DETERMINATION OF NITROFURANTOIN IN HONEY 
BY MOLECULARLY IMPRINTED POLYMERS 
MODIFIED CARBON PASTE ELECTRODES

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Molecularly imprinted polymers (MIPs) formatted from the pre-polymerization complex between complementary monomers and the template molecule, followed by polymerization in the presence of a crosslinker, in a porogenic environment are capable of specific molecular recognition [1-3].

Nitrofurantoin (NF) has been widely used in animal food additives for treatment and prevention of urinary tract infections. In 1997 the European Union banned its use in foodstuffs due to its mutagenic and carcinogenic effects. However, the illegal use of the drug has been found in many Asian countries [2].

Molecularly imprinted polymers (MIPs) for the recognition of nitrofurantoin were prepared using the traditional and newly suggested methods. In the traditional method (TMIP), free radical polymerization in polar solvent of dimethyl formamide (DMF) and using methacrylic acid (MAA) as the functional monomer, ethylene glycol dimethacrylate (EGDMA) as cross-linker and 2,2'-azobis (isobutyronitrile) (AIBN) as the initiator were used. In the newly suggested method (MIPresin), sulphonated styrene-divinylbenzene resin was swelled in DMF in the presence of template molecule NF. These polymers were used to modify carbon paste electrodes (CPEs).

Optimum conditions of square-wave cathodic adsorptive stripping voltammetry method for the determination of NF using CPE, TMIP and MIPresin modified CPEs were investigated. The maximum peak current was obtained at pH 2.0 and accumulation potential at 0.0 V. Detection limits were found to be 9.5x10⁻⁶ M for TMIP modified CPE, 7.8x10⁻¹² M for MIPresin modified CPE and 2.4x10⁻¹⁰ M for CPE. The performances of the electrodes were tested with NF spiked honey samples without any pretreatment. Recovery values in honey samples were calculated as %102 and %99 for TMIP and MIPresin modified CPE, respectively. Bare CPE was also used for comparison and no peak was obtained at this potential under the same condition.

References