NEW TRENDS IN POLYURETHANE WASTES RECYCLING USING GREEN SOLVENTS UNDER MICROWAVE IRRADIATION

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Abstract

The recycling of polyurethane, has always posed unique challenges due to its wide variety of applications from industry to bio-based materials namely, artificial organs. Mechanical regrinding was the oldest method in polyurethane wastes recycling and the use of the regrind wastes as filler in the new formulations. Chemical recycling of polyurethanes by hydrolysis, aminolysis, and glycolysis, is for the most part considered economically uncompetitive compared to formulating with virgin raw materials. This communication covers conventional heating and microwave assisted polyurethane wastes recycling using green solvents namely, glycerin and/ or sorbitol in the presence of basic catalysts. The aim of this work is the polyol recovery in high yields and high purities in comparisons with other technical works. In the meantime, the using of green destroying agents protects the environment during recycling and omits the formation of hazardous products. The reaction mechanism as well as the reaction parameters will be study in detail.

1. Introduction

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2. Results and Discussion

The recycling process has been investigated by using MW as an energy source and data compared by conventional heating method.

Two “split phases” were separated and identified using spectroscopy methods. Results showed the efficiency of the reactions when MW irradiation is applied as heating source. The reaction times were decreased and the recovered polyol had high purity in comparison with conventional heating method. In figure 1 the recycling process using glycerin is shown.

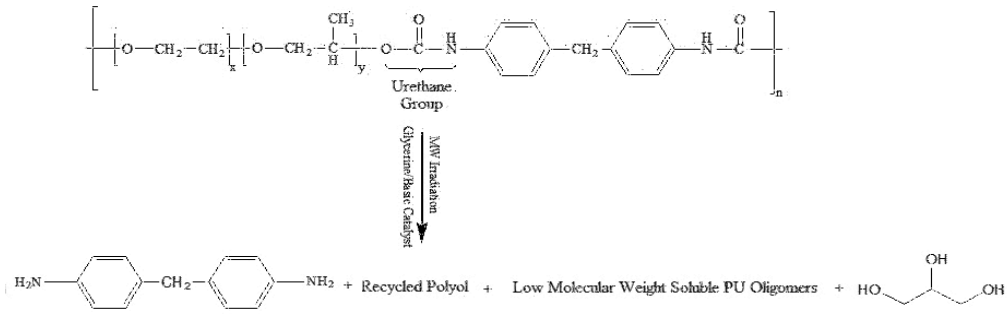

Figure 1: MW assisted PUFs Recycling Process

3. Conclusions

Polyols from PUFs wastes were recycled successfully using MW as an energy source and the chemical structure and physical properties namely, viscosity, density and etc. was comparable with virgin one polyol. Our results revealed the efficiency of the method in polyol recycling in eco-friendly, mild and green conditions.

References

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