knowledge of the cooling effect of ore. However, it has been found that if the "sum of carbon plus temperature" exceeds 1620 (instead of the usual 1600) then it is possible to feed a box of ore, and a second box fifteen minutes later, before the effect of the first is complete.

The method of applying immersion pyrometry is different again in a furnace recently built in the melting shop referred to, where the roof is of basic bricks instead of the silica bricks of the other three furnaces. The higher temperatures which the basic bricks can withstand allow a higher fuel rate, and consequently a higher production rate. In this furnace the oxidation rate can be controlled much more than is possible with a silica roof, not only by feeding ore but also by varying the ratio of "atomising" steam to oil. Again, whether oxidation requires to be accelerated depends on the temperature of the bath, which must be measured.

Conclusion

It is hoped that enough has been written to indicate the advantages of immersion pyrometry in improving productivity. Certainly it is possible to estimate visually the temperature of the steel in the furnace by observing the overlying slags and thereby to decide whether or not to feed ore. However, the inaccuracy of this estimate is such that in many cases the steelmaking process will be delayed by ore being fed either too early or too late. Immersion pyrometry is justified in the interests of faster production and consequently cheaper production.

The writer wishes to thank the directors of Colvilles Ltd. for permission to publish this article.

Platinum Catalysts in Fuel Cells

ADVANTAGES OF LOW TEMPERATURE OPERATION

The immense amount of research now being carried out on the development of fuel cells is directed towards a considerable variety of devices. The possible combinations of fuels, electrodes and electrolytes are obviously very numerous, even within the limits of potential practicability, and the range covered by both industrial and government sponsored research programmes is extremely wide. Naturally there is no expectation of the development of one all-purpose fuel cell, and it is likely that a number of differing types, each with its own particular advantages and shortcomings, will emerge within the next few years to meet the varied requirements of vehicular propulsion, communications, auxiliary power sources in aircraft and specialised military applications. The day of the fuel cell as a means of primary power generation is certainly farther away.

While research on cells aimed at central station generation is generally based upon operation at more or less elevated temperatures, there is an obvious advantage in the achievement of low temperature operation for cells designed to provide auxiliary power or to operate in locations remote from sources of heat. This lies in the ease of starting-up at normal temperature. Now in most types of fuel cell it is essential to incorporate a catalyst in the electrodes to achieve a high rate of reaction. In cells operating at elevated temperatures a catalyst of only moderate activity is adequate to ensure rapid reaction, depending, of course, upon the particular fuel employed and upon the structure of the electrodes. With lower temperatures of operation a more highly active catalyst – and one resistant to poisoning by impurities in the fuel – must be chosen.

An increasing number of fuel cell designs currently being investigated employ platinum, or sometimes another member of the platinum group, dispersed on or in the structure of the electrode in conjunction with one or other of a variety of fuels such as hydrogen, hydrocarbons and alcohols. Although in some cases precise details of the catalyst are not disclosed, a trend clearly discernible in the vast amount of research now in progress is towards the high degree of acceleration of the electrode reaction that can be provided by a platinum catalyst, operating at ambient temperature and with an organic fuel that can be made available cheaply in a state of high purity. L. B. H.