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I have completed further analysis on the additional mineral samples which were received from you on September 1. This series of experiments included moisture absorption and desorption studies and absorption of aromatic and thio (sulfur containing) organic compounds.

In the moisture experiments, the mineral was placed in a closed system in which the temperature and the relative humidity could be independently controlled. This enables us to expose the material to a series of atmospheres, each at a different relative humidity, while keeping the temperature constant. This series included exposure of the mineral as it is contained in the Foodsaver Unit to air with 100, 75, and 50 percent humidity for a period of 24 hours. The results from this study are as follows:

(1) The mineral is able to absorb / desorb a maximum of 48 percent of its weight of water.
(2) It is apparent that the absorption and desorption of moisture from this material is an equilibrium process (i.e. that moisture is gained or lost depending on the temperature and relative humidity of the surrounding atmosphere).

For the study of odor contamination, an aromatic organic compound (methyl butyrate) and a sulfur containing compound (hydrogen sulfide) were used to simulate the types of odors found in perishable food products stored in a refrigerated environment. The experimental setup consisted of two connected chambers, which could be evacuated so that a known amount of the vapors could be introduced. The vapor pressure of the gas was measured before and after exposure to the mineral. The difference in these pressures is a measure of the ability of the mineral to absorb the odors. The chambers were evacuated to

2 mTorr after which 100 mTorr of the gas was injected. Over a period of 48 hours a pressure reduction of 17 and 24 mTorr, was observed for the methyl butyrate and the hydrogen sulfide, respectively. Due to the fact that vapor adsorption onto a solid is a diffusion-controlled process, factors such as air-circulation, humidity, temperature and surface are important. These results suggest that this mineral will control odors and minimize cross-contamination of stored foods.

The favorable results of these experiments indicate that this mineral will reduce the energy and maintenance costs of operating the refrigerator units by controlling the humidity, which regulates heat transfer. The use of this mineral should also increase the storage life of perishables by reducing shrinkage, retarding discoloration and minimizing odor contamination.

Sincerely,

Dr. Jeffrey G. Nelson
Member of Technical Staff
Ferroelectric Materials Dept.

JGN/lew