ABSTRACT

During the past decade, research and development in ionic liquids has grown tremendously. Targeted applications for ionic liquids include replacement of volatile organic solvents in separation processes, organic chemistry, microelectronics, and many more. Ionic liquids are simply low melting temperature salts, typically below 80°C, which exhibit unique properties that are tunable with respect to the choice of cation and anion. Ionic liquids have been branded “green,” environmentally friendly, and non-flammable due to their negligible vapor pressures. However, ionic liquids may pose thermal stability hazards when used in large-scale processes at elevated temperatures. This paper briefly reviews several classes of ionic liquids and known thermal degradation properties resulting in a structure-dependent chemical process safety guide for the evaluation of candidate ionic liquids in a given application. Additionally, potential thermal runaway hazards will be assessed for select ionic liquids using the Semenov model of thermal ignition to provide guidelines for reactor/process vessel volume, high temperature safeguards, and ionic liquid selection.