

Supporting Information

Kinetic Modeling of Hydrogenolysis of Sorbitol Using Bimetallic RuRe/C Catalyst

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Mass Transfer Limitation Analysis (page S2)

Mass Transfer Limitation Analysis

(a) Gas-Liquid Mass Transfer Limitation of H₂:

$$\frac{R_{H_2}}{k_{g-l} \alpha_b C_{H_2,b}} = \frac{0.09(kmol / m^3.h)}{14.4(1 / h) \cdot 34.7(kmol/m^3)} = 1.18 \times 10^{-4} < 0.1$$

(b) Liquid-Solid Mass Transfer Limitation of Sorbitol:

$$\frac{R_{SOR} \rho_p d_p}{6 \cdot \omega_{cat} k_{l-s} C_{SOR,I}^*} = \frac{0.09(kmol / m^3.h) \cdot 2.0 \times 10^3(kg / m^3) \cdot 10^{-6}(m)}{6 \cdot 6.7(kg / m^3) \cdot 72.1(m / h) \cdot 0.28(kmol/m^3)} = 2.2 \times 10^{-7} < 0.1$$

(c) Internal Diffusion of Sorbitol:

$$\frac{R_{SOR} \rho_p d_p^2}{4 \cdot \omega_{cat} D_e C_{SOR,I}^*} = \frac{0.09(kmol / m^3.h) \cdot 7.6 \times 10^3(kg / m^3) \cdot (10^{-6}m)^2}{4 \cdot 6.7(kg / m^3) \cdot 0.000084(m^2 / h) \cdot 0.28(kmol/m^3)} = 1.08 \times 10^{-6} < 1$$