TLC ANALYSIS OF PHARMACEUTICAL PREPARATIONS CONTAINING VITAMINS A, D AND E

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Background

Vitamins are basic to human health and their determination gained increased significance in several areas of analytical chemistry such as pharmaceutical, clinical and food applications.
A large number of methods have been developed for quantifying vitamins content in pharmaceuticals.
Most of the fat-soluble vitamins present in pharmaceutical preparations or in natural products are accompanied by a number of closely related compounds. This explains why the chromatographic methods are so frequently used in analysis of these compounds.

Aim

The paper presents research results regarding the establishing of the optimal conditions for the determination of fat-soluble vitamins A, D_2 and E in multivitamin pharmaceutical products, by using the TLC method. TLC is almost ideally suited for these compounds because of its simplicity, speed, selectivity and sensitivity.

Materials and methods

• Standards: vitamins A, D_2 and E (purchased from Merck; stock solutions: 410.8 mg vitamin A, 52 mg vitamin D_2 and 391 mg vitamin E in chloroform at 10 mL volumetric flask)
• Fixed phase: TLC plastic sheets silica gel $60F_{254}$
• Mobile phase: *system 1* - hexane/ether (9:1, v:v)
system 2 - benzene/chloroform (1:1, v:v)
• Examination: UV 254 nm, by using a Vilber-Lourmat system, equipped with a black-white video camera, software BioProfil ver. 2.0.

Results and disscusions

Vitamins A and D_2 have been assayed in the system 1 (chromatogram presented in Fig. 1); 2µL have been spotted from each compound and their 1:1 mixture (the concentration of the solutions were 10.27 mg/mL for vitamin A and 1.3 mg/mL for vitamin D_2). The corresponding R_f obtained is presented in Table 1.

Table 1. R_f obtained for the vitamins

	Vitamin A	Vitamin D_2	Vitamin E
System 1	0.463	0.065	-
System 2	-	0.186	0.703

Fig. 1 Chromatogram for vitamins A, D_2 and mixture (M_1) in the system 1

Fig. 2 Chromatogram for vitamins D_2, E and mixture (M_2) in the system 2

Vitamins D_2 and E have been assayed in the system 2 (Fig. 2). 2 µL have been spotted from each compound and their mixture (the concentration of the solutions were 1.3 mg/mL for vitamin D_2 and 9.77 mg/mL for vitamin E). The corresponding R_f obtained is presented in Table 1.
A semi quantitative assay of the vitamins was performed via the blacking-out curves obtained for different amounts spotted (Fig. 3).

Fig. 3 Blacking-out curve for Vitamin D_2 1.8 µg

The regression lines obtained for the three substances is plotted in Figs. 4. and 5.
For vitamin A, a second order polynomial regression curve was obtained (R-square = 1) – figure 4 and for vitamins D_2 and E a regression line was obtained (R=0.98994, and 0.98191, respectively) – figure 5.
As little as 5 µg, 0.5 µg and 5 µg of A, D_2 and E vitamins, respectively, can be assayed.

Fig. 4. Polynomial regression for vitamin A quantification

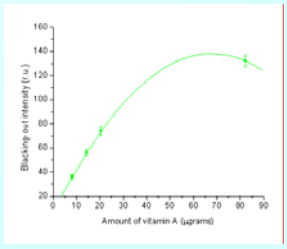
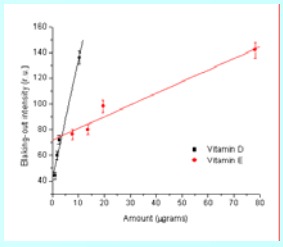


Fig. 5. Linear regression for vitamins D_2 and E quantification



Conclusions

- TLC methods for qualitative and semiquantitative assay of vitamins A, D_2 and E have been developed (fixed phase: silica gel $60F_{254}$, mobile phases: hexane/ether (9:1, v:v) for vitamin A and benzene/chloroform (1:1, v:v) for vitamins D_2 and E.
- The semiquantitative assay of vitamin A in the conditions given above resulted in a 2-order polynomial regression curve in the field 5-85 µg.
- The semiquantitative assay of vitamins D_2 and E in the conditions given above resulted in a linear regression curves in the fields: 0.5-10.5 µg for vitamin D_2 and 5-80 µg for vitamin E.

References

1. Holasova, M., Parizkova, H., Blattna, J., *Proc. Of Euro Food Chem. III,* Vol. 2, 101-106, 1985, Antwerp, Belgium.
2. Chavan, J.D., Khatri, J.M., *J. Planar Chromatogr.,* 5, 280-282, 1992.
3. Li, G., Zhuang, Zh., Zhou, R., Shi, X., *Chinese J. Hosp. Pharm.,* 15, 162-162, 1995.