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CORROSION2002

ADVAN... BIODEGRADABLE ... CORROSION PROTECTION PACKAGING

Christophe ... ler
Cortec Corporation
4119 White Bear Parkway
Saint Paul ...
USA

ABSTRACT

... films based on polyethylene are used in numerous applications. ... these films are either recycled or disposed of in landfills. Due to very limited ... land space, several countries have enacted ... laws to severely ... the disposal of plastic materials into landfills. A new ... VCI film has been developed to address the disposal concerns that ... of the polyethylene VpCI films have. ... these films not only provide excellent corrosion protection, but also readily degrade ...

INTRODUCTION

Corrosion is a plight that ... working with metals faces. Its impact on the United States economy has been documented to be about ... of the Gross ... product. It was estimated that about one third of the cost of corrosion ... could be ... The avoidable costs were related to the failure to use the best ... corrosion prevention ... available.

There are several ways of combatting corrosion. One method that is gaining wider acceptance is the use of vapor phase corrosion inhibitors (VpCIs). These chemical compounds ... their volatility at room temperature with their corrosion-inhibiting properties. ... compounds can reach ... crevices ... Protection ... within an enclosed space until equilibrium is reached. ... equilibrium is determined by the partial vapor pressure of the VpCI compound.

… dissolved in the electrolyte layer cause electrolyte layer inhibition. MCIs possess appreciable saturated vapour pressures under atmospheric conditions, thus allowing significant vapour phase transport of the inhibitive substance[11]. MCI admixtures migrate to the reinforcement … (both liquid and vapour). The first commercial use of … inhibitors was in 1980, as shown in Table 1. Migrating corrosion inhibitors … and once corrosion starts slow the corrosion rate to … a control. Superplasticizers modify the properties of fresh … concrete by increasing its workability, which … reduce the water/cement ratio, reduce the cement content or increase the workability of the concrete. Water-reducing admixtures were first introduced in 1935 as plasticizers … on ligno-and naphthalene sulfonates. In the early 1960's the first high range, or "super"-plasticizers, based on melamine and naphthalene formaldehyde were introduced[12]. Over the last 10 years a new generation of polycarboxylate … superplasticizers … developed (Table 2). The dispersion mechanism of these superplasticizers in cement paste is best explained in … electrostatic repulsion between cement particles, which … negatively charged … the adsorption of the polymer molecule on to the cement surface. Superplasticizing admixtures, when added to concrete mix … are very important admixtures in concrete technology today.

In order to test the compatibility of migrating corrosion inhibitors in … with superplasticizers, the three types of migrating corrosion inhibitors and three types of superplasticizers were tested in the combination … of separate dosages of migrating corrosion inhibitors and superplasticizers during the preparation of the specimens … as one product[14]. The three types of migrating corrosion inhibitors investigated were based: on alkanol amine, aminocarboxylates and … of oxycarbonic acids and on amine … and … organic inhibitors. The three types of superplasticizers investigated were based: on … on melamine salt and on salt of sulfonaphthalene.

The compatibility testing on fresh … concrete consisted of setting time of the cement paste at … on the hardened concrete on …

...extract was prepared following the procedures in ASTM D 5 ... (Standard Practice for ... Water Extraction ... Degraded Plastics for Toxicity Testing). The test organisms were larval fathead minnows. Test solutions for the chronic toxicity were renewed daily by transferring organisms to fresh test solutions. Test organisms were exposed to the control water and to ... filtered extract. Chronic toxicity was determined to be present if the growth of test organisms ... extract were significantly less than that of the control organisms.

DISCUSSION

[illegible]

The amount of carbon ... produced ... carbon present in the sample ...

The amount of CO_2 produced, when compared to the maximum theoretically calculated ... should have been produced, ranged from 92 to 128% ... The carbon conversion ... for the control (cellulose) was ...% (Figure ...).

The weight loss for the film ranged from ... to ...%. The positive control (cellulose) had a weight loss of 100% (Figure 4).

... the carbon conversion and the overall weight loss, the polyester-based ... film is considered to have ... biodegradability.

Chronic toxicity

... percent survival of the ... 97.5% survival ... both the control exposure and in the 100% extract exposure (Figure 5).

Mean dry weight of fish ... the control ... mg for the ...

[illegible]

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