Molecularly Imprinted Electrochemical Sensor Based on β-cyclodextrine for determination of Levothyroxine

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Abstract

Levothyroxine (LT4), a substituent of thyroxine, represents the synthetic form of the T4 hormone, used to treat hypothyroidism and other thyroid-related conditions. Thyroxine is an important hormone, produced in the follicular cells of the thyroid gland and it helps to regulate many vital processes, including metabolism, growth and development, heart and muscle function and digestive system. The present study focuses on the development of a sensitive electrochemical sensor for the detection of levothyroxine using screen-printed carbon electrodes (SPCEs). The modification of the electrode surface was carried out through electropolymerization of β-cyclodextrine, both in the absence and presence of levothyroxine as a template molecule, in phosphate buffer solution using cyclic voltammetry (CV), to evaluate how molecular imprinting affects the sensor's performance. β-cyclodextrine provides an ideal geometry to create a host−guest system for several molecules, including biomolecules. The electrochemical behavior of the developed sensors was characterized using cyclic voltammetry (CV), differential pulse voltammetry (DPV), and square wave voltammetry (SWV). The results showed that the electrode modified with β-cyclodextrine provided a more pronounced current response, indicating higher sensitivity and selective recognition.

Key words: levothyroxine, screen printed carbon electrode, β-cyclodextrine, voltammetry.

References

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