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Title: Roles of inorganic oxide nanoparticles on extraction efficiency of electrospun polyethylene terephthalate nanocomposite as an unbreakable fiber coating

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1 **Roles of inorganic oxide nanoparticles on extraction efficiency of electrospun polyethylene**
2 **terephthalate nanocomposite as an unbreakable fiber coating**

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6

7 **Abstract**

8 In the present work, the roles of inorganic oxide nanoparticles on the extraction efficiency of
9 polyethylene terephthalate-based nanocomposites were extensively studied. Four fiber coatings
10 based on polyethylene terephthalate nanocomposites containing different types of nanoparticles
11 along with a pristine polyethylene terephthalate polymer were conveniently electrospun on
12 stainless steel wires. The applicability of new fiber coatings were examined by headspace-solid
13 phase microextraction of some environmentally important volatile organic compound such as
14 benzene, toluene, ethylbenzene and xylene (BTEX), as model compounds, from aqueous
15 samples. Subsequently, the extracted analytes were transferred into a gas chromatography by
16 thermal desorption. Parameters affecting the morphology and capability of the prepared
17 nanocomposites including the type of nanoparticles and their doping levels along with the
18 coating time were optimized. Four types of nanoparticles including Fe₃O₄, SiO₂, CoO and NiO
19 were examined as the doping agents and among them the presence of SiO₂ in the prepared
20 nanocomposite was prominent. The homogeneity and the porous surface structure of the SiO₂-
21 polyethylene terephthalate nanocomposite was confirmed by scanning electron microscopy
22 indicating that the nanofibers diameters were lower than 300 nm. In addition, important
23 parameters influencing the extraction and desorption process such as temperature and extraction
24 time, ionic strength and desorption conditions were optimized. Eventually, the developed method
25 was validated by gas chromatography-mass spectrometry. Under optimized conditions, the
26 relative standard deviation values for a double distilled water spiked with the selected volatile
27 organic compounds at 50 ng L⁻¹ were 2–7% (n = 3) while the limits of detection were between

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