

Production of 3-hydroxypropionic acid from glycerol by *Klebsiella pneumoniae* strains

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3-Hydroxypropionic acid (3-HP) has vast applications in the synthesis of industrially important chemicals. We have demonstrated the biological production of 3-HP at 38.5 g/L from glycerol by recombinant *Escherichia coli* strains with exogenous addition of expensive coenzyme B12. To overcome the limitation of coenzyme B12, *Klebsiella pneumoniae*, a natural coenzyme B12 producer was genetically modified to synthesise 3-HP. In one approach, coproduction of 1,3-propanediol (1,3-PDO) and 3-HP at  $16 \pm 1$  g/L each in 24 h was demonstrated by developing a recombinant *K. pneumoniae*  $\Delta dhaT$  overexpressing aldehyde dehydrogenase. In another approach, a recombinant *K. pneumoniae* strain devoid of glycerol kinase (*glpK*) and 1,3-propanediol oxidoreductase (*dhaT*) genes resulted in  $\sim 22 \pm 2$  g/L 3-HP in presence of nitrate under anaerobic conditions. To improve the yield of 3-HP, the recombinant *K. pneumoniae*  $\Delta dhaT$  was further modified by deleting *yqhD* gene encoding NADPH dependent hypothetical oxidoreductase. This strain under controlled aeration condition produced  $\sim 28$  g/L 3-HP with 40% yield on glycerol.