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Obituary: Earl A. Gulbransen

Earl Gulbransen was born on January 20, 1909, and died 82 years and 8 months later on September 15, 1992. He was privileged to enjoy a long life in which he embraced, with enthusiasm, the arts and music, his family, travel, and his professional career. A well-rounded person, he understood the need for contrast in relaxation and this perhaps helped him to remain active and productive well into his 82nd year.

Earl was educated at Washington State University where, in June 1931, he obtained his B.S. in Chemical Engineering with honors and with minors in Physical Chemistry and Mathematics. He then obtained his Ph.D. in Physical Chemistry from the Department of Chemistry at the University of Pittsburgh in August 1934. During this time he assembled the first precision adiabatic differential calorimeter in the United States. He subsequently received a National Research Council Postdoctoral Fellowship in Physical Chemistry and used this to work in the Department of Chemistry at the University of California, Berkeley, which was then headed by G. N. Lewis. Later he moved to Tufts University in Medford, Massachusetts, to the Department of Chemical Engineering where he used mass spectrometry to measure the abundance ratios of C^{12} and C^{13} of naturally-occurring carbon compounds. This pioneering work provided one of the foundations for the use of C^{12}/C^{14} ratios in radiodating for archeology.

In 1940, Earl left Tufts and returned to Pittsburgh to begin his career with Westinghouse. The move was prompted by the difficulty in obtaining research funding in the university environment (apparently a chronic situation that has survived to the present time!), and caused him to address problems of a more practical nature, which he did while maintaining a strict fundamental approach that resulted in important developments and results.

By no means a completely theoretical person, Earl showed his practical strength by designing, developing, and using the well-known "Gulbransen balance" and pioneering the application of electron diffraction and electron microscopy to the study of oxide films formed on metal surfaces. He concentrated primarily on gas–metal reactions which he approached using

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both thermodynamic analysis and kinetic theory to interpret his results in terms of reaction mechanisms.

His subsequent work involved the first concentrated studies of the oxidation of solids that generated gaseous reaction products. This produced new understanding of these systems and of the important consequences in their technological application. Particularly, his work on the oxidation of carbon demonstrated this and was illustrated so tragically some 30 years later in the Chernobyl disaster when the carbon moderators of this nuclear reactor burned out of control. The theme of volatile reaction products was pushed further in his studies of refractory metals as part of the then-current search for systems capable of bearing loads at very high temperatures. A search which continues today.

The nuclear-power interests of Westinghouse caused part of Earl's work from the late forties to the late sixties to concentrate on the behavior of zirconium and its alloys. This 20-year effort produced 25 papers and solved many technical problems but left him decidedly skeptical about the use of these alloys as canning materials in nuclear reactors and he voiced his concerns continuously. The Three-Mile-Island incident was an example of his fears being realized. This was ironical, he had previously applied for funds to study this reaction and had been turned down on the grounds that there was already sufficient understanding of these systems!

In more mundane areas, the same careful application of experimental techniques and interpretation resulted in better, brighter, and less-expensive incandescent lamps with longer life.

Earl supported his chosen profession by joining many relevant societies and attending their meetings at national and local levels usually presenting papers of substance on these occasions, eventually receiving major awards from the Institute of Metals, the Electrochemical Society, and the National Association of Corrosion Engineers. He was an attendee of the first conference, from which the Gordon Conferences emerged, held under spartan conditions on Herrs Island, living and sleeping virtually in the open air. Since that time, he attended almost all of the Gordon Conferences on Corrosion being Chairman of the Metals Conference in 1952 and of the Corrosion Conference in 1955, but being, ironically, prevented by his health from attending the fiftieth anniversary in 1991. His affiliations with colleagues throughout the world took him to meetings in Canada, England, France, Japan, Norway, Sweden, Switzerland, and the USSR as well as throughout the USA.

Throughout his professional career Earl derived pleasure from his work, just as he took delight and satisfaction in seeing it result in benefits for all. Always approachable and helpful, it was fitting, as he retired from Westinghouse in 1974, that he should join the University of Pittsburgh, his

Alma Mater, as Research Professor within the high-temperature oxidation research group of the then Department of Metallurgical Engineering.

Earl revelled in being a University Professor, as if he had returned to his natural element. He took part in as many academic activities as he could find. He gave graduate courses, contributed strongly to research groups, and sat on final examinations for graduate degrees. His attendance at department seminars, for instance, was probably unmatched in frequency and regularity throughout the department. He enjoyed the variety of topics in the seminars and his hallmark at such meetings was to pose simple questions of a fundamental nature that went to the very root of the matter and, occasionally, placed the hapless lecturer with his back to the wall. He was also a compassionate, patient, and willing advisor, particularly to students, always finding time to discuss their problems and concerns and bring new insight to the projects from his own vast experience.

Earl was a well-rounded person with a love of the arts and devoted to his family. He lived a very full and active life applying the same characteristic tenacity to leisure pursuits as he did professionally. As a scientist, he upheld the highest standards of quality in his work, he pursued accuracy of measurement and interpretation without compromise, and his work stands as an example to us all.

Earl Gulbransen will be sorely missed by his colleagues, family, and friends, all of whom are fortunate to have been able to benefit from his long and fruitful life. At this time our own thoughts turn to offering sympathy and support to his wife, Margery, who supported him so completely and selflessly throughout their lives together. She, their family, and all of Earl's friends and colleagues can take some comfort in the knowledge that his name and achievements are preserved in the most enduring and powerful form, that of print, having run the gauntlet of peer evaluation and, more severely, of time.

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