

CHAPTER V

CONCLUSION

In the syntheses of ferrocenecarboxymethylated polymers by using the esterification reaction between the chloromethylated polymers; POLYMER 1, 2 and 3 and cesium ferrocenecarboxylate (CFC) in the present of phase-transfer catalyst (PTC), the following conclusions can be obtained.

The degree of esterification is found to increase with an increase in reaction temperature, and with an increase in mole ratio of CFC/ $-\text{CH}_2\text{Cl}$ in POLYMER 1; it also slightly increases with an increase in stirring rate. In addition, a high degree of esterification and noncrosslinked polymer can be obtained from the reaction in liquid-liquid two-phase system using low polarity solvent under phase-transfer conditions.

The distribution of catalyst cations between organic and aqueous phase, which is the result of the organic structure of the cation and the nature of the anion associated with the cation, plays a major rule in obtaining the high degree of esterification polymer. Consequently, the order of the catalytic activity for the reaction of POLYMER 1 with CFC is as follows : TBAC > TBPC > TBAB > TBAI > DCHC > TBAS. The mole of catalyst, in addition, should be equal to the mole of polymer substrate for obtaining the high degree of esterification.

The optimum conditions in the synthesis of ferrocene-carboxymethylated polymer by the esterification reaction between POLYMER 1 and CFC in the presence of PTC as the catalyst are the conditions which occur in a liquid-liquid two-phase system using chloroform as a solvent in the presence of TBAC as a PTC catalyst with a stirring rate of ca. 200 rpm at 60°C for 40 h. The CFC/-CH₂Cl in POLYMER 1/ TBAC molar ratio used is 1/1.5/1.

The polymer structure has a the great influence on the esterification reaction between chloromethylated polymer and cesium ferrocenecarboxylate using a phase-transfer catalyst in a nonpolar solvent. The chloromethylated polymers which have small side groups and slow free rotation of the polymer chain (high T_g) will have high reactivity in the esterification reaction under specific phase-transfer catalyst conditions. Using the optimum conditions in (4), POLYMER 1 shows a higher reactivity in the esterification reaction than POLYMER 2 and 3.