Advanced Seat Fabrics with High Performance Deodorant Function

With the objective of reducing new-car smells and tobacco smells, we developed seat fabrics with a deodorant function in 1991. The deodorant function was given by applying physical adsorption type adsorbents to the back of the fabrics<sup>1</sup>).

Topics

Recently, with the growing concern about air quality of the living environment, further improvement of the comfort of the vehicle compartment is demanded. Especially, it is necessary to reduce amines that are the main components of the new-car oders. So, we attempted to develop highly efficient seat fabrics with deodorant function that the adsorption capacity for amines is more than twice that of conventional products (same adsorption capacity as for hydrocarbons and aldehydes ) <sup>2, 3)</sup>.

Conventional products used sepiolite, which is a kind of clay minerals, and activated carbon for the adsorbents. Instead of using sepiolite as adsorbent for amines, we searched for new chemical reaction type adsorbents wrose odor-capturing mechanism is stronger than that of sepiorite.

As a result, we found that silica gel with high specific surface area has a greater porous diameter than sepiorite also, a number of silanol groups for adsorption sites are able to adsorb bulky molecules such as trimethylamine, the representative compound of amines. Moreover, we found that Cu salts, such as copper sulfate, form a stable complex with amines (**Fig. 1**). Using these adsorbents, adsorption efficiency for amines was increased.

Moreover, for the dispersion process of the abovementioned adsorbents and activated carbon to acrylic emulsion, we examined of the combination order, dispersing agent, stabilizer, etc. we were able to prepare compounds that had excellent dispersibility and stability.

We applied these compounds to the back of the fabrics and dried them. As a result of an adsorption



Silica gel : Hydrogen bond

Fig. 1 Proposed reaction mechanism.

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experiment, the adsorption capacity of the developed seat fabrics for trimethylamine was 3 times that of conventional products (**Fig. 2**). Also, for hydrocarbons and aldehydes, the adsorption capacities were equivalent to that of conventional products. As a result of real vehicle model evaluation using an acrylic resin box, the developed seat fabrics could reduce new-car smells effectively (**Fig. 3**). We also confirmed that the odors adsorbed by these seat fabrics were not released by the normal change of temperature in the vehicle compartment.

These seat fabrics with deodorant function were jointly developed by Toyota Motor Corp., Toyoda Boshoku Corp., Dainippon Ink & Chemicals, Inc. It was adopted in the Crown in September 1999 and the Celsior in August 2000. Adsoption in other deluxe cars has already been decided.

Reference

1) Yamada, Y., et al. : JASE Rev., 13(1992), 82

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Fig. 3 Results of odor sensory test.

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