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Development of In Situ Product Recovery (ISPR) System Using Amberlite IRA67 for Enhanced Biosynthesis of Hyaluronic Acid by Streptococcus zooepidemicus

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Abstract

High broth viscosity due to the accumulation of hyaluronic acid (HA) causes a limited yield of HA. It is a major problem of HA production using Streptococcus zooepidemicus. Extractive fermentation via in situ product recovery (ISPR) was utilized to enhance the HA production. Resins from Amberlite: IRA400 Cl; IRA900 Cl; IRA410 Cl; IRA402 Cl; and IRA67 were tested for the HA adsorption. IRA67 showed high adsorption capacity on HA. The study of the adsorption via a 2 L stirred tank bioreactor of S. zooepidemicus fermentation was investigated to elucidate the adsorption of HA onto IRA67 in dispersed and integrated internal column systems. The application of a dispersed IRA67 improved the HA production compared to the fermentation without resin addition by 1.37-fold. The HA production was further improved by 1.36-fold with an internal column (3.928 g/L) over that obtained with dispersed IRA67. The cultivation with an internal column shows the highest reduction of viscosity value after the addition of IRA67 resin: from 58.8 to 23.7 (mPa·s), suggesting the most effective ISPR of HA. The improved biosynthesis of HA indicated that an extractive fermentation by ISPR adsorption is effective and may streamline the HA purification.

Author keywords

extractive fermentation; hyaluronic acid; in situ product recovery; ion-exchange resin; Streptococcus zooepidemicus

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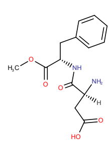

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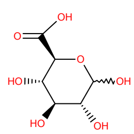

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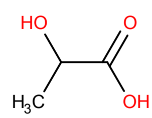

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