Journal of Thermal Analysis, Vol. 15 (1979) 257—260

THERMOANALYTICAL STUDIES OF ORGANIC COMPOUNDS. PART V*

REARRANGEMENT OF ACYLATED 3-HYDROXY-1,2-BENZISOXAZOLES

E. DOMAGALINA and T. SŁAWIK

Institute of Pharmaceutical Chemistry, Medical Academy, 20—002 Lublin, Poland

(Received December 15, 1977; in revised form May 18, 1978)

This paper deals with the thermal analysis of the new benzoyl, methoxy- and ethoxycarbonyl-3-hydroxybenzisoxazoles by means of derivatograph. In the serial stages of tautomeric, isomeric and decarboxylic transformation, the new *N*-acylated benzisoxazolin-3-ones, benzoxazolin-2-ones and 3-alkylbenzoxazolin-2-ones were obtained.

In contrast with the much work carried out on the synthesis and chemical and pharmacological properties of benzoxazolin-2-ones [1—3], the isomeric 3-hydroxybenzisoxazoles have only recently been produced [4]. By acylation of the starting compound and its 5-Cl and 5,7-Cl_2 derivatives with acetic anhydride, only the *N*-acetylbenzisoxazolin-3-ones are formed. However, benzoylation and alkoxycarbonylation give the labile 0-forms, which easily rearrange to the *N*-tautomers [5]. At 225° or under the influence of UV-light, the isomeric transformation of benzoyl and alkoxycarbonyl derivatives to the corresponding *N*-acylbenzoxazolin-2-ones was observed [6].

Continuing our DTA, DTG and TG studies [7] on different pyrolytic processes (degradation of dicarboxylic acids, anilide synthesis, acylation of hydrazines, diene synthesis, pyrolysis of acetylsalicylic acid [8—10], we should like to draw attention in the present paper to the thermal transformations of the new benzoyl, methoxy- and ethoxycarbonyl derivatives of 3-hydroxybenzisoxazoles synthesized by us previously [11].

Experimental

The products were isolated from the reactive melts by crystallization (EtOH, MeOH) or chromatographic resolution on silica gel columns developed with $CHCl_3$. The filtrates were analyzed on plates covered with Stahl Kieselgel HF_{254}. Melting points (uncorrected) were determined using a Tottoli—Büchi apparatus. IR spectra were recorded on Unicam SP-200 and UR-10 spectrophotometers in KBr (1 : 100). Thermal analyses were carried out on a MOM derivatograph, type OD-102, at a heating rate of 2°/min in air atmosphere; standard substance Al_2O_3. The sample mass was 1m mole.

* Part IV. E. Domagalina, T. Sławik, Acta Pol. Pharm. 33/1976/623.

Results and discussion

Reruns were switched off at the final temperature of the corresponding reaction stage. As an example, the diagram of 5-bromo-3-methoxycarbonyloxybenzisoxazole (7a), presented in Fig. 1, shows four steps. After the first endothermic melting process at 118°, an exothermic tautomeric transformation (max. DTA 134°) to

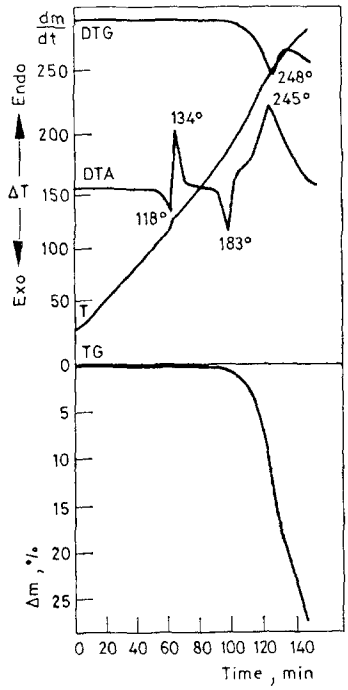


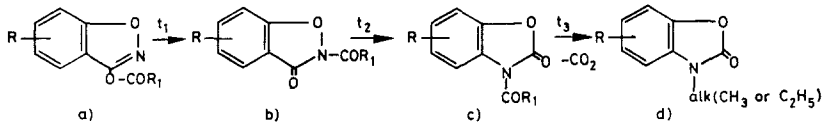
Fig. 1. Thermal curves of 5-bromo-3-methoxycarbonyloxybenzisoxazole

the 2-benzisoxazolin-3-one derivative (7b) and its melting at 183° follow. The next exothermic isomerization at 245° is connected with the decarboxylation of 3-methoxycarbonylbenzoxazolin-2-one (7c), unstable at this temperature, and the formation of the final 3-methylbenzoxazolin-2-one (7d). With regard to the simultaneous decomposition and sublimation processes up to 183°, the weight loss of the sample (ca. 25%) is larger than that corresponding to the amount of carbon dioxide liberated (16.2%).

The data on the investigated compounds (1a)–(9a) and (10b) are given in Table 1. Columns 10 and 11 give the total percent mass decrement ($\Delta m\%$) and $\Delta CO_2\%$ calculated, respectively. Columns 6, 8 and 12 contain the melting points of particular pure products isolated from the reactive melts and identified with those obtained in the synthetic processes [11].

Table 1

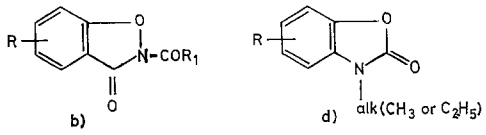
The transformations of acylated 3-hydroxybenzisoxazoles (1a)–(9a) and (10b)



The identities of the new 2-benzoylbenzisoxazolin-3-ones (1b, 4b) obtained by the tautomeric transformations of 1a and 4a, as well as those of the 3-alkylbenzoxazolin-2-ones (7d)–(10d) obtained from the decarboxylation of 7c–10c, were established by means of elemental and spectral analysis (Table 2).

Table 2

Analytical data on compounds



Work partly supported by Faculty of Medicine, Polish, Academy of Sciences.

References

1. C. K. CAIN and A. P. ROSZKOWSKI, Psychopharmacological Agents, Vol. I, M. GORDON, Ed. Academic Press, New York 1964, p. 325.
2. CH. LESPAGNOL and A. MARCINCAL-LEFEBVRE, Chim. Ther., 2 (1967) 395.
3. J. SAM and J. L. VALENTINE, J. Pharm. Sci., 58 (1969) 1043.
4. H. BÖSHAGEN, Ber., 100 (1967) 954, 3326.
5. H. BÖSHAGEN and W. GEIGER, Ber., 102 (1969) 3775.
6. H. BÖSHAGEN and W. GEIGER, Ber., 103 (1970) 123.
7. F. PAULIK, J. PAULIK and L. ERDEY, Talanta, 13 (1966) 1405.
8. E. DOMAGALINA, T. SŁAWIK, Folia Soc. Sci. Lub., Ser. C. 13 (1972) 13, 31.
9. E. DOMAGALINA and T. SŁAWIK, Ann. UMCS. AA, 29 (30) (1974) 331.
10. E. DOMAGALINA and T. SŁAWIK, Acta Pol. Pharm., 33 (1976) 623.
11. E. DOMAGALINA and T. SŁAWIK, Pol. J. Pharmacol. Pharm., 30 (1978) 717
12. Y. NITTA and F. YONEDA, Jap. Patent, 1467, 1964; CA. 66 (1967) 105000.

RÉSUMÉ — Le comportement thermique de nouveaux benzoyl, méthoxy et éthoxycarbonyl-3-hydroxybenzisoxazoles a été étudié à l'aide d'un Derivatograph. Lors des étapes successives correspondant aux transformations tautomères, isomères et de décarboxylation, il se forme de nouvelles N-acétylées benzisoxazoline-3-ones, benzoxazoline-2-ones et 3-alkylbenzoxazoline-2-ones.

ZUSAMMENFASSUNG — Der Artikel befasst sich mit der Thermoanalyse der neuen Benzoyl-, Methoxy- und Äthoxycarbonyl-3-hydroxybenzisoxazolen unter Anwendung der derivatographischen Methode. Die neuen N-acylierten Benzisoxazolin-3-one, Benzoxazolin-2-one und 3-Alkylbenzoxazolin-2-one wurden an Hand der Stufenfolge tautomerer, isomerer und Decarboxilierungs-Umwandlungen erhalten.

Резюме — Статья касается термического анализа новых бензоил-, метокси- и этоксикарбонил-3-оксибензоизоксазолов с помощью дериватографического метода. В результате нескольких стадий таутомерного, изомерного превращений, декарбоксилирования, были получены новые *N*-ацилированные бензоизоксазолин-3-он, бензоксазолин-2-он и 3-алкилбензоксазолин-2-он.