

Rechnitz G A. Ion selective electrodes: new life for analytical potentiometry.
Chem. Eng. News 45:146-58, 1967.

Newly developed ion-selective membrane electrodes are proposed for analytical measurements in chemistry and biochemistry. The paper discusses the nature, physical configuration, ion selectivity, and response behavior of potentiometric electrodes employing a variety of active membrane materials. The author predicts a vigorous expansion of the membrane electrode research field and outlines several major application areas for the resulting sensors. [The SOI[®] indicates that this paper has been cited over 80 times since 1967,]

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"In the mid 1960s, ion-selective membrane electrodes had by no means achieved the wide popularity and range of practical application they enjoy today. Indeed, some senior colleagues had publicly characterized such electrodes as 'laboratory curiosities'—much to the distress of those few of us who, even then, held to a more optimistic outlook. Yet, this was just the time when new types of potentiometric sensors were being intensively developed and commercially exploited as a novel direction for chemical instrumentation.

"As a result, I was naturally delighted when *Chemical and Engineering News* gave me such generous space to expound my own views in the format of a feature article. I had just moved my research group from the University of Pennsylvania to the State University of New York at Buffalo in the fall of 1966, so this was a particularly hectic time to try to prepare a comprehensive article. Fortunately, I had been on a recent lecture tour where much of the material was used in verbal form and some of the figures were already available as slides. Thus, I tried to condense the key portions of a series of lectures into a coherent written treatment emphasizing new results in the development and application of ion-selective membrane electrodes. This gave me the opportunity to reach a very wide audience and, also, to present the subject without the usual tight constraints of a conventional scientific paper.

"In any event, the article elicited an immediate response among the readership

with literally thousands of reprint requests and numerous personal inquiries from scientists around the world. It is gratifying that the continuing interest in this article and its subject matter has made it one of the most frequently cited papers in the field.

"Because detailed knowledge concerning ion-selective membrane electrodes was, at that time, limited mainly to a few active workers, I intentionally set out to provide not only an overview of the technical state of the art but also to stress current and potential applications of ion-selective electrodes in chemistry and related areas. As part of this effort, it was necessary to try to acquaint the scientific community with the nomenclature of the field. Purely as an aid in organizing the article, I classified ion-selective membrane electrodes not according to the ion to be measured but by nature of the active membrane phase. Surprisingly, this classification scheme appears to have endured and is found in virtually all subsequent textbooks and monographs.

"I had also been concerned about some of the claims made by a few of the commercial suppliers of electrodes regarding selectivity, sensitivity, and other basic properties. At that time, some electrodes were even being touted as ion 'specific' To correct such misconceptions, I took the unpopular course of including data about the practical limit of electrodes so that individual scientists could arrive at an intelligent decision concerning the possible use of such electrodes in their own work.

"Another purpose in my mind was to provide an account that would be appropriate for student reading and generally tailored to the non-specialist or novice to the field. Judging from the comments I have received from both students and professors over the years, it would appear that this has been a worthwhile effort.

"As I reread the article now I find surprisingly little that I would want to change with the benefit of hindsight. Of course, the entire field has exploded and advanced during the past 12 years so that anyone wishing to undertake such an article now would have a much more formidable task on hand.

"After all these years I can perhaps reveal a small deception. The cover photograph accompanying the article is represented as showing a membrane electrode measurement being carried out in a blood sample. At the crucial moment when the photographer arrived, no blood was available—and the sample vessel actually contains tomato juice!"