Chemical transformation of pet waste through glycolysis

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Abstract

PET bottle grade material makes up a significant portion of the feedstock in plastics recycling. Theoretically, there are many end users however there are few applications for less purified grades of recycled PET. The current work is aiming to investigate the transformation of recycled PET into its chemical building blocks using glycolysis to produce unsaturated polyester resin. In this regard, PET waste has been collected from different sources, mainly, beverages and bottled water. Chemical transformation has been achieved through degrading glycolysis reaction with different glycols namely, propylene glycol, diethylene glycol, triethylene glycol and mixture of diethylene glycol with propylene glycol or triethylene glycol in equal amounts. The glycolized products have been converted into unsaturated polyester (UP) after the reaction with maleic anhydride. Finally, styrene was added as a crosslinker and the obtained UP has been characterized. Factors affecting the curing process of the obtained unsaturated polyester resin have been investigated. (C) 2011 Elsevier Ltd. All rights reserved.
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Preparation and characterization of multi-walled carbon nanotubes/chitosan nanocomposite and its application for the removal of heavy metals from aqueous solution

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Abstract

Multi-walled carbon nanotubes (MWCNTs) were modified with chitosan, and a homogenous nanocomposite was obtained. The morphological properties of the MWCNTs/chitosan nanocomposite were studied with scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR), and thermal gravimetric analysis (TGA). The morphological results indicate the successful modification and the formation of MWCNTs/chitosan nanocomposites. The MWCNTs/chitosan nanocomposite was packed inside a glass column and used for the removal of copper, zinc, cadmium, and nickel ions from aqueous solution. The MWCNTs/chitosan nanocomposite showed a great efficiency for the removal of the target metal ions from the aqueous solution. The results suggested that this novel MWCNTs/chitosan nanocomposite could be used for different environmental applications. (C) 2010 Elsevier B.V. All rights reserved.

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Utilization of Urea- and Melamine-Formaldehyde Resin Wastes as Reinforcing Materials

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Abstract

Industrial wastes of urea-formaldehyde (UF) and melamine-formaldehyde (MF) resins have been collected from industrial sources in Jeddah. Such wastes were classified, with the exclusion of unsuitable fractions, according to color or shape. After that, classified wastes were ground into relatively fine powder and the coarse granular parts were excluded with the aid of special sieves. The powdered wastes were mixed in different compositions with unsaturated polyester (UP) in the presence of cobalt octanoate activator and methylethylketone peroxide initiator for crosslinking. Different mixtures were prepared in a cylindrical form and characterized through their ability to absorb water and their compression strength. Results have been discussed according to the variation of the chemical structure of the waste resins used. They reflect the ability of thermosetting polymeric wastes, especially those of UF and MF resins, to be utilized as fillers and reinforcing materials in UP end-products.

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Author(s): Abdelaal, Magdy Y.; Sobahi, Tariq R.; Makki, Mohamed S. I.

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Chemical Degradation of Poly(Ethylene Terephthalate)

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Abstract

The possibility of converting polyethylene terephthalate (PET) waste into terephthalic acid as a primary material by using different techniques through trans-esterification, with an alcohol and through hydrolysis in basic medium, has been investigated. In addition, utilization of activating agents such as inorganic salts and phase transfer catalysts has been investigated. Mineral water and beverage bottles were collected, cleaned and crushed into flakes suitable for the intended experiments. Also, the main products of chemical conversion of such wastes were isolated and confirmed by authentication with standard terephthalic acid through Thin Layer Chromatography (TLC) technique. The reaction yield % was determined to optimize the corresponding experimental conditions and the obtained results have been presented and discussed.

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43 Issue: 3 Pages: 913-936 DOI: 10.1081/PPT-120038070 Published: 2004

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Inventor/Assignee: TAMADA R

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Inventor/Assignee: YOSHINAGA K

17. Title: 200193080 Patent Number: JP 200193080
Inventor/Assignee: YOSHINAGA K

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Author(s): Yoshioka, T; Ota, M; Okuwaki, A
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Chemical modification of PVC into polymer-supported oxazolinones and triazoles

Abdelaal, MY (Abdelaal, Magdy Y.); Sobahi, TR (Sobahi, Tariq R.)

Abstract

PVC (P1) was converted into polymer-supported oxazolinone and triazole derivatives after sequential chemical assembly of the reactive groups onto PVC. First, poly(vinyl chloride-co-vinylaminoaniline) (P2) was prepared by the reaction of PVC with p-phenylenediamine. The primary aromatic amino group in P2 was diazotized and reacted with hippuric acid to form the supported oxazolinone derivative (P3) which could be converted into supported triazole derivatives (P4)-(P6) on further interaction with substituted anilines. The involved ring opening and preferred cyclization reactions have been clearly addressed based on spectroscopic and elemental analyses of the products. Also the ability for metal uptake has been roughly tested through the interaction with Cu(II) ions. (c) 2007 Wiley Periodicals, Inc.
Author Keywords: functional polymers; PVC; oxazolinone; chemical modification; triazole
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