pH-independent preconcentration of Hg (II) ions and rapid adsorption of methylene blue in fish and water samples by nano composite of MoS$_2$@MWCNT hybrid as a solid phase extraction sorbent

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ABSTRACT

There are a large number sulphur functional groups on the surface of MoS$_2$ nano sheets. But, the main problem was its hard collection from aqueous solutions owing to relatively high dispersibility in the media. Fabrication of hybrid from MoS$_2$ can solve this defect. MoS$_2$ nano sheets were synthesised on surfaces of MWCNT with the hydrothermal method and characterised by X-ray diffraction, energy-dispersive X-ray, field emission scanning electron microscopy and Raman spectroscopy. In addition, solve the problem of collection; adsorption capacity of adsorbent was strengthened. The hybrid was employed for methylene blue (MB) adsorption in river water and Hg (II) preconcentration in canned tuna fish and water samples. Hg (II) with using ICP-OES. Results showed that equilibrium time both analytes was fast. Qua it was 2 min for the Hg (II) and 5 min for MB. In both analytes, the adsorption isotherm and kinetic were better described by Freundlich isotherm and pseudo-second-order kinetic model, respectively. Maximum adsorption was 256.4 mg g$^{-1}$ and 1250 mg g$^{-1}$ for MB and Hg (II), respectively. Adsorbed methylene blue and Hg (II) has been released from the sorbent surface with 0.5 mol L$^{-1}$ ethanol/HNO$_3$ and sodium thiosulfate (1.0 mol L$^{-1}$), respectively.

Keywords: Layered sorbet; Kinetic; Thermodynamic; ICP-AES

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