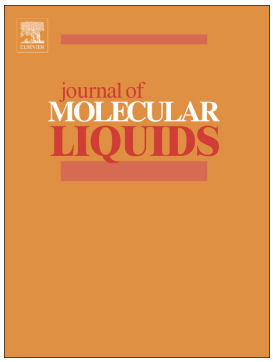

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PII: S0167-7322(17)35556-3
DOI: https://doi.org/10.1016/j.molliq.2018.01.151
Reference: MOLLIQ 8605

To appear in: *Journal of Molecular Liquids*

Received date: 17 November 2017
Revised date: 23 January 2018
Accepted date: 24 January 2018

Please cite this article as: Emad Hassan Borai, Mahmoud Goneam Hamed, Ahmed Mohamed El-kamash, Mohamed Mohamed Abo Aly , Sonochemical synthesis and characterization of emulsion polymer for sorption of lanthanides. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), https://doi.org/10.1016/j.molliq.2018.01.151

Sonochemical Synthesis and Characterization of Emulsion Polymer for Sorption of Lanthanides

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Abstract:

Recent advances in nanostructure materials have been developed by new synthetic method that provides control over size and chemical structure. The utilization of high intensity ultrasound has been investigated for synthesis of nanostructure polymer that is often unavailable by conventional methods. The preparation of emulsion polymer of carboxy methyl cellulose (CMC) as a backbone with grafting of methyl acrylate and acrylic acid has been investigated using ultrasonic irradiation at 15 minutes and Tween 80 as a surfactant which, hardly formed by conventional co-polymerization methods. Tween 80 was immersed inside the polymer matrix to improve interfacial tension between polymer and outer sphere water molecule, as well as to overcome the aggregation and compact of the component inside the polymer which, facilitate the grafting reaction. The influence of surfactant type, ultrasonic time and temperature on the particle morphology was studied. Moreover, Nitrilo tri-acetic acid (NTA) was grafted during the polymerization process to increase the effective function groups and hence increase the sorption capacity toward Lanthanum (La^{3+}), Cerium (Ce^{3+}), Neodymium (Nd^{3+}), Gadolinum (Gd^{3+}) and Uranium (U^{4+}) metal ions. The results showed relatively high sorption capacity reached to110, 121,169, 131, 158, 198 for La^{3+}, Ce^{3+}, Nd^{3+}, Eu^{3+}, Gd^{3+} and U^{4+} mg/g metal ions respectively.

Keywords: Ultrasonic; nanoparticale; Rare earth elements; Polymers; Nanocomposite.