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**Possible use of synthesized nano silica functionalized by Prussian blue as sorbent for removal of certain radionuclides from liquid radioactive waste**

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**Abstract**

The Prussian blue functionalized SiO<sub>2</sub> (nano-material of SiO<sub>2</sub>-Fe-CN) was successfully prepared using a novel and simple preparation route. The SiO<sub>2</sub> nanoparticles were functionalized by amino group by refluxing with (3-Aminopropyl) trimethoxysilane, iron (III) immobilized the modified nanoparticles through interaction with the amino group, finally, SiO<sub>2</sub>-Fe-CN nanomaterial produced as a result of potassium ferrocyanide addition. SEM, FTIR and XRD techniques were used for detecting the morphology, particle size, different functional groups and the crystal structure of the prepared nano-materials. The sorption potential of nano-material of SiO<sub>2</sub>-Fe-CN towards cationic and anionic radioisotopes from aqueous and HNO<sub>3</sub> solutions were tested using carrier free method. The experimental results showed that nano-material of SiO<sub>2</sub>-Fe-CN have high effective retention and recovery for <sup>134</sup>Cs, <sup>60</sup>Co and <sup>99</sup>Mo from nuclear liquid waste. Moreover, sorption of <sup>90</sup>Sr/<sup>90</sup>Y is insignificant using SiO<sub>2</sub>-Fe-CN nano adsorbent material. It is a promising and efficient nano adsorbent that could be used for upscaling design and application on liquid radioactive waste treatment facility.

**Keywords:** *Artificial radionuclides; Nano particle; Inorganic adsorbents; Nuclear waste.*

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