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CHARACTERIZATION OF UREASIL-POLYETHYLENE OXIDE/CHITOSAN HYBRID MATERIALS

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Siloxane-polyether hybrids are an interesting and versatile family of multifunctional organic-inorganic hybrid materials, also named ureasils. Ureasils have been the object of intensive studies in the last years due to their versatility and wide range of applications. Polyethylene oxide (PEO) and chitosan are biocompatible and low toxicity polymers that were used as organic phase while the inorganic phase was siloxane. Therefore, the aim of this work was the characterization of these hybrids that were prepared by the sol-gel route. Hydrochloric and acetic acids were used as catalysts. Due to the insolubility of chitosan in ethanol and organic solvents, water was used in the hydrolysis solution as the main component or alone. The obtained materials were transparent, rubbery, flexible and water-insoluble. They were characterized by different physicochemical techniques such as FTIR (Fourier Transform Infrared Spectroscopy), DSC (Differential Scanning Calorimetry), TG (Thermogravimetric Analysis), XRD (X-Ray Diffraction), SAXS (Small Angle X-ray Scattering) and NMR (Nuclear Magnetic Resonance Spectroscopy). Results showed that chitosan addition did not provoke appreciable changes in the thermal properties but modifies the polycondensation degree and the nanoscopic structure of the materials. Significant changes were not found neither by the hydrolysis solution nor by the type of acid, except in the thermal stability. It depended on the type of acid catalyst, being higher in hybrids prepared with HCl. We can conclude that these materials can be synthesized just with water as the hydrolysis solution and that any of the two acids can be used as catalyst without significantly affect its final properties.