

**PHYSICO-CHEMICAL PATTERNS OF PRECONCENTRATION
OF Sm(III), La(III), Er(III) BY A COPOLYMER
OF POLYVINYL ALCOHOL, FORMALDEHYDE AND UREA**

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Various sorption models are used to study surface phenomena in the preconcentration of rare earth metals. In this work, sorption theories are applied to the preconcentration of Sm(III), La(III), Er(III) with a copolymer of polyvinyl alcohol, formaldehyde and urea (PVF-U).

The PVF-U sorbent quantitatively extracts (recovery rate > 98%) REM from aqueous solutions at pH 4-7. The sorption capacity of the sorbent is relative to La(III), Sm(III), Er(III) is 0.086, 0.078, and 0.057 mmol/g, respectively.

The experimentally obtained sorption isotherms were analyzed by the sorption models of Langmuir, Freundlich, Dubinin-Radzhdankevich, Temkin (see the table).

Parameters of La(III), Sm(III), Er(III) sorption isotherms with PVF-U sorbent

Sorption theory	Characteristics	La(III)	Sm(III)	Er(III)
Langmuir	a_{\max} , mmol/g	0.085	0.074	0.057
	K_L , l/mmol	3.0	2.0	3.4
	R_L	0.15–0.94	0.23–0.94	0.19–0.95
	r	0.952	0.951	0.944
Freundlich	a_{\max} , mmol/g	0.061	0.058	0.048
	$1/n$	0.44	0.62	0.48
	n	2.3	1.6	2.1
	r	0.995	0.954	0.989
Dubinin-Radzhdankevich	a_{\max} , mmol/g	0.047	0.027	0.059
	K_D , mmol ² /kJ ²	0.0042	0.0061	0.0043
	E , kJ/mol	10.9	9.1	10.8
	r	0.982	0.971	0.972
Temkin	A_T , l/g	63	35	69
	B , J/mol	0.016	0.017	0.011
	r	0.912	0.962	0.900

The REM sorption corresponds to the Langmuir model, which indicates the sorption of metals on an energetically homogeneous surface. The values of the separation coefficient (R_L) according to the Langmuir model and $1/n$ according to the Freundlich model are in the range 0-1, which indicates a high adsorption capacity of the sorbent in relation to recoverable REM ions. The calculated free energy of adsorption (E) according to the Dubinin-Radostkevich model indicates the chemical mechanism of sorption, and the energy according to the Temkin model (B) indicates the exothermic process.