



PolyUrethane Recycling Towards
a Smart Circular Economy

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WP3 Smart Chemolysis

Dissemination Workshop
December 1st, 2022



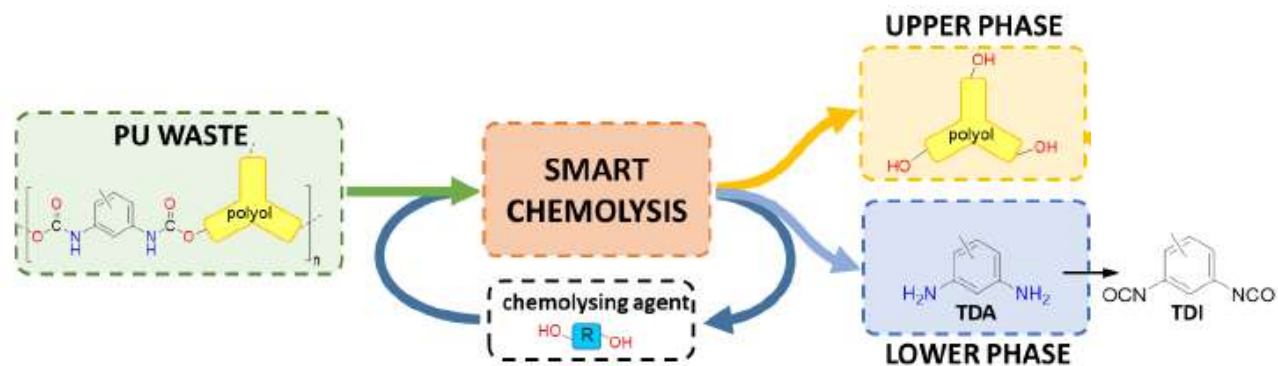
This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement N° 814543



General objectives of Working Package 3 « Smart Chemolysis »

Development of a pilot scale, split phase, cost-effective chemolysis procedure to recycle EoL flexible PU

- (1) leading to isolation of a very pure, high quality **recycled polyol**
- (2) **pure diamines** for re-use in isocyanate production and
- (3) the **recovery of the chemolysing agent** for re-use in a subsequent chemolysis process
- (4) that enables the **re-use of those recycled products** into the same flex foam products
- (5) applications to secure a long-lasting circular economy for flex foam PU

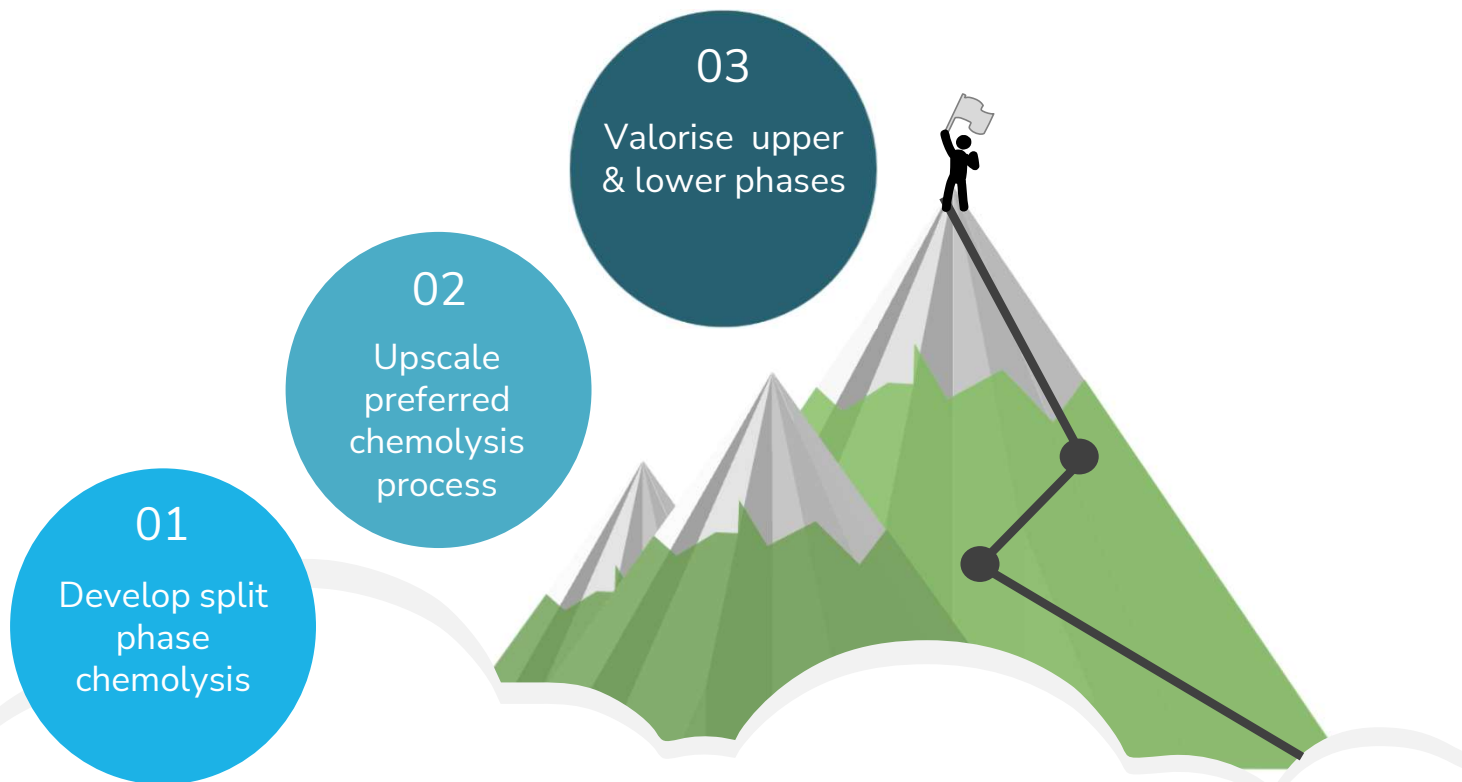


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Main steps to achieve objectives



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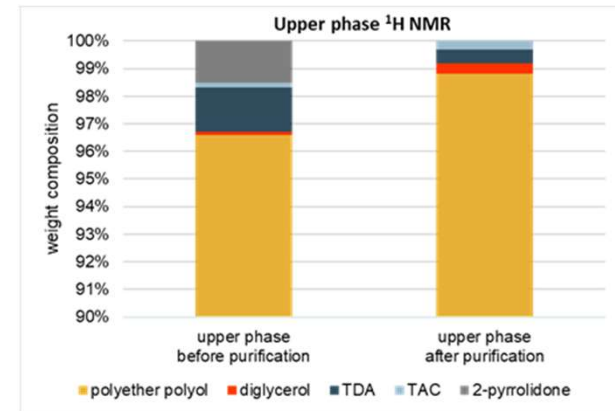
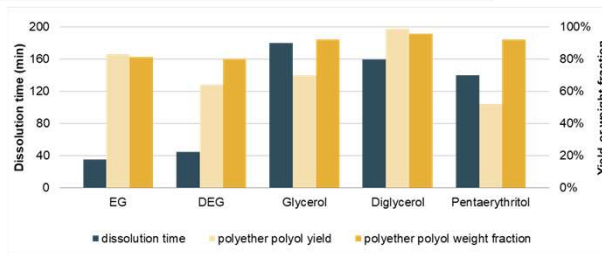
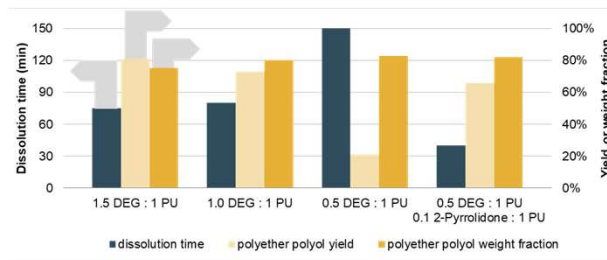
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01 Chemolysis Process Development

Targeting the choice of best suitable agent

- Leading to high purity polyols with minimal contamination of the alcohol and diamines
- Allowing a complete hydrolysis of the carbamates



Choice of the best suitable agent and process

- Use of chemolysing agent with upscaling potential (availability & costs)
- Optimized purification process for polyol recovery leading to high purity polyol with no contamination of amines and used materials
- Chemolysing agent and extraction solvent can be entirely removed and reused in the process



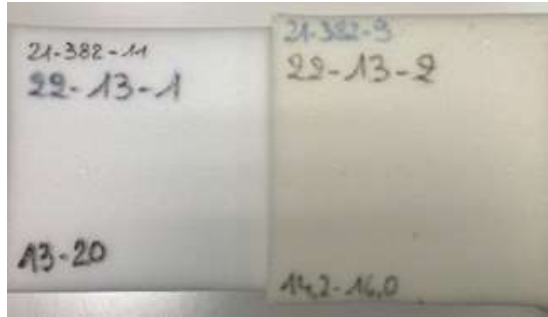
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03 Valorisation of upper and lower phases

Different batches of material with constant **polyol** quality produced



- Polyol purity and yield ~99%
- Replacement of virgin polyol in the application possible
- Mechanical foam properties and emission properties within specifications

- High purity **rTDA** produced at pilot plant stage, leading to a material achieving production standard
- Application trials with rTDI (T80) very promising



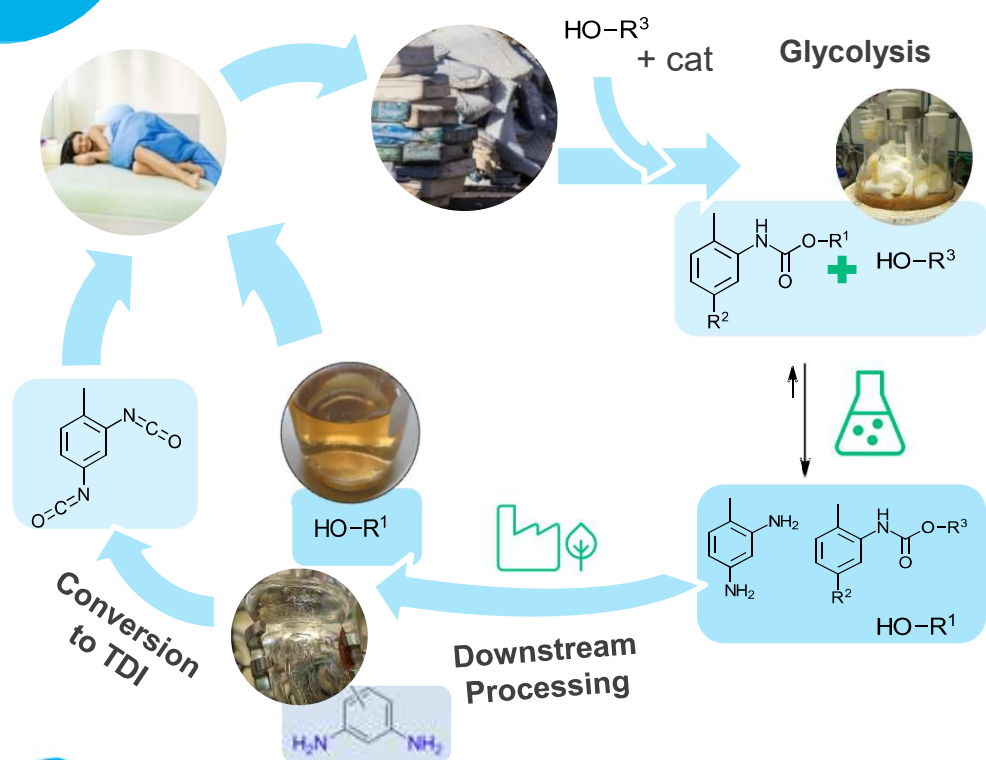
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Conclusion & perspectives

Main Achievements of Working Package 3 « Smart Chemolysis »



Development of a pilot scale chemolysis process to recycle flexible polyurethane foams

- (1) leading to isolation of a very pure, high quality recycled polyol
- (2) pure diamines for re-use in isocyanate production
- (3) the recovery of the chemolysing and extracting agents for re-use in a subsequent chemolysis process
- (4) that enables the re-use of those recycled products into the same flex foam products and applications to secure a long-lasting circular economy for flex foam PU
- (5) Reducing significantly the CO_2 footprint



Evocycle[®] CQ Mattress

Evolution of Recycling

At Covestro we make innovative recycling a priority. Our first initiative, **Evocycle[®] CQ** Mattress, transforms end-of-life mattress foam directly back into both main building blocks, polyether and toluene diamine, giving them new life and reducing significantly CO₂ emissions within a streamlined circular eco-system.

Evocycle[®] CQ, the straight path to circular.

#CircularIntelligence



Evocycle® CQ Mattress

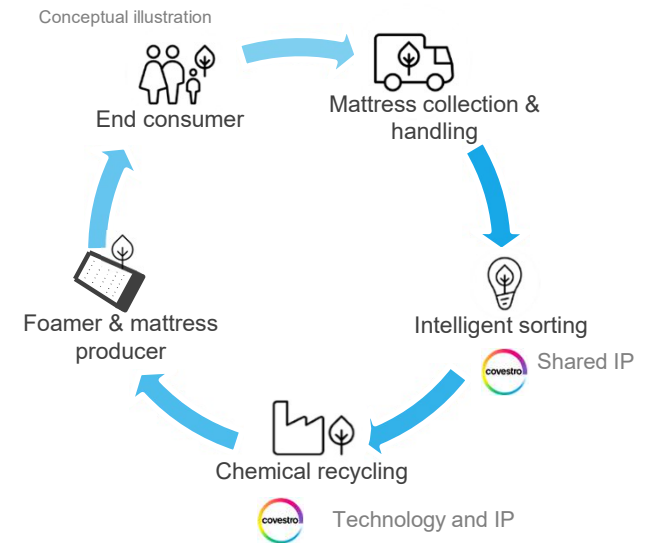
Re-shaping the PU value chain for soft foams into a closed loop

A strategic initiative supporting Covestro's vision in getting fully circular



Focusing on the industrialization of the chemical recycling process

- Process optimization for further upscaling ongoing
- Evaluation of reliable and cost-efficient supply chain for post-consumer and post-industrial flexible foams with waste collection companies
- Development of new business models
- Cooperation with partners along the entire value chain



Thank you

Any question?

