

4'-vinylbenzo-15-crown-5의 합성과 Di(ethylene glycol) ethyl ether acrylate와의 라디칼 공중합

마석일, 김용일, 한규찬

인하대학교 섬유공학과

Synthesis of 4'-vinylbenzo-15-crown-5 and its copolymerization behavior with Di(ethylene glycol) ethyl ether acrylate

Soukil Mah, Long Yi Jin and Kyuchan Han

Department of Textile Engineering, Inha University, Incheon, Korea

1. Introduction

Poly(crown ether)s as a functional polymer materials have powerful and selective complexation properties with a large number of metal cations and have advantage of facility of their recovery and modification of their complexation properties in contrast to their monomeric analogues. Poly(crown ether)s having pendant macrocyclic groups can easily form 2:1-type crown ether ring-to-cation complexes with particular metal ions which are a little larger than the cavity of the crown ether ring. Therefore the poly(crown ether)s often exhibit excellent cationbinding selectivities, which are very different from those of the corresponding monomeric analogs. Because of its advantage of processing for nonporous density Carrier-Facilitated Transport Membrane (CFM), it is widely used as carriers for selective transport particular metal ions. However, there is few literature has been reported radical polymerization behaviour of vinyl crown ether monomer and corresponding comonomers. [1~5]

In this study, synthesis of 4'-vinylbenzo-15-crown-5 (VCE) and its copolymerization behavior with di(ethylene glycol) ethyl ether acrylate(DEGEEA) have been investigated.

2. Experimental

Materials.

4'-vinylbenzo-15-crown-5 has been prepared in accordance with the literature(3,

3. Results and discussion

Vinyl crown ether monomer, i.e, 4'-vinylbenzo-15-crown-5, prepared in accordance with the modified Smid procedures(3) was duly identified using $^1\text{H-NMR}$ spectroscopy as shown in Figure 1.

$^1\text{H-NMR}$: 4.0(m, 16H), 5.15(d,1H), 5.62(d,1H), 6.6(m, 1H) and 6.95(m, 3H)

Figure 2 shows $^1\text{H-NMR}$ spectrum of copolymers. It is observed that with increasing monomer feed ratios for DEGEAA, the intensity of peaks at 6.02 ppm is rapidly shifted downfield. It is explained that the proximate crown ether rings proportion is decreased when copolymerization is progressed in increasing of DEGEAA.

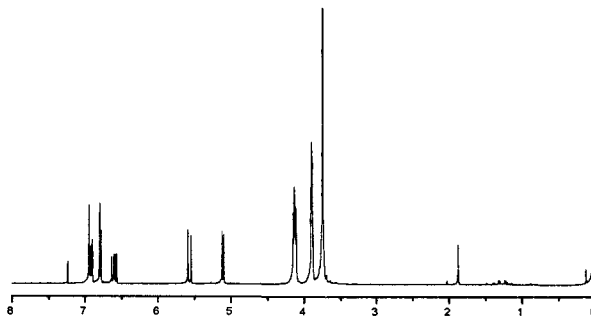


Figure 1. Monomer's $^1\text{H-NMR}$ spectrum (Solvent CDCl_3).

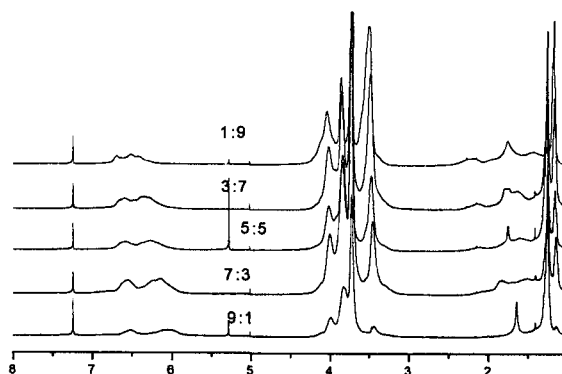


Figure 2. $^1\text{H-NMR}$ spectrum of poly(DEGEAA-co-VCE) (Solvent CDCl_3).

Figure 3 shows monomer-copolymer composition curves of copolymerization of VCE with DEGEEA. its result shows that with increases VCE mole fraction in comonomer it content in copolymer is increased, however when DEGEEA / VCE = 3 /7, monomer-copolymer composition value is equal. Monomer reactivity ratios r_1 and r_2 calculated by the Fineman-Ross method were , 0.55 for VCE, and 0.04 for DEGEEA respectively.

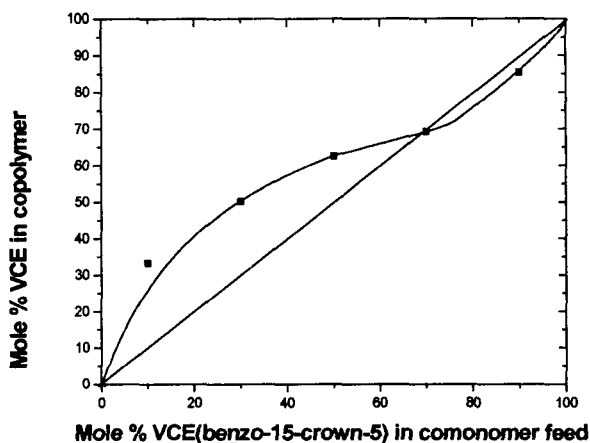


Figure 3. Copolymer composition as a function of monomer feed ratio in the copolymerization of VCE with DEGEEA.

4. Conclusion

Copolymers of 15-membered ring benzovinyl crown ether monomers with DEGEEA was synthesized via free radical polymerization. The reactivity ratios were 0.04 for DEGEEA, 0.55 for VCE respectively.

5. References

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