Journal of Chromatography, 257 (1983) 185–187
Elsevier Scientific Publishing Company, Amsterdam — Printed in The Netherlands

CHROM. 15,449

Note

Thin-layer chromatographic separation of new semisynthetic derivatives of daunomycinone

J. V. JIZBA, V. PŘIKRYLOVÁ* and H. LIPAVSKÁ
Department of Biogenesis of Natural Compounds, Institute of Microbiology, Czechoslovak Academy of Sciences, Videňská 1083, 142 20 Prague 4-Krč (Czechoslovakia)
(Received October 22nd, 1982)

The thin-layer chromatographic (TLC) separation of anthracyclinones and their derivatives has been used for instance for the isolation of dihydrodaunomycinone[1] and for the separation of adriamycin and dihydrodaunomycinone[2]. TLC is often used to follow the microbial transformation of anthracyclines[3,4] or to study the formation of this group of compounds during fermentations[5,6].

In the present work TLC was used to follow the course of the reaction of daunomycinone (I) with diols and to separate a reaction mixture of semisynthetic daunomycinone derivatives.

The chromatographic behaviour of the following compounds was studied in different solvent systems: daunomycinone (I), 7(*S*)-O-(2-hydroxyethyl)daunomycinone-13-ethylene acetal (II), 7(*R*)-O-(2-hydroxyethyl)daunomycinone-13-ethylene acetal (III), daunomycinone-13-ethylene acetal (IV), bisanhydrodaunomycinone-13-ethylene acetal (V), 7(*S*)-O-(3-hydroxypropyl)daunomycinone-13-propylene acetal (VI), 7(*R*)-O-(3-hydroxypropyl)daunomycinone-13-propylene acetal (VII), daunomycinone-13-propylene acetal (VIII), bisanhydrodaunomycinone-13-propylene acetal (IX), 7(*S*)-O-(4-hydroxybutyl)daunomycinone (X), 7(*R*)-O-(4-hydroxybutyl)daunomycinone (XI) and daunomycinone-1-(*p*-toluenesulphonyl hydrazone) (XII).

EXPERIMENTAL

Daunomycinone (I) was obtained from Medexport (U.S.S.R.), derivatives II–XI were prepared according to Jizba *et al.*[7] and compound XII according to Smith *et al.*[8].

The solvents chloroform, heptane, benzene, ethyl acetate and methanol were distilled before use.

The samples were chromatographed on precoated silica gel plates (DC-Fertigplatten Kieselgel 60, 0.25 mm, 200 × 200 mm; Merck). Samples II–XI were applied as a chloroform solution, XII as a tetrahydrofuran solution. The solvent systems used for TLC are given in Table I. The plates were placed into the development chamber immediately after introduction of the solvent system at 20–22°C. Zones of individual compounds were detected with ultraviolet (254 nm) and visible light (spots were rouge or rouge-violet). The limit of detection ranged between 1 and 10 μg.

0021-9673/83/0000–0000/$03.00

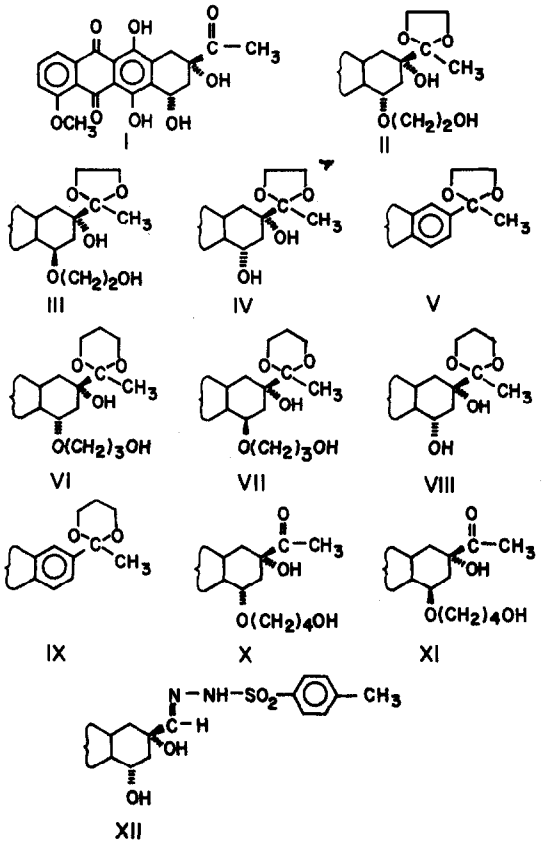

Fig. 1. Chemical structures of daunomycinone derivatives.

TABLE I

TLC OF DAUNOMYCINONE DERIVATIVES

Solvent systems: S1 = chloroform–benzene–ethyl acetate–methanol (7:7:3:1)[9]; S2 = heptane-chloroform–methanol (4:5:1); S3 = benzene–acetone (4:1); S4 = benzene–ethyl acetate–methanol (3:6:1); S5 = benzene–chloroform–methanol (25:65:10).

Compound	$R_F \times 100$				
	S1	*S2*	*S3*	*S4*	*S5*
I	35	56	15	52	47
II	12	49	2	30	25
III	21	59	7	41	40
IV	13	56	4	29	30
V	63	90	58	67	71
VI	19	48	6	38	26
VII	28	58	10	46	41
VIII	21	55	6	34	30
IX	65	90	59	67	69
X	13	36	5	38	15
XI	24	52	10	41	30
XII	23	45	8	51	26

RESULTS AND DISCUSSION

Of five solvent systems used for the TLC separation of mixtures arising from the reaction of daunomycinone with diols, system S1 was found to be most effective. In this system all compounds (II–V) arising from the reaction of I with ethanediol, including the configuration isomers II and III, are well separated. Repeated development is only required in the case of compounds II and IV. Similarly, compounds VI–IX formed after the reaction of I with 1,3-propanediol differ sufficiently in their R_F values; the separation of compounds VI and VIII can be improved by means of repeated development or using the systems S2 and S5, as with compounds II and IV. System S5, or occasionally, on repeated development, system S3, was found to be suitable for the separation of compounds I and XII.

This TLC method was found to be useful both in analytical studies of the above reaction mixtures and for their semipreparative separation.

REFERENCES

1 J. Lunel and J. Preud'homme, *French Pat.*, 1,583,752 (1969).
2 F. Arcamone, G. Cassinelli, G. Fantini, A. Grein, P. Orezzi, C. Pol and C. Spalla, *Biotechnol. Bioeng.*, 11 (1969) 1101.
3 G. S. Wu, A. Gard and J. P. Rosazza, *J. Antibiot.*, 33 (1980) 750.
4 A. Yoshimoto and T. Oki, *J. Antibiot.*, 33 (1980) 1158.
5 T. Oki, N. Shibamoto, Y. Matsuzawa, T. Ogasawara, A. Yoshimoto, I. Kitamura, T. Inuri, H. Naganawa, T. Takeuchi and H. Umezawa, *J. Antibiot.*, 30 (1977) 683.
6 T. Oki, Y. Matsuzawa, K. Kiyoshima, A. Yoshimoto, H. Naganawa, T. Takeuchi and H. Umezawa, *J. Antibiot.*, 34 (1981) 783.
7 J. V. Jizba, P. Sedmera, J. Vokoun, H. Lipavská, M. Podojil and Z. Vaněk, *Collect. Czech. Chem. Commun.*, 1982 (in press).
8 T. K. Smith, A. N. Fujiwara and D. W. Henry, *J. Med. Chem.*, 21 (1978) 280.
9 J. Karnetová, J. Matějů, P. Sedmera, J. Vokoun and Z. Vaněk, *J. Antibiot.*, 29 (1976) 1199.