

### Conclusion

The volume change and the activation volume for nonpolar reactions are used to be attributed to the difference between the van der Waals and covalent radii with possible minor geometrical contributions from the solvent packing. However as demonstrated here, the van der Waals volume change is not a dominant factor in many cases. Quite often the change in the void and/or the expansion volume is much larger than the van der Waals volume change. The hypothetical division of volumes proposed here seems to be beneficial when we deal with the effects of pressure, temperature and steric hindrance on  $\Delta V$  and  $\Delta V^\ddagger$ . The last case will be discussed in near future.

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## EVALUATION OF P-V-T PROPERTIES DATA

### The Most Probable Values of Compressibility Factor of Gaseous Ethane and Ethene

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The critical evaluations of the *P-V-T* data of gaseous ethane and ethene have been carried out based upon the experimental data available in literatures. All of the experimental measurements under high pressure were evaluated in view of their reliability and the data were correlated with temperature and pressure. The most probable values and the reference values of the compressibility factor of gaseous ethane and ethene are presented in the form of numerical tables covering the range of temperature from 273.15 to 498.15 K and that of pressure up to  $303.98 \times 10^5$  Pa for ethane, and from 273.15 to 423.15 K and up to  $810.60 \times 10^5$  Pa for ethene. The estimated uncertainty of the tabulated values is also presented in the tables.

#### Introduction

The evaluation of *P-V-T* properties of gases at high pressure has been made as a part of program of "High Pressure Data Center of Japan" organized in the Society of Material Science, Japan, with the sponsorship of the Agency of Science and Technology. In the program, the work for the evaluation of *P-V-T* properties of gaseous methane had already been made and reported previously in this journal<sup>1)</sup>. Next to it, this work for gaseous ethane and ethene has also been performed in a similar manner to the case of methane. The following members of the Committee and researchers attended for the discussion on the present work :

J. Osugi, Y. Takezaki (Kyoto Univ.);  
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1) J. Osugi, Y. Takezaki and T. Makita, *This Journal*, **41**, 60 (1971)