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Effect of Cross-Linker Concentration on the Synthesis and Swelling Behaviour of Superabsorbent Polymers (SAP) Using Graft Polymerization Techniques

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Abstract:

The graft polymerization of acrylic acid by varying the amount of cross-linker in ranging of 0.001 g to 0.05 g was investigated. The effect of cross-linker in synthesized superabsorbent polymers (SAP) was identified in terms of water absorbency responses by keeping the values of monomer and initiator. The implementation of SAP in agriculture could develop plant growth, enhancing water retention capacity in soils which can reducing dewatering system and improved the efficiency of soil condition so higher yield of product can be obtained particularly in arid regions. The SAPs were synthesized by graft polymerization using acrylic acid (AA) as monomer, N,N'-methylene bisacrylamide (MBA) as cross-linker and ammonium persulfate (APS) as initiator. The optimum water absorbency of synthesize SAP was defined using tea-bag method in deionize water. The structures of synthesize SAP was characterized by Fourier Transform Infrared Spectroscopy (FTIR) and morphologies of synthesize SAP was examined by Scanning Electron Microscope (SEM) testing. From the result, it was obvious showed that water absorbency will decreased as the increased of concentration of cross-linker which is MBA in synthesize SAP. The best value content of MBA was 0.01 g which achieved the highest water absorbency response which is 170 g water/g sample. In conclusion, SAP has hydrophilic structure of which renders them capable for holding a large amount of water which can help to retain nutrients and absorb water in soil with various applications for plant growth and soil condition which will be useful especially in agriculture field.