

# A STUDY ON THE POLYVINYLALCOHOL FIBER:

## I. Effect of Spinning Conditions on the Ultimate Fiber Properties

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Recently, high performance polyvinylalcohol(PVA) fiber has attracted attention as substitutes for asbestos in fiber reinforced concrete. More recently, advancement of technologies in polymerization and spinning has made it possible to produce high modulus/high strength PVA fiber on a commercial scale. It is very urgent thing to develop fibers which can replace asbestos because it is obvious that the use of asbestos will be regulated sooner or later.

Polyvinylacetate(PVAc) was obtained by solution polymerization in methanol which has very low chain transfer constant. Low temperature saponification of the PVAc in methanol by NaOH produced PVA with degree of saponification up to 95%.

PVA fibers were prepared by dry jet-wet spinning of either a solution in ethylene glycol (EG) containing boric acid or a solution in the mixture of dimethylsulfoxide (DMSO) and water. Of two methods, the DMSO process produced fibers with smoother surface and more compact microstructure than the EG process. Further, the X-ray diffraction pattern revealed that the spinning method had little influence on the crystalline structure of the fibers although the latter gave rise to higher crystallinity and accommodated greater stretching at the elevated temperature.

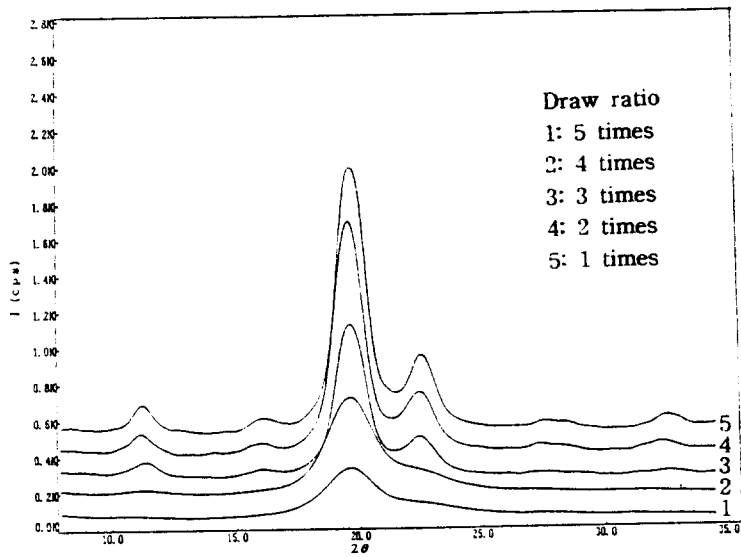


Fig.1. X-ray patterns of PVA fibers of various draw ratios prepared by dry jet-wet spinning of PVA solution in DMSO.

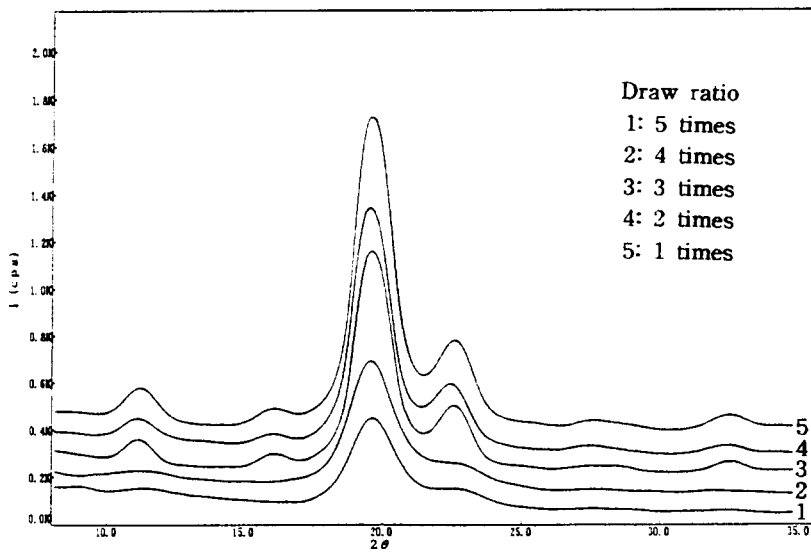


Fig.2. X-ray patterns of PVA fibers of various draw ratios prepared by dry jet-wet spinning of PVA solution in ethylene glycol.