Determination of medicinal substances in wastewater of the city of Shymkent using UHPLC method

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Purpose and objectives of the research

Detection and quantitative determination of medicinal substances in wastewater, water from sewerage systems and reservoirs in Shymkent

Materials and research methods

Water samples were taken from different points: the Badam River, Lake Burzhar, from the treatment facilities of Shymkent before entering and after leaving the systems. Before analysis, all test samples were stored at a temperature of 2-8 ºC. Carbamazepine (Valenta Pharm, Russia) and sulfamethoxazole (Medana Pharm, Poland) were taken as standard samples. In work we used a DIONEX UltiMate 3000 UHPLC chromatographic system with a DAD detector at an absorption wavelength of 254 nm, in a reversed-phase version with a mobile phase composition of acetonitrile: water (40:60) and with a Hypersil GOLD C8 column 150 mm x 2.1 mm 1.9 microns filled with porous ultra-purified silica gel.

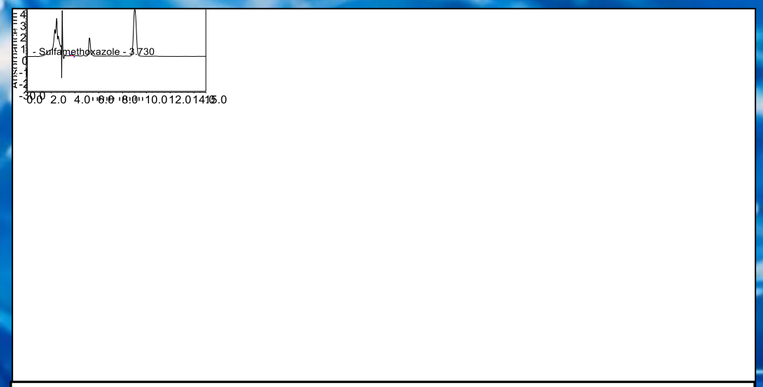

Fig. 2 – Chromatogram of the studied sample from Lake Burzhar for carbamazepine

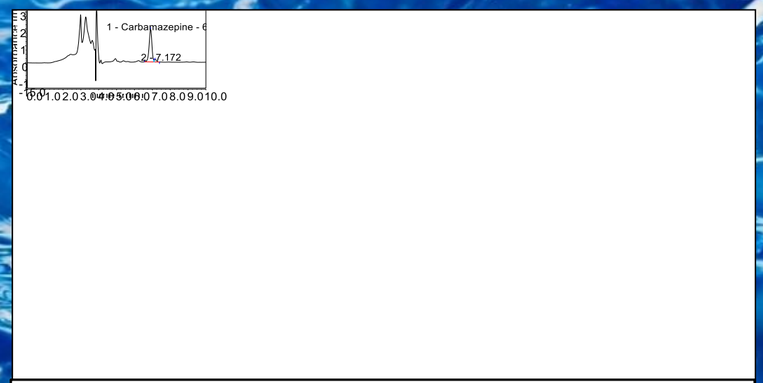

Fig. 2 – Chromatogram of the studied sample of Lake Burzhar for sulfamethoxazole

Stages of sample preparation and chromatography

Main results

As a result of an initial study of wastewater and reservoirs in the city of Shymkent in September 2023, we have found such medicinal substances as **carbamazepine** and **sulfamethoxazole**.

Under chromatographic conditions, the retention time of carbamazepine was 3.612 ± 0.1 minutes; sulfamethoxazole was 6.910 ± 0.1 minutes, which corresponds to the retention time of solutions of standard samples.

The concentration of carbamazepine in water samples was: Badam River 0.0472 ppm; lakes Burzhar 0.2735 ppm; waste water from inlet 0.0270 ppm; waste water from systems outlet 0.2109 ppm.

The concentration of sulfamethoxazole in water samples was: lake Burzhar 0.1740 ppm; waste water from inlet 2.9307 ppm; waste water from systems outlet 0.1850 ppm; not found in the waters of the Badam River.22222

Conclusion

We conducted identification and determined the quantitative contents of carbamazepine and sulfamethoxazole in wastewater and reservoirs of Shymkent during an initial study for the autumn period.