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The Co-operative Researches

THE FUNDAMENTAL STUDIES OF THE LIQUID PHASE REACTIONS AT HIGH PRESSURES

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In concert with the advancement of high pressure research in the world, further developments of the high pressure works are expected in Japan. History of high pressure works in Japan covers more than thirty years, and researchers have acquaintance each other but they work individually. These co-operative works were planned for the development of high pressure researches.

The pressure is one of the important variables in affecting the natural phenomena. The phenomena under high pressure are recently taken interest both scientifically and industrially. It is very interesting, in particular, to study kinetically and thermodynamically the reaction in liquid system under high pressure. By applying the theory of reaction rate and chemical equilibria in the liquid system, one can deduce the activation parameters and the thermodynamic properties of the reaction. These numerical values are turned to be useful for the elucidation of the reaction mechanism including the interaction between the solvent and the solute. Moreover, the basic researches, such as the dissolvation of gases into the liquid and the transport phenomena under high pressure, are also important and helpful for the interpretation of the reaction mechanism in liquid system.

From the point of view as mentioned above, this group of researchers, having the activity in the field of high pressure chemistry of Japan, was organized in 1965 under the subject of "The Fundamental Studies of the Liquid Phase Reactions at High Pressures" and then, with the Co-operative Research Grant in Aid of the Ministry of Education for three years, the members have investigated about the sub-thema as follows:

1) "Effects of Solvent on the High Pressure Reaction"
   by Prof. T. Imoto; Osaka City University.
2) "Studies on the Transport Properties of Fluids at High Pressure"
   by Prof. H. Iwasaki; Tohoku University,
3) "Ultrasonic Velocity in Liquid and its Thermodynamic Properties under Pressure"
   by Prof. T. Makita; University of Kobe,
4) "Effect of Pressure on the Condensation Reaction"
   by Lect. T. Moriyoshi; Tokushima University,
5) "Effect of Pressure on the Dissociation Reaction"
   by Prof. J. Osugi (Group Leader); Kyoto University,
6) "Biopolymer Solutions and Model Systems under High Pressure"
   by Prof. K. Suzuki; Ritsumeikan University,
7) "Liquid Reaction with Gas under High Pressure"

by Prof. Y. Takezaki; Kyoto University,

8) "Vapor-Liquid Equilibria under High Pressure"
by Prof. T. Toriumi; Tohoku University,

This special issue contains the last reports of this research group on these fundamental studies of the liquid phase reactions at high pressures and some reports already published in journals by the members of the group are also listed as follows.

J. Osugi and Y. Kitamura;
"Optical Studies of Pressure Effects (I) The Measurement of the O–H Stretching Vibration Band of Ethanol", *Rev. Phys. Chem. Japan*, **35**, 25 (1965)

J. Osugi, M. Sato and N. Ifuku;
"Micelle Formation of Cationic Detergent Solution at High Pressure", *Rev. Phys. Chem. Japan*, **35**, 38 (1965)

S. Takahashi and H. Iwasaki;
"The Diffusion of Gases at High Pressure. I. The Self-Diffusion Coefficient of Carbon Dioxide", *Bull. Chem. Soc. Japan*, **39**, 2105 (1966)

J. Osugi, K. Shimizu and H. Takizawa;
"Effect of Pressure on the Dissociation of Electrolytic Solution (III) Electrical Conductivity of Hexammine Cobalt (III) Sulphate at High Pressure", *Rev. Phys. Chem. Japan*, **36**, 1 (1966)

J. Osugi and Y. Kitamura;
"Optical Studies of Pressure Effect (III) Pressure Effect on the Aqueous Solution of Amylose-Iodine Complex", *Rev. Phys. Chem. Japan*, **36**, 88 (1966)

G. Kaminishi and T. Toriumi;
"Vapor-Liquid Equilibria in Systems of CO_2 liq. -H_2, -N_2 and -O_2", *J. Chem. Soc. Japan (Industrial Chemistry Section)*, **69**, 175 (1966)

J. Osugi, T. Mizukami and T. Tachibana;
"Optical Studies on the Effect of Pressure (IV) The Effect of Pressure on the Keto-Enol Equilibria of Ethyl Acetoacetate and Acetylacetone", *Rev. Phys. Chem. Japan*, **37**, 72 (1967)

K. Suzuki and Y. Taniguchi;
"Specific Conductivity of Aqueous Solution of Sodium Salt of Poly-D-Glutamic Acid under High Pressure", *Bull. Chem. Soc. Japan*, **40**, 1004 (1967)

Y. Takezaki, A. Inoue, N. Sugita, H. Teranishi and K. Kudo:
"Reaction of Anisole with Carbon Monoxide under High Pressure", *Bull. Japan Petroleum Institute*, **9**, 45 (1967)

K. Aotani and T. Imoto;
"The Reaction of Aldehydes with Ethyl Alcohol under High Pressure", *J. Chem. Soc. Japan (Pure Chemistry Section)*, **89**, 235 (1968)

T. Imoto and K. Aotani;
"Pressure Effect in the Aldol Condensation", *J. Chem. Soc. Japan (Pure Chemistry Section)*, **89**, 240

(1968)

S. Takahashi and H. Iwasaki:

"The Diffusion of $^{14}CO_2$ in the $^{12}CO_2$-Ar System", *Bull. Chem. Soc. Japan* **41**, 1573 (1968)

J. Osugi and Y. Kitamura;

"Optical Study of Pressure Effects (V) The Effect of Pressure on the Visible Absorption Spectra of Cobaltous Chloride in Alcohols", *J. Chem. Soc. Japan* (*Pure Chemistry Section*), **89**, 569 (1968)

And also many results were reported in the preprints of the 7th～10th Symposium on High Pressure (1965～1968) in Japan.

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