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## PHỤ LỤC

**Bảng khảo sát từng loại vật liệu tại nồng độ 30 ppm**

Vật liệu	% HP	DLHP	SD % HP	SD DLHP
virgin CS	19,15	2,52	1,068300848	0,227425
CS-GA	7,06	0,96	0,747838254	0,147042
ZrO <sub>2</sub> -CS	39,35	5,71	4,847617837	0,407589
ZCB 2:1	56,7	8,34	3,890937947	0,366685
ZCB 1:1	36,42	5,49	0,56781077	0,098022
ZCB 1:2	45,84	6,85	1,219463653	0,2459
ZCB 1:3	47,09	6,66	0,459437247	0,303893
ZCB 1:5	51,81	7,64	0,568406344	0,010131

**Bảng kết quả khảo sát pH2 - pH10 tại nồng độ 10ppm**

pH	% HP	SD % HP	DLHP	SD DLHP
pH2	58.739	4.398	2,842	0,146
pH3	38.575	3.134	1,897	0,168
pH4	29.584	1.008	1,406	0,113
pH5	36.142	10.108	1,674	0,542
pH6	40.103	4.703	1,985	0,217
pH7	29.917	1.388	1,510	0,119
pH8	26.560	2.250	1,350	0,106
pH9	16.195	4.031	0,810	0,216
pH10	13.311	2.384	0,655	0,117

**Bảng kết quả khảo sát nhiệt độ**

Nhiệt độ	% HP	SD % HP	DLHP	SD DLHP
29	29.529	1.689	29.145	0.759
40	36.474	2.610	36.943	2.688
60	40.338	2.108	41.791	2.011
80	47.979	3.092	47.798	3.503

**Bảng kết quả khảo sát nồng độ P ban đầu**

Nồng độ (mg/L)	% HP	SD % HP	DLHP	SD DLHP
10	83.654	0.113	4.220	0.001
20	77.056	14.064	7.737	1.482
40	61.843	4.174	12.275	0.884
60	57.967	2.949	17.242	0.943
140	47.791	3.470	32.462	2.785
200	36.260	2.437	33.531	1.316
260	27.601	2.131	35.422	2.211
300	23.222	5.423	33.561	6.802

**Bảng khảo sát thời gian**

Thời gian (phút)	% HP	SD % HP	DLHP	SD DLHP
5	33.558	1.698	4.978	0.303
10	35.145	0.764	5.155	0.764
30	39.743	2.951	5.773	0.477
60	48.471	1.711	4.197	0.272

90	59.821	7.334	9.132	1.097
120	57.549	1.572	8.760	0.308
150	61.517	0.999	9.286	0.157
180	65.750	2.214	9.804	0.334
240	75.165	6.866	11.448	1.051
300	75.912	6.329	14.408	4.490
360	78.758	6.685	12.046	1.017

### Bảng khảo sát cạnh tranh ion

Ion  $Cl^-$

Tỉ lệ	% HP	SD % HP	DLHP	SD DLHP
1:10	39.801	2.075	5.956	0.393
1:20	26.583	0.299	5.526	0.108
1:40	30.920	1.879	1.709	0.304

Ion  $HCO_3^-$

Tỉ lệ	% HP	SD % HP	DLHP	SD DLHP
1:10	43.804	1.278	6.590	0.223
1:20	37.430	1.912	5.635	0.291
1:40	31.401	2.402	4.744	0.279

Ion  $SO_4^{2-}$

Tỉ lệ	% HP	SD % HP	DLHP	SD DLHP
1:10	39.536	2.571	6.007	0.378
1:20	41.008	0.316	6.202	0.044
1:40	41.495	3.865	6.174	0.632

**Bảng khảo sát độ thu hồi**

**Hấp phụ**

Cycle	% HP	SD % HP	DLHP	SD DLHP
1	38.784	12.354	10.191	1.807
2	59.915	4.786	8.861	0.527
3	74.943	1.825	11.323	0.503

**Giải hấp**

Cycle	% GH	SD % GH
1	63.117	19.138
2	37.803	8.229
3	27.202	2.471

**Bảng thông số mô hình cân bằng hấp phụ**

Langmuir			Freundlich		
b	q <sub>max</sub> (mg/g)	R <sup>2</sup>	k <sub>F</sub>	n	R <sup>2</sup>
0.3151	29.5858	0.9534	4.093	2.282	0.9543

**Bảng thông số mô hình tuyến tính và phi tuyến tính của động học hấp phụ**

Mô hình	Giả bậc 1	Giả bậc 2
Tuyến tính	R <sup>2</sup> = 0.9347, k <sub>1</sub> = 0.0071 (1/min)	R <sup>2</sup> = 0.6989, k <sub>2</sub> = 0.01286 (g/(mg·min))
Phi tuyến tính	R <sup>2</sup> = 0.9421, k <sub>1</sub> = 0.09673 (1/min)	R <sup>2</sup> = 0.9612, k <sub>2</sub> = 0.009817 (g/(mg·min))