RADIATION SYNTHESIS AND CHARACTERIZATION OF NETWORK STRUCTURE OF NATURAL/SYNTHETIC DOUBLE-NETWORK SUPERABSORBENT POLYMERS

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Superabsorbent polymers (SAPs) are moderately cross linked, 3-D, hydrophilic network polymers that can absorb and conserve considerable amounts of aqueous fluids even under certain heat or pressure. Because of the unique properties superior to conventional absorbents, SAPs have found potential application in many fields such as hygienic products, disposable diapers, horticulture, gel actuators, drug-delivery systems, as well as water-blocking tapes coal dewatering, water managing materials for the renewal of arid and desert environment, etc. In recent years, naturally available resources, such as polysaccharides have drawn considerable attention for the preparation of SAPs. Since the mechanical properties of polysaccharide based natural polymers are low, researchers have mostly focused on natural/synthetic polymer/monomer mixtures to obtain novel SAPs.

The aim of this study is to synthesize and characterization of network structure of novel double-network (DN) hydrogels as a SAP. Hydrogels with high mechanical strength have been prepared by radiation induced polymerization and crosslink of acrylic acid sodium salt in the presence of natural polymer locust bean gum. Liquid retention capacities and absorbency under load (AUL) analysis of synthesized SAPs was performed at different temperatures in water and synthetic urine solution, in order to determine their SAP character. For the characterization of network structure of the semi-IPN hydrogels, the average molecular weight between cross links (M_c) were evaluated by using uniaxial compression and oscillatory dynamical mechanical analyses and the advantage and disadvantage of these two techniques for the characterization of network structures were compared.