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## Application of a novel and cheap post-reforming agent to produce high-quality aromatic bulk chemicals from MSPW pyrolysis oils and dehalogenation thereof

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Chemical recycling of mixed plastic waste via pyrolysis gains increasing interest as it has the potential to complement conventional mechanical recycling routes to reach ambitious political goals towards a circular plastics economy. On the other hand, the most generic approach of producing steam cracker feasible feedstocks from low quality wastes has not yet been demonstrated in commercially viable plants, and it remains questionable whether this route is economically and ecologically sustainable. To bypass the steam cracker route and therefor avoid high energy use and increased ecological footprint, it might be more sustainable to directly produce aromatic bulk chemicals from mixed waste plastics. It is known that gaseous pyrolysis products can be catalytically converted to high value mono-cyclic aromatic compounds like BTEX and styrene using technical catalysts like metal impregnated zeolites. In general, such catalysts can hardly be recovered or regenerated due to the high levels of contamination present in mixed waste plastic decomposition products. A novel process developed by Fraunhofer UMSICHT uses an innovative and cheap post-reforming agent to improve the formation of high value BTEX and styrene to bypass the steam cracker and receive a 100% aromatic product to substitute fossil-based aromatics. It was shown that a high-quality mono-aromatic drop-in feedstock can be produced from MSPW pyrolysis oil. In addition, the chlorine and bromine contents of the product are decreased from > 10 % and 200 ppm in the initial pyrolysis oil to < 150 ppm and < 1 ppm chlorine and bromine, respectively.

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