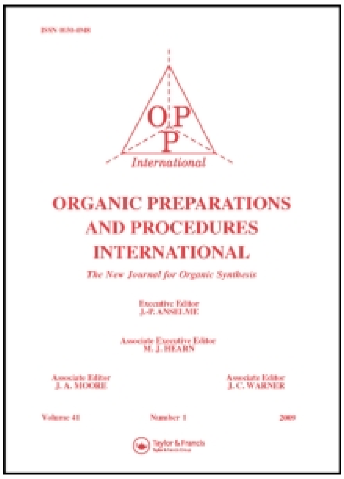

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A GENERAL SYNTHESIS OF UNSUBSTITUTED POLYCYCLIC ARENE IMINES. 3-METHYLCHOLANTHRENE 11,12-IMINE

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OPPI BRIEFS

A GENERAL SYNTHESIS OF UNSUBSTITUTED POLYCYCLIC ARENE IMINES. 3-METHYLCHOLANTHRENE 11,12-IMINE[1]

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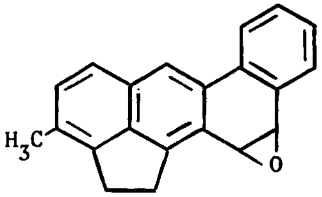
Recently[2] we reported a two-step synthesis of aziridines from the corresponding oxiranes that proved useful for the preparation of some K-region arene imines.[3] The increasing demand for the latter compounds for biological studies required substantial scaling-up of our preparations. By doing so, we noticed however, that both the arene oxides and the imines were prone to undesired ring cleavage unless measures are taken to control the reactions very carefully. For example, during attempts to synthesize the title compound by the procedure of reference 2, the arene oxide rearranged entirely into 3-methyl-



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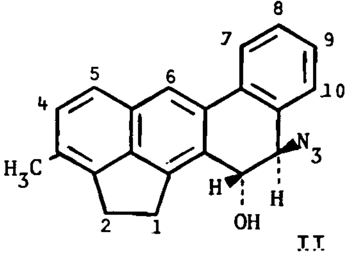

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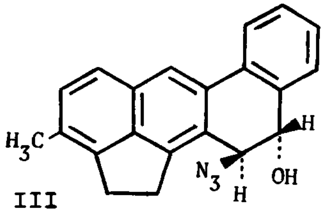
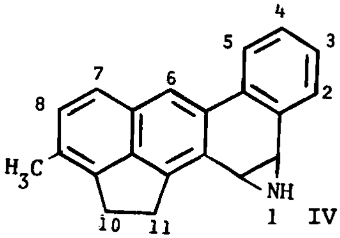


III



IV

cholanthrene-5- and -6-ol and gave none of the expected azido alcohols.

We now report conditions under which several K- and non-K-region arene imines can be prepared in excellent yield and with high reproducibility. The procedure is illustrated by the synthesis of the yet unreported 3-methylcholanthrene 11,12-imine (IV). Treatment of 3-methylcholanthrene 11,12-oxide[4,5] for 60 hrs with a pre-prepared solution of NaN_3/H_2SO_4 in aqueous acetone at pH 7.7-7.8 afforded a mixture of II and III (ratio 14:1 as determined from the NMR signals of the C_{11} and C_{12} protons) in 97% yield.[6] The reaction of the azido alcohols with excess of tri-n-butylphosphine at 0° followed by heating to 56° yielded imine IV in 95% yield.

EXPERIMENTAL

trans-11-Azido-1,2,11,12-tetrahydro-3-methylbenz[j]aceanthrylen-12-ol(II) and *trans*-12-Azido-1,2,11,12-tetrahydro-3-methylbenz[j]aceanthrylen-11-ol(III).- To a stirred solution of 100 g (1.56 mol) of sodium azide in 750 ml of water and 1500 ml of permanganate treated acetone there was added 4 ml (7.4 mol) of concentrated sulfuric acid. After 15 min (pH of the solution 7.7-7.8) 4.10 g (14.4 mmol) of 3-methylcholanthrene 11,12-oxide[4] was added and the stirring was continued at 22° for 6 hrs. The acetone was removed under reduced pressure and the yellow precipitate was washed with 100 ml of water and dried *in vacuo*. Recrystallization from CH_2Cl_2-heptane afforded 4.58 g (97%) of azido alcohols II and III in ratio 14:1 (determined by 300 MHz ^1H NMR); mp. 160-165° (dec.); IR (Nujol) 2107 (N_3), 3300 cm^{-1} (OH); 300 MHz ^1H NMR of II ($CDCl_3$) δ 1.864 (br, s, 1, OH), 2.424

(s, 3, CH_3), 3.380 (ABq, 2, H_2), 3,537 (ABq, 2, H_1), 4.777 (br, d, 1, J = 3 Hz, H_{11} sharpens with D_2O), 5.022 (d, 1, J = 3 Hz, H_{12}), 7.210 - 7.493 (m, 4, ArH), 7.593 (d, 1, J = 7.9 Hz, ArH), 8.013 (d, 1, J = 7.5 Hz, ArH), 8.090 (s, 1, H_6). The C_{11} and C_{12} protons of III appear at 4.753 (d, 1, J = 3 Hz), 5.105 (d, 1, J = 3 Hz); MS (70 eV, 100°): m/e (relative intensity) 327 ($M^{+\cdot}$, 15.9), 299 (4.5), 298 (4.3), 285 (16.8), 284 (19.0), 283 (5.6), 282 (7.9), 271 (11.5), 270 (32.3), 269 (26.5), 268 (100), 267 (23.7), 266 (8.7), 265 (13.3), 263 (6.6), 255 (8.4), 254 (13.9), 253 (32.7), 252 (34.5), 250 (6.8), 241 (5.2), 240 (5.6), 239 (11.9), 226 (5.8).

Anal. Calcd for $C_{21}H_{17}ON_3$: C, 77.1; H, 5.2.
Found: C, 77.2; H, 5.2.

3-Methylcholanthrene 11,12-Imine (IV).- To a suspension of 6.00 g (18.3 mmol) of finely powdered azido alcohols in 2 l of degassed and precooled hexane (0°) there was added under N_2 12 ml (47.5 mmol) of tri-*n*-butylphosphine (Fluka puriss). The mixture was stirred at 0° for 150 min and the temperature was raised to 22°. After further 45 min the mixture was heated for 3 hrs at 56°. At this temperature the white precipitate disappeared and a yellow solution was formed. The solvent was removed under reduced pressure and the resulting yellow crystals were washed with 50 ml of cold hexane to give 4.33 g (95%) of cream colored IV; mp. 138-141° (dec.) (from CH_2Cl_2-heptane); 300 MHz ^1H NMR ($CDCl_3$) δ 2.406 (s, 3, CH_3), 3,358 (t, 2, J = 6.2 Hz, H_{10}), 3,533 (t, J = 6.2 Hz, H_{11}), 3.536 (d, J = 5 Hz, H_{1a} or H_{11c}), 3.607 (t, 1, J = 6.2 Hz, H_{11}), 3.713 (d, 1, J = 5 Hz, H_{1a} or H_{11c}), 7.286 (t, 1, ArH), 7.330 (d, 1, ArH), 7.388

(t, 1, ArH), 7.556 (d, 1, ArH), 7.582 (d, 1, ArH), 8.225 (d, 1, H_5), 8.305 (s, 1, H_6); MS (70 eV, 100°), m/e (relative intensity) 283 ($M^{+\cdot}$, 99.5), 268 (74.2), 267 (37.7), 253 (61.6), 202 (100), 201 (44.7), 200 (80.8), 199 (59.6).

Anal. Calcd for $C_{21}H_{17}N$: C, 88.9; H, 6.0; N, 4.9.
Found: C, 88.9; H, 6.2; N, 4.7

Acknowledgement.- We are grateful to the Israel Commission for Basic Research, The Israel Academy of Sciences and Humanities for financial support.

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PREPARATION OF p-TOLUENESULFONYL AZIDE. A CAUTIONARY NOTE

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The utility of p-toluenesulfonyl azide (tosyl azide) for the preparation of diazo compounds is well established.[1] The