Table 3 Characteristics of Disodium Hydrogen Phosphate

Type	% Moisture in solid		$P(H_2O)$ (mm Hg)	Water activity (RH/100)
Anhydrous	0			
		Pair	9	0.38
Dihydrate	20			
		Pair	14	0.58
Heptahydrate	47			
		Pair	18	0.75
Dodecahydrate	60			
		Pair	22	0.92
Satd. solution (100 g water/4.5 g salt)				

the useful information reached from such a graph is the maximum RH that is satisfactory for storage of the products. 20% RH happens to be the relative humidity over a saturated solution of the compound (or over a salt pair, as will be discussed presently).

For inorganic compounds and hydrates, the curves are stepwise curves. For instance, for disodium hydrogen phosphate, the following situation exists: the compound can form three hydrates (2, 7, and 12) aside from being anhydrous. The percent of moisture in, e.g., the dihydrate, is calculated as follows: disodium hydrogen phosphate has a molecular weight of 142. The dihydrate hence has a molecular weight of $142 + 36 = 178$. Hence the moisture percentage is

$$100 \times \frac{36}{178} = 20\%$$

The moisture contents for the remaining hydrates are shown in Table 3.

7. EQUILIBRIUM MOISTURE CURVES FOR SALT HYDRATES

The previous section dealt with the *rate* with which moisture is taken up. As shown in Fig. 11, at longer time periods, the moisture level (the weight of the sample) will taper off and plateau at an equilibrium value. This equilibrium value is also a function of RH, and there are two types of curves that occur when equilibrium values are plotted against RH: salt pairs and continuous adsorption. The former will be discussed first.

It is seen in the table that the RH of the atmosphere above a mixture of anhydrous disodium hydrogen phosphate and the dihydrate is 9 mm Hg or $100(9/24) = 38\%$ RH. It is noted that any mixture of the anhydrous salt and the dihydrate will given this relative humidity. Hence disodium hydrogen phosphate containing from 0 to 20% moisture will have above it an atmosphere of 38% RH. Similarly, as shown in Table 3, the heptahydrate contains 47% moisture, and mixtures of di- and heptahydrate give rise to water vapor pressures of 14 mm Hg (58% RH). Proceeding in this fashion, a graph as shown in Fig. 13 results.