15th *calorimetry conference*

A Report by **Darrell W. Osborne,** *Conference Chairman*

THE fiifteenth annual Calorimetry Conference was held September 7–10 at Gatlinburg, Tennessee, with Oak Ridge National Laboratory acting as host and J. P. McCullough (Petroleum Thermodynamics Laboratory, Bureau of Mines) serving as chairman. In the pleasant surroundings of the Great Smoky Mountains 106 calorimetrists from the United States, Canada, and Europe heard and discussed 31 technical papers on recent work on many phases of calorimetry and engaged in informal discussions of calorimetric problems. Among the topics discussed were calorimetry at temperatures as low as 0.1°K and as high as 2800°K, precision reaction and bomb calorimetry, solution calorimetry, applications of calorimetry to solid-state problems, applications of calorimetry to radiation dosimetry, improvements in temperature-measuring devices, and data processing by digital computers. At the Conference banquet ORNL Director A. M. Weinberg shared his experiences and observations on a recent trip to Russia with the chairman of the US Atomic Energy Commission, illustrating his talk with a number of interesting slides. D. W. Osborne (Argonne National Laboratory) was program chairman, and R. H. Busey (ORNL) was local arrangements chairman.

The Hugh M. Huffman Memorial Lecture, established in memory of the founder of the Calorimetry Conference, was given by J. W. Stout (University of Chicago) on the subject "Magnetic Entropy in Ionic Crystals". Professor Stout gave a stimulating lecture on the magnetic contribution to the entropy of ionic salts of the transition metals, discussing the theoretical considerations and the results obtained from low-temperature heat capacity measurements and from experiments on magnetic susceptibility, paramagnetic resonance, and optical absorption.

Several papers were devoted to a perennial concern of the Conference: the improvement of temperature-measuring devices. Further tests of the germanium resistance thermometers developed at the Bell Telephone Laboratories were described, with H. Plumb reporting on low-temperature thermometry at the National Bureau of Standards in the range 2–20°K, and C. van Rijn, H. van Dijk, and M. Durieux (Kamerlingh Onnes Laboratorium, Leiden) reporting on the calibration of a germanium resistance thermometer at liquid helium and liquid hydrogen temperatures. These devices show such encouraging promise for precision temperature measurements from 1 to 20°K that a committee has been seeking a manufacturer of additional germanium thermometers for further testing. P. Lindenfeld (Rutgers University), chairman of the committee, reported that the Minneapolis-Honeywell Regulator Company has become interested, and G. Halverson of that company showed several pilot models.

Results in a quite different temperature region were presented by J. P. Evans (National Bureau of Standards), who described the development of platinum resistance thermometers for the International Temperature Scale from 630.5 to 1063°C. It is expected that the use of such thermometers will simplify and smooth the scale, as well as provide greater precision and reproducibility than is possible with present thermometric instruments. Also, the use of thermistors for measuring small changes of temperature in solution calorimetry was described in several papers. A notable example was the paper by G. R. Argue, E. E. Mercer, and J. W. Cobble (Purdue University) on "An Ultra-

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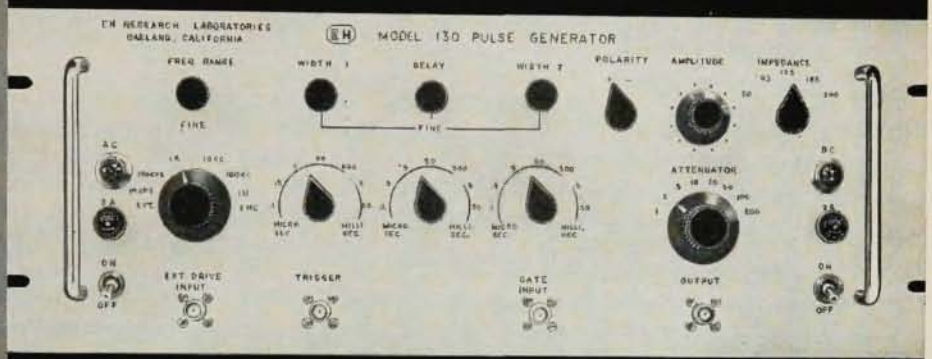

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Several authors reported on applications of calorimetric techniques to solid-state physics. J. E. Kunzler (Bell Telephone Laboratories), for example, discussed methods for the observation of very small amounts of energy—between 10^{-2} and 10^{2} ergs—and the application of these techniques to investigations of magnetothermal oscillations of single crystals of bismuth and the adiabatic demagnetization and heat capacity of ferrimagnets.

A subject of great interest to calorimetrists measuring or analyzing heat capacities was presented by B. N. Brockhouse (Atomic Energy of Canada) in an invited paper on "Dispersion Curves and Frequency Distributions of Lattice Vibrations from Neutron Scattering". A novel cryostat for low-temperature calorimetry from 4 to 80°K was described by V. Mathot (Free University of Brussels), along with experimental results on the heat of mixing of hydrogen and deuterium liquids. Another interesting new type of cryostat, a He^3 cryostat with a lead wire thermal switch for cooling the calorimeter to 0.3°K, was depicted by D. L. Martin (National Research Council of Canada).

The Conference is deeply interested in the adequate presentation of calorimetric and thermodynamic data. For this reason the 15th Calorimetry Conference considered carefully and adopted a "Resolution on Publication of Calorimetric and Thermodynamic Data" which is intended to be a guide for authors, editors, and referees of calorimetric papers. This resolution is a revision of one adopted in 1953 that has been valuable to authors and editors alike.

Plans were announced for the next conference, which will be an International Calorimetry Conference and will be held August 14–17, 1961, at Ottawa, Canada. The meeting will be jointly sponsored by the Calorimetry Conference and by the Subcommission on Experimental Thermochemistry of the Commission on Chemical Thermodynamics of IUPAC. The host organization will be the National Research Council of Canada.

At the annual election the following members were named to Conference offices: chairman, D. W. Osborne (Argonne National Laboratory); chairman-elect, J. E. Kunzler (Bell Telephone Laboratories); secretary-treasurer, 1960–63, G. T. Furukawa (National Bureau of Standards); directors, 1960–62, G. T. Armstrong (NBS) and J. K. Logan (Naval Research Laboratory). Other directors of the Conference are J. P. McCullough (Bureau of Mines), David White (Ohio State University), N. E. Phillips (University of California at Berkeley), and J. M. Sturtevant (Yale University).

The Calorimetry Conference does not attempt to publish the papers presented before it, since the members prefer to publish their results independently in various scientific journals. Most of the papers report very recent experiments, and there may be a delay of several years in some instances before they appear in the literature. Therefore, a list of the papers presented at the Conference is given below:

PROGRAM OF THE FIFTEENTH CALORIMETRY CONFERENCE

1. Welcome and Introduction (J. P. McCullough, Conference chairman).
2. The Huffman Memorial Lecture: Magnetic Entropy in Ionic Crystals (J. W. Stout, U. of Chicago).
3. Low-Temperature Heat Capacities and Magnetic Susceptibilities of K_2ReCl_6 and K_2ReBr_6 (R. H. Busey, R. B. Bevan, Jr., R. A. Gilbert, and E. Sonder, ORNL).
4. The Effect of the Martensitic Transformation on the Electronic Specific Heat of Sodium (D. L. Martin, NRC of Canada).
5. Invited Paper: Low-Temperature Thermometry at the National Bureau of Standards (H. Plumb, NBS).
6. Calibration of a Germanium Resistance Thermometer at Liquid Helium and Liquid Hydrogen Temperatures (C. van Rijn, H. van Dijk, and M. Durieux, Kamerlingh Onnes Lab., Leiden).
7. Report of the Committee on Germanium Thermometers (Peter Lindenfeld, Rutgers U.).
8. Some Effects of Structure on Heats of Reaction in Solution (J. M. Sturtevant, Yale U.).
9. Heats of Dilution of Aqueous Polyacrylic Acid Solutions (Hubert Daoust, U. of Montreal).
10. Enthalpy Changes Associated with the Stepwise Formation at 25°C in Aqueous Solution of HgX_4^{--} from Hg^{++} and X^- ($X^- = Cl^-$, Br^-, or I^-) (J. J. Christensen and R. M. Izatt, Brigham Young U.).
11. The Thermochemistry of the Acid Hydrolysis of Potassium Cyanate (C. E. Vanderzee and R. A. Myers, U. of Nebraska).
12. An Ultrasensitive Thermistor Microcalorimeter (G. A. Argue, E. E. Mercer, and J. W. Cobble, Purdue U.).
13. A Solution Calorimeter for Measurements to 100°C (C. M. Criss and J. W. Cobble, Purdue U.).
14. A New Approach to the Combustion Calorimetry of Organic Silicon Compounds: The Heat of Combustion of Hexamethyldisiloxane (W. D. Good, Petroleum Thermodynamics Lab., Bureau of Mines).
15. Combustion of Molybdenum Disulfide and Tungsten Disulfide in Oxygen (R. L. Nuttall, Argonne National Lab.).
16. Further Developments in Fluorine Bomb Calorimetry (W. N. Hubbard, Argonne National Lab.).
17. Invited Paper: The Stability of High Temperature Platinum Resistance Thermometers (J. P. Evans, NBS).
18. Review of Sapphire Heat Capacity Data (D. C. Ginnings, NBS).
19. Carbon Black Insulation for R-F Induction Furnace at 2800°K (E. D. West, NBS).
20. Reference Voltages for Furnace Control (E. D. West, NBS).
21. Proposal for a Pilot Project on Collection, Storage, and Dissemination of Calorimetric Data (J. P. McCullough).
22. Invited Paper: Dispersion Curves and Frequency Distributions of Lattice Vibrations from Neutron Scattering (B. N. Brockhouse, Atomic Energy of Canada).
23. The Heat Capacities of ZrH_2 and ZrD_2 from 5 to 350°K, and the Hydrogen Vibration Frequency in ZrH_2 (H. E. Flotow and D. W. Osborne, Argonne National Lab.).
24. Invited Paper: Some Solid-State Physics Investigations Involving the Measurement of Very Small Amounts of Energy (J. E. Kunzler, Bell Telephone Labs.).
25. A Differential Calorimeter for the Measurement of the Stored Energy of Cold Work (J. L. White and K. Koyama, General Atomic).
26. The Measurement of the Order-Dependent Specific Heat and Latent Heat of Cu_3Au (F. J. LoSacco and L. J. Schkolnick, Columbia U.).
27. A Calorimeter for Accelerator Voltage Calibration and Absorbed Dose Measurements (I. T. Myers and H. V. Larson, General Electric, Richland, Wash.).
28. Application of Low-Temperature Calorimetry to the Determination of Phase Diagrams (E. F. Westrum, Jr., U. of Michigan).
29. The Heat Capacity and Entropy of Nitrogen and Hydrogen Chloride in Their β-Quinol Clathrates (L. V. Coulter, Boston U.).
30. Invited Paper: A Nonconcentric Metallic Gas Cryostat for the Range 4°–80°K. Results on Heat of Mixing Measurements on Hydrogen-Deuterium Liquid (V. Mathot, Free U. of Brussels).
31. An Automatic Temperature Controller for Low-Temperature Adiabatic Calorimetry (G. B. Guthrie and J. F. Messerly, Petroleum Thermodynamics Lab., Bureau of Mines.
32. Calorimetric Studies of the Melting Point and Purity of Three IUPAC Samples of Benzene (S. S. Todd, J. F. Messerly, G. B. Guthrie, and J. P. McCullough, Petroleum Thermodynamics Lab., Bureau of Mines).