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Synthesis of 5-hydroxy-10-*R*-benzo[*a*]phenazine-12-oxides by cyclization of 2-arylamino-1,4-naphthoquinone-1-oximes under the action of nitrating mixture

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Abstract

The synthesis of polycyclic quinoid compounds, which exhibit a wide range of biological activity is one of the most promising and actively developing areas of the fine organic synthesis. Heterocyclic compounds including those that can be donors of nitrogen oxide NO occupy a special place among biologically active structures. These substances include a number of *N*-oxides, e.g., 1,2-diazet-1,2-dioxides, furoxanes and their benzo analogs, and *N,N'*-pyrazole dioxides. The reason for the high biological activity of *N*-oxides of nitrogenous heterocycles, which cannot easily generate nitrogen oxide NO may be their oxidative properties. Thus, *N*-oxides of nitrogenous heterocycles are of interest due to their high biological activity.

We have developed an approach to the synthesis of 5-hydroxy-10-*R*-benzo[*a*]phenazine-12-oxides that contain the *N*-oxide fragment, which makes these compounds promising for studying their biological activity. We have demonstrated that the treatment of 2-arylamino-1,4-naphthoquinones with hydroxylamine in ethanol at 50-60 °C leads to selective oximation at position *1* and the formation of 2-arylamino-1,4-naphthoquinone-1-oximes. It has been shown that the interaction of 2-arylamino-1,4-naphthoquinone-1-oximes with the nitrating mixture in acetic acid results in the formation of 5-hydroxy-10-*R*-benzo[*a*]phenazine-12-oxides. Our work is a continuation of the study on the interactions of 2-arylamino-1,4-naphthoquinones and 4-arylamino-1,2-naphthoquinones with nitrosylsulfuric acid in acetic acid and the interaction of 2-alkyl(benzyl)amino-1,4-naphthoquinones with nitrosylsulfuric acid or nitrating mixture in acetic acid. The former reactions lead to the formation of 3-*R*-benzo[*b*]phenazine-6,11-dione-5-oxides and 9-*R*-benzo[*a*]phenazine-5,6-dion-7-oxides, respectively. The latter reaction leads to the formation of 2-alkyl(aryl)naphtho[2,1-*d*][1,3]oxazole-4,5-dione-4-oximes and 2-alkyl(aryl)-1-hydroxy-1*H*-naphtho[2,3-*d*]imidazole-4,9-dione as main products.

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