

Treatment of highly concentrated dye solution by coagulation/flocculation–sand filtration and nanofiltration

Abstract

Treatment of highly concentrated C.I. Acid Black 210 dye solution using direct coagulation/flocculation–sand filtration (without sedimentation) and nanofiltration has been investigated in this paper. It was found that none of the treatments were able to fully decolourise the dye solution, but nanofiltration permeate quality was better, based on colour, residual dye, pH, and total organic carbon. The red colour for the sand filtration filtrate might be due to the formation of stable aluminium–sulphonic acid complexes. The sand filtration breakthrough after coagulation/flocculation is estimated at around 45 min. For nanofiltration of highly concentrated dye (>1000 mg/l), the separation factor analysis had confirmed that the mechanism of dye molecules attached to the membrane surface is irreversible adsorption.