ELECTROCHEMICAL BEHAVIOR OF MOCLOBEMIDE ON MERCURY AND GLASSY CARBON ELECTRODES AND VOLTAMMETRIC METHODS TO ITS DETERMINATION

Deniz Altunöz Erdoğan[1], İbrahim Hudai Taşdemir[2], Nevin Erk[3], Esma Kılıç[1]

1 Ankara University, Faculty of Science, Department of Chemistry, Ankara, Turkey
2 Ahi Evran University, Faculty Of Arts And Science, Department Of Chemistry, Kirşehir, Turkey
3 Ankara University, Faculty Of Pharmacy, Department Of Analytical Chemistry, Ankara, Turkey
E-mail: erdodeniz@gmail.com

Moclobemide (MCB) chemically known as [p-chloro-N-(2-morpholinoethyl)benzamide] is a new type of reversible and selective inhibitor of the enzyme monoamine oxidase subtype A (MAO-A). MCB is widely used and prescribed for the treatment of depression as a first benzamide antidepressant. Few analytical methods have been described for determination of MCB in pharmaceutical samples or biological fluids. Described methods for MCB are assay based on the use of high performance liquid chromatographic techniques with ultraviolet (UV) [1-5] and mass spectrometric (MS) [6, 7] detection after solid-phase extraction process for human plasma samples. Spectrophotometric method [8] and moclobemide-selective membrane electrode [9] have also been published for the assay of MCB in pharmecutical samples.

Electrochemical oxidation and reduction properties of moclobemide (MCB) were investigated on glassy carbon electrode (GCE) and hanging mercury drop electrode (HMDE). Diffusion-adsorption behavior and some electrochemical parameters such as number of transferred electrons and proton participated to its electrode mechanism and surface coverage coefficients were calculated from the results of cyclic voltammetry and square-wave voltammetry. Reversible catalytic hydrogen wave mechanism was proposed on HMDE and oxidation with single two-electron/two-proton irreversible mechanism controlled mainly by adsorption with some diffusion contribution on both electrodes was proposed. Experimental parameters were optimized to develop new, accurate, rapid, selective and simple voltammetric methods for direct determination of MCB in pharmaceutical dosage forms and spiked human serum samples without time-consuming steps prior to drug assay. In these methods, the lowest limit of detection (LLOD) was found as 0.0235 µM. Methods were successfully applied to determine the MCB content of commercial pharmaceutical preparations and spiked human serum. Methods were found to be highly accurate and precise, having recovery values between 98.2 % and 102.6 % and having relative standard deviation of less than 7.0 % for all applications.

References

[1] Vujic, Z., Uskokovic-Markovic, S., Kuntic, V., ***Anal. Lett.***, 42 (2009) 2060-2070.
[2] Malfara, W. R., Bertucci, C., Queiroz, M. E. C., Carvalho, S. D., Bianchi, M. L. P., Cesarino, E. J., Crippa, J. A., Queiroz, R. H. C., ***J. Pharm. Biomed. Anal.***, 44 (2007) 955-962.
[3] Rakic, A., Miljkovic, B., Pokrajac, M., Vucicevic, K., ***J. Pharm. Biomed. Anal.***, 43 (2007) 1416-1422.
[4] Amini, H., Shahmir, B., Ahmadiani, A., ***J. Chromatogr. B.***, 807 (2004) 271-275.
[5] Misztal, G., Skibinski, R., Olajossy, M., Paw, B., ***J. Pharm. Biomed. Anal.***, *30* (2002) 1277-1285.
[6] Kirchherr, H., Kühn–Velten, W. N., ***J. Chromatogr. B.***, *843* (2006) 100-113.
[7] Hoskins, J. M., Gross, A. S., Shenfield, G. M., Rivory, L. P., ***J. Chromatogr. B.***, 754 (2001) 319-326.
[8] Adikwu, M. U., Ofokansi, K. C., ***J. Pharm. Biomed. Anal.***, 16 (1997) 529-532.
[9] Stefan, R. I, Baiulescu, G. E., Aboul-Enein, H. Y., ***Talanta***, 43 (1996) 1171-1175.

KimyaKongreleri.org