

## CHAPTER V

### CONCLUSIONS

The density of purified spirosilicate and aminospirosilicate derivative products were investigated by varying temperature and time to find the optimum curing conditions. The volumetric shrinkage property of materials upon curing was reported to be an important parameter of the molecular packing. This packing has been caused from intermolecular hydrogen bonding between hydroxyl group and hydroxyl group or hydroxyl group and amino group of curing structures. Moreover, the hydrogen bonding in the structure is also influenced from the steric hindrance of its attaching group. The higher steric hindrance, the less hydrogen bonding is, resulting in the less shrinkage property.

In addition, aminospirosilicate derivatives are expected to use further as a starting material in benzoxazine synthesis. The products would decrease or minimize the nondimensional stability, which makes the materials have a high potential to use in engineering industry applications.