heat-resisting glass window through which the specimens can be observed, while the attachment at the other end of the tube is fitted with a bursting disc to ensure the safety of the operator should explosive conditions accidentally be created.

Gas is introduced into the furnace at the front end beneath the window and is discharged at the other end of the tube. Reducing conditions can be maintained in the furnace tube with a gas flow of less than half a litre per minute.

The principle of the test is to observe continuously a cone of ash as temperature rises at 5°C per minute and to note the temperatures at which three characteristic shapes occur. These are the initial deformation of the original cone, the formation of a hemisphere and the flow to a meniscus. As the initial deformation point is that at which fusion begins, and the other noted temperatures indicate the rate of subsequent fusion, the results indicate clearly the temperature above which serious fusion will occur.

Apart from the use for which it has been specially designed the furnace may also be used generally for controlled atmosphere work. In this case the built-in thermocouples will serve both for temperature measurement and control.

Platinum-coated Titanium Electrodes for Cathodic Protection

AN ELECTROCHEMICAL INVESTIGATION

The use of platinum-coated titanium as an anode material is growing rapidly, both in cathodic protection applications and in the field of industrial electrolysis. Relatively few studies have been made, however, of the behaviour of such electrodes in terms of loss in weight and potentials as functions of current density in a given set of conditions.

An investigation recently reported from Italy by G. Bombara and D. Gherardi of the Laboratori Riuniti, Studi e Richerche S.p.A. of San Donato, Milanese, (*La Metallurgia Italiana*, 1959, **51**, (10), 462) provides some interesting data. The anodes used comprised pure titanium, pure platinum, platinum discs brazed to both faces of titanium strips, and titanium electroplated with platinum from a chlorplatinic acid bath. The polarisation potentials and rates of attack in synthetic sea-water were determined as functions of current density. In accordance with the results of other workers, a very considerable reduction in anodic polarisation was found with the platinum-titanium electrodes, the breakdown region rising from 200 to 400 amp/sq.m for titanium to the order of 6000 to 7000 amp/sq.m for the bimetallic specimens. The loss of anode material was negligible up to 500 amp/sq.m, and remained very small up to current densities just below the critical value. It is considered therefore that the presence of the disc of platinum (the area ratio was 1 : 6) extended the useful range of a titanium anode up to 5000 amp/sq.m. The attack on the titanium was mainly confined to the edges.

With the platinum-plated specimens, it was found that the polarisation curve almost coincided with that of platinum up to 3000 amp/sq.m, but beyond this point showed a definite rise. Life tests showed that all the plated anodes had a limited period of usefulness, failure being indicated by a noticeable increase in polarisation potential when the platinum plate began to break down. The results showed a useful life of 85 to 100 hours for an electrodeposit 0.2μ thick at 1400 amp/sq.m and 850 hours for 2.5μ at the same current density. At 2300 amp/sq.m, values of about 350 hours were obtained for a thickness of 2.5μ, 250 hours for 1.75μ and 2 hours for 0.2μ. The durability of the anodes depends to some extent on the adhesion of the platinum and thus on the type of plating process used.

These results are compared with the very high losses of graphite electrodes at much lower current densities.