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**Author**

Hultgren, Ralph.

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University of California

Ernest O. Lawrence  
Radiation Laboratory

CALORIMETRY CONFERENCE

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CALORIMETRY CONFERENCE

Ralph Hultgren

September 1965

## CALORIMETRY CONFERENCE

Ralph Hultgren

Inorganic Materials Research Division,  
Lawrence Radiation Laboratory,  
Department of Mineral Technology, School of Engineering,  
University of California, Berkeley, California

The 20th Calorimetry Conference was held in Ames, Iowa, August 11-13, 1965 under the sponsorship of the Institute for Atomic Research of Iowa State University.

These conferences are conducted for the exchange of information among working calorimetrists. Many of the papers presented gave progress reports rather than reports of completed work. The proceedings are not published except for multilithed abstracts of papers distributed at the meetings. Of course, many of the researches are later published in standard journals.

This conference honored Daniel R. Stull of the Dow Chemical Company as its choice for the Huffman memorial lecture. It was an appropriate choice, since Stull had been associated with Huffman in the early years of the conference.

Stull presented fascinating highlights of the early history of the Conference before launching into his main theme; the evaluation of thermodynamic data and the preparation of authoritative tables of properties. For many species of interest "one or more of the necessary facts are imperfectly known or even completely unknown." Making a table of selected values "is like trying to assemble a jigsaw puzzle with part of the pieces missing and with some of the pieces swollen or shrunken from their true shapes." Stull is Project Director of the JANAF Thermochemical Tables.

The papers presented described calorimetric techniques and achievements from all sections of the United States and many foreign countries.

Th. Ackermann described a twin recording calorimeter employed at the University of Muenster, Germany, and its application to measurement of heat capacities of electrolytes and organic compounds near room temperature. The University of Lund, Sweden, was well represented by Stig Sunner and Ingemar Wadso. Sunner described a high precision calorimeter developed there and its application to direct measurements of heats of vaporization of water and of octane and other organic compounds. Wadso discussed improvements in their reaction calorimeter.

Dr. M. Olette described a high temperature drop calorimeter of excellent precision which has been developed at Irsid, France. With this calorimeter heats of fusion of iron, nickel, and silicon have been measured with an accuracy previously unattainable.

From England Dr. J. S. L. Leach of Imperial College, London and Dr. John N. Pratt of the University of Birmingham described liquid tin solution calorimeters. As usual, there was strong representation from Canada. Dr. R. H. Stokes came from the University of New England which, surprisingly, is in Australia. Dr. P. Paraskevoudakis described an x-ray radiant energy calorimeter in use at the Puerto Rico Nuclear Center.

No representatives from the Soviet Union were present but one abstract, read by title only, was submitted by B. N. Oleinik of the All-Union Scientific Research Institute of Metrology, Leningrad. It concerned a theoretical analysis of heat flow and temperature measurements in calorimeters.

A provisional temperature scale from 2° - 20°K was described by George Cataland of the National Bureau of Standards. This research was prompted, in part, by a request from The Calorimetry Conference. Germanium

resistance thermometers were described by G. Ahlers of Bell Telephone Laboratories and silicon resistance thermometers by William V. Johnston of North American Aviation. Albert Benjaminson of Dymech Division of Hewlett-Packard described a digital quartz thermometer in which the temperatures from  $-40^{\circ}$  to  $230^{\circ}\text{C}$  are presented in digital form with precision as high as  $0.0001^{\circ}$ . Quartz crystals are frequently cut for electronic applications on planes for which the frequency of vibration is nearly constant with temperature. For the quartz digital thermometer the cut is made to give a maximum sensitivity of frequency to temperature.

Darrel W. Osborne reported that standard copper samples are available at Argonne National Laboratory for heat capacity measurements below  $25^{\circ}\text{K}$ . The samples are cylindrical with an o.d. of 3.17 cm. Borrowers may machine them but should return the samples to Argonne after testing them. G. Ahlers of Bell Telephone Laboratories reported on measurements of several copper samples from  $1.2 - 20^{\circ}\text{K}$ .

Several papers discussed automatic adiabatic controls, automation of readings and other improvements in calorimeter design. A. Navrotsky of the University of Chicago described a new high temperature solution calorimeter using oxide solvents for the purpose of determining heats of formation of oxides such as  $\text{MgAl}_2\text{O}_4$ .

A new feature which was appreciated was the display of commercial calorimetry equipment. It is becoming possible to purchase calorimeters and parts of calorimeters; which formerly had to be designed and constructed by the experimenter.

For two sessions the meeting divided itself into small groups, where problems were discussed in specialized fields of interest to the members of the group. Among topics discussed were: solution calorimetry, bomb

calorimetry, automatic of measurements, thermometry, and low-temperature calorimetry. These groups permitted discussion of trends in calorimetry and needs of the future as well as promoting interesting arguments between working calorimetrists.

Particularly appreciated was the banquet speech of Dr. Frank H. Spedding. Dr. Spedding recounted how Iowa State University fulfilled its wartime assignment of producing large quantities of uranium. He interspersed his story with many humorous incidents as they actually happened.

At the business meeting O. J. Kleppa was elected to the position of Chairman-Elect and Program Chairman for the next conference. The following new directors were also elected: G. T. Furukawa of the National Bureau of Standards, B. C. Gerstein of Iowa State University, and B. J. Zwolinski of Texas A and M. University.

Ralph Hultgren of the University of California, Berkeley, will take the place of W. N. Hubbard of Argonne National Laboratory, the retiring Chairman of the Calorimetry Conference.

The Twenty-First Calorimetry Conference will be held at the University of Colorado, Boulder, Colorado in June 22-24, 1966. For information about program and attendance, inquire of the program chairman,

Professor O. J. Kleppa  
Institute for the Study of Metals  
University of Chicago  
Chicago, Illinois

