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1 Efficient removal of malachite green dye using biodegradable graft copolymer derived from
2 amylopectin and poly (acrylic acid)

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8 **Abstract:**

9 This article reports the application of a high performance biodegradable adsorbent based on
10 amylopectin and poly (acrylic acid) (AP-g-PAA) for removal of toxic malachite green dye
11 (MG) from aqueous solution. The graft copolymer has been synthesized and characterized
12 using various techniques, including FTIR spectroscopy, GPC analysis, SEM analysis, and XRD
13 analysis. Biodegradation study suggests that the co-polymer is biodegradable in nature. The
14 adsorbent shows excellent potential (Q_{max} , 352.11 mg g⁻¹; 99.05 % of MG has been removed
15 within 30 min) for removal of MG from aqueous solution. It has been observed that point to
16 zero charge (pzc) of graft copolymer plays significant role in adsorption efficacy. The
17 adsorption kinetics and isotherm follow pseudo-second order and Langmuir isotherm models,
18 respectively. Thermodynamics parameters suggest that the process of dye uptake is
19 spontaneous. Finally desorption study shows excellent regeneration efficiency of adsorbent.

20 **Keywords:** Adsorption; poly (acrylic acid); graft copolymer; malachite green dye.

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