

**THE EFFECT OF SIZING AGENTS ON THE SILANOL
CONDENSATION OF SILANE IN SOLUTION**

Mr. Bunyarit Rotchanarat

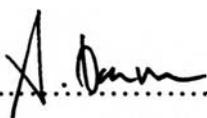
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ABSTRACT

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The effect of antistatic sizing agent on the condensation reaction of the silanol groups of γ -methacryloxypropyltrimethoxysilane(γ -MPS) was studied by using Fourier transform infrared spectroscopy(FTIR) and size exclusion chromatography(SEC). The mixture system between γ -MPS and vinyl trimethyl quaternary ammonium chloride (VTAC) sizing agent was used as the model treating system. It was found that VTAC influenced the silanol condensation of silane coupling agent through its effects on the pH of the treating solution and its interaction with the γ -MPS molecules. The silanol condensation of γ -MPS in the presence of a typical film-former and lubricant has also been studied. The model sizing system consisting of γ -MPS, polyvinylacetate (PVAc) and polyethyleneglycol (PEG) has been investigated by using Fourier transform infrared spectroscopy(FTIR) and size exclusion chromatography (SEC). It was found that PVAc enhanced silanol condensation through its interaction with the methacryl group of γ -MPS. In the system with only γ -MPS and PEG, PEG was found to restrict silanol condensation. However, in the system with both PEG and PVAc, PEG was found to reinforce the enhancing effect of PVAc by exerting a 'neighboring' effect on the silanol condensation.

บทคัดย่อ

บุญญฤทธิ โรจนรัตน์ : ผลกระทบของสารเติมแต่งต่อปฏิกิริยาควบแน่นของสารคู่จับไซเลนในสารละลาย(The Effect of Sizing Agents on the Silanol Condensation of Silane in Solution) อาจารย์ที่ปรึกษา : ศ. ดร. ฮัทสึโอะ อิชิดะ (Professor Hatsuho Ishida) และ ดร. นันทยา ขานุมศ 67 หน้า ISBN 974-636-129-5

ได้มีการนำฟูเรียร์ทรานสฟอร์มอินฟราเรดสเปกโตรสโคปีและไซส์เอกคลูชันโครมาโตกราฟีมาใช้ศึกษาผลกระทบของสารกันไฟฟ้าสถิตย์ต่อปฏิกิริยาควบแน่นของสารคู่จับไซเลน ผลการศึกษาระบบที่ประกอบด้วยแกมมาเอ็มพีเอสกับไวนิลไตรเมทิลควอร์เทอนารีแอมโมเนียมคลอไรด์พบว่า สารกันไฟฟ้าสถิตย์มีผลต่อปฏิกิริยาควบแน่นของสารคู่จับไซเลน โดยอาศัยผลกระทบต่อค่าความเป็นกรด-ด่างของสารละลายและการเกิดอันตรกิริยากับโมเลกุลของแกมมาเอ็มพีเอส

การศึกษาผลของสารเคลือบและสารหล่อลื่นต่อปฏิกิริยาการควบแน่นของสารคู่จับไซเลน โดยใช้ ฟูเรียร์ทรานสฟอร์มอินฟราเรดสเปกโตรสโคปีและไซส์เอกคลูชันโครมาโตกราฟี พบว่า พอลิไวนิลอะซีเตต ช่วยเสริมปฏิกิริยาควบแน่นของสารคู่จับไซเลน โดยอาศัยการเกิดอันตรกิริยากับหมู่เมทาคริลของสารไซเลน ในระบบที่มีสารไซเลนกับพอลิเอทิลีนไกลคอลๆ จะไปขัดขวางการเกิดปฏิกิริยาควบแน่นของสารคู่จับไซเลน อย่างไรก็ตามในระบบที่มีทั้งพอลิเอทิลีนไกลคอลและพอลิไวนิลอะซีเตต พอลิเอทิลีนไกลคอลจะช่วยเสริมผลของสารพอลิไวนิลอะซีเตตโดยทำให้ปฏิกิริยาควบแน่นของสารคู่จับไซเลนเกิดได้มากขึ้น

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