GLYCOPOLYMERS AS PHENOL ADSORBENTS

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New adsorbents, glycopolymers (GP) based on plant polysaccharide konjac glucomannan (KGM) cross-linked with blocked diisocyanates: 2,4-tolylene diisocyanate (TDI), 4,4′-methylene bis (phenyl isocyanate) (MDI) or polyisocyanate (PIC) were synthesized and used for phenol adsorption from water solutions. The influence of isocyanate structure and functionality, polysaccharide hydroxyl group substitution degree, phenol concentration and pH solution on GP adsorption capacity was investigated.

GPs based on cross-linked KGM exhibit good adsorption ability for phenols. Adsorption equilibrium for GP samples had been reached after 24 hours contact with phenol solution for all GP except GP(TDI), for which adsorption capacity had been remained unchanged after 48 hours.

Langmuir and Freundlich adsorption isotherm models can be used to describe phenol adsorption onto GP with correlation coefficients R^2 of 1.

Table. Constants of Langmuir and Freundlich equations and correlation coefficients

GP	Langmuir			Freundlich		
	A_{max}, mg/g	K_L, l/mol	R^2	1/n	lgK_F	R^2
GP(PIC)-40	10,75	$3,3 \cdot 10^{-2}$	0,997	1,11	-0,38	0,996
GP(PIC)-80	20,00	$2,2 \cdot 10^{-2}$	0,998	1,06	-0,31	0,998
GP(TDI)-40	23,26	$9 \cdot 10^{-2}$	0,999	1,05	-0,3	0,998
GP(TDI)-80	27,70	$3,5 \cdot 10^{-2}$	0,999	1,06	-0,35	0,998
GP(MDI)-40	31,17	$1,2 \cdot 10^{-2}$	0,999	0,91	-0,36	0,999
GP(MDI)-80	29,8	$1,4 \cdot 10^{-2}$	0,999	0,95	-0.37	0.997

The highest adsorption capacity is observed for GP(MDI) and GP(PIC)-40 has the lowest value. Adsorption capacity of GP based on PIC and TDI rises with increasing of hydroxyl group substitution degree. In contrast to GP(PIC) and GP(TDI) adsorption capacity of GP based on MDI slightly decreases with increasing of hydroxyl groups substitution degree.

According to Freundlich isotherm parameters listed in table K_F stay almost unchanged and indicate that active sites for all GP have similar strength. The decreases of 1/n for GP based on MDI might be regarded as increased surface heterogeneity.