Abstract

A new approach to reduce the impact of the most costly step in the conventional technology, i.e., nitrogen rejection, for upgrading coal mine methane to pipeline quality natural gas is proposed. The proposed methodology is based on the Velocys microchannel platform being developed to commercialize compact and cost-effective chemical processing technology. For this separation, ultra fast absorption and desorption cycles are enabled by the very high rates of heat and mass transfer inherent in microchannel processing. Ionic liquids are adopted as absorbents of choice and their performance is verified through batch and flow-through experiments that promote the intensive gas-liquid contacting and interaction required to render this approach feasible. Economic analyses, performed to gauge the potential of these materials, show promise for commercial implementation of this novel process alternative and guide the search for the most appropriate ionic liquid. This is an abstract of a paper presented at the AIChE Spring National Meeting and 5th Global Congress on Process Safety (Tampa, FL 4/26-30/2009).
The ionic liquid technology on biomass processing is relatively recent and first studies were focused on the lignocellulosic biomass dissolution in different ionic liquids (ILs). The dissolution in IL drives to the structural changes in the regenerated biomass by reduction of cellulose crystallinity and lignin content contrasting to the original biomass. These findings provided ILs as tools to perform biomass pre-treatment and the advantageous use of their specific properties over the conventional pre-treatment processes. This review shows the critical outlook on the study of biomass dissolution using ionic liquids have emerged as an environmentally friendly alternative to the volatile organic solvents. Being designer solvents, they can be modulated to suit the reaction conditions, therefore earning the name “task specific ionic liquids.” One of the twelve principles of green chemistry is that the use of auxiliary substances such as solvents and separation agents should be made unnecessary and if used should be innocuous [1]. The toxic and hazardous properties of many solvents particularly chlorinated hydrocarbons pose crucial environmental concerns such as atmospheric emissions and contamination of water effluents.