

# **Ecotoxicological effects of polystyrene particles on *Cyprinus carpio* – laboratory assessment**

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## **Abstract**

Global consumption led to an increased and persistent plastic pollution in the aquatic environments. Due to their small size, plastic particles are omnipresent affecting the aquatic biota. The polystyrene is a synthetic polymer and one of the most widely used plastic. Its elimination in the environment endangers the health of the aquatic organisms. This study aims to investigate the acute (7 days) and chronic (75 days) toxicity of spherical polystyrene particles (20, 200, 430  $\mu\text{m}$ ) on *Cyprinus carpio* fish using OECD methodology. No mortality or behavioural changes were recorded after acute or chronic tests conducted at 1, 10, 100 mg/L polystyrene particles. Polystyrene showed bioavailability mainly through ingestion with food, causing weight loss of fish. The fish lots exposed to the polystyrene mixt (in different particles sizes 20, 200, 430  $\mu\text{m}$  and 1.2 mg PS/L total concentration) showed changes in the physiological indices but without major significance comparing to control lot. After 75 days of chronic exposure of fish to a mixt of polystyrene particles, the organs were collected for sub-lethal effects investigations. The mixt of polystyrene has determinate oxidative stress in the fish organ. A very significant increase in the activity of catalase and glutathione reductase enzymes correlated with lipid peroxidation in the gill were observed. At the level of liver, increase catalase and glutathione S transferase activity without lipid peroxidation effects. Also, alanine transferase and aspartate transferase activities showed significant changes. Regarding the vitellogenesis initiated in liver, the vitellogenin activity increased with 40%. The EROD activity recorded an increased with 20% comparing to the control fish indicating stress enzyme expression. Instead, acetylcholinesterase showed significant inhibition (>80%) in brain and muscle. The protein profile showed new stress protein expression compared to the control in gill and liver. The monitoring regulations of microplastics in surface water became be urgent.

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