Topics

Development and Application of Formaldehyde Adsorbent

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There is a growing interest in air quality in the living environment in recent years. Formaldehyde as one of the substances causing sick house syndrome is not sufficiently eliminated by active carbon as a general adsorbent. This paper reports a chemical reaction type formaldehyde adsorbent we have recently developed. This removal material is comprised of sepiolite, a sort of clay mineral, to which an amino acid is impregnated. The most effective amino acid is a basic amino acid, which is typified by L-lysine having an amino group on the side chain. The formaldehyde adsorption capacity of the L-lysine-immobilized sepiolite was found to be approximately 10 times greater than that of the intact sepiolite, and approximately 100 times greater than that of activated carbon[1] (**Fig. 1**). On the other hand, activated carbon impregnated with an amino acid did not show any improvement in its removal property.

An FT-IR analysis[2] of the immobilization status of the amino acid to the sepiolite revealed that the amino acid was immobilized by the substitution of crystal water which coordinates with Mg ion exposed in the pores of the sepiolite (**Fig. 2**) in a highly dispersed manner. Activated carbon did not show any improvement in the formaldehyde adsorption property probably because it has no substitutable crystal water. A possible mechanism for the adsorption is such that formaldehyde reacts with the amino group and is trapped in the form of an imine compound[3].

This material has been put into practical use since August 1999 as a formaldehyde adsorbent for furniture through a joint study with Aisin Seiki Co., Ltd. and Omi Mining Co., Ltd. (**Fig. 3**). Applications as interior materials for houses and automobiles are expected in the future.

References

1) Kazuhiro Fukumoto and Seiji Onoda : Proc. for 27th Annual Meeting of Union of Chemistry-Related Societies in Chube Area, Japan, (1998), 171
2) Tomiko Mohri, et. al. : Proc. for 13th Annual Meeting on Odor Envronment, (2000), 72
3) Tomiko Suzuki, et. al. : J. of odor Research and Engineering, 32-1 (2001), 15

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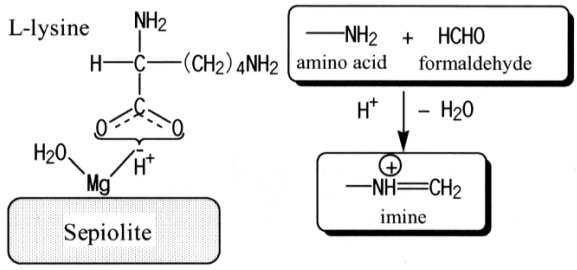

Fig. 2 Structure of L-lysine on sepiolite and proposed reaction mechanism.

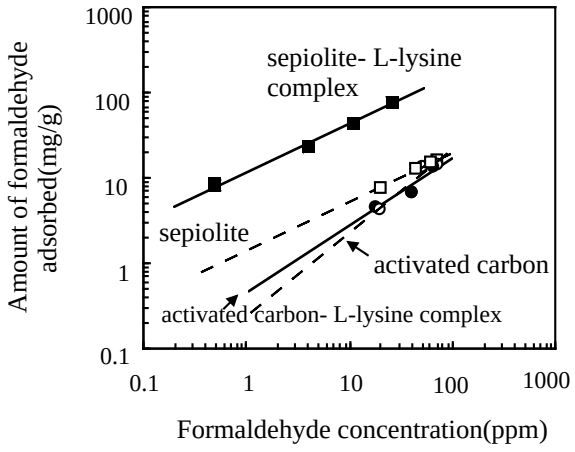

Fig. 1 Formaldehyde adsorption isotherms (25˚C) of adsorbents.

Fig. 3 Developed adsorbent for formaldehyde.