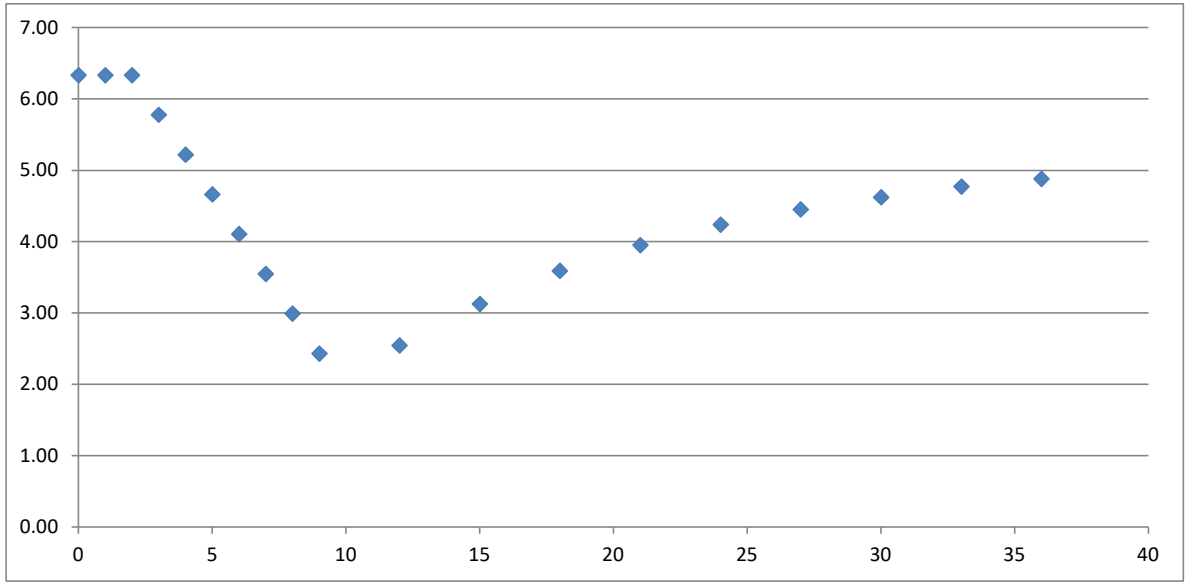
Cell Growth Problem 2B

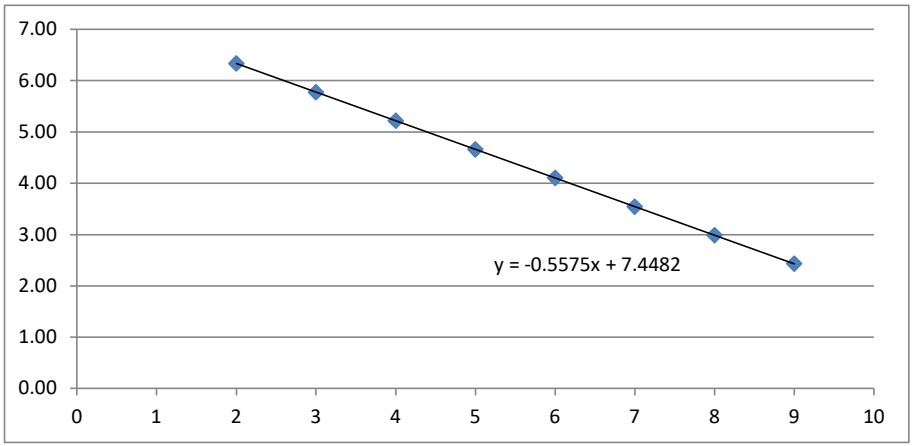
Original Data

Time	Conc. O2
0	6.33
1	6.33
2	6.33
3	5.78
4	5.22
5	4.66
6	4.10
7	3.55
8	2.99
9	2.43
12	2.54
15	3.12
18	3.59
21	3.95
24	4.24
27	4.45
30	4.62
33	4.77
36	4.88



Phase 1 - without aeration

Time	Conc O2
2	6.33
3	5.78
4	5.22
5	4.66
6	4.10
7	3.55
8	2.99
9	2.43

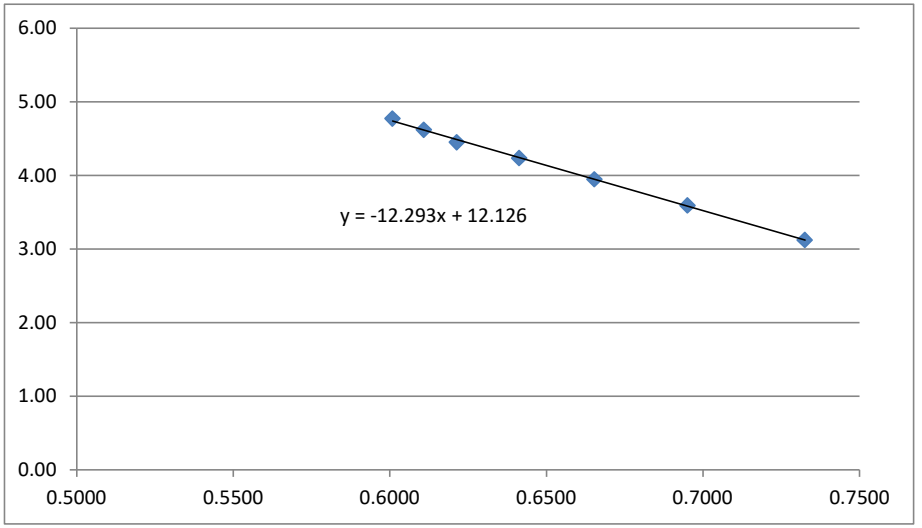


SLOPE:	-0.5575	mg/Ls
OUR	**0.56**	**mg/Ls**
Biomass (X)	0.96	g/L
q_o	**2.09**	**g/gh**

= OUR (mg/Ls) x (3600 s/h) x (L/0.96 g) x (g/1000 mg)

Phase 2 - with aeration

Time (s)	Conc O2 (mg/L)	OUR (mg/Ls)	dC/dt (mg/Ls)	dC/dt + OUR (mg/Ls)	Conc O2 (mg/L)
12	2.54	0.5575			
15	3.12	0.5575	0.1751	0.7326	3.12
18	3.59	0.5575	0.1375	0.6950	3.59
21	3.95	0.5575	0.1078	0.6653	3.95
24	4.24	0.5575	0.0838	0.6413	4.24
27	4.45	0.5575	0.0638	0.6213	4.45
30	4.62	0.5575	0.0533	0.6108	4.62
33	4.77	0.5575	0.0433	0.6008	4.77
36	4.88	0.5575			



SLOPE:	-12.293	s	
k_La:	0.0813	s^{-1}	= 1/SLOPE
k_La:	**293**	**h^{-1}**	= k_La (s^{-1}) x (3600 s/h)

Heat Generation

$Q_{MET} = 0.12(OUR)V$ This equation requires OUR to have units of mmol/Lh

OUR	0.558	mg/Ls	
OUR	2.01	g/Lh	= OUR (mg/Ls) x (3600 s/h) x (g/1000 mg)
OUR	62.7	mmol/Lh	= OUR (g/Lh) x (mol/32 g) x (1000 mmol/mol)
Q_{MET}	**301**	**kcal/h**	= 0.12 x (OUR mmol/Lh) x 40 L