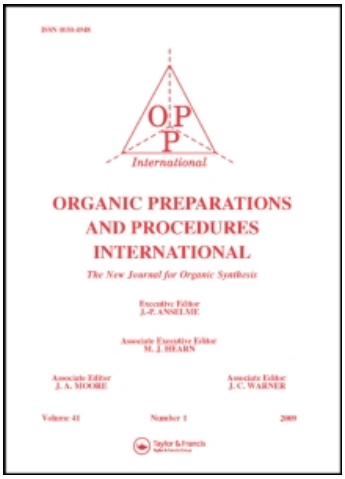

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SYNTHESIS OF 7-HYDROXYBENZO[a]PYRENE

Ronald G. Harvey[a]; Peter P. Fu[a]
[a] Ben May Laboratory for Cancer Research, University of Chicago, Chicago, IL

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5,7-Dimethylcarboxylate-N-methylimidazo[4,5-d]cycloheptatrien-6-one (IVc).- A mixture of 1.38 g (0.01 mole) of III and 2.1 g (0.012 mole) of dimethylacetone-1,3-dicarboxylate and a few drops of piperidine in 100 ml dry benzene was refluxed for 3 hrs. The reaction mixture was worked up as usual. The product was purified by chromatography using methylene chloride-hexane (2:1) as eluent and crystallized from benzene hexane (3:1) to give 1.7 g (62%) of IVc, mp. 212-213°.

Anal. Calcd. for $C_{13}H_{12}N_2O_5$: C, 56.52; H, 4.34; N, 10.14.
Found: C, 56.68; H, 4.48; N, 10.32.

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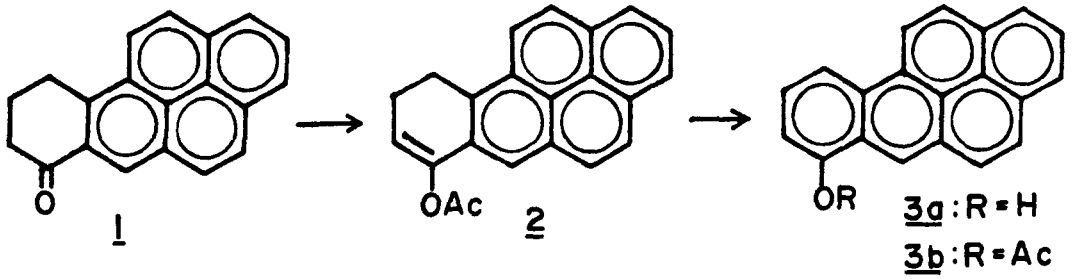
SYNTHESIS OF 7-HYDROXYBENZO[a]PYRENE

Submitted by Ronald G. Harvey* and Peter P. Fu
(7/8/82)
Ben May Laboratory for Cancer Research
University of Chicago, Chicago, IL 60637

7-Hydroxybenzo[a]pyrene (3a) is a metabolite of the potent carcinogen benzo[a]pyrene.[1] Synthesis of 3a by dehydrogenation of 7-oxo-7,8,9,10-tetrahydrobenzo[a]pyrene (1) with sulfur[2] or palladium black[3] in yields of 30% and 62%, respec-

tively, has previously been described. We now report an efficient synthesis of 3a from 1 via the sequence: (1) formation of the enol acetate 2 by acid-catalyzed reaction with isopropenyl acetate and acetic anhydride; (2) dehydrogenation with o-chloranil; and (3) acid-catalyzed methanolysis. This synthetic approach, which has been previously employed to prepare several phenolic derivatives of benz[a]anthracene,[4] provides 3a in higher overall yield (87%) than previously attainable. The 270 MHz spectrum[5] and other physical properties of 3a were in good agreement with the literature data.[3]



EXPERIMENTAL

7-Acetoxy-9,10-dihydrobenzo[a]pyrene (2).- A solution of 1 (1.08 g, 4 mmol), p-toluenesulfonic acid (60 mg), isopropenyl acetate (50 ml), and acetic anhydride (5 ml) was refluxed for one day. Water (300 ml) was added and the precipitate of 2 was isolated by filtration and dried over P_2O_5. Crude 2 was crystallized from CH_2Cl_2 hexane to afford sample (1.18 g, 95%) as colorless plates, mp. 190-191°. An analagous reaction conducted in the absence of acetic anhydride furnished 2 in only 46% yield.

NMR ($CDCl_3$): δ 2.40 (s, 3, CH_3), 2.52-2.87 (m, 2, allylic), 3.48 (t, 2, J = 8 Hz, benzylic), 5.92 (t, 1, J = 5 Hz, vinylic), and 7.85-8.40 ppm (m, 8, aromatic).

Anal. Calcd for $C_{22}H_{16}O_2$: C, 84.59; H, 5.16.
Found: C, 84.67; H, 5.16.

7-Acetoxybenzo[a]pyrene (3b).- A solution of 2 (194 mg, 0.62 mmol) and o-chloranil (154 mg, 0.62 mmol) in 20 ml of dry benzene was heated at reflux for 1 hr, then cooled to room temp. and poured onto a short column of Florisil. Elution with benzene and evaporation gave 3b as a pale yellow solid (188 mg, 98%). The NMR spectrum of 3b matched that of an authentic sample.[2] A portion of 3b recrystallized from ethanol had mp. 194-195°, lit.[2] 194-195°. Uncrystallized 3b was employed directly in the next step.

NMR ($CDCl_3$): δ 2.60 (s, 3, CH_3), 7.57 (d, 1, J = 8 Hz, H_8), 7.81 (t, 1, J = 8 Hz, H_9), 7.91-8.03 (m, 3, $H_{2,4,5}$), 8.09 (d, 1, J = 8 Hz, H_3), 8.23 (d, 1, J = 8 Hz, H_1), 8.31 (d, 1, J = 9 Hz, H_{12}), 8.51 (s, 1, H_6), 8.91 (d, 1, J = 9 Hz, H_{10}), and 8.98 ppm (d, 1, J = 9 Hz, H_{11}).

7-Hydroxybenzo[a]pyrene (3a).- A solution of 3b (90 mg, 0.29 mmol) and p-toluenesulfonic acid monohydrate (30 mg) in 10 ml of methanol was refluxed for 5 hrs, then cooled to room temp. and poured into 500 ml of icewater. The suspension was stirred for 20 min, then allowed to stand for another 30 min. prior to filtration. The precipitate was washed with cold water and dried over P_2O_5 to yield 3a (73 mg, 94%) as a pale yellow solid, mp. 217-219° (dec.), lit.[2] 218-219°. NMR (ace-

NMR (acetone-d_6)[3,5]: δ 7.26 (d, 1, H_8), 7.67 (t, 1, H_9), 7.96 (d, 1, H_4), 8.01 (t, 1, H_2), 8.10 (d, 1, H_5), 8.14 (d, 1, H_3), 8.28 (d, 1, H_1), 8.36 (d, 1, H_{12}), 8.63 (d, 1, H_{10}), 9.05 (s, 1, H_6), and 9.10 ppm (d, 1, H_{11}).

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