Supporting Information

Efficient solvent system containing Malonamides in Room Temperature Ionic Liquids: Actinide extraction, Fluorescence and Radiolytic Degradation Studies

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A. Nature of extracted species

Plot of varying diamides concentrations against the $D_{Am}$ values varying from 0.005 – 0.1M DMDBTDMA and DMOHHEMA ligands in ionic liquid diluents.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure.png}
\caption{Variation of $D_{Am}$ with diamide concentration; Diluent: [C$_4$ mim][Tf$_2$N]; [HNO$_3$]: 0.01 M; T: 298 K}
\end{figure}
B. Radiolytic degradation studies

B.1. Infra Red Spectroscopy

IR spectra of $\gamma$ irradiated samples were recorded on Shimadzu FTIR spectrometer. The spectrum for DMDBTDMA and DMDOHEMA samples irradiated with different doses are shown in figures SF-2 and SF-3 respectively.

![Figure SF-2: IR spectrum of irradiated DMDBTDMA in [C$_4$ mim][Tf$_2$N]](image)

![Figure SF-3: IR spectrum of irradiated DMDOHEMA in [C$_4$ mim][Tf$_2$N]](image)
B.2. GC-MS analysis

GCMS spectra of irradiated samples have been recorded using Shimadzu Gas chromatography - mass spectrum analyzer.

DMDBTDMa: 281.4 kGy irradiated sample-
DMDBTDMA: 1041.6 kGy irradiated sample-

Chromatogram (All TIC)

Chromatogram (Zoom)

Spectrum

Line#1  R Time=20.083(Scan#2410)  
MassDelta=3.34  
EAN Mode: Single 20.083(2410) BasePeak: 73.15(2526528)  
HG MoleNone
DMDOHEMA: 281.4 kGy irradiated sample-
DMDOHEMA: 1041.6 kGy irradiated sample-

The detailed analysis of the GCMS data has been explained in manuscript under section 3.3.3 GC-MS studies on irradiated samples, in results and discussion. The desired
fragment peaks were exposed to mass spectrometric data analysis. The comparison with available literature fragmentation data and possible fragmentation mechanism as shown in Figure 12 in manuscript was used to characterize the fragments formed at different irradiated samples.