

## عنوان مقاله:

Mathematical Investigation of Bio-Desulfurization of Organo-sulfur Compounds and Hydro-treated Diesel

## محل انتشار:

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## خلاصه مقاله:

The stringent regulation to lower sulfur content in fossil fuels require new economic and efficient methods for desulfurization of recalcitrant organic sulfur. Hydrodesulfurization of such compounds is very costly and requires high operating temperature and pressure. Bio-desulfurization is an approach that can specifically remove sulfur from refractory hydrocarbons under mild conditions and it can be potentially used in industrial desulfurization. A mathematical model to investigate the effects of mass transfer rate and kinetic parameters on the rate of bio-desulfurization of organo-sulfur compounds and hydro-treated diesel is presented. In the proposed model, the effects of temperature and pH on the specific growth rates of microbes, the effects of substrate mass transfer rate, kinetic parameters, volumetric ratio of aqueous and oleic phases, and the influence of inhibition of substrate and products on the sulfur conversion of organo-sulfur compounds are incorporated. The values of intrinsic kinetic parameters, like maximum desulfurization rate, half saturation constant, inhibition constant and yield coefficient have been determined using non-linear regression analysis of data obtained from the microbial growth and substrate consumption. The results of the model showed that there is an optimum temperature and pH conditions in which the specific bio-desulfurization rate is the highest. The effect of aqueous to oleic phase volume ratio on the specific bio-desulfurization rate has also been studied and it was found that specific bio-desulfurization rate has a maximum value at an optimum volume ratio of aqueous to oleic phase. It was also found that cell growth time has a substantial influence on the kinetic parameters of the bio- desulfurization reaction. The separate studies have also been conducted to determine the effect of various parameters on bio- desulfurization of a hydro-treated diesel. In the proposed model, the conversion of sulfur containing compounds during bio- desulfurization process has been predicted. The results obtained by the proposed model, has been compared with the experimental results presented by the others and it was observed that a good agreement was obtained between the results.

## کلمات کلیدی:

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