

# TÀI LIỆU THAM KHẢO

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## PHỤ LỤC

### Phụ lục 1. Dung lượng hấp phụ trung bình của các mẫu ở các pH khác nhau

pH	Dung lượng hấp phụ (mg/g)
2	$7,0206 \pm 0,14601^b$
3	$5,9421 \pm 1,702584^b$
4	$4,5501 \pm 1,877275^b$
5	$0,5015 \pm 0,557968^a$
6	$0,9185 \pm 0,617936^a$
7	$0,5863 \pm 0,557968^a$
8	$0,7504 \pm 0,028681^a$
9	$0,8555 \pm 0,177298^a$

### Phụ lục 2. Dung lượng hấp phụ trung bình của các mẫu ở các hàm lượng than khác nhau

Hàm lượng than (g/L)	Dung lượng hấp phụ (mg/g)
2	$11,9082 \pm 1,759945^d$
4	$8,6338 \pm 0,351989^c$
6	$6,5653 \pm 0,675297^{bc}$
8	$4,5174 \pm 1,343425^{ab}$
10	$3,9259 \pm 0,705542^{ab}$
12	$3,3232 \pm 0,01434^{ab}$
14	$2,3238 \pm 0,604527^a$
16	$2,4696 \pm 0,815441^a$

### Phụ lục 3. Dung lượng hấp phụ trung bình của các mẫu ở các thời gian khác nhau

Thời gian (phút)	Dung lượng hấp phụ (mg/g)
10	$1,0417 \pm 0,732659^a$
20	$4,4469 \pm 1,319307^{ab}$
30	$5,2360 \pm 1,439244^{ab}$
45	$6,8953 \pm 0,557968^b$
60	$6,1910 \pm 1,027286^b$

120	$5,6932 \pm 1,496605^b$
180	$6,3975 \pm 1,965924^b$
240	$6,0454 \pm 1,055967^b$

**Phụ lục 4. Dung lượng hấp phụ trung bình của các mẫu ở các nồng độ đầu khác nhau**

Nồng độ đầu (mg/L)	Dung lượng hấp phụ (mg/g)
30	$3,5011 \pm 0,941245^a$
60	$7,4631 \pm 0,823915^{ab}$
90	$9,4303 \pm 0,586648^{bc}$
120	$12,7913 \pm 1,673903^d$
150	$11,9782 \pm 2,20319^{bc}$

**Phụ lục 5. Kiểm tra sự tương thích của các mô hình hấp phụ đẳng nhiệt bằng SPSS**

a) Phương trình Langmuir

**Parameter Estimates**

Parameter	Estimate	Std.Error	95% Confidence Interval	
			Lower Bound	Upper Bound
qm	16.614	3.172	6.520	26.707
KL	.045	.023	-.027	.118

**ANOVA<sup>a</sup>**

Source	Sum of Squares	df	Mean Squares
Regression	457.314	2	228.657
Residual	6.668	3	2.223
Uncorrected Total	463.982	5	
Corrected Total	56.023	4	

Dependent variable: q

a. R squared =  $1 - (\text{Residual Sum of Squares}) / (\text{Corrected Sum of Squares}) = .881$ .

b) Phương trình Freundlich

**Parameter Estimates**

Parameter	Estimate	Std.Error	95% Confidence Interval	
			Lower Bound	Upper Bound
KF	2.162	1.171	-1.566	5.890
nF	2.389	.814	-.201	4.979

**ANOVA<sup>a</sup>**

Source	Sum of Squares	df	Mean Squares
Regression	452.348	2	226.174
Residual	11.635	3	3.878
Uncorrected Total	463.982	5	
Corrected Total	56.023	4	

Dependent variable: q

a. R squared =  $1 - (\text{Residual Sum of Squares}) / (\text{Corrected Sum of Squares}) = .792$ .

c) Phương trình Hill

**Parameter Estimates**

Parameter	Estimate	Std.Error	95% Confidence Interval	
			Lower Bound	Upper Bound
KH	203.827	545.354	- 2142.642	2550.297
nH	2.035	1.128	-2.820	6.890
qm	12.555	1.911	4.332	20.778

**ANOVA<sup>a</sup>**

Source	Sum of Squares	df	Mean Squares
Regression	459.949	3	153.316
Residual	4.034	2	2.017
Uncorrected Total	463.982	5	
Corrected Total	56.023	4	

Dependent variable: q

a. R squared =  $1 - (\text{Residual Sum of Squares}) / (\text{Corrected Sum of Squares}) = .928$ .

d) Phương trình Koble-Corrigan

**Parameter Estimates**

Parameter	Estimate	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
bKC	.005	.043	-.544	.554
nKC	2.035	4.436	-54.328	58.398
qm	1.062	- 4638664910 454711.000	- 5893982605 4746952.000	5893982605 4746952.000
aKC	.058	2535631607 12795.400	- 3221825433 568342.500	3221825433 568342.500

**ANOVA<sup>a</sup>**

Source	Sum of Squares	df	Mean Squares
Regression	459.949	4	114.987
Residual	4.034	1	4.034
Uncorrected Total	463.982	5	
Corrected Total	56.023	4	

Dependent variable: q

a. R squared = 1 - (Residual Sum of Squares) / (Corrected Sum of Squares) = .928.

**Phụ lục 7. Kiểm tra sự tương thích của các mô hình động học hấp phụ bằng SPSS**

a) Biểu kiến bậc 1

**Parameter Estimates**

Parameter	Estimate	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
qe	6.212	.406	5.167	7.257
k1	.049	.012	.018	.079

**ANOVA<sup>a</sup>**

Source	Sum of Squares	df	Mean Squares
Regression	193.695	2	96.848
Residual	2.796	5	.559

Uncorrected Total	196.491	7	
Corrected Total	20.974	6	

Dependent variable: q

a. R squared = 1 - (Residual Sum of Squares) / (Corrected Sum of Squares) = .867.

b) Biểu kiến bậc 2

**Parameter Estimates**

Parameter	Estimate	Std.Error	95% Confidence Interval	
			Lower Bound	Upper Bound
qe	6.955	.751	5.025	8.885
k2	.009	.005	-.004	.021

**ANOVA<sup>a</sup>**

Source	Sum of Squares	df	Mean Squares
Regression	192.087	2	96.044
Residual	4.404	5	.881
Uncorrected Total	196.491	7	
Corrected Total	20.974	6	

Dependent variable: q

a. R squared = 1 - (Residual Sum of Squares) / (Corrected Sum of Squares) = .790.

c) Khuếch tán trong

**Parameter Estimates**

Parameter	Estimate	Std.Error	95% Confidence Interval	
			Lower Bound	Upper Bound
qe	6.400	1.353	2.642	10.158
k3	.282	.000	.282	.282
a d)	2.559	.139	2.172	2.946

**ANOVA<sup>a</sup>**

Source	Sum of Squares	df	Mean Squares
Regression	186.133	3	62.044
Residual	10.358	4	2.590

Uncorrected Total	196.491	7	
Corrected Total	20.974	6	

Dependent variable: q

a.  $R^2 = 1 - (\text{Residual Sum of Squares}) / (\text{Corrected Sum of Squares}) = .506.$