Chapter 6. CONCLUSION

Dielectric and calorimetric properties of several alcohols were studied to clarify the slow dynamics of the intermediate liquid. Alcohol interacts with neighbors by hydrogen bonding in the process of liquid-glass transition.

1. The relaxation behavior and glass transition are explained by the frustration between the density and bond order parameters on the basis of the two order parameter model. The -OH group mainly controls the bond order parameter, while, the packing effect by alkyl group influences the density.

2. The fragility of alcohols depends on not only the number of -OH groups but also the chain structure.

3. From the Adam-Gibbs theory and Matsuoka's domain model, the minimum configurational entropy s^* and domain size are quantitatively determined for the Propylene Glycol monomer and its oligomers. The non-linearity of the relaxation behavior is enhanced as domain size increases.

4. By comparing of the Adam-Gibbs theory with the domain model through VTF relation, it is proved that the relaxation behavior, especially α relaxation, is related to the glass transition. Both dielectric and calorimetric glass transition temperatures are in agreement within experimental uncertainty in alcohols.

5. Three different relaxation processes are found in four kinds of propanol. It is supposed that Debye relaxation originates from the rotation of -OH group in the network structure, α relaxation from the cooperative motion of the molecules as segment around the surface of the domain, and slow β relaxation from the free molecules outside domain.