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STARCH STABILIZED ZERO VALENT IRON NANOPARTICLES ON CATECHOL REMEDIATION IN AQUEOUS MEDIA

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Catechol is one of the major toxic compounds, which can be frequently identified in the chemical and allied industrial effluents. Use of Nano Zero Valent Iron (NZVI) for wastewater treatment is considered as a promising technique for degrading various contaminants although there are no reports on its catechol removal. The aim of the present study was to investigate the effectiveness of NZVI, for its catechol removal ability. Starch was used as the stabilizing agent during the synthesis of starch stabilized NZVI (S-NZVI), by borohydride reduction method. Series of isotherm experiments were conducted to investigate the effect of initial catechol concentration and temperature at 0.5 g/L S-NZVI solid solution. A range of catechol (25-1000 mg/L) was prepared at pH 5 and reacted for 12 hours at darkness and the resultant solution was microcentrifuged, filtered and analyzed by UV-Vis spectroscopy (UV-160A Shimadzu) at 277 nm. Results showed that the removal of catechol by S-NZVI was increased with the increase in initial catechol concentration, until it reaches the maximum removal for the tested range. The resulted isotherm data well fitted with Langmuir isotherm model suggesting monolayer adsorption and a maximum adsorption capacity of 1.06 mg/g at room temperature 298 K. Further, results implied that the temperature is directly proportional to the removal of catechol by S-NZVI. The maximum adsorption capacity is 1.59 mg/g at 318 K and it showed ~53 % increment, compared to the maximum adsorption capacity at room temperature. Overall, S-NZVI has shown to be effective in catechol removal in aqueous media; however, more data will be produced for modeling. Further, the catechol remediation mechanism will be proposed using FT-IR spectroscopic method.