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Synthesis and Application of Glibenclamide Imprinted Polymer for Solid Phase Extraction in Serum Samples Using Itaconic Acid as Functional Monomer

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ABSTRACT
Glibenclamide is a second-generation sulfonylurea drugs for treatment of diabetes mellitus. Up to now, a glibenclamide imprinted polymer is not reported for molecular recognition in biological samples. This research is conducted to have Molecular Imprinted Solid Phase Extraction (MISPE) for separation of glibenclamide from serum samples. The results showed that the itaconic acid is the functional monomer that provides the best interaction with the template (glibenclamide) from the computational study using Gaussian 09 software. The MISPE made from itaconic acid monomer at a ratio of 1:6:70 gives the best binding to glibenclamide in methanol pH 4. Serum sample which was spiked with glibenclamide gives recovery more than 80% after pretreatment with MISPE 2 in all concentration ranges. Selectivity test showed that MISPE 2 can be used for selective extraction of glibenclamide from serum samples spiked with other sulfonylurea drugs. This developed MISPE could be further used as extraction method in antidiabetic drugs analysis from biological samples.

Key words: Molecularly imprinted polymer, glibenclamide, itaconic acid, solid phase extraction

INTRODUCTION

Molecular Imprinted Polymer (MIP) is a polymer that is made using molecular imprinting techniques with an affinity for the template molecule, its prepared by the existence of template as a print for the conformation of a complementary binding site of the template (Zheng *et al*., 2002; Yoshimi *et al*., 2013). The use of MIP in the Solid Phase Extraction (SPE) has high benefits because it produces selective extraction of analytes and eliminates sample matrices. It is able to produce the receptor binding site-like artificial memory on the shape and position of the functional groups of the template molecule (Rezaei *et al*., 2010; Khodadadian and Farhad, 2010). Molecular Imprinted Solid Phase Extraction (MISPE) is able to provide the stationary phase which selectively isolate the specific compound or its structural analog of a complex matrix (Qiao *et al*., 2006; Lulinski *et al*., 2014; Pichon, 2007; Yin *et al*., 2005). The selectivity of the MIP comes from synthetic procedure to prepare the MIP wherein a template molecule is linked by noncovalent or covalent bonding to a monomer with functional groups (Caro *et al*., 2006). Glibenclamide is a second-generation sulfonylurea drugs for the treatment of noninsulin dependant diabetes mellitus (NIDDM) diabetes type. Glibenclamide is capable to stimulate