these have already made possible the separation of a new isomer of adenylic acid[4] (see Fig. 1).

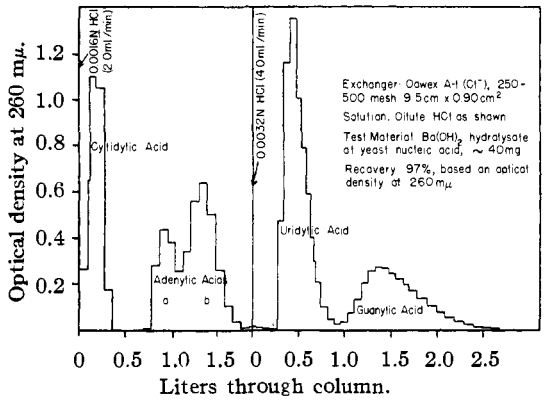

Fig. 1.—Separation of mixed monoribonucleotides by anion-exchange.

The type of separation possible is completely illustrated in Fig. 1. The mixture was adsorbed on the strong-base anion-exchanger from a small volume of an essentially neutral and salt-free solution, although larger volumes or salt-containing solutions can be adsorbed at higher *p*H's, and eluted with dilute hydrochloric acid. Similar separations have been achieved with acetic and formic acids while less satisfactory separations can be made at higher *p*H's. Bases and ribosides do not interfere and may be individually separated at higher *p*H values.[3] Concentration and recovery of the separated components is easily achieved by addition of base, readsorption on 10-fold smaller columns and elution with stronger acid or salt solutions. Crystalline material has been prepared in this manner, the rate of crystallization being slower than the rate of elution from the column. Thus it is possible to recover pure crystalline compounds from complex mixtures by ion-exchange alone.

(4) Carter and Cohn, *Federation Proceedings*, **8**, 190 (1949).

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RECEIVED APRIL 18, 1949

ON THE DEGRADATION OF COLLAGEN INTO A "PARENT GELATIN"[1]

Sir:

Scatchard, *et al.*,[2] have postulated that collagen on hydrolysis yields an undegraded "parent" gelatin molecule of dimensions 800 Å. by 17 Å. This communication compares these results with these obtained by direct observation of the formation of gelatin from intact collagen in solution.

The outflow times[3] at 20° of ichthyocol solutions[4] treated for varying lengths of time at two different temperatures are presented in the Figure. Evidently, ichthyocol degrades rapidly into a product which degrades further at a slower rate.

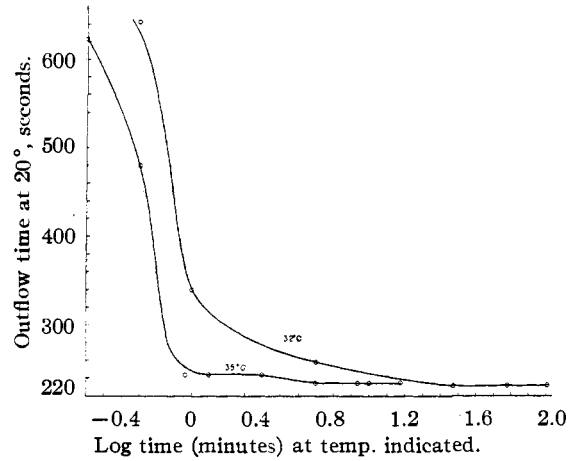

Fig. 1.—Solvent outflow time at 20°, 209.3 seconds; *p*H 2.5; 0.2 *M* NaCl.

The viscosity increment[5] of the solution which showed no further rapid change was approximately 160, which, with Simha's[6] equation, yields an axial ratio of 47.5. Assuming that the diameters of the gelatin molecule in this case and in that of Scatchard, *et al.*, are the same, the length of the parent gelatin molecule is about 800 Å.

The heat of activation[7] for the process of formation of the parent gelatin in the presence of salt is of the order of 20–30 kcal. per mole, while the further degradation of the parent gelatin has a heat of activation of about 10 kcal. per mole.[8] The heats of activation are without much meaning except to indicate differences in order of magnitude.

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RECEIVED MARCH 30, 1949

(1) This paper represents a partial report on research sponsored by the office of the Quartermaster General, Research and Development Branch, under Project No. 130-46 on "Determination of the Nature and Properties of Skin Structure" under direction of the Leather Subcommittee of the National Research Council Committee on Quartermaster Problems."

(2) Scatchard, Oncley, Williams and Brown, THIS JOURNAL, **66**, 1980 (1944).

(3) Measured with an Ostwald-Fenske type capillary viscosimeter at 20°.

(4) Tunic of carp swim-bladder was extracted with 0.05% acetic acid in the cold and was filtered under suction successively through Number 41 H Whatman paper, coarse and medium sintered glass filters. The filtrate, dialyzed exhaustively in the cold against an acetic acid solution of *p*H 2.5 and 0.2 *M* with respect to sodium chloride, was diluted with the latter solution to an ichthyocol concentration of 0.11%.

(5) The relative viscosities of dilutions of the parent gelatin solution with respect to the *p*H 2.5 0.2 *M* sodium chloride solution were determined and used to calculate the viscosity increment, assuming a partial specific volume of 0.75 for gelatin.

(6) Simha, *J. Phys. Chem.*, **44**, 25 (1940).

(7) Assuming equal outflow times at 20° mean equal amounts degraded.

(8) Degradation at 60 and 80°. Outflow times measured at 20°.

(9) Department of Chemistry, University of Tennessee, Knoxville, Tennessee.