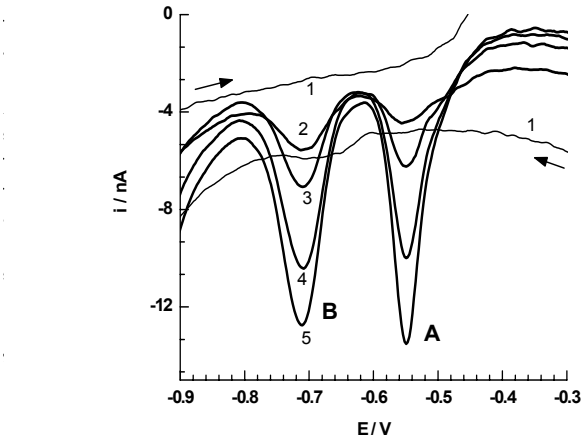

Fig. **CSV of HCy and Ni^{2+} containing solutions**. HCy (μM): (1) 0; (2) 0.6; (3) 1.0; (4) 1.4; (5) 1.8. Supporting electrolyte: 0.05 M Na_2HPO_4 and 4 mM Ni^{2+}, pH 6.5, *E*(dep): +0.1 V, *t*(dep): 30 s, 50 mV s^{-1}, HMDE

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CATHODIC STRIPPING VOLTAMMETRY OF HOMOCYSTEINE AND THE RESPECTIVE THIOLACTONE AT A MERCURY ELECTRODE

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Homocysteine (HCy) causes vascular disease by a direct effect on arterial cells and tissues[1,2]. Elevation of blood HCy concentrations is a result of dietary, genetic, metabolic, hormonal, or toxic factors. Because of its similarity to the protein amino acid methionine, HCy can enter the protein biosynthetic pathway. However, HCy cannot complete the protein biosynthetic process and is converted to HCy-thiolactone (HTL,) by a reaction catalyzed by methionyl-transfer RNA synthetase[3,4]. Accumulating evidence suggests that HTL plays an important role in atherogenesis and thrombosis[5]. As far as the electrochemical behavior is concerned, owing to the analogy of chemical structure, HCy behave in many respects like cysteine (Cys), although some difference have been noticed mostly in connection with the metal ion chelate formation[6].

Under anodic polarization at a mercury electrode, homo-cysteine (HCy) forms a sparingly soluble mercury thiolate and mercury ion reduction in this compound gives rise to a characteristic cathodic stripping peak (A). If the nickel ion is present, HCy released by this reaction does catalyze nickel ion reduction, yielding a second cathodic peak (B) at about –0.75 V (Fig. 1). Regarding peak A, nickel ion has no effect upon this response. Homocysteine-thiolactone (HTL) is electrochemically inactive under similar conditions, but HCy impurity present in the commercial MTH reagent develops both peaks A and B under suitable conditions. HCy impurity in HTL can therefore be assessed in experiments performed in the cathodic stripping voltammetric mode.

It can be concluded that, as found, HTL is electrochemically inactive under the conditions of CSV at a mercury electrode, either in the absence or in the presence of Ni^{2+} ion. However, HCy which is present as an impurity at the level of about 3 % undergoes characteristic electrochemical reactions occurring in a HTL solution and, due to mercury ion reduction in the mercury thiolate, the choice of CSV thus enables the determination of HCy in HTL samples.

Support of Ministry of Education, Youth and Sport of the Czech Republic (projects MSM0021627502 and LC06035) is gratefully acknowledged. Michal Galík is grateful for a grant from Iceland, Liechtenstein and Norway in the framework of the EEA Financial Mechanism and the Norwegian Financial Mechanism.

REFERENCES

1. McCully K. S.: Am. J. Clin. Nutr. *86*, 1563S (2007).
2. Přistoupilová K., Přistoupil T. I., Heyrovský M.: Chem. Listy *93*, 365 (1999).
3. Jakubowski H.: Cell. Mol. Life Sci. *61*, 470 (2004).
4. Jakubowski H., Zhang L., Bardeguez A., Aviv A.: Circ. Res. *87*, 45 (2000).
5. Jakubowski H.: Clin. Chem. Lab. Med. *45*, 1704 (2007).
6. M. Heyrovský, S. Vavřička: Bioelectrochem. Bioenerg. *48*, 43 (1999).
7. Galík M., Banica A., Vytřas K., Švancara I., Banica F. G., in: *Sensing in Electroanalysis*, Vol. 2 (Vytřas K., Kalcher K., ed.), p. 95–103. University of Pardubice, Pardubice 2007.
8. Spataru N., Banica F. G.: Analyst *126*, 1907 (2001).