

## عنوان مقاله:

Effect of magnetite nanoparticles addition on modification of cobalamins production via *Propionibacterium freudenreichii* PTCC۱۶۷۴ using oily sludge of lubricant industry as the carbon source

## محل انتشار:

مجله بین المللی فناوری نانو در آب و محیط زیست، دوره 5، شماره 4 (سال: 1399)

تعداد صفحات اصل مقاله: 16

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## خلاصه مقاله:

Cobalamins are one of the most complicated cofactors produced by the microorganisms. *Propionibacterium freudenreichii* has to follow the anaerobic and aerobic conditions respectively during a course of batch fermentation, for the production of the biologically active form of cobalamins. Magnetite ( $Fe_3O_4$ ) nanoparticles can modify gas-liquid volumetric mass transfer coefficient in the fermentation system to create more efficient aeration step. Initially, the modified production of  $Fe_3O_4$  nanoparticle through coprecipitation method was investigated, and the smallest size of nanoparticles optimized to ۱۳.۸۶ nm via Box-Behnken design of response to surface methodology (RSM). The optimum condition was at the synthesis temperature of ۶۰ °C, reaction duration of ۱۰ minutes, and the medium agitation speed of ۷۰۰ rpm. Synthesized nanoparticles characterized by SEM images, PXRD and EDS analysis while EDS spectrum reflects ۳۹.۳۳% of Fe and ۵۱.۸% of oxygen atomic distribution, which confirms  $Fe_3O_4$  nanoparticles synthesis. Magnetite nanoparticle suspension added to the fermentation medium to compare the effect of nanoparticles incorporation and dimethylbenzimidazole addition on the cobalamin production via *Propionibacterium freudenreichii*. NPs incorporation in the fermentation broth was able to increase cyanocobalamin production by ۲۰%, while there was no incorporation of external DMBI in the medium. Finally, by the central composite design analysis, cyanocobalamin production from *Propionibacterium freudenreichii* fermentation was optimized to ۱.۵۴۸ mg.L<sup>-1</sup>. Oily sludge (as a new carbon source) of ۴ %w/v, magnetite nanoparticles suspension of ۷.۵ %v/v, and the fermentation temperature of ۳۷ °C caused to CCD optimum condition.

## کلمات کلیدی:

Cobalamins biosynthesis, Magnetite nanoparticles, RSM Optimization, *Propionibacterium freudenreichii*

لینک ثابت مقاله در پایگاه سیویلیکا:

