

Effect of impurities in the recovery of 1-(5-bromo-fur-2-yl)-2-bromo-2-nitroethane using nanofiltration

Abstract

The recovery of the active pharmaceutical ingredient 1-(5-bromo-fur-2-yl)-2-bromo-2-nitroethane (denoted as G-1) from residual ethanol produced during the purification of G-1 was studied by using solvent resistant nanofiltration. The effect of the impurities pyridine, acetic anhydride and bromine on the process performance was studied. Four commercial nanofiltration membranes were studied in a stirred dead-end filtration module, i.e. NF 90, NF 270, Duramem 150 and BW30XLE, supplied by Evonik Industries and Filmtec (Dow). The membranes Duramem 150 and NF 90 showed the best performance, allowing a recovery of G-1 of above 60% in one stage. The separation factor of pyridine/G-1 for Duramem 150 and NF 90 was found to be higher than 2 for synthetic mixtures containing 26.75. g/L of G-1, 5.35. g/L of pyridine, 0.149. g/L of bromine and 0.105. g/L of acetic anhydride in ethanol. It was found that when using dead-end filtration, the recovery of G-1 is low when a high purity is required; both parameters cannot be optimized together. However, it is shown that with a sequence of filtrations, the recovery can be significantly improved at a given purity of G-1. These results indicate that the application of organic solvent nanofiltration for the recycling of valuable pharmaceutical compounds is feasible in realistic conditions.

Keywords

Active pharmaceutical compounds; Dead-end nanofiltration; Organic solvent nanofiltration; Recycling