relatively massive platinum microelectrode is insignificant, and this has the advantage that single-phase equipment produces no problems when lead-platinum anodes are used in a cathodic protection system.

The experience gained over the past ten years has shown that the lead-platinum bielectrode provides a cheap and reliable anode for the cathodic protection of marine structures, and it is envisaged that its importance will increase in the future.

References

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A Standard High Purity Platinum

NEW REFERENCE MATERIAL OF CERTIFIED COMPOSITION

In 1922, in the course of a study of methods for the preparation of high purity platinum, the National Bureau of Standards made a small trial melt which was identified in a laboratory notebook as No. 27. This was found to be thermoelectrically negative to all other specimens of platinum observed up to that time, although the temperature coefficient of resistance was only 0.003922. It is recorded that this specimen was put aside as a primary standard for thermoelectric purposes and was designated Pt 27. This has remained the standard of reference in the U.S.A. ever since, although it is extremely doubtful if any of the original sample exists.

At a conference in the U.S.A. in 1960 between the NBS and representatives of the platinum industry, an extensive programme was laid down to examine the properties of high purity platinum. In particular, it was agreed to try to relate e.m.f. against Pt 27 at 1200°C with temperature coefficient of resistance and the presence of impurities. This led to a prolonged series of tests by different bodies to assess the impurities in parts per million, by spectrographic and other means.

A batch of pure platinum was prepared by induction melting high purity platinum sponge in a zirconium silicate crucible, and casting into a platinum-lined water-cooled copper mould. The ingot was worked and drawn to wire taking the utmost care to prevent contamination. This material has been designated Standard Reference Material 680. Extensive analytical programmes, as well as tests for homogenity, were carried out, in co-operation with the NBS, by Johnson Matthey, Matthey Bishop, Sigmund Cohn, Engelhard Industries and RCA Laboratories, and a provisional certificate of analysis has been issued by the NBS giving the following impurities:

Copper	0.1 p.p.m.	Gold	<1
Silver	0.1	Magnesium	<1
Palladium	0.2	Zirconium	<0.1
Lead	<1	Rhodium	<0.2
Iron	0.7	Iridium	<0.01
Nickel	<1	Oxygen	4

Because of a certain amount of lack of agreement among the methods used, no estimate of accuracy can be made at present, but it is hoped that in six months' time a revised certificate will be issued.

In addition, a further sample designated SRM 681 containing substantially greater quantities of impurities, has been prepared for analytical reference, again with a provisional certificate of analysis.

Both of these materials in the form of 0.020 inch diameter wire may be obtained from the Office of Standard Reference Materials of the NBS, Washington, in lengths of either 4 inches or 1 metre.

Because the supply of Pt 27 has been totally exhausted, there is a need for a new standard. The NBS is making provision for platinum of substantially the same purity as SRM 680 to be prepared, and to be designated Pt 67. This will be used at NBS as the national standard for the calibration of thermocouple wires. It is probable that the new standard will give an e.m.f. against Pt 27 at 1200°C of about −9 microvolts and that it will have a temperature coefficient of resistance of 0.003927.

H. E. B.