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SYNTHESIS OF MOLECULAR IMPRINTING POLYMERS IN MICROEMULSION FOR THE REMOVAL OF MALACHITE GREEN FROM WATER

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ABSTRACT

Molecular imprinting polymers for Malachite Green (MG) were synthesized by microemulsion polymerization method. In this research microemulsion (Water+CTAB+Butanol+Hexane, 8G: 8G: 25mL: 160mL) was used as a solvent medium for polymerization. This polymerization method used Malachite Green (MG) as a template, Acrylic acid (AA) as a monomer,Diviniylbenzene (DVB) as a cross-linker and Azobisisobutyronitrile (AIBN) as an initiator.The synthesized polymers were characterized by using FTIR and SEM. The batch binding process was used to evaluate the rebinding efficiency of imprinted polymers. The removal efficiency of selected imprinted polymer (MIP-R2) was about 85% in Lake Water. The competivity binding test reveals that the MIP-R2 is highly selective towards the MG with the Kd (distribution ratio) of 1.700.

KEY WORDS : Molecular imprinted polymer, Malachite green, Acrylic acid, Divinyl benzene and Microemulsion

INTRODUCTION

Malachite Green (MG) is one of a common triphenylmethane dyeandis also known as Methanaminium or Basic green 4, with the molecular formula of C23H25ClN2(Sabnis, 2010). MG has many applications and is widely used in fish farming industries. One of the most essential role of MG is to treat fungal and protozoan infections in fishes because it is cheap and efficient (Cho *et al.*, 2003; Farhadi *et al.*, 2010; Li *et al.*, 2008; Lian *et al.*, 2012). At present, dyes arewidely used in the industries such as in foods, for fabrics, cosmetic coloration, etc. The application of dyes has disadvantages and serious consequences regarding the pollution in the environment. Most textile industries used dyes for their production and discharged certain amount of the chemicals to environment specifically to the river because it is cheaper to dispose as compared to treatment of dye effluents. As reported by Pang and Abdullah (Pang and Abdullah, 2012), the major source of water pollution is due to the discharge of dyes after the finishing process of textile dyeing of fibre. This kind of disposal becomes a big challenge and polluted our water resources that leads to various health complications. It is also reported that, malachite green dyehas carcinogenesis, mutagenesis, chromosomal fractures, teratogenecity and respiratory toxicities properties (Su *et al.*, 20017). This contamination can be mitigated by using a molecular imprinting polymers because of higly selective and specific for target compounds.

Molecular imprinted polymer (MIP) is one of the latest technologies used to extract a compound efficiently with promising recognition with selective molecular ability (Surikumaran *et al.*, 2014). MIPs are highly cross-linked man-made polymers with recognition abilities (Windstrand *et al.*, 2006). They are synthetic materials and are able to recognize targeted molecules or related compounds and are synthesized by polymerization process (Raof *et al.*, 2013). This technology was first introduced in the year 1972 by Wulff and Sarhan and then in 1980's,

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