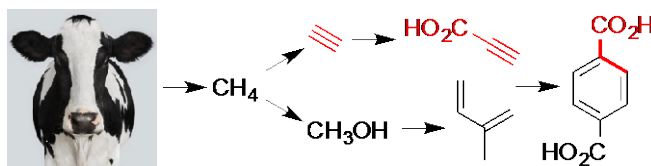


CORE-CM SEMINAR

Michigan State University

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Synthesis of Biobased Terephthalic Acid from Methane



ABSTRACT:

A reaction sequence has been elaborated that could enable the 50×10^9 kg/yr of terephthalic acid used in the manufacture of poly(ethylene terephthalate) (PET) to be synthesized from acrylic acid and isoprene derived from glucose or synthesized from propionic acid and isoprene derived from biogas methane. Solvent-free cycloaddition of acrylic acid with isoprene has to evade polymerization reactions promoted by the same Lewis acid catalyst needed to improve *para* selectivity in the cycloaddition. Use of BOB(OAc)₄ (tetracetyl diborate) as the cycloaddition catalyst results in high-yielding formation of *para* cycloadduct without competing olefin polymerization. Vapor phase Pd(0)-catalyzed aromatization of the *para*-cycloadduct affords *p*-toluic acid that is converted into terephthalic acid using a modified Amoco-MidCentury oxidation. The challenges associated with management of metal hydride during the aromatization step led to recruitment of propionic acid as the dienophile for cycloaddition with isoprene. The resulting cyclohexadiene cycloadduct undergoes a cascade oxidation where aromatization and oxidation are both accomplished in a one-pot Co²⁺/Mn²⁺-catalyzed O₂ oxidation. Pros and cons for synthesis of biobased terephthalic acid from biogas methane versus glucose will be discussed.

Thursday, September 8, 2016
12:00 NOON
Room 1400 – Biomedical & Physical Sciences
Professor Mitch Smith - Host