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Temperature Measurement Conference

Over one hundred delegates from some fifteen countries attended the third international symposium on Thermal and Temperature Measurement in Science and Industry, sponsored by the Institute of Measurement and Control and the International Measurement Confederation (IMEKO), which was held in Sheffield during September, 1987. This triennial event attracted speakers from national research organisations and major industrial companies. The conference began with a keynote lecture by Dr. T. J. Quinn, Deputy Director of the Bureau International des Poids et Mesures, on the International Temperature Scale. This paper first reviewed the history of the topic, then it outlined the proposals of the Conférence Générale des Poids et Mesures (CGPM) for the new scale, ITS-90, which is expected to be adopted worldwide in 1990 or 1991. The major proposal is that ITS-90 should be defined in terms of platinum resistance thermometry from -272.65°C (half a degree above absolute zero) to the silver point, 961.93°C , and in terms of radiation pyrometry above this temperature. Values for the various fixed (temperature) points, such as the freezing point of tin, silver, gold and platinum, will be modified in keeping with recent advances made in their accurate determination.

Progress on the determination of some of the thermodynamic temperatures of the fixed points, especially in the cryogenic range, was reported in detail. Some temperature determinations near absolute zero were described; for example the melting point of helium and the triple point of deuterium were established using techniques such as rhodium-iron resistance

thermometry and electrical radio-frequency noise thermometry. This last method utilises superconductive quantum interference devices (SQUID's). Papers on high temperature determinations were concerned mainly with radiation pyrometric methods and emissivity values, the source of their largest error.

Practical temperature measurement and heat-flows were also discussed. Measurements made in hostile environments, such as those found in industrial combustion chambers, showed that the robustness and simplicity of thermocouples made them difficult to improve upon. Acoustic methods are being developed for use in dusty and corrosive environments, and results are reproducible enough for commercial exploitation to be considered for the future. Single-crystal fibre optic devices incorporating an iridium coated tip have been evaluated industrially, and gave accurate readings provided there was no contamination of the fibre surface. A novel method of measurement by a laser technique known as coherent anti-Stokes Raman spectroscopy (CARS) was described, but at present the accuracy is insufficient for it to be considered as a practical alternative to other methods of temperature measurement. The great reliance of these newer products on microprocessor technology brought out a point of relative accuracy; random and systematic errors in the measurement system may erode the improved resolution of temperature which would otherwise be achieved.

The conference papers showed that the platinum metals continue to play a vital role in the field of temperature and thermal measurement.

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