

ESSAY REVIEW

Proceedings of Electrochemical Engineering Symposium—Newcastle 1971

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These three paper-backed volumes contain the complete proceedings of a three-day symposium on Electrochemical Engineering organized by the Institution of Chemical Engineers at the University of Newcastle-upon-Tyne in April 1971. The scope of the symposium was very much wider than that considered normally to constitute the applications of electrochemistry and two of the three days were concerned with electrochemical processes in the gas phase and the effect of electric fields on physical rate processes, areas which will be rather unfamiliar to many electrochemists. Each volume commences with an authoritative lecture on general aspects of the particular area of activity pertinent to the contents of that volume.

Volume 1 entitled 'Electrochemical Processes in the liquid phase' contains fourteen papers including the plenary lecture, representing a wide range of subject matter. Five of these papers are mainly concerned with the design, modelling and operation of cells of both conventional types and particulate electrode systems under monopolar and bipolar modes together with a computer simulation of a stirred tank cell and an optimization study. Three further papers deal with the use of and modelling of pulsed voltage systems and a transient technique for controlling electrode processes. The remaining six papers are investigations of specific processes and include two accounts of aspects of electrochemical machining, one on metal recovery by electrodeposition and three on organic electrode reactions. Two of these latter papers deal with non-aqueous systems and consider the use of electrochemically regenerated solvated electrons in reductions and the reduction of aromatic hydrocarbons in petroleum technology.

Volume 2, 'Electrochemical Processes in the gaseous phase' is the subject of eleven papers. Following an introductory lecture on the mechanisms of chemical changes in ionized gases, the next five papers consider as a basic theme the production of hydrazine by application of high voltage discharges to ammonia at low pressures, a reaction both potentially important and also representing a convenient basis for evaluating techniques in this field. Three of the papers report on types of reactors and discharge and include batch and flow systems under pulsed voltage operation and a reactor in which the discharge traverses the reaction vessel. An alternative approach is described in which a plasma of controlled electron energy distribution is produced and the fifth paper discusses a computational model for a microwave discharge system based on possible reaction schemes. Two further papers on chemical processes consider the production of hydrogen peroxide in a microwave discharge and polymer coating processes in a glow discharge. The section is completed by high temperature gas phase processes, the production of silica powder using a thermal plasma, the use of a radiofrequency plasma for producing nitrides and the use and applications of high voltage DC power to augment hydrocarbon flames.

Volume 3, 'The effects of electric fields on physical rate processes' is dealt with in eight papers which represent many diverse subjects some of which may be of direct interest to Chemical Engineers. Two papers discuss the effects of fields on heat and mass transfer, while three more are concerned with solid/fluid separations including electrostatic precipitation and coalescence, electrophoresis and dielectrophoresis. The use of electrically augmented flames are again considered in these instances for gas pumping and for inductive coupling of hydrocarbon flames as an alterna-

tive to direct DC augmentation. The eighth paper describes a technique for measuring the electrical potential associated with crystallization and dissolution as a means for investigating kinetics. The remainder of Volume 3 is taken up by a general paper on the development of electrochemical processes followed by the discussions on all the papers of the symposium and a general discussion.

The contributors to the symposium come from widely differing backgrounds, and almost the entire contents of the three volumes are characterized by the strong emphasis on possible industrial applications. Because of these facts, the proceedings provide an interesting and impressive source of information on the potential applications of electricity in chemical process technology.

It is unfortunate, however, that the contents are now a little dated due to the $2\frac{1}{2}$ -year gap between the symposium and the appearance of the proceedings. It is also a great pity that the standard of presentation falls rather short of that of the contents. The original intention to produce

the proceedings directly from the original typed manuscripts appears to have been frustrated by the revisions made by many of the authors. The result is a rather 'hotch-potch' collection of papers some of which now appear typeset and some in more or less their original forms which include all sizes and shapes of typescript. Neither have all revisions been satisfactorily made, particularly inexcusable in Volume 2 is one paper where revision has been accomplished simply by ruling out sentences with a pen and writing in a few words here and there. The number of typographical errors indicates a complete lack of the most rudimentary proof reading. One rather gets the impression that the editorial board at the conclusion of their efforts had lost heart in the task.

Nevertheless, the series should provide a valuable introduction and reference source to those embarking on and engaged upon many different aspects of electrochemical engineering.

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