



# DEVELOPMENT OF A UNIFIED METHOD FOR SAMPLE PREPARATION OF WATER SAMPLES BY LIQUID-LIQUID EXTRACTION

Karabayeva Ainur Nysanbekovna, 2<sup>nd</sup> year PhD student; Ordabayeva S.K., pharm. s. d., professor; Nursultankyzy M.; Rodina T.A., cand. of chem. sci.

JSC «South Kazakhstan Medical Academy», Shymkent, Republic of Kazakhstan



## Purpose

Development of a method for sample preparation of water samples using the liquid-liquid extraction method for studying wastewater for the content of drug residues.

## Material and research methods

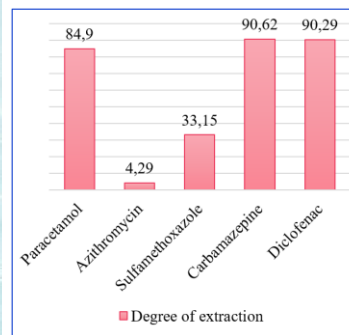
Standard samples: carbamazepine (Max Pharma, India), diclofenac (Amoli Organics Pvt. Ltd, India), paracetamol (AO Bohimik, Russian Federation), sulfamethoxazole (Virchow Laboratories Ltd, India), and azithromycin (Quimica Sintetica, Spain).

HPLC-grade solvents used in this work were: acetonitrile (LC-MS grade, Biosolve); methanol (LC-MS grade, Biosolve); formic acid (grade "for LC-MS", Merck Millipore); deionized water (Milli-Q), ammonium acetate buffer pH 7.0 (GP RK), sodium chloride (GP RK), ethyl acetate (GP RK). Premium cellulose acetate syringe filters Captiva from Agilent were used to filter aqueous samples. The results of the sample preparation stage were analyzed using a Shimadzu liquid chromatograph (Japan) with a Nexera LCMS-8040 (QQQ) chromatographic system. A ZORBAX Eclipse XDB-C18 column (4.6 x 150 mm x 5  $\mu$ m Agilent, USA) with a thermostat temperature of 30°C was used for separation. The mobile phase consisted of eluents A (0.1 vol. % formic acid in deionized water) and B (acetonitrile).

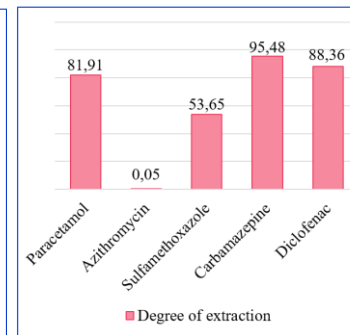
## Main results

We conducted comparative studies of the degree of drug extraction by the LLE method depending on the pH of the medium: pH 3.5 0.1% formic acid solution; pH 7.0 0.1 M acetate-ammonium buffer solution; pH 7.0 0.1 M acetate-ammonium buffer with the addition of NaCl. The most optimal extraction results were achieved in a neutral medium with acetate-ammonium buffer with a pH of 7.0. In this case, the degree of extraction of paracetamol was 80.15%, carbamazepine - 96.84%, diclofenac - 92.97%, sulfamethoxazole - 55.67%, azithromycin - 3.30% (Fig. 1). In an acidic medium (Fig. 2) and a neutral medium with the addition of NaCl (Fig. 3), the results were ambiguous and were optimal for carbamazepine (95.48% pH 3.5) and azithromycin (4.29% pH 7.0 with the addition of NaCl).

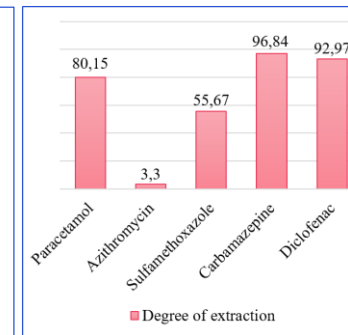
The solubility of sulfamethoxazole in water increases in alkaline media due to the presence of an NH-acid center in the molecule, caused by p,  $\pi$ - conjugation in the sulfonamide fragment, due to which in this medium the drug passes poorly into the organic layer.



Pic. 1 – The degree of extraction of MS by the LLE method (pH 7.0 with the addition of NaCl)



Pic. 2 – The degree of extraction of MS by the LLE method (pH 3.5)



Pic. 3 – Degree of extraction of MS by the LLE method (pH 7.0)

## Conclusions

Thus, the most optimal conditions for LLE of drugs from aqueous samples were observed in a neutral environment with an ammonium acetate buffer with pH 7.0.