Lignite based granular activated carbon of 20x30 mesh size was used to investigate the extent of bioregeneration of phenol and 2,4-DCP in a batch system. The adsorption isotherm fits very well with the Freundlich isotherm and it is apparent that 2,4-DCP is more adsorbable than phenol. The degree of reversible adsorption for phenol and 2,4-DCP were 32.9 and 10.6%, respectively. The low percentages of their reversibility meant that the adsorption phenomena of both phenol and 2,4-DCP were not fully physiosorption. The microorganisms can regenerate 31.4% (21.2 mg g⁻¹) of GAC loaded with phenol and 14.3% (24.8 mg g⁻¹) of GAC loaded with 2,4-DCP over a period of 7-10 days. The bioregeneration of phenols closely followed the fast order kinetics with the rate constant of 0.046 day⁻¹ at initial phenol concentration of 100 mg l⁻¹ and biomass concentration of 20 mg l⁻¹ MLVSS. The rate constant was 0.021 day⁻¹ at initial 2,4-DCP concentration of 200 mg l⁻¹ and 200 mg l⁻¹ MLVSS. In addition, the increasing in initial concentration of biomass in the solution shortened the time required to reach the asymptotic limit on the bioregeneration but rendered little impact on the bioregeneration percentage.