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A CONVENIENT REGIOSPECIFIC AND STEREOSELECTIVE SYNTHESIS OF [2,4-²H₂]METHYL-*trans*-4-OXO-2-BUTENOATE

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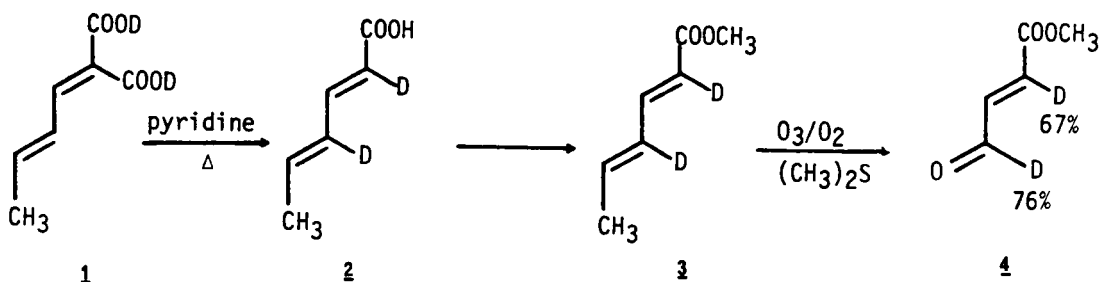
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**A CONVENIENT REGIOSPECIFIC AND STEREOSSELECTIVE
SYNTHESIS OF [2,4-²H₂]METHYL-trans-4-OXO-2-BUTENOATE**

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(06/21/85)

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In the course of our studies on natural pyrethrins as domestic insecticides, we required some stereospecific deuteriated chrysanthemic acid. We took advantage of the condensation of crotonaldehyde with CH₂(CO₂D)₂ to give the dicarboxy-deuteriated crotonylidenemalonic acid (1), which upon heating in pyridine, afforded sorbic acid (2) bearing a label at both the 2- and 4-positions.^{1,2}



The ¹H nmr spectrum confirmed the regiospecificity of deuterium through the marked reduction in intensity of the 2- and the 4-positions. The two-site labeling also occurred when a mixture of crotonaldehyde, pyridine, malonic acid, and a trace of tritiated water was kept at room temperature and later heated at 110° for 6 hrs. In this case, the labeling of sorbic acid was demonstrated unambiguously by the two-line ³H nmr spectrum obtained with ¹H decoupling. We proposed that in boiling pyridine, the monodecarboxylation of crotonylidenemalonic acid in good yield is accompanied by lactonization followed by ring opening,³ thus resulting in

transfer of the carboxy deuteron to both 2- and 4-positions. In the present study, the labeled acid was methylated⁴ and subjected to ozonolysis according to the procedure described by Stotter and Eppner.⁵ [2,4-²H₂]Methyl sorbate gave excellent results and afforded as high as 90% yield of [2,4-²H₂]methyl trans-4-oxo-2-butenolate (4) by ozonolytic cleavage (method A).^{5,6} The stereoselective preparation of the target molecule is made possible by the highly electrophilic ozone which selectively attacks the Δ⁴ double bond of the deuterated methyl sorbate because of the lower electron density at the Δ² double bond due to π-conjugation and σ-induction by the carbonyl group.⁵

REFERENCES

- Visiting Assistant Professor, Department of Medicinal Chemistry and Pharmacognosy, School of Pharmacy and Pharmacal Sciences, Purdue University, West Lafayette, Indiana 47907.
- 1. J. A. Elvidge, J. R. Jones, R. B. Mane and M. Saljoughian, *J. Chem. Soc. Perkin Trans. I*, 1191 (1978).
- 2. [2,4-²H₂]Sorbic acid [0.35 g. from crotonaldehyde (0.50 g.), malonic acid-D₂ (0.6 g.) and pyridine (0.5 ml)],¹ mp. 133-134°; MS: M⁺ 114; nmr (CDCl₃): δ 5.77 (d, J = 15.5 Hz, 2-¹H, 33% ↔ 2-²H, 67%) and 6.25 (m, 4-¹H, 24% ↔ 4-²H, 76% incorporation); a Varian FT-80 MHz Spectrometer was used for these studies.
- 3. A. Riedel, *Ann.*, 361, 96 (1908).
- 4. A. B. Sen and V. S. Misra, *J. Indian Chem. Soc.*, 26, 149 (1949).
- 5. P. L. Stotter and J. B. Eppner, *Tetrahedron Lett.*, 2417 (1973).
- 6. [2,4-²H₂]Methyl trans-4-oxo-2-butenolate, mp. 41°; MS: M⁺ 116; nmr (CDCl₃): δ 6.90 (d, J = 15.8, 2-¹H, 33% ↔ 2-²H, 67%) and 9.75 (d, J = 7.8, 4-¹H ↔ 4-²H, 76% incorporation).