

IDENTIFICATION OF FLUOROQUINOLONES WITH COLOR REAGENTS

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Introduction. Rapid development of the pharmaceutical industry and large consumption of pharmaceutical products leading to the fact that drugs and their metabolites accumulate in the environment.

Particular threat among this class of contaminants are antibiotics that are widely used not only in medicine but also in agriculture. Getting to environmental this type of pollutants become a source of resistance to many strains of microorganisms. In many countries, confirmed the presence of trace concentrations of antibacterial drugs in wastewater, surface water and in soil.

For Ukraine, where the proportion of production and consumption of antibiotics is quite large, this issue is very important and requires detailed study and develop methods to identify and remove this type of pollutants from the objects of biosphere.

Aim of the work was the development of methods of identification fluoroquinolones (ciprofloxacin, norfloxacin and ofloxacin) by colored reagents in a thin layer of sorbent for the purposes of ecotoxicological monitoring.

Materials and methods. Objects of research: eye/ear drops, containing ciprofloxacin («Ciprofarm», «Farmak», Ukraine), norfloxacin («Norfloxacin», Ukraine), ofloxacin («Unifloks», «Unimed Pharma», Slovak Republic).

Preparation of samples for research: to 1 ml of antibiotic solution (concentration is 3000 µg/ml) was added 10 ml of distilled water (Solution 1, concentration is 300 µg/ml). To 1 ml of Solution 1 was added 10 ml of methanol (Solution 2, concentration is 30 µg/ml).

The appropriate solution of fluoroquinolones in concentrations 0.3 µg, 0.6 µg, 0.9 µg in the sample was applied with capillary to the center of chromatographic plate Sorbfil (size 2x2 cm). After evaporation of the solution a glass stick was applied the appropriate reagent. After some time observed the appearance of characteristic color. Parallel control experiments were carried out. The results are presented in the table (Table 1).

Results and discussion. Was determined the color of the fluoroquinolones and spots and their sensitivity during TLC determination. For this purpose, we used:

- 1) irradiation of UV-light ($\lambda=254$ nm);
- 2) iodine vapors;
- 3) Dragendorff's reagent (modified by Munje);

4) ninhydrin;

5) bromothymol blue.

Reagents were prepared by known methods immediately before use.

Table 1

The identification of ciprofloxacin, norfloxacin and ofloxacin with color (chromogenic) reagents

Reagent	Results					
	ciprofloxacin		norfloxacin		ofloxacin	
	color	limit of detection, μg	color	limit of detection, μg	color	limit of detection, μg
Irradiation of UV-light (fluorescence)	white	0.6	white	0.6	green	0.6
Iodine vapors	light brown	0.6	light brown	0.6	light brown	0.6
Dragendorff's reagent (modified by Munje)	brick red	0.3	brick red	0.3	brick red	0.3
Ninhydrin	pink	0.3	pink	0.3	pink	0.3
Bromothymol blue	orange	0.6	orange	0.6	orange	0.6

The results showed, that the most sensitive reagents for fluoroquinolones identification are Dragendorff's reagent (modified by Munje) and ninhydrin. It formed the color with the solution of fluoroquinolone at a concentration 0.3 μg in the sample.

Reactions with bromothymol blue, iodine vapors and irradiation of UV-light were less sensitive – limit of detection was 0.6 μg in the sample.

Conclusions. Were investigated the conditions of the antibacterial drugs detection – fluoroquinolones derivatives with chromogenic reagents. Most sensitive reagents for fluoroquinolones identification are Dragendorff's reagent (modified by Munje) and ninhydrin.