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Determination of the Mechanism of Uptake of Organic Vapors by Chitosan

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Abstract: It was of interest to investigate the possible interactions that might occur between chitosan and various compounds using solvent vapor sorption and FTIR. The sorption system was composed of a gas inlet, a gas cell and a gas outlet. The experimental setup allowed quantification of the free vapor and therefore the amount of the sorbed vapor by chitosan powder. The BET equation was applied to the experimental data to obtain the apparent monolayer sorption capacity (S_m) and the parameter C . Results demonstrated that the surface areas obtained for chitosan from the BET analyses for heptane, 1,4-dioxane and methanol were 421, 379 and 58 m^2/g respectively. These values were extremely higher than the value obtained from nitrogen vapor adsorption isotherm (4.56 m^2/g). The difference is attributed to the partitioning of these compounds into the chitosan particles. The large difference in the S_m values between the nonpolar (heptane and 1,4-dioxane) and the semipolar compounds (methanol) also suggested that the polarity of the solvent might have a significant effect on the partitioning of these compounds into the chitosan particles. The results obtained from this study also confirmed what was previously described regarding the ability of chitosan to act as a "fat magnet" or a "fat sponge".