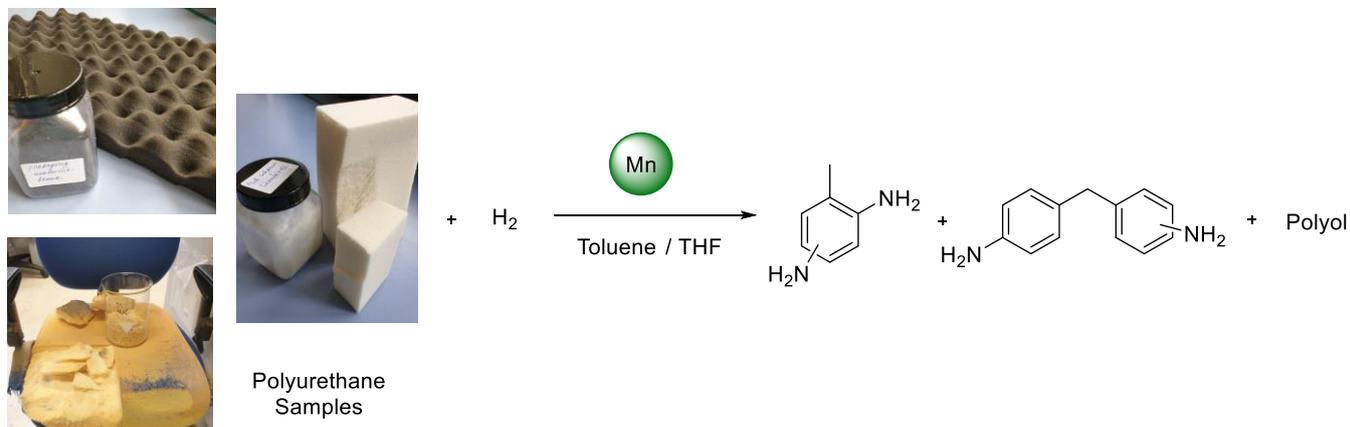


## Hydrogenative Depolymerization of Polyurethanes Catalyzed by Manganese- and Ruthenium Pincer Complexes

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### Abstract

Polyurethanes (PU) are the 6<sup>th</sup> most commonly used polymer accounting for almost 8% of annually produced plastic materials. Due to the high possibility to tune polyurethane properties it can be found in different classes of plastics, such as elastomers, hard foams, soft foams, adhesives, fibers and others and thereby has countless applications. Chemical recycling, namely decomposing polymers into their monomers, offers a sustainable loop of plastic production, since the monomers obtained by this means can be used to prepare polymers without loss in properties, thus creating an ideal, circular polymer economy. One option to achieve this is the Hydrogenation of spend Polyurethanes to the monomeric units as polyols and polyamines to be reused to produce new polyurethanes. The key to success to allow this recycling concept is the use of suitable hydrogenation catalysts. We developed systems based on homogeneous Ruthenium- and Pincer-Complexes which allow this hydrogenation in combination with elevated temperatures (up to 200 °C) as well as appropriate solvents to ensure a sufficient solubility of the polymers. A wide range of polyurethane samples of varying polyol and isocyanate compositions, some of which featuring significant amounts of urea functionalities, were successfully depolymerized, releasing polyetherols and diaminotoluene (TDA) as well as 4,4'-methylenedianiline (MDA).



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