Abstract Listing

Use your browser's Print button, or File-Print command sequence.

417128: Liquid ionic phosphates (LIPS): Electrochemical and spectroscopic properties

IEC 0 [417128]: Liquid ionic phosphates (LIPS): Electrochemical and spectroscopic properties

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ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry*
Invited: *Y*
Comments to Organizer: *Immediately following our other oral presentation (R.Engel last author)*
Preferred Presentation Format: *Oral*
Consider for Sci-Mix: *N*
Conforms to Bylaw 6: *Y*
Last Modified: *2000-11-24*

Abstract

The recently synthesized liquid ionic phosphates (LIPs), phosphate salts of polyammonium cations, have been investigated for their electrochemical and spectroscopic characteristics. In particular, the specific conductivities of these new species have been studied in the pure state and with added salts, and measurements of diffusion characteristics have been made using pulsed gradient spin-echo NMR. The abilities of these new non-aqueous ionic liquids (NAILs) for partitioning of salts with insoluble liquid organic media have also been investigated, along with measurement of the electrochemical windows for the pure LIPs. A study of the UV/Vis spectroscopy of these new materials has also been conducted. The absorption spectra of the LIPs differ between the pure state and in aqueous solution. Further, an investigation of the observed fluorescence in aqueous solution of the LIPs bearing unsaturated linkages in the organic portion has been conducted. While most efforts have been focussed on the polycationic species, corresponding studies of LIPs based on simple pyridinium and imidazolium cations are also discussed.

419480: Superoxide electrochemistry in ionic liquids

IEC 0 [419480]: Superoxide electrochemistry in ionic liquids

Matthew L. Leonard, Matthew C. Kittle, **Michael A. Matthews**, and John W. Weidner, Department of Chemical Engineering, University of South Carolina, Swearingen Engineering Center, Columbia,

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ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry*
Invited: *N*
Comments to Organizer: *We are submitting in response to a Call for Papers. Dr. Michael A. Matthews of University of South Carolina (matthews@engr.sc.edu) sent an email asking/confirming invitation.*
Preferred Presentation Format: *Oral*
Consider for Sci-Mix: *N*
Conforms to Bylaw 6: *Y*
Last Modified: *2000-11-19*

Abstract

We have demonstrated that superoxide ion can be generated electrochemically in a room-temperature ionic-liquid solvent. It is proposed that these superoxides can be used to perform low-temperature oxidation of wastes. Low-temperature oxidation of wastes in such a solvent can provide a much-needed alternative to high temperature waste incinerators, whose use is greatly complicated by regulatory requirements and locating suitable sites. Such superoxide chemistry has previously been demonstrated in volatile and environmentally-suspect aprotic solvents such as dimethyl formamide and acetonitrile. However, ionic liquids are non-volatile and should minimize the problems of secondary solvent waste. Here we show that superoxide ion (O2-) can be generated through electrochemistry in room temperature ionic liquid solvents (RTILs), and also show comparison with superoxide generation in a typical aprotic solvent, acetonitrile. Such initial studies suggest further research using RTILs as a substitute for traditional organic solvents.

419573: Applications of room temperature ionic liquids: Actinide separations

IEC 0 [419573]: Applications of room temperature ionic liquids: Actinide separations

Robin D. Rogers, **Ann E. Visser**, Richard P. Swatloski, Scott T. Griffin, and W. Matthew Reichert, Department of Chemistry and Center for Green Manufacturing, The University of Alabama, Tuscaloosa, AL 35487, Fax: 205-348-9104, rdrogers@bama.ua.edu, ann@mrlimpit.ch.ua.edu

ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry*
Invited: *N*
Preferred Presentation Format: *OralOnly*
Consider for Sci-Mix: *N*
Conforms to Bylaw 6: *Y*
Last Modified: *2000-11-19*

Abstract

Room Temperature Ionic Liquids (RTIL) are liquids composed of organic cations and either organic or inorganic anions that remain liquid at room temperature. Of the anions that can be incorporated to

produce water immiscible RTIL, we have used PF_6^- and $N(CF_3SO_2)_2^-$ in combination with various [1-alkyl-3-methylimidazolium] cations to replace traditional organic solvents in liquid/liquid extraction of actinides. Since the highly hydrated UO_2^{2+}, Pu^{4+}, and Am^{3+} remain in the aqueous phase, well-known metal ion extractants such as CMPO can be incorporated to increase the affinity of the metal ions for the RTIL phase. This presentation will explore the effect of various metal ion extractants, as well as different ionic liquid systems on actinide extraction.

438086: Actinide chemistry in room temperature ionic liquids

IEC 0 [438086]: Actinide chemistry in room temperature ionic liquids

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Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry*
Invited: *Y*
Preferred Presentation Format: *OralOnly*
Consider for Sci-Mix: *N*
Conforms to Bylaw 6: *Y*
Last Modified: *2000-11-19*

Abstract
Room temperature ionic liquids (RTILs) offer great potential for development of efficient, environmentally responsible purification and processing schemes for nuclear materials. Here we present solubility data, coordination chemistry and speciation, spectroscopy, and electrochemistry of actinide salts dissolved in air and water stable RTILs. Ionic liquids composed of either imidazolium, or quaternary ammonium cations combined with the weakly coordinating bis(trifluoromethylsulfonyl) amide anion have been examined. N,N'-dialkylimidazolium containing RTILs have previously been shown to react with metal ions to yield N-heterocyclic carbene (NHC) complexes through deprotonation of the imidazolium cation. In support of our RTIL program, we have evaluated the coordination chemistry of NHCs toward simple actinide salts.

438244: Ionic Liquids: From Green Chemistry to Ore Refining

IEC 0 [438244]: Ionic Liquids: From Green Chemistry to Ore Refining

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ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry*

Invited: *Y*
Preferred Presentation Format: *Oral*
Consider for Sci-Mix: *Y*
Special Equipment Needs: *35 mm slides*
Conforms to Bylaw 6: *Y*
Last Modified: *2000-11-21*

Abstract

Ionic liquids offer the possibility of new approaches in the processing of copper sulfide ores and other base metal sulfides. The wide temperature range over which these reagents are liquid, their negligible vapour pressures and their ability to dissolve a wide range of solutes at high concentrations suggests that ionic liquids can provide a means to increase the intensity of sulfide processing without resorting to the high capital demands of autoclaves or the capital and energy demands of high temperature processing in furnaces. The immiscibility of some ionic liquids with water and many other organic solvents raises the possibility of using solvent extraction steps for electrolytic purification, and electrical conductivity of these liquids may allow a simplification of flow sheets by allowing direct electrowinning in the ionic liquid solvent.

In this paper we present our preliminary findings in the use of ionic liquids in the electrorefining of chalcopyrite (CuFeS2).

440862: Studies of the radiation stability of ionic liquids

IEC 0 [440862]: Studies of the radiation stability of ionic liquids

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ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry*
Invited: *Y*
Preferred Presentation Format: *Oral*
Consider for Sci-Mix: *N*
Conforms to Bylaw 6: *Y*
Last Modified: *2000-11-19*

Abstract

Ionic liquids have been considered for their potential applications within the nuclear fuel cycle. If ionic liquids are to be successful in their application as solvents for highly radioactive materials in any future process, there will be a requirement for them to be robust to high radiation doses. A preliminary assessment of the radiation stability of 1,2-dialkylimidazolium based ionic liquids based upon nitrate

and chloride anions has been performed. Experiments to assess the radiation stability of ionic liquids, are challenging to design. The ionic liquids should be subjected to a high radiation dose, whilst avoiding any localised heating of the samples. The samples during and after irradiated, must be able to be subjected to analytical techniques, so for ease of handling should not be contaminated with radioactive materials. Analytical techniques, should be sufficiently sensitive to detect any radiolysis products and their concentrations. The results of radiolysis studies are reported, in which the samples were exposed to alpha radiation from a tandem Van der Graaf generator, beta from a linear accelerator, and gamma from a cobalt 60 source. Conclusions as to the current understanding of the radiation stability of these ionic liquids, and the mechanism of degradation will be reported.

442843: Potential Applications of Ionic Liquids in Aluminum Industries

IEC 0 [442843]: Potential Applications of Ionic Liquids in Aluminum Industries

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ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry*
Invited: *Y*
Preferred Presentation Format: *OralOnly*
Consider for Sci-Mix: *N*
Special Equipment Needs: *Overhead Projector*
Conforms to Bylaw 6: *Y*
Last Modified: *2000-11-24*

Abstract

Studies on electrowinning, electrorefining, and recycling of aluminum via electrolysis in ionic liquids were carried out at near room temperatures of 100-150^{o}C. 1-butyl-3-methylimidazolium chloride ¨C $AlCl_3$ ionic liquid was used for the study. The products were characterized using a micro-image analyzer, X-ray diffractometer, emission spectrometer, and atomic absorption analyzer. Anhydrous aluminum chloride was used as raw material for the aluminum reduction. Aluminum was deposited on the copper cathode and chlorine was released on the anode. For the recycling and refining processes, the impure aluminum and aluminum composites were dissolved at anode and pure aluminum was deposited at the cathode with the purity increases from about 80% to 99.9%. Impurities such as Si, Cu, Zn, Fe, Mg, Cr, Ni, Mn, Pb, and SiC particles were removed as anode residue. The advantages of the current methods using ionic liquids are low temperature, low energy consumption, low pollutant emissions, and no refractory material consumption.

445115: Intermission

0 [445115]: Intermission

ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry* ***Preferred Presentation Format:*** *Break*
Consider for Sci-Mix:
Last Modified: *2000-11-24*

Abstract: Abstract text not available.

445116: Discussion

0 [445116]: Discussion

ACCEPTED
Topic Selection: *Green (or Greener) Industrial Applications of Neoteric Solvents: Ionic and Supercritical Fluids: Nuclear and Electrochemistry* ***Preferred Presentation Format:*** *Break*
Consider for Sci-Mix:
Last Modified: *2000-11-24*

Abstract: Abstract text not available.
