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Modification of carbon sorbent by sequential adsorption of biologically active phenylalanine and salicylic acid

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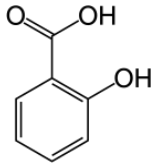
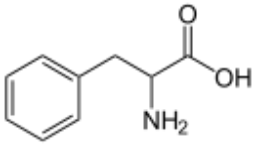
Table S1 Characteristics of modifiers.

Modifier	M.M.	Structure and size of molecules/nm	Chemical properties
Salicylic acid (SA)	138.1	0.85×0.71×0.59 	pK_a 2.97 Sparingly soluble in water[a]
Phenylalanine (Phe)	165.2	0.70×0.50×0.50 	pK_a 2.20 pI 5.48 Sparingly soluble in water[b]

[a] Reference S1. [b] Reference S2.

Experimental part

A porous carbon sorbent (CS) was used as a material modification. Modifiers: salicylic acid (99%, Sigma-Aldrich, Germany), phenylalanine (98%, Omskreaktiv, Russia).

The specific surface area of the samples was studied by low-temperature nitrogen adsorption (Gemini 2380 analyzer, Micromeritics, USA). By titration method H.P. Boehm determined the quantitative content of functional groups on the surface of the samples under study. Adsorption/desorption of modifiers was studied using a spectrophotometry method (spectrophotometer CECIL-1021, Cecil Instruments Limited, England). The pH of solutions was determined using a Sartorius PP-20 pH meter (Sartorius AG, Germany).

The concentration of modifiers in solutions before and after contact with the sorbent was determined by the spectrophotometry method, using a quartz cuvette with an absorbing layer thickness of 10 mm, measuring the optical density at the absorption maximum at a wavelength of 255 nm for phenylalanine and 295 nm for salicylic acid. To construct calibration graphs, a series of aqueous solutions of phenylalanine in the concentration range of 125–2000 mg dm^{-3} and salicylic acid in the range of 10–500 mg dm^{-3} were prepared.

Possibility of desorption of modifiers into model solutions (aqueous solution, 96% ethanol solution and solutions simulating the environment of the stomach 0.02N HCl and intestines 0.0025N $NaHCO_3$), volumetric ratio of sorbent/model solution 1/10, static conditions, temperature 25 °C and 36 °C - for solutions simulating the environment of the stomach and intestines, contact time 24–48 h.

Every adsorption/desorption experiment was repeated twice, and the average value was reported.

References

S1 J. Choi and W. S. Shin, *Minerals*, 2020, **10**, 898.
S2 C. C. O. Alves, A. S. Franca and L. S. Oliveira, *LWT - Food Sci. Technol.*, 2013, **51**, 1.