LXXX. NOTE ON THE CAPILLARY BEHAVIOUR OF GLYCINE.

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IN view of the capillary activity exhibited by dispersions of lecithin in water [Price and Lewis, 1929] and of lecithin-cholesterol dispersions [Jones and Lewis, 1932] it was of interest to see whether a maximum in the surface tension would likewise occur at the isoelectric point in the case of a simple amphoteric substance such as glycine which does not exhibit any colloidal or emulsoidal properties but dissolves in water in the form of simple and double molecules [Lewis, 1931].

The method of measurement, namely, the dynamic method of Sugden, which had been employed in the case of lecithin dispersions, was again used in the present case. The temperature was 25°. The results obtained for the variation of surface tension with p_H in the case of two concentrations of glycine, namely, 10 % and 5 %, are given in Fig. 1. Inspection of the curves indicates

Fig. 1.

—●—●— = 10 % solution of glycine in water.
—x—x— = 5 % " " "
△ —△ = Pure water.

that once more the surface tension is maximal at or close to the known isoelectric point of glycine, namely, p_H 6.08. At the same time glycine differs from lecithin in that the surface tension over the p_H range examined is greater than that of water. It follows that the explanation suggested by Price and Lewis to account for the maximum in the case of lecithin requires modification. This explanation regarded the capillary-active units as dipoles, each carrying the

same amount of positive and negative electricity, the dipoles being arranged vertically to the surface with positive and negative poles alternating. It was assumed that, at the isoelectric point, the contiguous dipoles annulled each other's effect upon the surface tension so that the value tended to approximate to, but could not exceed, that of water itself. In the light of the glycine results it is necessary to assume that in the isoelectric condition the dipoles are able to increase the surface tension even above that possessed by water. Whether the observed tension is greater or less than that of water will thus depend upon the nature of the material employed. The remaining treatment of the lecithin case, to account for the decrease in surface tension on either side of the isoelectric point, appears to hold good generally.

It may be mentioned that the influence of addition of NaCl (0.1 *N*) to solutions containing 10 % glycine was determined over the p_H range 2.68 to 8.80. The values lay approximately on a horizontal line parallel with the water line itself the average surface tension being approximately one dyne greater than that of water. The presence of the ions of the simple inorganic salt thus serves to obliterate any appreciable effect due to the glycine. Since glycine and sodium chloride raise the surface tension, both are negatively adsorbed at the surface but it appears that the glycine is more completely removed than is the sodium chloride.

SUMMARY.

Using the Sugden bubble method it is shown that the surface tension of glycine dissolved in water has a maximum value at the isoelectric point (p_H 6.08).

REFERENCES.

- Jones and Lewis (1932). *Biochem. J.* **26**, 633.
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Price and Lewis (1929). *Biochem. J.* **23**, 1030.