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# Novel Process to Reduce Benzene, Thiophene, and Pyrrole in Gasoline Based on [4bmpy][TCM] Ionic Liquid

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**ABSTRACT:** Regulations on benzene-, nitro-, and sulfur-containing aromatic hydrocarbon content in commercial gasolines are becoming more restrictive due to environmental and health issues. The benzene content in reformulated commercial gasoline is currently around 1%. The reduction of benzene levels to comply with future regulations will imply significant changes in refinery configurations. This paper reports a novel extraction process to simultaneously separate benzene, thiophene, and pyrrole from a gasoline using the 1-butyl-4-metylpyridinium tricyanomethanide ([4bmpy][TCM]) ionic liquid (IL). A distillation sequence is also proposed for the isolation of the three aromatic hydrocarbons. The conceptual design of the whole process has been based on experimental data from the liquid−liquid extraction and vapor−liquid separation of benzene, thiophene, and pyrrole from isooctane using the IL [4bmpy][TCM]. A COSMO-based/Aspen Plus methodology has been used to simulate the conceptual design. The a priori COSMO-based/Aspen Plus approach was validated by comparison with the experimental liquid−liquid extraction results and conventional simulations based on experimental distribution ratios and *K* values. Benzene, thiophene, and pyrrole contents in the gasoline would be reduced from 5.0% to 0.1% using the proposed process with a solvent-to-feed mass ratio of 5.0, and also three streams with high content in each aromatic would be obtained. Increasing the solvent-to-feed mass ratio above 5.0, benzene content in the treated gasoline could be reduced up to 200 ppm.

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