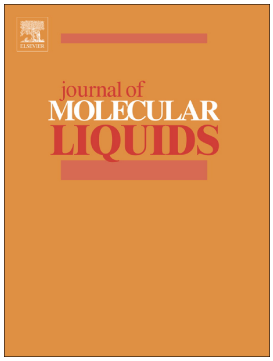

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PII: S0167-7322(16)34220-9
DOI: doi: 10.1016/j.molliq.2017.04.012
Reference: MOLLIQ 7162

To appear in: *Journal of Molecular Liquids*

Received date: 26 December 2016
Revised date: 28 March 2017
Accepted date: 3 April 2017

Please cite this article as: Ayman M. Atta, Hamad A. Al-Lohedan, Abdelrhman O. Ezzat, Ahmed M. Tawfik, Ahmed I. Hashem , Synthesis of zinc oxide nanocomposites using poly (ionic liquids) based on quaternary ammonium acrylamidomethyl propane sulfonate for water treatment. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi: 10.1016/j.molliq.2017.04.012

Synthesis of Zinc oxide Nanocomposites using Poly (Ionic Liquids) Based on Quaternary AmmoniumAcrylamidomethyl Propane Sulfonate for Water Treatment

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Abstract:

Antimicrobial zinc oxide (ZnO) nano-sized materials have been used as environmentally friendly nanocomposites for water treatment applications due to their superior properties. Their particle size growth in water is one of their limitations that affects their preparation as nano-sized ZnO in aqueous medium at room temperature. In the present work, poly(ionic liquid), PIL, based on quaternary ammonium salts of 2–acrylamido-2-methyl propane sulfonic acid homopolymer and its copolymer with N-vinyl pyrrolidone were used as capping agents to control the ZnO shapes and sizes. The surface charges, morphology, particle sizes and chemical structure of ZnO capped with PIL were studied as well as their antimicrobial activity. The prepared ZnO nanomaterial was used to prepare crosslinked 2–acrylamido-2-methyl propane sulfonic acid-co-acrylonitrile nanocomposites to apply as adsorbent for methylene blue dye from water as harmful organic pollutants. The ZnO composites achieved high adsorption removal rate for 3000 mg/L of MB from water during 20 minute.

Keywords: Zinc oxide nano-size, polymer composite, water treatment, poly (ionic liquid), antimicrobial activity.

1. Introduction:

The clean drinking water (free from toxic materials and pathogens) is very urgent human target due to the population growth, extended droughts and more stringent health regulations besides depleting of fresh water sources [**1**]. There are many chemical, physical methods and techniques were used to treat the waste water such as chlorination, ion exchange resins, irradiation with ultraviolet or ultrasonic, boiling, distillation, filtration, reverse osmosis membranes, etc. [**2-4**]. Recently, green nanomaterials attracted great attention to play a crucial role in water treatments due to their unique large surface to volume ratio and their high and fast removal rates to act as environmentally friendly water pollutants adsorbents [**5**]. There are also different opportunities and challenges faced the scientist for using nanomaterials in purification and desalination of water due to