

Preparation and characteristics of High polymerization PMTA film

Song Jung Han, Tae Won Son

Department of Textile Engineering, Graduate School, Yeungnam University, Gyeongsan , Korea

*School of Textile, Yeungnam University, Gyeongsan, Korea

E-mail: puha2343@nate.com

ABSTRACT

In this work a PMTA(poly m-phenylene terephthal amide) polymer was synthesized by using new solvent to produce film composite. This Film composite membrane based on PMTA were prepared with 1,3-phenylenediamine(MPD), terephthaloyl chloride (TPC) and Co-solvent (NMP with added CaCl₂)was adopted for synthesize PMTA polymer.

A series of synthetic experiments were done, aimed to find the optimum condition of polymerization.

1. INTRODUCTION

Aramid are well known for their high strength and excellent heat-resistant properties. Aramids can be divided into two types, para-aramid and meta-aramid. In this paper a new kind of aramid polymer was synthesized. Its name is poly (m-phenylene terephthalamide), shortened form is PMTA. In the study, a series of synthetic experiments were done, aimed to find the optimum condition of polymerization. The inherent viscosities of the polymers were checked by Ubbelohde viscometer, also the molecular weight of the polymers were calculated. The polymer properties were checked by TGA.

2. EXPERIMENTS

2.1 Materials

MPD(1,3-phenylenediamine),TPC(terephthaloyl chloride) supplied by Aldrich Chemical co. and NMP(N-methylpyrrolidone) supplied by DC Chemical co. Ltd. CaO(Calcium Oxide) supplied by Sigma-Aldrich.co.

2.2 Synthesis

In this paper a series of experiments were done. The final solid (PMTA) concentrations were chosen at 5mol%~15mol% in polymer solution. And in co-solvent, the concentrations of CaCl₂.

2.3 Film forming

Put solution onto the glass plate, used film maker

to form a film with the thickness of 100um. Then put glass plate into water for 12 hours at 60°C, after that put them into the oven for drying for 12 hours at 60°C.

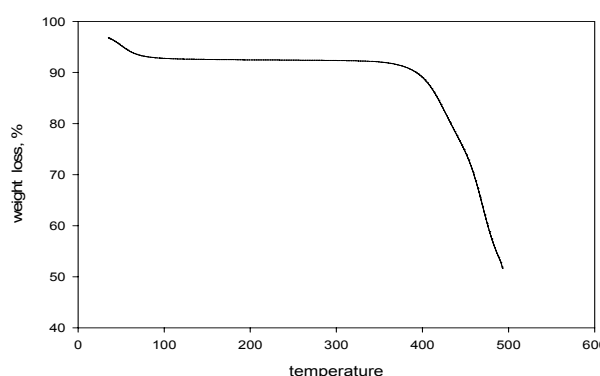


Fig. 1. TGA curve of PMTA Film (Solid 15mol% , NMP(CaCl₂) 5wt%)

3. RESULT AND DISCUSSION

TGA studies thermostable property of PMTA polymer. As the Fig.1 showed, the onset of weight loss by TGA(point where the curve deviates from the tangent to the linear/horizontal segment) for PMTA was observed at the temperature of 360°C namely the initial decomposition temperature. And the onset of intensive decomposition by TGA(point of intersection of the tangent to the segments of the curve before and after the inflection) was at the approximate temperature of 430°C which means the maximum polymer decomposition temperature

4. REFERENCES

- 1.Y.P.KHANNA; "Aromatic Polyamides. I. Synthesis and Characterization of Some Aromatic Polyamides and Their Model Diamides"; 1981.
- 2.Y.P.KHANNA and E.M. PEARCE; "Aromatic Polyamides. II. Thermal Degradation of Some Aromatic Polyamides and Their Model Diamides"; 1981.