

the results obtained with nickel electrodes were found to be inferior to those reported in earlier work, it was concluded that all electrodes investigated might have been improved by the use of better powder metallurgical techniques.

With methanol in KOH electrolyte, palladium provided the best results, platinum and rhodium following in decreasing order of performance. With methanol in acid solution platinum was found to be most active. In all cases, activity was considerably reduced when potassium carbonate solutions were employed as electrolyte. Copper and cobalt were not considered to be satisfactory catalysts for methanol or hydrogen electrodes. It was also found that sintering the noble metal electrodes destroys their activity with methanol and seriously affects it for use with hydrogen.

A laboratory-scale fuel cell using a palladium fuel electrode, a silver oxygen electrode and a 5N solution of KOH as electrolyte, was employed to examine the degree of conversion of methanol. The conclusion was formed that even at room temperature methanol oxidation proceeds almost completely to carbonate or carbon dioxide.

When formaldehyde and formic acid were investigated as possible fuels, large current densities were obtained with polarisations comparable with those observed for methanol. Similar results were found in alkaline and acid electrolytes, although somewhat higher fuel conversion efficiencies were obtained in the latter. No appreciable electrochemical oxidation was found under the experimental conditions employed when hexane or methylcyclohexane were tried as fuels. H. C.

Oxides of Iridium and Ruthenium

NEW VALUES FOR OXYGEN PRESSURES OF FORMATION

In his review of the thermodynamics of the gaseous oxides of the platinum metals, C. B. Alcock (*Platinum Metals Rev.*, 1961, 5, 134) referred to the work of Schäfer and his collaborators on the oxides of iridium and ruthenium. Some further experimental work has now been reported by G. Schneidereith in the course of a dissertation from the Harald Schäfer Institute of Münster, Westphalia.

Schäfer and his co-workers had previously found that coarse crystals of IrO₂ and RuO₂ were produced by heating the metals in a stream of oxygen (760 torr) to 1150 and 1270°C respectively. Both metals form volatile trioxides which, in contact with the colder walls of the quartz vessel, decompose to rough single crystals of blue-black IrO₂ and black RuO₂. The oxygen pressures of formation of these dioxides have been determined by Schneidereith by different methods and compared with the numerical values given by Alcock. Some of the values reported are set out in the table.

Solid IrO₂ dissolves less than 5 atomic per cent of iridium. The enthalphy of formation ΔH(298)—calculated from the elements—amounts to -52.42 Kcal for

Oxygen-pressures p in torr for reactions IrO ₂ → Ir + O ₂ and RuO ₂ → Ru + O ₂ at temperatures t in °C		
t	p for IrO ₂	p for RuO ₂
900	34	—
950	76	—
1000	154	—
1050	316	—
1100	572	1.5..4.5
1124	760	~2
1150	1020	3.3..6.9
1200	—	6.7..12
1250	—	13.2..23
1300	—	~25

IrO₂ and to -68.1 Kcal for RuO₂. The resistivities of single crystals of IrO₂ and RuO₂ at 22°C were found to be 48 microhm-cm and 50 microhm-cm respectively. The temperature coefficients between -78 and +22°C were approximately +0.0008 for IrO₂ and +0.00075 for RuO₂.

O. L.