ADMET & DMPK 00(0) (2025) 2635; doi: https://doi.org/10.5599/admet.2635

ADMET

Open Access : ISSN : 1848-7718

http://www.pub.iapchem.org/ojs/index.php/admet/index

Original scientific paper

Voltammetric determination of sumatriptan in the presence of naproxen using a modified screen printed electrode

Hazim Saad Jabbar Al-Maliki[1], Sudad Jasim Mohammed[2,*], Adil Turki Al-Musawi[2], Aliaa Saadoon Abdul- Razaq Al-Faraji[2], Mazin Hadi Kzar[3], Abdul Amir H. Kadhum[4], Huda Hadi Nameh[5], Raed Muslim Mhaibes[6,*]

[1]*Department of Basic Sciences, College of Dentistry, University of Basrah, Iraq*
[2]*Market Research and Consumer Protection Center, University of Baghdad, Iraq*
[3]*College of Physical Education and Sport Sciences, Al-Mustaqbal University, 51001 Hillah, Babil-Iraq*
[4]*College of Medicine, University of Al-Ameed, Karbala, Iraq*
[5]*College of Pharmacy, University of Hilla, Babylon, Iraq*
[6]*Department of Biochemistry, College of Medicine, Misan University, Misan Iraq*

Corresponding Authors: E-mails*: * sudad@mracpc.uobaghdad.edu.iq; *raid.mcm@uomisan.edu.iq*

Received: December 7, 2024; Revised: February 11, 2025; Published: February 19, 2025

Abstract

Background and purpose: Sumatriptan is used to alleviate symptoms of migraine headaches, particularly during acute attacks. Naproxen is a medication that provides relief from pain, inflammation, and fever. Therefore, determination of them is important. **Experimental approach:** In the present work, $CoMoO_4$ nanosheets were synthesized in a basic and easy way. A screen-printed graphite electrode's surface was altered using the as-prepared $CoMoO_4$ nanosheets' high electroactivity to create a $CoMoO_4$ nanosheets-modified screen-printed electrode ($CoMoO_4$ NSs-SPE), which was then employed for sumatriptan's electrochemical oxidation. Due to the superior electron transfer characteristics and catalytic activity of the produced $CoMoO_4$ nanosheets, the results demonstrated a notable improvement in sumatriptan's current responses. This study examined the electrochemical behavior of sumatriptan on the $CoMoO_4$ NSs-SPE utilizing a number of methods, including as chronoamperometry, cyclic voltammetry, and differential pulse voltammetry (DPV). **Key results**: With a high sensitivity of 0.0718 μA/μM and a good correlation value of 0.9998, a linear calibration curve was obtained over a broad concentration range of 0.02-600.0 μM, suggesting a strong linear connection between the concentration and the response. Based on a signal-to-noise ratio of 3, the limit of detection for sumatriptan was determined to be 0.01 μM, suggesting a high degree of sensitivity for the detection technique. DPV results showed that the $CoMoO_4$ nanosheets-modified screen-printed electrode ($CoMoO_4$ NSs-SPE) could detect naproxen and sumatriptan at the same time. **Conclusion:** The created sensor's usefulness and efficacy in real-world applications were demonstrated when it was successfully used to identify the target analytes in actual samples.

Keywords

Simultaneous determination, real sample analysis, nanomaterials, drug analysis

Introduction

Sumatriptan is a medication that belongs to the tryptamine class and is widely used to alleviate symptoms of migraine headaches, particularly during acute attacks [1]. Sumatriptan works by activating specific serotonin receptors, known as 5-HT1D and 5-HT1B, which helps to reduce inflammation in blood vessels and relieve migraine symptoms [2]. When a 50 mg sumatriptan tablet is taken orally, it reaches its highest