

various forms of globulin and its solutions was carried out by analysis of the two phases appearing upon evaporation of a globulin solution, or upon addition of ammonium sulphate to the solution, or upon dialysis of the same. A remarkable similarity to soap was observed, both between the forms of globulin and soap separating and the shapes of the areas representing the solutions of the two substances. After dilution or concentration of globulin solutions and precipitation with ammonium sulphate, points representing analyses of the liquid phase fall on the curve found with the original solution, or in a special case coincide with a point previously found. Lines passing through these points and those representing the mixture from which the phases separate indicate that these phases are the same as those separating from the stock solution. Thus the equilibria were found to be reproducible and the applicability of the phase rule established. In the case of the globulin form which separates on dialysis, resolution and precipitation gave points falling below the curve mentioned above. This we suggested was probably due to aggregation of the particles brought about, perhaps, by surface denaturation of the protein during dialysis. It appears that globulin solutions, euglobulin and pseudoglobulin are but three phases of a system of the same mother substance, dehydrated globulin, solutions of globulin being the ordinary isotropic solutions, while euglobulin and pseudoglobulin are liquid crystalline phases or a liquid and glass which are slightly doubly refracting.

*The heat of formation of water:*¹ FREDERICK D. ROSINI (introduced by George K. Burgess). The usually accepted value for the heat of formation of water is based upon measurements made by Thomsen in 1873, Schuller and Wartha in 1877 and Mixter in 1903. The most accurate and precise of these data are those of Schuller and Wartha, whose average value has an uncertainty of nearly 0.1 per cent., practically all of which lies in the calibration factor of their calorimeter. The procedure employed in the present investigation was to determine directly the quantitative correspondence between (1) the energy liberated when hydrogen and oxygen combine to form a weighed mass of H_2O and (2) a measured quantity of electrical energy, by using the calorimeter as the absorber of the two energy quantities and its temperature rise as the comparator. In so far as systematic errors are concerned, the absolute accuracy depends only upon the determination of the mass of water formed, in grams, and of the quantity of electrical energy, in terms of the mean solar second and the international volt and international ohm. High precision is obtained by the use of proper calorimetric technique, a sensitive device for measuring changes of temperature, a sensitive potentiometric system for measuring the electrical power input, a precision timing device and a suitable balance for weighing the H_2O formed. The data of two sets of nine experiments each give 285,775 international joules per mole (18.0156 g) for the

heat of formation of liquid H_2O at $25^\circ C$, 1 atm. With the factors 1.0004 and $(1.0004/4.185)$, this is equivalent to 285,890 absolute joules or 68,313 g-cal.₁₅. The maximum and the average deviations, in percentages, are, respectively: 0.031 and 0.019 in Set I; 0.024 and 0.010 in Set II. The data of Schuller and Wartha, Thomsen and Mixter were recomputed in terms of the international joule. Their average values plus or minus the assigned errors are entirely concordant with the value obtained in this investigation.

Diffusion of electrolytes and of colloids in aqueous solution: T. H. LIU and J. W. McBAIN (introduced by W. C. Bray). By standardizing the procedure in the Northrop method of confining the diffusion gradient within a coarsely porous diaphragm, diffusion coefficients are easily obtainable which are reproducible within a fraction of a per cent. They agree well with the few good results which the laborious classical methods have hitherto produced but they permit of far closer scrutiny as to the effects of such factors as concentration. Substances in mixtures do not diffuse independently but may accelerate, retard or even reverse the diffusion of another and an action may be set up resembling that in a gaseous diffusion pump. Diffusion data point to incomplete dissociation of electrolytes, and the Nernst equation for a diffusion at infinite dilution is extended to cover high concentrations of potassium chloride. Other applications are to cadmium iodide with its complex ions and to constituents of soap solutions as colloidal electrolytes.

(To be continued)

BOOKS RECEIVED

- Contributions from the Biological Laboratory of the Science Society of China: Study of the Fishes of Amoy*, by Hsien Wen Wu. Pp. 90. 70 figures. Prodromus Florae Sinensis, by H. H. Hu. Pp. 77. The Science Society of China, Nanking.
- CRONEIS, CAREY. *Geology of the Arkansas Paleozoic Area, with Especial Reference to Oil and Gas Possibilities*. Pp. xx+457. Illustrated. Arkansas Geological Survey.
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- GUYÉNOT, ÉMILE. *La Variation et l'Évolution*. Pp. 414. Gaston, Doin & Cie. 32 fr.
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- TAYLOR, T. CLINTON. *Reactions and Symbols of Carbon Compounds*. Pp. x+704. Century. \$4.00.
- WOOD, A. B. *A Text-book of Sound*. Pp. xiv+519. 156 figures. Macmillan. \$6.50.

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