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ODOUR PROFILE OF SOME SAMPLES OF HOTMELT ADHESIVES

Odours of adhesive materials are an important aspect in the market success of many manufactured products. A positive odour perception is a fundamental factor in the branding of consumer goods, beyond that, negative perceptions are immediately noticeable. Odorous off-notes might be released during all stages of product development. Several techniques have been developed to characterize the odour of given material or product, and to predict how it can be perceived and accepted by consumers. Sensory techniques can be based on trained or naïve human panels, and are generally applied to measure certain odour parameters in a wide range of products, like odour intensity, hedonic tone, and character. Knowing these parameters allows the understanding and improvement of the final affective perception of consumers, but are not informative on the ultimate causes of specific, good or bad, perceived odours. Therefore, further methodologies for the characterization of odours are directed towards complementing sensory analysis with instrumental chemical techniques.

In this study, we implemented an integrative chemical/sensory analysis by means of a gas chromatography and mass spectrometry linked to a sniffing port (GC-Sniffing-MS), in order to compare the odour characteristics of three raw materials and two finished products of hotmelt adhesives from Henkel used in fast-moving consumer goods. Test samples were coded as: Lab Product 1 (LabPro1); Product 2 (Pro2); Raw Material 5 (RMat5): Raw Material 6 (RMat6) and Raw Material 7 (RMat7). The GC-Sniffing-MS technique is a very powerful tool due to its high sensitivity and capacity to simultaneously provide a chemical profiling – the identification and quantification of volatile organic compounds (VOCs)– and an olfactive characterization, performed by trained panellists, on a given sample. The obtained results showed differences in the chemical profile, which were related to the odour differences among some of the tested samples. Aliphatic hydrocarbons were the group of chemical compounds with the highest concentration in all samples. This class of chemical compounds are usually associated with the characteristic petrol, bitumen, solvent odour. However, because of most of the compounds from this family showed concentrations below the olfactory perception limit, only a reduced number of them could contribute to the samples' overall odour. On the other hand, some aldehydes were olfactory perceived and found at concentrations over their odour threshold value (OTV), the most important was acetaldehyde with its contribution to a pungent and sweet odour. More specifically, LabPro1 had the highest total concentration of VOCs and the largest variety of chemical compounds, especially of aliphatic hydrocarbons like 2-methyl-pentane, while RMat7 displayed the lowest total VOCs concentration and number of compounds. The reported individual concentrations were generally below the OTV in this latter sample, which was ranked among the least odorous. Despite ranking the fourth position in terms of total VOCs concentration, RMat5 contained 2 of the 3 most intense odorants in terms of relative concentration above the OTV: methyl ester 2-propenoic acid (9 times over its OTV; pungent, sweet, and fruity) and thiophene (7 times over its OTV; sulphurous). Only nonanal was reported in Pro2 at higher concentration in odour terms (8 times its OTV; orange, citrus, fat, green).

In summary, this study illustrates the usefulness of the GC-Sniffing-MS approach to swiftly compare and characterize different adhesive materials in both chemical and sensory terms. Thanks to this information, appropriate measures for optimizing the production process could be taken at the design and prototyping stages, considering the potential sensory impact on consumers as an additional decision factor.