

## Intensifying Approach for Separation of Bio-Butanol Using Ionic Liquid as Green Solvent: Moving Towards Sustainable Biorefinery

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**Abstract :** Biobutanol has been considered as a potential and alternative biofuel relative to the most popular biodiesel and bioethanol. End product toxicity is the major problems in commercialization of fermentation based process which can be reduce to some possible extent by removing biobutanol simultaneously. Several techniques have been investigated for removing butanol from fermentation broth such as stripping, adsorption, liquid-liquid extraction, pervaporation, and membrane solvent extraction. Liquid-liquid extraction can be performed with high selectivity and is possible to carry out inside the fermenter. Conventional solvents have few drawbacks including toxicity, loss of solvent, high cost etc. Hence alternative solvents must be explored for the same. Room temperature ionic liquids (RTILs) composed entirely of ions are liquid at room temperature having negligible vapor pressure, non-flammability, and tunable physiochemical properties for a particular application which term them as “designer solvents”. Ionic liquids (ILs) have recently gained much attention as alternatives for organic solvents in many processes. In particular, ILs have been used as alternative solvents for liquid-liquid extraction. Their negligible vapor pressure allows the extracted products to be separated from ILs by conventional low pressure distillation with the potential for saving energy. Morpholinium, imidazolium, ammonium, phosphonium etc. based ionic liquids have been employed for the separation biobutanol. In present chapter, basic concepts of ionic liquids and application in separation have been presented. Further, type of ionic liquids including, conventional, functionalized, polymeric, supported membrane, and other ionic liquids have been explored. Also the effect of various performance parameters on separation of biobutanol by ionic liquids have been discussed and compared for different cation and anion based ionic liquids. The typical methodology for investigation have been adopted such as contacting the equal amount of biobutanol and ionic liquids for a specific time say, 30 minutes to confirm the equilibrium. Further, biobutanol phase were analyzed using GC to know the concentration of biobutanol and material balance were used to find the concentration in ionic liquid.

**Keywords :** biobutanol, separation, ionic liquids, sustainability, biorefinery, waste biomass

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