Adsorció de metalls pesants a partir de diferents GTR residual

Document:

ANNEXOS

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Titulació:

Grau en enginyeria química

Convocatòria:

Primavera

Treball final d'estudis

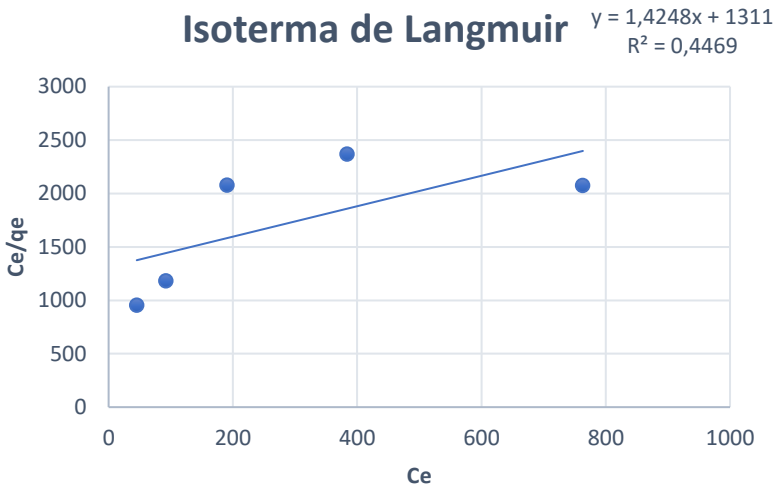
GTR truck 500-800 micres

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	45	955
100	92	1180
200	191	2079
400	384	2369
800	763	2074

K_L (g ads/L)	0,0008
b (L/mg)	0,001
Qm (mg/g ads)	**0,702**

Taula 1. Resultats GTR WJ D

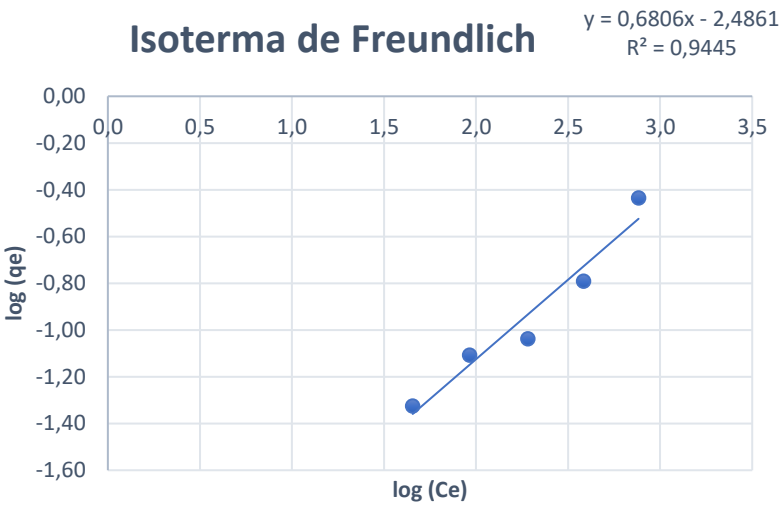


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,66	-1,32
100	1,96	-1,11
200	2,28	-1,04
400	2,58	-0,79
800	2,88	-0,43

KF (unitats)	0,0033
n	1,469

Taula 2. Resultats GTR WJ D

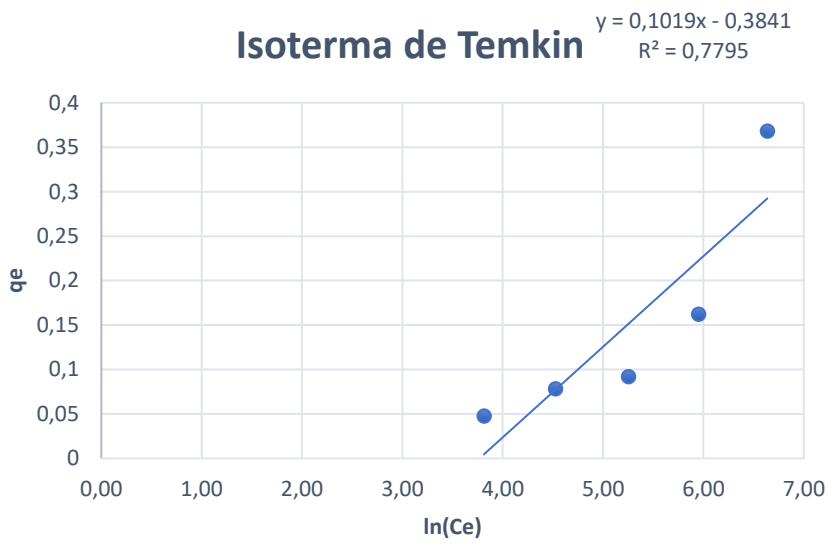


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,81	0,047
100	4,52	0,078
200	5,25	0,092
400	5,95	0,162
800	6,64	0,368

b_T	23905
A_T (L/g)	0,0231

Taula 3. Resultats GTR WJ D

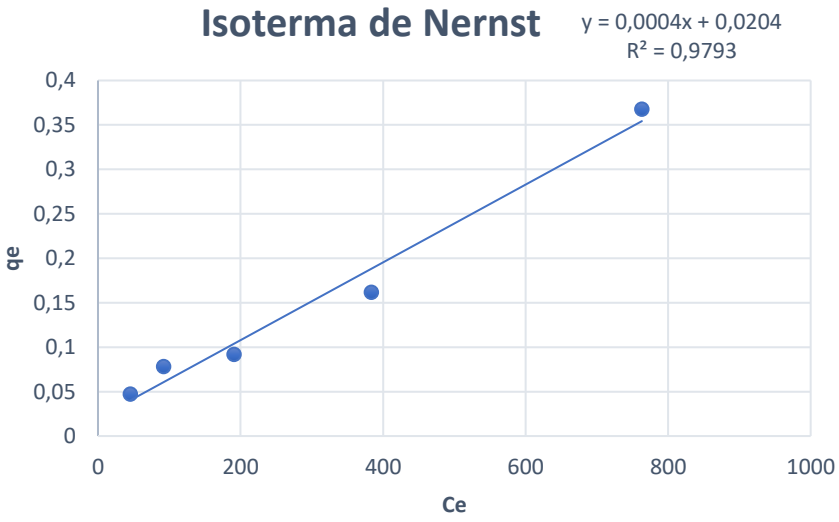


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	45,26	0,047
100	92,19	0,078
200	190,82	0,092
400	383,8	0,162
800	763,2	0,368

K_N	0,0004

Taula 4. Resultats GTR WJ D



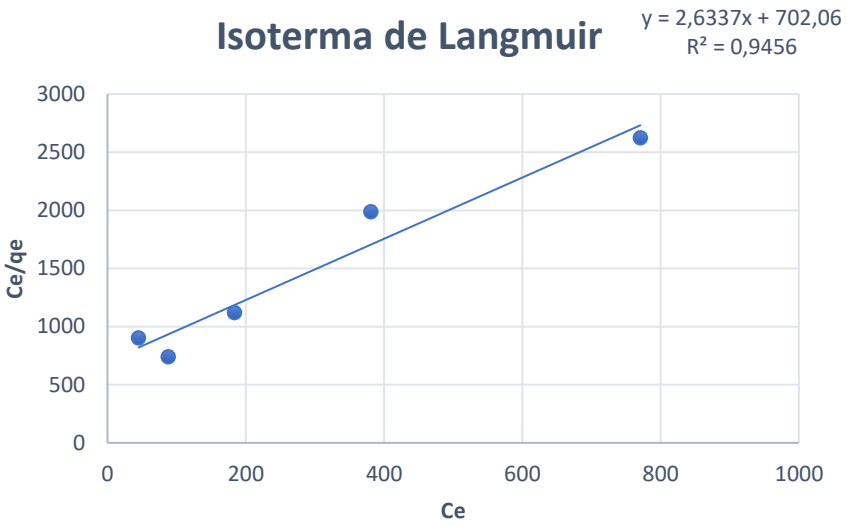
GTR truck 500-800 micres D

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	45	904
100	88	740
200	184	1121
400	381	1988
800	771	2625

K_L (g ads/L)	0,0014
b (L/mg)	0,004
Qm (mg/g ads)	**0,380**

Taula 5. Resultats GTR WJ D

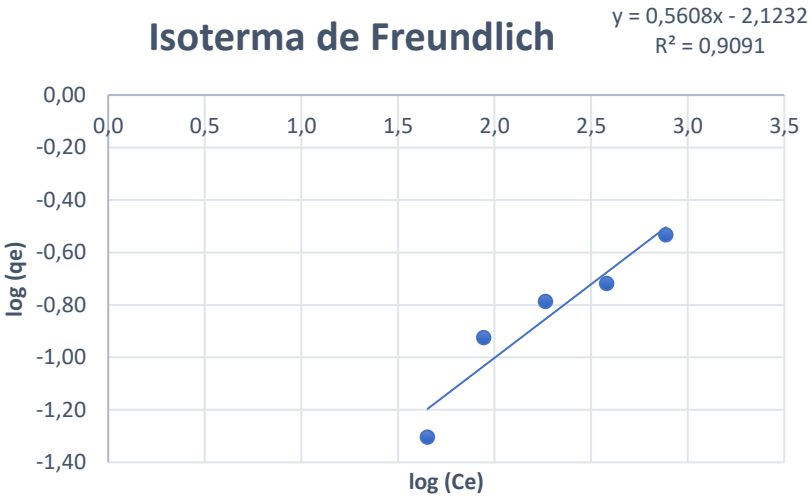


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,65	-1,30
100	1,94	-0,92
200	2,26	-0,79
400	2,58	-0,72
800	2,89	-0,53

KF (unitats)	0,0075
n	1,783

Taula 6. Resultats GTR WJ D

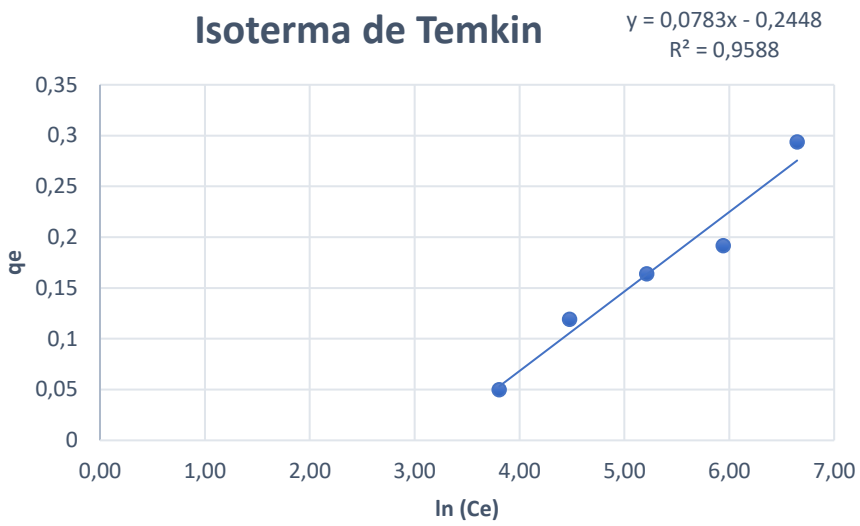


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,81	0,0498
100	4,48	0,1191
200	5,21	0,1638
400	5,94	0,1916
800	6,65	0,2936

b_T	31111
A_T (L/g)	0,0439

Taula 7. Resultats GTR WJ D

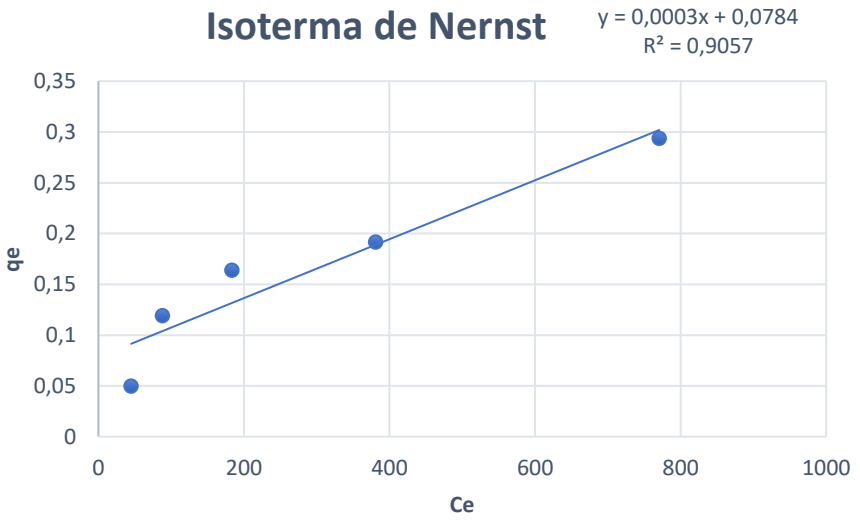


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	45,02	0,0498
100	88,09	0,1191
200	183,62	0,1638
400	380,84	0,1916
800	770,64	0,2936

K_N	0,0003

Taula 8. Resultats GTR WJ D



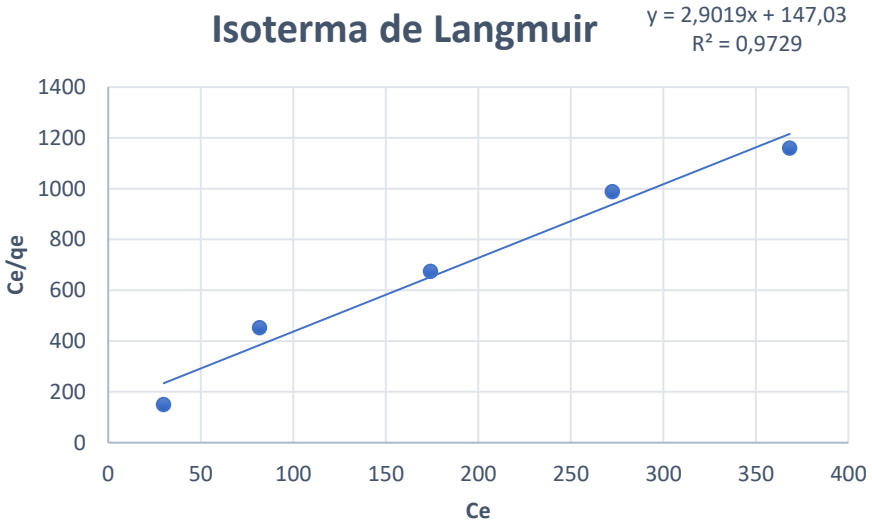
GTR truck 250-500 micres

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	30	150
100	82	452
200	174	674
300	272	988
400	368	1160

K_L (g ads/L)	0,0068
b (L/mg)	0,002
Qm (mg/g ads)	**0,345**

Taula 9. Resultats GTR WJ D

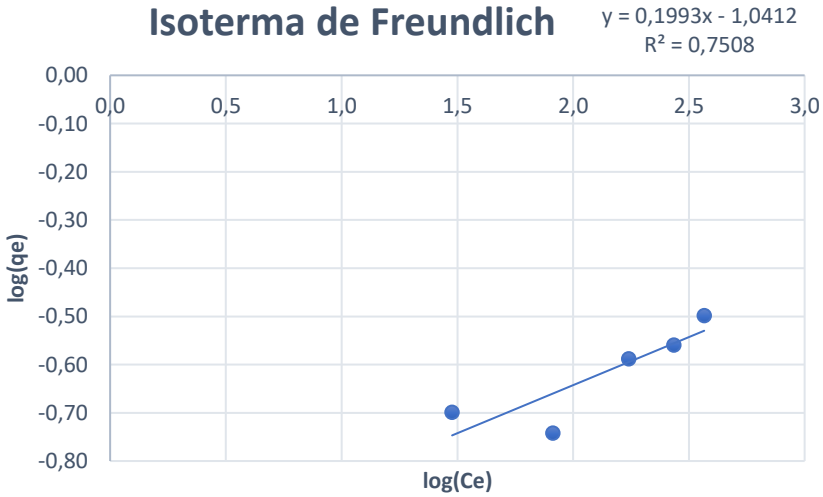


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,48	-0,70
100	1,91	-0,74
200	2,24	-0,59
300	2,44	-0,56
400	2,57	-0,50

KF (unitats)	0,0909
n	5,018

Taula 10. Resultats GTR WJ D

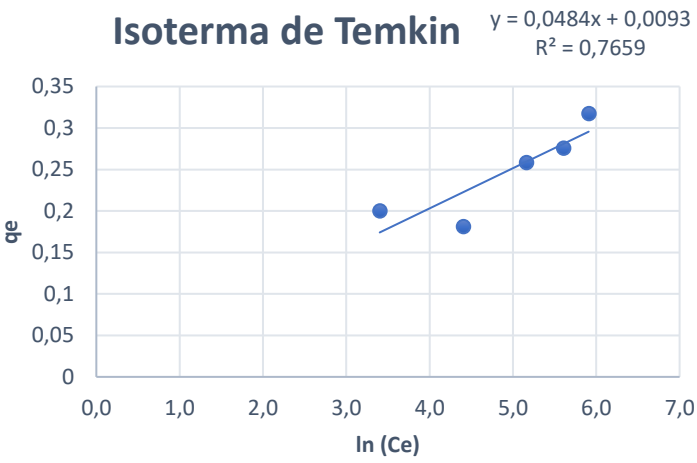


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,401	0,2
100	4,405	0,181
200	5,160	0,2584
300	5,607	0,2757
400	5,909	0,3175

b_T	50330
A_T (L/g)	1,2119

Taula 11. Resultats GTR WJ D

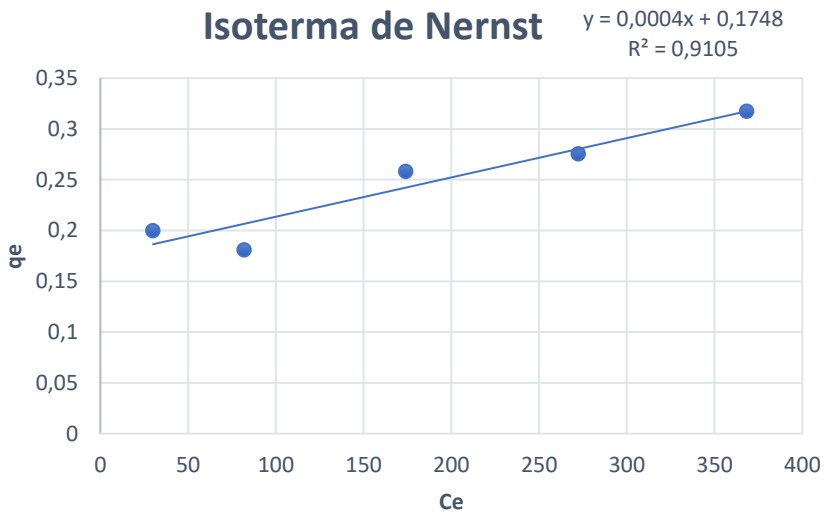


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	30	0,2
100	81,9	0,181
200	174,16	0,2584
300	272,43	0,2757
400	368,25	0,3175

K_N	0,0004

Taula 12. Resultats GTR WJ D



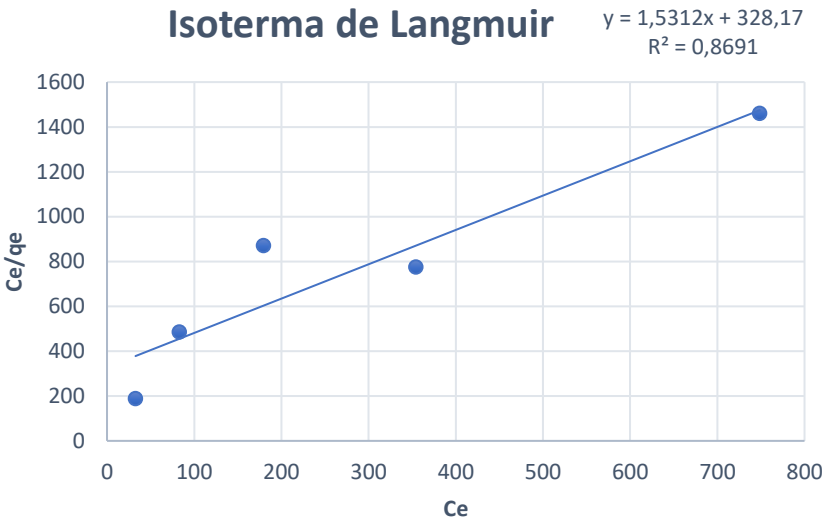
GTR truck 100-250 micres

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	33	189
100	83	485
200	179	872
400	354	776
800	749	1460

K_L (g ads/L)	0,0030
b (L/mg)	0,005
Qm (mg/g ads)	**0,653**

Taula 13. Resultats GTR WJ D

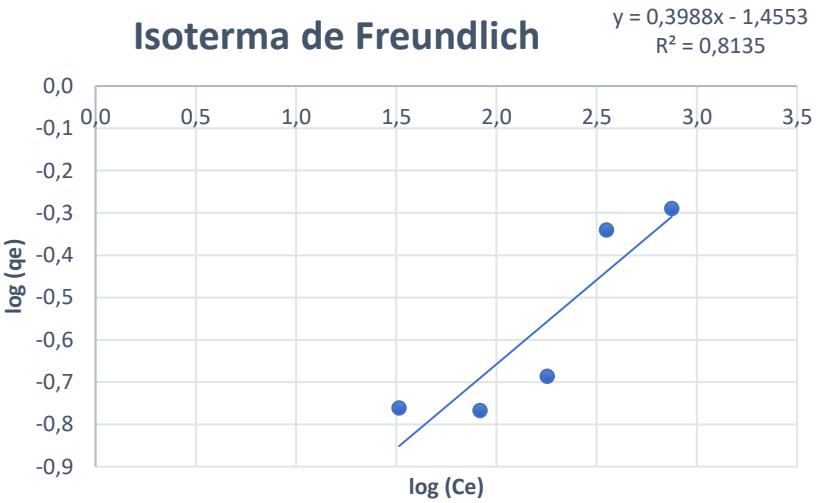


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,51	-0,76
100	1,92	-0,77
200	2,25	-0,69
400	2,55	-0,34
800	2,87	-0,29

KF (unitats)	0,0351
n	2,508

Taula 14. Resultats GTR WJ D

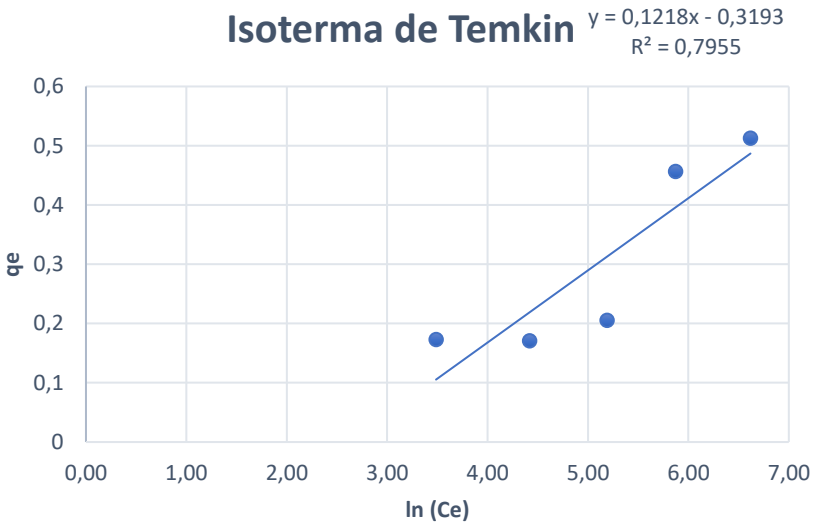


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,49	0,1733
100	4,42	0,1708
200	5,19	0,2058
400	5,87	0,4568
800	6,62	0,5128

b_T	20000
A_T (L/g)	0,0727

Taula 15. Resultats GTR WJ D

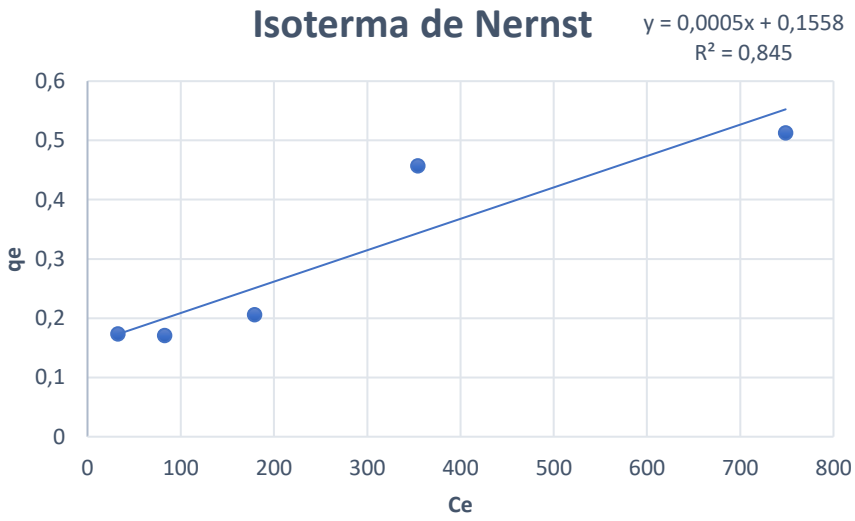


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	32,67	0,1733
100	82,92	0,1708
200	179,42	0,2058
400	354,32	0,4568
800	748,72	0,5128

K_N	0,0005

Taula 16. Resultats GTR WJ D



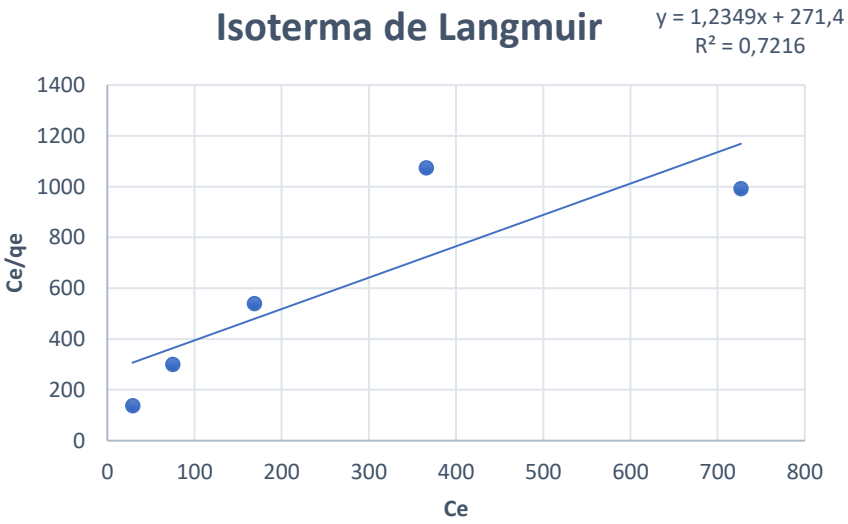
GTR truck 100-250 micres D

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	29	137
100	75	300
200	169	540
400	366	1074
800	727	992

K_L (g ads/L)	0,0037
b (L/mg)	0,005
Qm (mg/g ads)	**0,810**

Taula 17. Resultats GTR WJ D

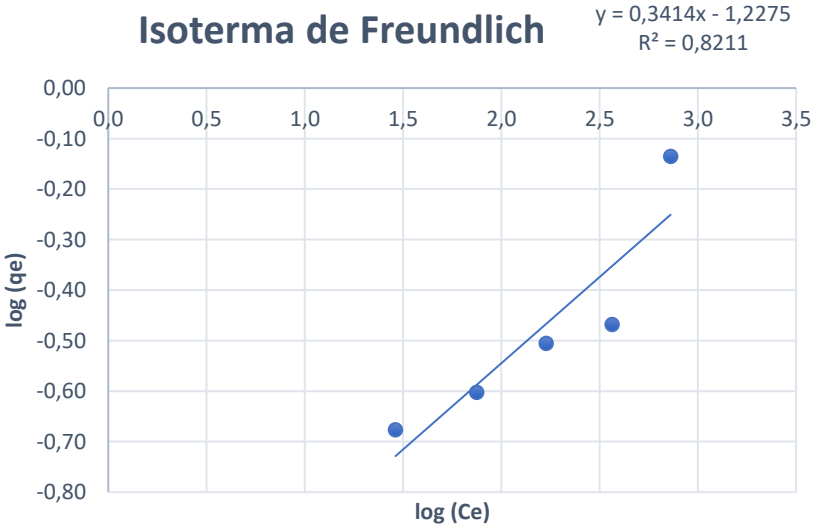


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,46	-0,68
100	1,88	-0,60
200	2,23	-0,51
400	2,56	-0,47
800	2,86	-0,14

KF (unitats)	0,0592
n	2,929

Taula 18. Resultats GTR WJ D

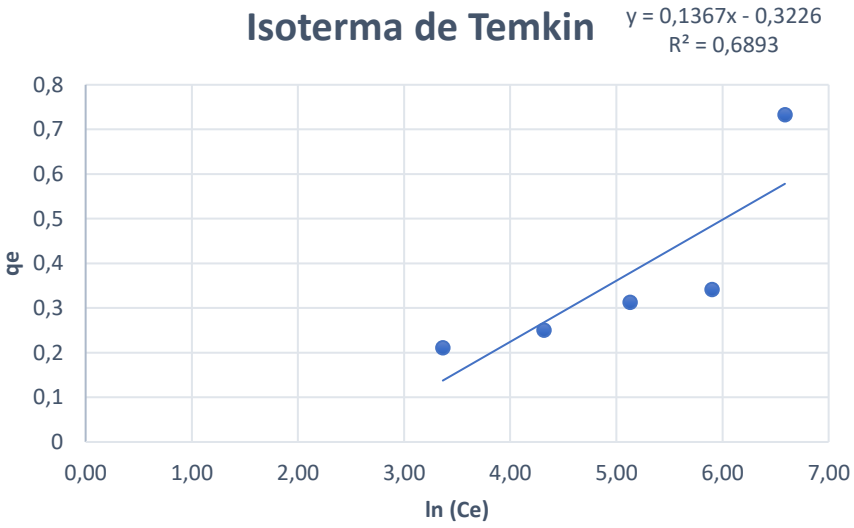


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,37	0,2106
100	4,32	0,25
200	5,13	0,3124
400	5,90	0,3408
800	6,59	0,7328

b_T	17820
A_T (L/g)	0,0944

Taula 19. Resultats GTR WJ D

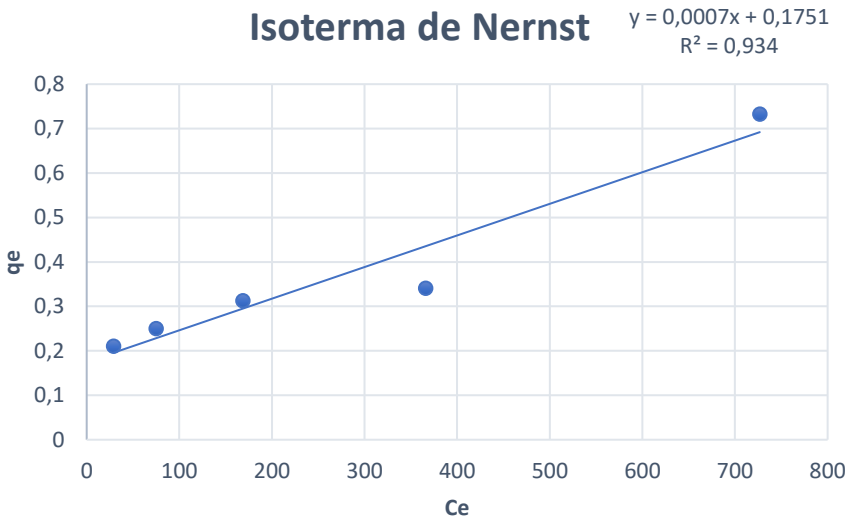


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	28,94	0,2106
100	75	0,25
200	168,76	0,3124
400	365,92	0,3408
800	726,72	0,7328

K_N	0,0007

Taula 20. Resultats GTR WJ D



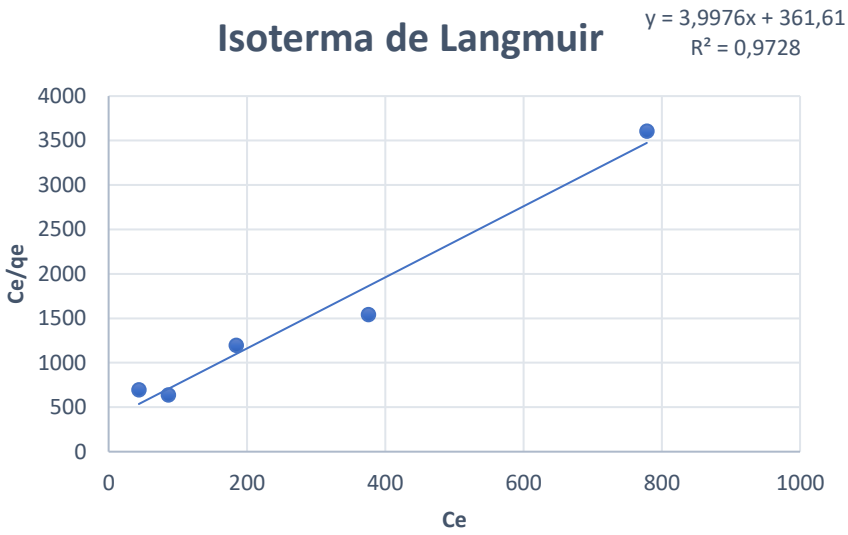
GTR car 500-800 micres

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	44	697
100	86	640
200	185	1197
400	376	1542
800	778	3604

K_L (g ads/L)	0,0028
b (L/mg)	0,011
Qm (mg/g ads)	**0,250**

Taula 21. Resultats GTR WJ D

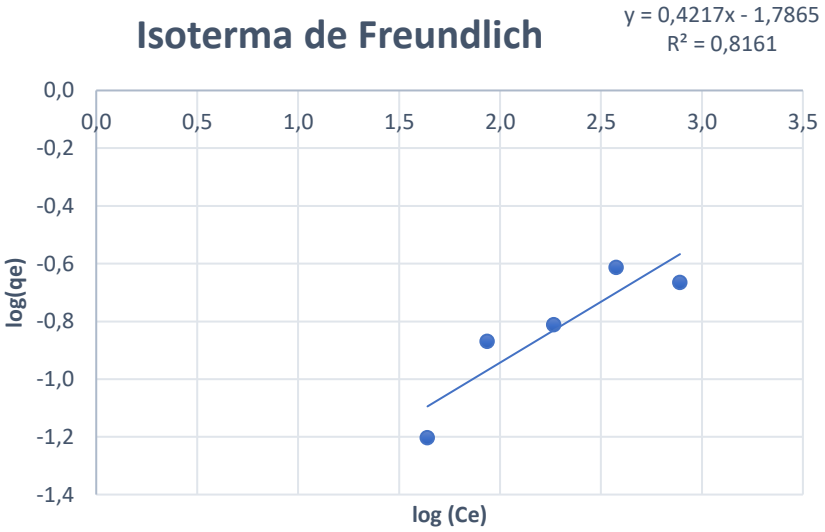


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,64	-1,20
100	1,94	-0,87
200	2,27	-0,81
400	2,57	-0,61
800	2,89	-0,67

KF (unitats)	0,0163
n	2,371

Taula 22. Resultats GTR WJ D

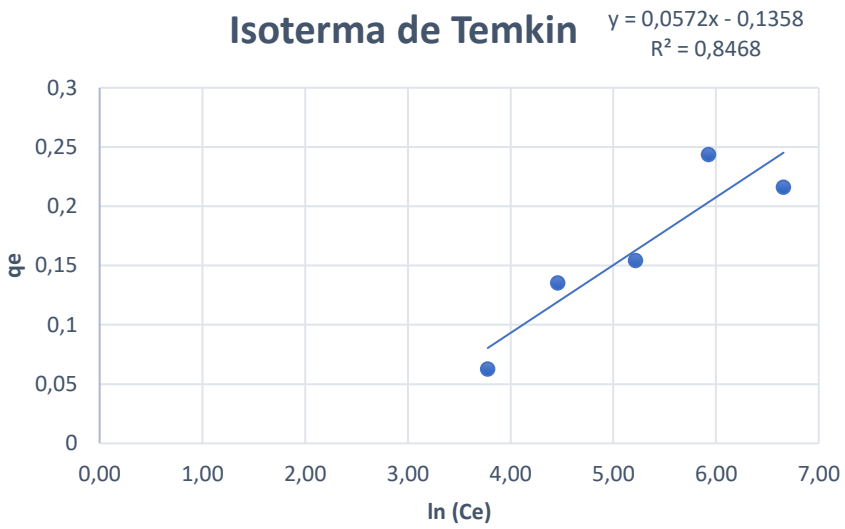


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,78	0,0627
100	4,46	0,1352
200	5,22	0,1542
400	5,93	0,2436
800	6,66	0,216

b_T	42587
A_T (L/g)	0,0931

Taula 23. Resultats GTR WJ D

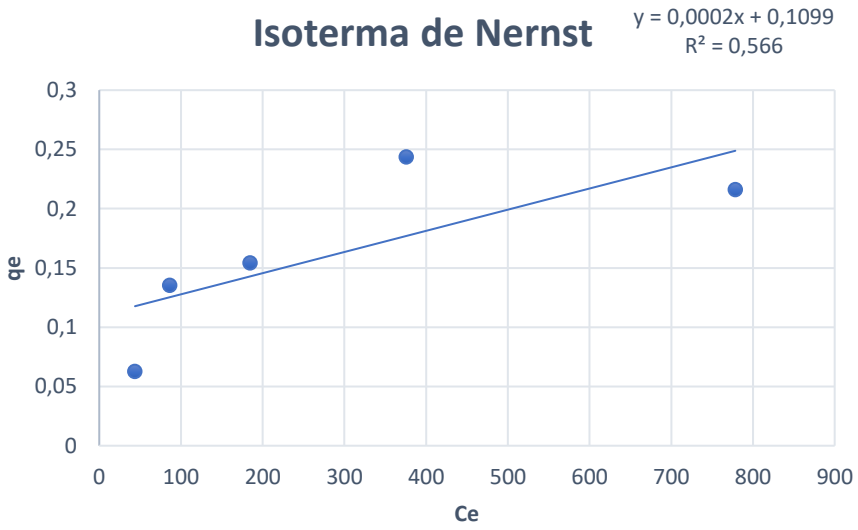


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	43,73	0,0627
100	86,48	0,1352
200	184,58	0,1542
400	375,64	0,2436
800	778,4	0,216

K_N	0,0002

Taula 24. Resultats GTR WJ D



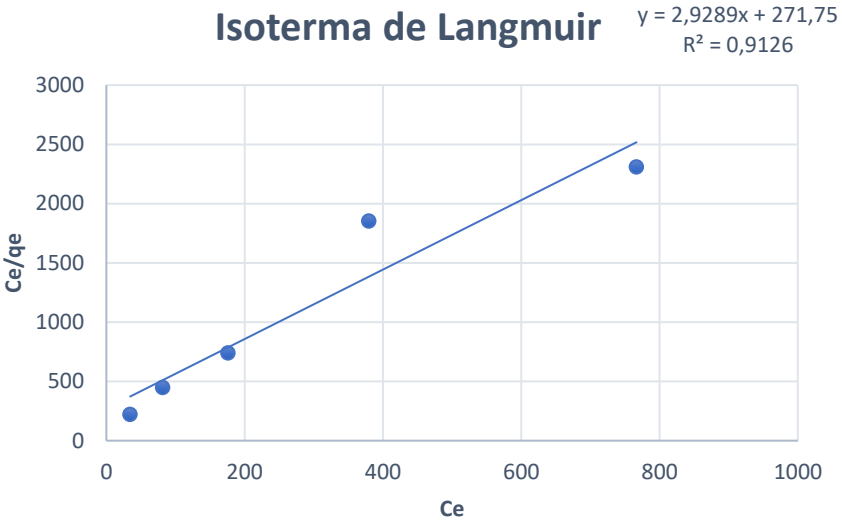
GTR car 500-800 micres D

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	34	221
100	82	449
200	176	740
400	380	1853
800	767	2310

K_L (g ads/L)	0,0037
b (L/mg)	0,011
Qm (mg/g ads)	**0,341**

Taula 25. Resultats GTR WJ D

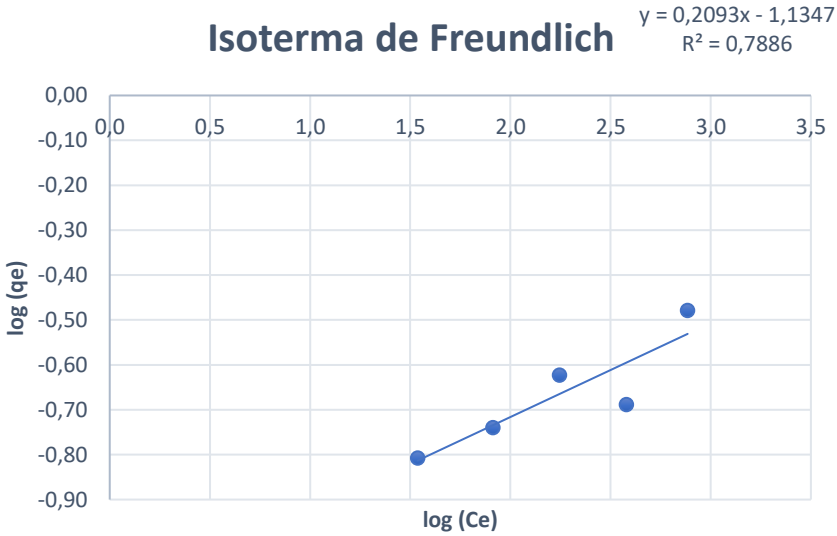


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,54	-0,81
100	1,91	-0,74
200	2,25	-0,62
400	2,58	-0,69
800	2,88	-0,48

KF (unitats)	0,0733
n	4,778

Taula 26. Resultats GTR WJ D

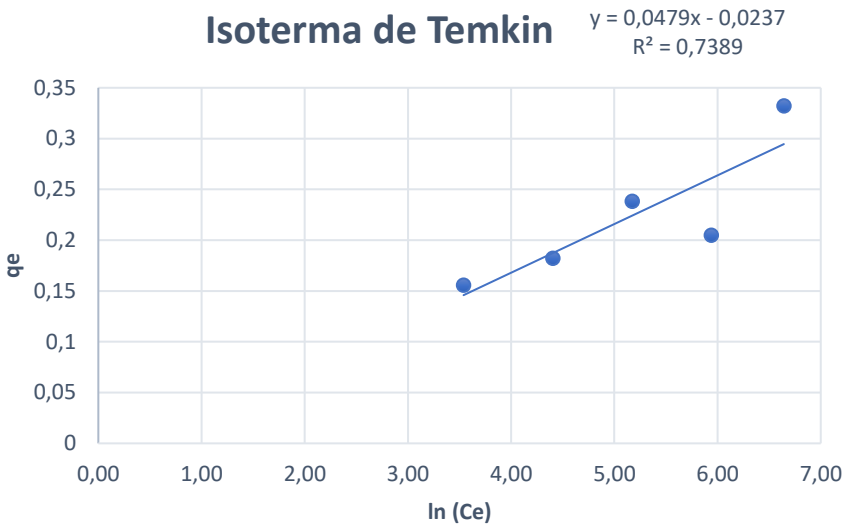


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,54	0,1557
100	4,40	0,1821
200	5,17	0,2382
400	5,94	0,2048
800	6,64	0,332

b_T	50855
A_T (L/g)	0,6097

Taula 27. Resultats GTR WJ D

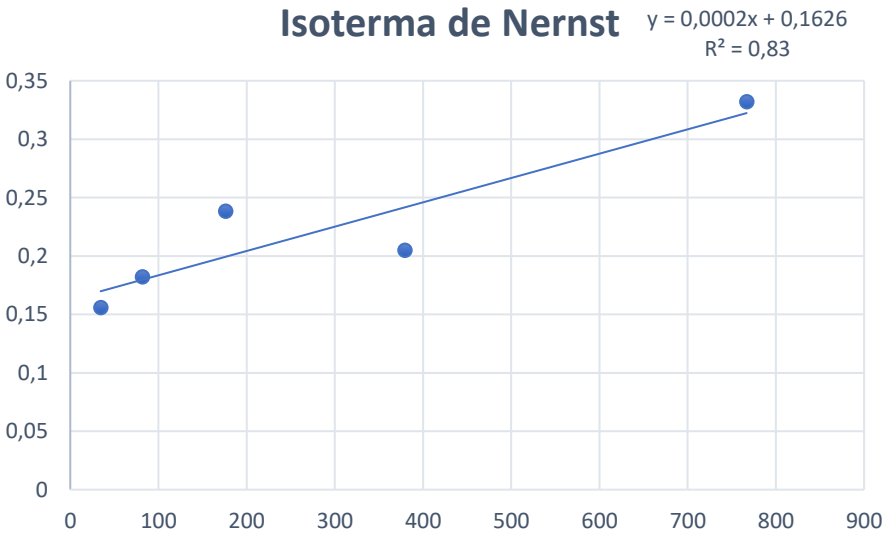


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	34,43	0,1557
100	81,79	0,1821
200	176,18	0,2382
400	379,52	0,2048
800	766,8	0,332

K_N	0,0002

Taula 28. Resultats GTR WJ D



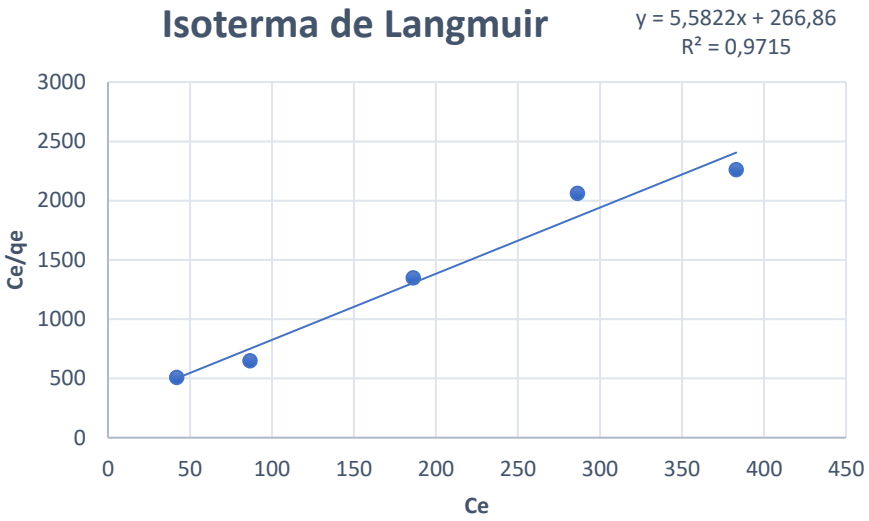
GTR car 250-500 micres

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	42	509
100	87	649
200	186	1347
300	286	2061
400	383	2260

K_L (g ads/L)	0,0037
b (L/mg)	0,020
Qm (mg/g ads)	**0,179**

Taula 29. Resultats GTR WJ D

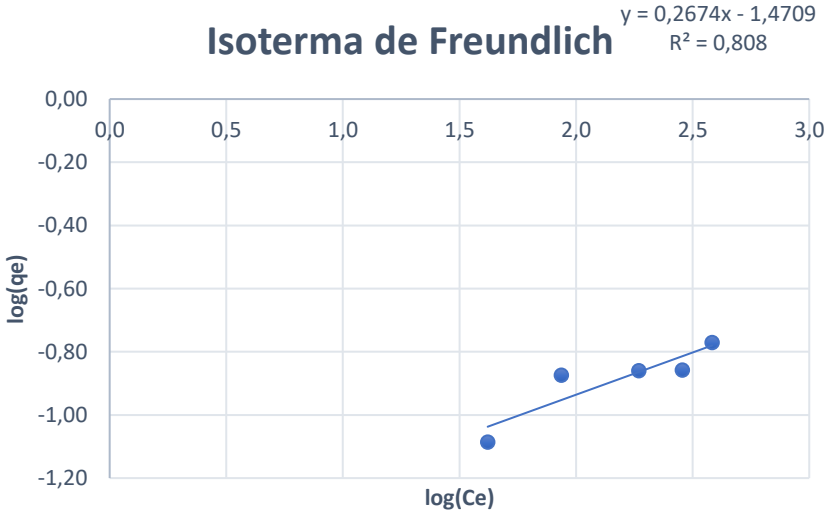


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,62	-1,09
100	1,94	-0,87
200	2,27	-0,86
300	2,46	-0,86
400	2,58	-0,77

KF (unitats)	0,0338
n	3,740

Taula 30. Resultats GTR WJ D

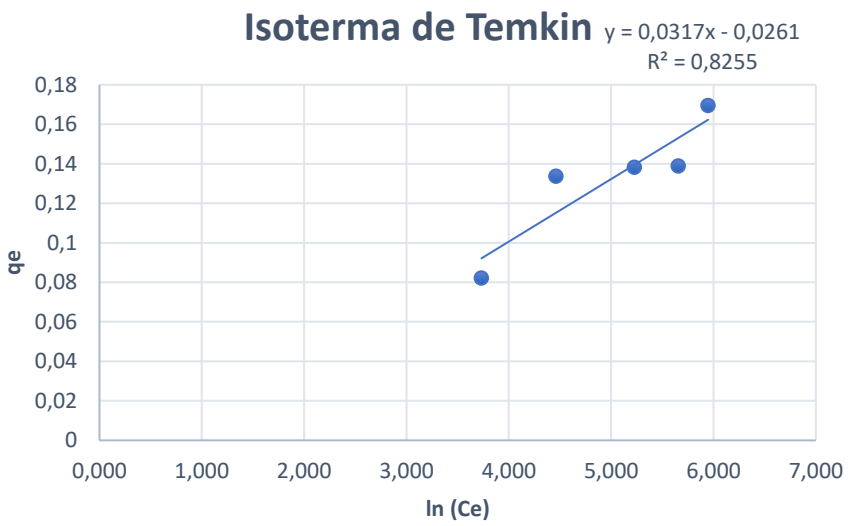


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,733	0,0821
100	4,462	0,1336
200	5,227	0,1382
300	5,656	0,1388
400	5,948	0,1695

b_T	76845
A_T (L/g)	0,4390

Taula 31. Resultats GTR WJ D

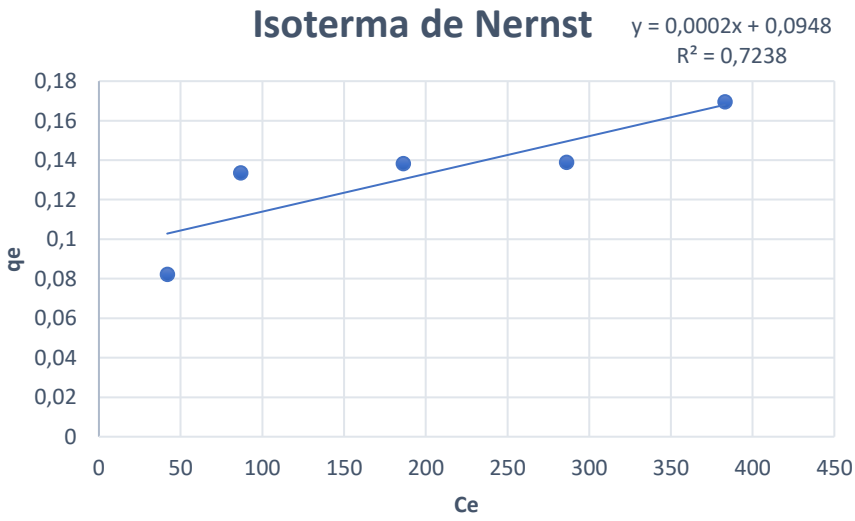


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	41,79	0,0821
100	86,64	0,1336
200	186,18	0,1382
300	286,12	0,1388
400	383,05	0,1695

K_N	0,0002

Taula 32. Resultats GTR WJ D



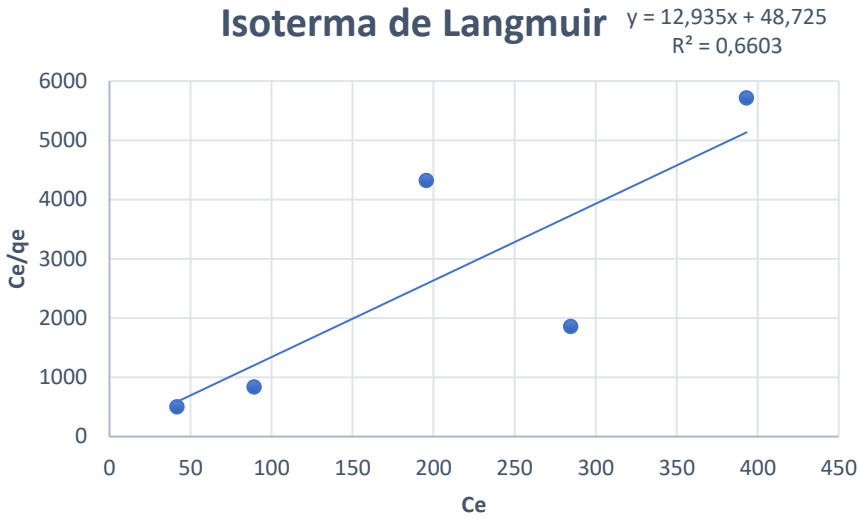
GTR car 250-500 micres D

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	42	501
100	89	836
200	195	4325
300	285	1858
400	393	5714

K_L (g ads/L)	0,0205
b (L/mg)	0,27
Qm (mg/g ads)	**0,077**

Taula 33. Resultats GTR WJ D

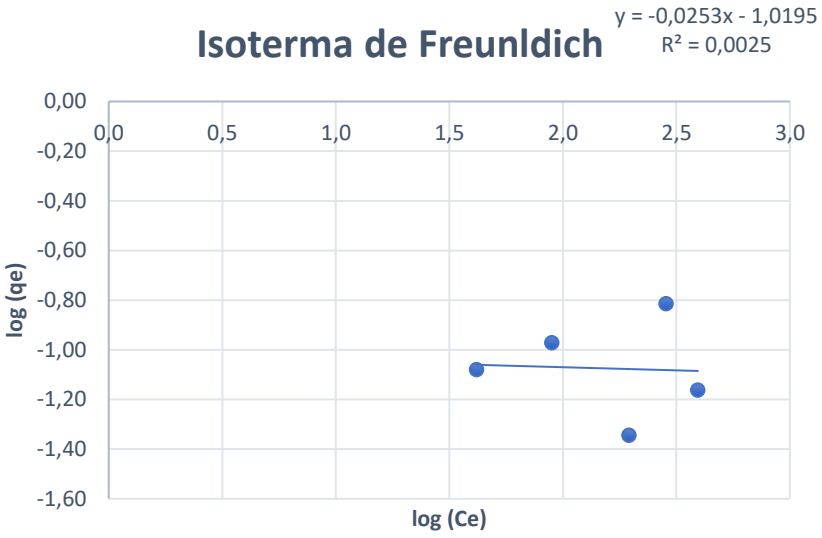


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,62	-1,08
100	1,95	-0,97
200	2,29	-1,34
300	2,45	-0,81
400	2,59	-1,16

KF (unitats)	0,0956
n	-

Taula 34. Resultats GTR WJ D

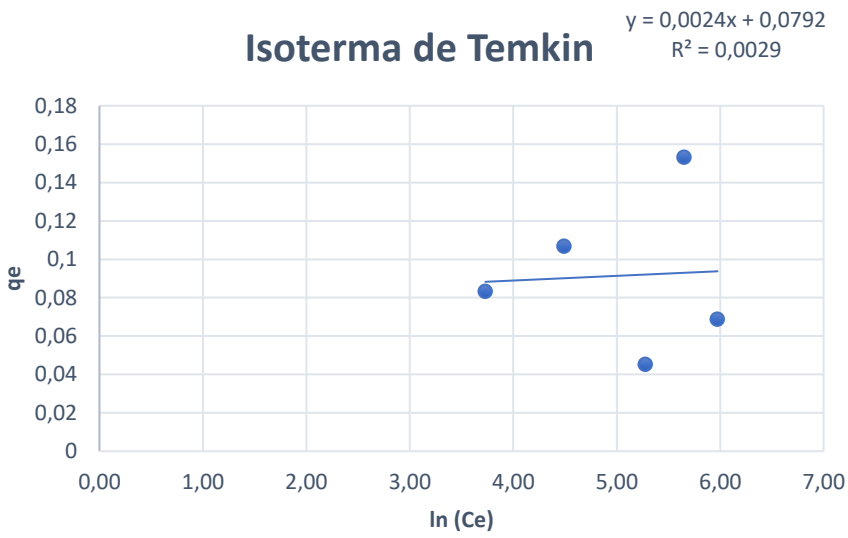


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,73	0,0832
100	4,49	0,1068
200	5,28	0,0452
300	5,65	0,1532
400	5,97	0,0688

b_T	-
A_T (L/g)	-

Taula 35. Resultats GTR WJ D

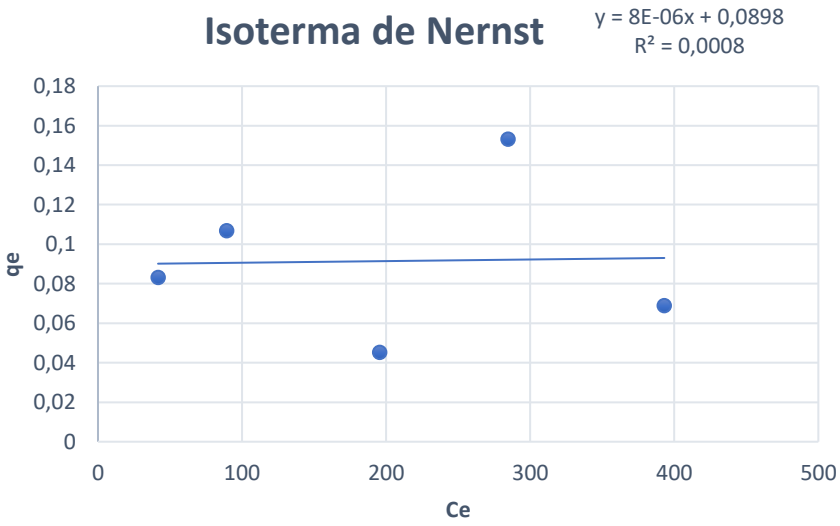


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	41,68	0,0832
100	89,32	0,1068
200	195,48	0,0452
300	284,68	0,1532
400	393,12	0,0688

K_N	-

Taula 36. Resultats GTR WJ D



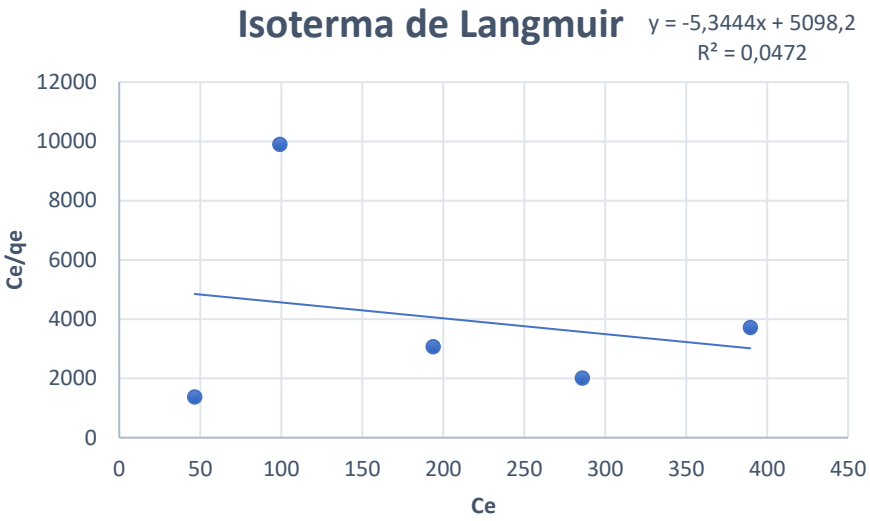
GTR car 100-250 micres

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	47	1371
100	99	9900
200	194	3075
300	286	2007
400	390	3717

K_L (g ads/L)	0,0002
b (L/mg)	0,00
Qm (mg/g ads)	**-**

Taula 37. Resultats GTR WJ D

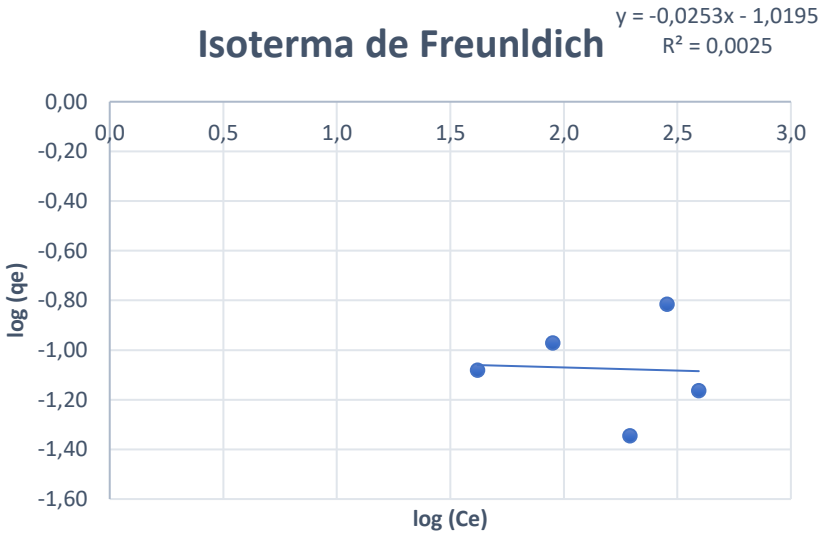


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,67	-1,47
100	2,00	-2,00
200	2,29	-1,20
300	2,46	-0,85
400	2,59	-0,98

KF (unitats)	0,0006
n	1,140

Taula 38. Resultats GTR WJ D

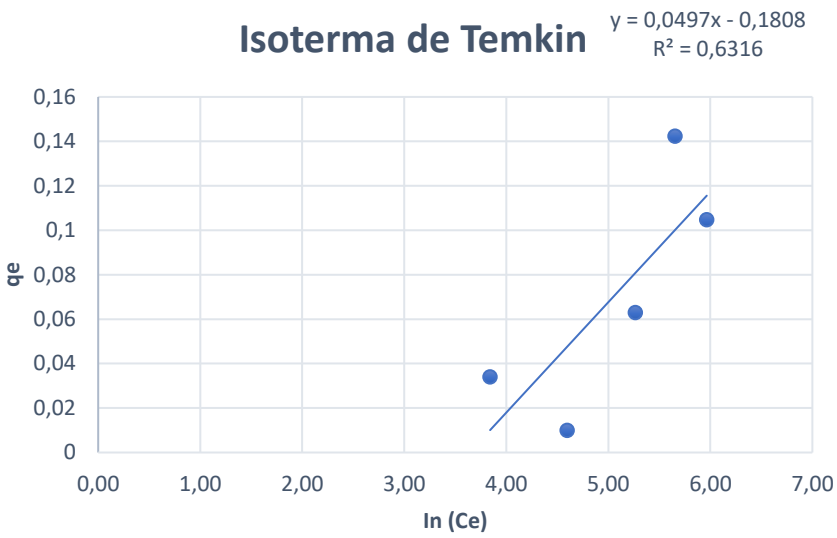


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,84	0,034
100	4,60	0,01
200	5,27	0,063
300	5,66	0,1424
400	5,96	0,1048

b_T	49014
A_T (L/g)	0,0263

Taula 39. Resultats GTR WJ D

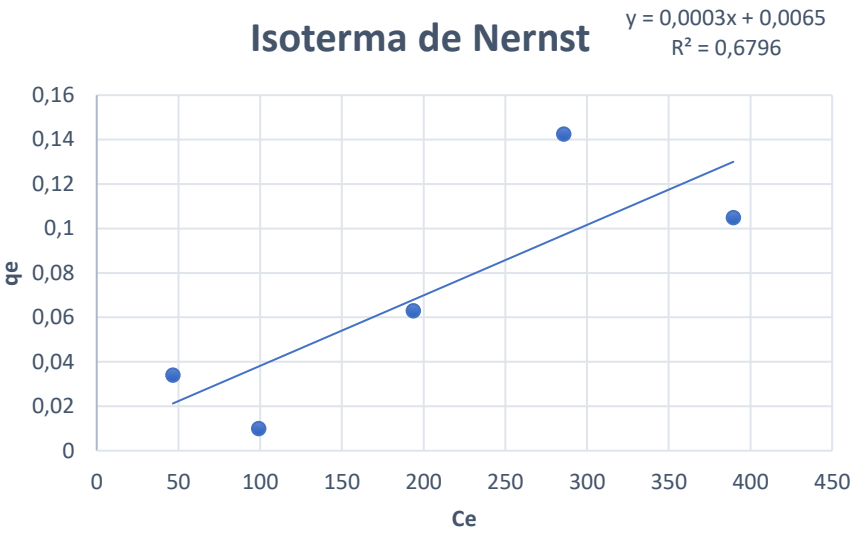


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	46,6	0,034
100	99	0,01
200	193,7	0,063
300	285,76	0,1424
400	389,52	0,1048

K_N	0,0003

Taula 40. Resultats GTR WJ D



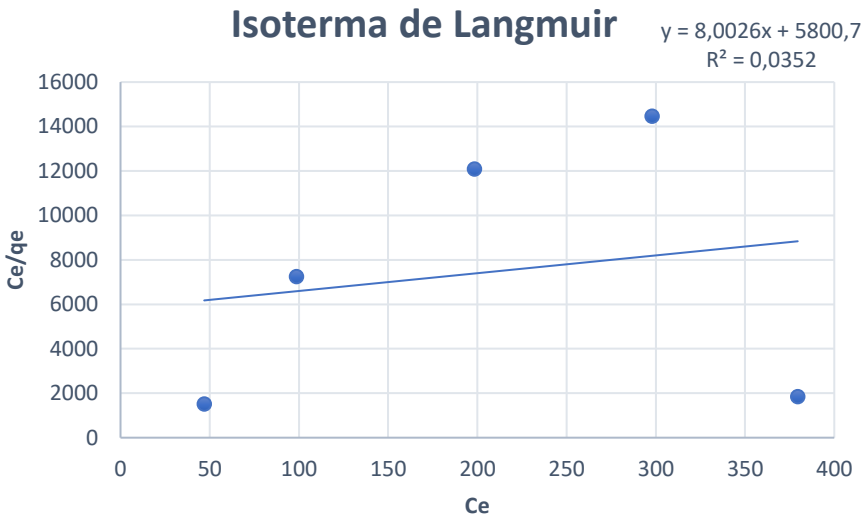
GTR car 100-250 micres D

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	47	1371
100	99	9900
200	194	3075
300	286	2007
400	390	3717

K_L (g ads/L)	0,0002
b (L/mg)	0,0014
Qm (mg/g ads)	**0,125**

Taula 41. Resultats GTR WJ D

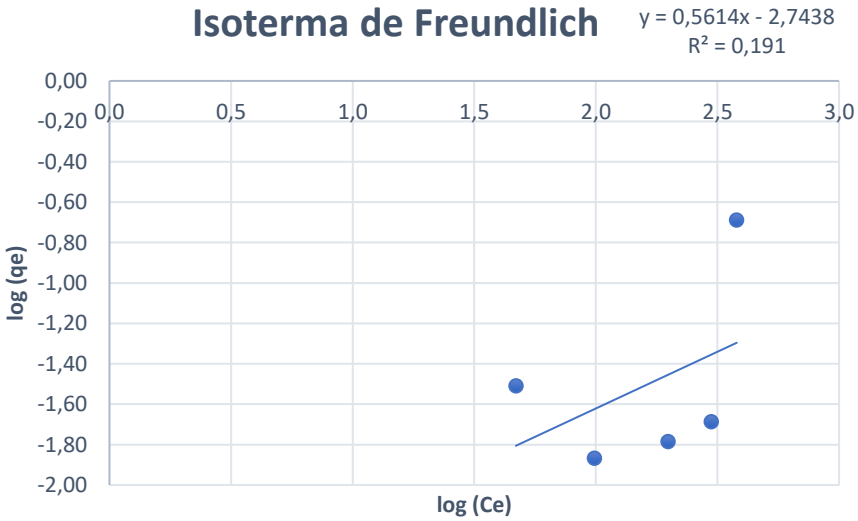


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,67	-1,51
100	1,99	-1,87
200	2,30	-1,79
300	2,47	-1,69
400	2,58	-0,69

KF (unitats)	0,0018
n	1,781

Taula 42. Resultats GTR WJ D

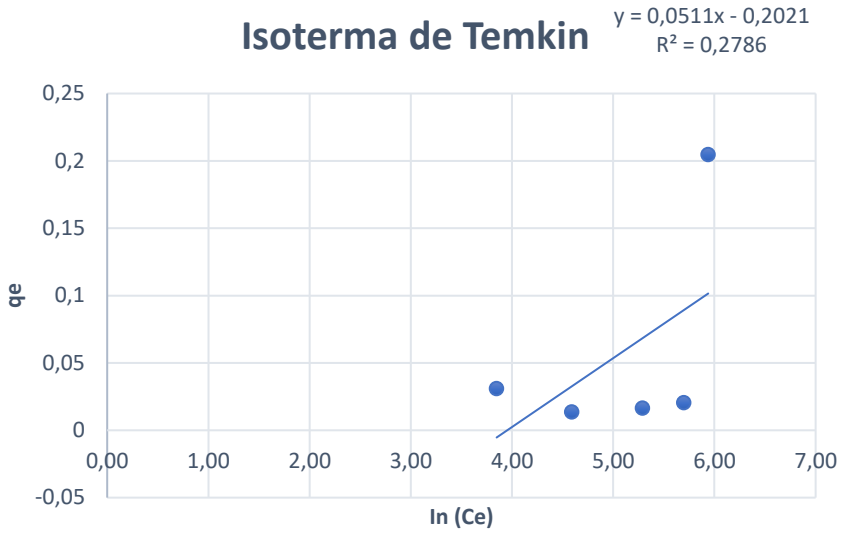


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,85	0,031
100	4,59	0,0136
200	5,29	0,0164
300	5,70	0,0206
400	5,94	0,2048

b_T	47671
A_T (L/g)	0,0192

Taula 43. Resultats GTR WJ D

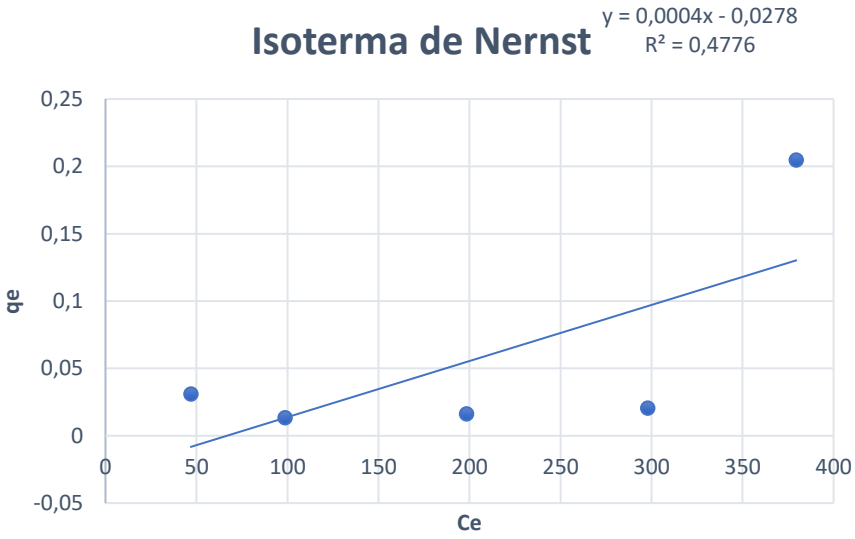


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	46,9	0,031
100	98,64	0,0136
200	198,36	0,0164
300	297,94	0,0206
400	379,52	0,2048

K_N	0,0004

Taula 44. Resultats GTR WJ D



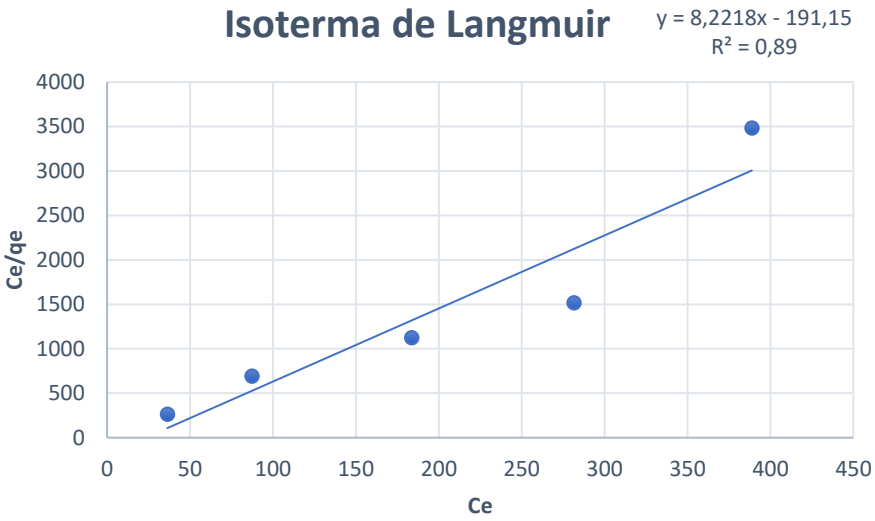
GTR car 0-100 micres

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	36	265
100	87	691
200	184	1124
300	281	1518
400	389	3484

K_L (g ads/L)	-0,0052
b (L/mg)	-0,04
Qm (mg/g ads)	**0,122**

Taula 45. Resultats GTR WJ D

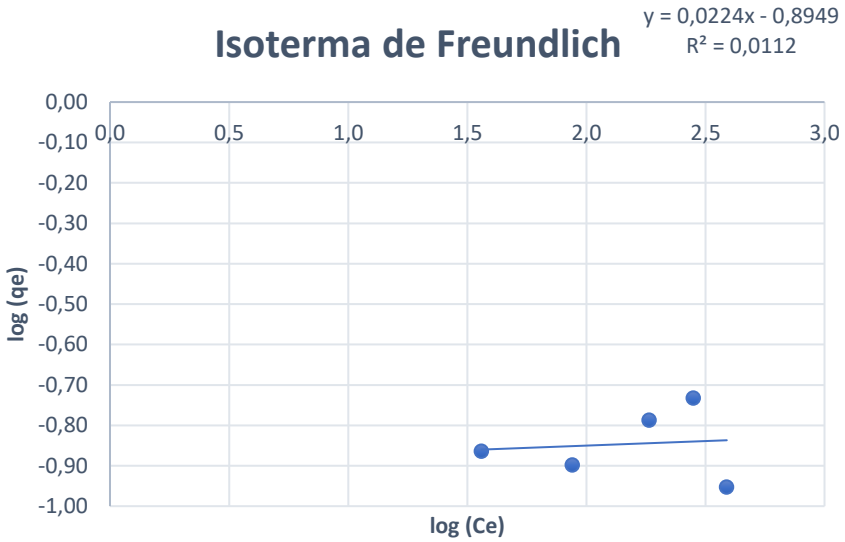


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,56	-0,86
100	1,94	-0,90
200	2,26	-0,79
300	2,45	-0,73
400	2,59	-0,95

KF (unitats)	0,1274
n	44,643

Taula 46. Resultats GTR WJ D

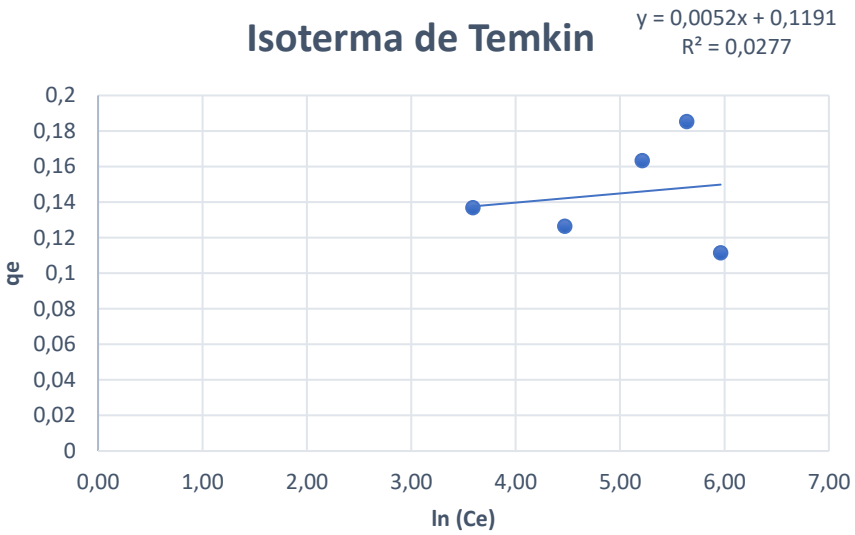


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,59	0,1369
100	4,47	0,1265
200	5,21	0,1634
300	5,64	0,1854
400	5,96	0,1116

b_T	-
A_T (L/g)	-

Taula 47. Resultats GTR WJ D

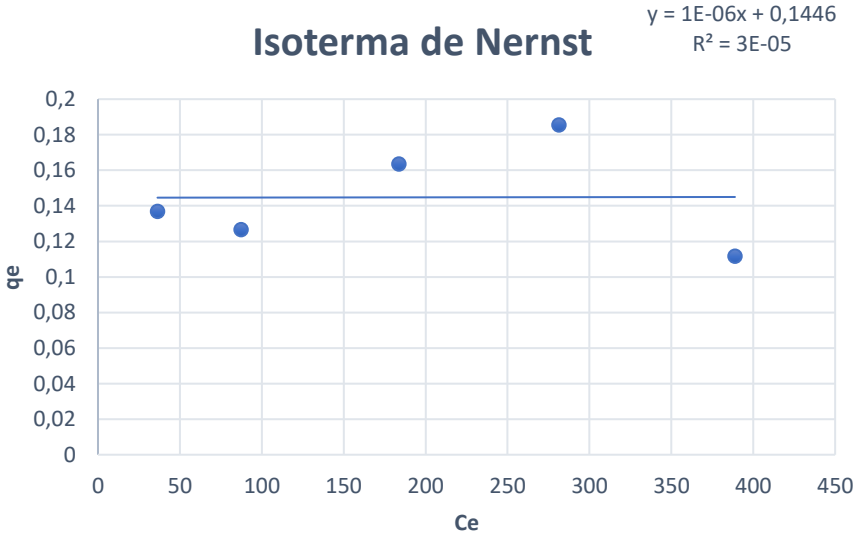


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	36,31	0,1369
100	87,35	0,1265
200	183,66	0,1634
300	281,46	0,1854
400	388,84	0,1116

K_N	-

Taula 48. Resultats GTR WJ D



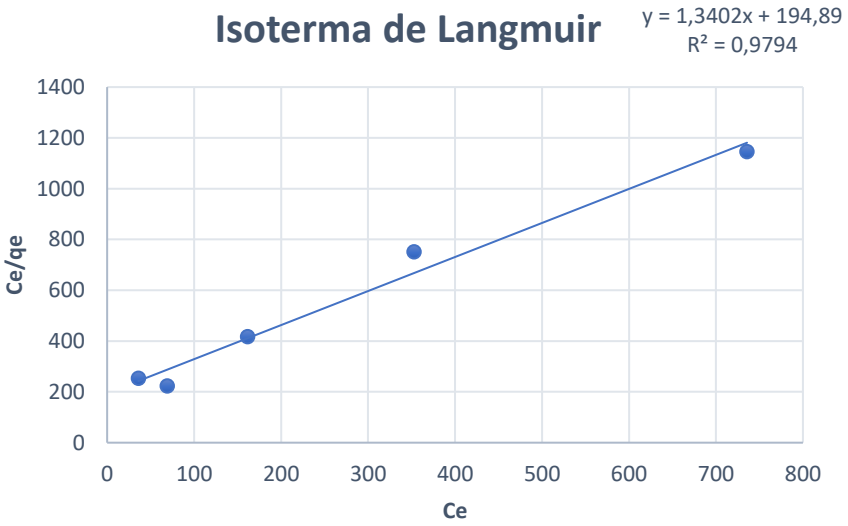
GTR cryo

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	36	254
100	69	223
200	161	417
400	353	751
800	736	1145

K_L (g ads/L)	0,0051
b (L/mg)	0,007
Qm (mg/g ads)	**0,746**

Taula 49. Resultats GTR WJ D

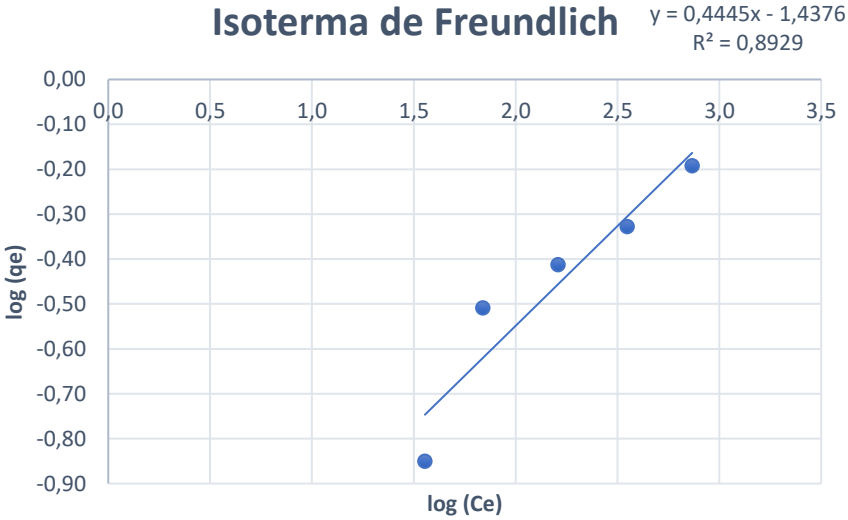


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,55	-0,85
100	1,84	-0,51
200	2,21	-0,41
400	2,55	-0,33
800	2,87	-0,19

KF (unitats)	0,0365
n	2,250

Taula 50. Resultats GTR WJ D

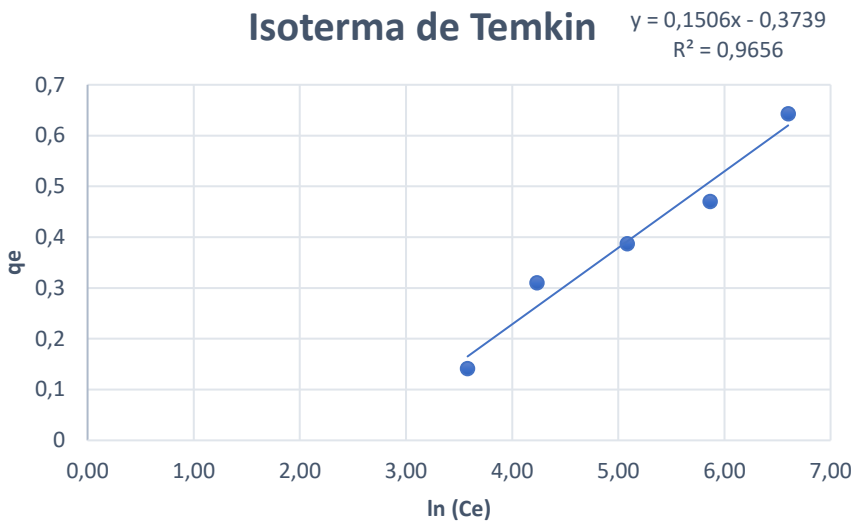


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,58	0,1412
100	4,23	0,3097
200	5,08	0,3868
300	5,87	0,47
400	6,60	0,6424

b_T	16175
A_T (L/g)	0,0835

Taula 51. Resultats GTR WJ D

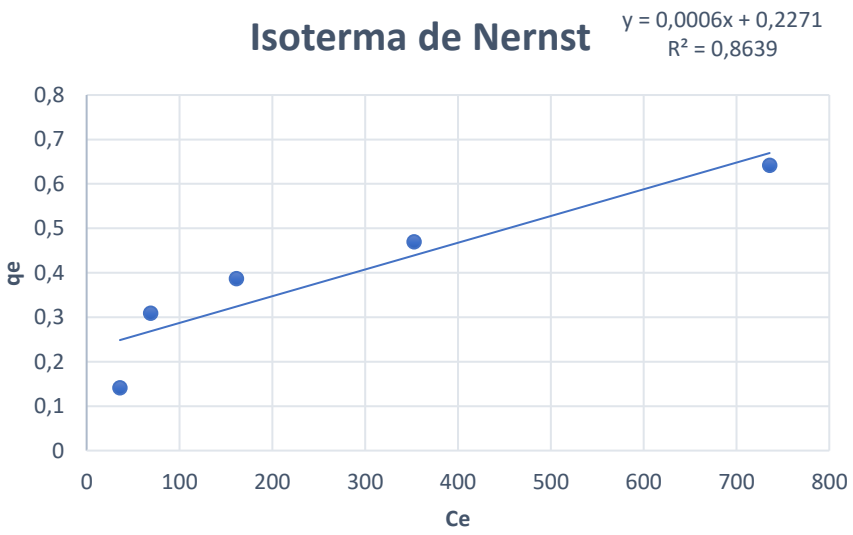


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	35,88	0,1412
100	69,03	0,3097
200	161,32	0,3868
300	353	0,47
400	735,76	0,6424

K_N	0,0006

Taula 52. Resultats GTR WJ D



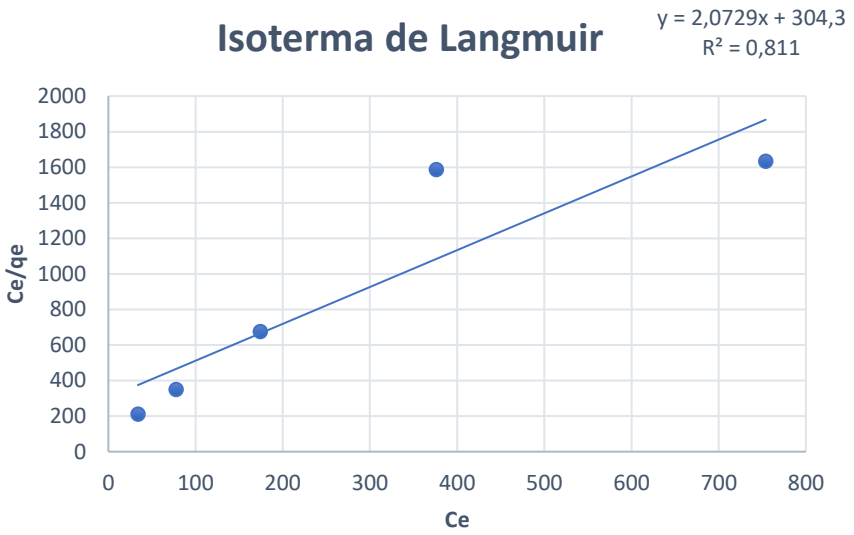
GTR cryo D

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	34	212
100	78	349
200	174	676
400	376	1586
800	754	1633

K_L (g ads/L)	0,0033
b (L/mg)	0,007
Qm (mg/g ads)	**0,482**

Taula 53. Resultats GTR WJ D

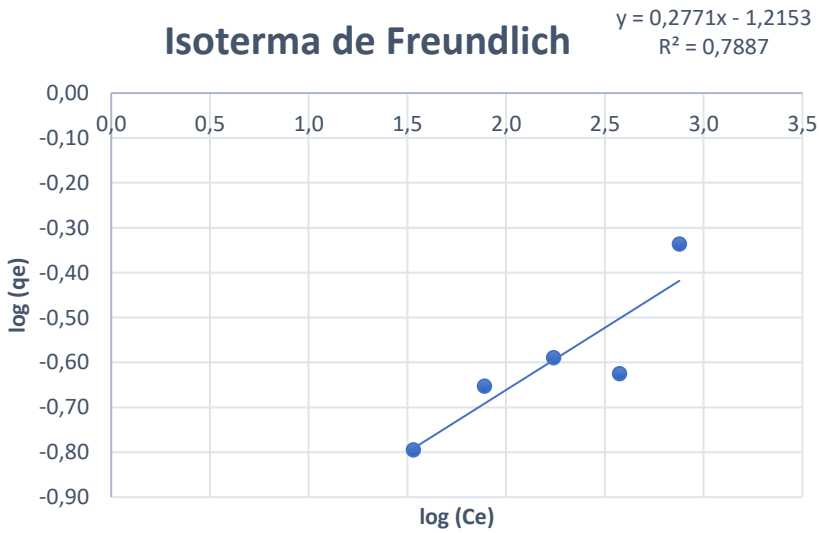


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,53	-0,79
100	1,89	-0,65
200	2,24	-0,59
400	2,58	-0,362
800	2,88	-0,34

KF (unitats)	0,0609
n	3,609

Taula 54. Resultats GTR WJ D

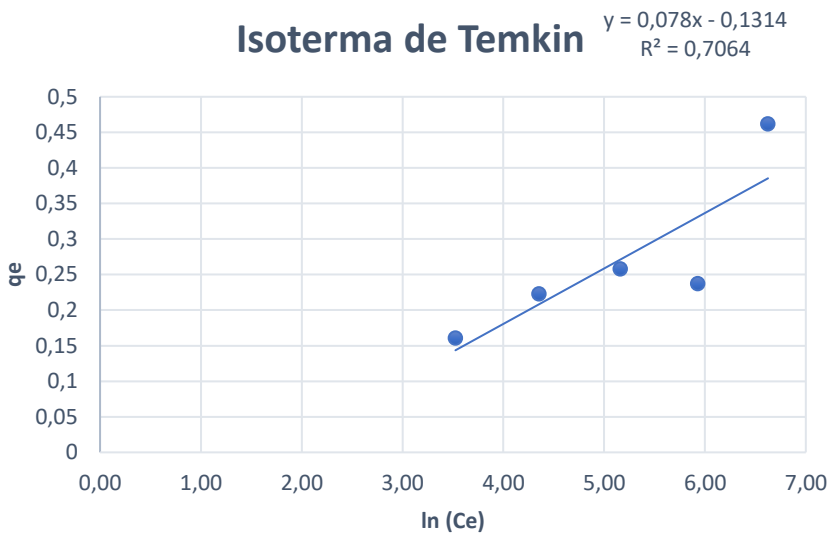


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,52	0,1605
100	4,35	0,2225
200	5,16	0,2576
300	5,93	0,2372
400	6,63	0,4616

b_T	31230
A_T (L/g)	0,1855

Taula 55. Resultats GTR WJ D

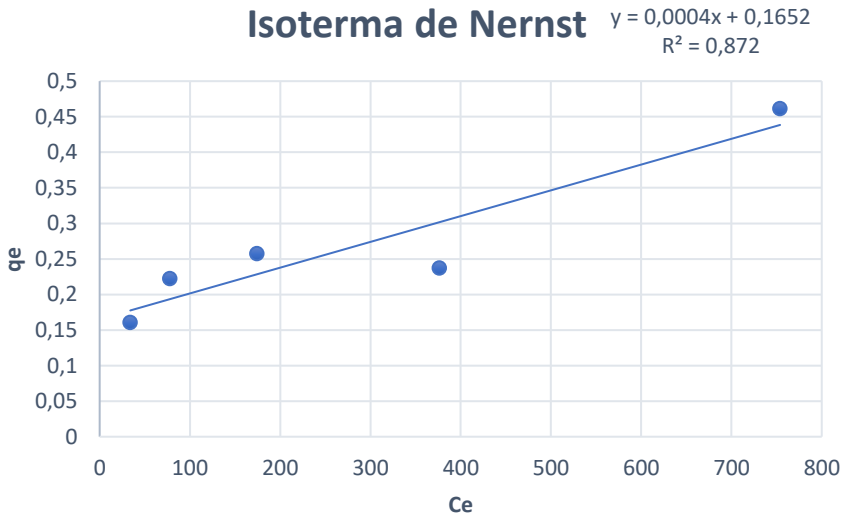


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	33,95	0,1605
100	77,75	0,2225
200	174,24	0,2576
300	376,28	0,2372
400	753,84	0,4616

K_N	0,0004

Taula 56. Resultats GTR WJ D



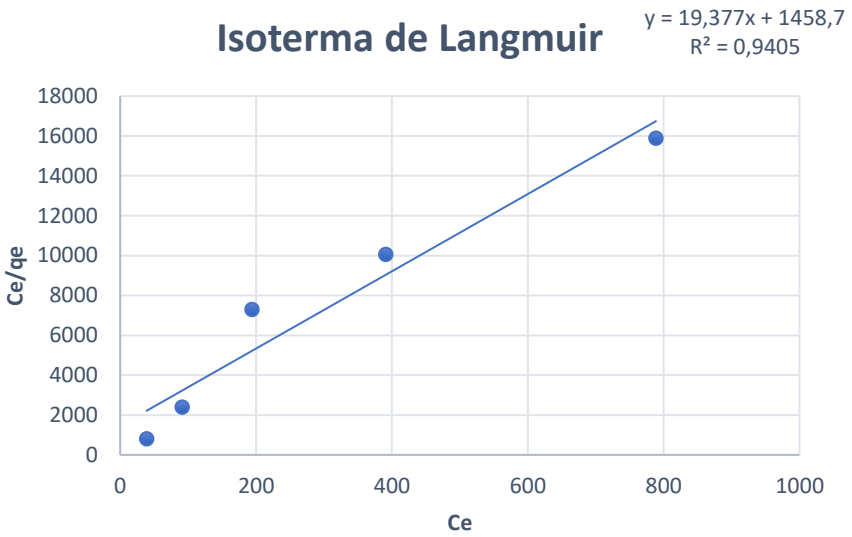
GTR WJ

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	39	801
100	91	2391
200	194	7298
400	391	10057
800	789	15891

K_L (g ads/L)	0,0007
b (L/mg)	0,013
Qm (mg/g ads)	**0,052**

Taula 57. Resultats GTR WJ D

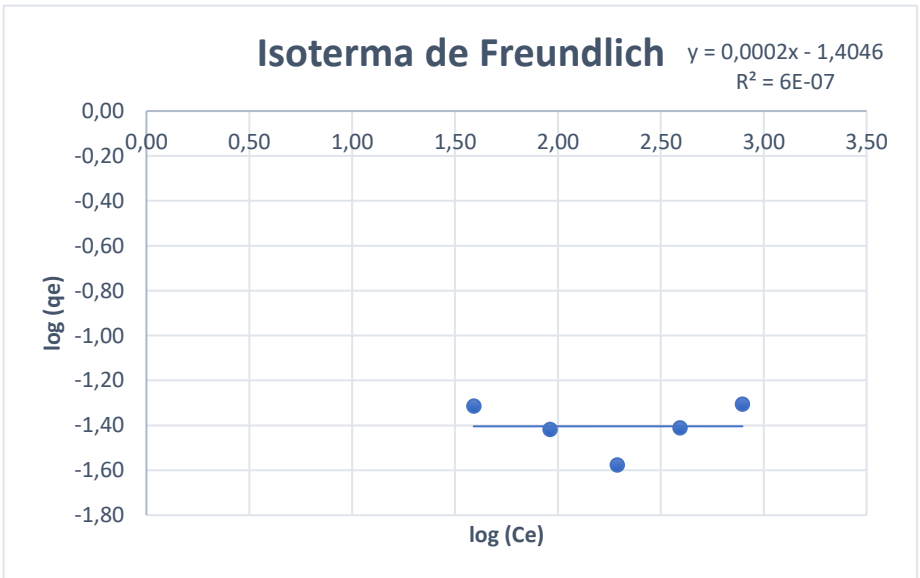


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,59	-1,31
100	1,96	-1,42
200	2,29	-1,58
400	2,59	-1,41
800	2,90	-1,30

KF (unitats)	0,0394
n	-

Taula 58. Resultats GTR WJ D

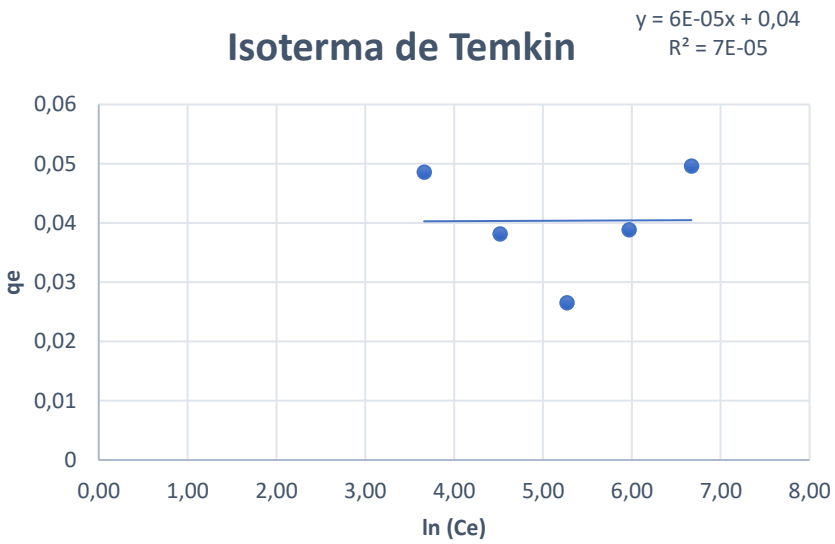


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,66	0,0486
100	4,51	0,0381
200	5,27	0,0265
300	5,97	0,0389
400	6,67	0,0496

b_T	-
A_T (L/g)	-

Taula 59. Resultats GTR WJ D

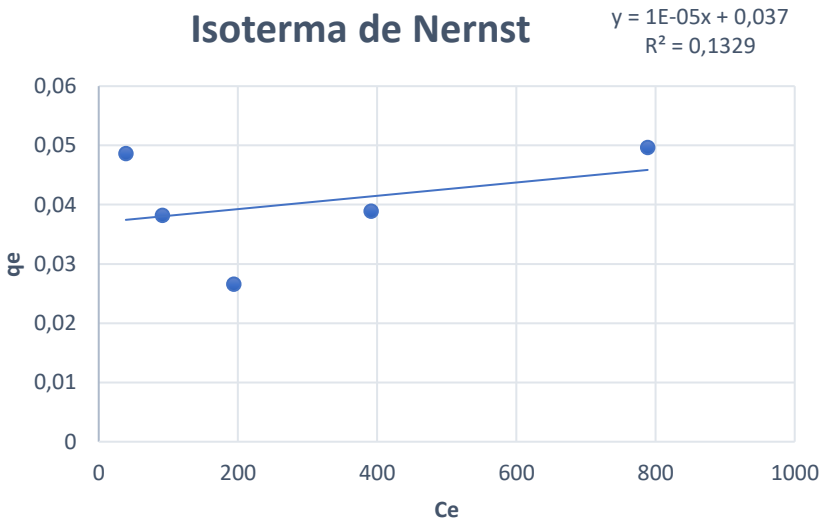


ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	38,95	0,0486
100	91,32	0,0381
200	193,96	0,0265
300	391,16	0,0389
400	788,72	0,0496

K_N	-

Taula 60. Resultats GTR WJ D



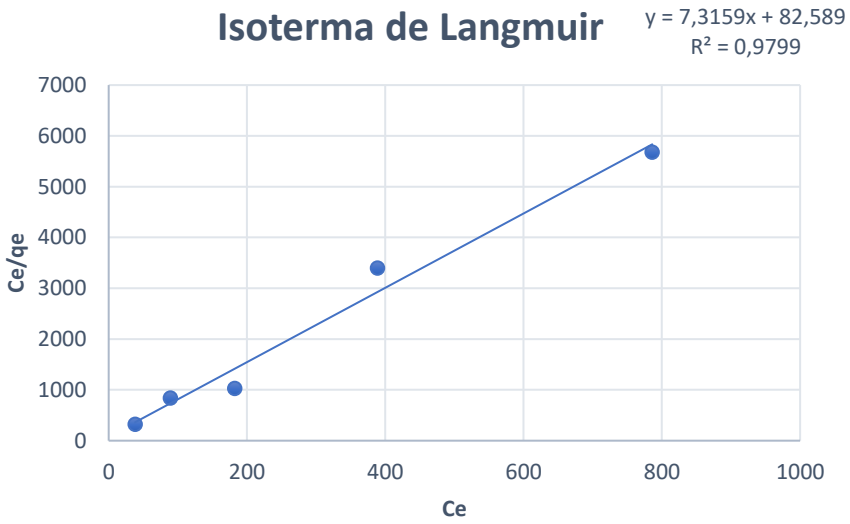
GTR WJ D

ISOTERMA DE LANGMUIR

Cr inicial (mg/L)	Ce	Ce/qe
50	38	325
100	89	842
200	182	1031
400	389	3397
800	786	5680

K_L (g ads/L)	0,0121
b (L/mg)	0,089
Qm (mg/g ads)	**0,137**

Taula 61. Resultats GTR WJ D

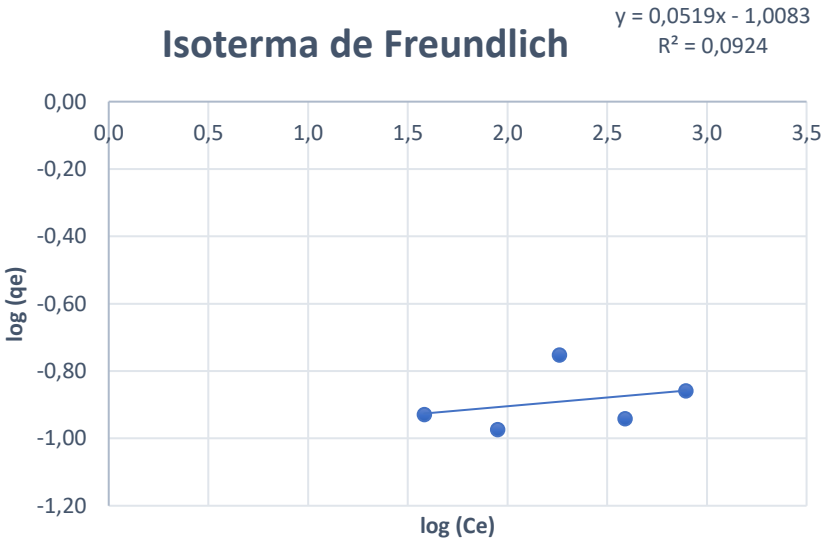


ISOTERMA DE FREUNDLICH

Cr inicial (mg/L)	log(Ce)	log(qe)
50	1,58	-0,93
100	1,95	-0,97
200	2,26	-0,75
400	2,59	-0,94
800	2,90	-0,86

KF (unitats)	0,0981
n	19,27

Taula 62. Resultats GTR WJ D

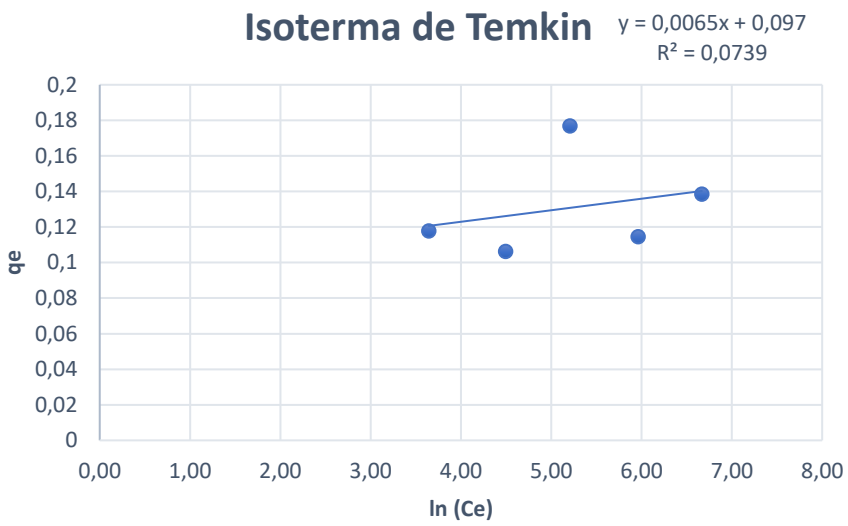


ISOTERMA DE TEMKIN

Cr inicial (mg/L)	ln (Ce)	qe
50	3,64	0,1177
100	4,49	0,1062
200	5,21	0,1768
300	5,96	0,1144
400	6,67	0,1384

b_T	-
A_T (L/g)	-

Taula 63. Resultats GTR WJ D



ISOTERMA DE NERNST

Cr inicial (mg/L)	Ce	qe
50	38,23	0,1177
100	89,38	0,1062
200	182,32	0,1768
300	388,56	0,1144
400	786,16	0,1384

K_N	-

Taula 64. Resultats GTR WJ D