**Environmental evaluation of renewable formaldehyde for production of melamine non-woven material**

Annamaria Vujanović1, Tina Kegl1, Damjan Murn2, Christoph Kindler2, Rok Gomilšek3, Igor Mihelič4, Lidija Čuček1

*1 Faculty of Chemistry and Chemical Engineering, University of Maribor, Smetanova 17, Maribor, Slovenia; 2 SmartMELAMINE d.o.o., Tomšičeva cesta 9, Kočevje, Slovenia; 3 Talum Inštitut d.o.o., Tovarniška cesta 10, SI-2325 Kidričevo, Slovenia; 4 MELAMIN d.d., Tomšičeva cesta 9, Kočevje, Slovenia*

*\*Corresponding author: lidija.cucek@um.si*

**Highlights**

* Formaldehyde is sourced from methanol and air and used for melamine non-woven material
* Environmental evaluation of renewable formaldehyde from biomass and waste is performed
* OpenLCA software, ecoinvent 3.1 database and data from Aspen Plus models are used
* Environmental evaluation is compared with non-renewable formaldehyde from natural gas

**1. Introduction**

Melamine Etherified Resin (MER) non-woven, commercially known as smartMELAMINE, have a great potential for various applications, such as mobility, as a construction material, for thermal protection (fire blocker, thermal protective clothing, thermal insulation), filtrations and other industrial applications. To produce MER non-woven, mainly formaldehyde and ammonia are used as raw materials. Both could be produced from renewable sources and offer great potential for reducing environmental burdens. Formaldehyde is produced from methanol and air, where methanol could be sourced from various waste materials, while ammonia could be produced from nitrogen by using renewable sources (renewable hydrogen and electricity).

**2. Scope**

In this contribution environmental evaluation of formaldehyde is performed, which is sourced from renewable methanol, to be used to produce melamine non-woven material. Various waste materials for formaldehyde production are considered, such as wet and dry biomass, waste plastics and waste CO2. Environmental evaluation is performed with OpenLCA software using the ecoinvent 3.1 database and the data from process models developed using Aspen Plus simulator. Environmental burdens are further compared with those using natural gas as a raw material for formaldehyde production.

**Acknowledgments**

Authors would like to acknowledge financial support from the Ministry of Education, Science and Sport of Republic of Slovenia and European Regional Development Fund for the project No. 5442-1/2018/106 and Slovenian Research Agency (PhD research fellowship contract No. 1000-18-0552 and core research funding No. P2 0412). This project has also received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 756081.