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低高径比外循环气升式生物反应器带渣发酵生产有效霉素

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摘要 Fermentation experiments to produce validamycins from crude substrates by Streptomyces
hygroscopicus were carried out in an external-loop airlift bioreactor (0.0115 m3) with a low ratio of height to diameter of the riser of 2.9 and a ratio of riser to downcomer diameter of 6.6. The influences of gas flow rate and liquid volume on fermentation of validamycins were investigated. Comparisons of validamycin fermentation were made among the
external-loop airlift bioreactor, a mechanically stirred tank bioreactor (0.010m3) and shaking flasks. Under the same operation conditions including fermentation medium composition, inoculum ratio and culture temperature,the fermentation time in the external-loop airlift bioreactor (45 h) was shorter than that in the shaking flasks (100 h)and the same as that in the mechanically stirred tank bioreactor. After a total fermentation time of 45 h under optimized operation conditions, average validamycin concentration obtained in the external-loop airlift bioreactor was close to 19630μg.m1-1 validamycin concentration in the mechanically stirred tank bioreactor. It was demonstrated that the external-loop airlift bioreactor could substitute for the mechanically stirred tank bioreactor in production of validamycins from crude substrates with dregs by Streptomyces hygroscopicus.

关键词 airlift bioreactor validamycins Streptomyces hygroscopicus

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Production of Validamycins from Crude Substrates by Streptomyces hygroscopicus in an External-loop Airlift Bioreactor with a Low Height-to-Diameter Ratio

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Abstract Fermentation experiments to produce validamycins from crude substrates by Streptomyces hygroscopicus were carried out in an external-loop airlift bioreactor (0.0115 m3) with a low ratio of height to diameter of the riser of 2.9 and a ratio of riser to downcomer diameter of 6.6. The influences of gas flow rate and liquid volume on fermentation of validamycins were investigated. Comparisons of validamycin fermentation were made among the external-loop airlift bioreactor, a mechanically stirred tank bioreactor (0.010m3) and shaking flasks. Under the same operation conditions including fermentation medium composition, inoculum ratio and culture temperature,the fermentation time in the external-loop airlift bioreactor (45 h) was shorter than that in the shaking flasks (100 h)and the same as that in the mechanically stirred tank bioreactor. After a total fermentation time of 45 h under optimized operation conditions, average validamycin concentration obtained in the external-loop airlift bioreactor was close to 19630μg.m1-1 validamycin concentration in the mechanically stirred tank bioreactor. It was demonstrated that the external-loop airlift bioreactor could substitute for the mechanically stirred tank bioreactor in production of validamycins from crude substrates with dregs by Streptomyces hygroscopicus.

Key words airlift bioreactor; validamycins; Streptomyces hygroscopicus

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