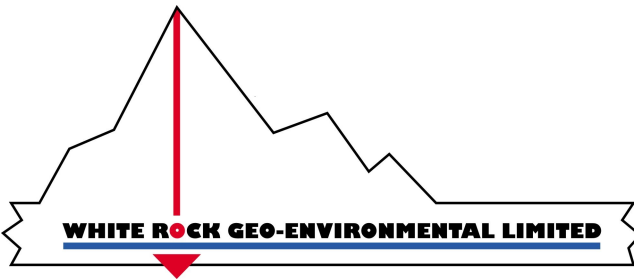


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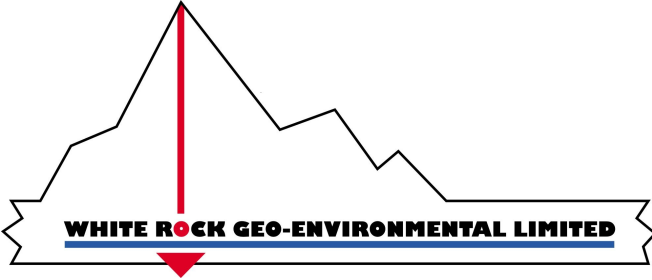


Napthalene Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Napthalene 10 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0		
2	0.05039	0.02	39.98	4	0.0005	0.0065	0.035
3	0.09940	0.04	39.96	4	0.001	0.037	0.13
4	0.25593	0.1	39.9	4	0.0025	0.086	0.14
5	0.49262	0.2	39.8	4	0.005	0.2	0.5
6	1.04605	0.3	39.7	4	0.0075	0.33	1.7
7	1.50447	0.4	39.6	4	0.01	0.52	2.3
8	1.99642	1	39	4	0.025	0.9	1
9	2.49695	2	38	4	0.05	3.3	17
10	3.04224	4	36	4	0.1	5	50
11	5.02625	6	34	4	0.15		
12	7.32435	10	30	4	0.25		

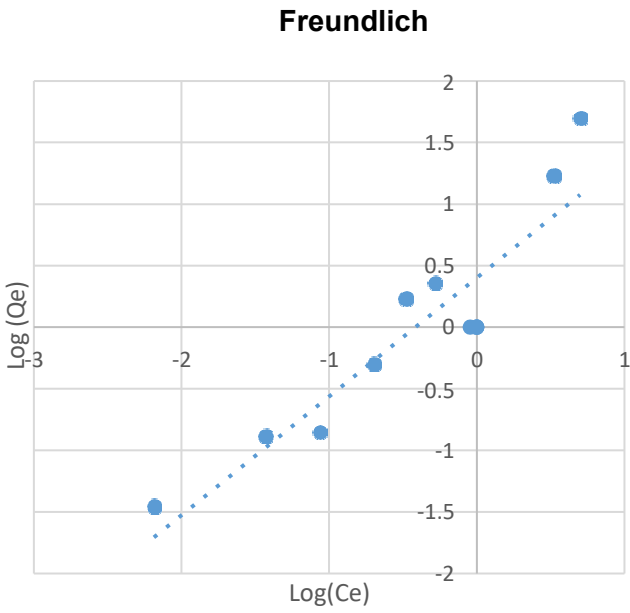
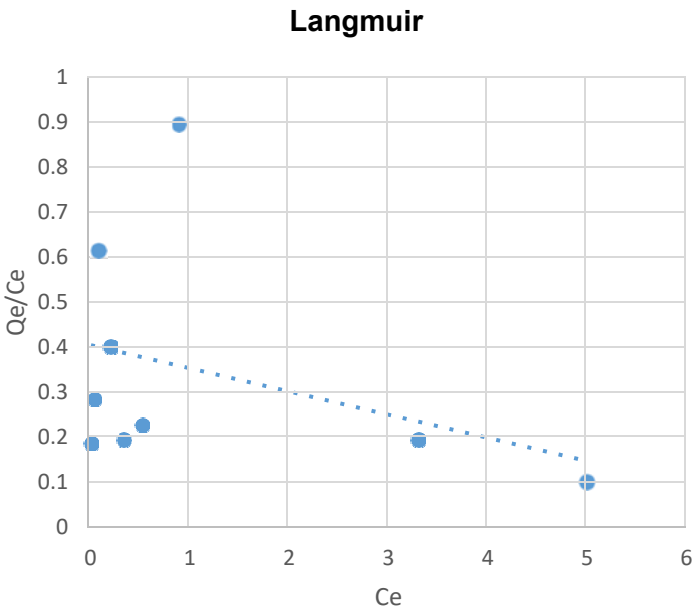
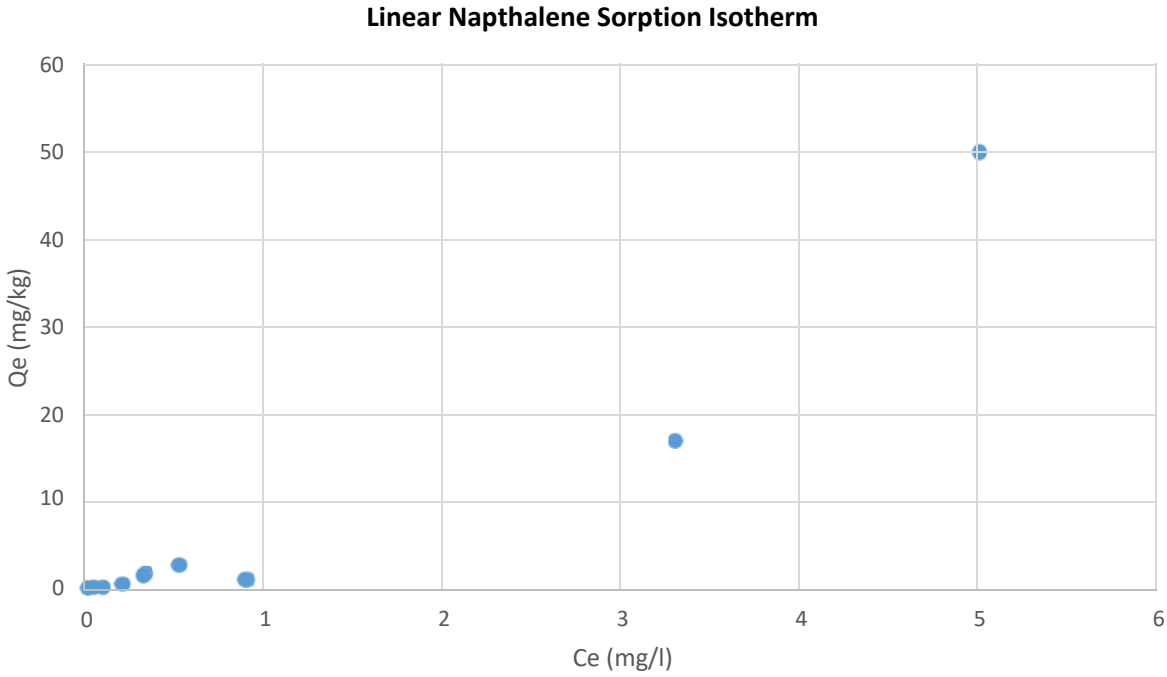
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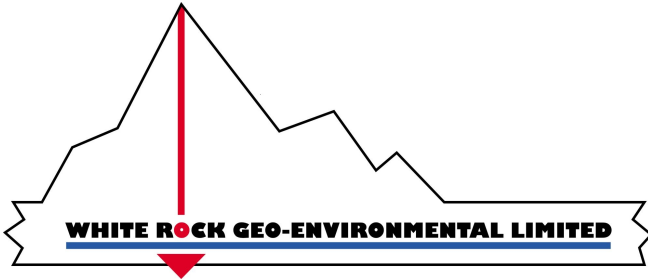
Napthalene Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Napthalene 10 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
8.940	0.951	0.91	0.94	0.590	0.920	-0.808	-5.00E-	0.12



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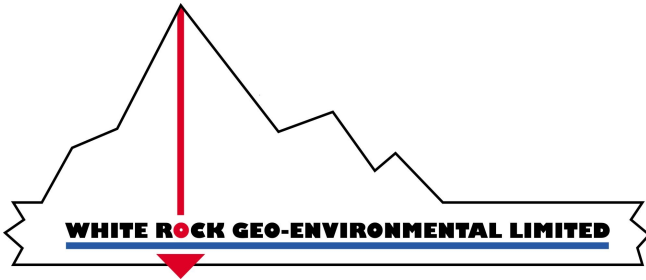


Phenol Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Phenol 1000 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	0.005	-0.05
2	0.05039	0.02	39.98	4	0.0005	0.005	0.95
3	0.09940	0.04	39.96	4	0.001	0.005	2.45
4	0.25593	0.1	39.9	4	0.0025	0.02	4.8
5	0.49262	0.2	39.8	4	0.005	0.005	7.45
6	1.04605	0.3	39.7	4	0.0075	0.03	9.7
7	1.50447	0.4	39.6	4	0.01	0.18	23.2
8	1.99642	1	39	4	0.025	0.41	45.9
9	2.49695	2	38	4	0.05	0.94	90.6
10	3.04224	4	36	4	0.1	3.1	219
11	5.02625	6	34	4	0.15	5.3	447
12	7.32435	10	30	4	0.25	12	880

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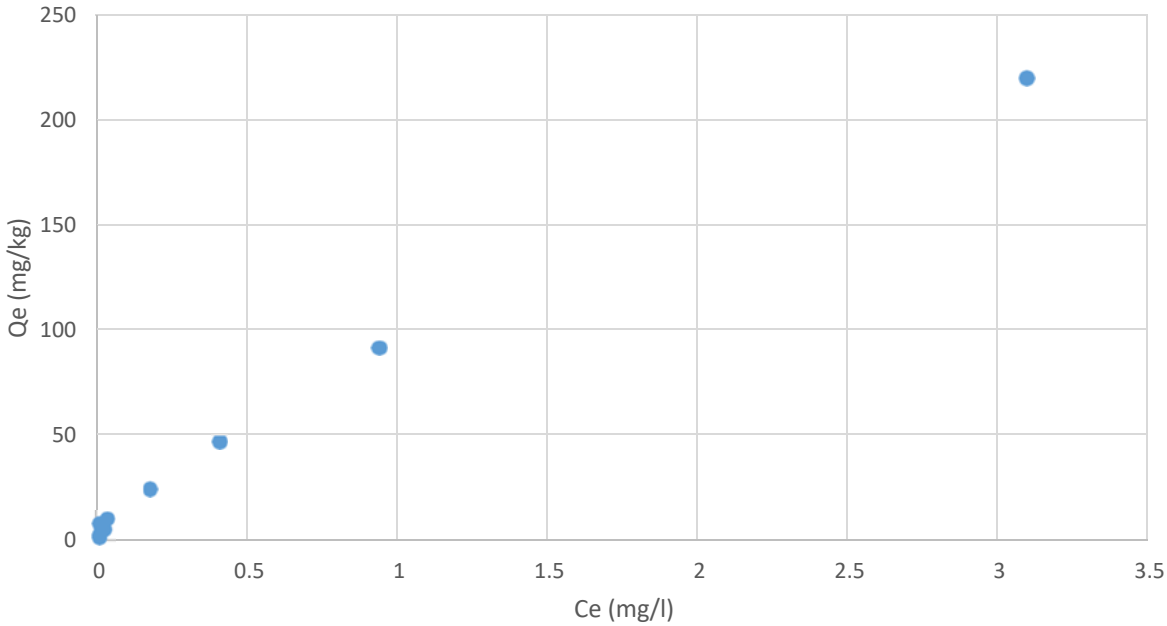


Phenol Sorption Isotherm

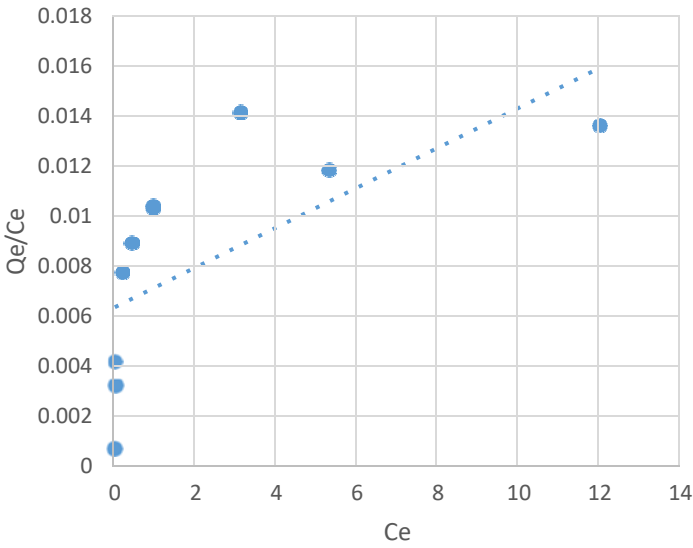
Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Phenol 1000 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
74.012	1.869	0.99	1.48	2.046	0.945	990.908	6.40E-06	0.45

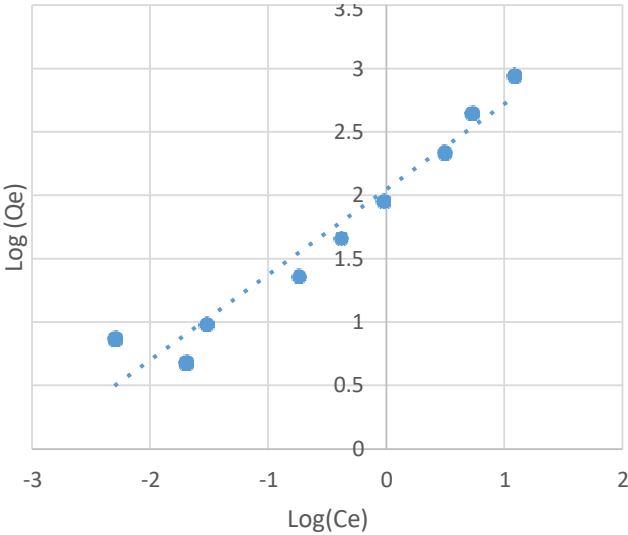
Linear Phenol Sorption Isotherm



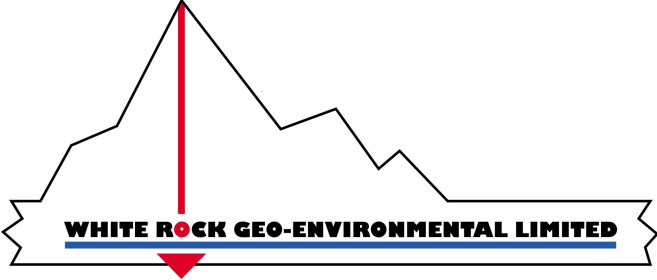
Langmuir



Freundlich



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Project ID CParrys Quarry
Client Mold Investments Ltd



Benzene Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Benzene 1000 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	0.001	-0.01
2	0.05039	0.02	39.98	4	0.0005	0.0045	0.955
3	0.09940	0.04	39.96	4	0.001	0.013	2.37
4	0.25593	0.1	39.9	4	0.0025	0.024	4.76
5	0.49262	0.2	39.8	4	0.005	0.035	7.15
6	1.04605	0.3	39.7	4	0.0075	0.05	9.5
7	1.50447	0.4	39.6	4	0.01	0.15	23.5
8	1.99642	1	39	4	0.025	0.4	46
9	2.49695	2	38	4	0.05	0.71	92.9
10	3.04224	4	36	4	0.1	2	230
11	5.02625	6	34	4	0.15	4.7	453
12	7.32435	10	30	4	0.25	4.9	951

Benzene Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl

100 g /l

Benzene

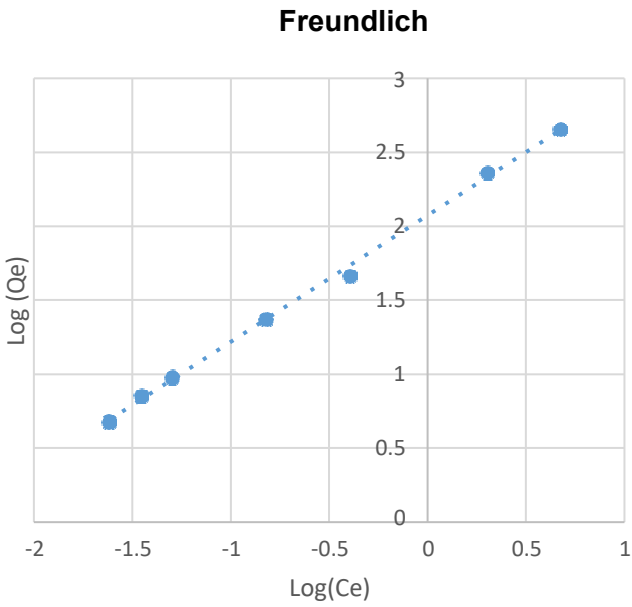
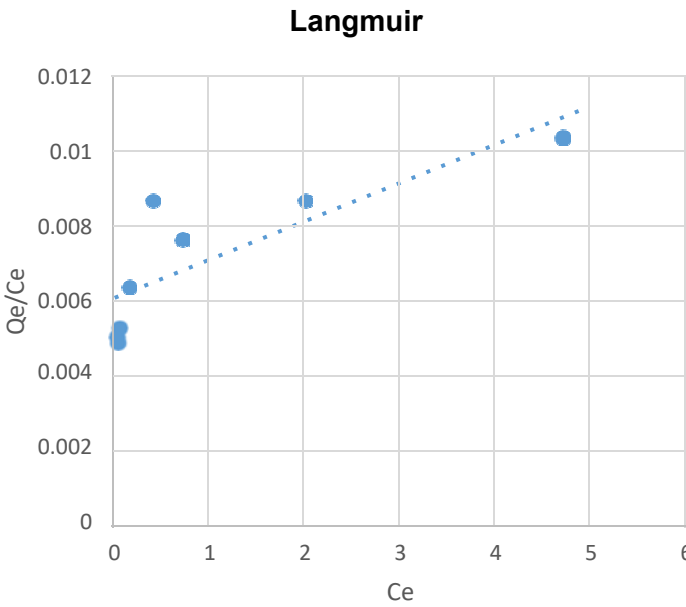
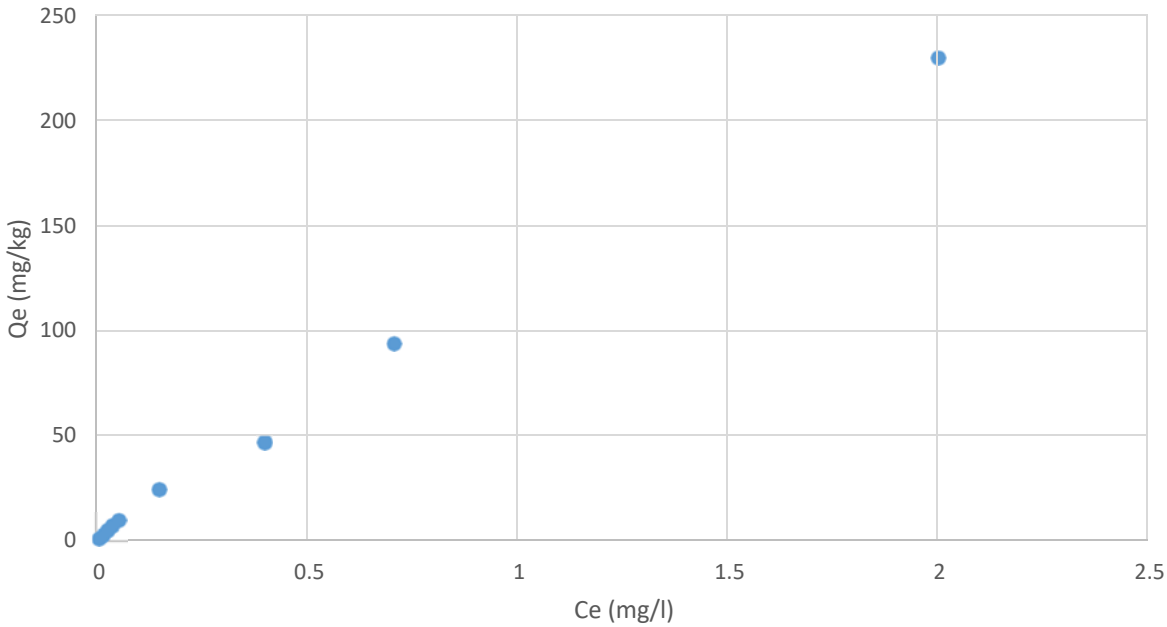
1000 mg/l

8.6 +/-0.1

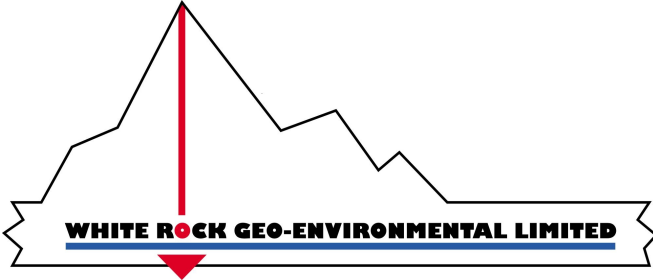
0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
146.095	2.165	0.87	1.16	2.074	0.998	313.582	1.94E-05	0.67

Linear Benzene Sorption Isotherm



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Cd Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Cd 7.5 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	0.00008	-0.00008
2	0.05039	0.02	39.98	4	0.0005	0.00008	0.050315
3	0.09940	0.04	39.96	4	0.001	0.0024	0.097006
4	0.25593	0.1	39.9	4	0.0025	0.0016	0.254339
5	0.49262	0.2	39.8	4	0.005	0.0065	0.486123
6	1.04605	0.3	39.7	4	0.0075	0.03	1.016052
7	1.50447	0.4	39.6	4	0.01	0.072	1.432472
8	1.99642	1	39	4	0.025	0.47	1.526424
9	2.49695	2	38	4	0.05	0.31	2.186959
10	3.04224	4	36	4	0.1	1	2.042246
11	5.02625	6	34	4	0.15	2.9	2.126257
12	7.32435	10	30	4	0.25	3.7	3.624359

Cd Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl

100 g /l

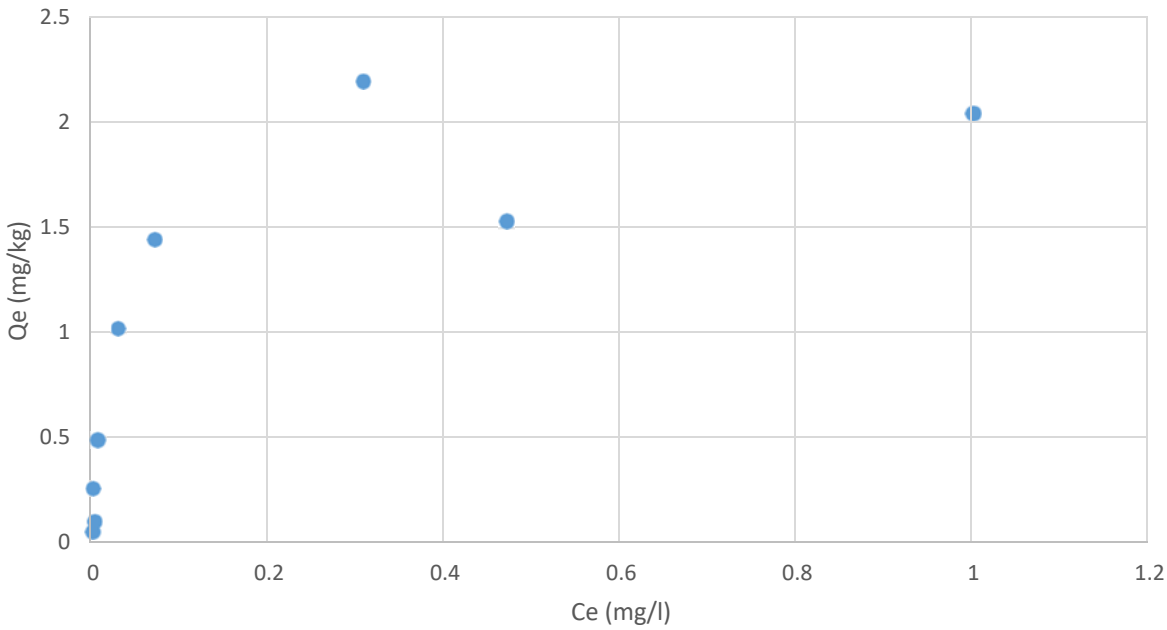
Cd7.5 mg/l

8.6 +/-0.1

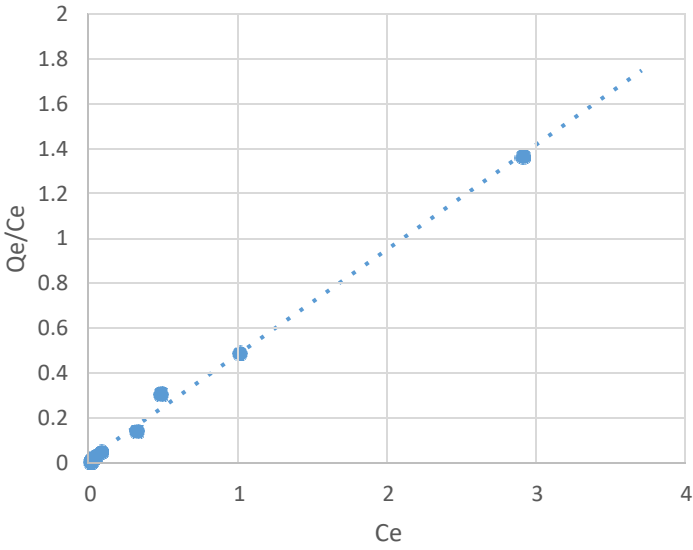
0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
68.603	1.836	0.84	3.63	0.306	0.900	0.782	2.72E-02	0.99

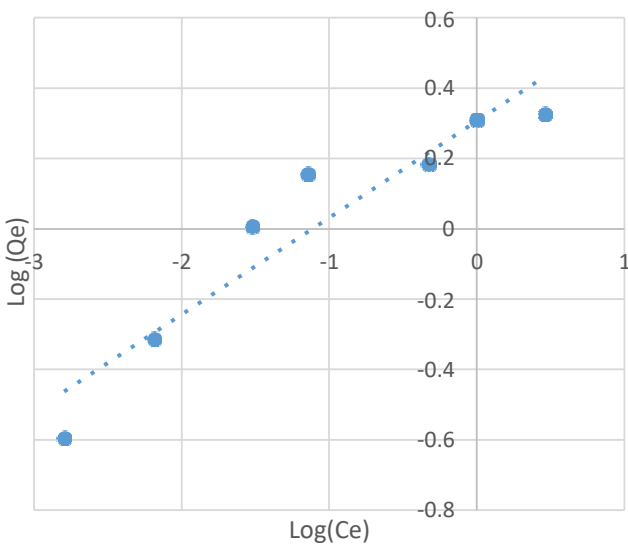
Linear Cd Sorption Isotherm



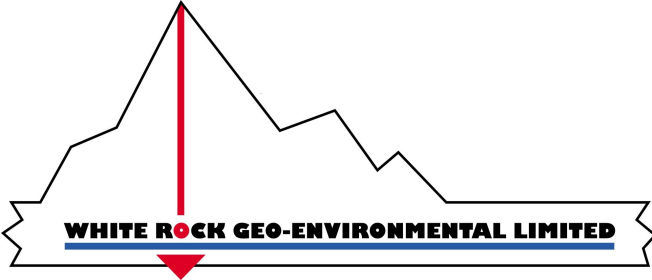
Langmuir



Freundlich



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Pb Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Pb 7.5 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	0.001	-0.2
2	0.05039	0.02	39.98	4	0.0005	0.001	9.87895
3	0.09940	0.04	39.96	4	0.001	0.001	19.6811
4	0.25593	0.1	39.9	4	0.0025	0.001	50.9877
5	0.49262	0.2	39.8	4	0.005	0.001	98.3245
6	1.04605	0.3	39.7	4	0.0075	0.014	206.410
7	1.50447	0.4	39.6	4	0.01	0.049	291.094
8	1.99642	1	39	4	0.025	0.001	399.084
9	2.49695	2	38	4	0.05	0.12	475.391
10	3.04224	4	36	4	0.1	0.17	574.449
11	5.02625	6	34	4	0.15	0.17	971.251
12	7.32435	10	30	4	0.25	0.13	1438.87

Pb Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl

100 g /l

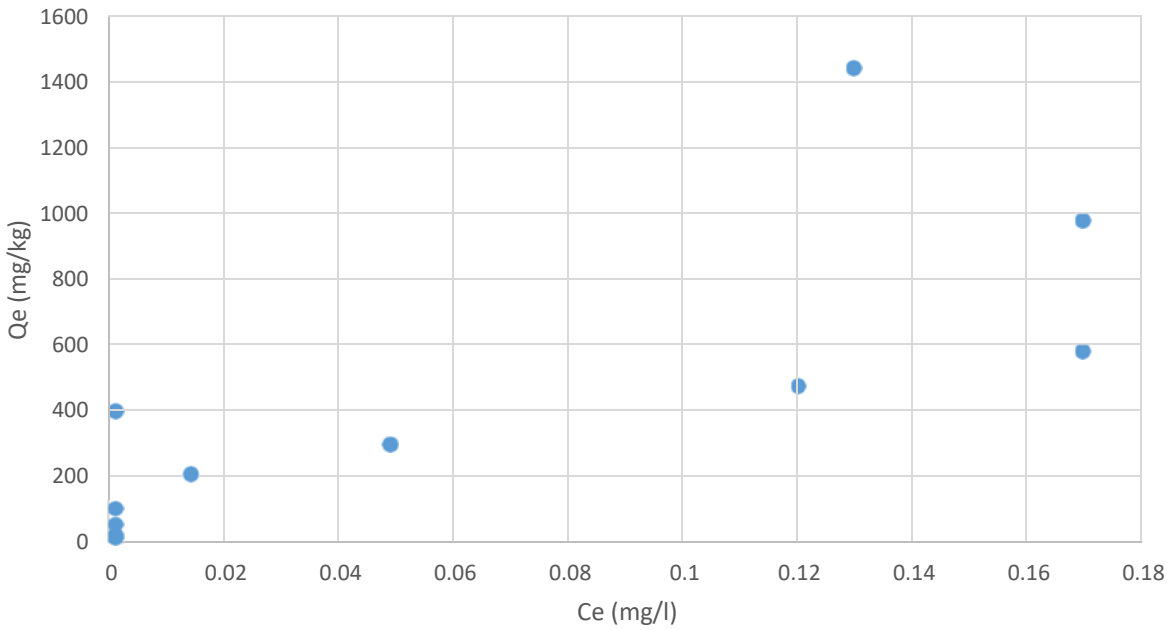
Pb7.5 mg/l

8.6 +/-0.1

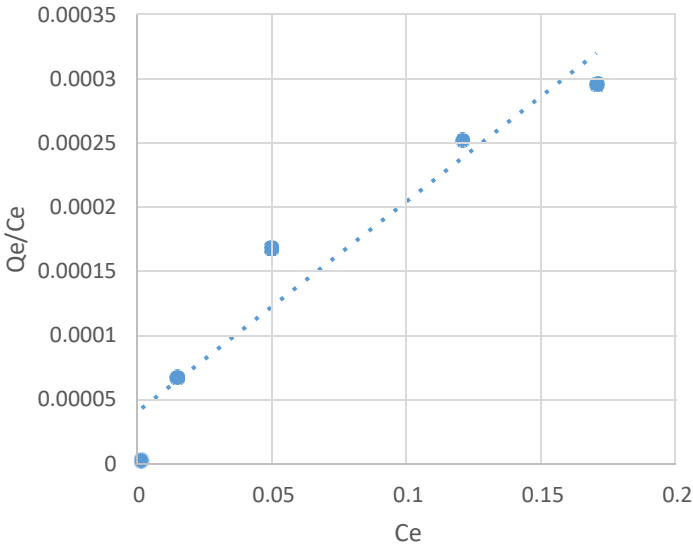
0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
13128.92	4.118	0.79	2.98	2.968	0.976	1300.30	3.20E-08	0.92

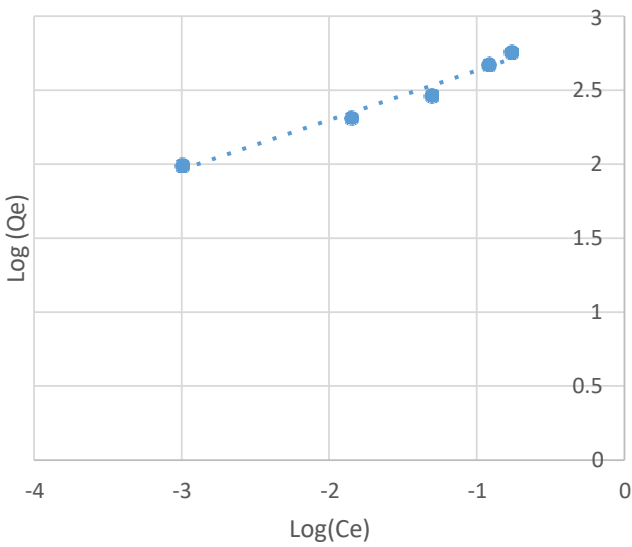
Linear Pb Sorption Isotherm



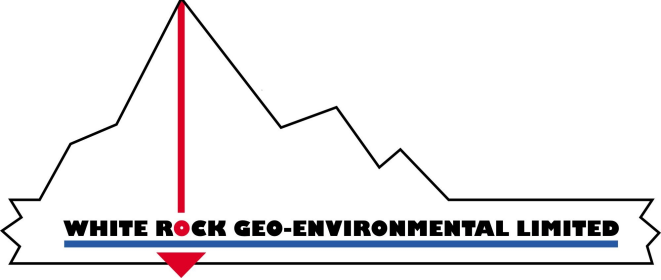
Langmuir



Freundlich



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Zinc Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Zinc 100 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	0.001	-0.2
2	0.05	0.02	39.98	4	0.0005	0.0018	9.71895
3	0.1	0.04	39.96	4	0.001	0.003	19.2811
4	0.25	0.1	39.9	4	0.0025	0.0018	50.8277
5	0.5	0.2	39.8	4	0.005	0.0015	98.2245
6	0.75	0.3	39.7	4	0.0075	0.0033	208.550
7	1	0.4	39.6	4	0.01	0.013	298.294
8	2.5	1	39	4	0.025	0.0036	398.564
9	5	2	38	4	0.05	0.029	493.591
10	10	4	36	4	0.1	0.047	599.049
11	15	6	34	4	0.15	0.092	986.851
12	25	10	30	4	0.25	0.18	1428.87

Zinc Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl

100 g /l

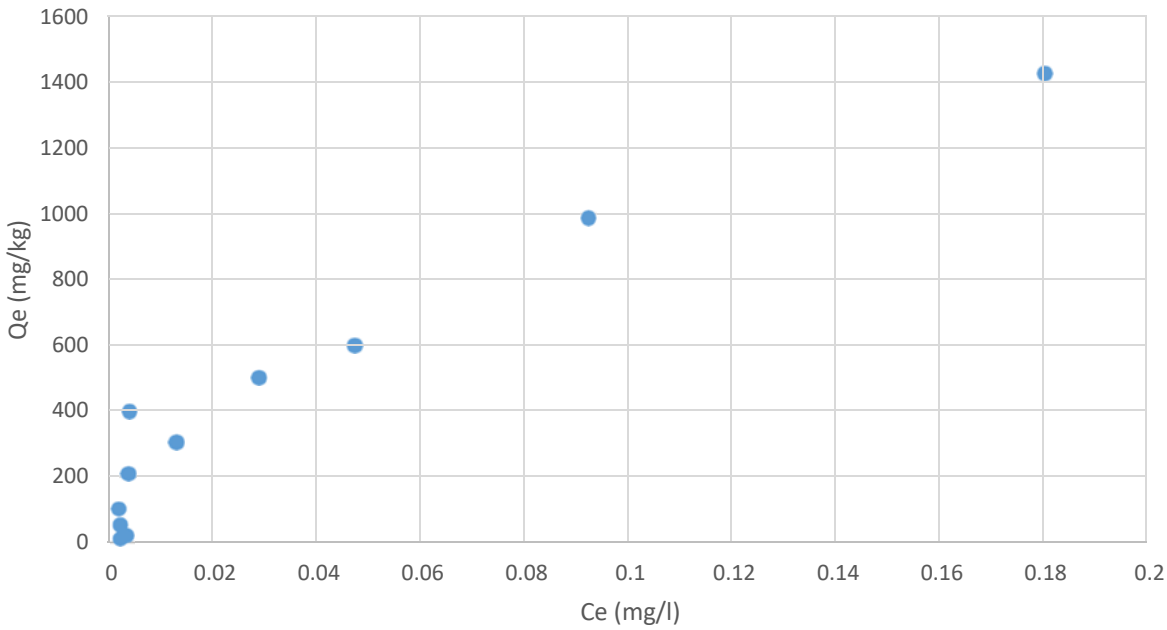
Zinc100 mg/l

8.6 +/-0.1

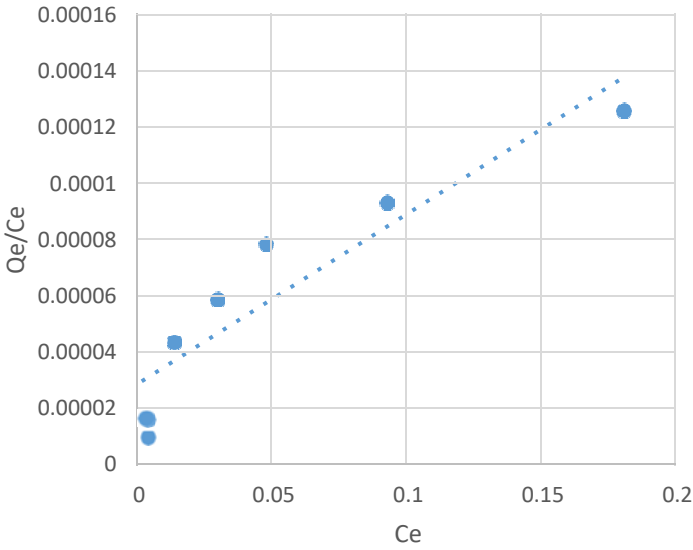
0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
7822.374	3.893	0.91	2.15	3.453	0.874	521.517	5.55E-08	0.85

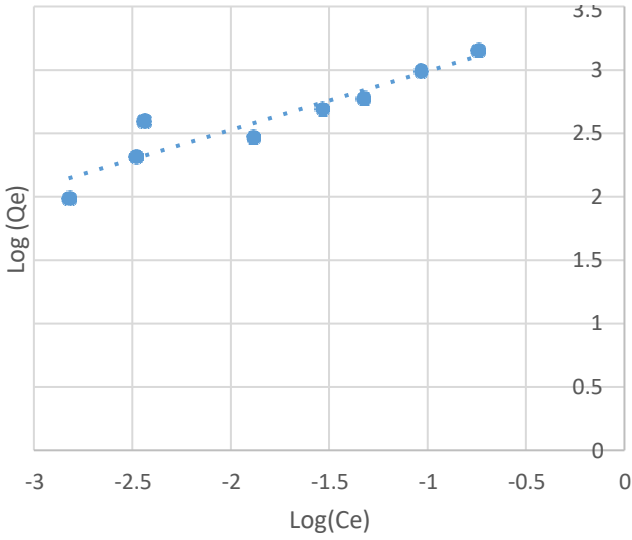
Linear Zinc Sorption Isotherm



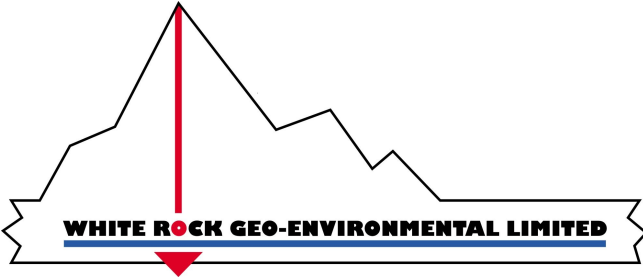
Langmuir



Freundlich



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Client Mold Investments Ltd



Arsenate Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Arsenate 100 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	0.01	-0.1
2	0.05	0.02	39.98	4	0.0005	0.01	0.4
3	0.1	0.04	39.96	4	0.001	0.021	0.79
4	0.25	0.1	39.9	4	0.0025	0.035	2.15
5	0.5	0.2	39.8	4	0.005	0.09	4.1
6	0.75	0.3	39.7	4	0.0075	0.13	6.2
7	1	0.4	39.6	4	0.01	0.18	8.2
8	2.5	1	39	4	0.025	0.38	21.2
9	5	2	38	4	0.05	0.93	40.7
10	10	4	36	4	0.1	2.3	77
11	15	6	34	4	0.15	4.4	106
12	25	10	30	4	0.25	9.3	157

Arsenate Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl

100 g /l

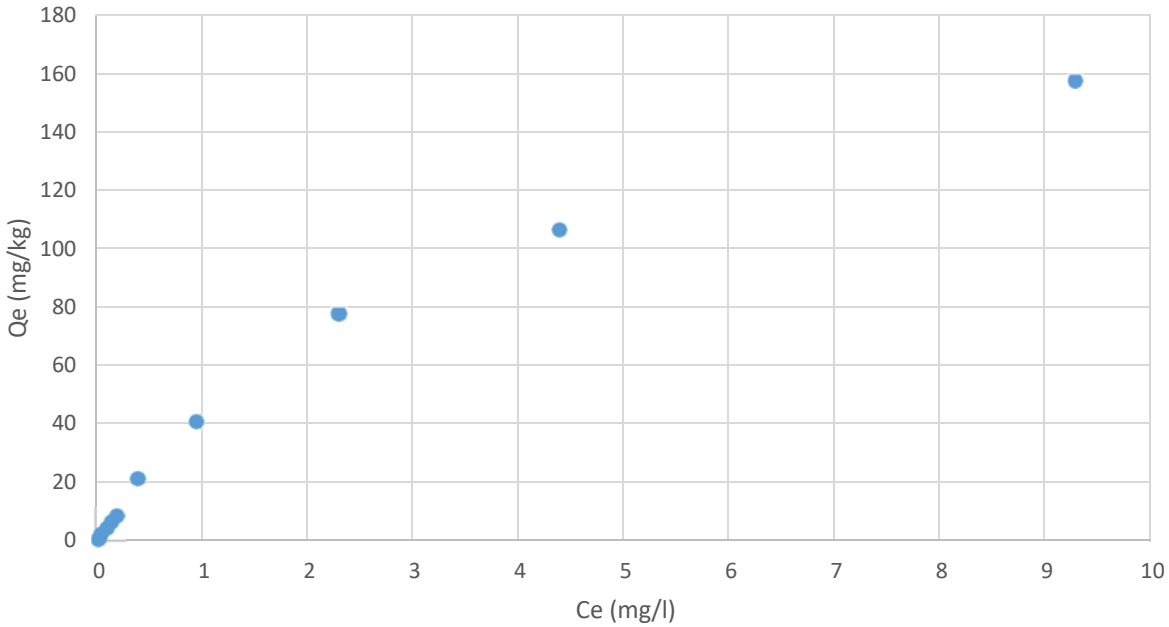
Arsenate100 mg/l

8.6 +/-0.1

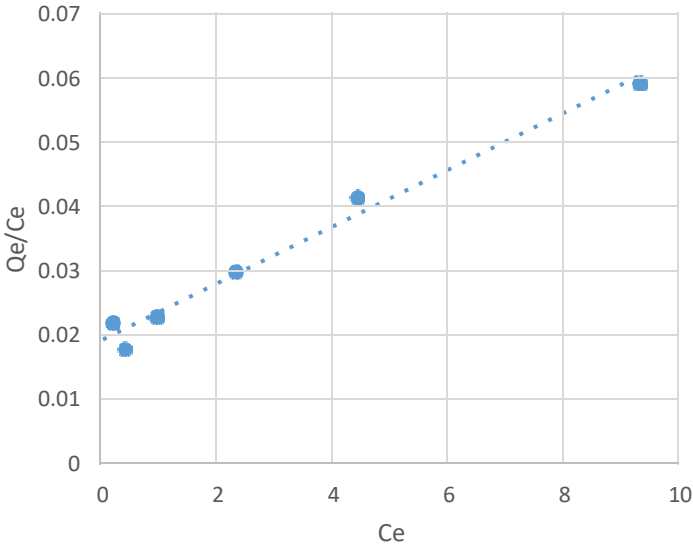
0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
49.419	1.694	0.95	1.12	1.525	0.981	61.038	0.000	0.98

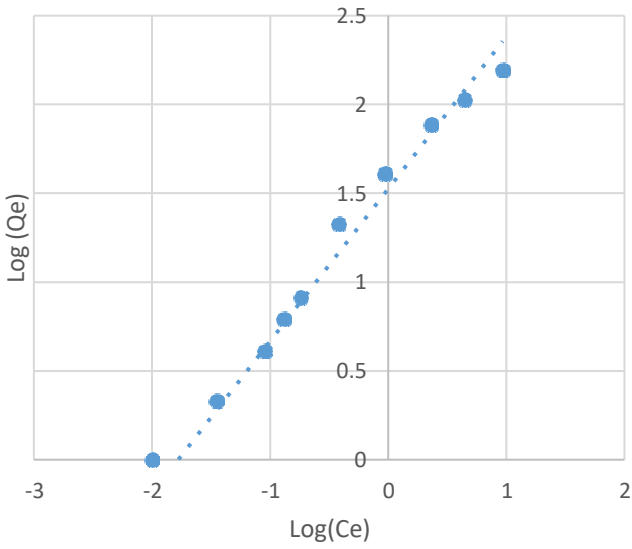
Linear Arsenate Sorption Isotherm



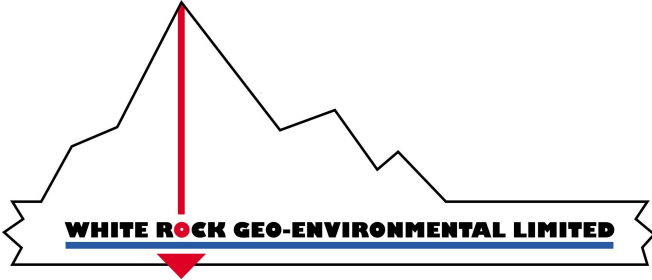
Langmuir



Freundlich



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Client Mold Investments Ltd



Chloride Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Chloride 5000 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	1	-10
2	50	0.4	39.6	4	0.5	53	-30
3	100	0.8	39.2	4	1	110	-100
4	150	1.2	38.8	4	1.5	170	-200
5	250	2	38	4	2.5	270	-200
6	500	4	36	4	5	510	-100
7	750	6	34	4	7.5	740	100
8	1000	8	32	4	10	1100	-1000
9	1250	10	30	4	12.5	1300	-500
10	2500	20	20	4	25	2500	0
11	3750	30	10	4	37.5	3600	1500
12	5000	40	0	4	50	5000	0

Chloride Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl

100 g /l

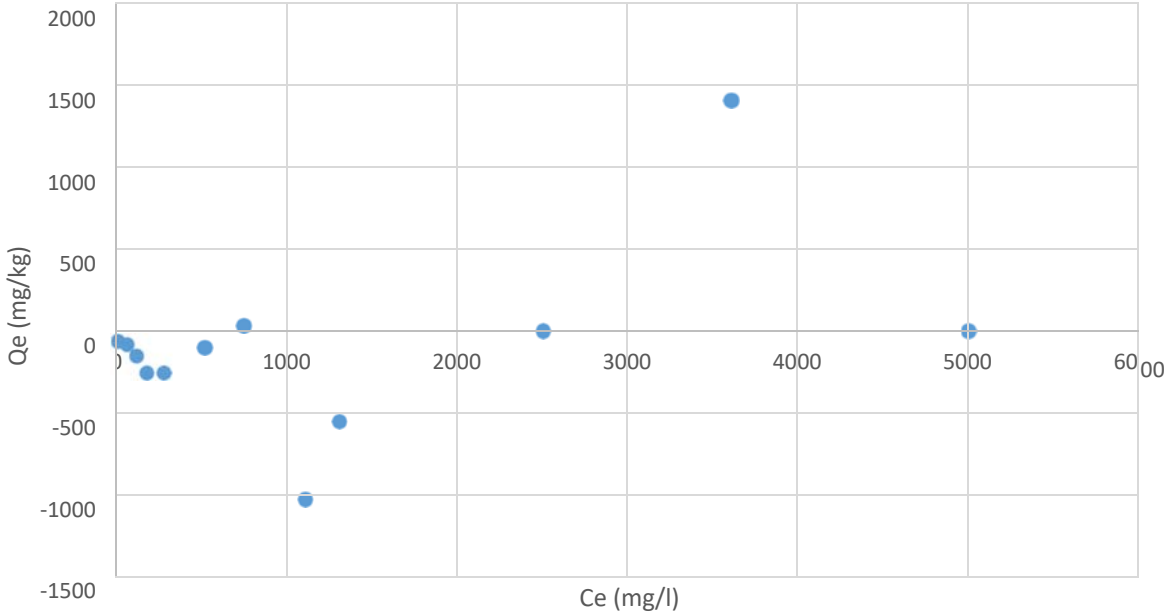
Chloride5000 mg/l

8.6 +/-0.1

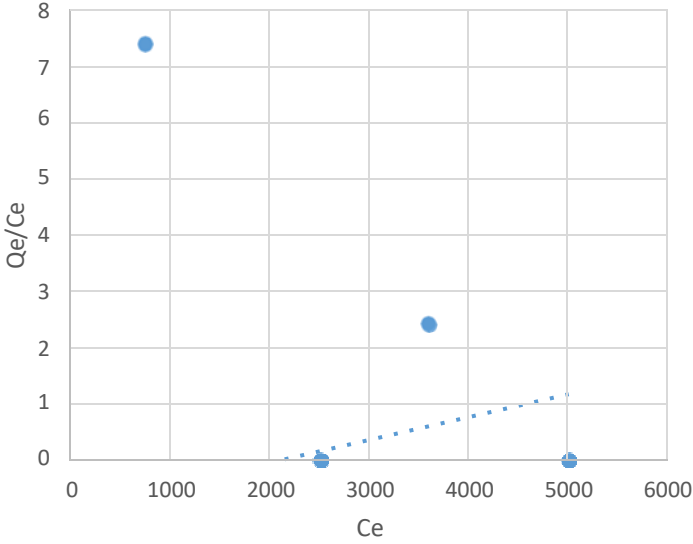
N/A

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogK	R²	n	k	R²	Qmax	k	R²
0.150	-	0.17	0.58	-2.911	1.000	189.770	-0.006	0.08

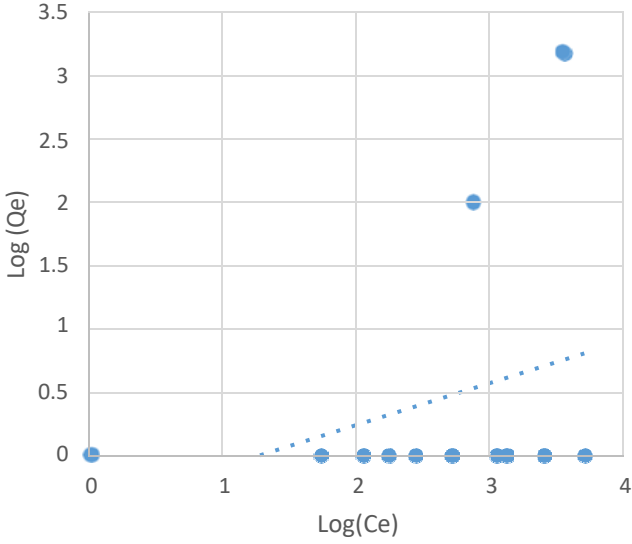
Linear Chloride Sorption Isotherm



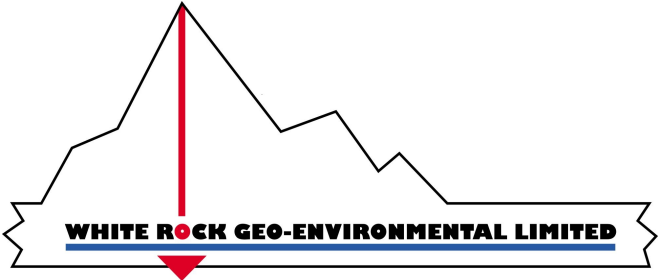
Langmuir



Freundlich



Project No. A192879
Project ID Parrys Quarry
Client Mold Investments Ltd



Sulphate Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Sulphate 5000 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	3.9	-39
2	50	0.4	39.6	4	0.5	52	-20
3	100	0.8	39.2	4	1	97	30
4	150	1.2	38.8	4	1.5	130	200
5	250	2	38	4	2.5	230	200
6	500	4	36	4	5	470	300
7	750	6	34	4	7.5	660	900
8	1000	8	32	4	10	890	1100
9	1250	10	30	4	12.5	1100	1500
10	2500	20	20	4	25	2200	3000
11	3750	30	10	4	37.5	3400	3500
12	5000	40	0	4	50	4600	4000

Sulphate Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl 100 g /l

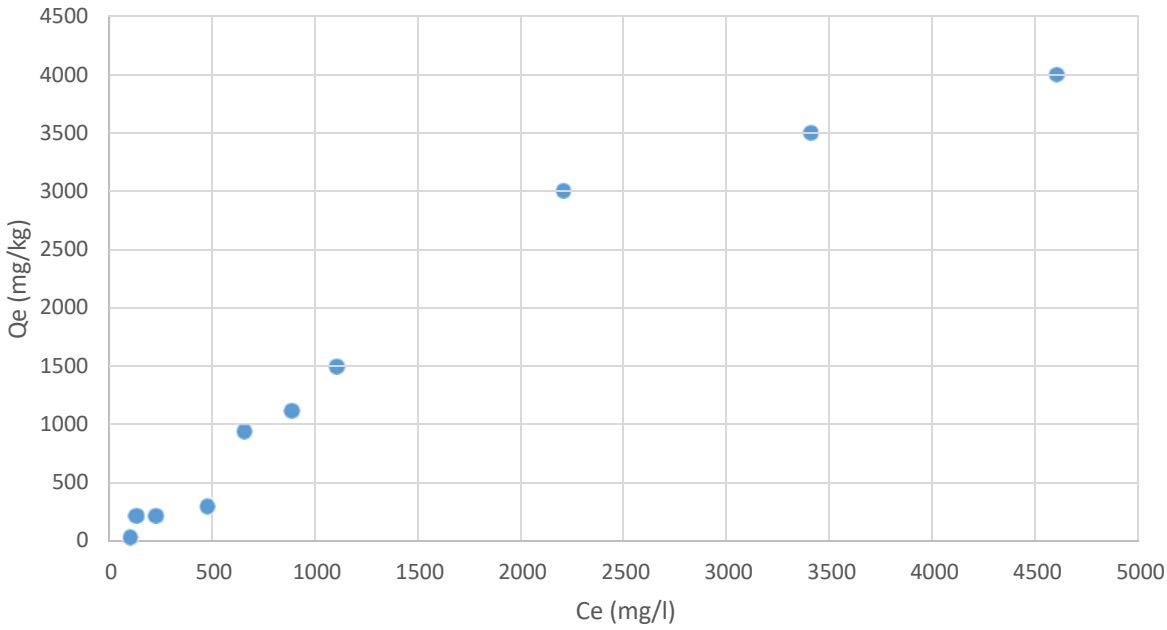
Sulphate 5000 mg/l

8.6 +/-0.1

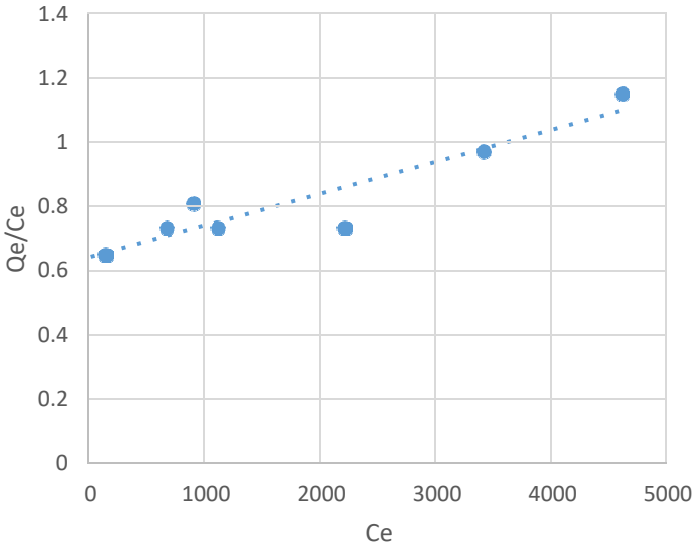
0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogK	R²	n	k	R²	Qmax	k	R²
0.962	-	0.94	0.87	-0.418	0.919	3631.85	0.000	0.85

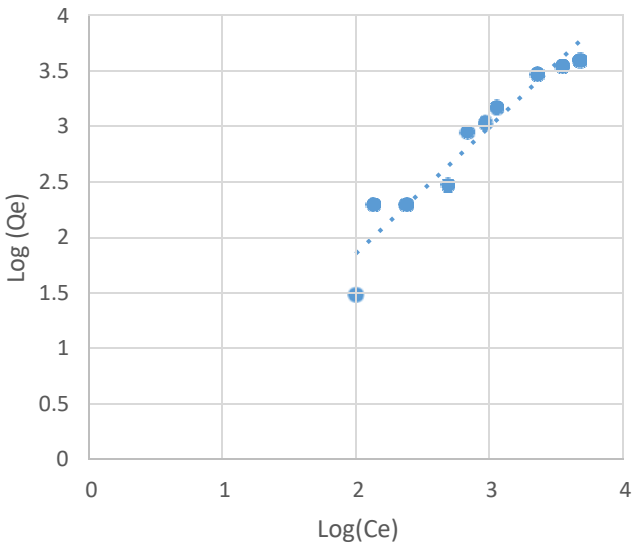
Linear Sulphate Sorption Isotherm



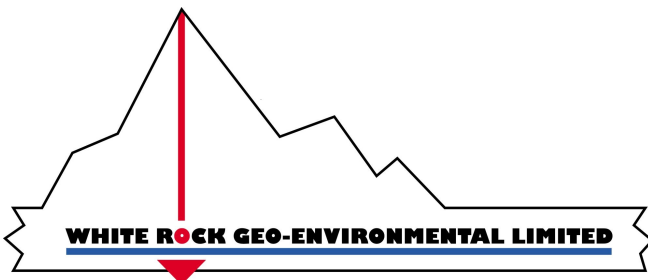
Langmuir



Freundlich



Project No. A192879
Project ID Parrys Quarry
Client Mold Investments Ltd



Ammonium Sorption Isotherm

Sorbent <425 um Parrys Quarry Marl
Sorbent Density 100 g /l
Sorbate Ammonium 1000 mg/l
Target pH 8.6 +/-0.1
Background Electrolyte 0.1M NaCl

Exp #	Sorbate (mg/l)	Volume Sorbate (mls)	BE (mls)	Sorbent (g)	Max Sorption density (mg/g)	Ce (mg/l)	Qe (mg/Kg)
1	0	0	40	4	0	0.096	-0.96
2	0.1	0.004	39.996	4	0.001	0.15	-0.5
3	0.25	0.01	39.99	4	0.0025	0.21	0.4
4	0.5	0.02	39.98	4	0.005	0.31	1.9
5	0.75	0.03	39.97	4	0.0075	0.44	3.1
6	1	0.04	39.96	4	0.01	0.56	4.4
7	2.5	0.1	39.9	4	0.025	1.3	12
8	5	0.2	39.8	4	0.05	2.6	24
9	10	0.4	39.6	4	0.1	5.6	44
10	25	1	39	4	0.25	15	100
11	50	2	38	4	0.5	33	170
12	100	4	36	4	1	68	320

Ammonium Sorption Isotherm

Sorbent

Sorbent Density

Sorbate

Target pH

Background Electrolyte

<425 um Parrys Quarry Marl

100 g /l

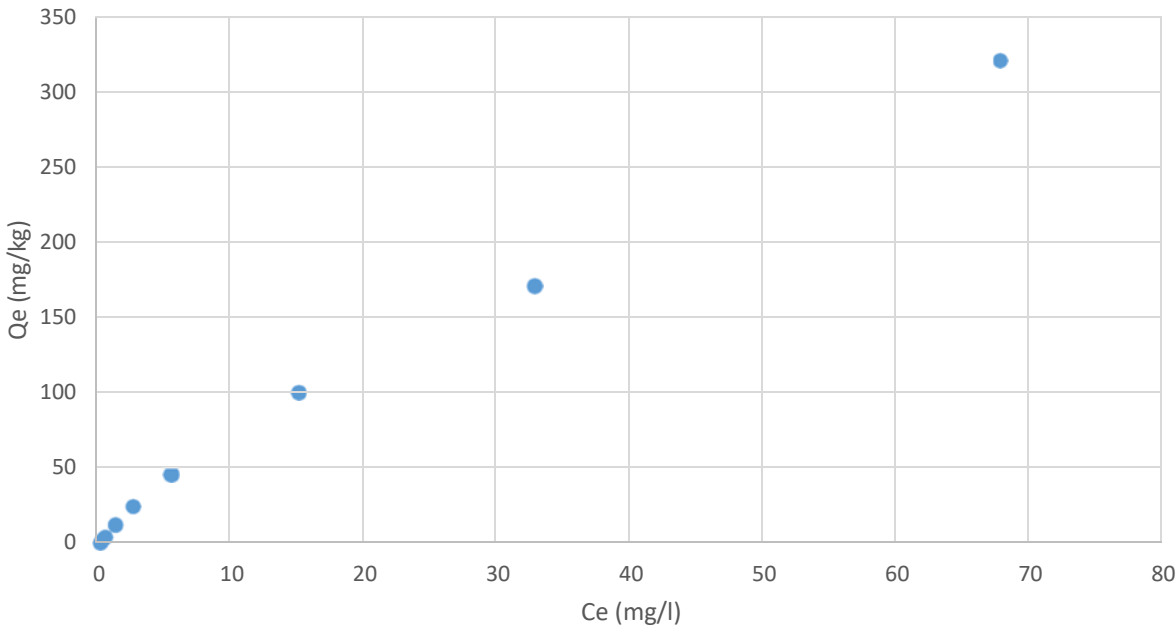
Ammonium1000 mg/l

8.6 +/-0.1

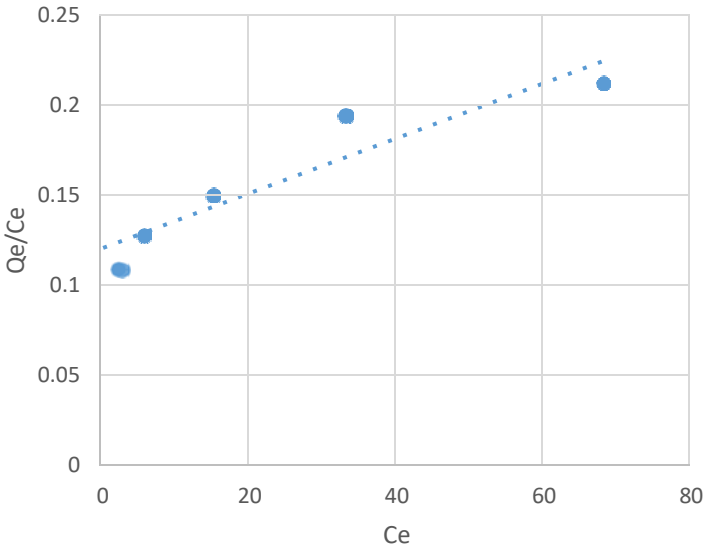
0.1M NaCl

Isotherm Parameters								
Linear			Freundlich			Langmuir		
Kd	LogKd	R²	n	k	R²	Qmax	k	R²
4.754	0.677	0.99	0.973	0.77	0.954	232.487	0.001	0.87

Linear Ammonium Sorption Isotherm



Langmuir



Freundlich

