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# Efficient Process to Make Biodegradable Polyesters and Green Solvents from Itaconic Acid

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**IP Status:** Issued US Patent; **Application #:** 15/491,236

## Lactones, Diols and Triols Synthesized From Biomass

A new process synthesizes multifunctional alcohols from bio-derived carboxylic acids. Starting with itaconic acid or mesoconic acid, this high-yield, two-step process uses heterogeneous catalysts in aqueous media as an efficient method of producing of lactones, diols and triols, where resulting alcohols such as 2-methyl butanediol and 3-methyl-1,5-pentanediol can be used to prepare polyesters. The diol compounds are created by reacting itaconic acid or mesoconic acid with hydrogen (H2) gas to form a lactone  such as (alpha/beta)-methyl-gamma-butyrolactone (MGBL).  MGBL can then be reacted further with hydrogen to make 2-methyl butane diol.  MGBL also presents an interesting possibility as a renewable, green solvent.

## Alternative to Petrochemical Processes

Traditional petrochemical processes render diols that are too expensive for most commercial applications, so transforming biomass into useful chemicals, monomers, and polymers helps mitigate the high cost, the depletion of petroleum and the trend for low environmental impact processes. However, only a few efficient and environmentally benign processes exist for monomer synthesis from biomass. This new method comes with a lower cost of production and use. Furthermore, the aqueous based process is more efficient in terms of high yield and selectivity.

**BENEFITS AND FEATURES:**

- More efficient – high yield and selectivity
- Less expensive than current processes
- Aqueous based process

**APPLICATIONS:**

- Production of 2-methyl-1,4-butanediol
- Bio-derived lactones, diols and polymers
- Production of methyl substituted polyesters
- Both monomer and bio-solvent markets
- Bio-based solvent: isomer of gamma valerolactone

**Phase of Development** Proof of concept. Process demonstrated at laboratory scale.

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