폴리(피발산비닐 / 비닐아세테이트) 구형입자의 크기 분포에 영향을 미치는 피발산비닐과 비닐아세테이트의 현탁공중합 조건

김선길, 제갈영순*, 이택승**, 노석균***, 류원석
영남대학교 섬유패션학부, *경일대학교 교양학부, **충남대학교 섬유공학과,
***영남대학교 디스플레이화공학부

Suspension Copolymerization Condition of Vinyl Pivalate and Vinyl Acetate on Size Distribution of Poly(vinyl pivalate / vinyl acetate) Microspheres

Sun Gil Kim, Yeong Soon Gal*, Lee Taek Seung, Seok Kyun Noh*** and Won Seok Lyoo**
School of Textiles, Yeungnam University, Gyeongsan, Korea
**College of General Education,*
Kyungil University, Hayang, korea
***Department of Textile Engineering, Chungnam National University, Daejeon, Korea*
****School of Chemical Engineering & Technology, Yeungnam University, Gyongsan, Korea*

1. Introduction

Supension polymerization is a common industrial process for many reasons, including the ease with which theheat produced by the strongly exothermic reaction can be removed and the possibility of producing polymer particles with diameter in the range 50 - 1000 ㎛ which can be appropriate for different application.[1] One of the most important issues in suspension polymerization process is the control of the final particle size distribution (PSD).[2] Athough many studies on particle size distribution (PSD) in suspension polymerization have been published in the last few decades, the understanding of the influence and importance that the known key factor have on the shape and spread of the PSD is still unclear and incomplete.[3] The size of polymer beads is a complex function of drop break up and coalescence rates during the polymerization process. Those rates are affected by several parameters such as the densities and viscosities of each, interfacial tension, type and concentration of suspending agent, concentration of initiator, type of impeller and stirring speed.

In this study, Poly(vinyl pivalate / vinyl acetate) Microspheres were prepared by using suspension copolymerization at diverse process parameters such as concentration of initiator, diverse blend ratio of VPi / VAc and copolymerization temperature.

2. Experimental

2.1. Materials

VPi and VAc (Shin-Etsu, Tokyo, Japan) were washed with an aqueous solution of $NaHSO_3$ and water and dried over anhydrous $CaCl_2$; this was followed by distillation under reduced nitrogen pressure. The initiator ADMVN (Wako Co., Osaka, Japan; 99%) was recrystallized twice from absolute methanol before use. PVA, with a number-average molecular weight of 127,000 and

a DS value of 88% (Aldrich Co., Milwaukee, WI), was used as a suspending agent. Other extrapure-grade reagents were used without further purification. Water, used for all the procedures, was deionized.

2.2. Suspension copolymerization of VPi and VAc

In a typical, the suspending agent was dissolved in water, under a nitrogen atmosphere and with constant stirring, in a 250 mL reactor fitted with a condenser. After degassing, the VPi and VAi monomers, along with ADMVN, were added all at once at a fixed polymerization temperature. After predetermined times, the reaction mixture was cooled and kept for 1 day to separate and sink spherical P(VPi/VAc) particle. To eliminate residual VPi and VAc and the suspending agent, P(VPi/VAc) was filtered and washed with warm water.

3. Result and discussion

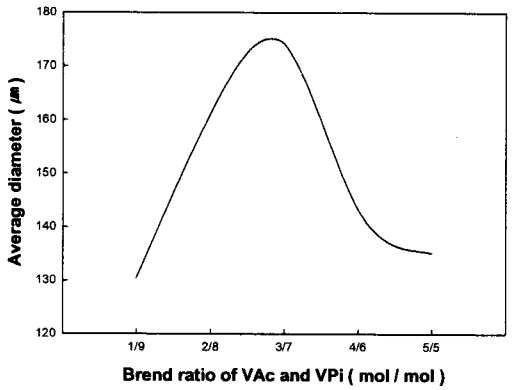

fig. 1. Effect of the blend ratio of VPi and VAc (mol /mol) on average diameter

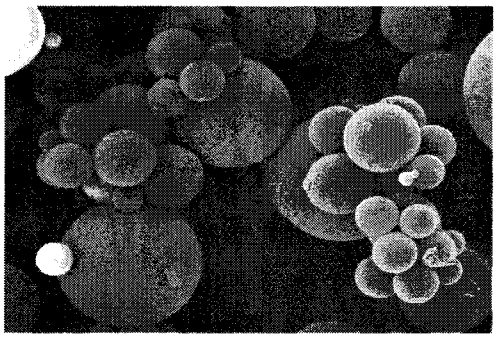

fig. 2. SEM micrograph of nonsieved P(VPi/VAc) microspheres with VPi/VAc feed molar ratio of 3/7

P(VPi/VAc) microspheres were prepared by the suspension copolymerization with various blend ratio of VPi and VAc, which average diameter of particles shown in fig.1. With increasinf the VPi ratio, the particle size of average diameter was increased. While the particle size was decreased at more than VPi/VAc ratio 3/7.

4. Acknowledgements

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