average composition of the volatile oxides of $IrO_{2.5}$ the weight loss can be estimated from these values but the results obtained seem to be too high by about two orders of magnitude.

The theoretical treatment of the oxidation process at higher pressures is rather difficult (6 to 8) since in addition to the chemical surface reactions, eventually occurring equilibrium reactions, the mass transfer in the gas phase and natural or forced convection have to be taken into consideration. Specifically, the influence of the convection fluxes cannot be definitely determined due to geometrical parameters like shape and size of the sample and of the receiver. A theoretical treatment of iridium oxidation based on the diffusion of the evaporating species through the gaseous boundary layer is given by Wimber et al (6, 7). The strong influence of the sample dimensions is shown, for example, by Fryburg (8) studying the oxidation of platinum wires 0.29 to 2.2 mm diameter. Further difficulties may arise in an inert gas/oxygen mixture like air, where the inert gas pressure reduces the evaporation rate (14, 15).

Finally, in Figures 6 and 7 the results of oxidation studies in air are compiled. Figure 6 shows the weight loss of iridium during oxidation at reduced pressures, 10 to 6.7×10^4 pascals, reported by Wimber et al (7). Compared with oxygen the iridium losses lie half an order to one order of magnitude lower. Figure 7 gives the iridium losses during the oxidation in the range of atmospheric pressure. A relatively fair agreement is obtained over the large temperature range (800 to 2260°C) taking into consideration the difficulties of measuring the very low weight losses at low temperatures, and the factors influencing the oxidation rate, which were mentioned above. In particular at temperatures below 2000°C the iridium losses are enlarged by several orders of magnitude when compared with pure evaporation in vacuum.

Muhamed I. Ismail has been on leave of absence from the University of Alexandria, Faculty of Engineering, Alexandria, Egypt.

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A Review of Fuel Cell Development

As the industrial countries of the world continue to search for satisfactory alternatives to their present sources of energy a timely review of twenty-five years of fuel cell development has been published (*J. Electrochem. Soc.*, 1978, **125**, (3), 77C–91C).

Well supported by a bibliography listing 33 major titles on fuel cells and related subjects, and with 187 references from international literature, the review by K. V. Kordesch—formerly with the Union Carbide Corporation, and now at the Technical University of Graz, Austria—covers a third cycle of interest in fuel cells, which is considered to start after the second world war. During this period numerous systems have of course been investigated and in many of them the properties of the platinum group metals have been utilised with advantage.

In the future, if the technology of fuel cells is better supported by basic scientific studies of the principles involved, further improvements in efficiency could result.