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Naturel Eutectic Mixtures for neutralizing household bad odours and litter smells

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PURPOSE OF THE ABSTRACT

Urban growth, its related olfactive pollution and increasing social awareness has led to the emergence of an increasing number of complaints due to odour nuisance.[1], [2] Malodorous substances produced by human activities are the cause of significant discomfort, but also health issues such as tension, depression, fatigue and mood disturbance.[3]

In order to tackle this emerging issue, methods for preventing the production of such substances or eliminating them from air have been proposed. In households, because hindering the production of malodorous substances originating from human activity (such as cooking, human odors or dejections) are impossible in households, technologies for masking or neutralizing malodorous substances are in most case developed.[2] Such technologies require to be efficient, cheap and most of all harmless for consumers.

Due to their hydrogen-bonding abilities, DES have been reported to be very good solubilizing solvent for a range of natural compounds and drugs.[4]?[6] Because a specific family of DES, so-called non-ionic DES, or type-V DES[7] can be prepared by combining natural compounds such as menthol, thymol, or eugenol, terpineol, accordingly, with carboxylic acids, polyols, or coumarine accordingly, they exhibit specific olfactive properties. Such solvents are therefore promising candidates for neutralizing bad odours present in urban households while having a pleasant olfactive note. A series of type-V DES solvents were thus prepared using natural compounds only, with at least one component presenting sole olfactive properties, are detailed here in Table 1.

Next, a model solution, composed with a range of malodorous molecules typical of those present in households and exhibiting different chemical families, was prepared, and used as a source of bad odours. The ability of eutectic mixtures to eliminate these malodorous compounds from air was then studied in vials and in real operating conditions. In a first set of experiments, eutectic solvents were injected neat in a vial containing a malodorous solution. In a second set of experiments, cat litter was impregnated with given amounts of eutectic mixtures and inserted in a vial. Malodorous compounds were then added into the vial. In each case, the composition of the vial headspace was then measured using SPME and GC-FID analysis and the neutralization efficiency of an eutectic mixture was calculated.

Results indicated that in vials without using litter, significant decrease in malodourous compounds in the head space are observed when a natural eutectic is present. Such a decrease is in agreement with the very good solubilising properties of such solvents reported in the literature. Similarly, impregnated a solid substrate such as cat litter with a DES led to a significant decrease in the amount of malodorous compound in the head space, as shown in Figure 1. Overall, these results demonstrate the ability of natural type V -DES to be used as fouly odour neutralizing agents in households or in cat litters, resulting in a recently filed patent.[8]

FIGURES

Type-V DES
based on natural compounds

Compound	*Olfactive type and descriptor*
Menthol	Mentholic Peppermint
Thymol	Herbal Thyme
Coumarine	Tonka Sweet hay tonka
Methylanthranylate	Fruity Concord grape
Hydrocynnamic acid	Floral Sweet fatty rose musk cinnamon
Levulinic acid	-
1-Phenylethylalcohol	Floral Rose flower

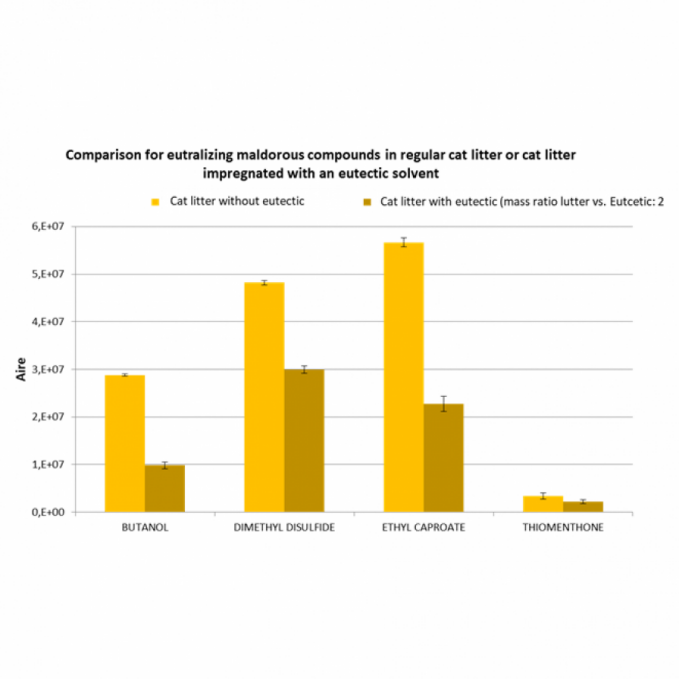

FIGURE 1

Table 1

Examples of compounds used for prepared type-V DES, along with there typical olfactive description.

FIGURE 2

Figure 1

Figure 1 – Peak area for selected malodorous compound contacted with cat litter.

KEYWORDS

NaDES | Malodorous substabces | Odor neutralizing technology

BIBLIOGRAPHY