

## C-3,4-Dimethoxyphenylcalix[4]resorcinarene Triphenylphosphonium Chloride Adsorbent for Hexavalent Chromium Removal

Rika Wulandari<sup>1,2\*</sup>, Jumina<sup>2</sup>, Dwi Siswanta<sup>1</sup>

<sup>1</sup>Department of Chemistry, Faculty of Mathematic and Natural Sciences,  
Universitas Gadjah Mada, Yogyakarta, Indonesia.

<sup>2</sup>Institute for Industrial Research and Standardization, Ministry of Industry  
Republic of Indonesia, Pontianak, West Kalimantan, Indonesia

**Abstract :** Synthesis of positively-charged C-3,4-dimethoxyphenylcalix[4]resorcinarene triphenylphosphonium chloride (CMPCRP) has been conducted. The synthesis was carried out from vaniline via methylation, aromatic electrophilic substitution-cyclization, chloromethylation, and bimolecular nucleophilic substitution reaction. Structural elucidation of products was performed using FT-IR and NMR spectrometer. CMPCRP is an orange solid with a 97.14% yield and melting point of 296°C. The removal of hexavalent chromium (Cr(VI)) from aqueous solution was investigated in this study. Adsorption studies were carried out using the batch methods at different acidity, contact time, and initial Cr(VI) concentration. The initial and final Cr(VI) concentration were determined using AAS spectrometer. The result showed that the optimum condition of Cr(VI) adsorption was at pH 4, contact time 30 min, and concentration of 25 mg/L. The maximum adsorption capacity for the adsorption process is 15.71 mg/g. The rate of adsorption was found to follow the pseudo-second-order kinetic model. Cr(VI) adsorption equilibrium fitted the Langmuir isotherm model most and the mechanism is a chemisorption (Gibb's energy = 36.24 kJ/mol) that occurs in the monolayer.

**Key Words:** Adsorption, C-3,4-dimethoxyphenylcalix[4]resorcinarene triphenylphosphonium chloride, Cr(VI), Chemisorption.

Rika Wulandari *et al* /International Journal of ChemTech Research, 2016,9(12): 549-557.

\*\*\*\*\*