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SHORT COMMUNICATIONS

Reaction of Vinylpyridines and Vinylquinolines with 1,3,5-Triazine in Polyphosphoric Acid

A. V. Aksenov, I. V. Aksenova, I. V. Malikova, S. V. Shcherbakov, and A. M. Zhirov

Stavropol State University, Stavropol, 355009 Russia
e-mail: k-biochem-org@stavsu.ru

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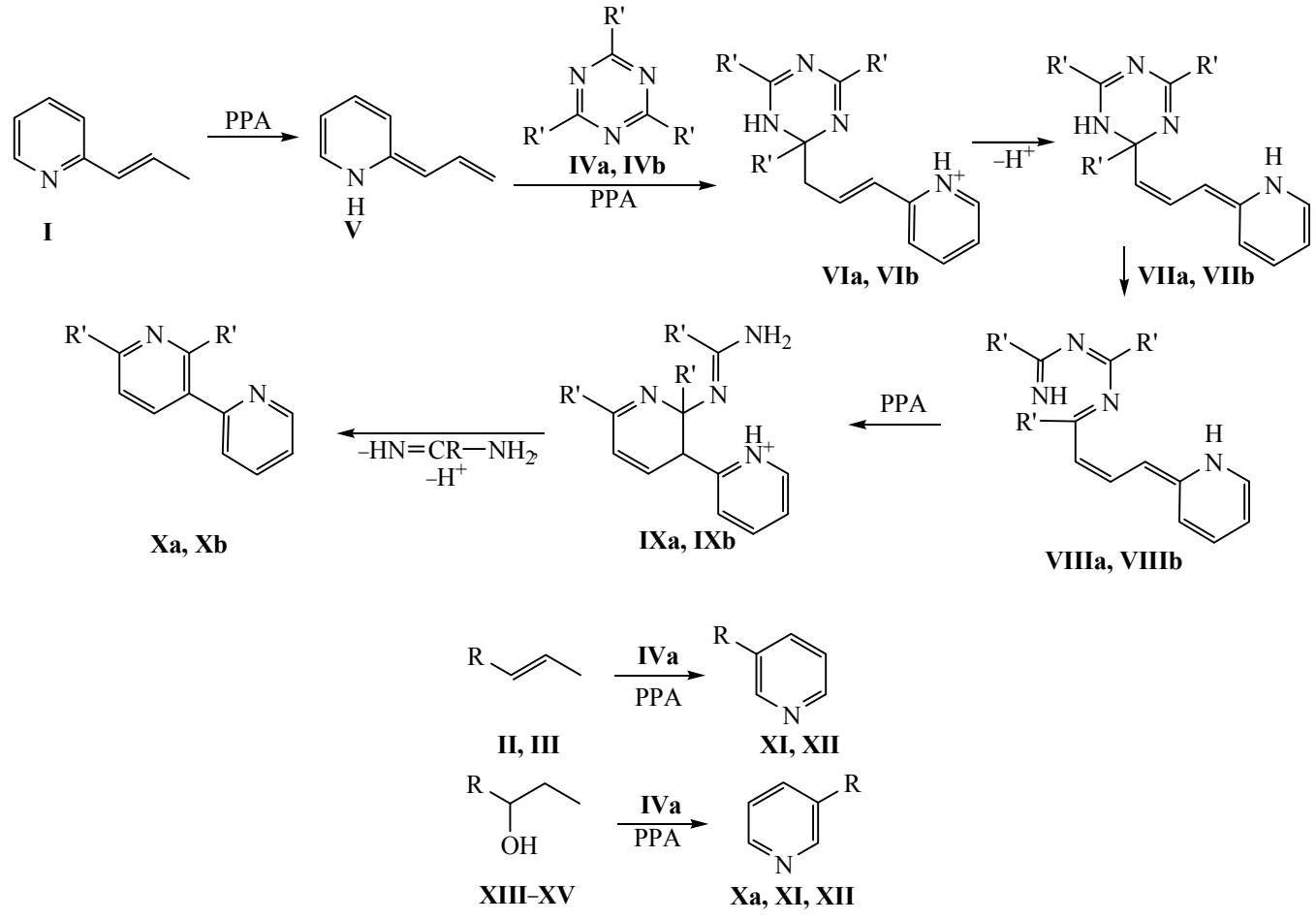
We showed formerly that the system 1,3,5-triazine–polyphosphoric acid (PPA) was an efficient reagent for *peri*-fusion of a pyridine ring to azaphenalenes [1, 2] and 1,8-naphthylenediamine [3]. Here we report on reactions of 2-propenylpyridine (**I**), 4-propenylpyridine (**II**), and 2-propenylquinoline (**III**) with 1,3,5-triazines



R = 2-pyridyl (**I, X, XIII**), 4-pyridyl (**II, XI, XIV**), 2-quinolyl (**III, XII, XV**); R' = H (a), Me (**b**).

IVa and **IVb** in PPA[a].

We showed that at heating compound **I** with triazines **IVa** and **IVb** in PPA formed 2,3'-bipyridyls **Xa** and **Xb** in 37 and 34% yield respectively. Similarly from azine **II** formed bipyridyl **XI**, from reagent **III**, compound **XII**.

Instead of compounds **I–III** their precursors, alcohols **XIII–XV**, can be employed.

General procedure. A mixture of 1 mmol of vinylhetarene **I–III** or alcohol **XIII–XV** and 3–4 g of PPA was vigorously stirred for 15 min at 60–65°C, 1.5 mmol of an appropriate 1,3,5-triazine was added, and the reaction mixture was stirred for 2 h at 70–75°C, then 5 h at 120–130°C. The reaction mixture was cooled, poured at stirring into 30 ml of cold water, alkalinized with 25% aqueous ammonia, saturated with potassium carbonate, and extracted with ethyl acetate (5×50 ml). The solvent was evaporated, the residue was subjected to column chromatography. Eluent ethyl acetate–petroleum ether, 1:1.

2,3'-Bipyridyl (Xa). Yield 0.058 g (37%) ([from compound **I**), 0.056 g (from compound **XIII**). Yellow oily substance. Picrate, mp 153–154°C (mp 153–155°C [5]). ^{1}H NMR spectrum, δ, ppm: 7.27 d.d (1H, H$^{5'}$, $J_{4',5'}$ 7.9, $J_{5',6'}$ 4.9 Hz), 7.39 d.d (1H, H^5, $J_{4,5}$ 7.9, $J_{5,6}$ 4.9 Hz), 7.74 d (1H, H^3, $J_{3,4}$ 7.9 Hz), 7.78 t (1H, H^4 *J* 7.9 Hz), 8.31 d.d (1H, H$^{4'}$, $J_{4',5'}$ 7.9, $J_{2',4'}$ 2.1 Hz), 8.64 d (1H, H^6, $J_{5,6}$ 4.9 Hz), 8.72 d (1H, H$^{6'}$, $J_{5',6'}$ 4.9 Hz), 9.18 d (1H, H$^{2'}$, $J_{2',4'}$ 2.1 Hz). Found, %: C 77.08; H 5.11; N 17.81. $C_{10}H_8N_2$. Calculated, %: C 76.90; H 5.16; N 17.94.

2',6'-Dimethyl-2,3'-bipyridyl (Xb). Yield 0.063 g (34%). Yellow oily substance. Picrate, mp 136–138°C ^{1}H NMR spectrum, δ, ppm: 2.42 s (3H, Me), 2.46 s (3H, Me), 7.27 d (1H, H$^{5'}$, $J_{4',5'}$ 7.9 Hz), 7.39 d.d (1H, H^5, $J_{4,5}$ 7.9, $J_{5,6}$ 4.9 Hz), 7.54 d (1H, H^3, $J_{3,4}$ 7.9 Hz), 7.59 t (1H, H^4, *J* 7.9 Hz), 8.21 d (1H, H$^{4'}$, $J_{4',5'}$ 7.9 Hz), 8.89 d (1H, H^6, $J_{5,6}$ 4.9 Hz). Found, %: C 78.39; H 6.49; N 15.12. $C_{12}H_{12}N_2$. Calculated, %: C 78.23; H 6.57; N 15.20.

3,4'-Bipyridyl (XI). Yield 0.064 g (41%) (from compound **II**), 0.055 g (35%) (from compound **XIV**). Yellow oily substance. Picrate, mp 205–206°C (mp 204–205°C [5]). ^{1}H NMR spectrum, δ, ppm: 7.41 d.d (1H, H^5, $J_{4,5}$ 7.9, $J_{5',6'}$ 4.9 Hz), 7.49 d (2H, H$^{3'}$, H$^{5'}$, *J* 4.9 Hz), 7.74 d (1H, H^3, $J_{3,4}$ 7.9 Hz), 7.91 d.d (1H, H^4, $J_{4,5}$ 7.9, $J_{2,4}$ 2.1 Hz), 8.67 d (1H, H^6, $J_{5,6}$ 4.9 Hz), 8.70 d (2H, H$^{2'}$, H$^{6'}$, *J* 4.9 Hz), 8.88 d (1H, H$^{2'}$, $J_{2',4'}$ 2.1 Hz). Found, %: C 77.06; H 5.09; N 17.85. $C_{10}H_8N_2$. Calculated, %: C 76.90; H 5.16; N 17.94.

2-(3-Pyridyl)quinoline (XII). Yield 0.116 g (56%) (from compound **III**), 0.117 g (57%) (from compound **XV**), mp 69–71°C (from petroleum ether) (mp 70–71°C [5]). ^{1}H NMR spectrum corresponds to the published one [6]. Found, %: C 81.28; H 4.71; N 13.53. $C_{14}H_{10}N_2$. Calculated, %: C 81.53; H 4.89; N 13.58.

NMR spectra were registered on a spectrometer Bruker WP-200 (200 MHz) in $CDCl_3$, internal reference TMS. The reactions progress was monitored and the homogeneity of compounds obtained was cheched by TLC on Silufol UV-254 plates, eluent ethyl acetate–petroleum ether, 1:1.

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[a] PPA used contained 86% of P_2O_5 and was prepared by procedure [4].