

## SYNTHESIS OF 2,3-DIHYDRO DERIVATIVES OF IMIDAZO[1,2-a]IMIDAZOLE SYSTEMS

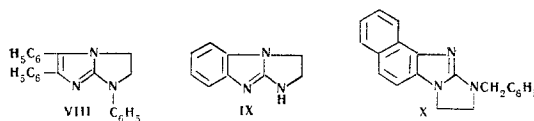
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Continuing our previous investigations [1], we have studied the reaction of 2-halogen-substituted imidazoles, benzimidazoles, and naphtho[1,2-d]imidazoles with  $\beta$ -halogenoalcohols, olefin oxides, and 1,2-dihalogenoalkanes, which takes place readily in an alkaline medium leading to the formation of the corresponding N-( $\beta$ -hydroxyalkyl)-2-halogenoimidazoles (I-III) or N-( $\beta$ -halogenoalkyl)-2-halogenoimidazoles (IV, V). By heating I-III with ammonia and primary amines we obtained N-hydroxyalkyl-2-aminoimidazoles and the corresponding alkylamino and arylamino derivatives (VI, VII) which, on treatment with thionyl chloride, cyclized to form 2,3-dihydro derivatives of imidazo[1,2-a]imidazole (VIII), imidazo[1,2-a]benzimidazole (IX), and imidazo[3,2-b]naphtho[1,2-d]imidazole (X).

Bi-, tri-, and tetracyclic compounds are also readily obtained by the reaction of IV and V with ammonia or primary amines



2-Bromo-1-( $\beta$ -hydroxyethyl)-4,5-diphenylimidazole (I), mp 165–166° C (from aqueous dioxane). Found, %: C 59.55; H 4.58; Br 23.63; N 7.96. Calculated for  $C_{17}H_{15}BrN_2O$ , %: C 59.49; H 4.40; Br 23.28; N 8.16. 2-Chloro-1-( $\beta$ -hydroxyethyl)benzimidazole (II). Mp 138–139° C (from aqueous methanol). Found, %: C 54.82; H 4.66; Cl 18.32; N 14.00. Calculated for  $C_9H_9ClN_2O$ , %: C 54.97; H 4.61; Cl 18.03; N 14.25. 2-Chloro-3-( $\beta$ -hydroxyethyl)naphtho[1,2-d]imidazole (III). Mp 186–187° C (from methanol). Found, %: C 63.01; H 4.45; Cl 14.42; N 11.17. Calculated for  $C_{13}H_{11}ClN_2O$ , %: C 63.29; H 4.49; Cl 14.37; N 11.36. 2-Bromo-1-( $\beta$ -bromoethyl)-4,5-diphenylimidazole (IV). Mp 147–148° C (from aqueous ethanol). Found, %: C 50.33; H 3.54; N 7.15. Calculated for  $C_{17}H_{14}Br_2N_2$ , %: C 50.27; H 3.47; N 6.90. 3- $\beta$ -Bromoethyl-2-chloronaphtho[1,2-d]imidazole (V). Mp 106–107° C (from aqueous ethanol). Found, %: Cl + Br 37.20; N 8.71. Calculated for  $C_{13}H_{10}ClBrN_2$ , %: Cl + Br 37.27; N 9.05. 1-( $\beta$ -Hydroxyethyl)-4,5-diphenyl-2-phenylaminoimidazole (VI). Mp 219–220° C (from aqueous ethanol). Found, %: C 77.52; H 6.06; N 11.83. Calculated for  $C_{23}H_{24}N_3O$ , %: C 77.72; H 5.96; N 11.82. 2-Benzylamino-3-( $\beta$ -hydroxyethyl)naphtho[1,2-d]imidazole (VIII). Mp 173–175° C (from aqueous ethanol). Found, %: C 75.35; H 5.94; N 13.36. Calculated for  $C_{20}H_{19}N_3O$ , %: C 75.68; H 6.03; N 13.24. 1,5,6-Triphenyl-2,3-dihydroimidazo[1,2-a]imidazole (VIII). Mp 199–200° C (from aqueous dimethylformamide). Found, %: C 81.55; H 5.60; N 12.60. Calculated for  $C_{23}H_{19}N_3$ , %: C 81.87; H 5.67; N 12.45. 2,3-Dihydroimidazo[1,2-a]benzimidazole (IX). Picrate with 180–182° C (from ethanol). Found, %: N 21.62. Calculated for  $C_9H_9N_3 \cdot C_6H_3N_3O_7$ , %: N 21.64. 1-Benzyl-2,3-dihydroimidazo[3,2-b]naphtho[1,2-d]imidazole (X). Mp 186–187° C (from aqueous dimethylformamide). Found, %: C 80.52; H 5.84; N 14.42. Calculated for  $C_{20}H_{17}N_3$ , %: C 80.24; H 5.72; N 14.04.

## REFERENCES

1. P. M. Kochergin, V. A. Priimenko, V. S. Ponomar, V. M. Povstyanoi, A. A. Ikachenko, I. A. Mazur, A. N. Krasovskii, E. G. Knysh, and M. I. Yurchenko, KhGS [Chemistry of Heterocyclic Compounds], 5, 177, 1969.

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