**Modeling a biorefinery for production of furfural and furfuryl alcohol in a green, high-yield process.**

Bio-based societies could become a reality when biomass-derived renewable substitutes are found for the vast array of products currently derived from the processing of crude petroleum and other fossil sources. The biorefineries in these societies would integrate biomass conversion processes and equipment to produce fuels, power, and chemicals from biomass. Platform chemicals have been introduced as valuable chemicals that could be candidates for production in such a biorefinery setting, and they include ethanol, lactic acid, and furfural. Around 62% of the furfural produced around the world each year is converted via chemical catalysis into furfuryl alcohol which can be used in the manufacture of foundry resins, piping and high performance chemical processes, and the improvement of the physical and mechanical properties of wood, including resistance to microbial decay and insect attack. Researchers in the DOE’s Great Lakes Bioenergy Research Center studied the potential of a microbial conversion method as an alternative to the conventional chemical catalysis process for furfural and furfuryl alcohol production via growth and fermentation experiments using commercial Bakers’ yeast and 6 furfural-tolerant wild *S. cerevisiae* strains. Their results showed that yields from the *S. cerevisiae* strains ranged from ~93-37%, with increasing furfural concentrations from 25-65 g/l. The highest yield for furfuryl alcohol resulted from the UWOPS87-2721 strain. They also found out that furoic acid was a significant byproduct of the conversion process, and while selectivity of the strains towards production of furfuryl alcohol decreased with increasing furfural concentrations, concentrations of furoic acid remained relatively constant. Furthermore, researchers evaluated an integrated biorefinery model which showed that production of the furan compounds via microbial conversion could add value to an existing cellulosic ethanol plant by being able to produce furfuryl alcohol in a separate stream.

**References:** Mandalika A, Qin L, Sato TK, Runge T. “Integrated biorefinery model based on production of furans using open-ended high yield processes”. Green Chemistry (2014) 16, 2480-2489.

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