

EQUILIBRIUM LIMITATIONS AND SELECTIVITY ON CONVERSION OF GLYCEROL TO PROPYLENE GLYCOL

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ABSTRACT

Hydrogenolysis of glycerol to propylene glycol was performed at lower temperatures and pressures using concentrated glycerol. Reactions were carried out at 180, 200, 220, and 240°C and at a system pressure of 1, 2, and 4 bars in the presence of a copper-chromite catalyst. The effect of temperature, pressure, residence time, water content, and H₂: Glycerol mole ratios were evaluated. All results indicate that lower temperatures and higher pressures promote the selectivity on conversion of glycerol to propylene glycol. The amount of byproducts decreased with decreasing the residence time. Product quality correlates with lower water content. Catalyst productivity increased with decreasing H₂: Glycerol mole ratio. An optimal H₂: Glycerol mole ratio is near 15:1. Lower temperatures (220°C) are the preferred operated conditions to increase the catalyst productivity.

The results are also fully consistent with a two-step reaction in which the second step of conversion of acetol to propylene glycol is equilibrium limited.