SUPPORTING INFORMATION

Anion exchange resins for C.I. Direct Blue 71 removal from aqueous solutions and wastewaters – effect of basicity as well as matrix composition and structure

Monika Wawrzkiewicz[1]

Department of Inorganic Chemistry, Faculty of Chemistry, Maria Curie-Sklodowska University, Maria Curie-Sklodowska Sq. 2,

20-031 Lublin, Poland

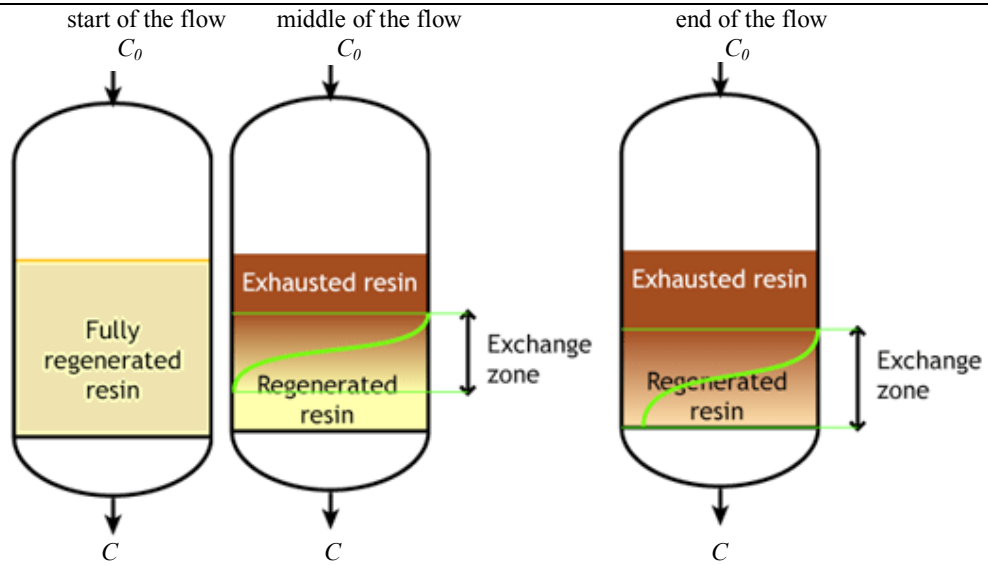
m.wawrzkiewicz@op.pl

[1] m.wawrzkiewicz@op.pl tel: +48 81 537 57 38, fax: +48 81 533 33 48

Table S1. Anion exchangers properties.

Name	Amberlite IRA 67	Lewatit MonoPlus MP 62	Lewatit MonoPlus MP 64	Lewatit MonoPlus MP 500	Amberlite IRA 900	Lewatit MonoPlus M 500	Amberlite IRA 458	Amberlite IRA 958
Functional groups	tertiary amine		tertiary amine and quaternary ammonium	quaternary ammonium, type I				
Matrix	crosslinked polyacrylic	crosslinked polystyrene					crosslinked polyacrylic	
Structure	gel	macroporous				gel		macroporous
Total capacity (eq/L)	1.6	1.7	1.3	1.1	≥1.0	1.2	1.25	0.8
Bead size (mm)	0.5-0.75	0.47 (±0.06)	0.59 (±0.05)	0.63 (±0.06)	0.65-0.82	0.61(±0.05)	0.6-0.9	0.63-0.85
Operating temperature (^{o}C)	60	70	70	70	60	70	35	80
Operating pH range	0-7	0-8	0-7	0-12	0-14	0-12	0-12	0-14

Table S2. Colum experiments formulae.

Column experiments			
Formation of the exchange zone or mass transfer zone (MTZ)			
Density of anion exchangers (g/cm^3)	Amberlite IRA 67: 0.2367; Lewatit MonoPlus MP 62: 0.3191; Lewatit MonoPlus MP 64: 0.2510; Amberlite IRA 458: 0.2860; Amberlite IRA 900: 0.2882; Amberlite IRA 958: 0.2097; Lewatit MonoPlus MP 500: 0.2242; Lewatit MonoPlus M 500: 0.2570;		
Parameters	Formula	Denotation	Eq . no
Weight distribution coefficients	$D_w = \frac{(U - U_0 - V_v)}{w}$	U (mL) - effluent volume at $C/C_0 = 0.5$; U_0 (mL) - dead volume in the column; V_v (mL) - void (interparticle) resin bed volume; w (g) - dry resin mass, v (mL)- volume of swollen resin,	(1)
Bed distribution coefficients	$D_b = \frac{(U - U_0 - V_v)}{v}$		(2)
Working ion exchange capacity	$C_w = \frac{V_{bp} C_0}{v}$		(3)

Total ion exchange capacity	$C_t = \frac{V_t C_0}{v}$	V_t (L) - total effluent volume, V_{bp} (L) - effluent volume to the breakthrough point, C_0 (mg/L) - inlet dye concentration.	(4)
Column efficiency	$\eta = \frac{C_w}{C_t}$	C_w (mg/mL) - working ion exchange capacity C_t (mg/mL) - total ion exchange capacity	(5)
Time required for MTZ to move through its own length down the bed	$t_z = \frac{V_z}{U_r S}$	$V_z = V_t - V_{bp}$ (mL) - distinction between the total volume (V_t) of effluent and that collected to the break point (V_{bp}); U_r (cm/min) - linear flow rate; S (cm^2) - total column cross-section area; F_s - parameter measuring the symmetry of the breakthrough curve; S_z (mg) - amount of solute removed by the resin from the breakthrough to the exhaustion; S_{max} (mg) - amount of solute removed by the resin when it is completely exhausted	(6)
Time required for MTZ to become established and move completely out of the bed	$t_e = \frac{V_t}{U_r S}$		(7)
Time needed for MTZ formation	$t_f = (1 - F_s) t_z$		(8)
Symmetry parameter of the breakthrough curve	$F_s = \frac{S_z}{S_{\max}} = \frac{\int_{V_{bp}}^{V_t} (C_0 - C) dV}{C_0 (V_t - V_{bp})}$		(9)