

## Preparation and Properties of Hydrogels of PVA/PVP/Chitosan by Radiation

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### Abstract

The radiation can induce chemical reaction to modify polymer under even the solid condition or in the low temperature. The radiation crosslinking can be easily adjusted and is easily reproducible by controlling the radiation dose. The finished product contains no residuals of substances required to initiate the chemical crosslinking which can restrict the application possibilities. In these studies, hydrogels from a mixture of chitosan and polyvinyl alcohol(PVA)/Poly-N-vinylpyrrolidone(PVP) were made by "freezing and thawing", or gamma-ray irradiation or two steps of "freezing and thawing" and gamma-ray irradiation for wound dressing. The mechanical properties such as gelation, water absorptivity, and gel strength were examined to evaluate the hydrogels for wound dressing. The composition of PVA:PVP was 60:40, PVA/PVP: chitosan ratio was in the range of 9:1 - 7:3, and the solid concentration of PVA/PVP/chitosan solution was 15wt%. Gamma irradiation doses of 25, 35, 50, 60 and 70kGy, respectively were exposed to a mixture of PVA/PVP/chitosan to evaluate the effect of irradiation dose on the mechanical properties of hydrogels. Water-soluble chitosan was used to in this experiment. The mechanical properties of hydrogels such as gelation and gel strength was higher when two steps of "freezing and thawing" and irradiation were used than only "freezing and thawing" was utilized. Gel content was influenced slightly by PVA/PVP:chitosan composition and irradiation dose, but swelling was done greatly by them. Swelling percent was much increased as the composition of chitosan in PVA/PVP/chitosan increased.