Abstract
Reduction in nutrient loss during dialysis cultivation of Escherichia coli on a glycerol medium was investigated. A dialysis reactor with an inner fermentation and an outer dialysis chamber was used. Aerobic condition was maintained by limiting the glycerol feed rate to an optimum value which was estimated from the oxygen requirements for glycerol oxidation and oxygen transfer capacity of the reactor. High reduction in nutrient loss was achieved by using water as the dialyzing fluid. However, osmotic movement of water from the dialysis to the fermentation chamber was observed, and the final cell concentration was low. With a nutrient-split feeding strategy (feeding glycerol directly to the fermentation chamber and dialyzing with salt solution), glycerol loss was small, there was no osmotic flux of water to the fermentation chamber, and the cell concentration was high. Both glycerol and salt loss could be avoided, and a cell concentration of 170 g/L was obtained when the dialysis process was substituted by addition of XAD adsorbents to the dialysis chamber. Application of this nutrient-split feeding strategy to cell cultivation in a stirred tank reactor, coupled with dialysis in external dialyzer modules, resulted in low cell concentrations.