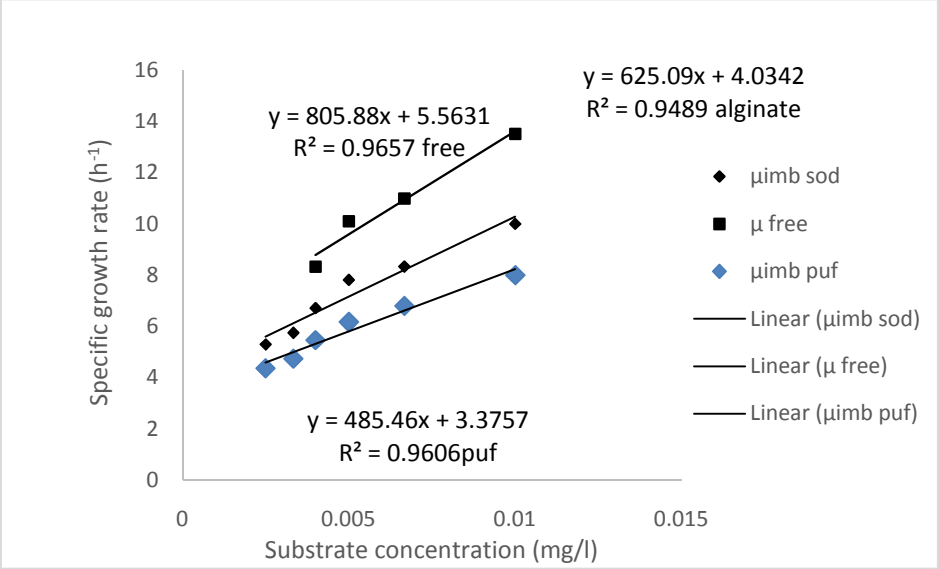
APPENDIX

Data

Shows observed Data of biomass(mg/l) in free and immobilized cell on alginate bead and PUF w.r.t concentration of benzene (mg/l)

S	1/s	μ_{PUF} immobilized	$1/\mu_{PUF}$ immobilized	S	1/S	$\mu_{Alginate}$ immobilized	$1/\mu_{Alginate}$ immobilized	μ free	$1/\mu$
100	0.01	0.125	8	100	0.01	0.1	10	0.074	13.51351
150	0.006667	0.147	6.802721	150	0.006667	0.12	8.333333	0.091	10.98901
200	0.005	0.162	6.17284	200	0.005	0.128	7.8125	0.099	10.10101
250	0.004	0.183	5.464481	250	0.004	0.149	6.711409	0.12	8.333333
300	0.003333	0.211	4.739336	300	0.003333	0.174	5.747126		
400	0.0025	0.229	4.366812	400	0.0025	0.189	5.291005		



Data. Shows calculate the value of μ_{max} and K_s by Monod growth model

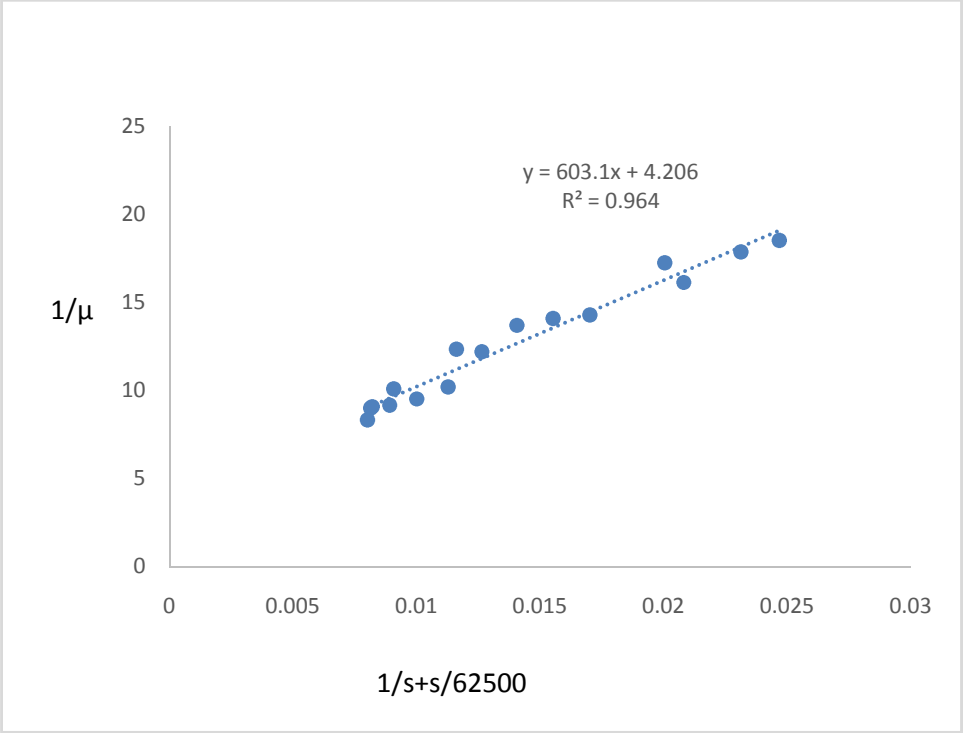
Concentration mg/l	μ_{max} (day^{-1})	K_s ($mg.l^{-1}$)	μ_{max}/ K_s
250	0.179	144.86	0.00123
400	0.247	154.94	0.00159
400	0.296	143.81	0.00206

Data: Shows Monod growth model fitted by using the value of μ_{max} and K_s in free and immobilized cell on alginate and PUF.

S	μ observed free cell	Model fitted free cell	μ observer immobilized alginate beads	Model fitted immobilized alginate beads	μ observed immobilized PUF	Model fitted immobilized PUF
0	0	0	0	0	0	0
100	0.074	0.073103	0.1	0.096886	0.125	0.121406
150	0.091	0.09106	0.12	0.121499	0.147	0.151118
200	0.099	0.10381	0.128	0.139178	0.162	0.172188
250	0.12	0.113331	0.149	0.152492	0.183	0.187908
300			0.174	0.162879	0.211	0.200086
400			0.189	0.178037	0.229	0.217723

Data: shows observed Data of biomass(mg/l) in free cell w.r.t concentration of benzene (mg/l)

S	μ	1/s + s/62500	Free Cell (Without Immobilization)
50	0.062	0.0208	16.12903
100	0.081	0.0116	12.34568
150	0.099	0.009067	10.10101
200	0.11	0.0082	9.090909
250	0.12	0.008	8.333333
300	0.111	0.008133	9.009009
400	0.109	0.0089	9.174312
500	0.105	0.01	9.52381
600	0.098	0.011267	10.20408
700	0.082	0.012629	12.19512
800	0.073	0.01405	13.69863
900	0.071	0.015511	14.08451
1000	0.07	0.017	14.28571
1200	0.058	0.020033	17.24138
1400	0.056	0.023114	17.85714
1500	0.054	0.024667	18.51852



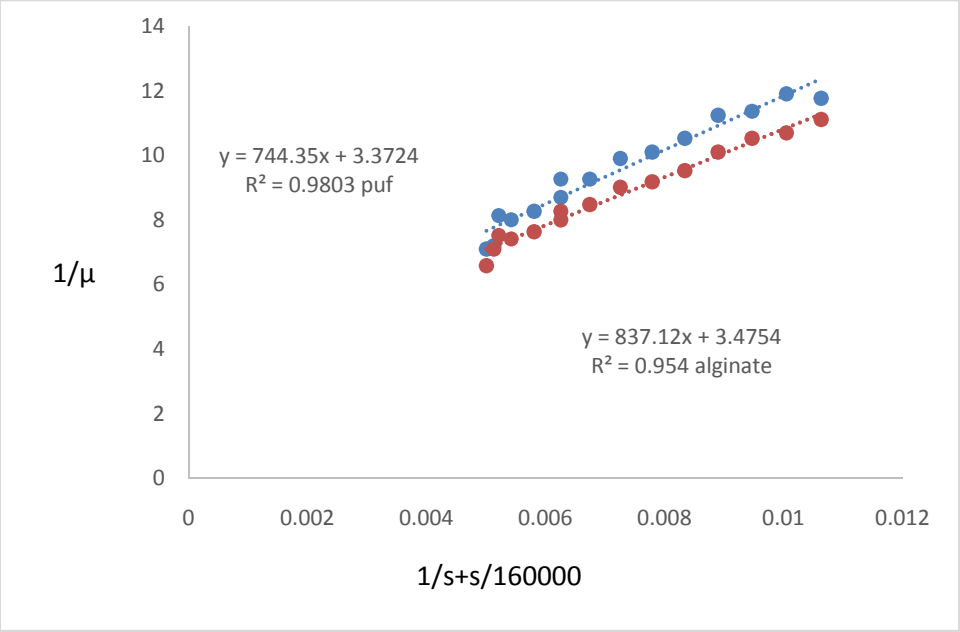
Data: shows observed Data of biomass(mg/l) in immobilized cell on alginate bead and PUF w.r.t concentration of benzene (mg/l)

S	$\mu_{Alginate}$	1/s+s/160000	$1/\mu_{Alginate}$ (Immobilization)	μ_{PUF}	1/s+s/160000	$1/\mu_{PUF}$ (Immobilization)
100	0.085	0.010625	11.76471	0.09	0.010625	11.11111
200	0.108	0.00625	9.259259	0.121	0.00625	8.264463
300	0.123	0.005208	8.130081	0.133	0.005208	7.518797
400	0.141	0.005	7.092199	0.152	0.005	6.578947
500	0.139	0.005125	7.194245	0.141	0.005125	7.092199
600	0.125	0.005417	8	0.135	0.005417	7.407407
700	0.121	0.005804	8.264463	0.131	0.005804	7.633588
800	0.115	0.00625	8.695652	0.125	0.00625	8

900	0.108	0.006736	9.259259	0.118	0.006736	8.474576
1000	0.101	0.00725	9.90099	0.111	0.00725	9.009009
1100	0.099	0.007784	10.10101	0.109	0.007784	9.174312
1200	0.095	0.008333	10.52632	0.105	0.008333	9.52381
1300	0.089	0.008894	11.23596	0.099	0.008894	10.10101
1400	0.088	0.009464	11.36364	0.095	0.009464	10.52632
1500	0.084	0.010042	11.90476	0.0935	0.010042	10.69519

Data: Shows calculate the value of μ_{max}, $K_s$and Ki by Andrew-Haldaneinhibition model

μ_{max} (day^{-1})	K_s ($mg.l^{-1}$)	μ_{max}/ K_s	Ki ($mg.l^{-1}$)
0.237	143.4	0.00039	435.84
0.287	240.87	0.00119	664.25
0.296	220.71	0.00134	724.93



Data: Shows Andrew-Haldane inhibition model fitted by using the value of μ_{max}, K_s and Kiin free and immobilized cell on alginate and PUF.

S	Immobilized on PUF observed	Immobilized on PUF Haldane-Andrews Model fitted	Immobilized on Alginate bead observed	Immobilized on Alginate bead Haldane-Andrews Model fitted	S	Free Cell observed	Free Cell Haldane-Andrews Model fitted
0	0	0	0	0	0	0	0
100	0.09	0.088489	0.085	0.080635	50	0.062	0.059507
200	0.121	0.124399	0.108	0.127654	100	0.081	0.088983
300	0.133	0.137704	0.123	0.142216	150	0.099	0.103036
400	0.152	0.140714	0.141	0.145536	200	0.11	0.108921
500	0.141	0.138893	0.139	0.143526	250	0.12	0.110376
600	0.135	0.13482	0.125	0.139044	300	0.111	0.109402
700	0.131	0.129773	0.121	0.133513	400	0.109	0.104118
800	0.125	0.124399	0.115	0.127654	500	0.105	0.09737
900	0.118	0.119032	0.108	0.121833	600	0.098	0.090608
1000	0.111	0.113839	0.101	0.11623	700	0.082	0.084313
1100	0.109	0.108902	0.099	0.110927	800	0.073	0.078613
1200	0.105	0.104253	0.095	0.105957	900	0.071	0.073504
1300	0.099	0.099897	0.089	0.10132	1000	0.07	0.068939
1400	0.095	0.095828	0.088	0.097006	1400	0.058	0.05493
1500	0.0935	0.092031	0.084	0.092995	1500	0.056	0.052235

Sequence of Bacillus sp. M2 and M3

>*Bacillus*sp.M2(KU845307)GGCATTGGGGCAGCTATACATGCAGTCGAGCGAACTGATT
AGAAGCTTGCTTCTATGACGTTAGCGGCGGACGGGTGAGTAACACGTGGGCAACCTGC
CTGTAAGACTGGGATAACTTCGGGAAACCGAAGCTAATACCGGATAGGATCTTCTCCT
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16S amplicon sequence obtained using**Bac8F** (forward) primer

>*Bacillus*sp.M3(KU845307)TGGCCGTGGGGCAGCTATACATGCAGTCGAGCGAACTGAT
TAGAAGCTTGCTTCTATGACGTTAGCGGCGGACGGGTGAGTAACACGTGGGCAACCTG
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16S amplicon sequence obtained using**Bac8F** (forward) primer

>*Bacillus*sp.M4(KU845309)GAGGCATGCGGGGTCTATAATGCAGTCGAGCGAACTGATT
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16S amplicon sequence obtained using **Bac8F** (forward) primer