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CONTENT	Country	Page
Water Supply And Sewerage System In The Republic Of Croatia And The Republic Of Slovenia	Croatia	1
A New Generation Communication System Model That Provides Immediate Data And Pollution In The Seas	Turkey	2
Simulation Of Marine Pollution From A Tanker Accident At The Canakkale Strait (Dardanelle)	Turkey	3
Assessment Of Ecological Risk Of Heavy Metal Contamination In Agricultural Soil In Municipality Pljevlja (Montenegro)	Montenegro	4
Investigation Of The Reduction Of Herbicide Metribuzin With Sphingomonas Melonis Bacteria	Turkey	5
Response Of High-, Mid- And Low-Abundant Taxa And Potential Pathogens To Eight Disinfection Methods And Their Interactions In Domestic Hot Water System	China	6
Smart Scale For Iot Applications	Turkey	7
Iot Based Forest Fire Monitoring System	Turkey	8
Degradation Of Phenol In Water By Using Tio2 Nanotubes	Turkey	9
Reuse Of Urban Wastewater Effluent For Sustainable Water Production	Turkey	10
Evaluation Of Various Medical Aromatic Plant (Antibacterial / Antioxidant) Extract Structure In The Wood Industry	Turkey	11
Various Protectives In The Wood Industry And Technological Change (Pressure Strength)	Turkey	12
Medical Aromatic Plant Extract Impregnation Effect On The Anatomic Structure Of Wood	Turkey	13
Various Medical Aromatic Plant Extract Impregnation Ability And Tga / Mushroom Tests In Wooden Material	Turkey	14
Natural Polymer-Based Composite Hydrogel Beads For Adsorptive Removal Of Reactive Dyes From Wastewater	Turkey	15
Synthesis And Characterization Of Graphene Oxide Nano-Sheets And Its Application As Adsorbent For Wastewater Treatments	Turkey	16

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SYNTHESIS AND CHARACTERIZATION OF GRAPHENE OXIDE NANO-SHEETS AND ITS APPLICATION AS ADSORBENT FOR WASTEWATER TREATMENTS

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Abstract:

Recently, there has been a great attention in the use of graphene oxide (GO) as an adsorbent in wastewater treatments. GO is a novel two-dimensional carbon material with a honey-comb structure synthesized from graphite. It is biocompatible and has excellent mechanical strength, also it is obtained by easy preparation methods. GO nano-sheets have large surface area and abundant oxygen-containing functional groups such as carboxylic, hydroxyl and epoxide groups. Therefore, GO shows hydrophilic property and can be easily dispersed in water [1]. Moreover, these groups can act as anchoring sites for metal ion complexation or provide binding sites for dye molecules through hydrogen bonding, dipole–dipole interaction, ionic interaction, etc. As a result, all these properties make GO attractive to use in the adsorption of both heavy metal ions and dye molecules from wastewaters. However, it is difficult and costly to separate and recover GO from treated water due to its small size and high dispersibility in water. To overcome these limitations, GO is incorporated into a polymeric matrix as a nanofiller, resulting in polymer nanocomposites like hydrogels used as adsorbents in water treatment [2, 3].

In this study, GO nano-sheets were synthesized modified Hummer method [4]. It was aimed to increase the number of oxygen-containing functional groups of GO nano-sheets for the increment of its adsorption capacity. The obtained GO were characterized by FTIR, UV, XRD and SEM analysis methods. The lateral size of the sheets was also determined dynamic light scattering method. Then, the GO incorporated nanocomposite hydrogel with acrylic polymer matrix was prepared. The adsorption capacity of this nanocomposite was determined for Pb+2 ions and azo dyes in aqueous medium.

Keywords: Wastewater Treatment, Graphene Oxide, Adsorption

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