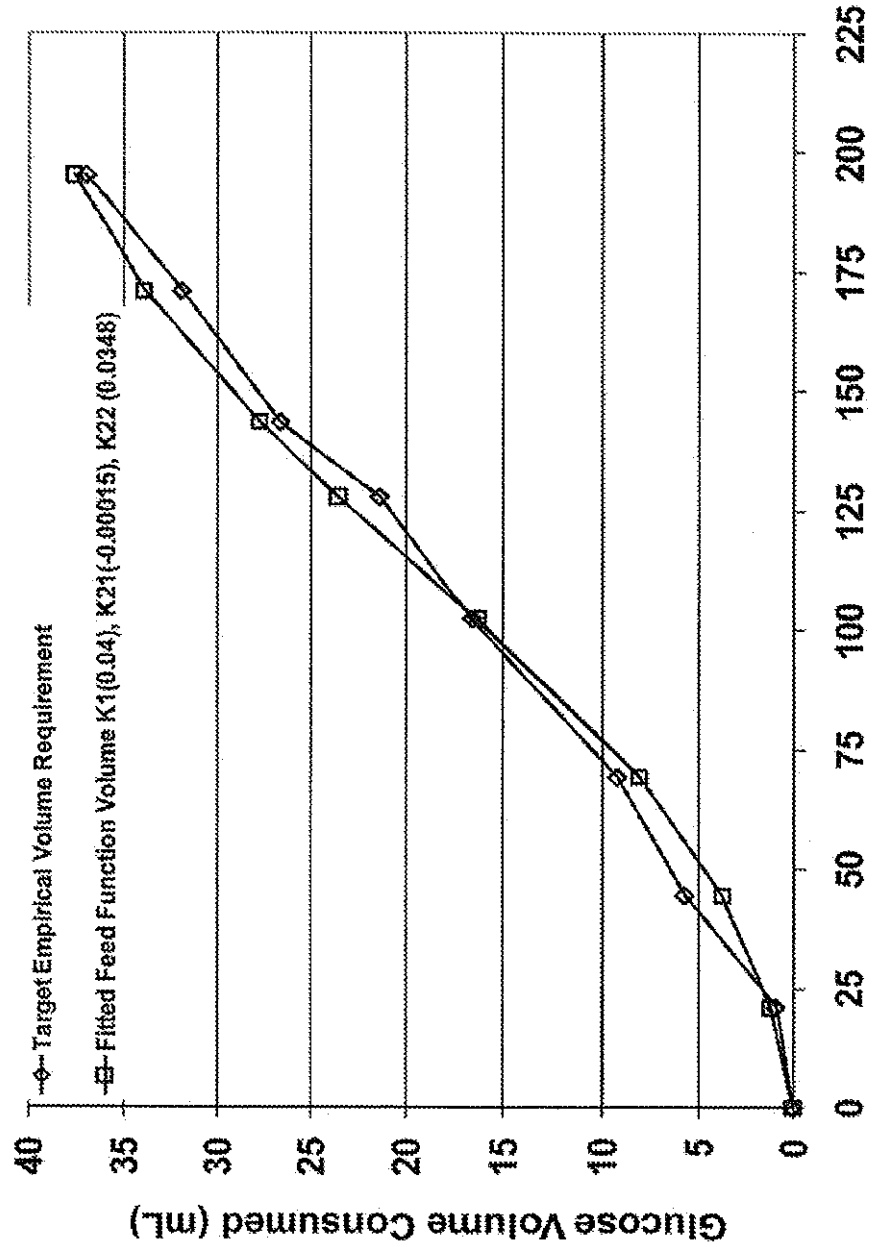
Target Empirical Volume Requirement
Fitted Feed Function Volume K1(0.04), K21(-0.00015), K22 (0.0348)
Glucose Volume Consumed (mL)
Production Duration (hr)
0
5
10
15
20
25
30
35
40
0
25
50
75
100
125
150
175
200
225

Figure 1

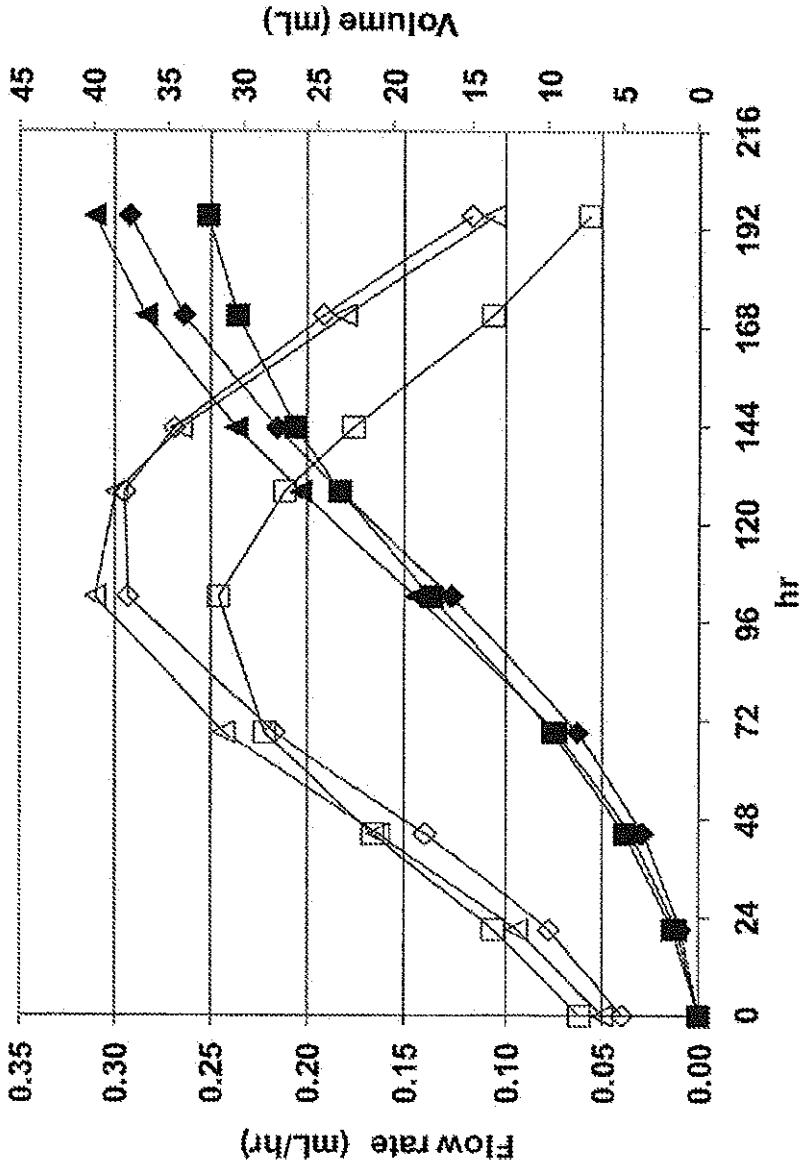
Volume (mL)
45
40
35
30
25
20
15
10
5
0
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Flow rate (mL/hr)
0
24
48
72
96
120
144
168
192
216
hr

Figure 2

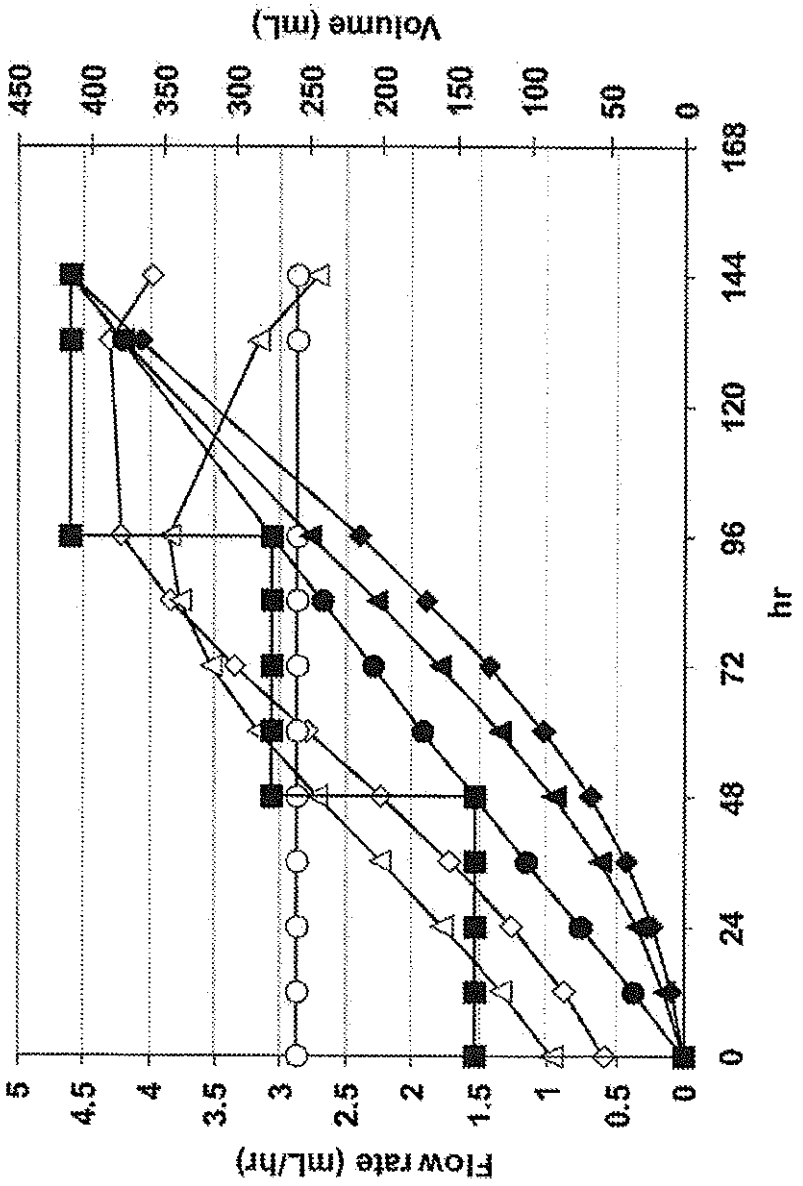
Volume (mL)
450
400
350
300
250
200
150
100
50
0
Flow rate (mL/hr)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
24
48
72
96
120
144
168
hr

Figure 3

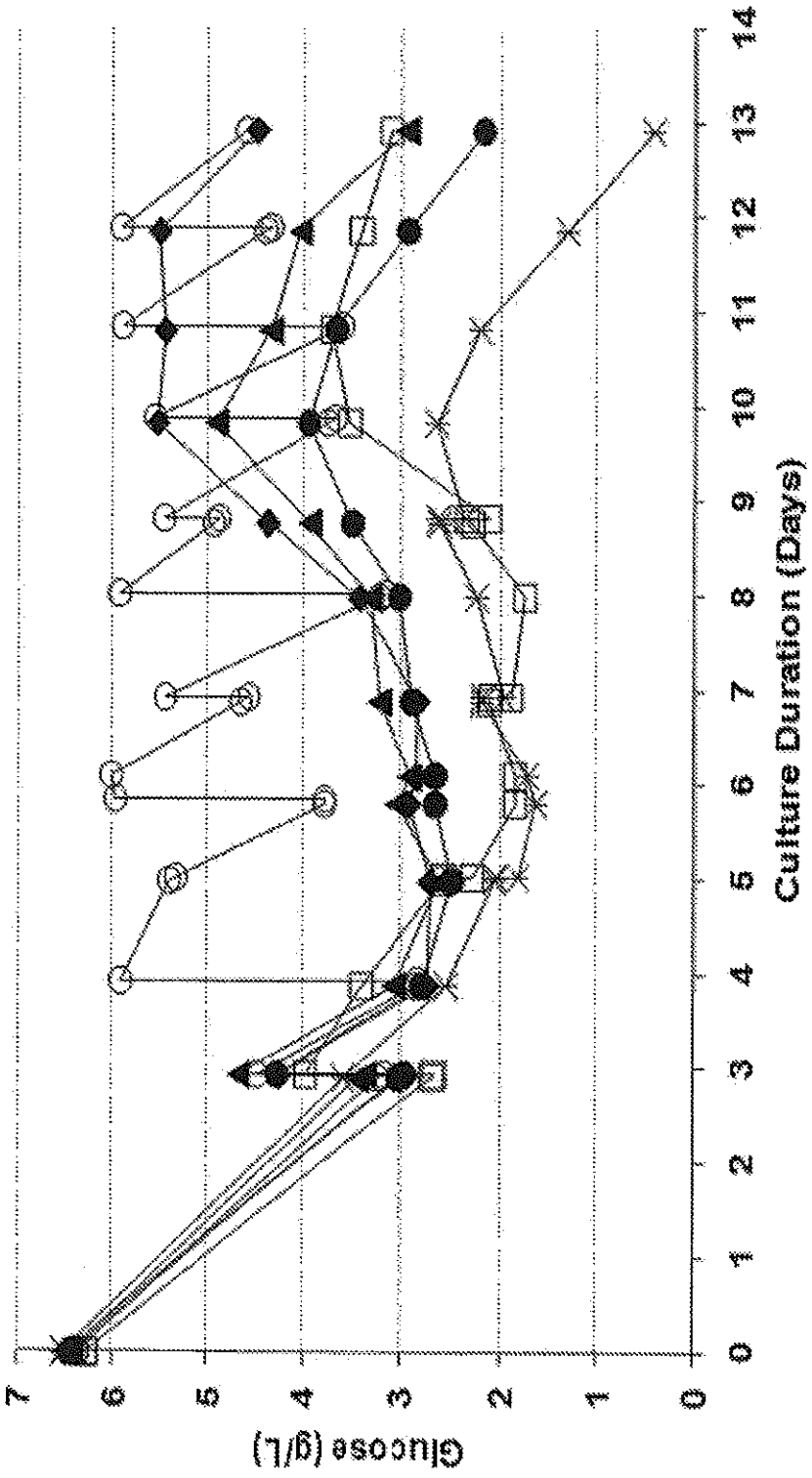
Glucose (g/L)
7
6
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Culture Duration (Days)

Figure 4a

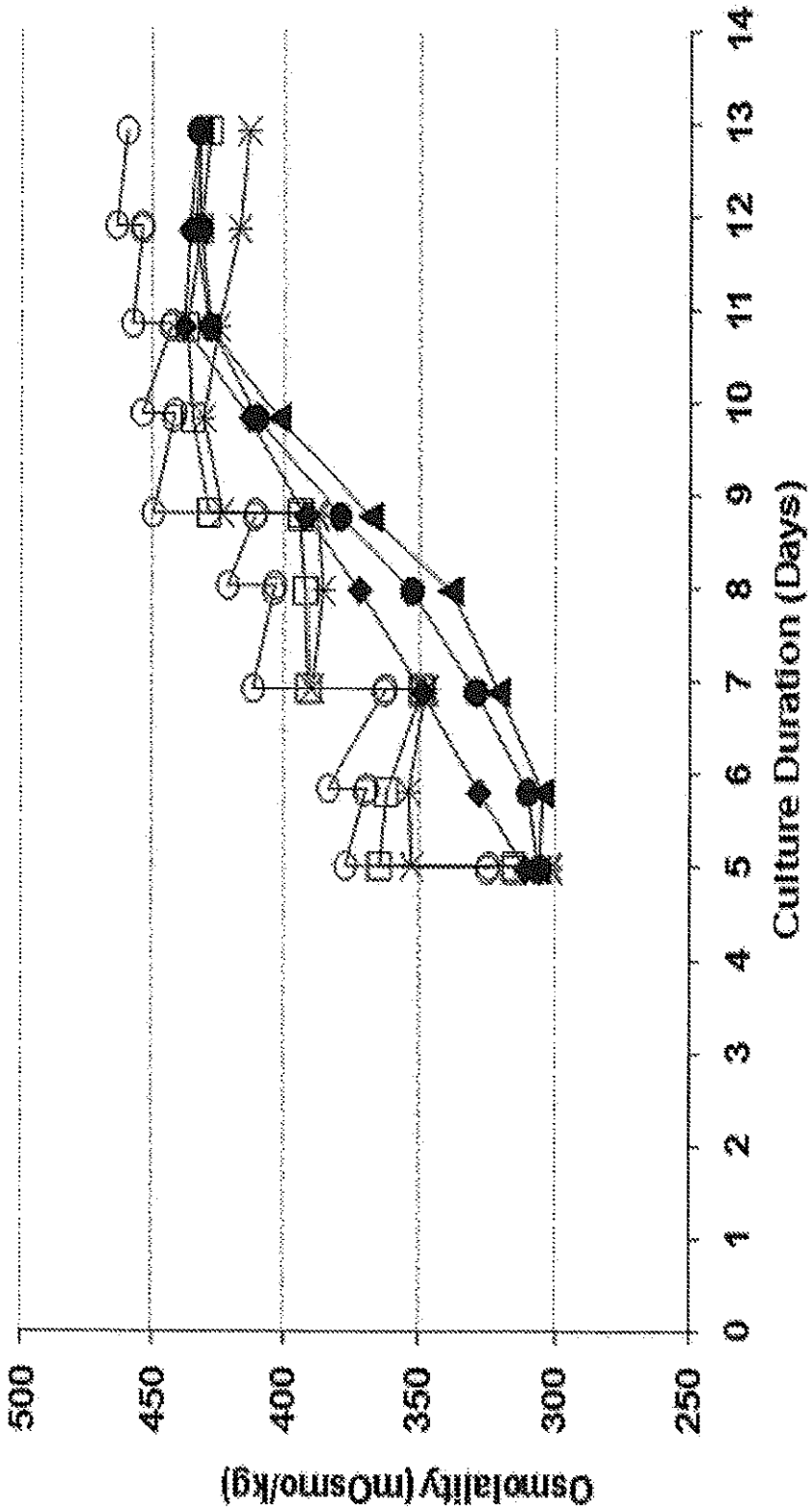
Osmolality (mOsmo/kg)
500
450
400
350
300
250
Culture Duration (Days)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Figure 4b

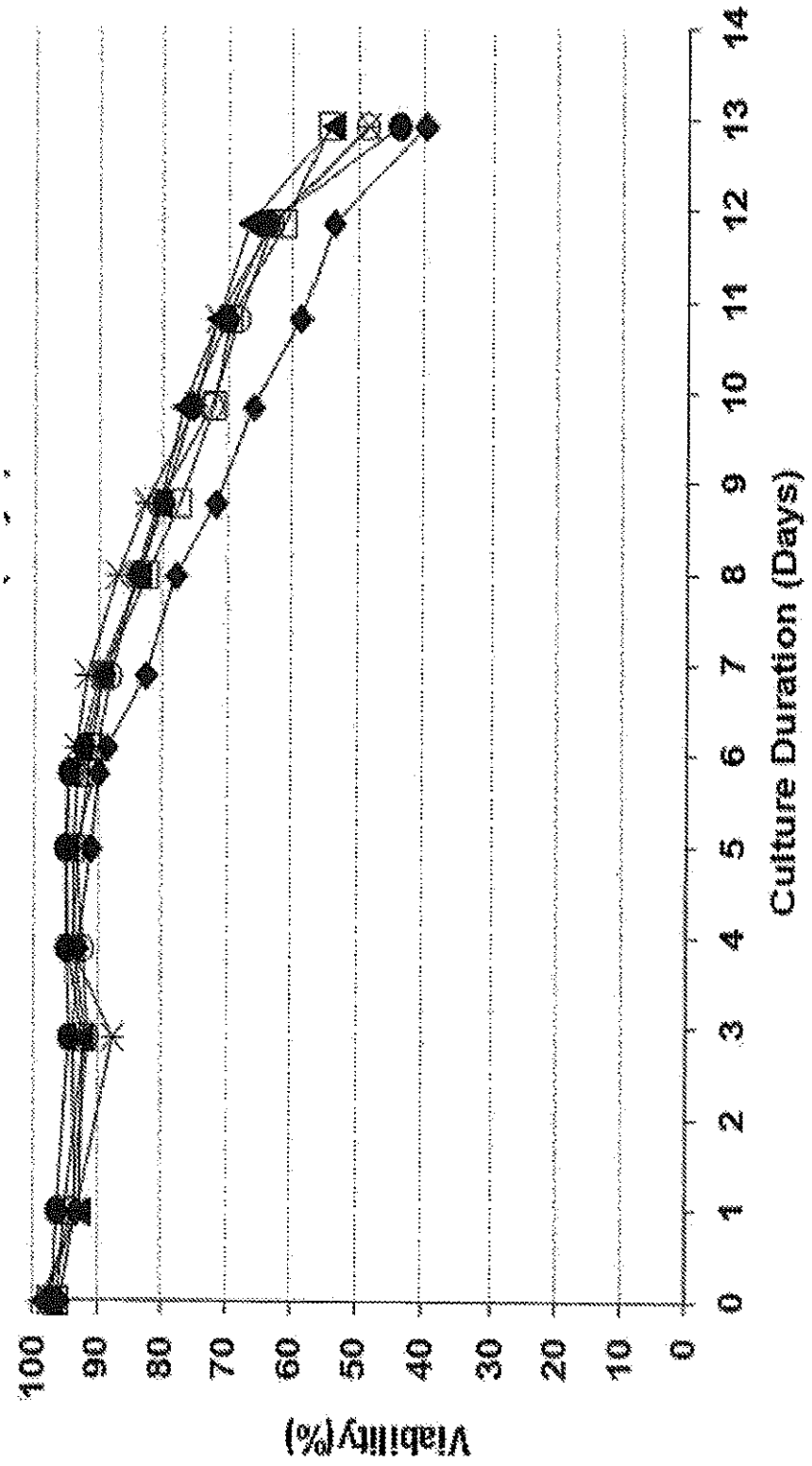
Viability (%)
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Culture Duration (Days)

Figure 4c

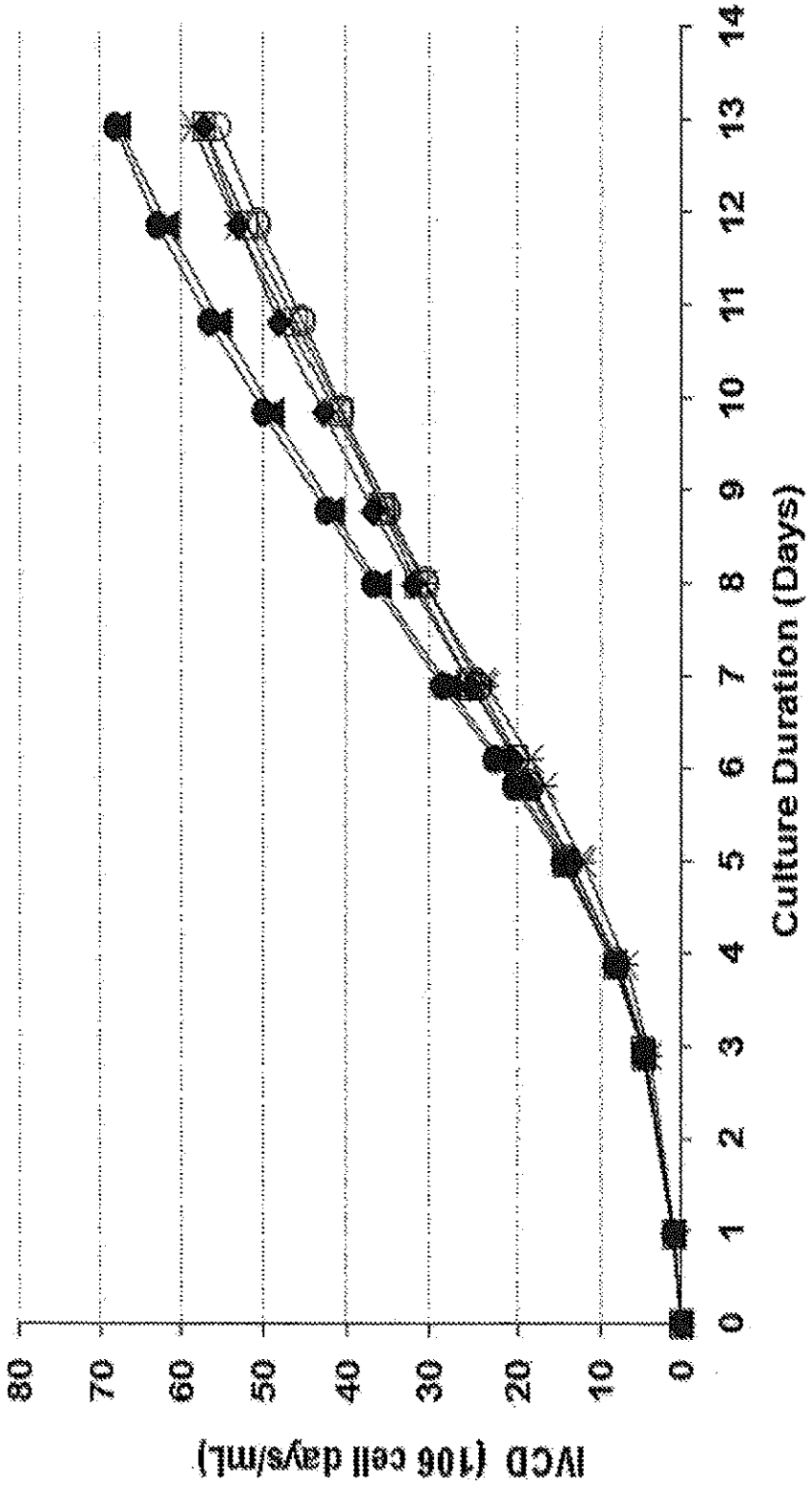
IVCD (106 cell days/mL)
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Culture Duration (Days)

Figure 4d

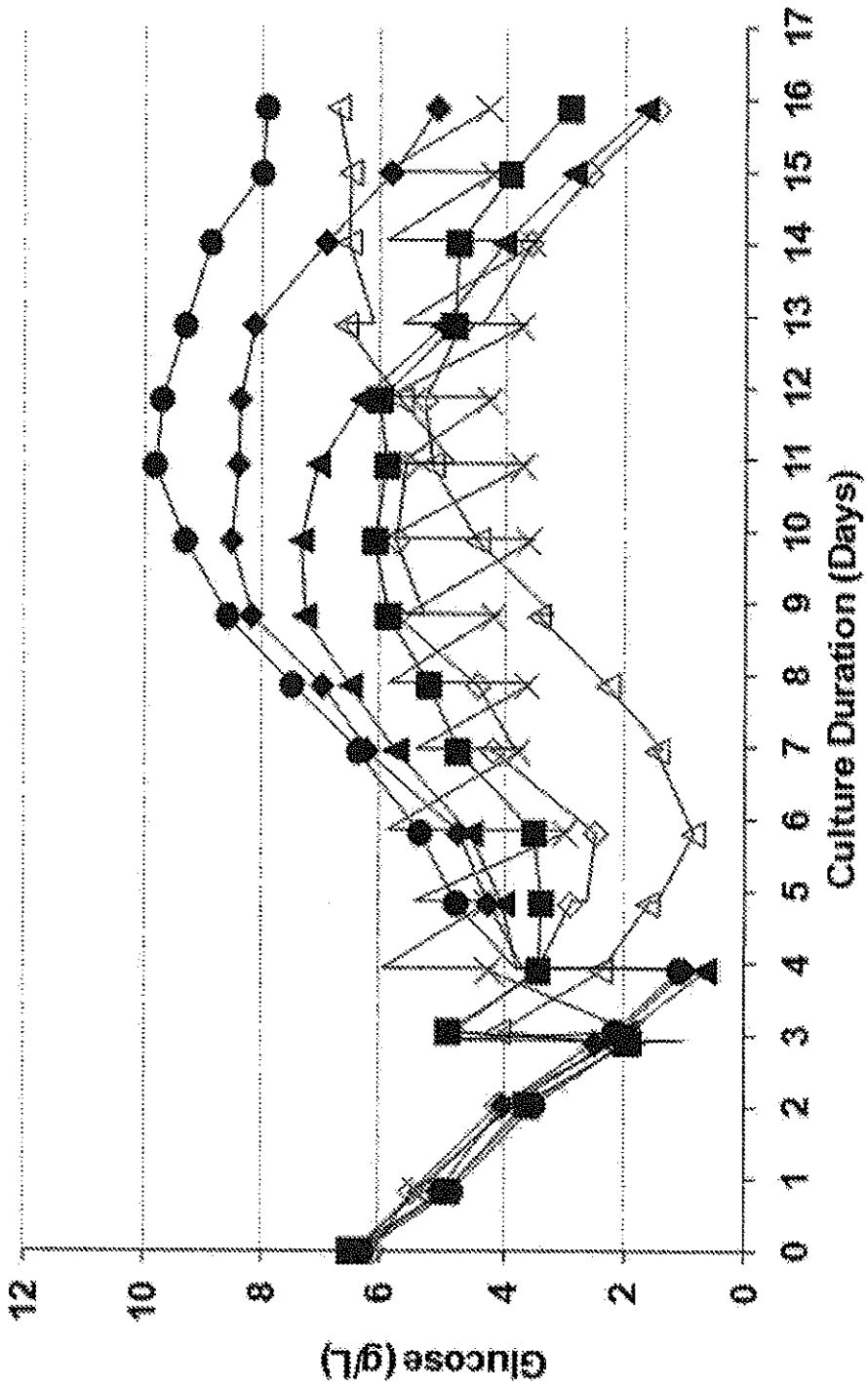
Glucose (g/L)
0
2
4
6
8
10
12
Culture Duration (Days)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Figure 5a

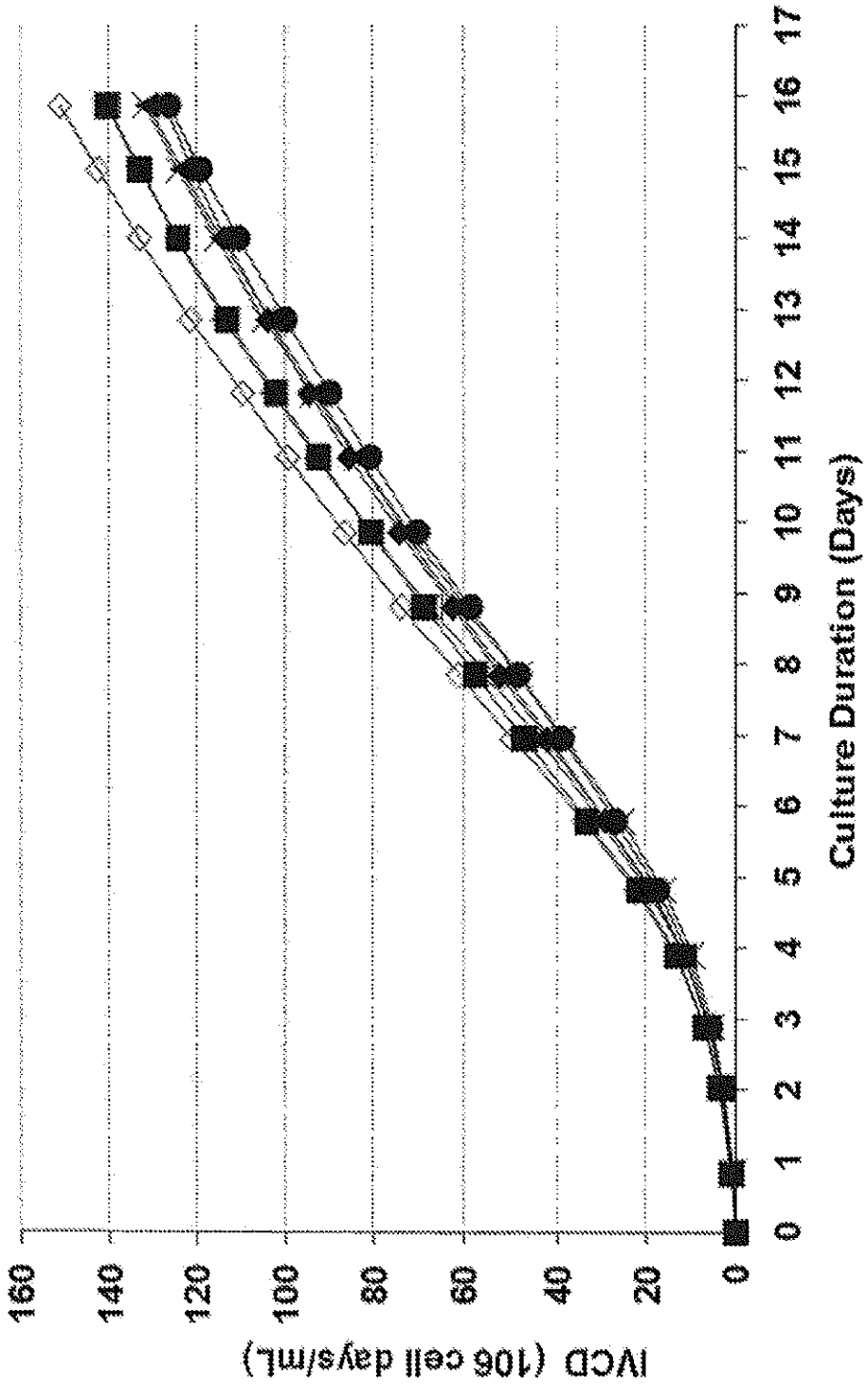
IVCD (106 cell days/mL)
160
140
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Culture Duration (Days)

Figure 5b

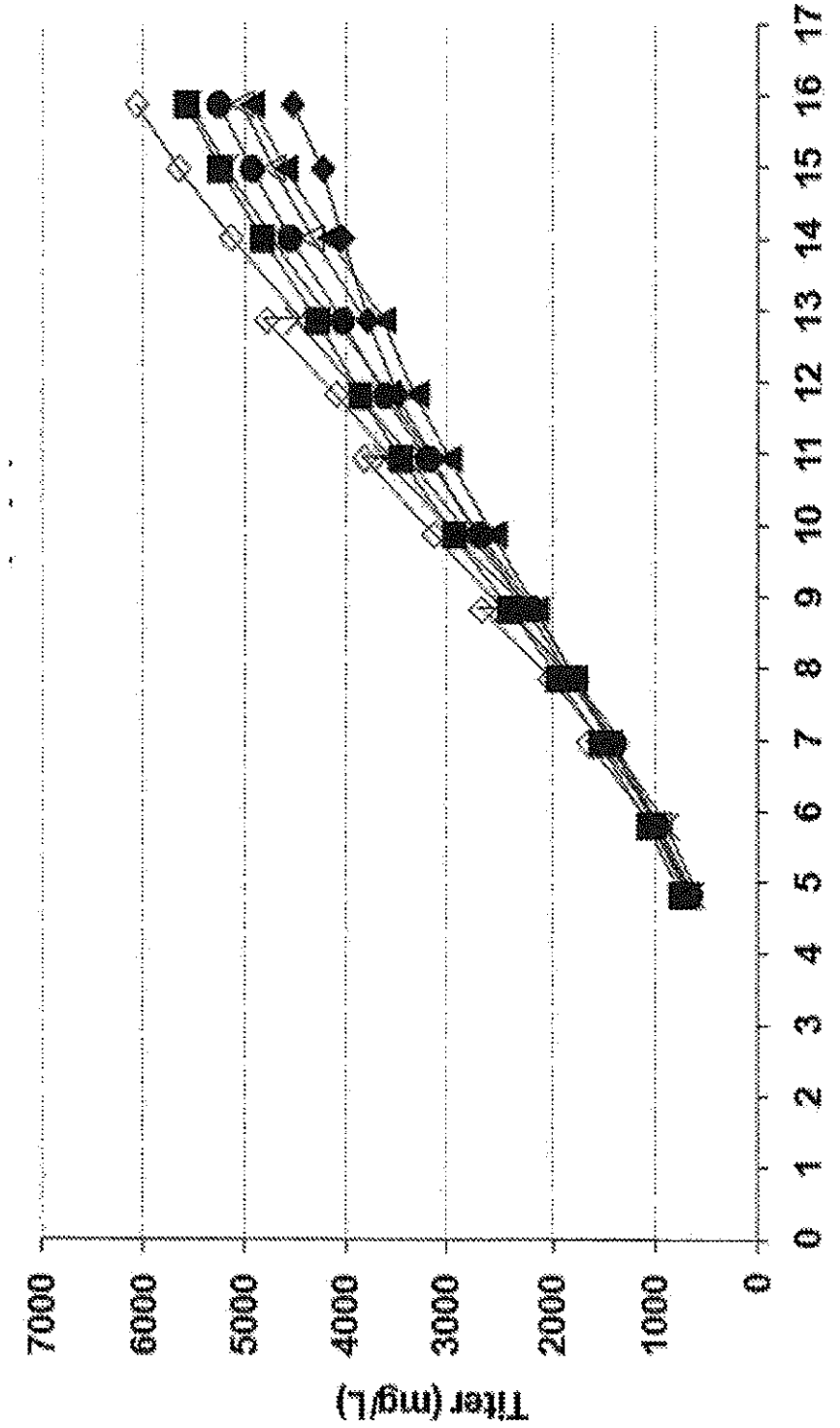
Titer (mg/L)
7000
6000
5000
4000
3000
2000
1000
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Culture Duration (Days)

Figure 5c

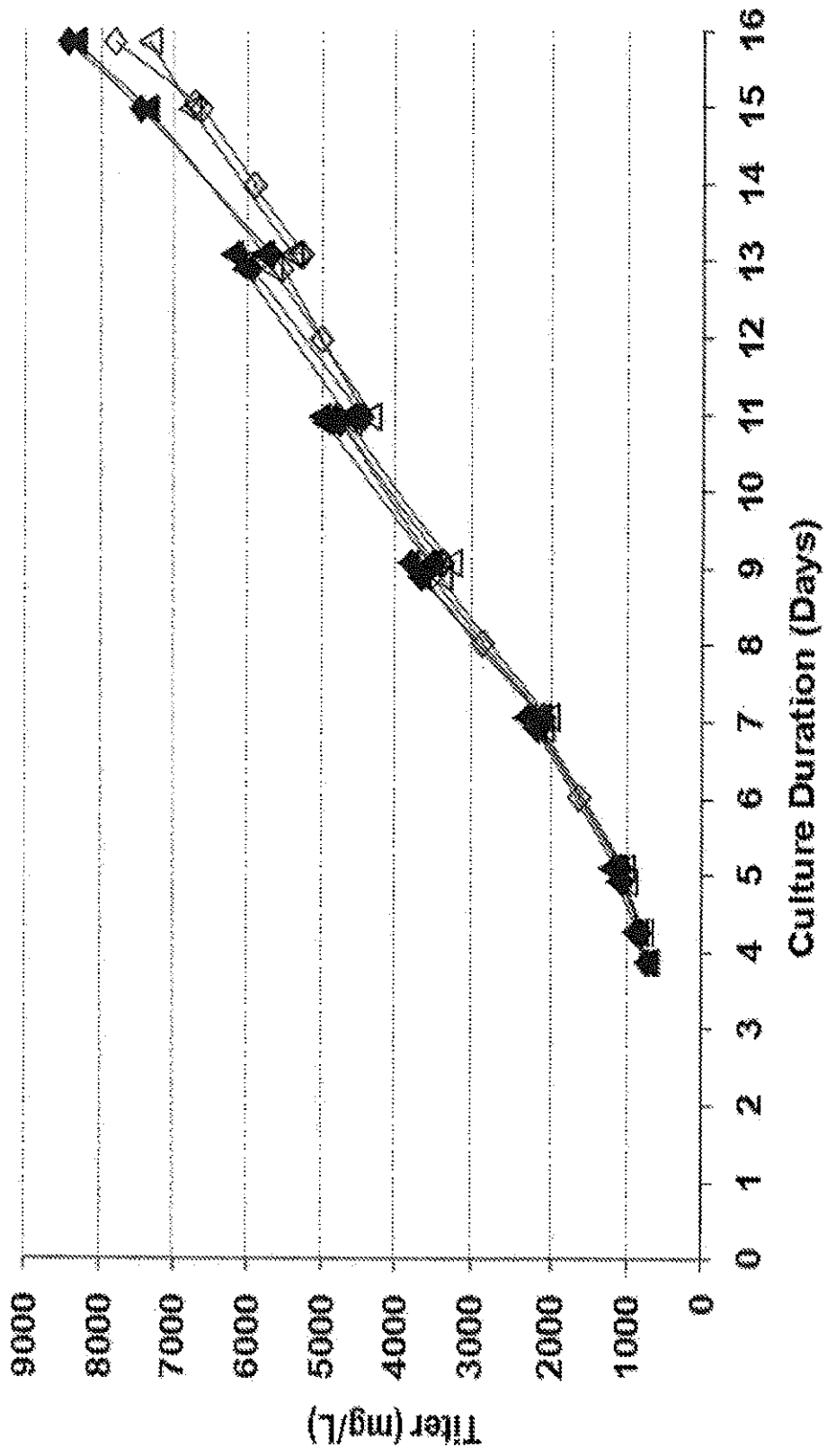
Titer (mg/L)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Culture Duration (Days)

Figure 6a

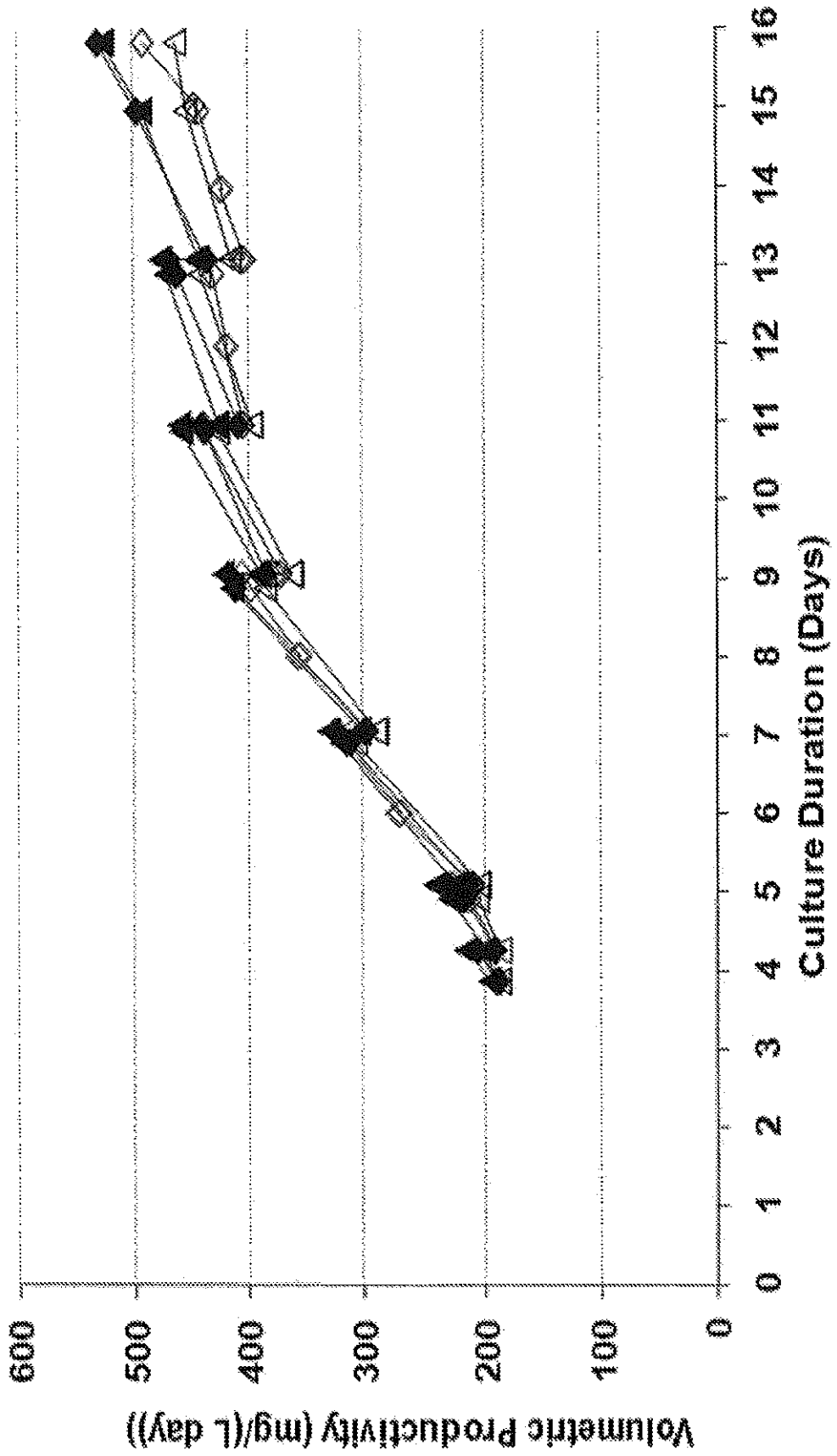
Volumetric Productivity (mg/(L day))
600
500
400
300
200
100
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Culture Duration (Days)

Figure 6b

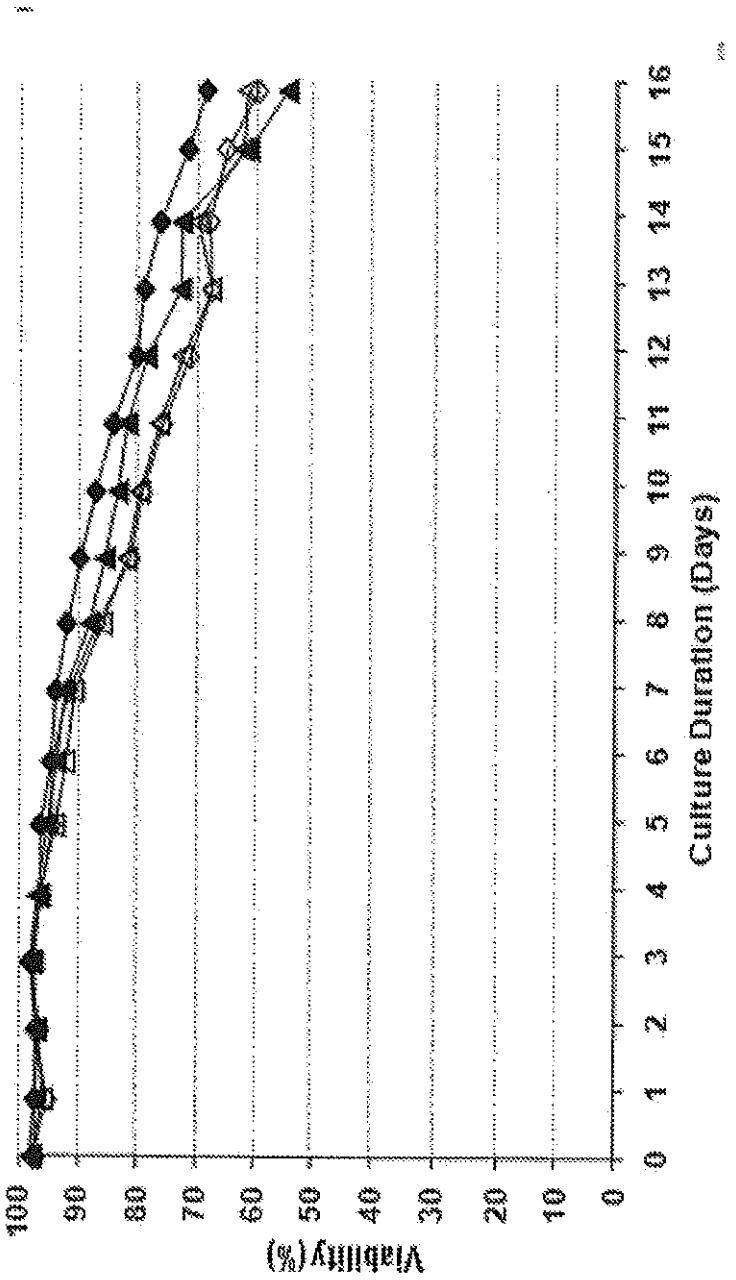
Viability (%)
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Culture Duration (Days)

Figure 6c

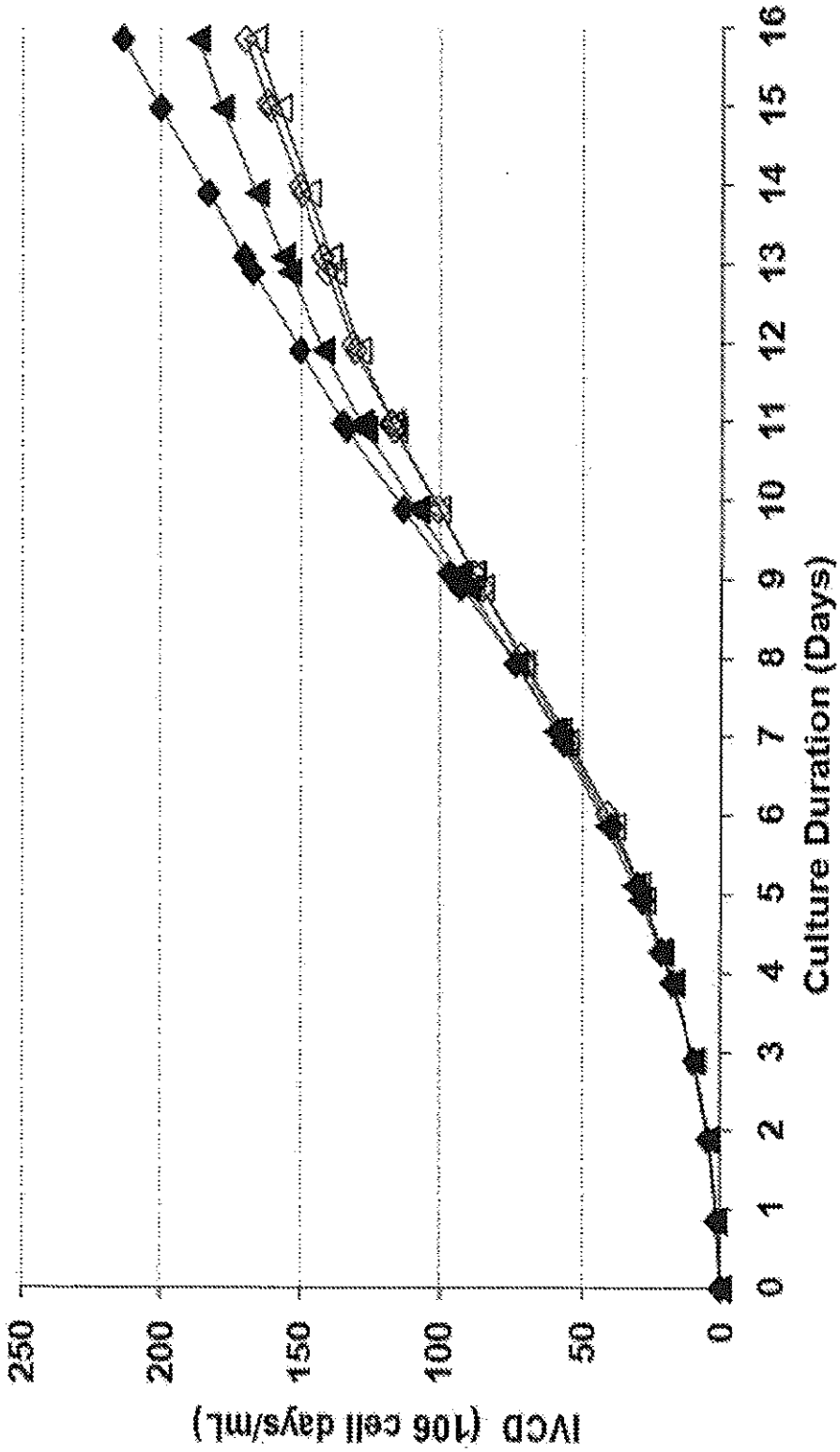
IVCD (106 cell days/mL)
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Culture Duration (Days)

Figure 6d

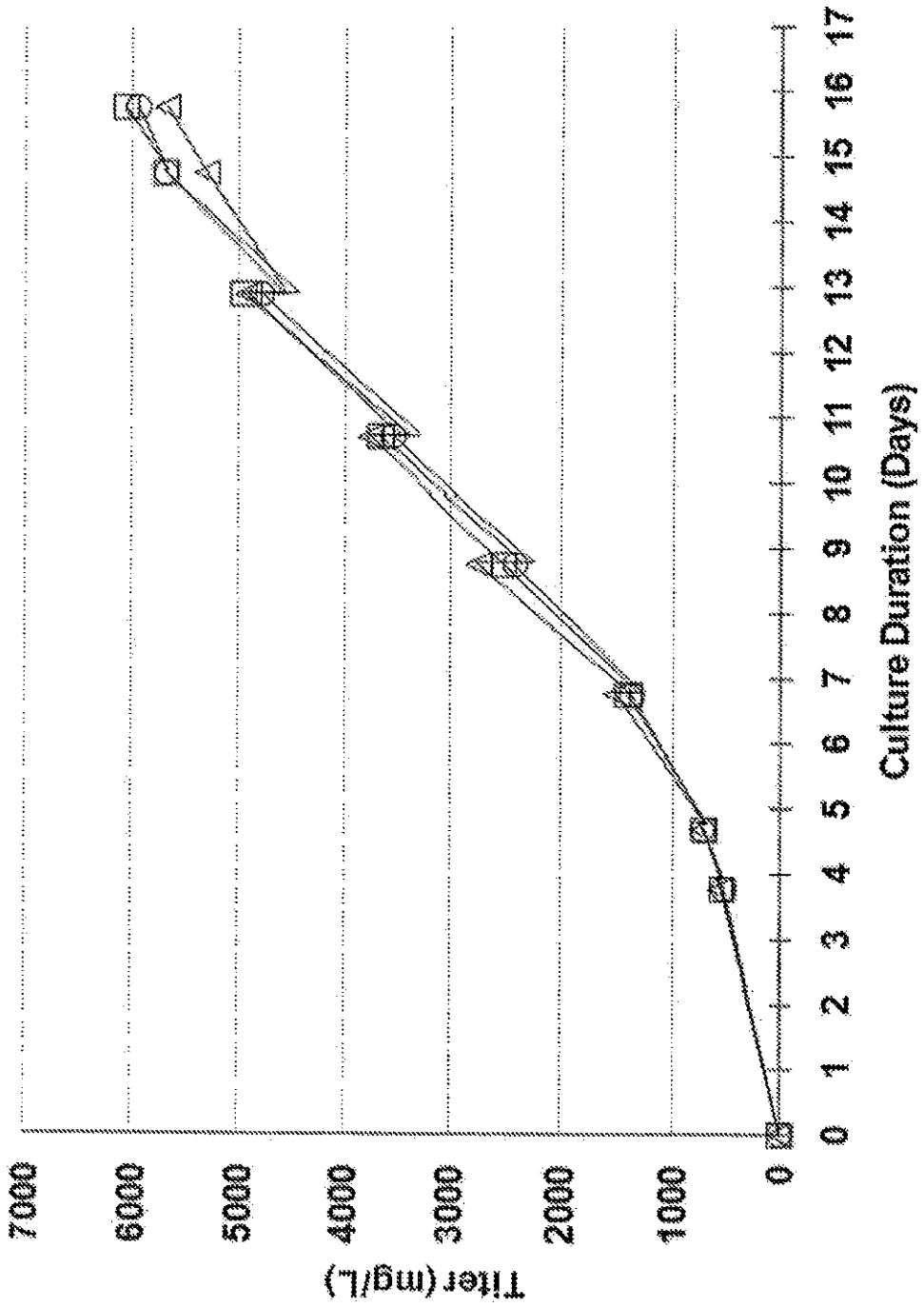
Titer (mg/L)
7000
6000
5000
4000
3000
2000
1000
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Culture Duration (Days)

Figure 7a

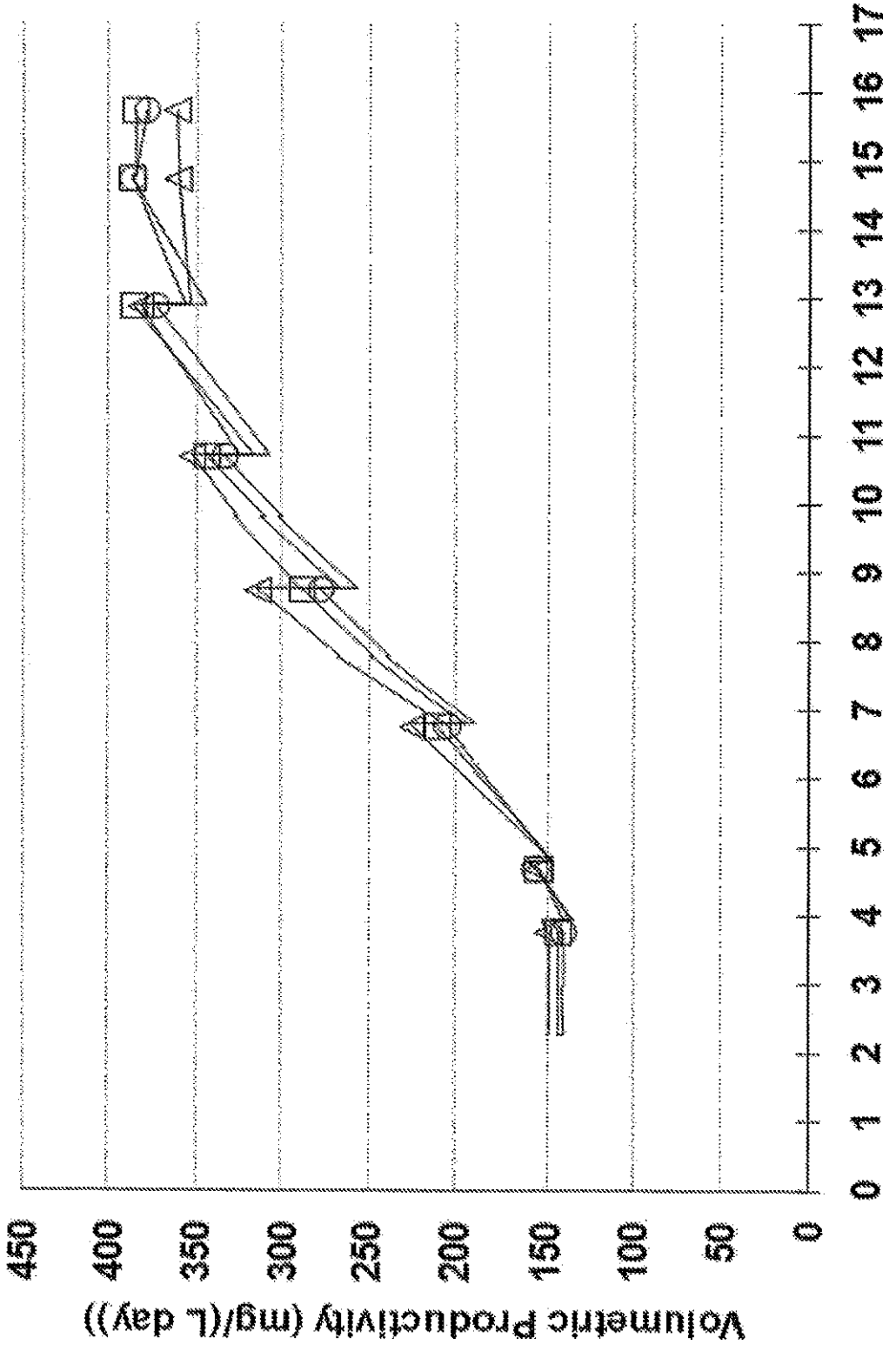
Volumetric Productivity (mg/(L day))
450
400
350
300
250
200
150
100
50
0
Culture Duration (Days)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Figure 7b

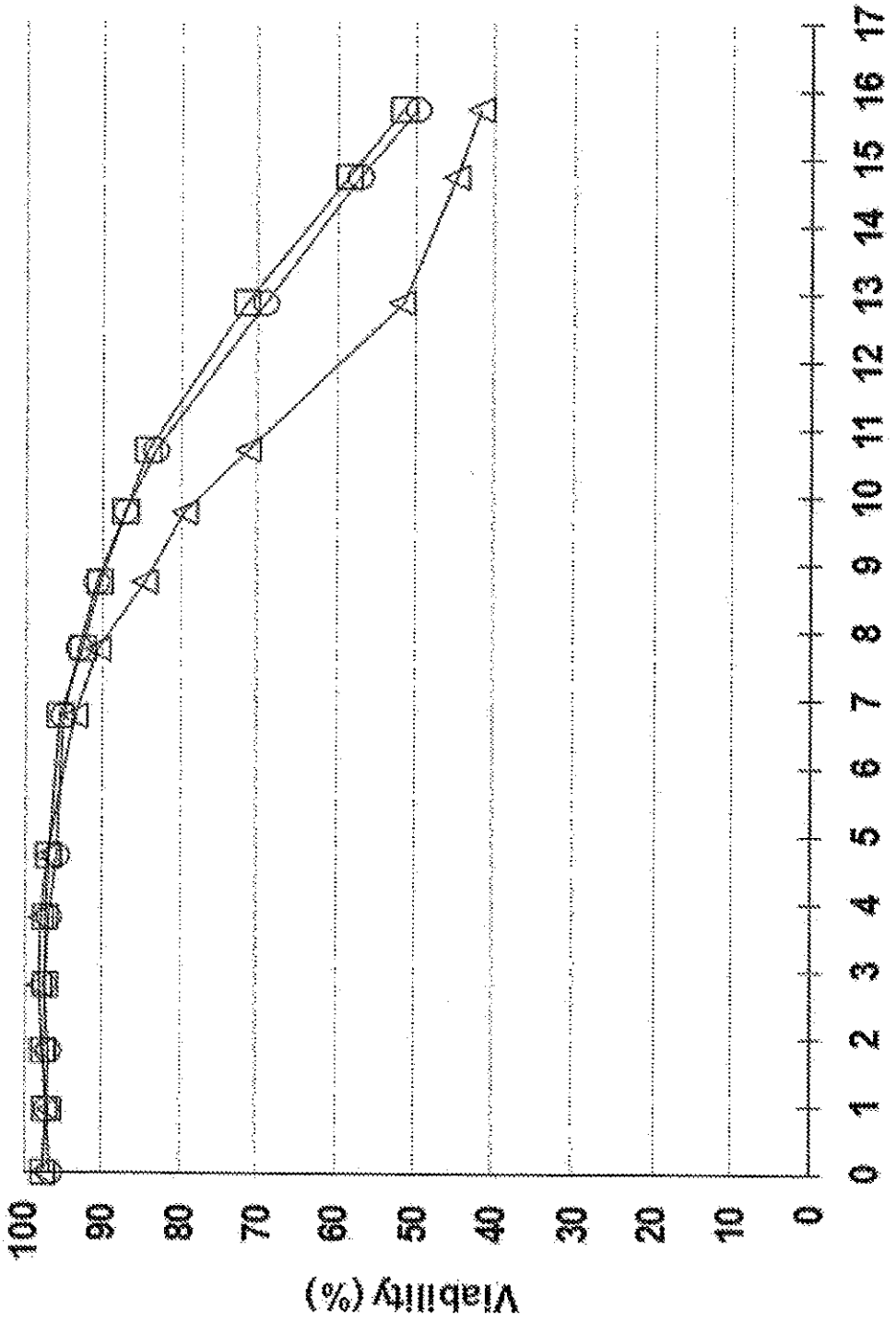
Viability (%)
100
90
80
70
60
50
40
30
20
10
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Culture Duration (Days)

Figure 7c

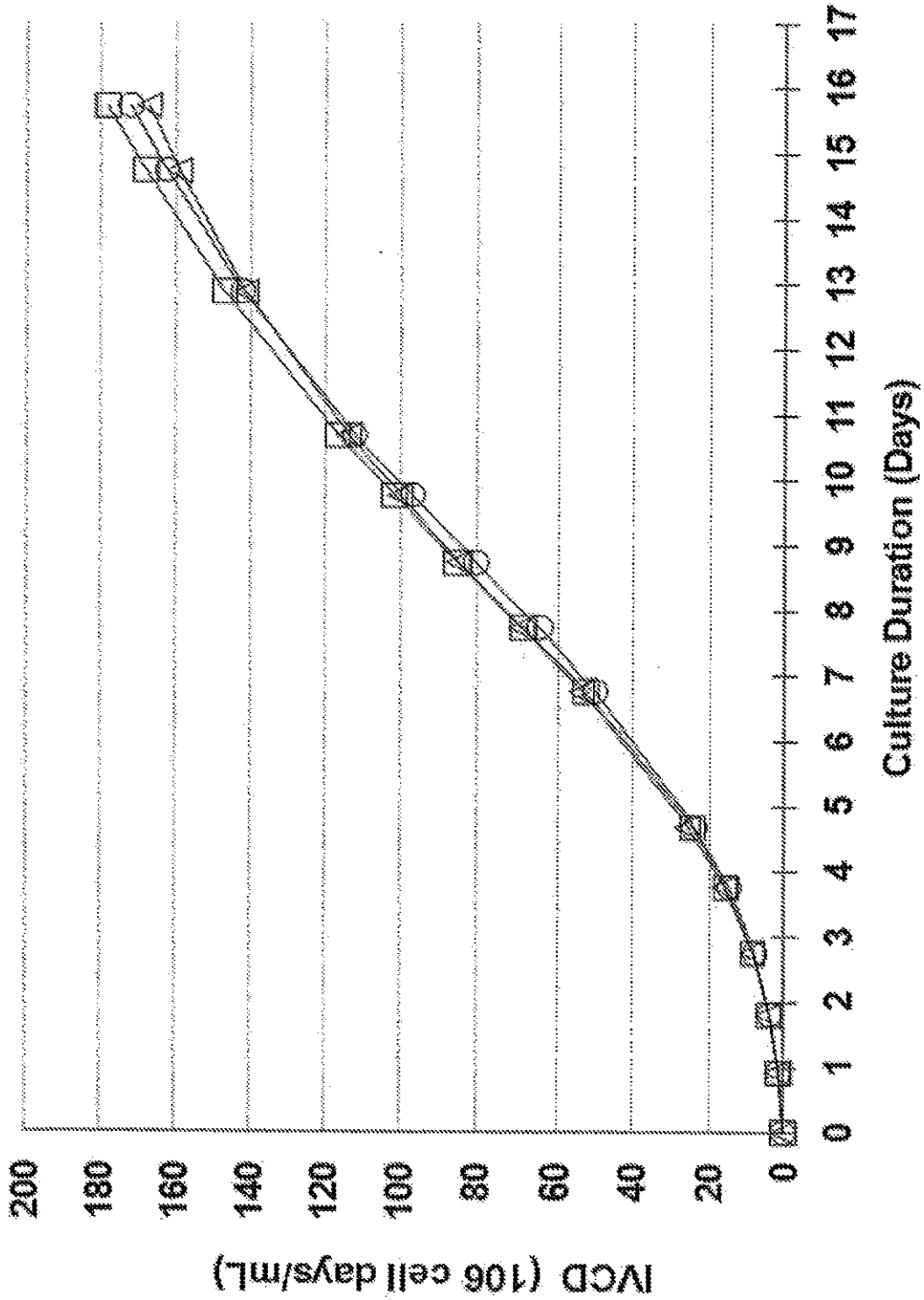
IVCD (106 cell days/mL)
200
180
160
140
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Culture Duration (Days)

Figure 7d

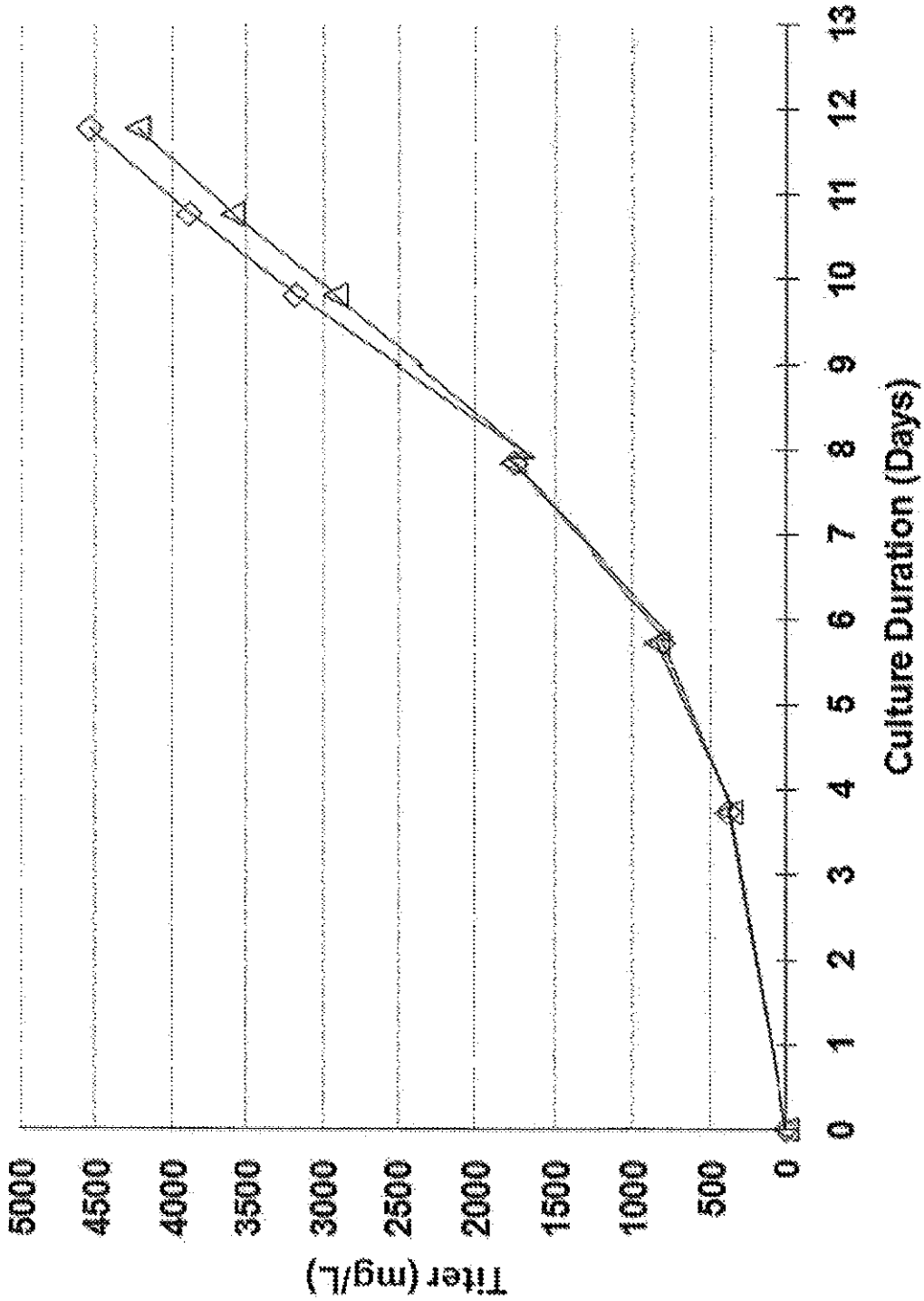
Titer (mg/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Culture Duration (Days)

Figure 8a

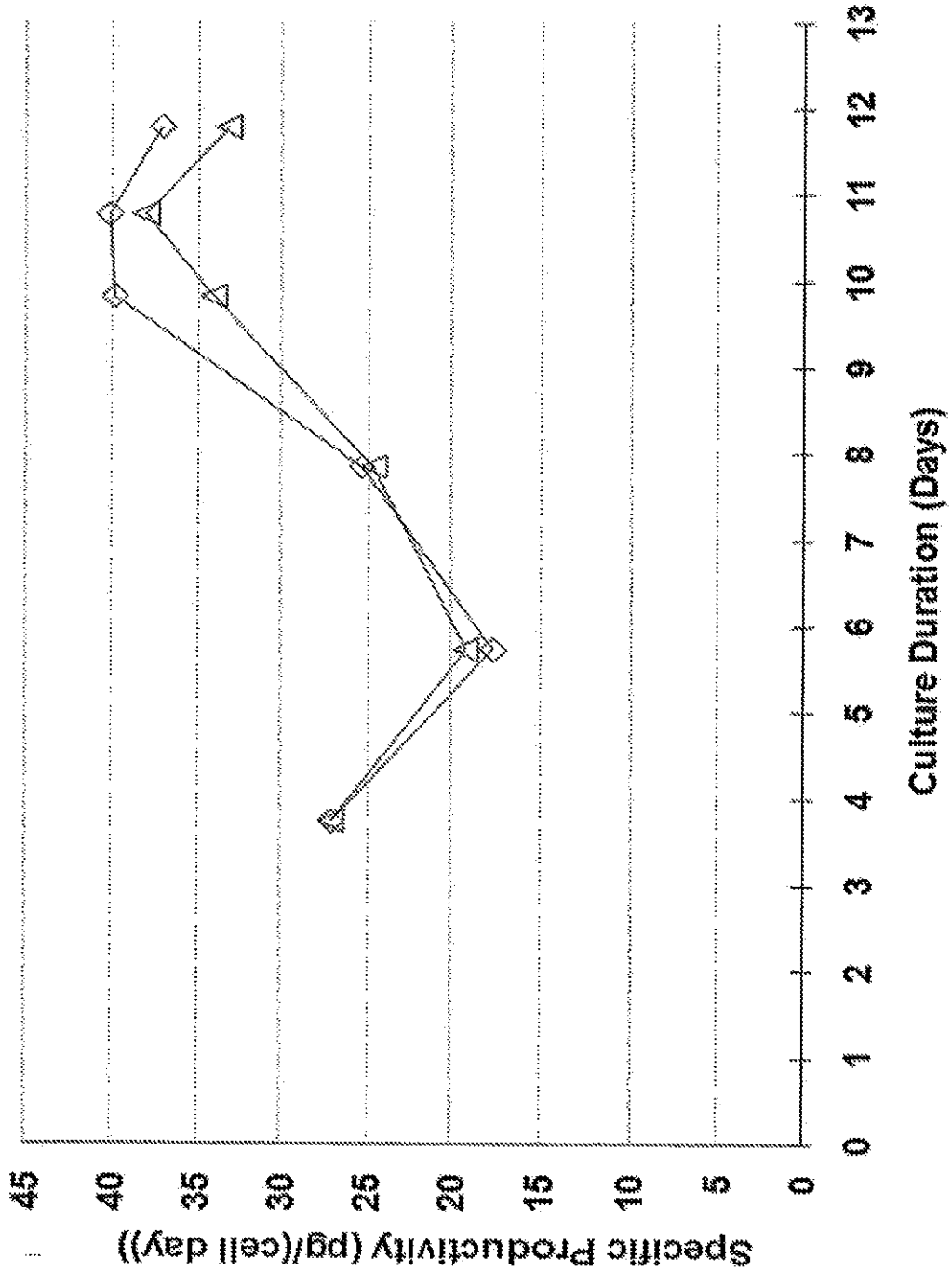
Specific Productivity (pg/(cell day))
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Culture Duration (Days)

Figure 8b