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Investigations in sonication–induced intensification of crude glycerol fermentation to dihydroxyacetone by free and immobilized *Gluconobacter oxydans*

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ABSTRACT

This study reports crude glycerol fermentation by *G. oxydans* for dihydroxyacetone (DHA) production, and intensification of fermentation with sonication. Fermentation was carried out using both free and immobilized cells (on polyurethane foam support) for initial glycerol concentrations of 20, 30 and 50 g/L. Sonication at 20% duty cycle enhanced glycerol consumption by 60–84% with no significant change in cell morphology. Lesser DHA yield in crude glycerol fermentation was attributed to possible formation of inhibitory products. Slight reduction in DHA yield for initial glycerol concentration of 50 g/L was attributed to substrate inhibition. Higher DHA productivity was obtained for immobilized cells. Circular dichroism analysis of intracellular proteins obtained from ultrasound–treated *G. oxydans* revealed significant reduction in α–helix and β–sheet content. These conformational changes in protein structure could augment activity of intracellular glycerol dehydrogenase, which is manifested in terms of enhanced metabolism of glycerol by *G. oxydans*.

Key words: Crude glycerol, Dihydroxyacetone, *Gluconobacter oxydans*, Ultrasound, Circular Dichroism analysis