

BenzSepTM

Novel Membrane Process Removes Benzene from Gasoline

In February 2007, the U.S. EPA finalized a rule to reduce hazardous air pollutants from mobile sources. The rule will limit the benzene content of gasoline and reduce toxic emissions from passenger vehicles and gasoline cans. EPA estimates that in 2030 this rule would reduce total emissions of mobile source air toxics by 330,000 tons and VOC emissions (precursors to ozone and PM 2.5) by over 1 million tons.

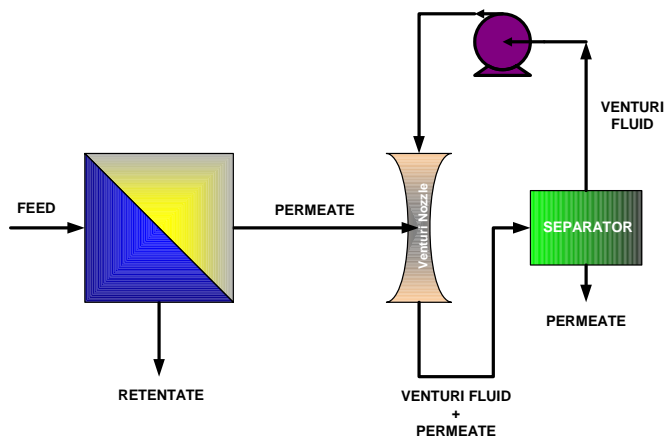
The new EPA rule limits the benzene content of gasoline to an annual refinery average of 0.62 vol% by 2011, down from its current average of 1.0 vol%. EPA estimates the rule will cost the average U.S. refinery approximately \$14 million in capital investment using known technology. Currently there are 142 operating refineries in the U.S. that process about 16.4 million BPD of crude, producing about 3.1 million BPD of reformate, which has the highest concentration of benzene in the product slate and is the preferred feed for lowering benzene in gasoline.

Trans Ionics has developed *BenzSep*TM, a membrane pervaporation process, covered under existing U. S. and European patents, that can remove benzene from straight run naphtha or reformate for less than half of the cost of current methods. The Company's business plan is to complete development within 12-15 months to allow refiners to deploy *BenzSep* technology in U.S. refineries well before the 2011 deadline.

BenzSep is a proven pervaporation process that selectively separates aromatic molecules from straight run naphtha, reformate or cat naphtha. More specifically, operated in a preferred mode, *BenzSep* is capable of selectively removing benzene, while leaving octane-rich toluene and xylenes in the gasoline, a feat not possible with solvent extraction. *BenzSep* is also expected to work efficiently to recover valuable benzene from pyrolysis gasoline.

What sets *BenzSep* apart from other pervaporation methods is the unique and patented use of a Venturi nozzle and special working fluid to pull the vacuum required to recover permeate from the downstream side of the membrane. The figure here shows the simplicity of the process.

For more information, please contact Trans Ionics directly.



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