

## 4,6-Dinitroanthranilic Acid and Benzo-fused Six-membered Heterocycles on Its Basis

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Aromatic polynitro compounds are valuable for synthesis owing to their ability to be reduced and to take part in nucleophilic substitution, and also to the possibility of modification of the other substituents in the ring. In particular, we formerly obtained from 2,4,6-trinitrotoluene (I) and 2,4,6-trinitrobenzoic acid (II) benzo-fused five-membered and seven-membered heterocycles [1–3].

This report concerns the synthesis of six-membered benzo-fused nitrogen-containing heterocycles, quinazolines. Some of compounds from this class are known to possess the biological activity [4]. As initial compound we applied 4,6-dinitroanthranilic acid (III) which we prepared by a modified procedure involving reduction of compound II with hydrazine in the presence of a catalytic quantity of  $\text{FeCl}_3$  [5]. Acid III was previously obtained from compound II by treating with  $\text{TiCl}_3$ , but in this process alongside the target acid formed also 4-amino-

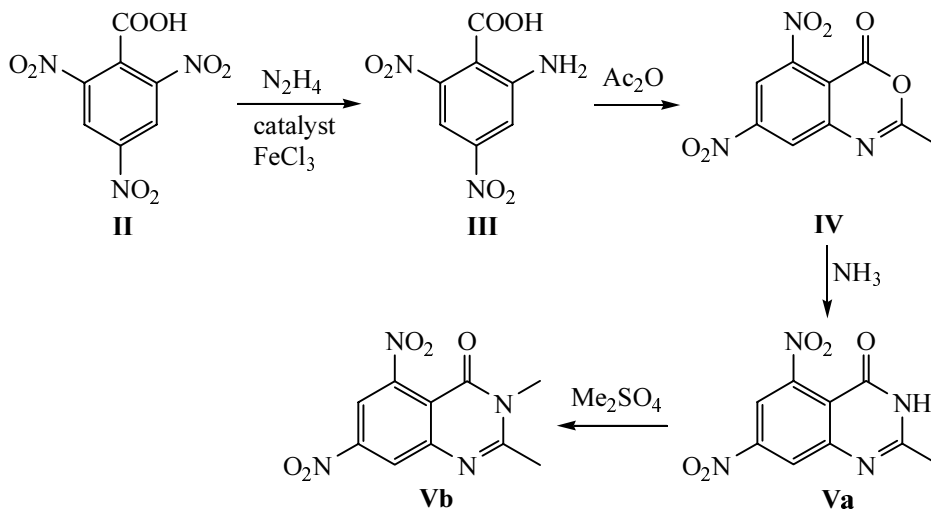
2,6-dinitrobenzoic acid, and the isomers separation was difficult [6]. The preparative procedure for the synthesis of acid III is essentially developed here for the first time.

Further acid III at boiling in acetic anhydride afforded 4,6-dinitrobenzoxazin-4-one (IV) that at heating with aqueous  $\text{NH}_3$  suffered recyclization into the corresponding quinazolone Va. The methylation of quinazolone Va with dimethyl sulfate furnished N-methyl derivative Vb. Dinitro-substituted benzoxazinone IV and quinazolones Va and Vb were not described before (see the scheme).

The range of quinazolines synthesized from acid III can be extended by nucleophilic substitution and reduction of the nitro groups, and also by modification of the C=O group in quinazolones V that we are planning to investigate further.

**2-Amino-4,6-dinitrobenzoic acid (III).** To a dispersion of 20.0 g (78 mmol) of acid II and 5.0 g of

Scheme.



$\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  (24 mol%) in 400 ml of EtOH was added at stirring within 2 h at 42–47°C a mixture of 30 ml of 70% hydrazine hydrate, 40 ml of AcOH, and 10 ml of water. The stirring at this temperature was continued for 2 h more. On cooling the reaction mixture the separated dark precipitate was filtered off and washed on the filter with EtOH (3×5 ml). Then the precipitate was dispersed in 50 ml of water, acidified to pH 3, and the formed yellow-brown precipitate was filtered off and dried. Yield 9.2 g (52%).

From the mother liquor that remained after filtration of the reaction mixture on acidifying to pH 3 and evaporation was isolated 2.0 g more of the target product. Overall yield 11.2 g (63%), mp 264–265°C (decomp.) [6].  $^1\text{H}$  NMR spectrum,  $\delta$ , ppm: 7.67 s (1H), 7.89 s (1H). Mass spectrum,  $m/z$  ( $I_{\text{rel}}$ , %): 227 (27)  $M^+$ , 209 (72), 183 (79), 137 (36), 107 (43), 64 (100).

**2-Methyl-5,7-dinitro-4H-benz[d][1,3]oxazin-4-one (IV).** A dispersion of 10.0 g (44 mmol) of acid **III** was boiled for 1 h in 70 ml of  $\text{Ac}_2\text{O}$ . Then the insoluble impurities were filtered off, the filtrate was evaporated on a rotary evaporator to 1/10 of the initial volume, then it was cooled, the precipitate was filtered off, washed with ether (3×10 ml), and dried. Yield 9.0 g (81%), mp 148–150°C. Mass spectrum,  $m/z$  ( $I_{\text{rel}}$ , %): 251 (44)  $M^+$ , 236 (100), 207 (55), 43 (45). Found, %: C 43.00; H 2.05; N 16.69.  $\text{C}_9\text{H}_5\text{N}_3\text{O}_6$ . Calculated, %: C 43.04; H 2.01; N 16.73.

**2-Methyl-5,7-dinitroquinazolin-4(3H)-one (Va).** At vigorous stirring to 80 ml of 6% water solution of ammonia was added by portions 4.0 g (15.9 mmol) of benzoxazinone **IV**. The mixture was brought to boiling and thus stirred for 10 min. Then it was evaporated on a rotary evaporator to dryness, diluted with 20 ml of water, filtered off, washed with water (3×50 ml), and dried. Yield 3.6 g (90%), mp 296–299°C (decomp.).  $^1\text{H}$  NMR

spectrum,  $\delta$ , ppm: 2.42 s (3H), 8.46 s (1H), 8.67 s (1H), 13.03 s (1H, NH). Mass spectrum,  $m/z$  ( $I_{\text{rel}}$ , %): 250 (100)  $M^+$ , 204 (16), 158 (21), 90 (13). Found, %: C 43.17; H 2.47; N 22.45.  $\text{C}_9\text{H}_6\text{N}_4\text{O}_5$ . Calculated, %: C 43.21; H 2.42; N 22.40.

**2,3-Dimethyl-5,7-dinitroquinazolin-4(3H)-one (Vb).** To a solution of 2.0 g (8 mmol) of quinazolinone **Va** and 0.48 g (12 mmol) of NaOH in 15 ml of water was added at stirring 1.51 g (12 mmol) of  $\text{Me}_2\text{SO}_4$ . The mixture was stirred for 1 h, then the precipitate was filtered off, washed with 10% aqueous ammonia (3×10 ml), then with water (50 ml), and dried. Yield 1.8 g (85%), mp 206–208°C.  $^1\text{H}$  NMR spectrum,  $\delta$ , ppm: 2.65 s (3H), 3.53 s (3H), 8.47 s (1H), 8.70 s (1H). Found, %: C 44.74; H 2.68; N 19.68.  $\text{C}_{10}\text{H}_8\text{N}_4\text{O}_5$ . Calculated, %: C 44.68; H 2.72; N 19.76.

$^1\text{H}$  NMR spectra were registered from solutions in  $\text{DMSO}-d_6$  on a spectrometer Bruker DRX500 at operating frequency 500.13 MHz, mass spectra were recorded on Kratos MS-30 instrument (electron impact, 70 eV).

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