Amperometric detection of nitro compounds using novel nanomaterial composite

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Amperometric based detection of nitro compounds was carried out using nanomaterial coated metal organic framework (MOF). The hydrothermal process was used to synthesize MOF composite and morphology was cubic structure with nanoparticle on it. To detect nitro-compound, an electrochemical based sensor was developed by immobilizing MOF on gold electrode surface using nafion as a binder. The performance of sensor was evaluated on the basis of catalytic activity and structure of sample. The sensor was found effective to detect nitro-compound in Phosphate-Buffered Saline (PBS) solutions and in real water samples through amperometric and cyclic voltammetry techniques. The scanning electron microscopy (SEM) images of the modified electrode surface was used to analyze the morphological behavior of material. Significant reduction effect of nitro-compound was shown by modified electrode with starting potential about +0.05V (vs. AgCl/Ag) which decreases significantly with nitrocompound concentration over potential. The concentration ranges of nitrocompounds $4.0x10^{-6}$ to $1.3x10^{-3}$ mol /L was proportional to electrolytic response current of the sensor with 0.21 u mol/L detection down limit. The electro-reduction effect on catalytic rate constant and the electrochemical active surface area were also analysed. The nitro-compound sensor shows low detection limit with signal reproducibility and the precise measurements of the sample.

Keyword: Amperometry, nitro-compound, electro-reduction