimmerman	1999-2000	1
Gregory S. Girolami	2000-2005	5
Steven C. Zimmerman	2005-	

See also

- Charles Pence Slichter
- Nuclear magnetic resonance
- Chemical shift
- Knight shift
- Relaxation
- J-coupling
- Dynamic nuclear polarisation
- NMR spectroscopy
- Carbon-13 NMR
- Deuterium NMR
- 2D-FT NMRI and Spectroscopy
- Solid-state nuclear magnetic resonance
- NMR spectra database
- In vivo magnetic resonance spectroscopy

External links

- Biography of Herbert S. Gutowsky [8]
- Herbert S. Gutowsky and NMR Spectroscopy [9]
- Nuclear Magnetic Resonance in Physical Chemistry [10]

References

[1] Research on Nuclear Magnetic Resonance by Herbert S. Gutowsky (http://www.wolffund.org.il/full.asp?id=47)
[2] The Wolf Prize in Chemistry (http://www.wolffund.org.il/cat.asp?id=15&cat_title=CHEMISTRY)
[3] http://www.pnas.org/cgi/content/abstract/81/12/3713?ck=nck
[4] NMR study of chloride ion interactions with thylakoid membranes. PNAS, June 1, 1984, vol. 81, no. 12, 3713-3717, I. C. Baianu, C. Critchley, Govindjee and H. S. Gutowsky
[5] http://www.life.illinois.edu/govindjee/pubschron.html W.J. Coleman, I.C. Baianu, H.S. Gutowsky and Govindjee (1984) The Effect of Chloride and Other Anions on the Thermal Inactivation of Oxygen Evolution in Spinach Chloroplasts. In: C. Sybesma (ed.) Advances in Photosynthesis Research, Martinus Nijhoff/Dr. W. Junk Publishers, Den Haag, pp. 283-286
[6] http://www.life.illinois.edu/govindjee/pubschron.html Govindjee, I.C. Baianu, C. Critchley and H.S. Gutowsky (1983) Comments on the Possible Roles of Bicarbonate and Chloride Ions in Photosystem II. In: Y. Inoue, A.R. Crofts, Govindjee, N. Murata, G. Renger and K. Satoh (eds.) The Oxygen Evolving System of Photosynthesis. Academic Press, Tokyo and San Diego, pp. 303-315
[7] http://www.life.illinois.edu/govindjee/pubschron.html C. Critchley, I.C. Baianu, Govindjee and H.S. Gutowsky(1982) The Role of Chloride in O2 Evolution by Thylakoids from Salt-tolerant Higher Plants. Biochim. Biophys. Acta 682: 436-445.
[8] http://chemistry.illinois.edu/about/illini_chemists/Herbert_Gutowsky.html
[9] http://acswebcontent.acs.org/landmarks/landmarks/noyes/gutowsky.html
[10] http://planetphysics.org/?op=getobj&from=books&id=290

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