D_m = oxygen diffusivity through the membrane
F = Faraday's constant
I = current
k = electrode time constant
K = thermal death rate constant
n = number of electrons
N = number of viable cells
p_m = permeability coefficient of the membrane
q = specific oxygen consumption rate
t = time
T = temperature
Δt = time elapsed between oxygen concentration measurements
V_p = volume of agar particles
x = cell concentration being used in the experiment
X_b = cell concentration in agar particles

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In memoriam . . .

ROBERT L. PIGFORD
1917-1988

Professor Robert L. Pigford died on August 4th after suffering a stroke on May 14th from which he never recovered. He was 71 years old and a long-time resident of Newark, Delaware.

He was born and raised in Meridian, Mississippi. He earned his BS degree in chemical engineering from Mississippi State College in 1938, his MS and PhD degrees from the University of Illinois. His next six years were spent in the Engineering Research Laboratory at the DuPont Experimental Station, working on both civilian and military research problems, the latter arising from World War II. With his industrial colleagues, he participated in what was to become one of the national centers for a renaissance in engineering education, in which the group replaced approximate analyses guided by experiment with careful, quantitative models of the chemical and physical processes being considered. Dr. Pigford's association with the University of Delaware began shortly after his arrival in Delaware when he began organizing these new analyses into evening and week-end courses for chemical engineering students on the campus. One result of this activity was a textbook, *Application of Differential Equations to Chemical Engineering Problems*, which he coauthored with the late W. R. Marshall. In 1947 Allan Colburn prevailed upon Bob Pigford to come to the University on a full-time basis as chairman of the fledgling department of chemical engineering. His association with the University of Delaware spanned more than thirty years. From 1966 to 1975 he served on the faculty at the University of California, Berkeley.

He was one of the earliest proponents of the use of computers in engineering and built several for both instruction and research before the widespread availability of such machines. His colleagues remember the numerous hurdles he had to overcome to convince conservative administrators of the need for these expensive new tools of science and technology.

His advice was sought by numerous industrial, academic and governmental institutions. He served as a member of the U.S. Army's Advisory Council, the Scientific Advisory Board of the U.S. Air Force, the Department of Energy and the National Research Council, as well as being a member of the Advisory Committees for Chemical Engineering at Princeton University and Massachusetts Institute of Technology. He received virtually all the national awards of the American Institute of Chemical Engineers and served as a Director of that organization from 1963 to 1966. In 1983, on the occasion of that organization's 75th anniversary, he was named as one of thirty pre-eminent leaders of his profession. He was elected to the National Academy of Engineering in 1971 and to the National Academy of Sciences in 1972. In 1977, the University of Delaware named him as its first Alison Scholar, and in 1983 he was appointed to the University's Board of Trustees.

In addition to serving on numerous editorial advisory boards, he served as editor of the American Chemical Society Journal *Industrial and Engineering Chemistry Fundamentals* for a full quarter century. The Delaware Association of Professional Engineers named him Engineer-of-the-Year in 1988.

Professor Pigford married Marian Pinkston in 1939. Their daughter, Nancy, is a resident of Philadelphia and their son, Robert, lives in Newark, Delaware. There are three grandsons.

Arthur Metzner, Marian Pigford