Tetrahedron Letters, Vol.31, No.26, pp 3743-3744, 1990
Printed in Great Britain

0040-4039/90 $3.00 + .00
Pergamon Press plc

SYNTHESIS OF 6-AZABENZO[*a*]PYRENE

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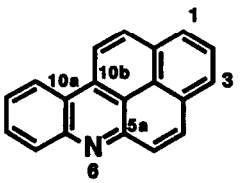
Summary : 6-Azabenzo[*a*]pyrene was synthesized from perinaphthenone and 1-iodo-2-nitrobenzene.

Aza-analogs of polycyclic aromatic hydrocarbons are carcinogenic and environmental substances in addition to their parent compounds.[1] Among the structurally possible twelve azabenzo[*a*]pyrenes (azaBaPs), the syntheses of 4-, 7-, 8-, 10- and 12-azaBaPs have been reported.[2] No compounds are known which have a nitrogen atom in the 1-, 3- and 6-position. Since these positions are involved in the metabolism of BaP and are susceptible to addition of NO_X to form nitroBaPs as powerful mutagens, 1-, 3- and 6-azaBaPs should be of particular interest.[3] In this letter, we report the synthesis of 6-azaBaP (**4**) by a simple and practical method using a commercially available perinaphthenone (**1**) and 1-iodo-2-nitrobenzene (**2**) as starting materials.



4

Our approach involves construction of the $C_{(10a)}$ - $C_{(10b)}$ bond by a reaction that $C_{(10a)}$ acts as a nucleophile toward a $C_{(10b)}$ electrophile[4] and then intramolecular Schiff base formation of $C_{(5a)}$ and $N_{(6)}$.[5] Perinaphthenone (**1**) was added to the aryllithium prepared from **2** and *n*-butyllithium in THF as rapidly as possible at -78 °C. Subsequent treatment of the reaction mixture with activated MnO_2 in benzene afforded **3**. The yield of **3** was 65 % after the purification by silica gel column chromatography.[6] Catalytic hydrogenation of **3** in THF - EtOH (5 : 1) in the presence of PtO_2 gave **4** in 90 % yield.[7] Its N-oxide **5** was derived from **4** using *m*CPBA in CH_2Cl_2 (95 % yield).

The structures of **4** and **5** were characterized with 400 MHz proton NMR and mass spectrometry. High resolution mass spectrum of 6-azaBaP indicated the molecular component ($C_{19}H_{11}N$). The lack of a singlet resonance peak of **4** and **5** showed that the nitrogen heteroatom was located at 6-position. The chemical shifts of the protons of **4** and **5** were downfield as compared with those of BaP, resulting from the nitrogen heteroatom at 6-position. In the case of **5**, the peri protons (H_5 and H_7) were largely shifted to downfield by

the effect of N-oxide function. The proton NMR resonance assignment (Table 1) was performed by NOE and ^{1}H 2-DCOSY.

Further investigation concerning chemical and biological properties of **4** is now underway.

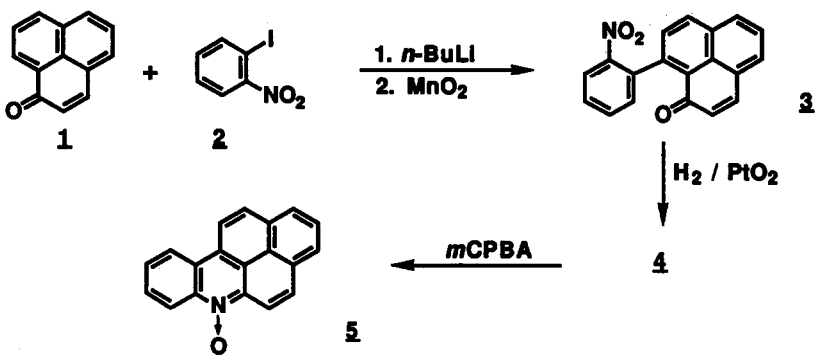


Table 1

	H_1	H_2	H_3	H_4	H_5	H_6	H_7	H_8	H_9	H_{10}	H_{11}	H_{12}
6-azaBaP	8.27	8.00	8.21	8.18	8.22	-	8.50	7.95	7.80	8.83	8.83	8.42
6-azaBaP N-oxide	8.33	8.08	8.26	8.42	8.86	-	8.94	7.95	8.05	9.27	8.96	8.32
BaP	8.24	7.98	8.09	7.93	8.00	8.52	8.29	7.78	7.84	9.05	9.06	8.33

References and notes

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4. C. F. Koelsch and J. A. Anthes, *J. Org. Chem.*, **6**, 558 (1941).
5. The condensation reactions of perinaphthenone and aniline derivatives hardly proceeded under several conditions.
6. The sufficient purification is necessary for further reaction.
7. Compound **4** ; m. p. 160 - 162 °C ; high-resolution MS, calcd for $C_{19}H_{11}N$ 253.089, found 253.090.

(Received in Japan 13 April 1990)