Chemical Modification of PVC into Polymer-Supported Oxazolinones and Triazoles

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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. © 2007 Wiley Periodicals, Inc. J Appl Polym Sci 104: 2304–2309, 2007

Key words: functional polymers; PVC; oxazolinone; chemical modification; triazole

INTRODUCTION

Chemical modification of polymers has widespread applications, as the obtained functionalized polymers acquire the reactivity of the introduced functionality while keeping the main features of the base polymeric matrix.[1–5] Hence, many functional polymers have been prepared through the reaction of a base polymer with different chemically reactive species such as aldehydes,[6,7] phenols,[8] and ketones.[9] Functionalization can also be achieved through physical blending of some organic compounds such as phenolic compounds.[10] Some heterocyclic compounds showed stabilizing efficiency for rubber mixes[11] and their ability for metal uptake is expected as well. Considering the problems in the case of physical blending, which cause the additives to bloom to the surface of the blend, chemical blending or functionalization would be beneficial in comparison. Oxazolinones and triazoles are known as common classes of organic compounds and a lot of work, from the middle of the last century,[12] has been done to synthesize different oxazolinones and 1,2,4-triazoles either through solution- or through solid-phase synthesis strategy. However, little work has been reported in the light of supporting them onto polymer matrices.[13–15] The supported organic compounds in the current work are the first to be synthesized in the last decade and since that time no bulk work has been done.[11]

The present work deals with the chemical modification of **P1** into polymer-supported oxazolinone and triazole derivatives through sequential chemical assembly of the reactive species onto the **P1** matrix. Characterization of the obtained modified polymers as well as estimation of the reaction efficiency has been achieved and the possible ability for metal uptake has been also roughly tested through the interaction with Cu(II) ions.

EXPERIMENTAL

All chemicals were purchased from Aldrich, unless otherwise mentioned, and used without further purification. The low molecular weight analogues as model compounds have been synthesized and characterized previously by our group.[11]

Conversion of P1 into poly(vinyl chloride-*co*-vinylaminoaniline) (P2)

P1 has been converted into poly(vinyl chloride-*co*-vinylaminoaniline) **(P2)** through chemical modification with *p*-phenylenediamine **(1)**, according to the method reported before.[11] Elemental and FTIR spectroscopic analyses have concluded the formation of the above-mentioned copolymer **(P2)** with 70% conversion. The reaction conversion has been calculated from the elemental analysis on the basis of mole fraction concept.[16]

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