



## Immobilization of 4-amino-2-hydroxyacetophenone onto silica gel surface and sorption studies of Cu(II), Ni(II), and Co(II) ions

Aysel Çimen\*, Murat Torun, Ali Bilgiç

*Faculty of Science, Department of Chemistry, Karamanoğlu Mehmetbey University, Karaman 70200, Turkey*  
Tel. +90 338 226 21 53; Fax: +90 338 226 21 50; email: [ayselcimen42@hotmail.com](mailto:ayselcimen42@hotmail.com)

Received 26 June 2013; Accepted 26 October 2013

---

### ABSTRACT

The 4-amino-2-hydroxyacetophenone was immobilized onto silica gel modified with 3-aminopropyltrimethoxy silane. The carried reaction is classic condensation reaction. The obtained structure was characterized by infrared spectroscopy and thermo gravimetric analysis. The values of adsorption of Cu(II), Ni(II), and Co(II) ions were detected with an atomic absorption spectrometer. The experiment conditions for effective sorption of the studied metal ions were performed by using batch method. The maximum adsorption capacities and isotherm parameters were calculated with using the Langmuir, Freundlich, and Dubinin-Radushkevich isotherm equations. Thermodynamic parameters such as free energy ( $\Delta G^\circ$ ), entropy ( $\Delta S^\circ$ ), and enthalpy ( $\Delta H^\circ$ ) were also calculated from the experimental results. The sorption results were used to explain the mechanism of the sorption. The modified structure was successfully used in the separation of Cu(II), Ni(II), and Co(II) from the aqueous solutions.

*Keywords:* Chemical analysis; Surface analysis; Thermal analysis; Surface treatments

---

\*Corresponding author.