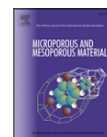




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## Microporous and Mesoporous Materials

journal homepage: [www.elsevier.com/locate/micromeso](http://www.elsevier.com/locate/micromeso)

### Evaluation of potential adsorbents for simultaneous adsorption of phosphate and ammonium at low concentrations

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#### ARTICLE INFO

**Keywords:**  
Simultaneous adsorption  
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#### ABSTRACT

Evaluation of potential adsorbents to tackle eutrophication caused by low concentrations of phosphate and ammonium are rarely reported in the literature. Besides, the dynamics/mechanisms for removal of these pollutants at low concentration are yet to be explored. In this study we used five different adsorbents, including La-modified zeolite (LMZ), MgFe-modified biochar (MgFe-BC), phoslock, activated alumina (AA), and diatomaceous earth (DE) to evaluate the removal of these pollutants. Among the selected adsorbents in this study, LMZ and AA both exhibited effective and simultaneous adsorption for phosphate and ammonium and the maximum adsorption capacities were 2.47 mg/g and 3.07 mg/g, respectively. The presence of  $\text{SO}_4^{2-}$  and  $\text{CO}_3^{2-}$  negatively impacted phosphate adsorption, while  $\text{Fe}^{3+}$  and  $\text{K}^+$  ions inhibited ammonium adsorption. LMZ adsorption kinetics was over 3 times faster than other adsorbents within 60 min reaction time. Kinetics studies and isotherms



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## Environment International

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#### Full length article

### Nanoplastic contamination: Impact on zebrafish liver metabolism and implications for aquatic environmental health

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#### ARTICLE INFO

**Keywords:**  
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Zebrafish

#### ABSTRACT

Nanoplastics (NPs) are increasingly pervasive in the environment, raising concerns about their potential health implications, particularly within aquatic ecosystems. This study investigated the impact of polystyrene nanoparticles (PSN) on zebrafish liver metabolism using liquid chromatography hybrid quadrupole time of flight mass spectrometry (LC-QTOF-MS) based non-targeted metabolomics. Zebrafish were exposed to 50 nm PSN for 28 days at low (L-PSN) and high (H-PSN) concentrations (0.1 and 10 mg/L, respectively) via water. The results revealed significant alterations in key metabolic pathways in low and high exposure groups. The liver metabolites showed different metabolic responses with L-PSN and H-PSN. A total of 2078 metabolite features were identified from the raw data obtained in both positive and negative ion modes, with 190 metabolites deemed statistically significant in both L-PSN and H-PSN groups. Disruptions in lipid metabolism, inflammation, oxidative stress, DNA damage, and amino acid synthesis were identified. Notably, L-PSN exposure induced changes in DNA building blocks, membrane-associated biomarkers, and immune-related metabolites, while H-PSN exposure was associated with oxidative stress, altered antioxidant metabolites, and liver injury. For the first