Adsorption study of chloroform and hexane by using silver nanoparticles supported on reduced graphene oxide

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Abstract: Two volatile organic compounds, chloroform and hexane, were adsorbed on reduced graphene oxide supported with silver nanoparticles (Ag@GRO). The adsorption study was performed by means of UV-visible spectroscopy and Fourier transform infrared (FTIR) spectroscopy. When chloroform was adsorbed on Ag@RGO, UV-visible absorption spectrum revealed a red-shifted and blue-shifted of maximum absorption peaks at 263 and 400 nm to 268 and 392 nm, respectively. When hexane was adsorbed on Ag@RGO, the spectrum revealed a red-shifted of maximum absorption peaks at 263 and 400 nm to 270 and 408 nm, respectively. These were due changes of $\pi \rightarrow \pi^*$ transition of the C-C bonds in aromatic ring. FTIR spectra also showed that when adsorption of chloroform took place, the absorption peaks of bending of aromatic C=C bonds (802 cm$^{-1}$) and stretching of aromatic C-C bonds (1022 cm$^{-1}$) were shifted to 799 and 1027 cm$^{-1}$, respectively. For adsorption of hexane, shifts of these two vibrational bonds were also found. Moreover, S/N of FTIR spectra for adsorption of chloroform and hexane were improved when RGO was supported with silver nanoparticles in comparison to those adsorption on the pristine RGO.

Keywords: Chloroform; Hexane; Volatile organic compound; Reduced graphene oxide; Silver nanoparticles