**Komitet za termodinamiku i fazne dijagrame Srbije**

***u saradnji sa:***

Fakultetom tehničkih nauka u Kosovskoj Mitrovici,
Tehničkim fakultetom u Boru i
Associated Phase Diagram and Thermodynamics Committee
(Poland, Czech Republic, Hungary, Bulgaria, Slovenia, Serbia,
Montenegro, Romania, Croatia, Bosnia and Herzegovina)

# DVANAESTI SIMPOZIJUM O TERMODINAMICI I FAZNIM DIJAGRAMIMA

***sa međunarodnim učešćem***


# ZBORNIK IZVODA RADOVA

**Kosovska Mitrovica,**
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# Dvanaesti simpozijum o termodinamici i faznim dijagramima


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# Sadržaj



## Plenarno predavanje:



## Izvodi radova:

# Kinetic and DTA-TGA analysis of $Cu^{2+}$ biosorption on hazelnut shells

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**Abstract**

Biosorption can be defined as the ability of biomaterials to accumulate and concentrate heavy metals from even the most dilute aqueous solutions. The biosorption process involves a solid phase (biological material) and a liquid phase (solvent, usually water) containing the dissolved metal. [1]. In this work, hazelnut shells were used as biosorbents for the biosorption of $Cu^{2+}$ ions from synthetic solutions.

This paper presents the results of kinetic and DTA-TGA analysis of the biosorption of $Cu^{2+}$ ions on hazelnut shells. A pseudo-first order kinetic model, a pseudo-second order kinetic model, an intraparticle diffusion kinetic model and an Elovich kinetic model were used to describe the kinetics of biosorption of $Cu^{2+}$ ions with hazelnut shells.

The change in the adsorption capacity of copper ions with time was determined by contacting a series of solutions of copper ions with an initial concentration of 0.2 g $dm^{-3}$ with 0.5 g of the sample for different contact times. Biosorption was terminated after 90 minutes, assuming that this time was long enough to establish equilibrium in the system [2]. It can be seen from Fig. 1a that at the beginning of the process (in the first 10 minutes) the adsorption capacity increases sharply with the contact time. The sudden increase in capacity in the first 10 minutes of the process is due to the large number of active sites available on the surface of the adsorbent. Thereafter, until the end of the experiment, a slight increase in adsorption capacity can be observed, which is due to the decrease in available active sites and the decrease in the concentration of copper ions in the solution [3]. The pseudo-second order kinetic model, with the correlation coefficient $R^2$ = 0.961, showed the best agreement with the experimental data. Based on this model it can be concluded that chemisorption is a possible binding mechanism of copper ions on the surface of hazelnut shells [4].

**Type of work:** original research paper.

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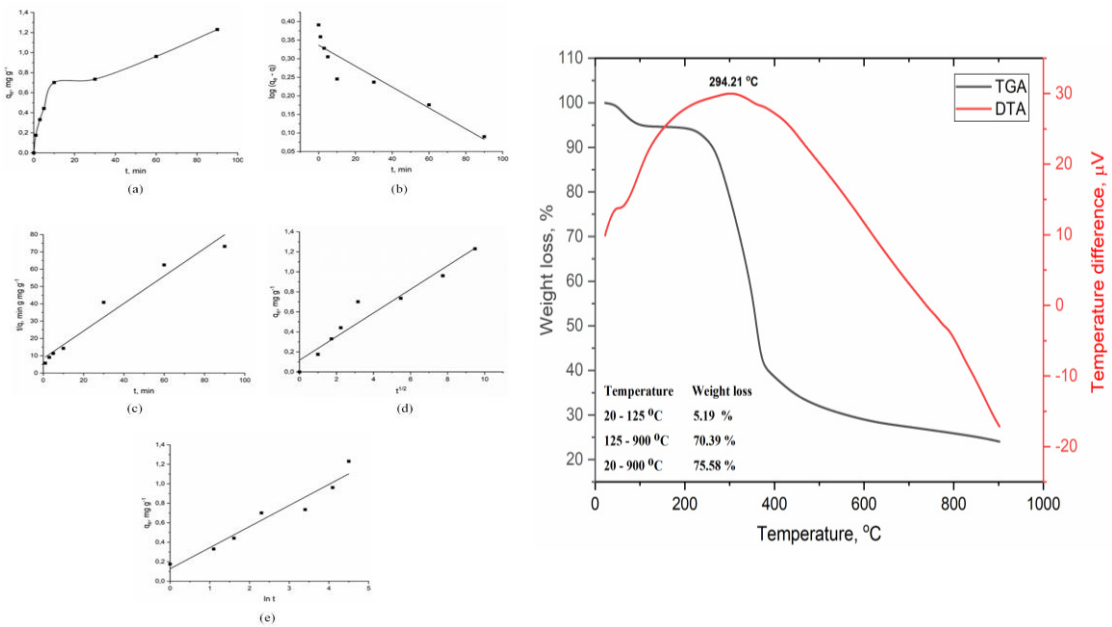
**Graphical abstract:**




*DTA-TGA analysis of hazelnut shells.*

*(a) Change in the adsorption capacity with time;*
*(b) pseudo-first order kinetic model;*
*(c) pseudo-second order kinetic model;*
*(d) intraparticle diffusion kinetic model;*
*(e) Elovich kinetic model.*