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ADSORPTION ISOTHERMS FOR COPPER IONS ADSORPTION ONTO WALNUT SHELLS

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Abstract

In this paper Langmuir, Freundlich, and Temkin adsorption isotherm models were used for describing the adsorption of copper ions onto walnut shells. The adsorption was performed in a batch system. The obtained isotherm data were fitted using the mentioned models, and the isotherm parameters were calculated from the linearized plots corresponding to each model. The Langmuir adsorption isotherm model showed the best agreement with the analyzed experimental data, with the correlation coefficient R^2 = 0.993. According to this model, the adsorption process occurs until a complete monolayer of copper ions is formed on the surface of the walnut shells. The maximum adsorption capacity, according to this model, was 7.71 mg g^{-1}.

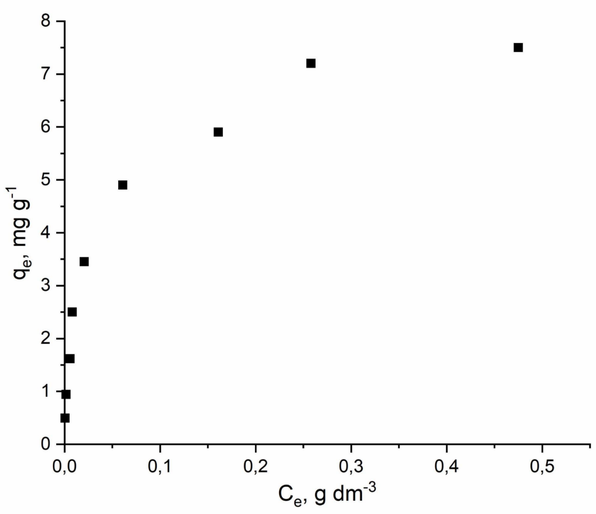

Figure 1. Adsorption isotherm data

Table 1. Obtained parameters for Langmuir, Freundlich and Temkin adsorption isotherm models for copper ions adsorption onto walnut shells

Langmuir				Freundlich			Temkin		
K_L dm³ mg⁻¹	q_{exp} mg g⁻¹	q_m mg g⁻¹	R^2	K_F	1/n	R^2	B J mol⁻¹	K_T dm³ g⁻¹	R^2
45.19	7.50	7.71	0.993	12.87	0.4	0.960	1.11	8.11	0.968

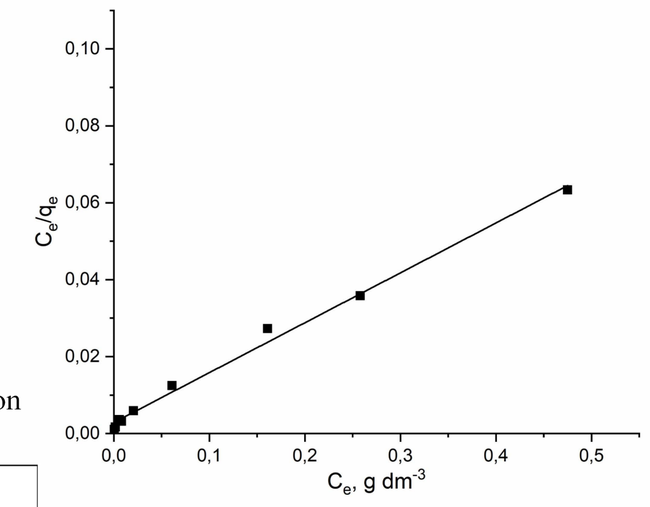

Figure 2. Langmuir adsorption isotherm model

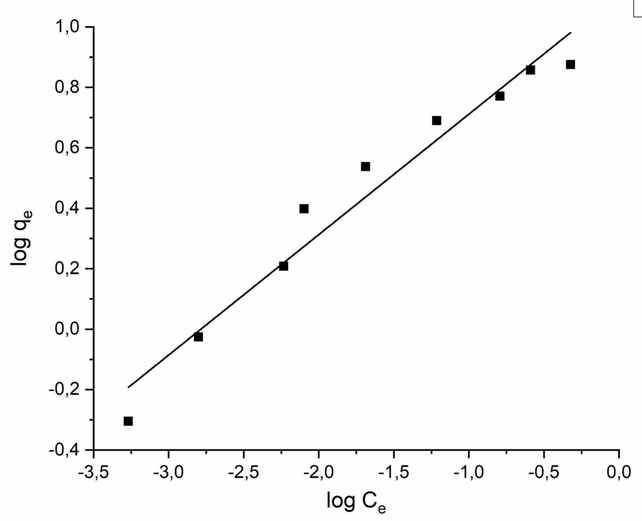

Figure 3. Freundlihch adsorption isotherm model

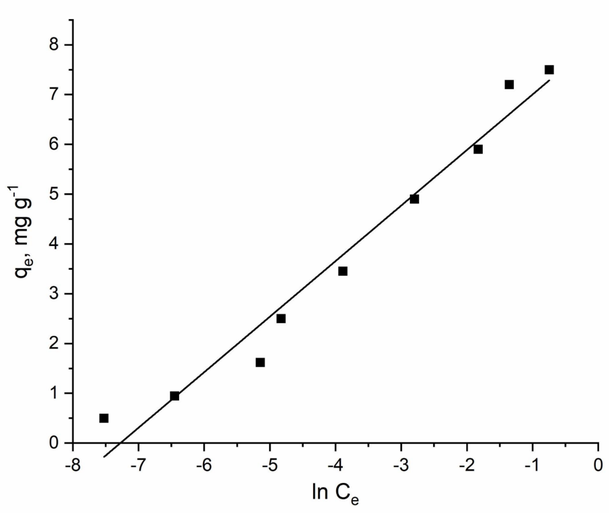

Figure 4. Temkin adsorption isotherm model

Conclusions

- ✓ *Walnut shells were used as an adsorbent for copper ions adsorption from aqueous solutions.*
- ✓ *The adsorption isotherm data were fitted using three theoretical adsorption isotherm models, i.e. Langmuir, Freundlich, and Temkin adsorption isotherm model.*
- ✓ *The obtained results, shown in Table 1, indicate that Langmuir model shows the best agreement with the analyzed experimental data, with the correlation coefficient R^2 = 0.993.*
- ✓ *The maximum adsorption capacity, obtained by the Langmuir adsorption isotherm model, according to Table 1, was 7.71 mg g^{-1}.*

Acknowledgements

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