Kinetics sorption of Co(II) and Cr(III) ions on ion exchange resin from acidic solutions

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Currently, many factories dispose waste water containing various toxic and non-ferrous metal ions [1]. In particular, an increase in concentrations of Co(II), Cr(III), Cu(II) and Zn(II) in waters adversely affects the environment [2]. This study demonstrate the possibility of remove Co(II) and Cr(III) from aqueous solutions by the formation of the polyampholyte based on polyvinylchloride. The calculated parameters of the pseudo-first and second order of sorption of Co(II) and Cr(III) on PVC- (SO_3H) (NH) are presented in Table. According to the results of the investigation the kinetics of the adsorption of Co(II) and Cr(III) with polyampholyte on the base of PVC is close to the data integrity of the pseudo-first-order model compared to the pseudo-first-order model.

Table. Kinetic parameters for Co(II) and Cr(III) adsorption with polyampholyte on the base of PVC

Initial conc (mol/L)	Calculated equilib. uptake q_e (mg·g^{-1})	k_2 (g mg^{-1} min^{-1})	h (g mg^{-1} min^{-1})	R^2
0,010	37,04	0,000497	0,682	0,989
0,0125	50,00	0,000163	0,407	0,937
0,025	58,82	0,000092	0,321	0,848
0,050	90,91	0,000076	0,635	0,871
Average k_2	0,000112			
0,010	45,45	0,000374	0,773	0,987
0,0125	76,92	0,000219	1,311	0,993
0,025	100,0	0,000145	1,451	0,990
0,050	125,0	0,000066	1,033	0,967
Average k_2	0,000113			

Pseudo-second order adsorption coefficient the coefficient of correlation in the (R^2) relative to the combined Co(II) ($R^2=0,989$) and Cr(III) ($R^2=0,987$). This means that the sorption process is influenced not only by the nature of the ions, but also by the sulpho- and amine- groups in the ion exchanger.

References

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