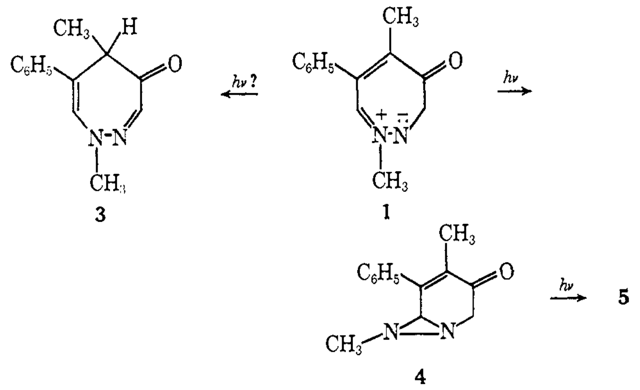
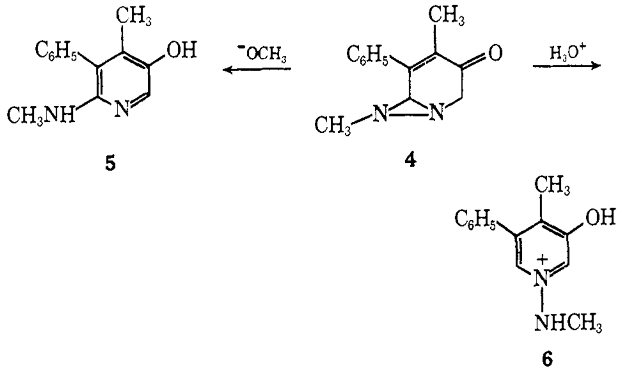
arises by a secondary photochemical reaction of **4** as shown by separate irradiation of the latter.



The bicyclo[4.1.0] ketone **4** is of particular importance in this series since intermediates with this ring system have been postulated in both acid-catalyzed rearrangements of the 2,3-dihydrodiazepinone system to 1-aminopyridines[2] and more recently also in the base-catalyzed rearrangement of the 1,5-dihydro- or 1,7-dihydrodiazepinones to 6-aminopyridines.[4,6] In accord with these suggestions, we have found that **4** is in fact converted very rapidly in methanolic hydrochloric acid into the 1-methylaminopyridinium chloride **6** and in methanolic sodium methoxide into the 6-methylaminopyridine **5**. The nmr spectra of the reaction mixtures in each case indicated a single product; **5** and **6** were isolated and compared (melting point, ir and uv spectra) with samples described previously. These reactions demonstrate that bicyclo[4.1.0] species such as **4** can serve as precursors of both types of pyridine products.



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Observation of a Helix–Coil Transition by Pulsed-Field-Gradient Spin–Echo Nuclear Magnetic Resonance

Sir:

Poly-L-glutamic acid has been shown to undergo a helix to random coil conformational change as a function of pH.[1,2] At low pH the helical conformation is the more stable form, and at high pH the random coil is the more stable. The pH at the transition midpoint has been reported to be 5.1 in 1 *M* NaCl,[3] 5.8 in H_2O,[2] and 6.0 in D_2O with 0.2 *M* NaCl.[4] This note describes a study of this conformational change by the study of the translational self-diffusion coefficient by pulsed-field-gradient spin–echo nmr spectroscopy.[5,6]

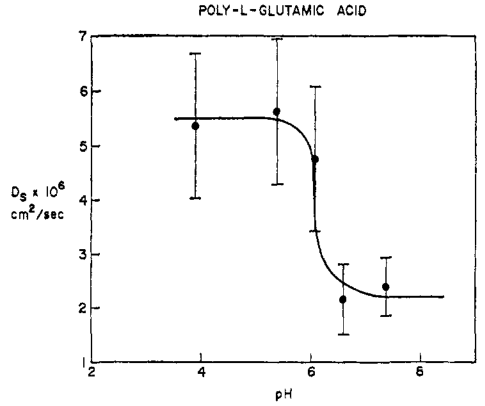

Figure 1. The self-diffusion coefficient, D_s, of poly-L-glutamic acid in D_2O at 25° at various pH values.

The polypeptide solutions were prepared by adding 35.8 mg of Pilot Chemical Co. sodium poly-L-glutamate monohydrate (DP 530) to 1.5 ml of 0.5 *M* phosphate buffer solutions of the desired pH. The sample tubes were then connected to a vacuum system, and the solutions were freeze dried and redissolved in 99.8 mole % D_2O from Stohler Isotope Chemicals. This was repeated three times, and the final time the volumes of the solutions were adjusted to 1.2 ml. The samples were then sealed, still under vacuum. This left only protons in nonexchangeable positions on the poly-L-glutamic acid in the sample, with a very few residual protons in the D_2O.

The self-diffusion coefficient of poly-L-glutamic acid was measured by measuring the self-diffusion coefficient of the protons in the sample by pulsed-field-gradient spin–echo nmr. Figure 1 shows the plot of self-diffusion coefficient D_s at 25° *vs.* the pH of the sample. Each value of D_s is the average obtained from measurements at four values of the magnetic field gradient, and the results of 20 echo amplitude determinations were averaged for each choice of the field gradient. The error limits in Figure 1 indicate the standard deviation of these measurements. The large uncertainties in D_s values result from a roughly ±10% limitation in the determination of the echo amplitudes.

The smaller self-diffusion coefficient at higher pH is compatible with the unfolding of the polypeptide into a bulkier random-coil conformation. It thus appears feasible to study conformational changes in biological systems by the measurement of the self-diffusion coefficient by spin–echo nmr.

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