Permeation of ethylbenzene, styrene and cyclohexene through CR 61-CMP-447, a crosslinked-poly (sulfonated styrene) ion-exchange membrane, was investigated. The experiments were performed with single-component and bicomponent feeds with solute concentrations ranging from 0.5 to 2.0 M. The Na\(^+\)-form membrane was highly permeable to the aromatics, while giving a much lower flux for cyclohexene. The magnitude of solute flux correlated well with the swelling degree of membrane by the solute. An additional experiment was carried out with the Na\(^+\)-form membrane incorporated with poly (pyrrole) and 2.0 M styrene as a feed. The presence of poly(pyrrole) in the membrane resulted in a significant flux decline. As Ag\(^+\) ions were exchanged for Na\(^+\) ions, the solute fluxes were increased through the reversible complex formation. It was found that the solute flux attributed to the facilitated transport closely related to the diffusional flux. The styrene/ethylbenzene separation factors observed with single-component and bicomponent feeds were much the same, indicating a lack of competitive transport.