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SWELLING BEHAVIOUR OF CHEMICALLY ION-DOPPED HYDROGELS

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Polyacrylamide-co-Bisacrylamide was synthesized in the presence of a trace amount of piranine fluoro probe as a doping agent. Piranine binds to the polymer chains over the OH group via radical addition. Thus the final gel was doped with the piranine fluoro probe having SO₃ ions as side groups and Na as counter ions. The swelling behaviour of gels prepared with varying amount of piranine were tested. We observed that the swelling ratio of the gels including 10⁻⁴M maximum did not exceed 15. However when the doping agent reaches some critical value of 10⁻²M an abrupt change occurred in the swelling ratio; the swelling ratio V/V_0 reaches about 1300. Then, the swelling behaviour of the gels doped with the piranine after the preparation where the piranines were diffused into the gel from the outer solution and did not bind to the gel via radical addition were compared with the chemically doped gels. We have observed that the swelling ratio of the gels including free ions is much less than that of the gels including the ions which are chemically bonded to polymer chains. This experiment clearly indicates that the contribution of the ions to the osmotic pressure of the gel becomes much more effective when the ions are stationary on the polymer chains.