

Dehydrogenative Coupling of Diols and Hydrosilanes with Salen-Mn complex



Interdisciplinary
Renewable &
Environmental
Chemistry REU

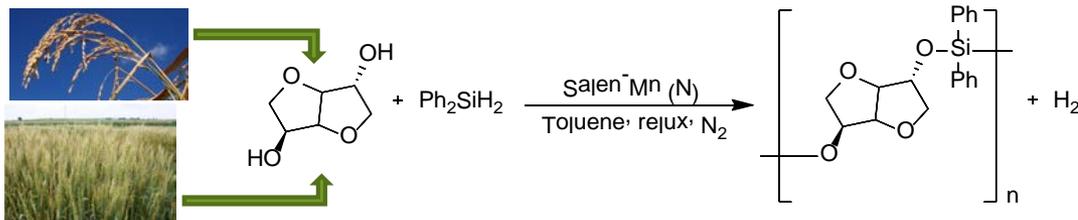
Marianne Hull, Srikanth Vijjamarri, Dr. Guodong Du, Dr. Edward Kolodka

Objective:

The synthesis and disposal of non-biodegradable polymers from petroleum derived compounds has a big impact in the level of CO₂ in the atmosphere, which can result in Global Warming. The non biodegradation of materials results in its accumulation in oceans and landfills; this affects the ecosystems that surround them. Due to this situation, the search for environmentally-safe polymers is required. The research conducted is an attempt to synthesize by dehydrogenative coupling a bioderived polymer that can be applied in commonly used materials.

Research Project:

In order to improve the synthesis of poly(silylether)s different compounds of the reaction were modified. Instead of using expensive metals such as Rhodium, Palladium and Platinum, an abundant and non-expensive Salen-Mn complex was used to synthesize the polymer. Isosorbide and Isomannide, the substrates used for this reaction are renewable and abundant diols that come from starch. This substrates were used with different hydrosilanes that offer the advantage of producing poly(silylether)s with H₂ as the only byproduct. A 1:1 ratio of the substrate and hydrosilane was used in addition to a 1% mole of catalyst and 2.5 ml of Toluene as the solvent. The reactions were placed under inert conditions and reflux temperature to determine which hydrosilane would give poly(silylether)s with the biggest average molecular weigh. NMR, IR and GPC were used to prove the successful synthesis of pol(silylether)s from a bio-derived source.



Reaction Scheme of the synthesis of Poly(silylether) from Isosorbide and Diphenylsilane.

Substrate	t (h)	Silane	Yield %	M _n	PDI
Isosorbide	40	Ph ₂ SiH ₂	86	5700	1.66
Isomannide	40	Ph ₂ SiH ₂	83	5100	1.93

This material is based upon work supported by the National Science Foundation (NSF) Research Experience for Undergraduates under Grant Chemistry No. 1460825 and UND Chemistry and chemical Engineering departments. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.