VERSITA

Cent. Eur. J. Chem. • 8(4) • 2010 • 946-952
DOI: 10.2478/s11532-010-0062-7

Central European Journal of **Chemistry**

Spectroscopic evaluation of chiral and achiral fluorescent ionic liquids

Research Article

Hadi M. Marwani*

Department of Chemistry, King Abdulaziz University, Jeddah 21589, Saudi Arabia

Received 08 January 2010; Accepted 13 April 2010

Abstract: In this study, spectroscopic investigation of chiral and achiral room temperature ionic liquids is achieved. New ionic liquids were prepared *via* metathesis, accomplished by the reaction of either L-phenylalanine ethyl ester hydrochloride, chlorpromazine hydrochloride or 1,10-Phenanthroline monohydrate hydrochloride with lithium bis(trifluoromethane) sulfonamide in water. The resulting ionic liquids were produced in high yield and purity. The results obtained by use of ^{1}H NMR and IR experiments were in very good agreement with the chemical structures of the synthesized ionic liquids. In addition, the results of thermal gravimetric analysis suggested that these ionic liquids have good thermal stability. UV-Vis and fluorescence spectroscopy measurements indicated that these ionic liquids are strongly optically absorbent and fluorescent. Lastly, time-based fluorescence steady-state measurements demonstrated the high photostability of these ionic liquids.

Keywords: *Ionic liquids • Metathesis reaction • NMR • UV-Vis • Fluorescence*

1. Introduction

One of the most pressing industrial problems is the dependence of nearly all chemical plants on toxic, hazardous, and flammable organic solvents [1]. However, recently discovered room temperature ionic liquids (RTILs) show promise as a replacement for volatile organic compounds. There is evidence that ionic liquids (ILs) are exceptional and versatile solvents in a host of analytical and chemosensing applications [2,3]. ILs have also generated interest in environmental areas because of their potential as greener solvents for many organic, inorganic, and polymeric substances as compared to environmentally damaging organic solvents [4]. The good thermal stability, high ionic conductivity, miscibility with other solvents, negligible vapor pressure, and the non-reactive and recyclable nature of ILs are a few other properties that make these compounds appropriate solvents for diverse applications [5-7]. RTILs belong to a class of potentially benign solvents that exist as molten salts under ambient conditions [8]. Both ILs and molten salts are composed of ions. The presence of bulky organic cations in ILs interrupts the crystal packing and lowers the melting temperature.

RTILs have potential for many different applications, including catalysis and synthesis. For instance, conventional organic solvents have been replaced by ILs in organic synthesis [9]. They have also been used in solvent extractions [10], liquid-liquid extractions [11], enzymatic reactions [12], pharmaceutical studies [13], electrochemical studies [14], dye-sensitized solar cells and batteries [15], and as buffer additives in capillary electrophoresis [16], stationary phases in gas-liquid chromatography [17], and ultralow volatility liquid matrixes for matrix-assisted laser desorption/ionization (MALDI) mass spectrometry [18]. In addition, their high thermal stability allows for their use in high temperature gas sensing [19].

Chiral ILs have been used as chiral selectors in different applications because of their chiral recognition abilities [13,20-22]. It has also been found that chiral ILs can be good alternatives for other chiral selectors, such as, cyclodextrins, molecular micelles, antibodies and crown ethers. The use of other chiral selectors is limited because of their low solubility, difficult organic syntheses, instability at high temperature, and high cost. However, chiral ILs are at a preliminary stage of development, and although there have been many

* E-mail: hmarwani@kau.edu.sa

Springer