
Chemisorption of Benzene on Cu-Montmorillonite as Characterized by FTIR and ^{13}C MAS NMR

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Abstract: Sorption of benzene onto Cu-montmorillonite was characterized by Fourier transform infrared (FTIR) spectroscopy and ^{13}C magic angle spinning nuclear magnetic resonance (MAS NMR). Under anhydrous conditions, chemisorption of benzene in the interlamellar region of Cu-montmorillonite led to the formation of a dark red surface complex that exhibited a vibrational spectrum similar to that of doped poly-p-phenylene. When the benzene sorption reaction was carried out under high relative humidity conditions, polymerization of benzene did not occur. The FTIR spectrum of the surface complex formed under wet conditions exhibited vibrational bands that could not be assigned to those of the parent benzene molecule or to those of previously observed chemisorbed Type I or Type II complexes. ^{13}C MAS NMR spectra of ^{13}C -enriched benzene sorbed onto Cu-montmorillonite powder showed the presence of two groups of peaks that could be assigned to aromatic and aliphatic carbon respectively.

Key words: Benzene chemisorption • ^{13}C MAS NMR • Cu-montmorillonite • FTIR • Poly-p-phenylene

Clays and Clay Minerals; February 1993 v. 41; no. 1; p. 87-94; DOI: [10.1346/CCMN.1993.0410109](https://doi.org/10.1346/CCMN.1993.0410109)

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