

qPCR analysis of oxidation of zero-valent iron and microbial metabolic shift in glycerol bioconversion

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1,3-Propanediol (1,3-PDO) is a high-value product used for chemical synthesis of PTT and adhesives, laminates, and food additives as a three-carbon source. For efficient production of 1,3-PDO, sustainable and non-toxic regeneration of NADH is of great importance. ZVI (Zero-Valent Iron) can provide reducing equivalent for 1,3-PDO synthesis from glycerol as an electron donor. When ZVI donates electrons, the reducing energy increases and activates the reductive pathway, causing metabolic changes. In this study, the effect of ZVI on the metabolic change of bacteria was investigated. It was confirmed that the NADH ratio was shifted to 21: 6 (with ZVI: without ZVI). To quantitatively measure the expression level of a specific protein with qPCR, we designed primer for *dhaB*, *dhaD*, *glpK* and *rpoD* genes. The increase of glycerol dehydratase (*DhaB*) was confirmed in ZVI. Therefore, When ZVI was applied, it was confirmed that the reductive pathway was activated by providing reductive energy. These results indicate that ZVI modulate the biotransformation of electroactive strains such as *K. pneumoniae* L17, and enhance the conversion of glycerol into a value-added platform chemical.