SYNTHESIS AND CHARACTERIZATION OF NEW PH- AND THERMO-RESPONSIVE HYDROGELS BASED ON ACRYLIC ACID AND POLY(2-CYCLOPROPYL-2-OXAZOLINE) MACROMONOMERS

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Before the interest of the materials was focused on certain intrinsic properties of the materials like hardness, tenacity, resistance to corrosion, density, among others, with the intention that these materials did not change their properties over time and thus to be able to use them in different types of machinery, construction, among others [1,2]. However, this trend has been changing towards the search of materials that not only have these intrinsic properties but can perform certain tasks or adapt to the environment that surrounds them. These materials are known as smart materials that unlike intrinsic properties, smart materials react to certain changes by design, so sensitive polymer are materials that go through a phase transition in response to an external stimulus such as temperature, pH, magnetic field, electrical impulses, light, among others. This research aims to find new intelligent materials with potential as microchemical, chemicals pumps, sensors-actuators. And that can be used for example for the automatic regulation of certain flow[3,4].

New statistical hydrogels based on acrylic acid and poly (2-cyclopropyl-2-oxazoline) macromonomer were synthesized, where acrylic acid will give sensitivity to changes in pH value while the poly(2-cyclopropyl-2-Oxazoline) will give sensitivity to temperature changes. The synthesis of the macromonomer was a live cationic type polymerization, which allows us to obtain macromonomers with very low polydispersity. Whereas the synthesis of the hydrogels was a free radical redox polymerization in aqueous media [5-9]. The synthesized macromonomer was characterized by 1H-NMR, 13C-NMR and HSQC while the hydrogels were characterized by FTIR and 1H-NMR. It was found that the changes in the degree of water absorption in the hydrogels had a greater variation between a pH value of 3 to 8, where at pH = 3 they had a minimum degree of absorption and at pH= 8 a maximum degree of absorption [10-13]. The temperature sensitivity depended very much on the pH of the medium, however, it was found that the major changes in the degree of absorption occurred between 10 and 45 °C where at 45 °C it had a very low absorption rate compared to degree of absorption at a temperature of 10 °C.

Keywords: hydrogel, smart polymer, bi-sensitive materials

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