Development of a Honeycomb Filter Using Porous Materials

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Recently, odor has come to occupy increasingly high importance as an element of an agreeable environment. Deodorizing filters used for present air conditioners and air cleaners consist mainly of paper or non-woven fabric fastened with adsorbent and folded into a tucked shape. In the future, honeycomb filters are expected to become mainstream due to their low pressure loss and high performance.

Topics

However, since activated carbon and silica gel do not have plasticity, it is difficult to develop a honeycomb with extrusion molding. In this connection, we attempted to use sepiolite for the molding aid as it has plasticity, sintering properties and adsorptive properties¹). Sepiolite belongs to the clay family known as sepiolite-polygorskite. Sepiolite has a fibrous structure. Numerous channels (pores) exist along the fibrous axes. Therefore, it has properties for adsorbing gases and liquids. In addition, since sepiolite is fibrous and belongs in the hydroxyl group, it has plasticity and sintering properties. By adding sepiolite to activated carbon or a silica gel, and then extruding it after kneading, we succeeded in realizing honeycombs of activated carbon and silica gel. It was formerly difficult to provide these materials with sufficient strength without sacrificing adsorptive properties. If other organic binders were used for the molding aid, their adsorptive properties is remarkably lowered because the surfaces of the adsorbent are covered with the binder. Conversely, sepiolite does not lose its deodrizing performance, as it is an adsorbent by itself.

We were able to fabricate honeycombs of various materials and shapes (**Fig. 1**). The maximum dimensions of moldable honeycomb are a section of \Box 100mm and a cell size of 400 cells/in² with a compressive strength of 0.7 MPa and over.

Measurement of acetaldehyde removal, one of the



Fig. 1 Developed honeycomb filter.

principal components of tobacco odor, by the newly developed honeycomb (**Fig. 2**) confirmed that it sharply exceeds the performance of a conventional deodrizing filter. The pressure loss of the developed honeycomb (300cells/in²) is about 1/3 that of a conventional deodorizing filter, which happens to be approximately the same as that of monolithic substrates for an automotive catalyst (**Fig. 3**).

These honeycomb filters have been developed jointly with Omi Kogyo. Currently, honeycombs using activated carbon as the base material are used in INAX shower toilets. In the future, the new honeycombs are expected to be used in automobile and home air conditioners and air cleaners as a deodorizing filter.

Reference

 Fukumoto, K. et al. : Proc. for 12th Annual Meeting of odor Research and Engineering of Japan, (1999), 100 (Report received on Jan. 28, 2000)



Fig. 2 Removal effect of acetaldehyde.



Fig. 3 Pressure drop.

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