

Model-Assisted Optimization of Cobalt Biosorption on Macroalgae *Padina pavonica* for Wastewater Treatment

Abeer S. Aloufi ¹, Bahja Al Riyami ², Mustafa A. Fawzy ^{3,4}, Hatim M. Al-Yasi ⁴, Mostafa Koutb ⁵ and Sedky H. A. Hassan ^{2,*}

¹ Department of Biology, College of Science, Princess Nourah bint Abdulrahman University, P.O. Box 84428, Riyadh 11671, Saudi Arabia; asaloufi@pnu.edu.sa

² Department of Biology, College of Science, Sultan Qaboos University, Muscat 123, Oman; bahja@squ.edu.om

³ Botany and Microbiology Department, Faculty of Science, Assiut University, Assiut 71516, Egypt; mafawzy@tu.edu.sa or mustafa.fawzy@aun.edu.eg

⁴ Biology Department, Faculty of Science, Taif University, P.O. Box 11099, Taif 21944, Saudi Arabia; h.alyasi@tu.edu.sa

⁵ Department of Biology, Faculty of Science, Umm Al-Qura University, Makkah 24381, Saudi Arabia; mmkoutb@uqu.edu.sa

* Correspondence: s.hassan@squ.edu.om; Tel.: +968-93879120

Table S1. The actual response with RSM predicted data (the efficiency of Co(II) removal).

Variables	Code	Levels			
		Low (-1)	Centre (0)	High (+1)	
Algal dose (g/L)	A	2	4	6	
pH	B	4	6	8	
Co(II) ion conc. (mg/L)	C	20	40	60	
Std. order	Factors		Response %		
	A	B	C	Actual	Predicted
1	2	4	40	70.80	70.75
2	6	4	40	84.38	84.57
3	2	8	40	76.25	75.48
4	6	8	40	84.78	84.25
5	2	6	20	76.70	77.72
6	6	6	20	87.95	89.02
7	2	6	60	68.70	68.51
8	6	6	60	80.55	79.81
9	4	4	20	84.70	83.45
10	4	8	20	85.60	85.66
11	4	4	60	73.38	74.24
12	4	8	60	75.47	76.44
13-17 ^a	4	6	40	80.18	79.95

^a mean value of five center point assays.

Table S2. Comparison of Langmuir biosorption capacity of the studied biosorbent in removing Co(II) ions with different adsorbent capacities.

Adsorbents	q _{max} (mg/g)	References
mesoporous-activated carbon	5.8	[1]
<i>Ulva fasciata</i>	40.0	[20]
Clearing nut seed powder	4.245	[31]
<i>Sargassum wightii</i>	20.63	[59]
Date pits	6.28	[60]
<i>Ficus benghalensis</i> leaf powder	5.65	[61]
<i>Padina sanctae</i>	13.73	[62]
<i>Sargassum</i> sp.	3.12	[63]
<i>Aspergillus niger</i>	33	[64]
<i>Rhizopus chinensis</i>	11.5	[65]
<i>Ulva lactuca</i>	11.69	[66]
<i>Padina pavonica</i>	17.98	The current study



Plate 1. *Padina pavonica*