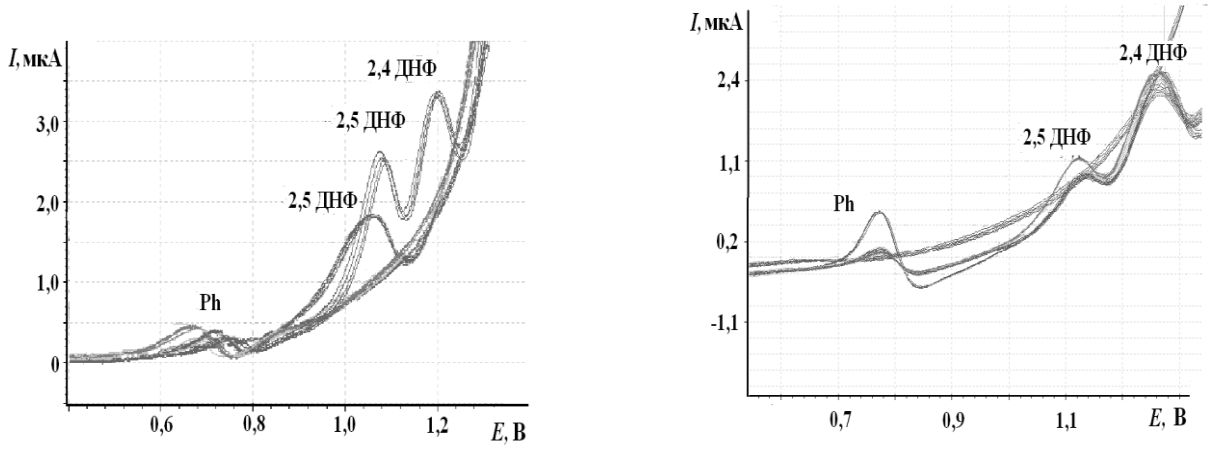
Voltammetric behavior of dinitrophenyl and phenol at their joint presence

K. Uskova, P. D. Halfina, E. A. Levkovich
Federal State Educational Institution of Higher Professional Education "Kemerovo State University", Kemerovo, Russia, e-mail: irishaklim@ya.ru

Phenol and its derivatives t refer to pollutants of the second class of hazard, their total content in the water should be less than 0.5 mg/l. The known method of their analysis is voltammetric determination of phenol and dinitroethylbenzene using glassy carbon electrode (GCE) [1, 2].

In our work the electrochemical behavior of the modified GCE in different background electrolytes containing 2,5-dinitrophenol, 2,4-dinitrophenol under their individual or joint presence and in the phenol availability have been studied. VAM-curves were recorded in a three-electrode cell with electrochemically modified GCE as a working electrode.

In case of acetate buffer background solution the analytic signals on current-voltage curves were observed as peaks at potentials $E_{2,4\text{-DNP}}$ = 1,250 ± 0,150 B and $E_{2,5\text{-DNP}}$ = 1,100 ± 0,110 V, the value of which increased with the enlargement of concentration. At the addition of a mixture of 2,4- dinitrophenol and 2,5- dinitrophenol in a ratio of 1 : 1 a broad total peak at E = 1.100 V appeared. At the increase of 2,4- dinitrophenol concentration to the ratio of 3 : 1 the separation of peaks was observed. The addition of phenol provided the separatation of the measured peaks of phenol, 2,4-DNP and 2,5-DNP on the current-voltage curve. At the joint presence of phenol and dinitrophenols in the background solution three separate good measured peaks were observed on the current-voltage curves (Figure). The results show the possibility of the use of electrochemially modified GCE electrodes in voltammetric analysis of phenol and its derivities at their joint presence in acetate buffer background solution.



a b

Fig. VAM-curves illustrating the behavior of electrochemially modified GCE electrode in acetate buffer background solution containing phenol, 2,5-dinitrophenoland 2,4-dinitrophenol:
a – phenol is added to 2,5-dinitrophenol and 2,4-dinitrophenol;
b – 2,5-dinitrophenol and 2,4-dinitrophenol are added to phenol

References

1. I.K. Uskova, O.N. Bulgakova. *J. Analytical Chem*. (2014) 69 (6): 604.
2. I.K. Uskova, P.D. Halfina, V.A. Nevostruev. *J. Analytical Chem*. (2006) 61 (8): 861.