



Efficiency of ultrasonic process in regeneration of graphene nanoparticles saturated with humic acid

Ali Naghizadeh^{a,b,*}, Fatemeh Momeni^a, Elham Derakhshani^a

^aDepartment of Environmental Health Engineering, Faculty of Health, Birjand University of Medical Sciences (BUMS), Birjand, Iran, Tel. +985632381665; Fax: +985632395346; emails: al.naghizadeh@yahoo.com (A. Naghizadeh), fatememomeni76@yahoo.com (F. Momeni), el.derakhshani@yahoo.com (E. Derakhshani)

^bSocial determinants of health research center, Birjand University of Medical Sciences (BUMS), Birjand, Iran

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ABSTRACT

The presence of humic acid, as one of the precursors of trihalomethanes, in water resources causes many health problems for many communities. The purpose of the present study was to investigate the feasibility of ultrasonic process on regeneration of graphene nanoparticles saturated with humic acid. This experimental study was performed in batch condition, which the effects of main parameters such as regeneration time, pH, number of saturation cycles and frequency were investigated for the regeneration of the saturated adsorbent. In the regeneration of graphene nanoparticles saturated with humic acid, the maximum regeneration efficiency, at pH of 11 and regeneration time of 60 min, was 85.37% and 72.47% for frequencies of 60 and 37 kHz, respectively. Regeneration increased with increasing ultrasonic irradiation time. Moreover, the efficiency of regeneration was higher in frequency of 60 kHz compared with frequency of 37 kHz. Adsorption capacity of graphene nanoparticles after five cycles of saturation–regeneration at frequencies of 37 and 60 kHz decreased from 22.65 mg/g to 11.87 and 13.27 mg/g, respectively. The results of regeneration of graphene nanoparticles with ultrasonic waves at frequencies of 37 and 60 kHz showed that the process has a very high efficiency in the regeneration of graphene nanoparticles saturated with humic acid. The process can also be a promising alternative to chemical and thermal regeneration methods.

Keywords: Humic acid; Ultrasonic regeneration; Graphene nanoparticles

* Corresponding author.