# A STUDY OF THE ABSORPTION OF GELATIN MOLECULES AT HYDROPHOBIC/HYDROPHILIC INTERFACES

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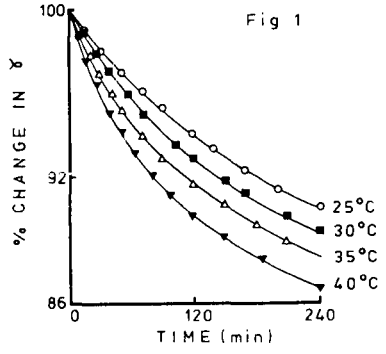
Alternating sequences of relatively polar and non polar tripeptides, promote the adsorption of gelatin molecules at hydrophobic/hydrophilic interfaces. At the aqueous/air interface the surface activity is time dependent. It is postulated (Sato and Ueberreiter, 1979) that the molecules undergo conformational changes at the surface, but their precise orientation in the film is unknown. Association may occur intra or inter molecularly depending on concentration to form triple helices. The coil-helix transition would be expected to depend on factors such as temperature concentration and pH. To study these effects the surface tension ($\gamma$) of gelatin solutions were measured over a 4h period using a Wilhelmy plate attached to a microforce balance.



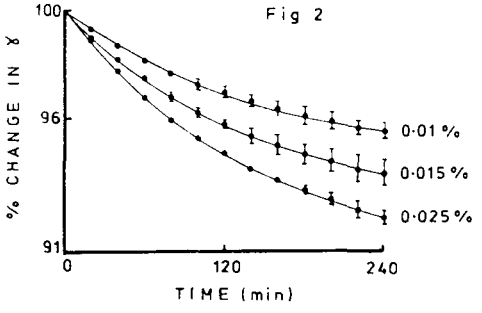




Fig. 1. illustrates the influence of temperature on the % change in $\gamma$, of a 0.05% solution pH 5.8. Fig. 2. illustrates the effect of concentration on the % change in $\gamma$ at 35°C pH 5.8. (Rousselot acid ossein 50720) Increasing the kinetic energy or total number of molecules initially in the bulk resulted in an increased surface adsorption.

Over the pH range 3-9 little difference in the % change in $\gamma$ was observed in an acid ossein solution. However, the % change for a limed ossein was greater at pH vales at and below the isoelectric point (IEP) than at values above. This is consistent with the well defined IEP of limed ossein (IEP 4.8-5.1), compared with the broader profile displayed by acid ossein gelatin (IEP 6.0-8.0)

At the solid/liquid interface adsorption of gelatin molecules is thought to occur by the preferential adsorption of particular groups along the polypeptide chain with free loops or chains extending into the solution (Simha et al 1953). At extremes of pH, charge repulsion is expected to result in chain extension and a reduced surface coverage. This effect should be minimal at the IEP, and thus, pH would be expected to influence the thickness of an adsorbed film.

Gelatin solutions 0.0001% were prepared at pH 4.8 and 7.0 incorporating 0.00125% latex spheres (0.267 $\mu$m SD $\pm$ 0.003). The hydrodynamic thickness of the adsorbed film was measured at 35°C by photon correlation spectroscopy.

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|---|---|---|---|
| pH 4.8 | 36.5 $\pm$ 3nm | pH7 39.5 $\pm$ 2.5 nm | LIMED OSSEIN |
| pH 4.8 | 34.0 $\pm$ 4nm | pH7 26.0 $\pm$ 4 nm | ACID OSSEIN |

The limed ossein, showed no statistical difference in film thickness at the IEP or pH 7.0, whereas the acid ossein appeared greater at pH 4.8 compared with a value in its IEP range. Until further evidence is available it may be tentatively proposed that the chains are more extended when bearing a positive as opposed to a negative resultant charge.

Sato, H and Ueberreiter,K. Makromol Chem 180 829-835, 1107-1112 (1979)
Simha, R. et al, J. Phys. Chem. 57, 584-589 (1953)