

Meetings

SOCIETY OF RHEOLOGY

WEST COAST MEETING REPORTED

The papers presented at the second annual meeting of the West Coast Section of the Society of Rheology covered an unusually wide range of rheological subjects. The meeting was organized by A. A. Bondi in cooperation with the Division of Mechanical Engineering of the University of California and was held on the Berkeley Campus on December 1, 1950.

V. R. Smith discussed the flow properties of petroleum asphalts as revealed by coaxial cylinder type (non-rotating) viscometer measurements. The influence of temperature upon the visco-elastic properties of asphalts was demonstrated and the effect of refining procedures discussed. It was shown that even those asphalts which exhibit markedly non-Newtonian flow properties do not possess measurable yield values. The shearing stress-rate of shear data was found to be describable by a simple power function and the use of the exponential factor was recommended for characterizing various asphalts.

S. A. Schaaf and R. G. Folsom presented a paper on the fundamentals of rarified gas dynamics. Similarities and differences between the results of continuum theory and kinetic theory were discussed and various alternative expressions for the stress tensor and heat flux vector presented. Recent experimental work designed to study various flow and slip phenomena was outlined.

J. A. Putnam and M. B. Biles discussed the viscosity of gases and elevated pressures and temperatures. The gas viscosity data were obtained in connection with the development of a gas metering device employing a large aluminum thimble. Viscosity determinations were made for air and nitrogen at 75°F for pressures up to 1000 psi and for air at 517°F over the same pressure range. An apparatus employing porous membranes and designed specifically for viscosity measurements would improve the accuracy considerably.

The pressure coefficient of the viscosity of liquids was the subject of A. A. Bondi's paper. The pressure coefficient can be expressed as a characteristic volume which is closely related to the geometry of the flow process. Although the magnitude of this volume cannot be predicted from first principles as yet, a few semiempirical correlations have been found based on the observation that the ratio of characteristic volume to molar volume is large for rigid and spherical molecules and small for elongated and flexible ones. One correlation relates the characteristic volume to expansion at the melting point. A relation was also shown to exist between mobile segment size of linear chain molecules and their viscosity-pressure coefficient. A third method estimates the characteristic volume from the temperature coefficient of viscosity and the internal pressure. It was shown that the correlation of temperature and pressure coefficients of viscosity is limited to series of liquids of equal internal pressure.

W. M. Sawyer and J. D. Ferry presented some recent results on the mechanical properties of concentrated polymer solutions. The dynamic rigidity and the dynamic viscosity of such systems have been studied by means of transverse

waves generated by a sinusoidal shearing stress and via electrical measurements using an electromagnetic transducer. Using the above methods the mechanical properties of polyvinyl acetate have been measured in several solvents and at various concentrations and temperatures in the low audio frequency range. A single function describing the distribution of relaxation times can be derived from the dispersion of either the dynamic rigidity or the dynamic viscosity.

Rheological manifestations of chemical reactions in wool fibres were discussed by H. P. Lundgren. The stress-strain behavior of wool was correlated with its morphology and ultimate chemical constitution. The influence on rheological behavior of controlled chemical modification and of isolated morphological components was described. The stabilizing function of hydrogen bonds and disulfide bonds was discussed and the possible practical applications of propiolactone modified wool pointed out.

C. J. Penther, L. B. McKee and C. H. Klute described an electrical extensometer for use in tension testing of vulcanized rubber and similar elastomers. The aim of this work was to design a device which records automatically and accurately the elongation of the reduced section of the specimen without interfering in principle or in fact with the test. This has been accomplished by designing an extensometer based on the principle that the specimen shall contribute only a negligible amount of energy to the sensitive elements of the instrument, this energy serving only to energize shaded pole motors through thyatron circuits and the motors so energized to contribute the power to operate the extensometer. This apparatus allows the routine determination of tensile properties with an accuracy exceeding that of techniques generally employed today and has been shown to be successful with materials ranging in stiffness from almost gummy to almost horny.

J. E. Dorn discussed the strain hardening of metals with particular emphasis on the role of alloying elements. The amount of solid solution hardening in aluminum alloys was found to be controlled mainly by two factors: the strain introduced in the lattice and the difference in valence between the solute and solvent metals. Silver, for example, causes appreciable solution hardening in spite of the fact that practically no lattice strain results when it is dissolved in aluminum. The results are well correlated on the basis of the change in the mean number of free electrons per atom of solid solution. On this basis aluminum appears to contribute two electrons per atom to the metallic bond in its alloys.

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ACOUSTICAL SOCIETY

FALL MEETING IN NEW ENGLAND

The Acoustical Society of America held its Fortieth Meeting in Boston and Cambridge on November 9-11, 1950. The total registration of 325 members and guests made this one of the largest meetings of the Society to be held elsewhere than in New York or Washington. The local citizenry would be the last to deny that New England is indeed a focal point for activity in the acoustics field, but the wise and beneficial influence of government support of research in promoting attendance at such meetings is also to be duly acknowledged. The technical sessions were divided in locale between the Statler Hotel in Boston and Harvard University in Cambridge, the coincidence of the Armistice Holiday with the sacrificial mission of the Harvard football team to