

Supplementary material

Table S1. Kinetic parameters of adsorption of MB on R-40, R-70, AC-40 and AC-70. Conditions: Co, 150 mg L⁻¹; temperature, 25°C; adsorbent dosage, 20 g L⁻¹ pH, unaltered.

Models	Pseudo-first order	Pseudo-second order	Avrami
Adsorbent R-40			
Parameters	$q_e = 7.40$ $k_1 = 2.61$	$q_e = 7.41$ $k_2 = 8.96$	$q_e = 7.41$ $k_{av} = 4.32$ $n_{av} = 1.66$
R^2 (10 ⁻²)	99.99	99.99	99.99
X^2 (10 ⁻²)	0.03	0.02	0.05
ARE (%)	0.18	0.147	0.224
MQ_R/MQ_r	266396.23	431474.78	82275.00
$F(R,r)$	4.49	4.49	3.68
MQ_{faj}/MQ_{ep}	3.05	1.39	6.14
$F(faj,ep)$	3.29	3.29	3.37
Adsorbent R-70			
Parameters	$q_e = 7.48$ $k_1 = 0.88$	$q_e = 7.49$ $k_2 = 2.05$	$q_e = 7.48$ $k_{av} = 4.32$ $n_{av} = 0.48$
R^2 (10 ⁻²)	99.99	99.99	99.99
X^2 (10 ⁻²)	0.17	0.02	0.13
ARE (%)	0.12	0.13	0.24
MQ_R/MQ_r	575365.74	469051.38	35519.67
$F(R,r)$	4.49	4.49	3.68
MQ_{faj}/MQ_{ep}	0.84	1.32	17.34
$F(faj,ep)$	3.29	3.29	3.37
Adsorbent AC-40			
Parameters	$q_e = 6.69$ $k_1 = 0.25$	$q_e = 7.30$ $k_2 = 0.11$	$q_e = 7.23$ $k_{av} = 0.71$ $n_{av} = 0.42$
R^2 (10 ⁻²)	96.50	99.75	98.75
X^2 (10 ⁻²)	17.50	1.20	7.20
ARE (%)	5.49	1.21	2.71
MQ_R/MQ_r	441.17	6874.32	597.24
$F(R,r)$	4.49	4.49	3.68
MQ_{faj}/MQ_{ep}	53.40	2.53	22.32
$F(faj,ep)$	3.29	3.29	3.37
Adsorbent AC-70			
Parameters	$q_e = 7.45$ $k_1 = 1.20$	$q_e = 7.53$ $k_2 = 0.62$	$q_e = 7.49$ $k_{av} = 3.91$ $n_{av} = 0.42$
R^2 (10 ⁻²)	99.87	99.96	99.47
X^2 (10 ⁻²)	0.70	0.20	3.40
ARE (%)	0.76	0.47	1.21
MQ_R/MQ_r	13161.29	40081.09	1411.32
$F(R,r)$	4.49	4.49	3.68
MQ_{faj}/MQ_{ep}	6.48	1.26	37.96
$F(faj,ep)$	3.29	3.29	3.37

Table S2. Isothermal parameters of adsorption of MB on R-40, R-70, AC-40 and AC-70 at 25°C. Conditions: adsorbent dosage, 4 g L⁻¹, for R-40 and R-70, and 20 g L⁻¹, for AC-40 and AC-70; pH, unaltered; contact time, 60 min.

Models	Langmuir	Freundlich	Sips	Tóth
Adsorbent R-40				
Parameters	$q_{max} = 86.03$ $K_L = 2.64$	$K_F = 33.81$ $n = 3.29$	$q_{max} = 82.34$ $K_S = 0.95$ $m = 1.25$	$q_{max} = 80.79$ $b = 0.60$ $d = 1.06$
R^2 (10 ⁻²)	98.97	88.32	99.50	99.62
X^2 (10 ⁻²)	956.18	10911.20	499.97	375.04
ARE (%)	11.24	52.17	10.92	8.26
MQ_R/MQ_r	1354.70	105.94	1302.27	1738.24
$F(R,r)$	4.60	4.60	3.81	3.81
MQ_{faj}/MQ_{ep}	255.12	2879.02	151.00	114.70
$F(faj,ep)$	3.58	3.58	3.69	3.69
Adsorbent R-70				
Parameters	$q_{max} = 53.32$ $K_L = 2.14$	$K_F = 25.08$ $n = 5.13$	$q_{max} = 63.81$ $K_S = 0.70$ $m = 0.50$	$q_{max} = 70.21$ $b = 20.96$ $d = 0.34$
R^2 (10 ⁻²)	96.53	95.20	99.23	99.36
X^2 (10 ⁻²)	1422.70	1973.75	340.77	282.04
ARE (%)	17.3	23.56	6.52	6.90
MQ_R/MQ_r	390.57	277.69	838.02	1013.87
$F(R,r)$	4.60	4.60	3.81	3.81
MQ_{faj}/MQ_{ep}	324.51	442.48	87.97	73.56
$F(faj,ep)$	3.58	3.58	3.69	3.69
Adsorbent AC-40				
Parameters	$q_{max} = 8.28$ $K_L = 0.84$	$n = 2.62$ $K_F = 5.37$	$q_{max} = 8.67$ $K_S = 2.33$ $m = 0.92$	$q_{max} = 8.84$ $b = 2.85$ $d = 0.85$
R^2 (10 ⁻²)	98.58	93.82	98.67	98.66
X^2 (10 ⁻²)	6.64	29.04	6.76	6.76
ARE (%)	7.82	16.09	8.02	7.99
MQ_R/MQ_r	977.10	212.70	480.50	480.60
$F(R,r)$	4.60	4.60	3.81	3.81
MQ_{faj}/MQ_{ep}	3427.71	15134.05	3882.04	3880.74
$F(faj,ep)$	3.58	3.58	3.69	3.69
Adsorbent AC-70				
Parameters	$q_{max} = 43.83$ $K_L = 3.05$	$n = 4.20$ $K_F = 22.14$	$q_{max} = 52.66$ $K_S = 1.56$ $m = 0.66$	$q_{max} = 53.3$ $b = 7.55$ $d = 0.49$
R^2 (10 ⁻²)	95.10	89.50	97.00	97.40
X^2 (10 ⁻²)	1013.09	2165.41	645.60	573.21
ARE (%)	24.50	53.57	29.64	27.71
MQ_R/MQ_r	351.81	155.01	281.65	318.30
$F(R,r)$	4.60	4.60	3.81	3.81
MQ_{faj}/MQ_{ep}	661.98	1400.07	451.50	399.11
$F(faj,ep)$	3.58	3.58	3.69	3.69