

Synthesis and characterization of 4-cyano-4- [(phenylcarbothioyl)sulfanyl]pentanoic acid RAFT agent

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ABSTRACT

In this work, we used grignard reagent to prepare dithiocarboxylic acid. Then as first option, oxidation with dimethyl sulfoxide (DMSO) to diphenyldithioperoxyanhydride and its derivate was carried out. The formation of dithoesters is possible when the coupled compounds (disulfides) are allow to react with initiators such as 4,4-azobis(4-cyano pentanoic acid). The synthesized RAFT agent were identified by fourier-transform infrared (FTIR) and nuclear magnetic resonance spectroscopy(NMR).

Keywords: RAFT AGENT, controlled/living free radical polymerizations, dithoester,

1. INTRODUCTION

Much work carried out [1–5] over the past few years has demonstrated that polymerization with reversible addition–fragmentation chain transfer (RAFT) is an extremely versatile process. It can be applied to form narrow polydispersity polymers or copolymers from most monomers amenable to radical polymerization. It is possible to take RAFT polymerizations to high conversion and achieve commercially acceptable polymerization rates. Polymerizations can be successfully carried out in heterogeneous media (emulsion, miniemulsion, suspension). There is compatibility with a wide range of functionality in monomers, solvents and initiators. Stars, blocks, microgel and hyperbranched structures, supramolecular assemblies and other complex architectures are accessible and can have high purity. great progress has been acheived in controlled/living free radical polymerizations (CLRP) technique that enables the design of well-defined, functional and complex macromolecular architectures. Such as living free radical nitroxide-mediated polymerization (NMP) [12–14], atom-transfer radical polymerization (ATRP) [21–24] and reversible addition-fragmentation chain transfer (RAFT) [6–11]

However, this outstanding versatility cannot be achieved without giving due thought to the choice of RAFT agent and reaction conditions. Reported difficulties with RAFT polymerization (retardation, poorer than expected control) are frequently attributable to inappropriate choice of RAFT agent for the monomer(s) and/or reaction conditions. RAFT agents that perform well under a given set of circumstances are not necessarily optimal for all circumstances. In consideration of the mentioned concerns, the main aim in this work was to Synthesis and characterization of 4-cyano-4-[(phenylcarbothioyl)sulfanyl]pentanoic acid RAFT agent in the presence of grignard reagent.

2. Experimental

2.1. Materials

N, N-Dimethyl formamide (DMF) (Merck-Germany) was distilled under reduced pressure from calcium hydride and stored over molecular sieves (4A). Bromobenzene and carbon disulfid dried using anhydrous magnesium