

## Adsorption properties and chromatographic performance of microdispersed sintered detonation nanodiamonds

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Detonation nanodiamond (ND) has very complex structure of particles and surface chemistry presented by a broad spectrum of various functional groups. Mainly, surface chemistry of ND depends on type oxidative purification applied to post-blast soot and on technology and reagents used for disaggregation and stabilisation of nanoparticles. Clearly, the application of nanodiamond in biotechnology and medicine requires a systematic investigation of adsorption properties of ND, understanding the reasons for its unusual adsorption selectivity and the ways of the most efficient utilisation of unique physico-chemical properties of ND related materials. Different chromatographic methods have been successfully applied for the characterisation of adsorption properties, so the goal of the present work was investigation of adsorption properties of detonation nanodiamonds by using high-performance liquid chromatography [1-3].

It is difficult to use nanoparticles as a stationary phase in chromatography, so microdispersed sintered nanodiamond (MSND) with particle diameter of 3-5 micron and specific surface area 191 m<sup>2</sup>/g was used for packing of 15 cm long stainless steel columns of internal diameter 4.6 mm. All experiments are performed with common HPLC equipment except of using column oven Polatherm in chromatographic experiments at elevated temperatures up to 200°C.

The set of dependences of retention on eluent pH, type and content of organic solvent in the eluent and of column temperature was obtained for a big group of organic compounds including alkylbenzenes, dialkylphthalates, polyaromatic hydrocarbons, phenols, aromatic acids and nucleic acid precursors. The analysis of molecule structure-retention dependences confirmed the presence of conducting carbon layer at the surface of ND and charge induced dipole-dipole interactions as a key retention mechanism for polar organic molecules.

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