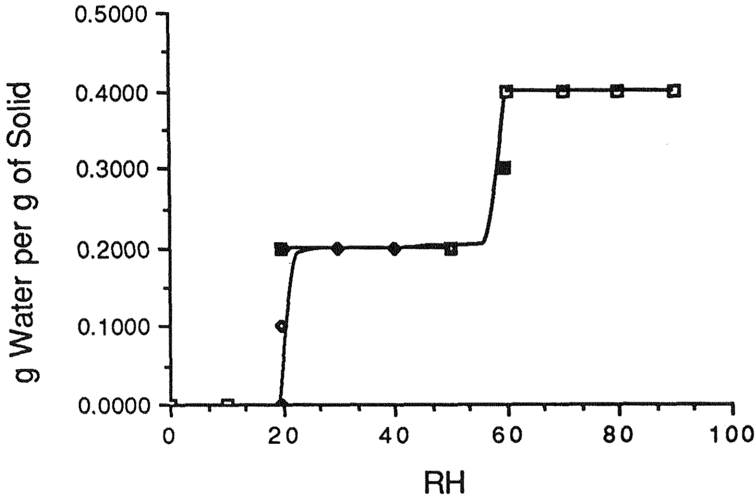

Fig. 15 Vapor phase diagram of an organic substance that forms a pentahydrate at 25°C (MW 360 + 90).

monohydrate, and a dihydrate. Shefter and Kmack (1967) showed that the dehydration kinetics of theophylline hydrate were first order.

Hemihydrates also exist. Wu et al. (1996) have reported on an anhydrous and a hemihydrate form of brequinar sodium. Both have fairly comparable solubilities. Loosely bound water is also present in the structure, and this is lost (in thermograms) at 90°C, and the water of hydration is released at about 175°C.

It should be mentioned that in some cases "bound" moisture is indeed held very tightly. Magnesium chloride tetrachloride is an example. Heating this substance to 80–100°C will remove two of the molecules of water. But further heating results in the removal of 2 moles of hydrochloric acid, leaving magnesium hydroxide behind.

8. MOISTURE EQUILIBRIUM CURVES OF A SMOOTH NATURE

There are substances such as gelatin and corn starch that give rise to moisture equilibrium curves of the type shown in Fig. 16. These are referred to as BET moisture isotherms.

As a dry sample is exposed to increasingly higher vapor pressures, P_u (u stands for "up"), moisture contents x_u will be in equilibrium with the sample. If the experiment is terminated at a pressure of P^*, and the vapor pressures in the atmospheres decrease, then, e.g. at P_d (d stands for "down") the moisture content will be x_d, i.e., higher than during the up curve. The hysteresis loops shown in Fig. 15 are exaggerated for graphical clarity. Such curves can be shown to be variants of the BET equation or the GAB equation (Guggenheim, Anderson, and deBoer) (Guggenheim et al., 1968; Zografi and Kontny, 1986; Grandolfi, 1986). It is noted that y_d is not an equilibrium condition. Obviously