solution obtained by means of dialysis, gave very different adsorption-curves and showed a different manner of adsorption on dilution, it is concluded that they are not identical but only a mixture.

STUDIES ON ENZYME ACTION IV.

ON THE SELECTIVE ADSORPTIONS OF UREASE AND PROTEINS IN A MIXED SOLUTION. (2)

By MATSUNOSUKE KITAGAWA

(Received May 4 th., 1927)

As a biological extract such as an enzyme solution contains always several kinds of salt in different quantities, the influence of salts upon the selective adsorption of urease and proteins by aluminium hydroxide was examined in jack bean-urease solution, with the following results.

1) Inorganic salts generally make a salt-like adsorption with aluminium hydroxide at the solid surface of the adsorbent, but in the presence of urease and proteins a part of the salts is replaced by them, therefore the mechanism of the adsorption of the urease and proteins by aluminium hydroxide should be ascribed to chemical affinity, not to merely mechanical adhesion.

2) The salts are divided into two groups from the point of view of adsorption. The one like phosphates occupies the active surface of the adsorbent and diminishes the adsorption of the protein and urease, especially of the latter. The other like NaCl or CH_3COONa does not occupy the surface but merely changes the nature of the medium, and exerts some influence upon the adsorption, namely in the presence of certain phosphates it increases the adsorption of urease, but in their absence it decreases the adsorption.

The adsorption of proteins and urease is most favorable in the solution containing no salts.

Thus the selective adsorptions of the urease and proteins are influenced quantitatively by the nature and quantity of salts present. Consequently, in the presence of a moderate quantity of the adsorbent, and in comparatively pure solution obtained by complete dialysis the urease is more easily adsorbed, but on the contrary, in a less pure solution obtained by insufficient dialysis, the proteins are more easily adsorbed. In the latter case, however, if NaCl or CH_3COONa is added to the solution, the degree of selective adsorption is reduced and the adsorption of urease is promoted.

3) The adsorptions of these substances were completed instantaneously

in a pure solution, but, in the presence of some salt, required some short intervals of time for attaining equilibrium.

4) The influence of hydrogen ion concentration upon the adsorption was remarkable, especially in the case of urease, in the solution containing some salts, namely in an acid range such as pH 5, the adsorption was very much accelerated, but in an alkaline range such as pH 7.5 it was largely retarded. In this case, the less the concentration of the salts, the less was the influence.

Urease is an amphoteric substance, as it was readily adsorbed by both kaolin and aluminium hydroxide.

5) The urease and proteins were not set free from their adsorption-compounds either by shaking with water or with glycocoll, acetate or NaCl, but were set free only by the addition of phosphate. In this case the proteins were more easily liberated than the urease. The liberation or elution was very insignificant especially in the case of urease at pH 4.5, but gradually increased with increasing alkalinity up to pH 7.5.

6) I have repeated several times Sumners' experiments on the crystallization of urease from the acetone extract, but unfortunately failed to justify his findings. On the other hand, my urease preparation obtained by his method was shown to be less active than that obtained by the method of dialysis. Consequently, I used the latter preparation for the examination of adsorptive factors.

As a result the experiments in regard to the adsorption-curves, the salt-influences and other factors, we came to the conclusion that urease and protein are not identical but exist as a mixture even in the purest preparation examined.

ON THE DEGREE OF SATURATION AND THE ADSORBED BASES OF JAPANESE SOILS.

SHIGERU OSUGI and YOSHIO SANO.

(Received May 17 th., 1927)

1) The degree of saturation of Japanese soils was investigated by Hissink's method and it was found that the degree of saturation thus obtained was fairly in accordance with the reaction of the soils tested as shown in the following table.

soil.	(Degree of saturation)	PH.
1	77.1	6.76
2	19.4	4.35