

## ORGANIC ECOTOXICANTS IN WATER SYSTEMS OF UKRAINE

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A methodology has been developed for the study of organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) in surface and drinking waters, bottom sediments and aquatic species of living organisms of the bottom layer from various water systems of Ukraine. The study of persistent organic pollutants (POPs) includes the following stages: extraction, concentration, identification and determination of these compounds using adequate sample preparation methods, modern chromatographic and gas chromatography-mass spectrometric methods, such as gas chromatography/mass spectrometry with mass selective detection by total ion current and selective ion monitoring (SCAN, SIM modes), gas chromatography with electron capture detection and high performance liquid chromatography with fluorescence detection [1].

Monitoring of OCPs, PCBs and PAHs in surface and drinking waters, bottom sediments and aquatic species of living organisms of the bottom layer from various water systems of Ukraine was carried out. The concentrations of these compounds at the monitoring points were determined, their bioavailability and the degree of bioaccumulation were established. Systematic data on the identification of OCPs and PCBs and on their levels in various tissues of aquatic organisms are very limited. To assess the threat to aquatic ecosystems and humans posed by OCPs and PCBs, they were extracted from muscle and other fish tissues by liquid extraction methods, and reliable results were obtained on the content of these compounds. To assess the state of the environment, the results of monitoring of OCPs, PCBs and PAHs in these areas were summarized [1–3].

Information on the levels of these organic pollutants has been obtained, summarized and presented in accordance with generally accepted regulatory standards that determine the toxicity of compounds of these classes. Regularities of changes in the concentrations of ecotoxics in the objects of five water systems of the Dnieper River basin and the Black Sea (Dnieper-Bug estuaries, Danube delta, Balaklava Bay, Sevastopol Bay) have been established. The concentrations of ecotoxics in natural water were estimated relative to the MPC (Maximum Permissible Concentration). The reported levels of OCPs, PCBs and PAHs in many sediment samples exceeded the TEC (Threshold Effect Concentration) and PEC (Probable Effect Concentration) values [1–3].

To assess the toxicity of hydrobionts, the OCPs content is given relative to the equivalent toxicity factor – TEF (Toxicity Equivalent Factor) and PCBs – toxic equivalent or equivalent of dioxin relative to 3,4,7,8-tetrachloro-dibenzo-*p*-dioxine – TEQ (Toxicity Equivalent). The levels of PCBs in hydrobionts, presented relative to TEQ, indicate that hydrobionts of the bottom layer are significantly contaminated with compounds of this class and then their bioconcentration by higher organisms along the trophic chain is possible [1].

The results obtained indicate that toxic pollutants accumulate in significant amounts in bottom sediments, and their content in aquatic organisms characterizes the bioavailability of OCPs and PCBs. The bioavailability of OCPs and PCBs was evaluated. The results of

exceeding their critical level (Critical Concentration Level, CCL) and bioconcentration factor (the Bioconcentration Factor, BCF) for muscle and other fish tissues, as well as dioxin equivalent for PCBs of aquatic organisms over the past decades in the aquatic systems of Ukraine were obtained.

The results of monitoring of OCPs, PCBs and PAHs in surface water of the Dnieper River are presented for 2011–2019 [4–6]. The results of mutagenicity and toxicity in the surface Waters of Kyiv, Ukraine are presented for 2011–2014 [5].

During the last decade, a study was carried out to determine the dispersed-phase distribution of individual OCPs, PCBs and PAHs in the surface waters of the Dnieper River and other rivers of Ukraine. It was shown that more than half of the compounds of these classes are associated with suspended particles matter (coarse, fine fraction) [6].

#### Literature

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