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# Synthesis of MIPs towards Precursors and Intermediates of Illicit Drugs and Their following Application in Sensing Unit

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**Abstract :** The threat of synthetic drugs is one of the most significant current drug problems worldwide. The use of drugs of abuse has increased dramatically during the past three decades. Among others, Amphetamine-Type Stimulants (ATS) are globally the second most widely used drugs after cannabis, exceeding the use of cocaine and heroin. ATS are potent central nervous system (CNS) stimulants, capable of inducing euphoric static similar to cocaine. Recreational use of ATS is widespread, even though warnings of irreversible damage of the CNS were reported. ATS pose a big problem and their production contributes to the pollution of the environment by discharging big volumes of liquid waste to sewage system. Therefore, there is a demand to develop robust and sensitive sensors that can detect ATS and their intermediates in environmental water samples. A rapid and simple test is required. Analysis of environmental water samples (which sometimes can be a harsh environment) using antibody-based tests cannot be applied. Therefore, molecular imprinted polymers (MIPs), which are known as synthetic antibodies, have been chosen for that approach. MIPs are characterized with a high mechanical and thermal stability, show chemical resistance in a broad pH range and various organic or aqueous solvents. These properties make them the preferred type of receptors for application in the harsh conditions imposed by environmental samples. To the best of our knowledge, there are no existing MIPs-based sensors toward amphetamine and its intermediates. Also not many commercial MIPs for this application are available. Therefore, the aim of this study was to compare different techniques to obtain MIPs with high specificity towards ATS and characterize them for following use in a sensing unit. MIPs against amphetamine and its intermediates were synthesized using a few different techniques, such as electro-, thermo- and UV-initiated polymerization. Different monomers, cross linkers and initiators, in various ratios, were tested to obtain the best sensitivity and polymers properties. Subsequently, specificity and selectivity were compared with commercially available MIPs against amphetamine. Different linkers, such as lipoic acid, 3-mercaptopioponic acid and tyramine were examined, in combination with several immobilization techniques, to select the best procedure for attaching particles on sensor surface. Performed experiments allowed choosing an optimal method for the intended sensor application. Stability of MIPs in extreme conditions, such as highly acidic or basic was determined. Obtained results led to the conclusion about MIPs based sensor applicability in sewage system testing.

**Keywords :** amphetamine type stimulants, environment, molecular imprinted polymers, MIPs, sensor
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