Applied Catalysis A: General 423–424 (2012) 205–210

Contents lists available at SciVerse ScienceDirect

Applied Catalysis A: General

journal homepage: www.elsevier.com/locate/apcata

Preparation of Al, Ti, Zr-perfluoroheptanoate compounds and their use in ring opening polymerization

Gamze Yalcin, Ufuk Yildiz, Asgar Kayan*

Kocaeli University, Department of Chemistry, Kocaeli 41380, Turkey

ARTICLE INFO

Article history:
Received 5 January 2012
Received in revised form 16 February 2012
Accepted 26 February 2012
Available online 5 March 2012

Keywords:
Catalyst
Metal alkoxides
Perfluoroheptanoate
Ring-opening

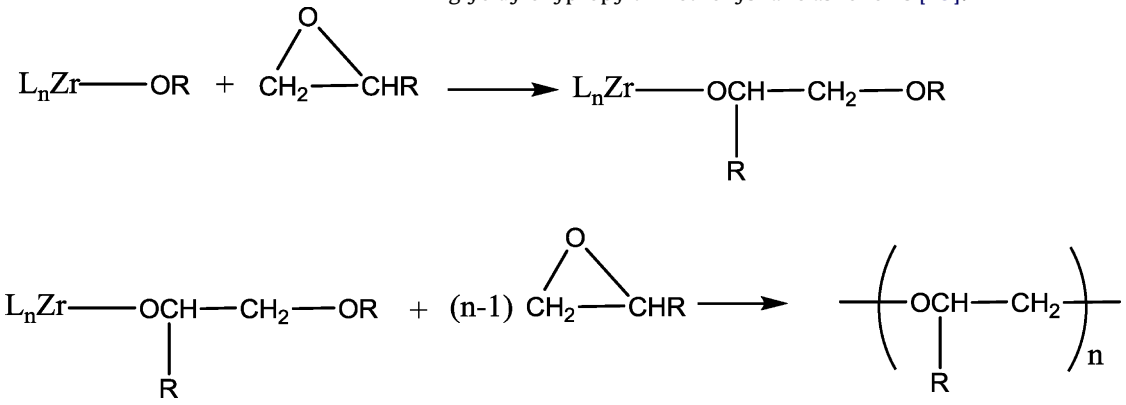
ABSTRACT

Aluminum, titanium and zirconium perfluoroheptanoate (PFH) were prepared by reaction of Al, Ti and Zr-alkoxides with perfluoroheptanoic acid (PFHA) in alcohol. All compounds were characterized by NMR spectroscopy, FTIR, MS and elemental analysis and used in polymerization of 3-glycidyloxypropyltrimethoxysilane (GPTS) in order to see their catalytic activity over epoxides. These catalysts were effective in ring opening of epoxide. Poly-GPTS was characterized by ^{1}H, ^{13}C NMR and gel permeation chromatography (GPC).

1. Introduction

Carboxylate anions and their derivatives are useful ligands for the construction of new interesting supramolecular compounds [1–3]. Metal alkoxide complexes modified by carboxylates, β-diketonates and β-ketoesterates ligands have attracted much attention as coating materials for glasses [4,5]. Only a few reports mention the use of $L_nM(OR)$ compounds as catalysts for the polymerization of epoxides [6–8]. The chemistry of the complexes of the type Al, Ti and Zr-(OR)(perfluoroheptanoate) in which OR^- is a potentially active ligand for polymerization catalysis remains unknown. Ring-opening polymerization of epoxide monomers has been gaining much attention due to its wide range of applications [9,10]. 3-Glycidyloxypropyltrimethoxysilane is one of the most commonly used epoxides for the preparation of inorganic–organic hybrid polymers which are used, for instance, for hard coatings of organic polymers, adhesion promoters, derivatizing surfaces, contact lens materials in the optical industry, electronics, membranes, sensors, nano-imprinting and waveguide [11–15]. So far, there is not enough knowledge concerning the effect of different catalysts on the epoxide ring-opening and the polymerization degree of GPTS in polymerization reactions.

Tetrafluorophthalate zirconium complex was synthesized and characterized recently and used in the polymerization of 3-glycidyloxypropyltrimethoxysilane as follows [15]:



* Corresponding author. Tel.: +90 262 3032018; fax: +90 262 3032003.
E-mail address: akayan@kocaeli.edu.tr (A. Kayan).

0926-860X/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
doi:10.1016/j.apcata.2012.02.042