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Development of new hexamine and DABCO-based ionic liquids as green solvents for organic reactions

Warjeet S Laitonjam

Manipur University, India

Hexamethylenetetramine-based and DABCO-based ionic liquids were synthesized. These readily available DABCO-based and hexamethylenetetramine-based ionic liquids behave as recyclable catalysts for various organic reactions, such as, the Michael reaction, the Knoevenagel condensation, Henry reactions, aldol reactions, etc. It will be demonstrated that the DABCO-based ionic liquids behave as recyclable catalysts for the Michael addition reaction of a broad range of active methylene compounds, and α,β -unsaturated carboxylic esters and nitriles, offering excellent yields in short duration. The Knoevenagel condensation of various aromatic/aliphatic/heterocyclic aldehydes and ketones with active methylene compounds using DABCO-based and Hexamethylenetetramine-based ionic liquids afforded the condensation products in excellent yields in short durations. The use of DABCO-based ionic liquid, 1-butyl-4-aza-1-azaniabicyclo[2.2.2]octane hydroxide, as an efficient catalyst for Henry reaction of various carbonyl compounds with nitroalkanes affording very high yields within short duration will also be highlighted. These ILs can also be used as green catalysts for aldol reactions of various aromatic aldehydes and ketones under solvent free conditions at room temperature; and very high to excellent yield can be obtained. These methods are very simple, clean and avoid hazardous organic solvents. The catalysts could be easily recovered and recycled for several times. Thus, development of a series of ionic liquids which could be easily prepared and could be used as recyclable catalysts for various organic reactions will be highlighted. The process developed is an improved process which offers several advantages over other processes and would contribute to environmentally friendly and safer processes.

warjeet@yahoo.com

The effect of Magnetic Resonance Imaging (MRI) on some properties of acrylic resin denture base materials

Amer A Taqa, Ammar Kh Al-Noori and Ahmed I J Al-Khyeet

University of Mosul, Iraq

Introduction: Magnetic Resonance Imaging have been used nowadays as one of the accepted tool for diagnosis, estimation, and evaluation of many of human diseases; in dentistry, many of prosthodontics patients and "maxillofacial-prosthesis" patients may fall under the category who might be subjected to routine MRI check-up either for follow-up of certain disease or cancer patient for determining the degree of healing or metastasis; thus, there has been growing interest in the research of the possible effect of MRI procedure on different component of dental appliances worn by the patients and one of these components is heat cured acrylic resin.

Aim: The aim of this study is to evaluate the effects of magnetic resonance imaging on mechanical (tensile strength, hardness) physical (color change) chemical (FTIR, NMR) properties at different periods of time exposure.

Materials & Methods: In this study, total 454 samples were prepared from acrylic based heat cured denture material, which were divided into two main groups clear and pink. Each main group was subdivide into 4 groups according to the exposure to MRI control; (5, 15, 30) minute each of the 4 sub-groups underwent different tests like tensile strength, hardness (Rockwell) test, dimensional accuracy test, color change by spectrophotometer, surface roughness, water sorption, residual monomer release by FTIR and NMR.

Results: The results were analyzed by descriptive analysis, analysis of variance, Duncan's multiple range tests and student's t-test. The results showed that there were changes in the physical properties of heat cured acrylic resin weather it is in pink or clear after exposure to MRI and these changes happened at different levels and variable degrees. It was also shown that there was a slight tendency to change order of arrangement of atoms within each molecular with no well and clear evidence of chemically altering of the main material itself, at least, at circumstances of experiment.

amertaqa@hotmail.com