CELLULOSE/BIOCHAR CRYOGELS: STUDY OF ADSORPTION KINETICS AND ISOTHERMS

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SUPPLEMENTARY INFORMATION

STATISTICAL ANALYSIS

S.1 Cellulose/biochar cryogels adsorption capacity

The values obtained in the petroleum adsorption capacity test of the cellulose/biochar aerogels for are presented in Table S.1.

Table S.1 – Adsorption capacity of the cellulose/biochar aerogels.

		Concentração de biochar (%)			
		0	**5**	**10**	**20**
Concentração de celulose (%)	**1.43**	24.16	22.71	20.89	26.07
		22.43	22.81	25.71	23.22
		20.36	28.34	24.46	23.99
	0.715	40.83	70.97	70.32	55.34
		39.77	72.55	67.86	50.90
		43.31	75.47	68.63	61.46

With the data collected during the test and presented in Table S.1, the ANOVA table was generated in the Statistics software, presented in Table S.2.

Table S.2 - Table ANOVA.

Effect	*SQ*	*gl*	*MQ*	*F*	*P value*
% cellulose	7785.25	1	7785.25	5525.40	0.0000
%biochar	1031.86	3	343.95	1027.031	0.0000
interaction	823.02	3	274.34	45.375	0.0000
Error	121.29	16	7.58	36.191	0.0000

Since the "P-value" is less than 0.05, there is a significant difference between the groups. For this, the Tukey HSD test was performed for determined between the groups there is a significant difference. The result found is shown in the Table S.3.

Table S.3 Tukey HSD test.

Cryogel	AC-.2	AC-2.B5	AC-2.B10	AC-2.B20	AC-1	AC-1.B5	AC-1.B10	AC-1.B20
AC-2		0.000175	0.000175	0.000311	0.000177	0.000193	0.000182	0.000190
AC-2.B5	0.000175		0.624930	0.000187	0.000175	0.000175	0.000175	0.000175
AC-2.B10	0.000175	0.624930		0.000689	0.000175	0.000175	0.000175	0.000175
AC-2.B20	0.000311	0.000187	0.000689		0.000175	0.000175	0.000175	0.000175
AC-1	0.000177	0.000175	0.000175	0.000175		0.963344	0.998225	0.977092
AC-1.B5	0.000193	0.000175	0.000175	0.000175	0.963344		0.999853	1.000000
AC-1.B10	0.000182	0.000175	0.000175	0.000175	0.998225	0.999853		0.999970
AC-1.B20	0.000190	0.000175	0.000175	0.000175	0.977092	1.000000	0.999970	

The results presented in Table S.3, show significant difference between the groups that presents values < 0.05. Thereby, there is a significant difference between the concentrations of cellulose, therefore, in their choice, the 0.715% of cellulose presents the greatest capacity. Analyzing the results the biochar concentration with the highest capacity is 5%, due to the non-significant difference between 5 and 10%, preferred to 5%.

S.2 Petroleum adsorption capacity AC-2.B5 cryogel

The values obtained in the adsorption capacity test of the cellulose/biochar aerogels for are presented in Table S.4.

Table S.4 – Petroleum adsorption capacity of the cellulose/biochar aerogels.

		Petroleum concentration (g L^{-1})			
		8.75	**17.5**	**35.0**	**70.0**
Tempo (min)	**0**	0.085	0.000	0.000	0.000
		0.130	0.000	0.000	0.000
	0.25	7.022	10.161	17.594	12.622
		6.504	19.154	17.536	24.582
	0.5	8.067	14.343	30.185	22.100
		7.177	20.861	24.867	39.625
	1	8.494	17.228	33.332	29.469
		6.826	22.408	27.399	50.840
	3	8.327	18.461	34.517	43.589
		6.073	21.841	30.129	54.802
	5	8.156	18.444	33.664	48.569
		6.248	22.039	30.862	56.281
	10	8.624	19.104	33.454	46.415
		6.577	23.230	31.523	57.670
	15	9.566	20.242	34.539	45.930
		8.328	25.081	33.194	56.406

20	8.895	19.225	33.443	42.735
	8.042	24.865	33.211	54.251

With the data collected during the test and presented in Table S.4, the ANOVA table was generated in the Statistics software, presented in Table S.5.

Table S.5 - Table ANOVA.

Effect	*SQ*	*gl*	*MQ*	*F*	*P value*
Time (min)	5913.60	8	739.20	29.193	0.00000
Petroleum concentration (g L^{-1})	9534.90	3	3178.30	125.520	0.00000
Interaction	2368.63	24	98.69	3.898	0.00012
Error	911.56	36	25.32		

Since the "P-value" is less than 0.05, there is a significant difference between the groups. For this, the Tukey HSD test was performed for determined between the groups there is a significant difference. The result found is shown in the Table S.6.

Table S.6 Tukey HSD test.

		t = 3 min			
Petroleum conc (g L^{-1})		8.75	17.5	35.0	70.0
Time (min)	5	1,000	1,000	1,000	1,000
	10	1,000	1,000	1,000	1,000
	15	1,000	1,000	1,000	1,000
	20	1,000	1,000	1,000	1,000

The results presented in Table S.3, show not significant difference between the groups that presents values in black writing.