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Synthesis of Cu-TiO2 Nanocomposite and Investigation of the Effectiveness of PEG, Pectin, and CMC as Additives

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Abstract

Recently, TiO2 has been widely used as a photocatalyst for degradation of environmental pollutants. In the present study, the advantage of metal doping onto TiO2 for enhanced photocatalitic activity has been investigated. Copper-Titanium dioxide nanocomposites were prepared by the sol-gel method in the presence of Carboxy Methyl Cellulose (CMC), Pectin, and Poly Ethylene Glycol (PEG) as additives. The structures and properties of prepared samples were identified by IR spectra, Scanning Electron Microscopy (SEM), and X-Ray Diffraction (XRD) methods. Furthermore, the photocatalytic activity under UV-irradiation to remove organic pollutant was investigated. The results have revealed that the photocatalytic activity of the nanocomposite in presence of additives increased. SEM pictures have shown that the particle size of Cu-TiO_2 powder with additives was smaller than other samples without any additive.

Key words: *Sol-Gel, Nanocomposite, Photocatalytic activity, Additive.*

Introduction

Titanium dioxide (TiO_2) has been an attractive research material in recent years, due to its extensive applications. Thanks to its durability, availability, non-toxicity, stability and high refractive index, titanium dioxide is a preferred material for various applications such as white pigment, gas sensor, corrosive-protective, and as photocatalyst. For environmental concerns, this material is extensively used for to photodegradation of organic and inorganic pollutants [1].

In order to improve the efficiency of photocatalytic activity, TiO_2 catalyst can be modified with the addition of various impurities. For example, metals or metallic oxides can be added either into the TiO_2 structure by doping, implanting or coprecipitating or on the TiO_2 surface by coating or photodepositing as metal islands Among them, one approach is

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