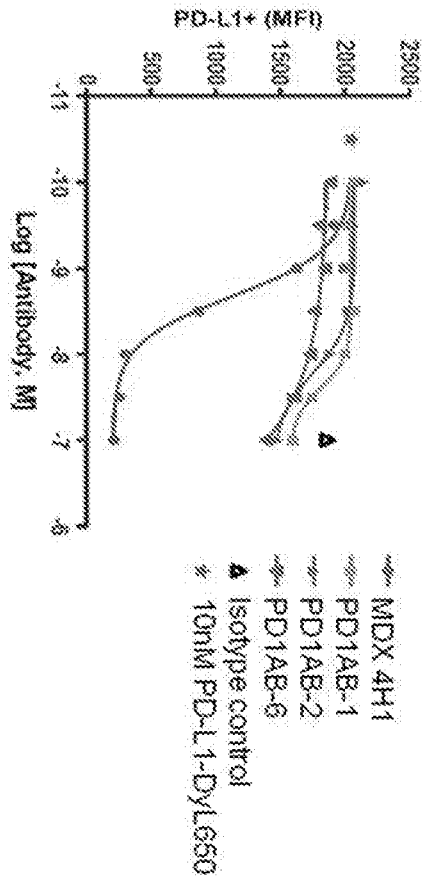

PD-L1+ (MFI)
2500
2000
1500
1000
500
0
-11
-10
-9
-8
-7
-6
Log [Antibody, M]
MDX 4H1
PD1AB-1
PD1AB-2
PD1AB-3
Isotype control
10nM PD-L1-DyL650

FIG. 1A

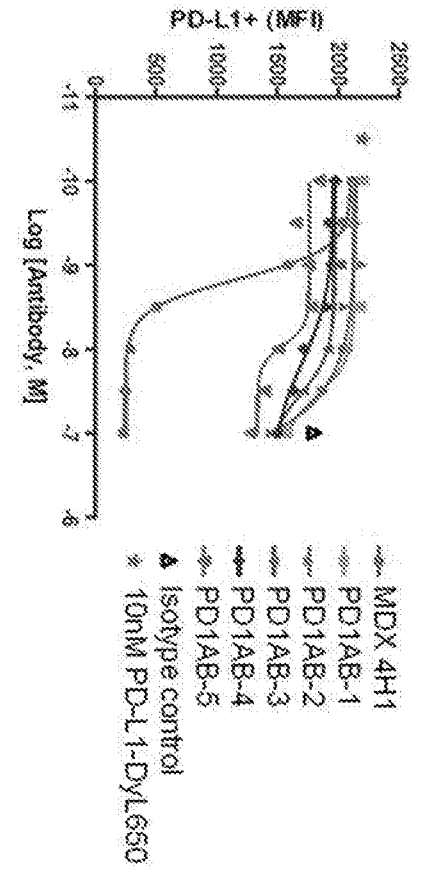

PD-L1+ (MFI)
2500
2000
1500
1000
500
0
-11
-10
-9
-8
-7
-6
Log [Antibody, M]
MDX 4H1
PD1AB-1
PD1AB-2
PD1AB-3
PD1AB-4
PD1AB-5
Isotype control
10nM PD-L1-DyL650

FIG. 1B

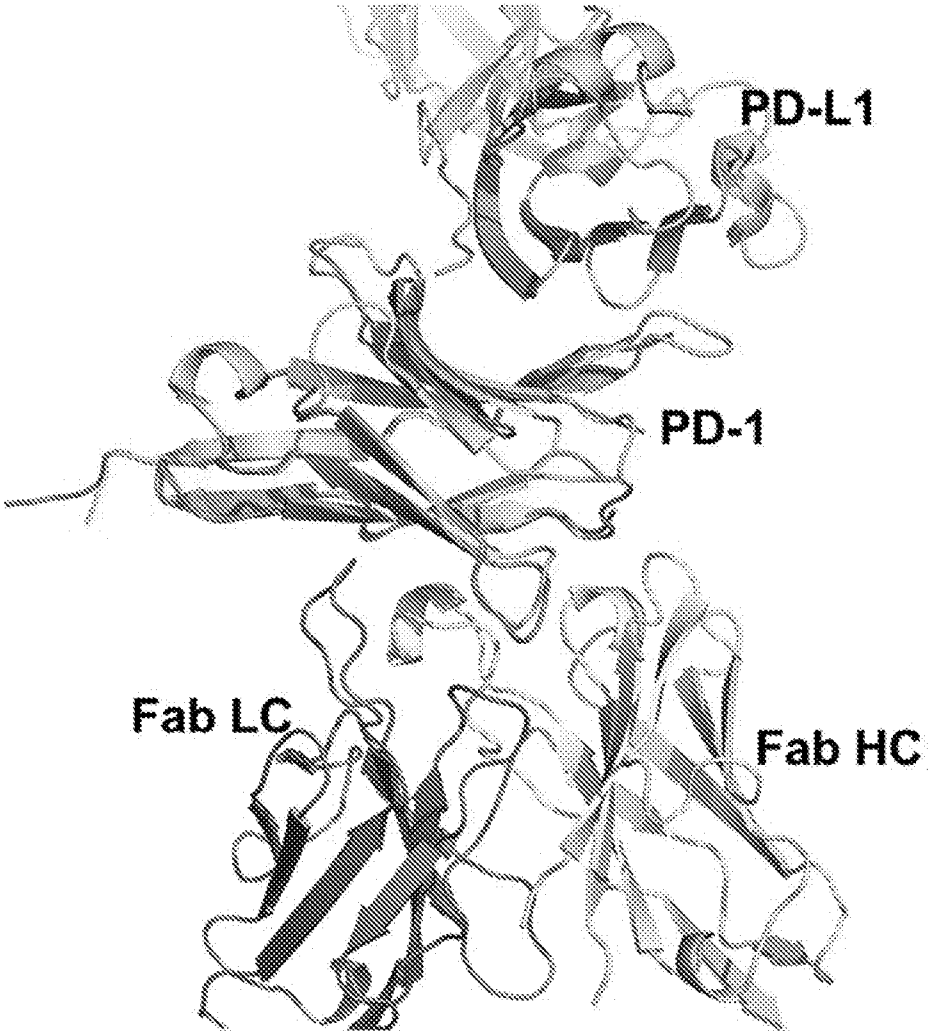


FIG. 2

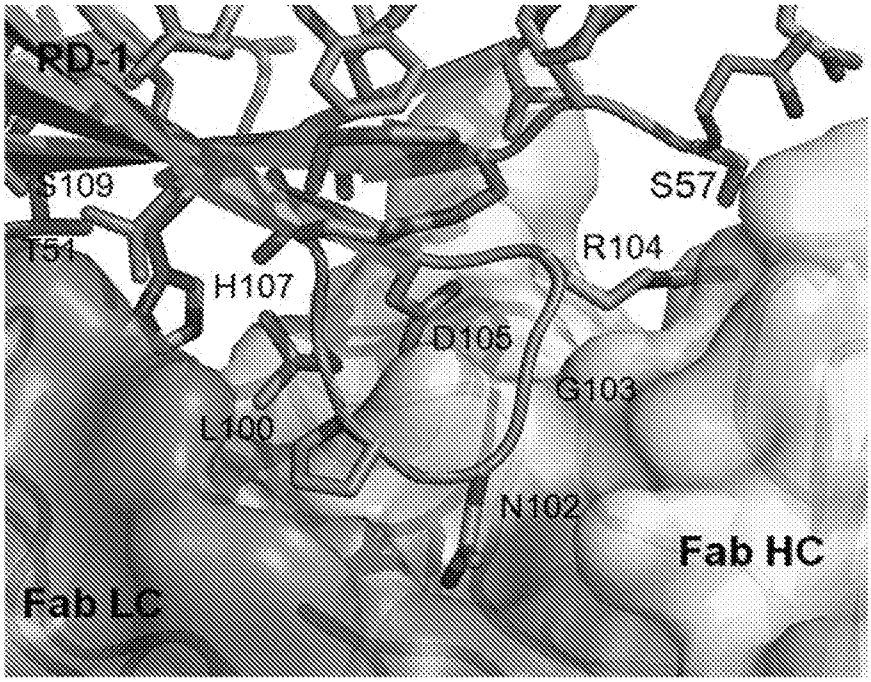


FIG. 3

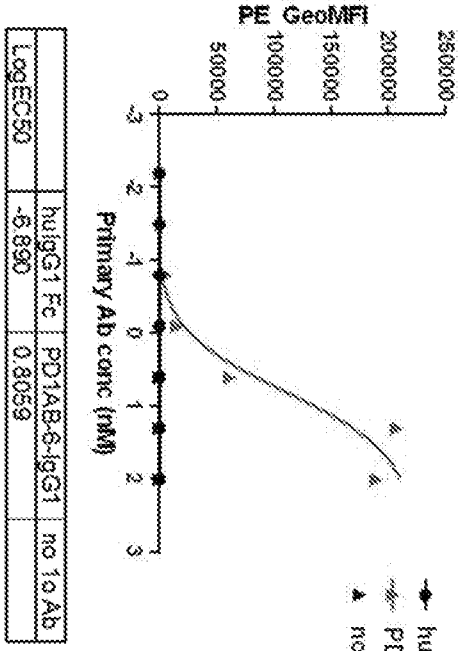
>LC_PD1AB-6-IgG1
DIVMTQSPDSLAVSLGERATINCKSGQSVLYSSNQKNFLAWYQQKPGQPPKLLIYWASTRESGVPDRFSGSGSGTDFTLTISSLQAE
DVAVYYCHQYLYSWTFGQGTKLEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQD
SKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC

>HC_PD1AB-6-IgG1
EVQLVQSGAEVKKPGATVKISCKASGFNIKDTYMHWVQQAPGKGLEWMGRIDPANGDRKYDPKFQGRVTITADTSTDTAYMELS
SLRSEDTAVYYCARSGPVYYYGSSYVMDYWGQGTTVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSG
ALTSGVHTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKD
TLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQ
QGNVFSCSVMHEALHNHYTQKSLSLSPGK

>HC_PD1AB-6-IgG1-K322A
EVQLVQSGAEVKKPGATVKISCKASGFNIKDTYMHWVQQAPGKGLEWMGRIDPANGDRKYDPKFQGRVTITADTSTDTAYMELS
SLRSEDTAVYYCARSGPVYYYGSSYVMDYWGQGTTVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSG
ALTSGVHTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKD
TLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCAVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQ
QGNVFSCSVMHEALHNHYTQKSLSLSPGK

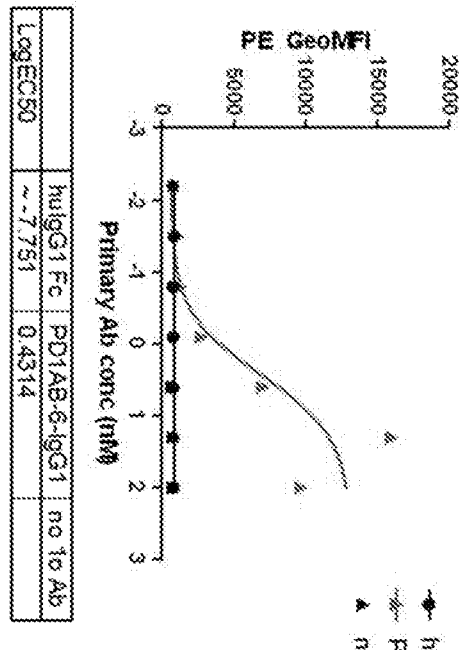
>HC_PD1AB-6-IgG4P
EVQLVQSGAEVKKPGATVKISCKASGFNIKDTYMHWVQQAPGKGLEWMGRIDPANGDRKYDPKFQGRVTITADTSTDTAYMELS
SLRSEDTAVYYCARSGPVYYYGSSYVMDYWGQGTTVTVSS*ASTKGPSVFPLAPCSRSTSESTAALGCLVKDYFPEPVTVSWNSGALTS*
GVHTFPAVLQSSGLYSLSSVVTVPSSSLGTKTYTCNVDHKPSNTKVDKRVESKYGPPCPPCPAPEFLGGPSVFLFPPKPKDTLMISRTPEVT
CVVVDVSQEDPEVQFNWYVDGVEVHNAKTKPREEQFNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKGLPSSIEKTISKAKGQPREPQVY
TLPPSQEEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSRLTVDKSRWQEGNVFSCSVMHEALHNHYTQ
KSLSLSPGK

FIG. 4



	huIgG1 Fc	PD1AB-6-IgG1	no 1o Ab
LogEC50	-6.890	0.8059	

FIG. 5A



	huIgG1 Fc	PD1AB-6-IgG1	no 1o Ab
LogEC50	~-7.751	0.4314	

FIG. 5B

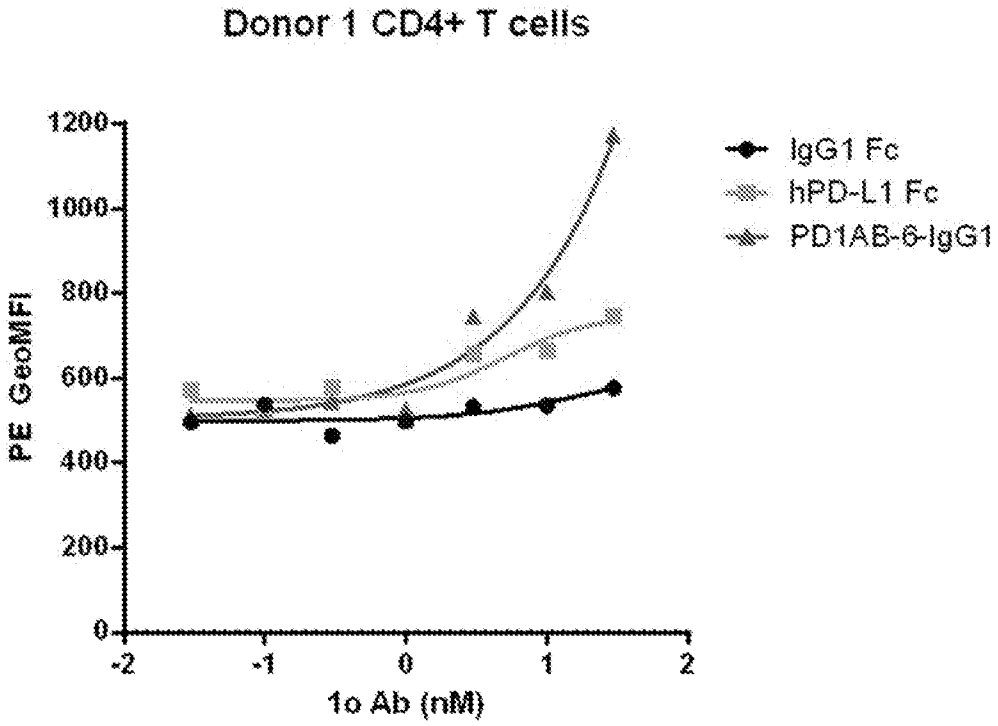

Donor 1 CD4+ T cells
PE GeoMFI
1200
1000
800
600
400
200
0
-2
-1
0
1
2
1o Ab (nM)
IgG1 Fc
hPD-L1 Fc
PD1AB-6-IgG1

FIG. 6

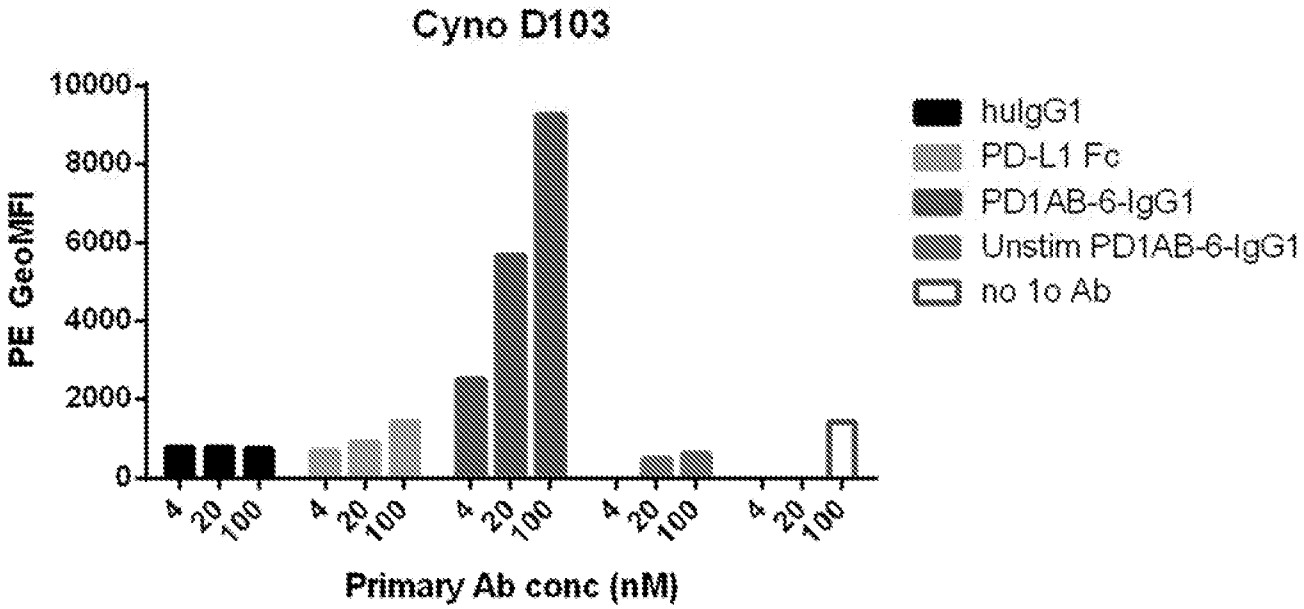

Cyno D103
PE GeoMFI
10000
8000
6000
4000
2000
0
4
20
100
Primary Ab conc (nM)
huIgG1
PD-L1 Fc
PD1AB-6-IgG1
Unstim PD1AB-6-IgG1
no 1o Ab

FIG. 7

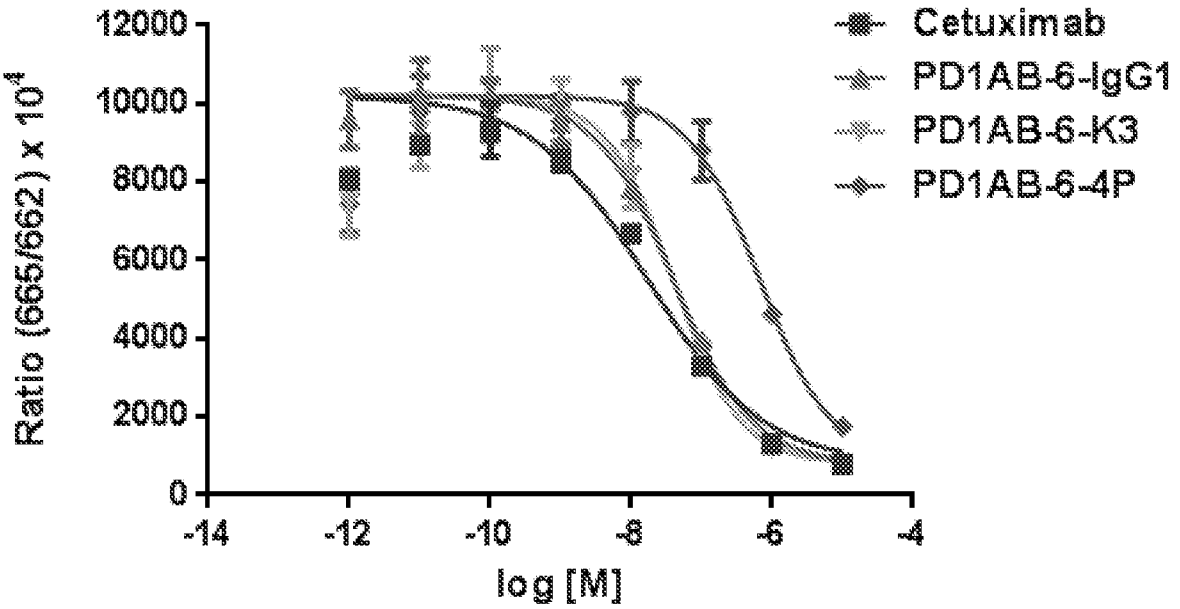

Ratio (665/662) x 10^4
12000
10000
8000
6000
4000
2000
0
-14
-12
-10
-8
-6
-4
log [M]
Cetuximab
PD1AB-6-IgG1
PD1AB-6-K3
PD1AB-6-4P

FIG. 8A

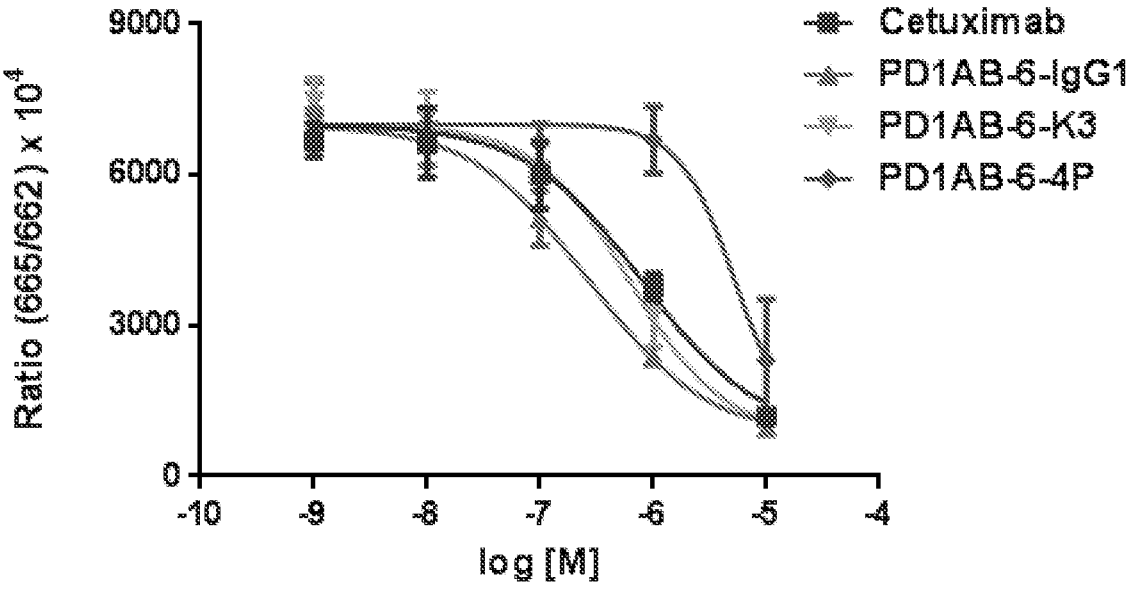

Ratio (665/662) x 10^4
9000
6000
3000
0
-10
-9
-8
-7
-6
-5
-4
log [M]
Cetuximab
PD1AB-6-IgG1
PD1AB-6-K3
PD1AB-6-4P

FIG. 8B

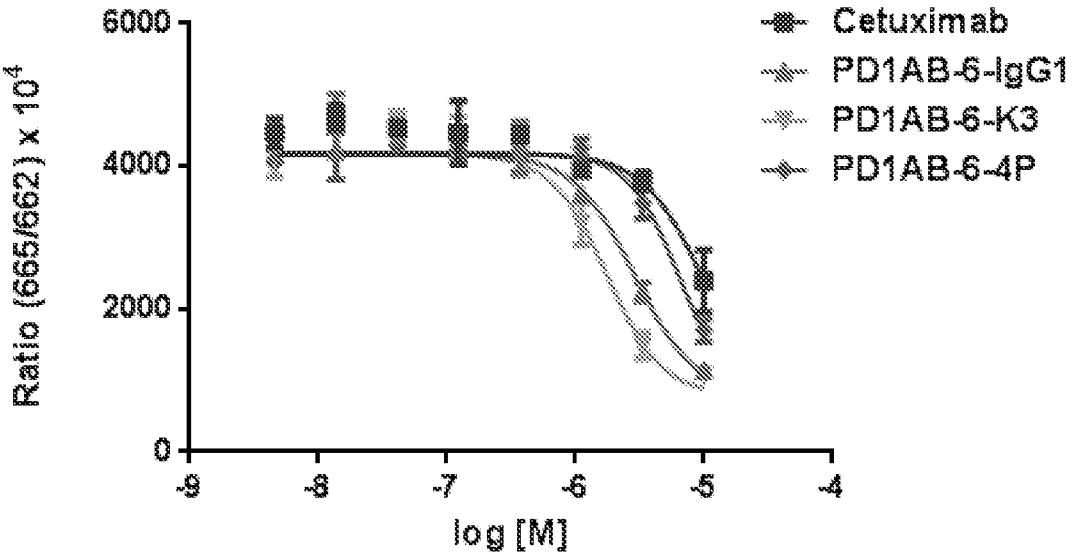
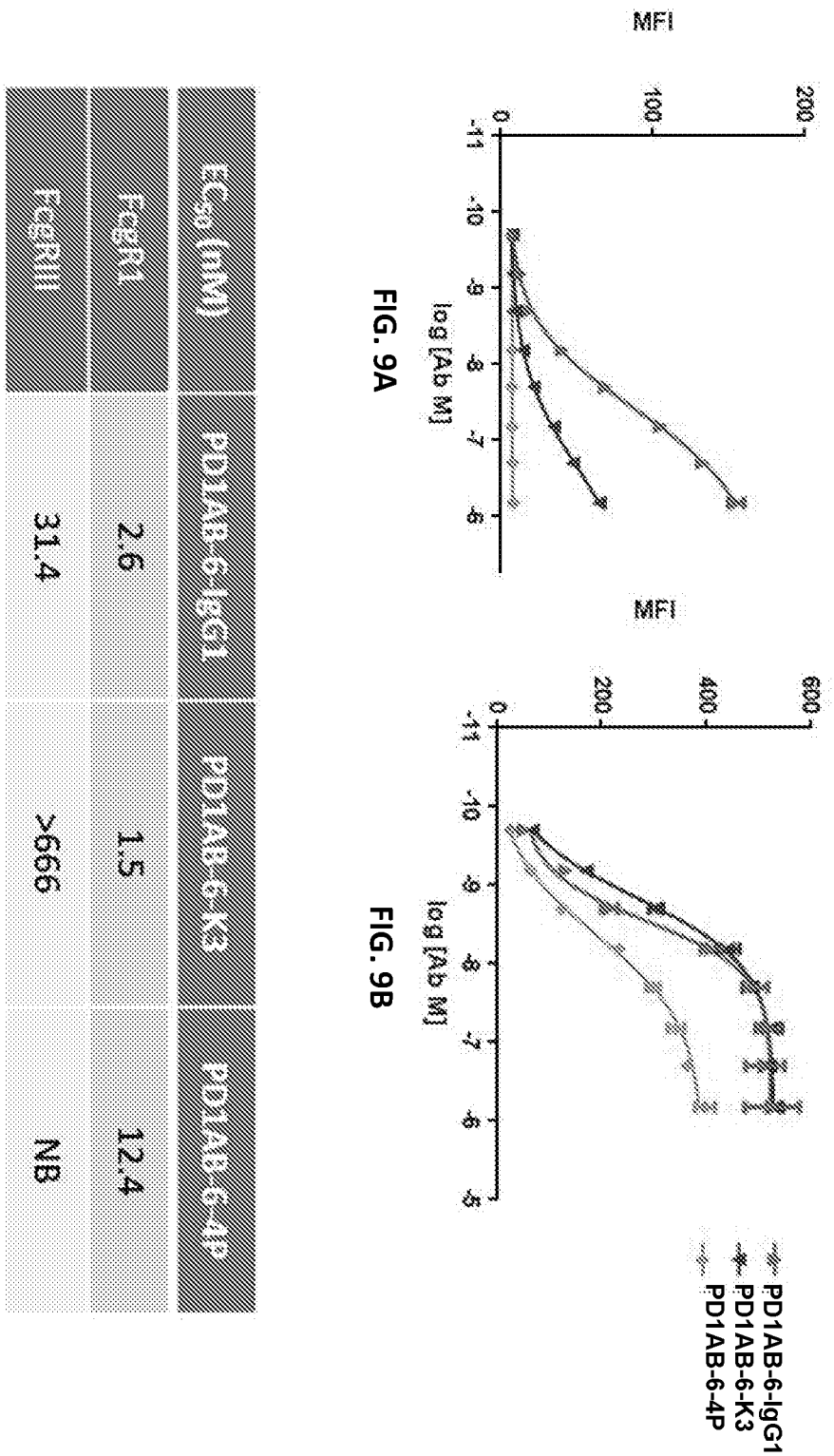


FIG. 8C

EC_{50} nM	FcγRI	FcγRIIIa (V158)	FcγRIIb
Cetuximab	33.1	915.7	9749.7
PD1AB-6-IgG1	54.7	293.9	2804.5
PD1AB-6-K3	**56.0**	**622.6**	**1652.9**
PD1AB-6-4P	868.9	6325.8	7179.1

FIG. 8D



EC_{50} (nM)	PD1AB-6-IgG1	PD1AB-6-K3	PD1AB-6-4P
FcgR1	2.6	1.5	12.4
FcgRII	31.4	>666	NB

FIG. 9C

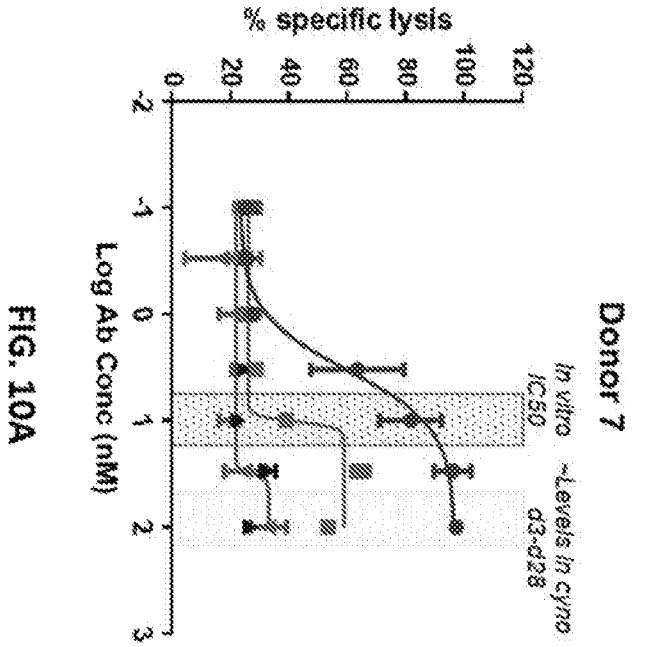


FIG. 10A

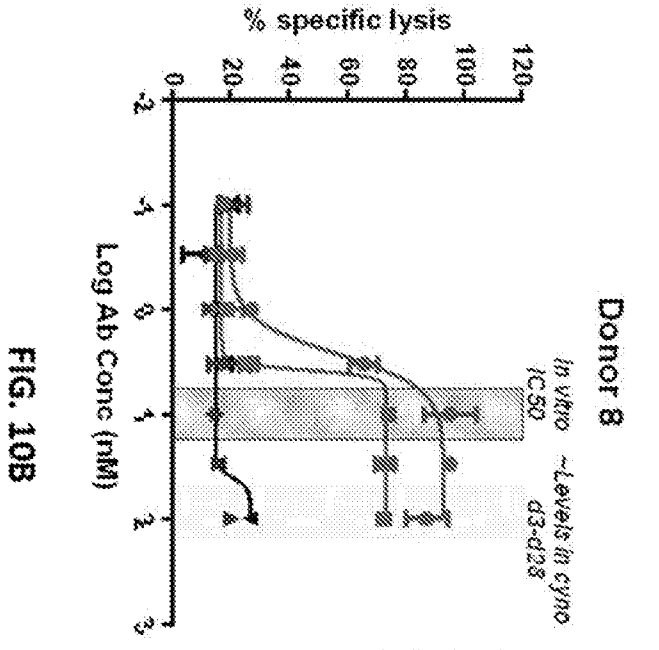


FIG. 10B

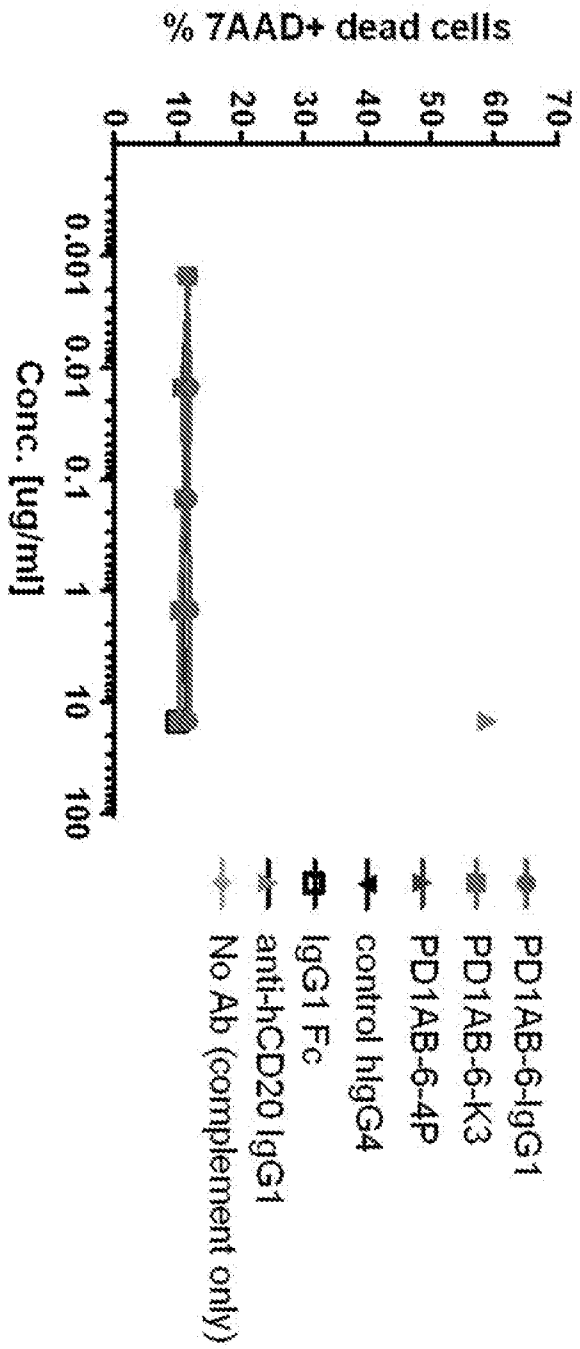

% 7AAD+ dead cells
0
10
20
30
40
50
60
70
Conc. [ug/ml]
0.001
0.01
0.1
1
10
100
PD1AB-6-IgG1
PD1AB-6-K3
PD1AB-6-4P
control hIgG4
IgG1 Fc
anti-hCD20 IgG1
No Ab (complement only)

FIG. 11

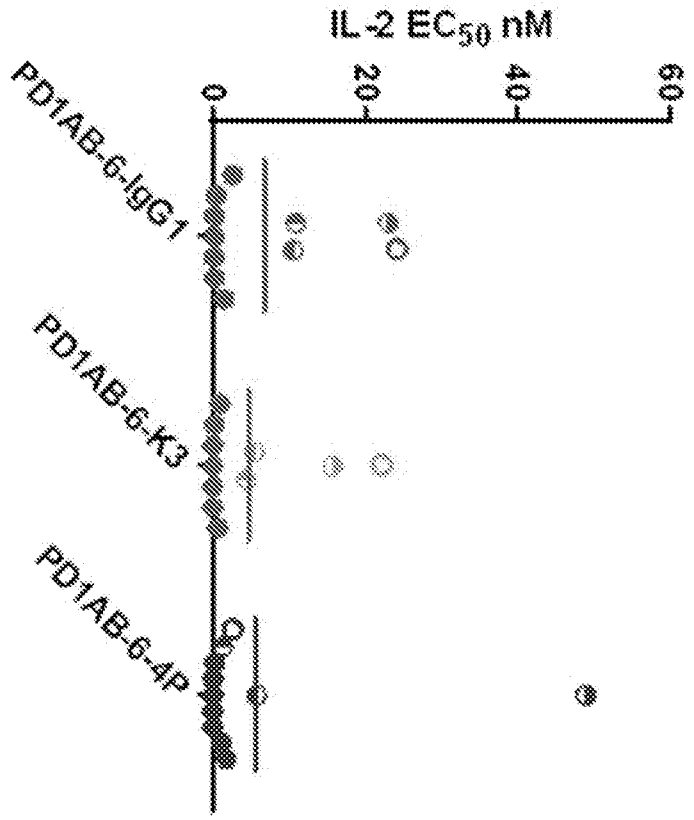
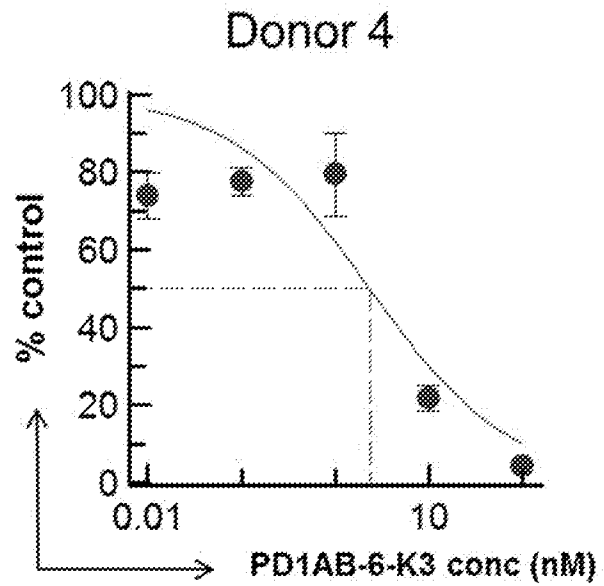


FIG. 12



	PD1AB-6-K3	PD1AB-6-4P	CTLA4Ig
	IFN-γ EC50 (nM)		
Donor 1	<0.01	<0.01	0.02
Donor 2	<0.01	0.02	<0.01
Donor 3	22.4	51	81
Donor 4	2.3	>100	9

FIG. 13

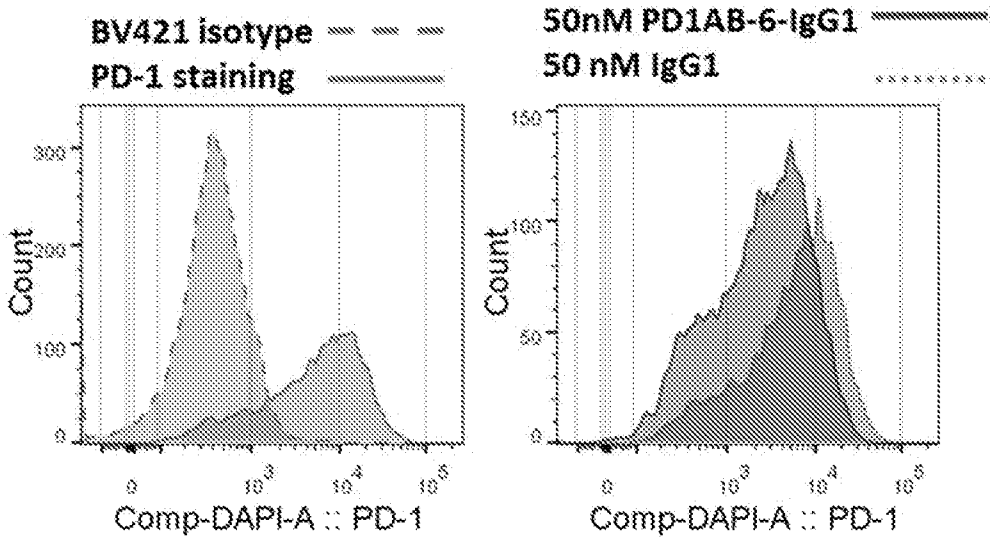


FIG. 14A

FIG. 14B

Gated on CD3+ T cells

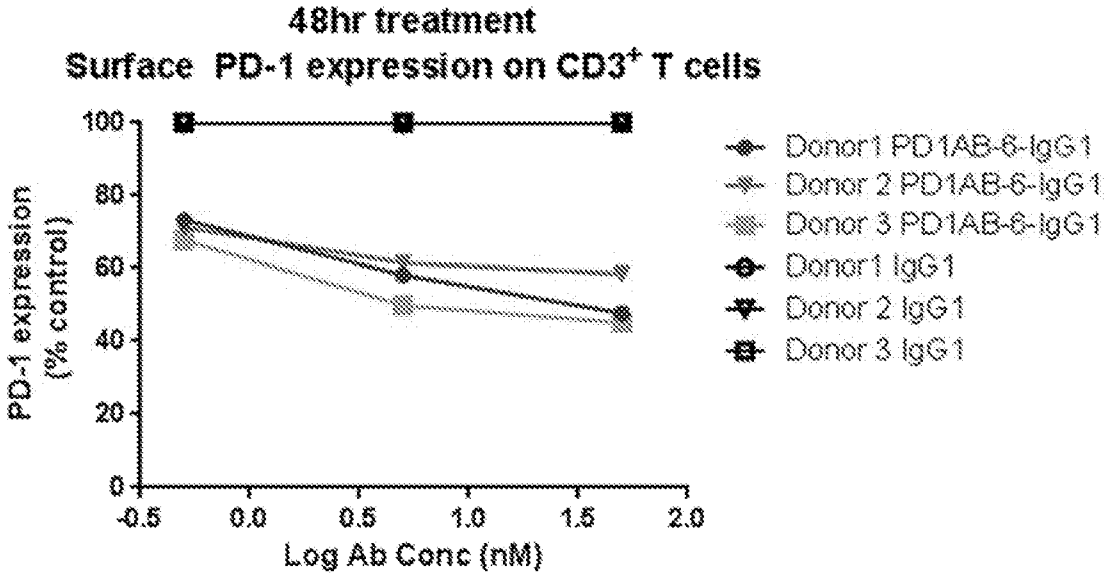


FIG. 14C

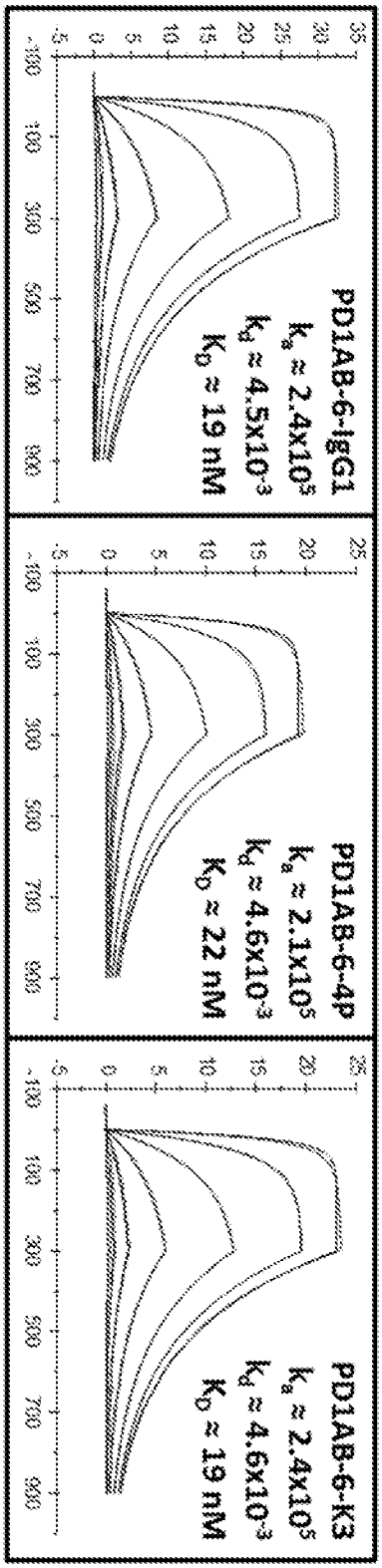


FIG. 15A

FIG. 15B

FIG. 15C

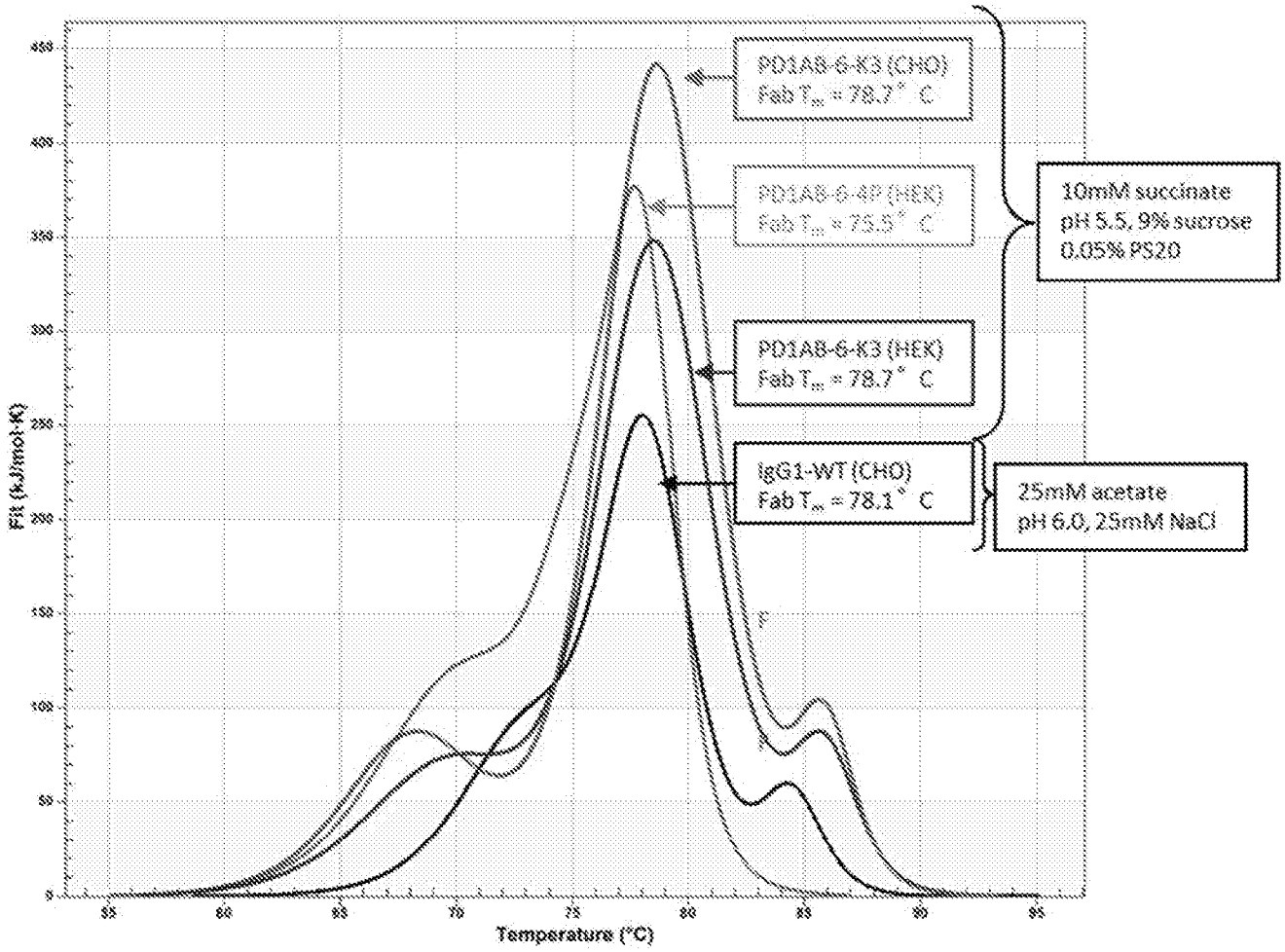

PD1A8-6-K3 (CHO)
Fab T_m = 78.7° C
PD1A8-6-4P (HEK)
Fab T_m = 75.5° C
PD1A8-6-K3 (HEK)
Fab T_m = 78.7° C
IgG1-WT (CHO)
Fab T_m = 78.1° C
10mM succinate
pH 5.5, 9% sucrose
0.05% PS20
25mM acetate
pH 6.0, 25mM NaCl
Fit (kJ/mol-K)
Temperature (°C)

FIG. 16

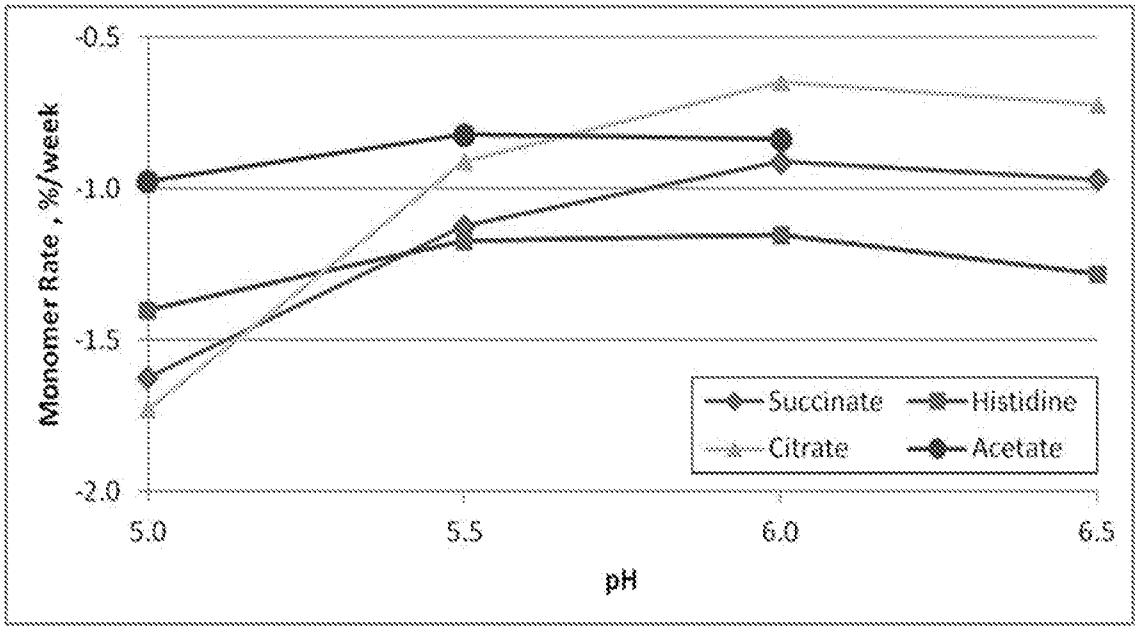

-0.5
-1.0
-1.5
-2.0
Monomer Rate , %/week
5.0
5.5
6.0
6.5
pH
Succinate
Histidine
Citrate
Acetate

FIG. 17

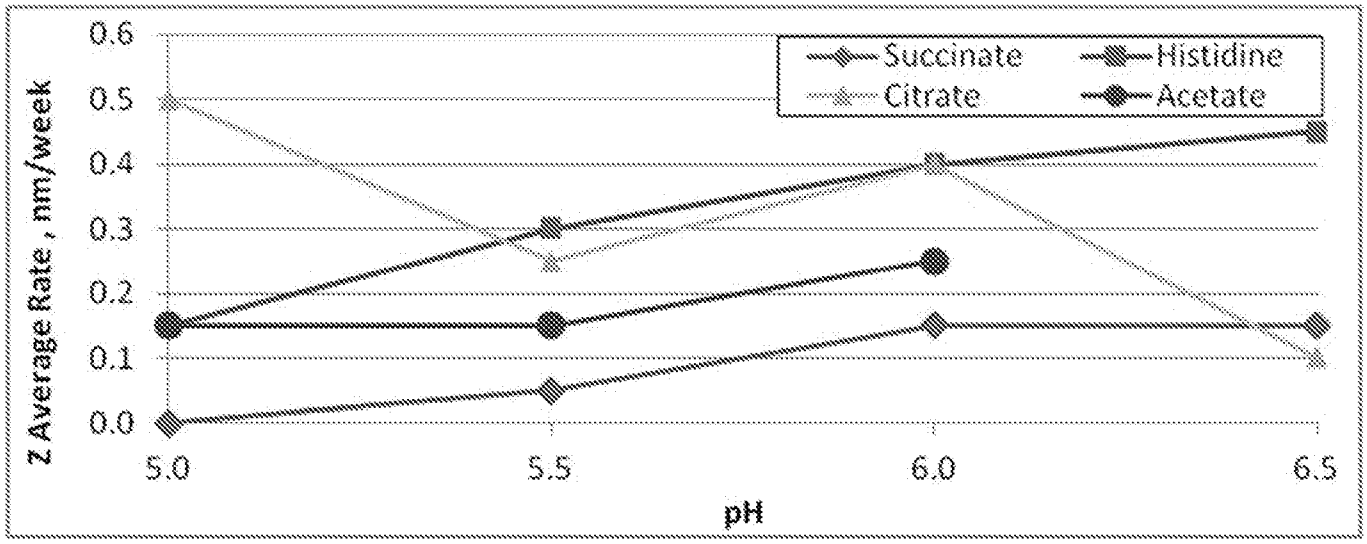

Z Average Rate , nm/week
0.6
0.5
0.4
0.3
0.2
0.1
0.0
5.0
5.5
6.0
6.5
pH
Succinate
Histidine
Citrate
Acetate

FIG. 18

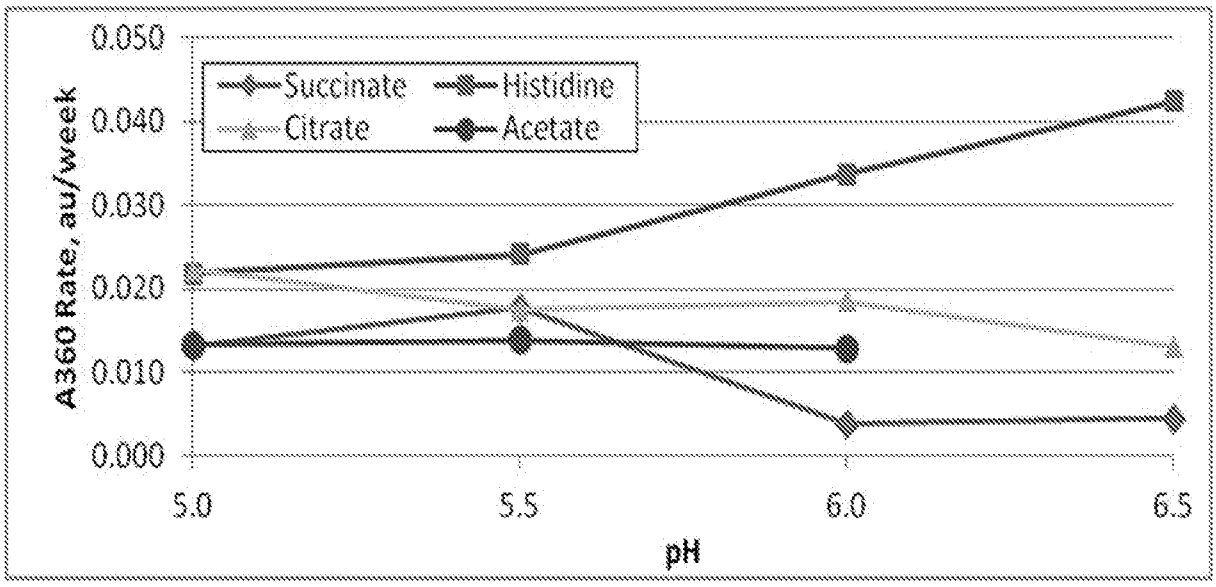

0.050
0.040
0.030
0.020
0.010
0.000
A360 Rate, au/week
Succinate
Histidine
Citrate
Acetate
5.0
5.5
6.0
6.5
pH

FIG. 19

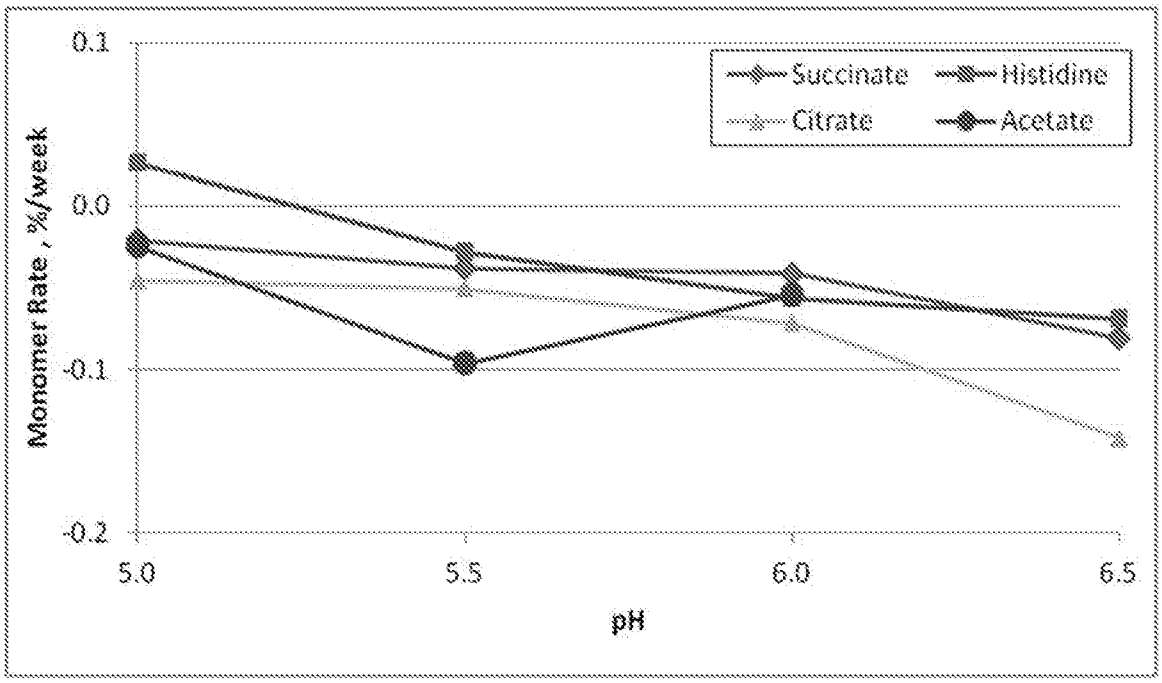

0.1
0.0
-0.1
-0.2
Monomer Rate , %/week
5.0
5.5
6.0
6.5
pH
Succinate
Histidine
Citrate
Acetate

FIG. 20

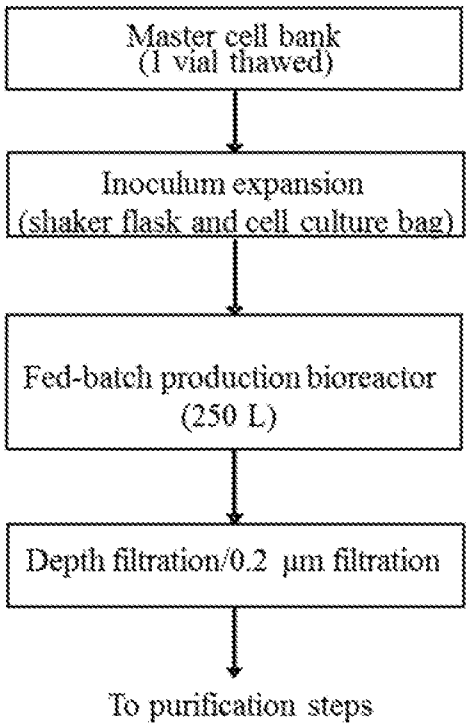


FIG. 21A

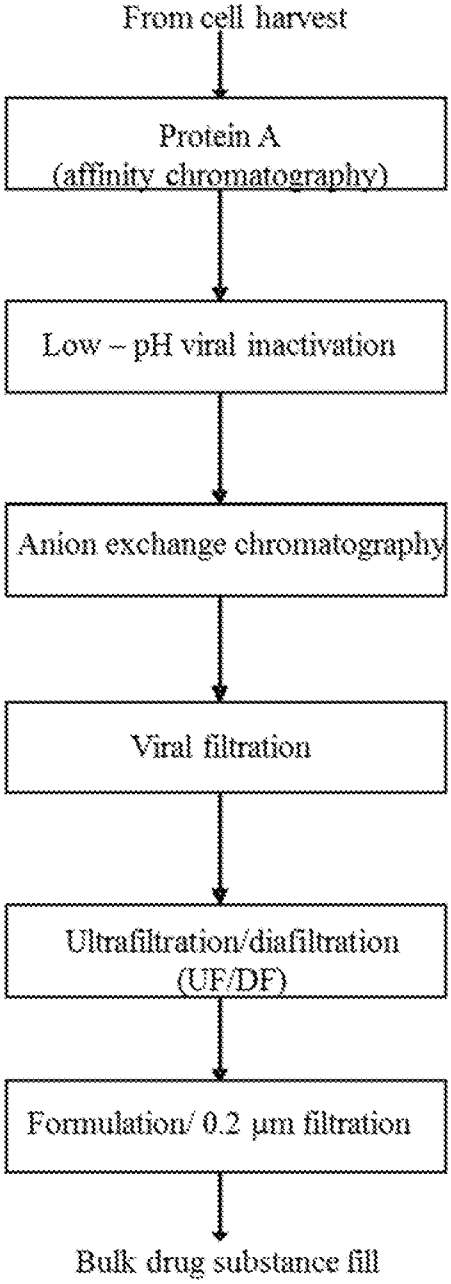


FIG. 21B

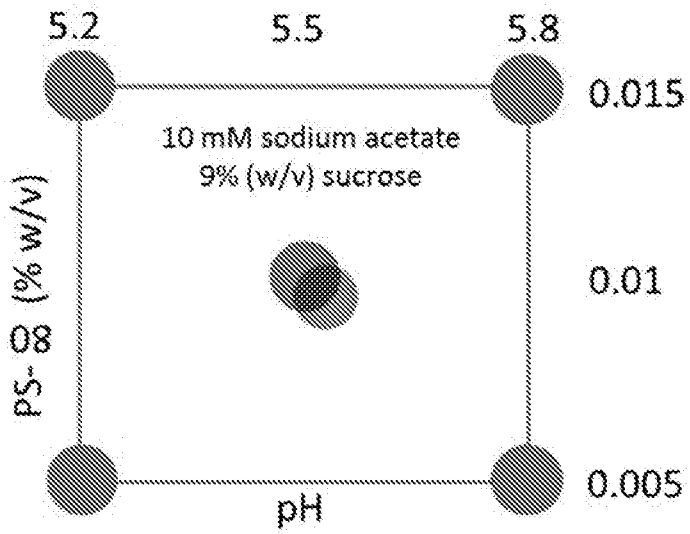

5.2
5.5
5.8
0.015
10 mM sodium acetate
9% (w/v) sucrose
PS-08 (% w/v)
0.01
0.005
pH

FIG. 22

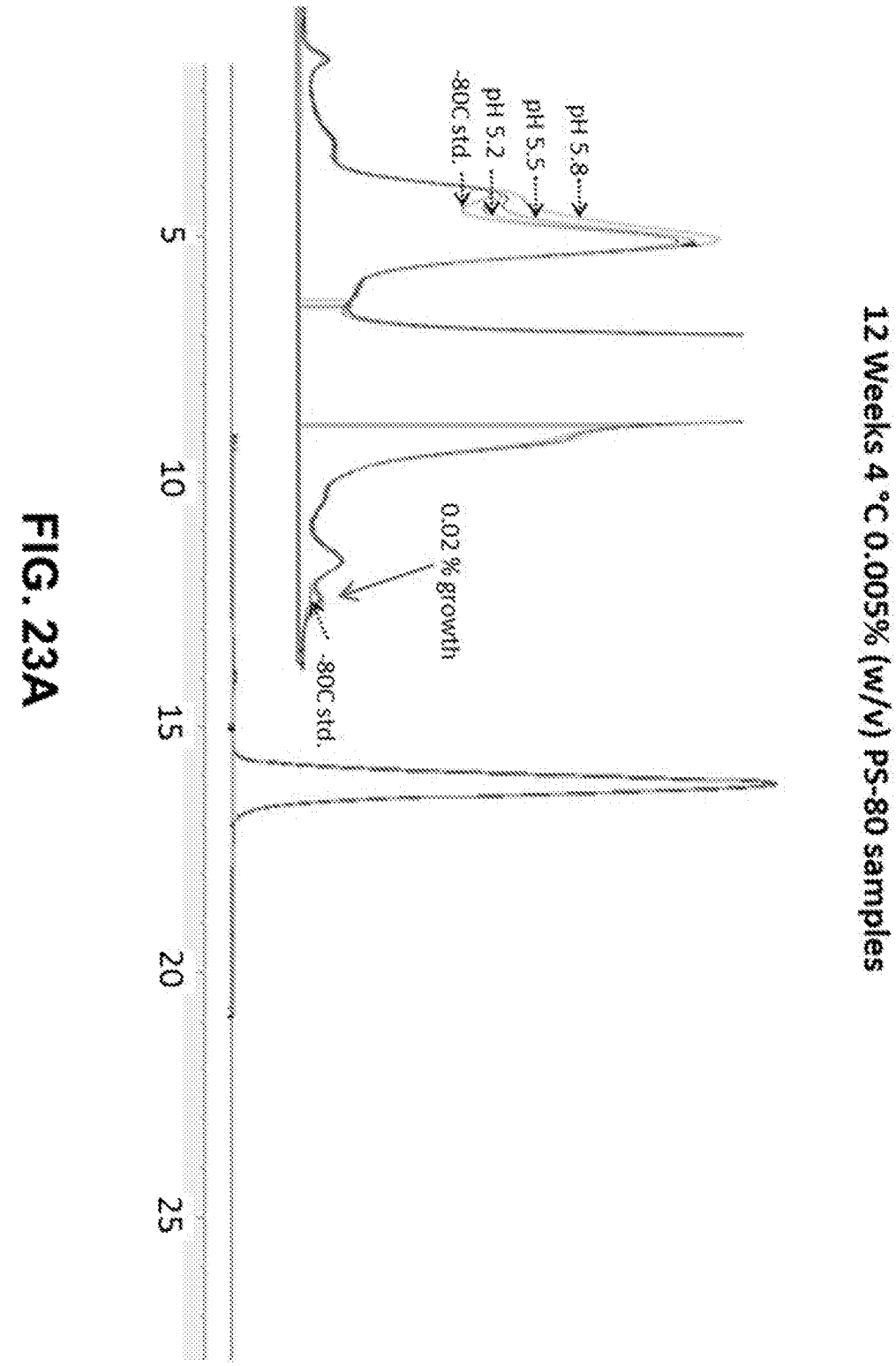

12 Weeks 4 °C 0.005% (w/v) PS-80 samples
pH 5.8
pH 5.5
pH 5.2
-80C std.
0.02 % growth
-80C std.
5
10
15
20
25

FIG. 23A

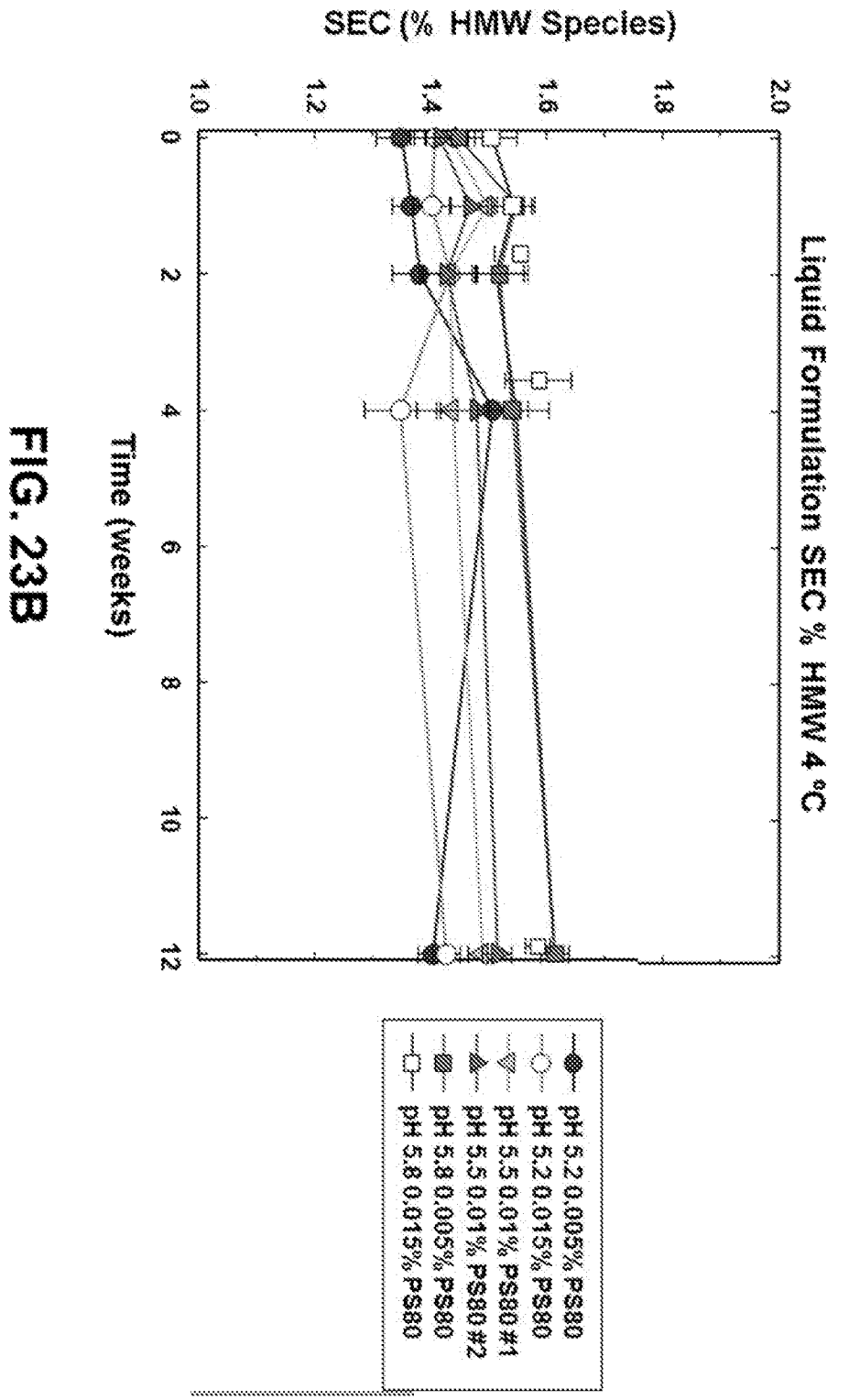

Liquid Formulation SEC % HMW 4 °C
SEC (% HMW Species)
1.0
1.2
1.4
1.6
1.8
2.0
0
2
4
6
8
10
12
Time (weeks)
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80 #1
pH 5.5 0.01% PS80 #2
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 23B

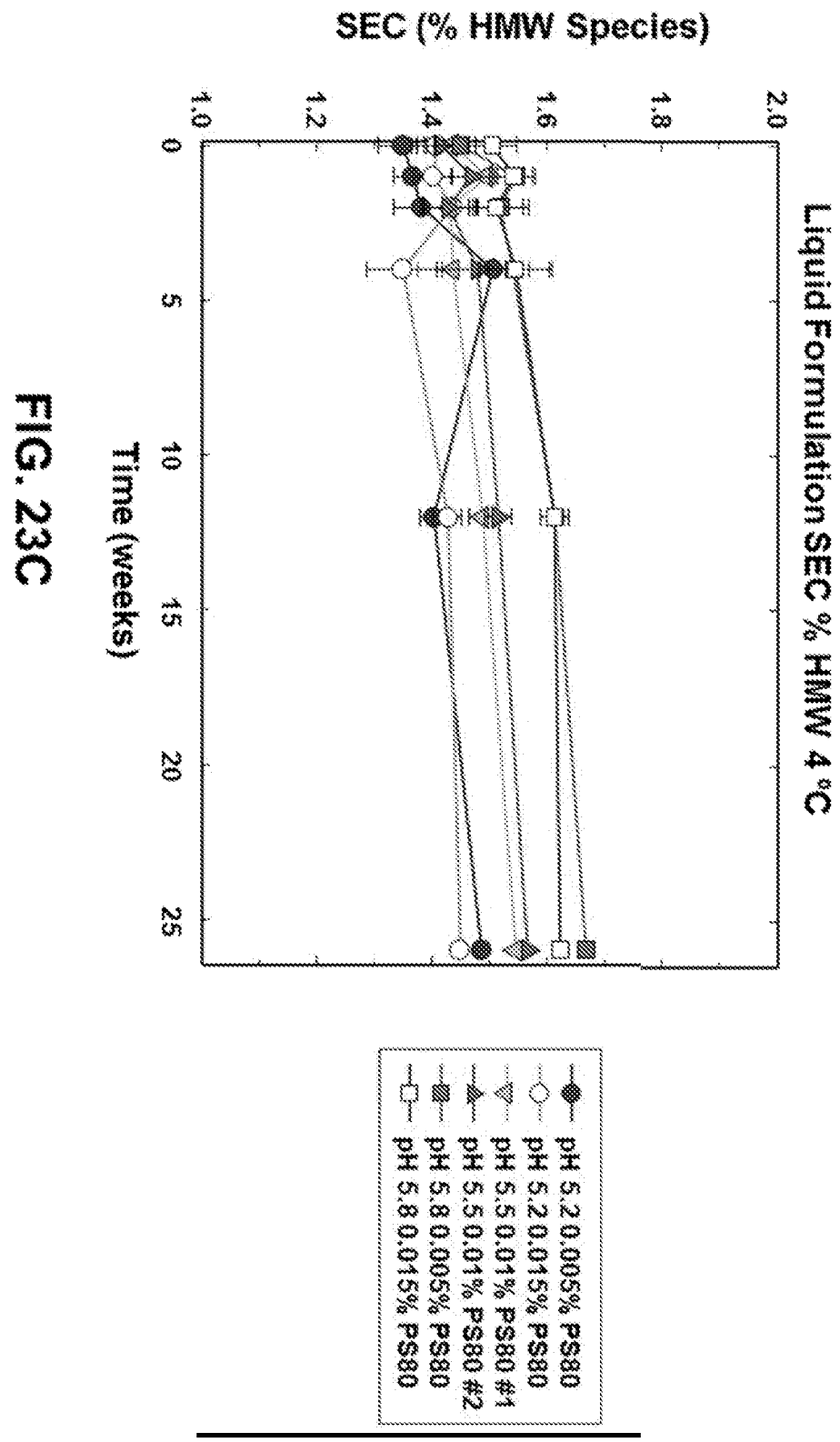

SEC (% HMW Species)
Liquid Formulation SEC % HMW 4 °C
Time (weeks)
1.0
1.2
1.4
1.6
1.8
2.0
0
5
10
15
20
25
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80 #1
pH 5.5 0.01% PS80 #2
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 23C

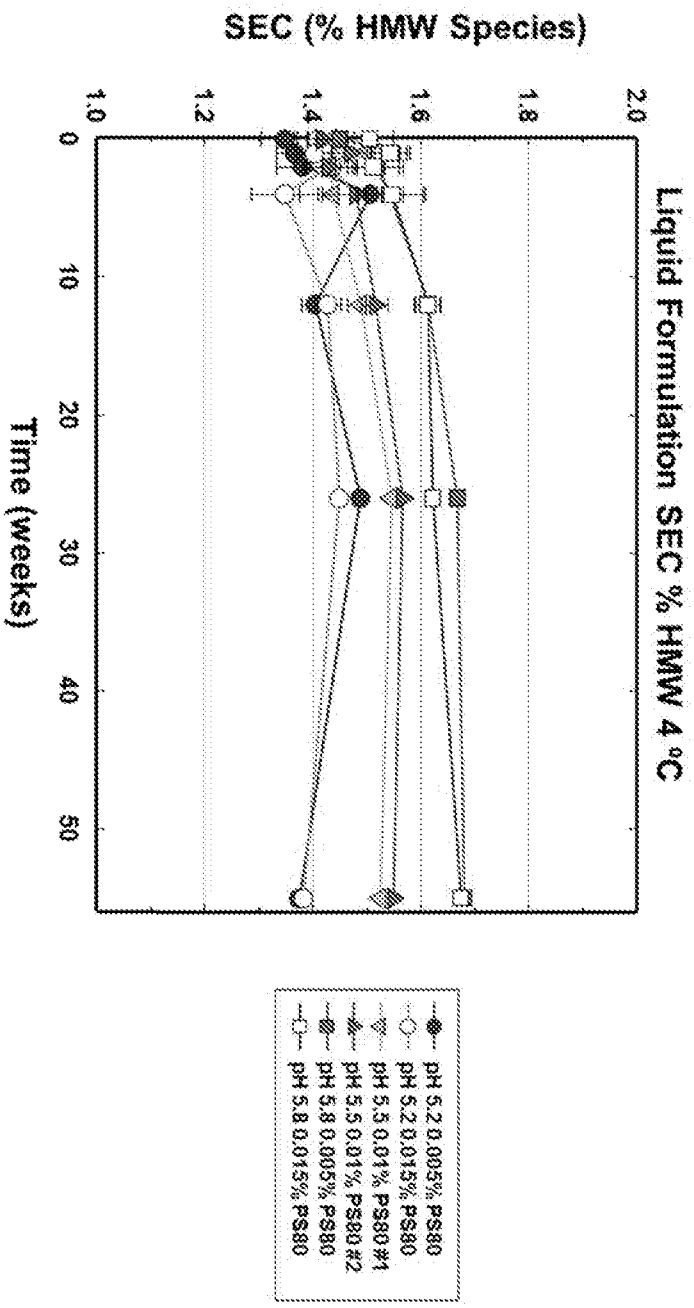

SEC (% HMW Species)
Liquid Formulation SEC % HMW 4 °C
Time (weeks)
1.0
1.2
1.4
1.6
1.8
2.0
0
10
20
30
40
50
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80 #1
pH 5.5 0.01% PS80 #2
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 23D

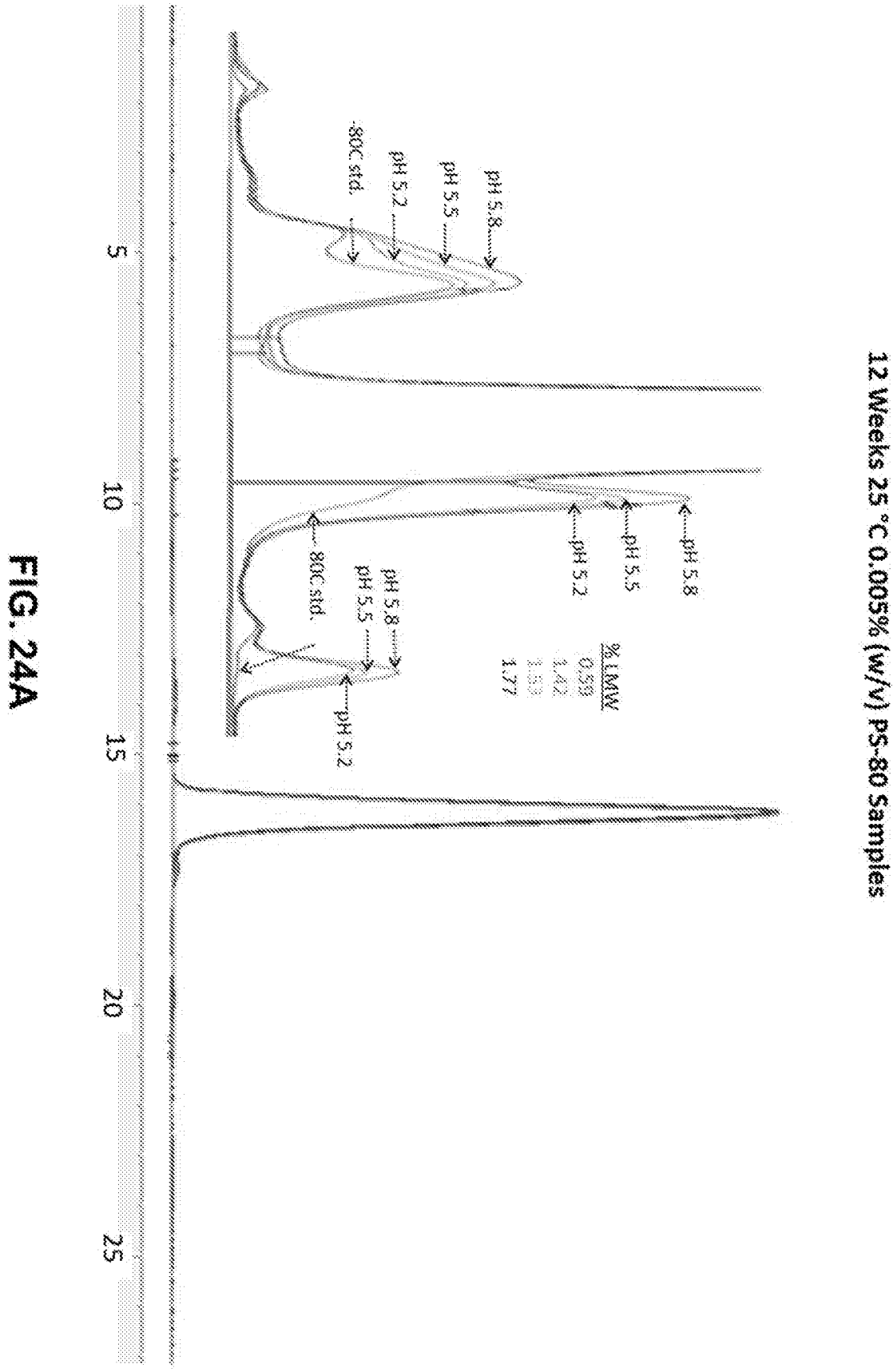

12 Weeks 25 °C 0.005% (w/v) PS-80 Samples
pH 5.8
pH 5.5
pH 5.2
% LMW
0.59
1.42
1.53
1.77
pH 5.8
pH 5.5
pH 5.2
-80C std.
-80C std.
pH 5.8
pH 5.5
pH 5.2
5
10
15
20
25

FIG. 24A

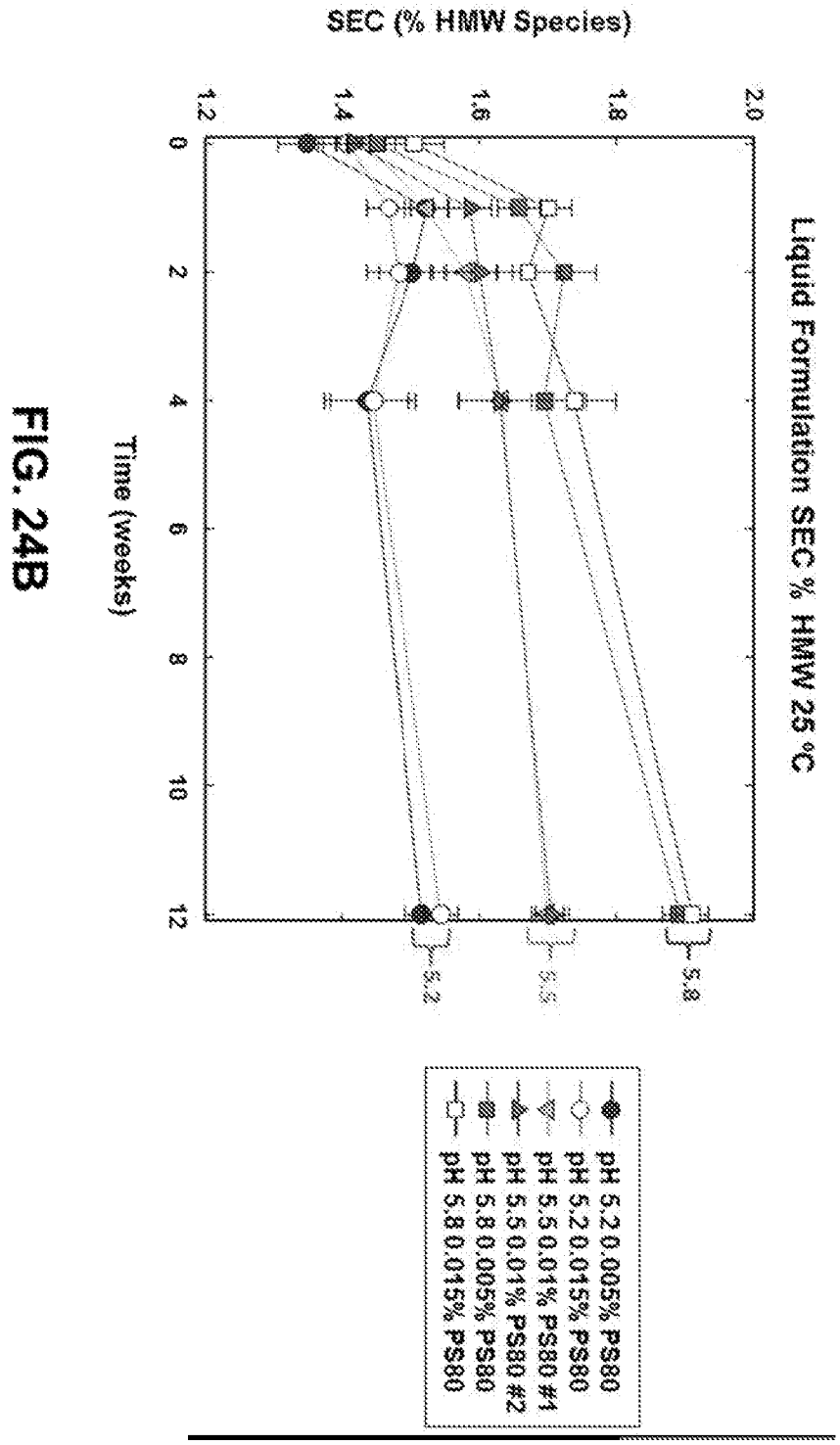

Liquid Formulation SEC % HMW 25 °C
SEC (% HMW Species)
Time (weeks)
1.2
1.4
1.6
1.8
2.0
0
2
4
6
8
10
12
5.8
5.5
5.2
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80 #1
pH 5.5 0.01% PS80 #2
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 24B

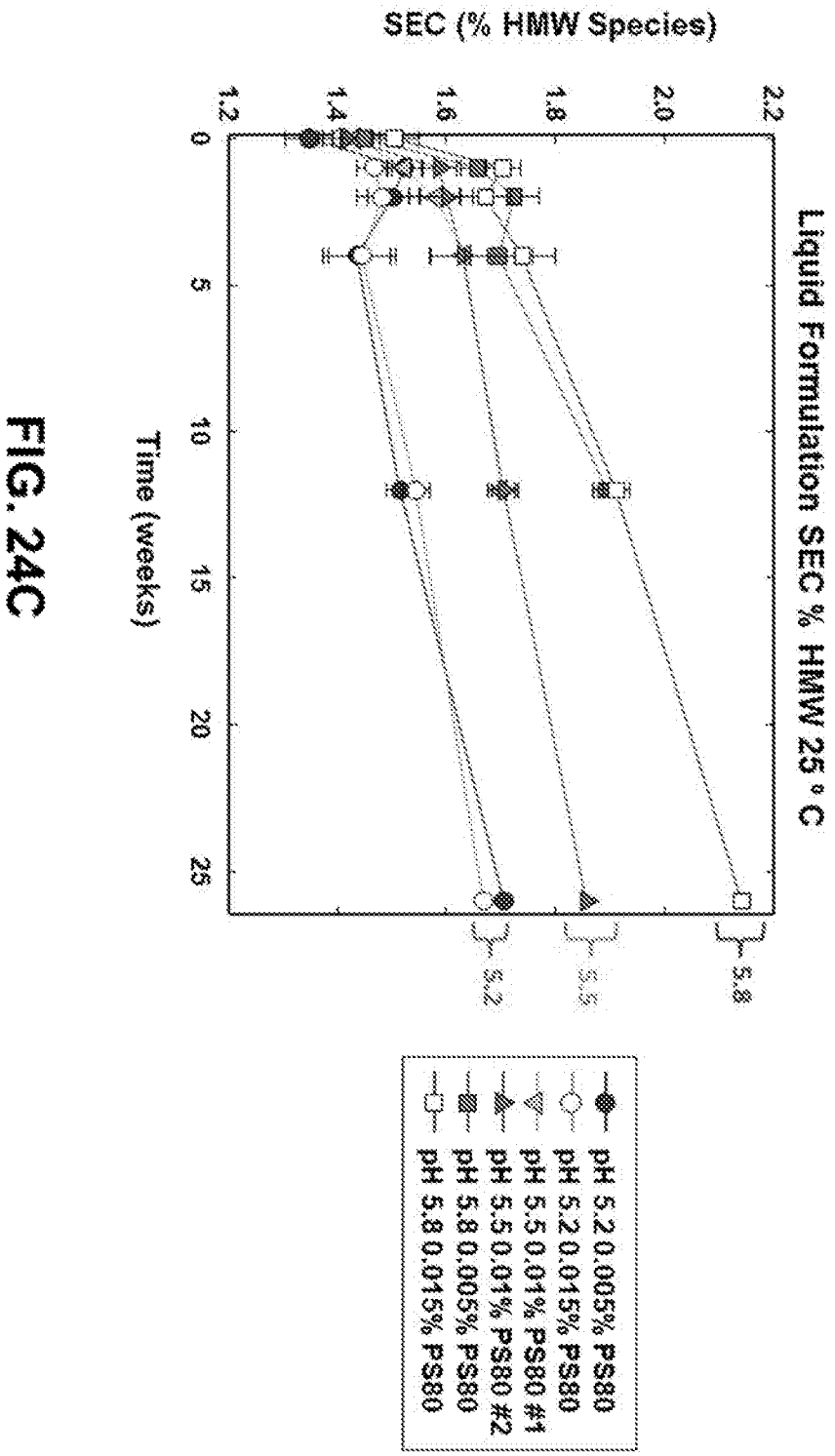

Liquid Formulation SEC % HMW 25 ° C
SEC (% HMW Species)
Time (weeks)
1.2
1.4
1.6
1.8
2.0
2.2
0
5
10
15
20
25
5.8
5.5
5.2
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80 #1
pH 5.5 0.01% PS80 #2
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 24C

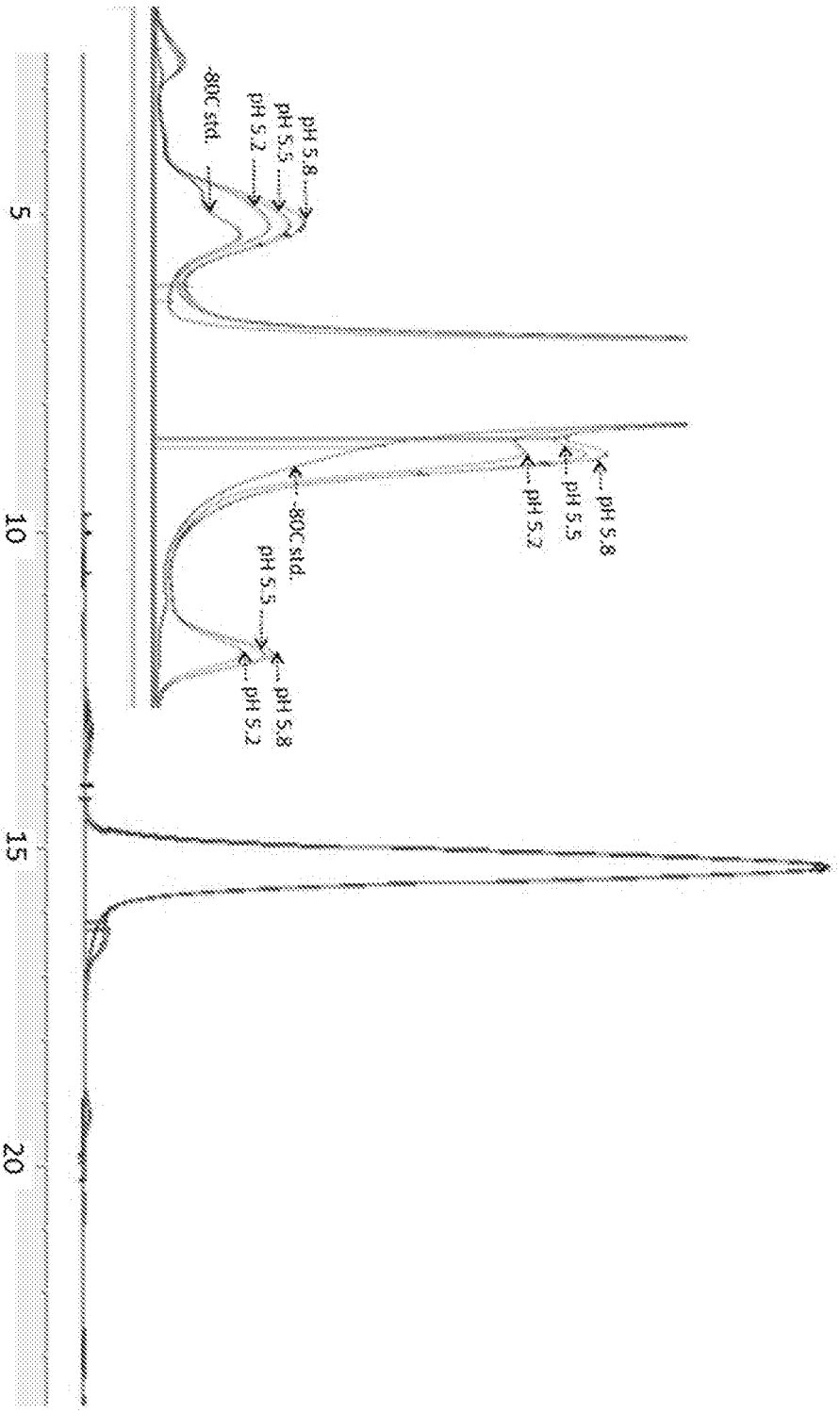

4 Weeks 40 °C 0.005% (w/v) PS-80 Samples
pH 5.8
pH 5.5
pH 5.2
-80C std.
pH 5.8
pH 5.5
pH 5.2
-80C std.
pH 5.3
pH 5.8
pH 5.2
5
10
15
20

FIG. 25A

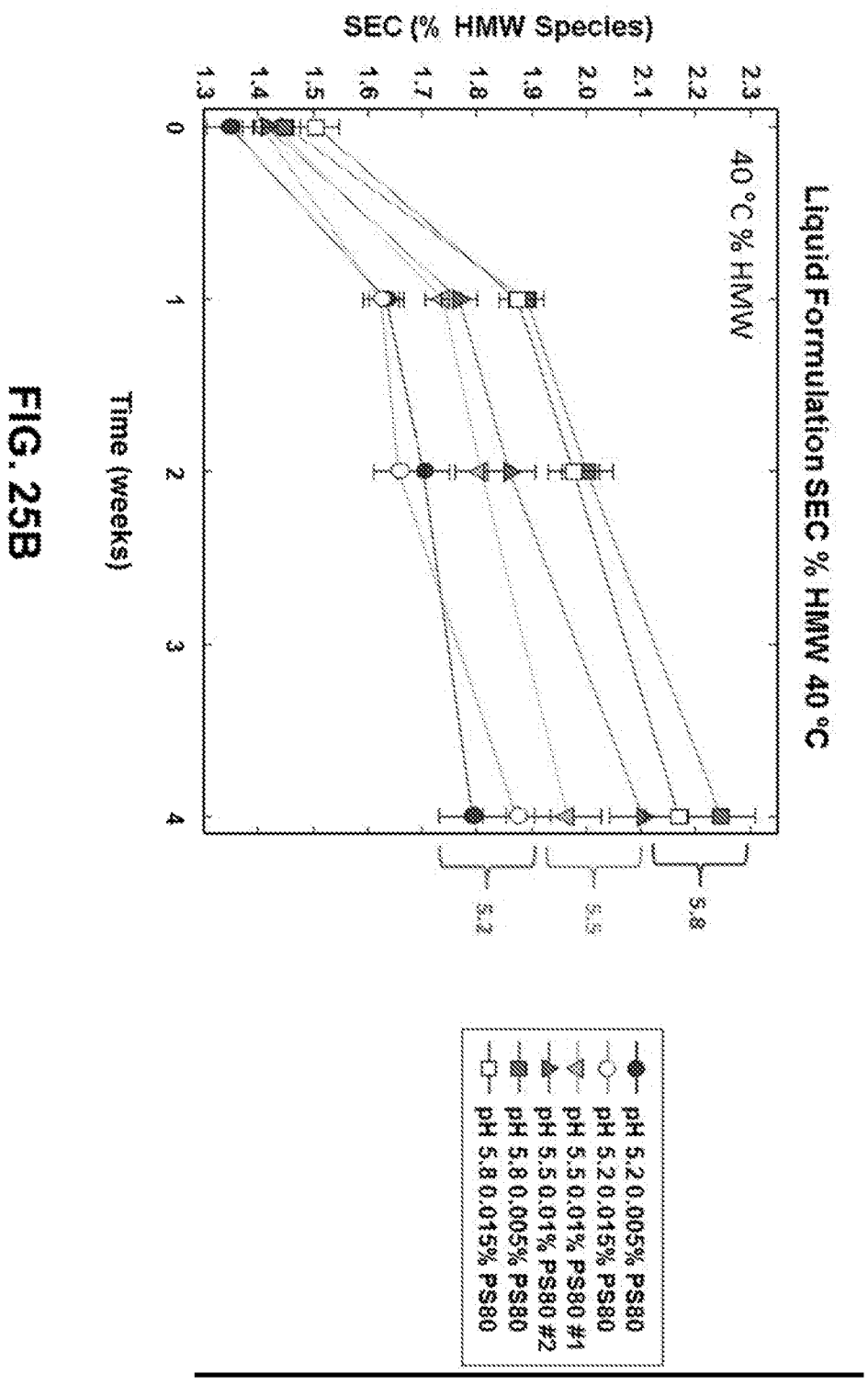

Liquid Formulation SEC % HMW 40 °C
40 °C % HMW
SEC (% HMW Species)
Time (weeks)
5.8
5.5
5.2
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80 #1
pH 5.5 0.01% PS80 #2
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 25B

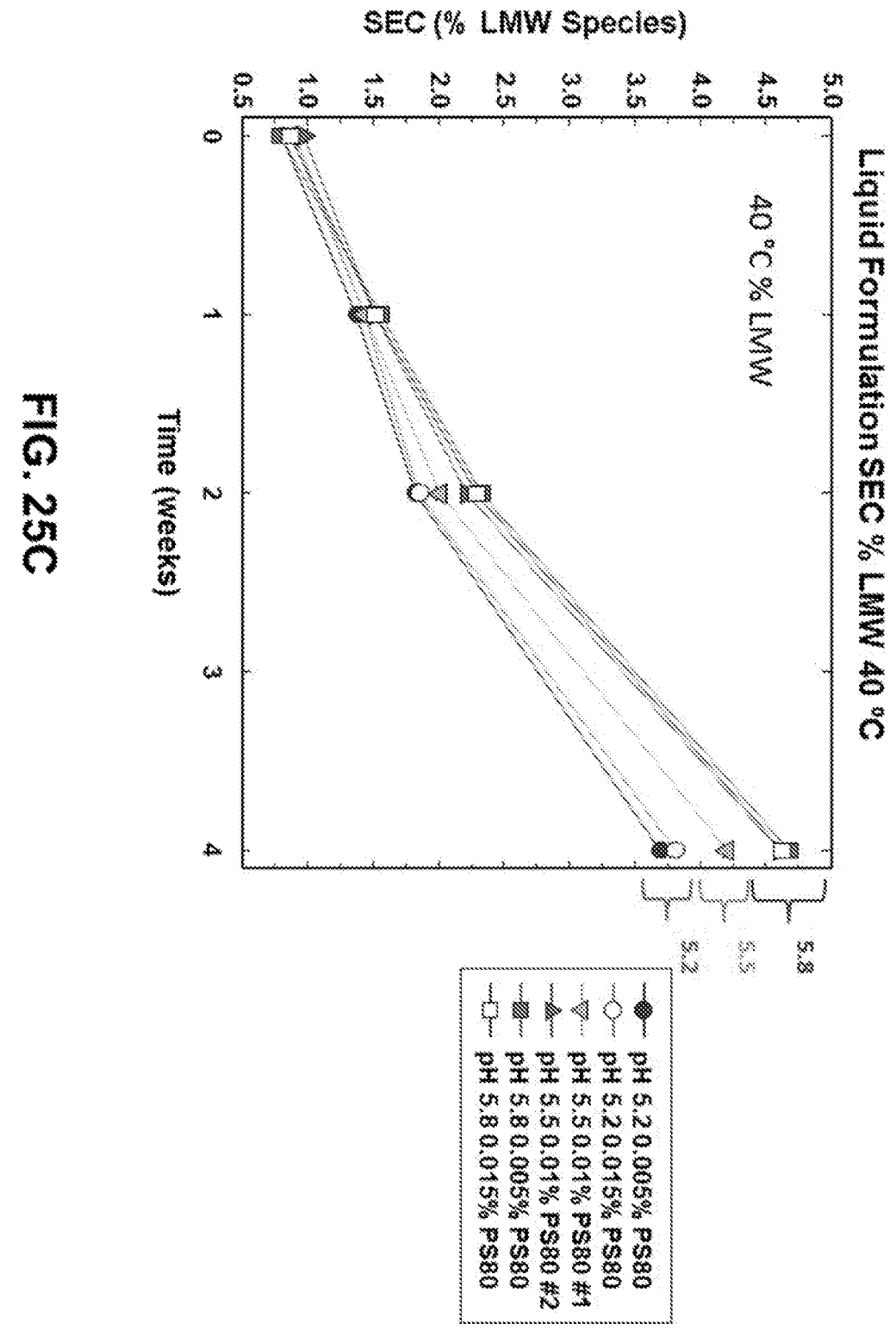

Liquid Formulation SEC % LMW 40 °C
SEC (% LMW Species)
40 °C % LMW
Time (weeks)
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
1
2
3
4
5.2
5.5
5.8
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80 #1
pH 5.5 0.01% PS80 #2
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 25C

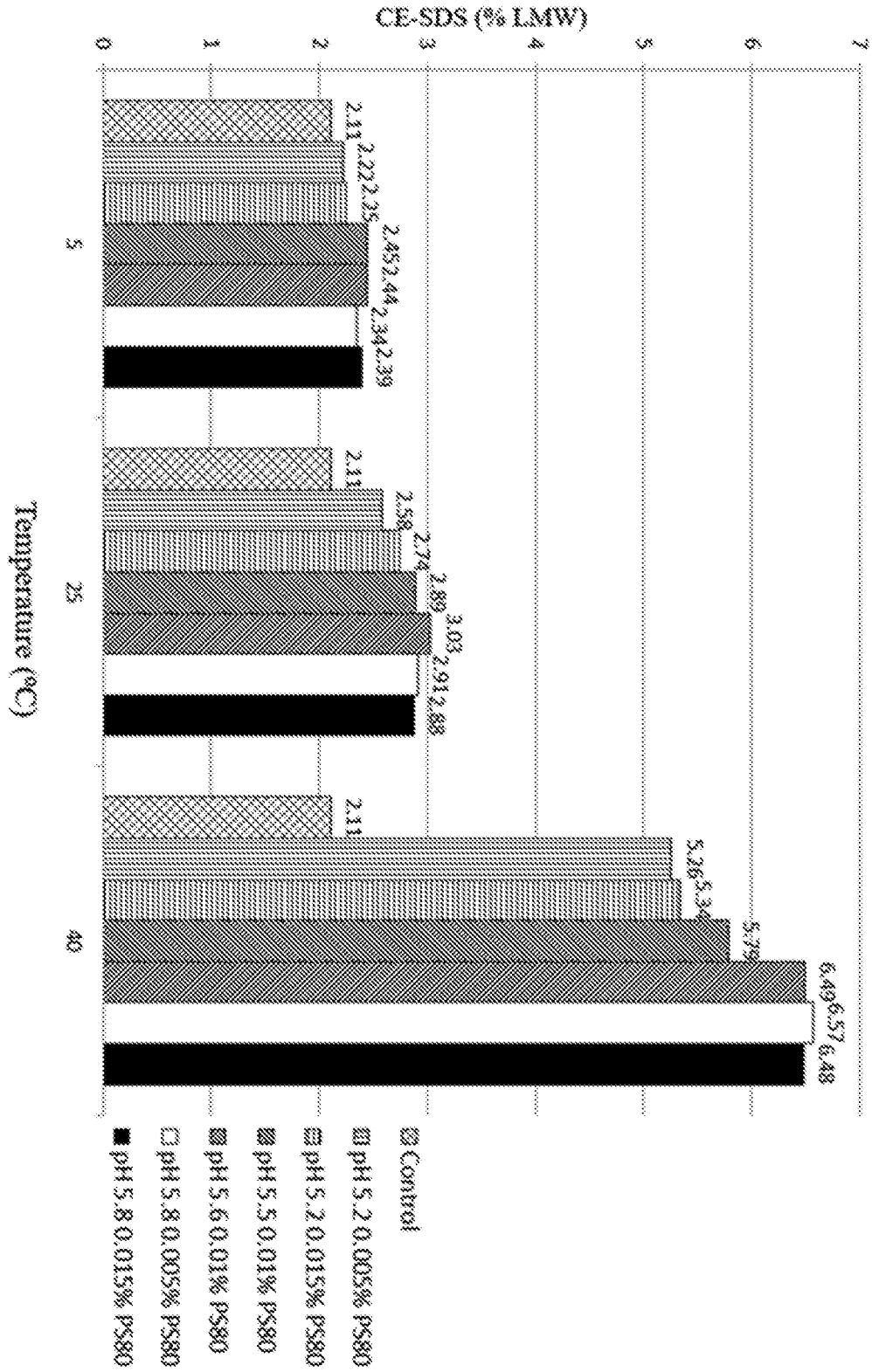

CE-SDS (% LMW)
0
1
2
3
4
5
6
7
2.11
2.22
2.35
2.45
2.44
2.34
2.39
2.11
2.58
2.74
2.89
3.03
2.91
2.88
2.11
5.26
5.34
5.79
6.49
6.57
6.48
5
25
40
Temperature (°C)
Control
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 26

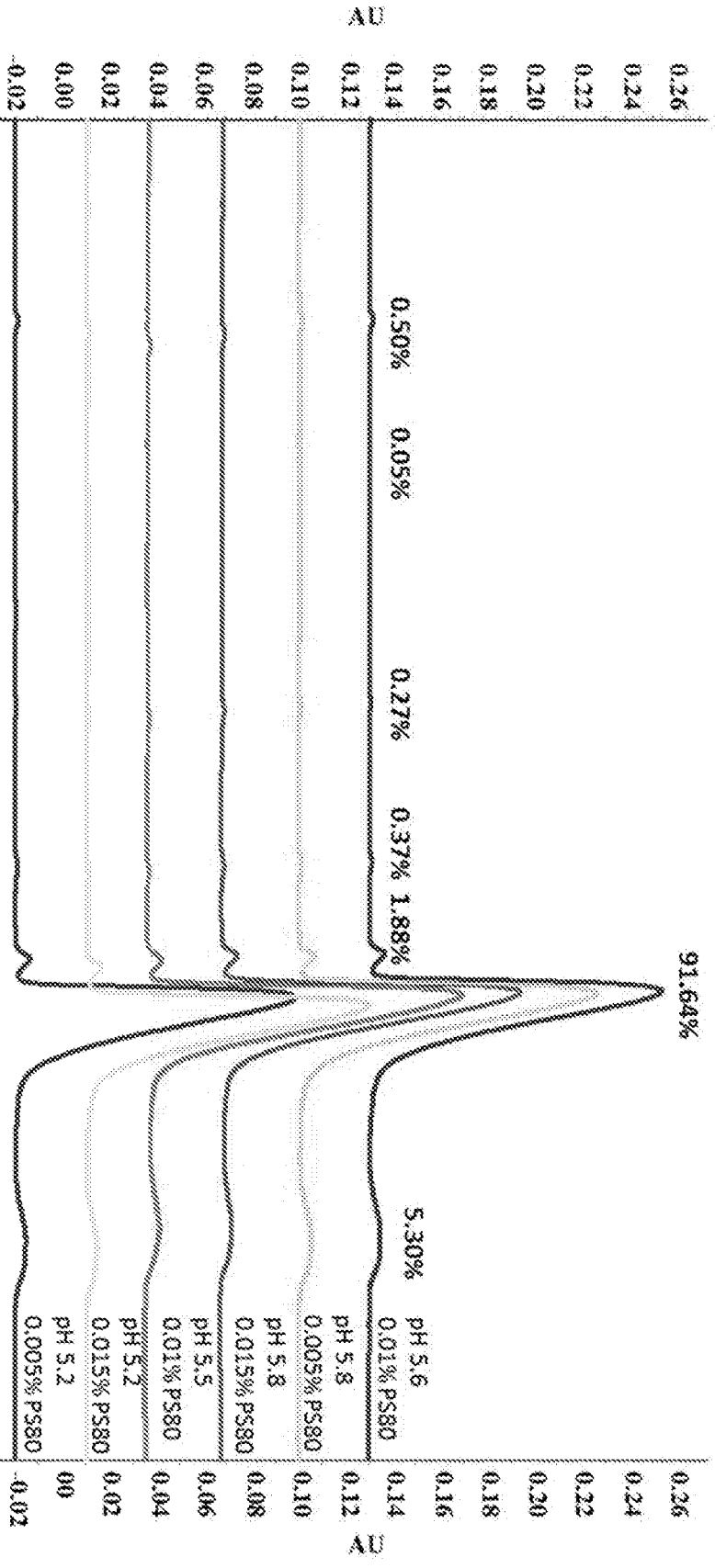

AU
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
-0.02
0.50%
0.05%
0.27%
0.37%
1.88%
91.64%
5.30%
pH 5.6
0.01% PS80
pH 5.8
0.005% PS80
pH 5.8
0.015% PS80
pH 5.5
0.01% PS80
pH 5.2
0.015% PS80
pH 5.2
0.005% PS80
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Minute

FIG. 27

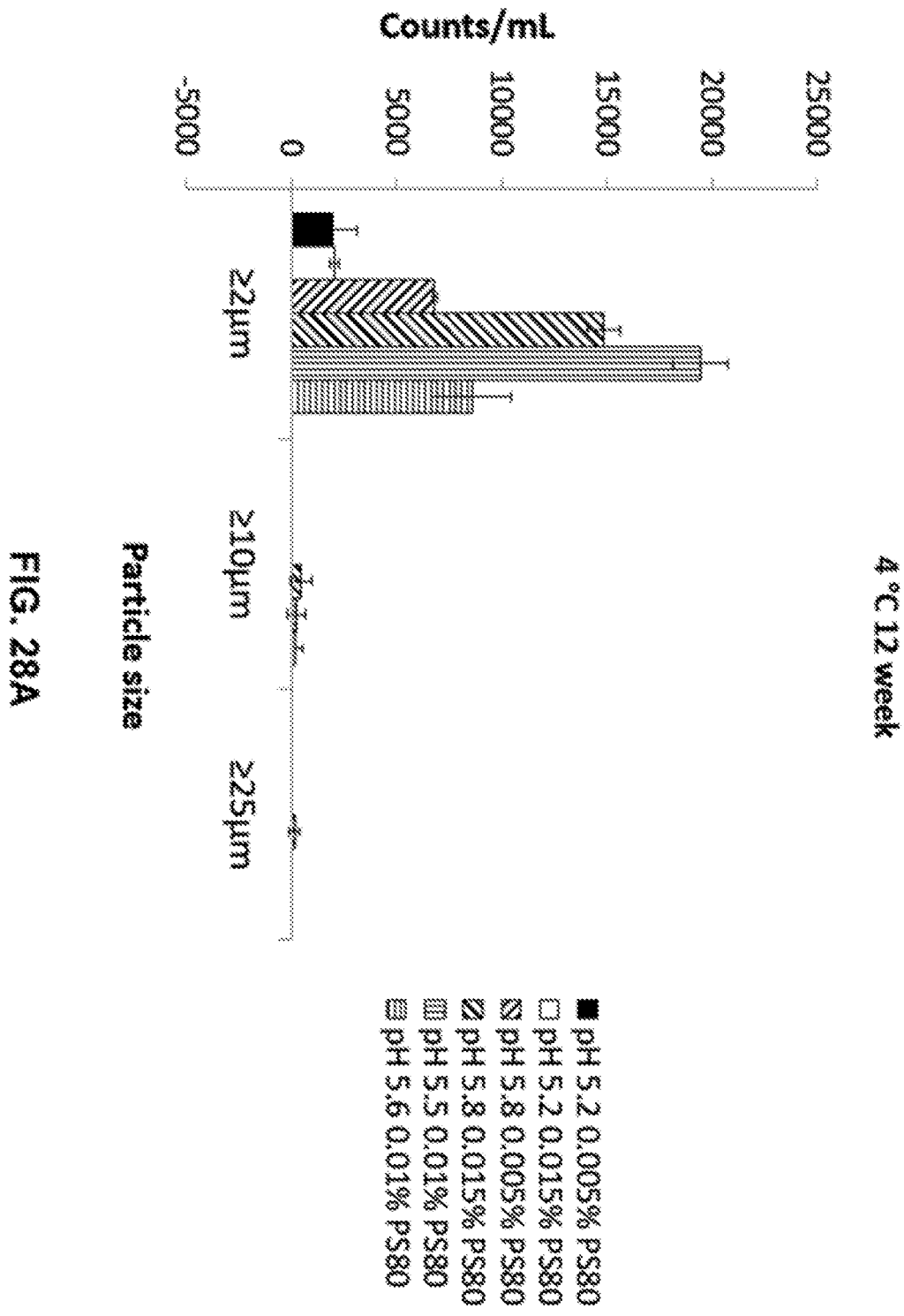

4 °C 12 week
Counts/mL
-5000
0
5000
10000
15000
20000
25000
≥2μm
≥10μm
≥25μm
Particle size
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80

FIG. 28A

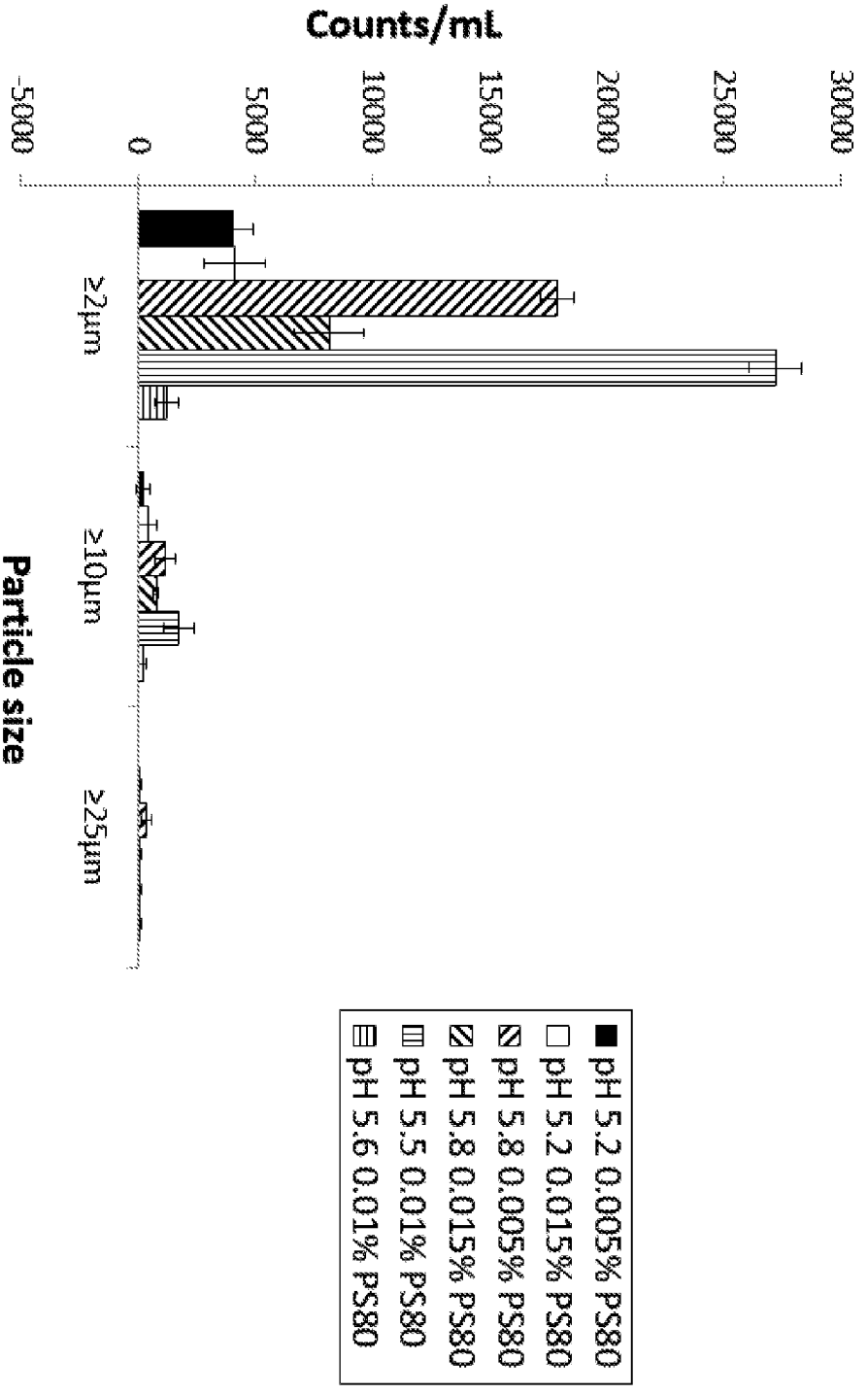

25 °C 12 Week
Counts/mL
30000
25000
20000
15000
10000
5000
0
-5000
≥2μm
≥10μm
≥25μm
Particle size
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80

FIG. 28B

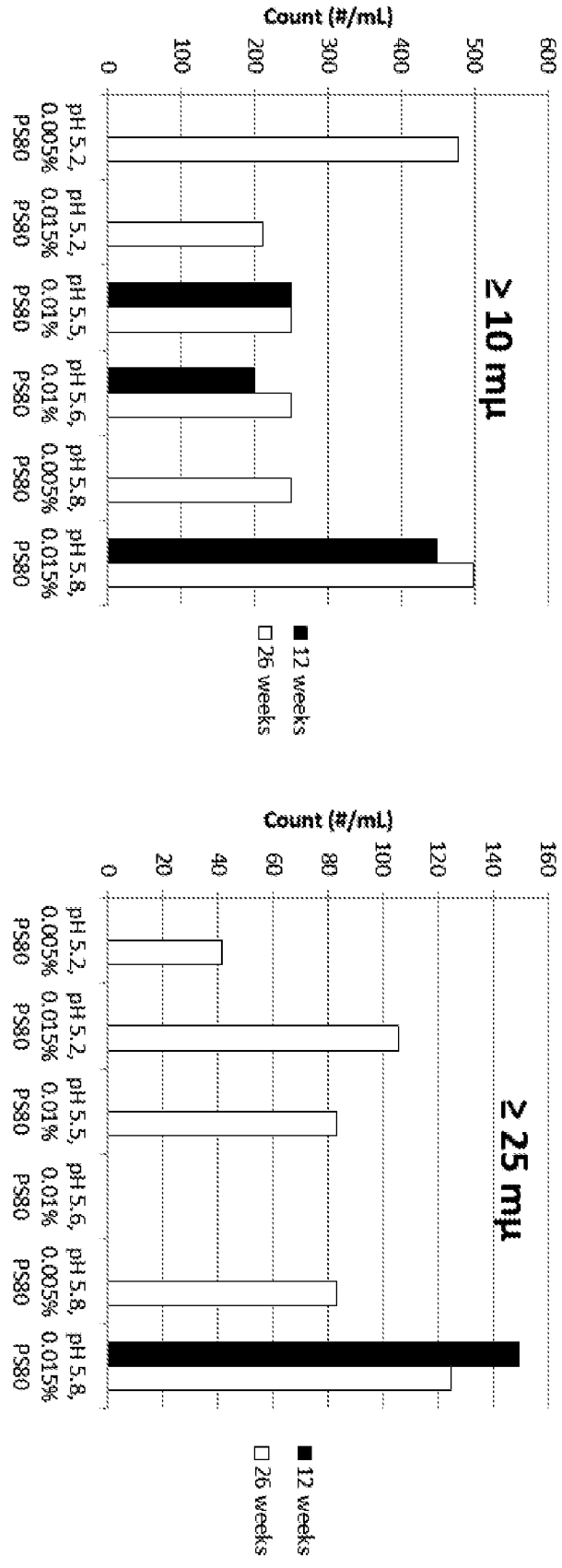

≥ 10 μm
Count (#/mL)
0
100
200
300
400
500
600
pH 5.2, 0.005% PS80
pH 5.2, 0.015% PS80
pH 5.5, 0.01% PS80
pH 5.6, 0.01% PS80
pH 5.8, 0.005% PS80
pH 5.8, 0.015% PS80
12 weeks
26 weeks
≥ 25 μm
Count (#/mL)
0
20
40
60
80
100
120
140
160
pH 5.2, 0.005% PS80
pH 5.2, 0.015% PS80
pH 5.5, 0.01% PS80
pH 5.6, 0.01% PS80
pH 5.8, 0.005% PS80
pH 5.8, 0.015% PS80
12 weeks
26 weeks

FIG. 29

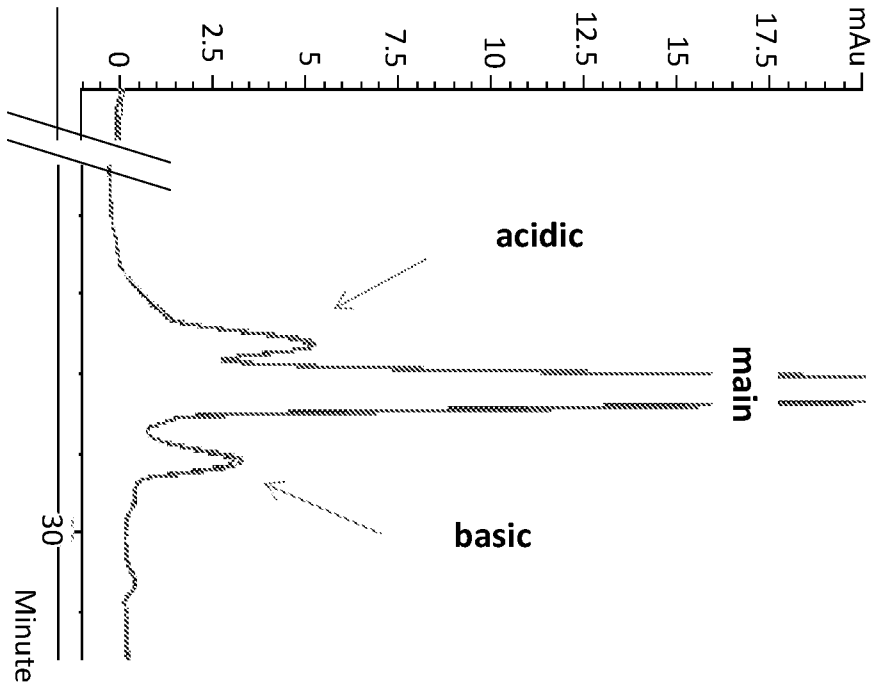


FIG. 30A

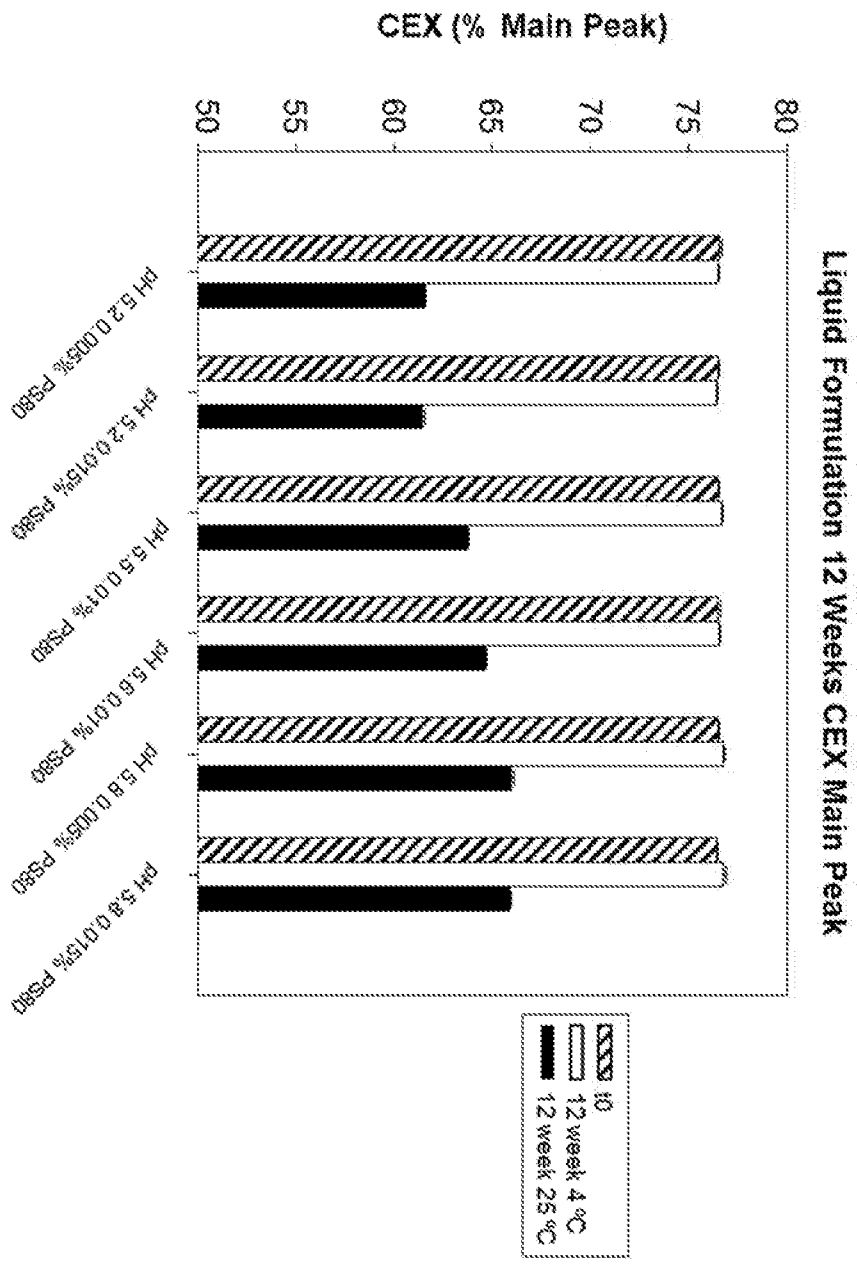

Liquid Formulation 12 Weeks CEX Main Peak
CEX (% Main Peak)
50
55
60
65
70
75
80
t0
12 week 4 °C
12 week 25 °C
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 30B

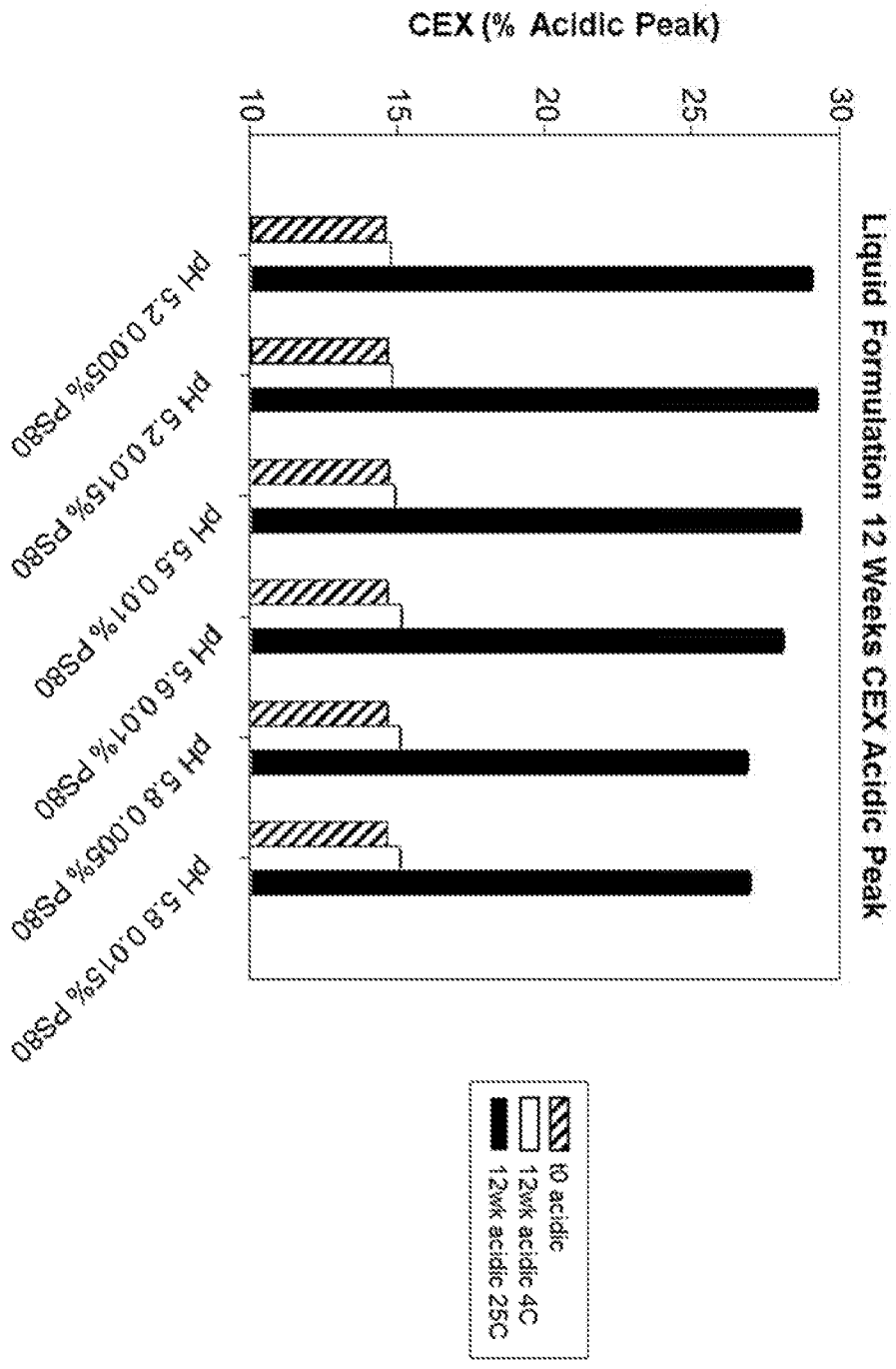

CEX (% Acidic Peak)
10
15
20
25
30
Liquid Formulation 12 Weeks CEX Acidic Peak
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80
t0 acidic
12wk acidic 4C
12wk acidic 25C

FIG. 30C

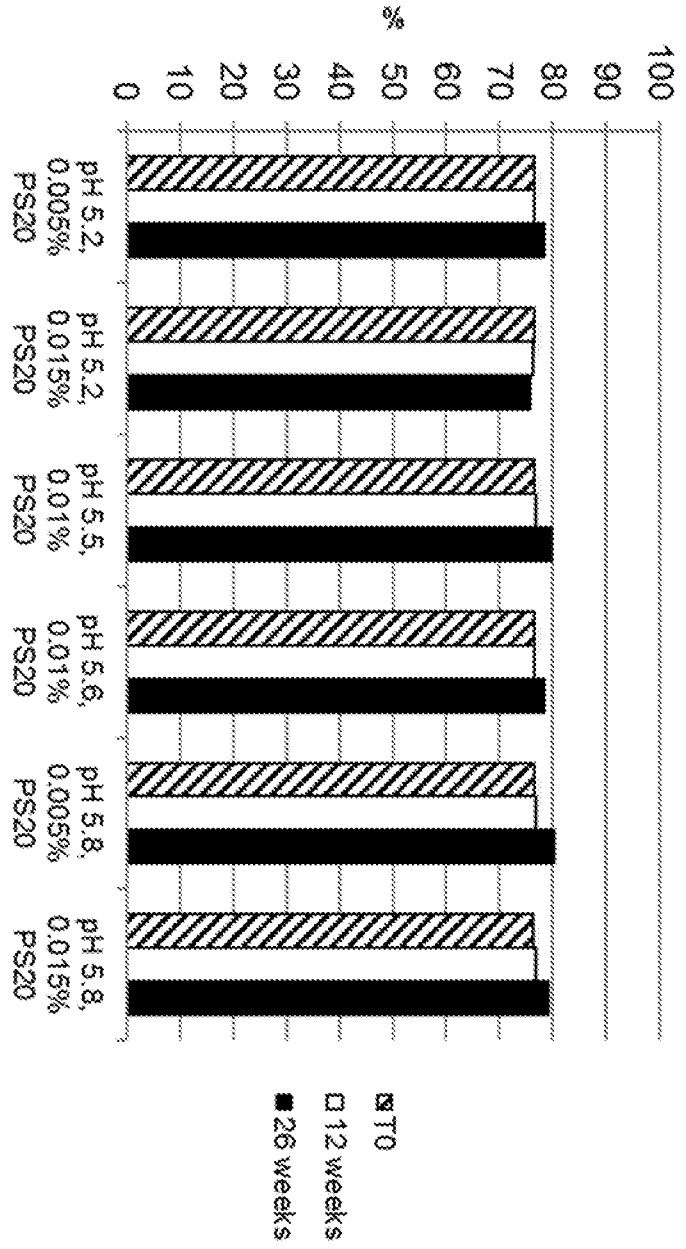

CEX Main Peak
%
0
10
20
30
40
50
60
70
80
90
100
pH 5.2, 0.005% PS20
pH 5.2, 0.015% PS20
pH 5.5, 0.01% PS20
pH 5.8, 0.01% PS20
pH 5.8, 0.005% PS20
pH 5.8, 0.015% PS20
T0
12 weeks
26 weeks

FIG. 31

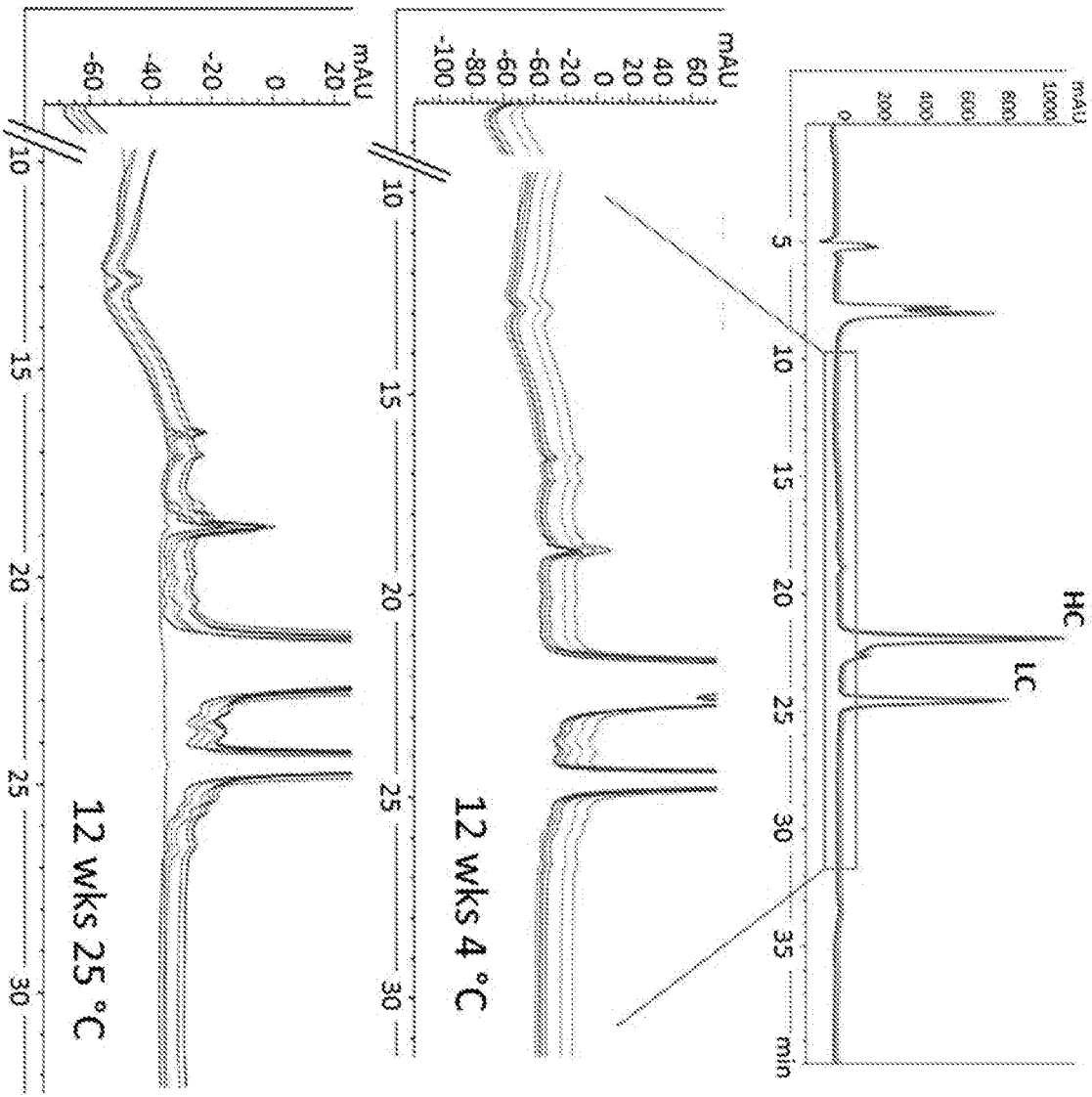

mAU
1000
800
600
400
200
0
5
10
15
20
25
30
35
min
HC
LC
mAU
60
40
20
0
-20
-40
-60
-80
-100
10
15
20
25
30
12 wks 4 °C
mAU
20
0
-20
-40
-60
10
15
20
25
30
12 wks 25 °C

FIG. 32

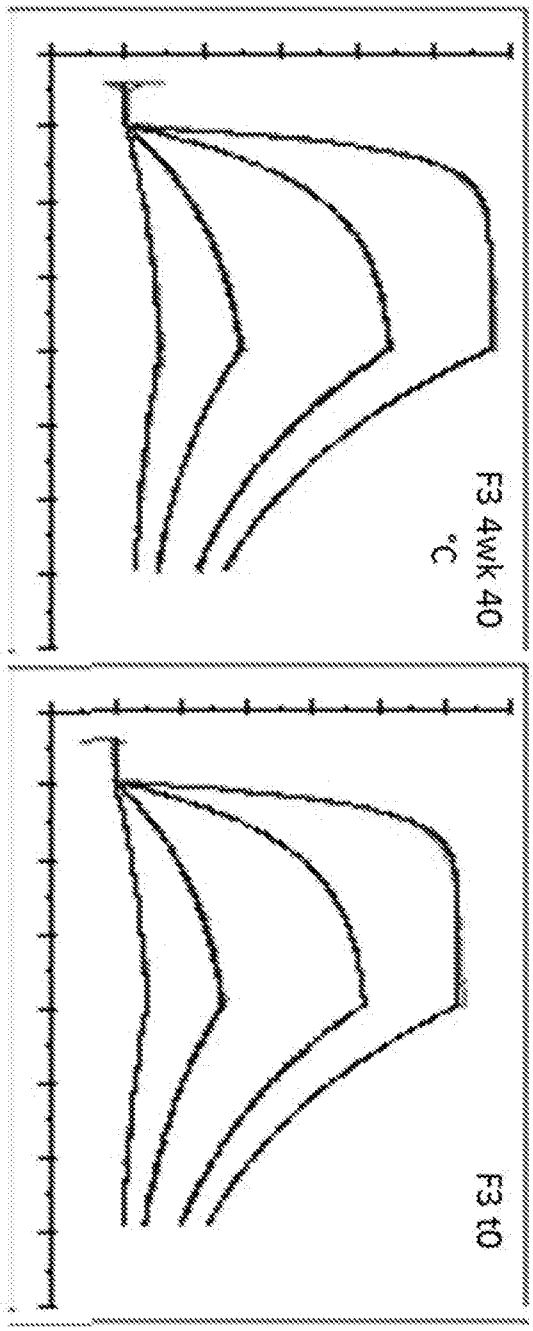


FIG. 33A

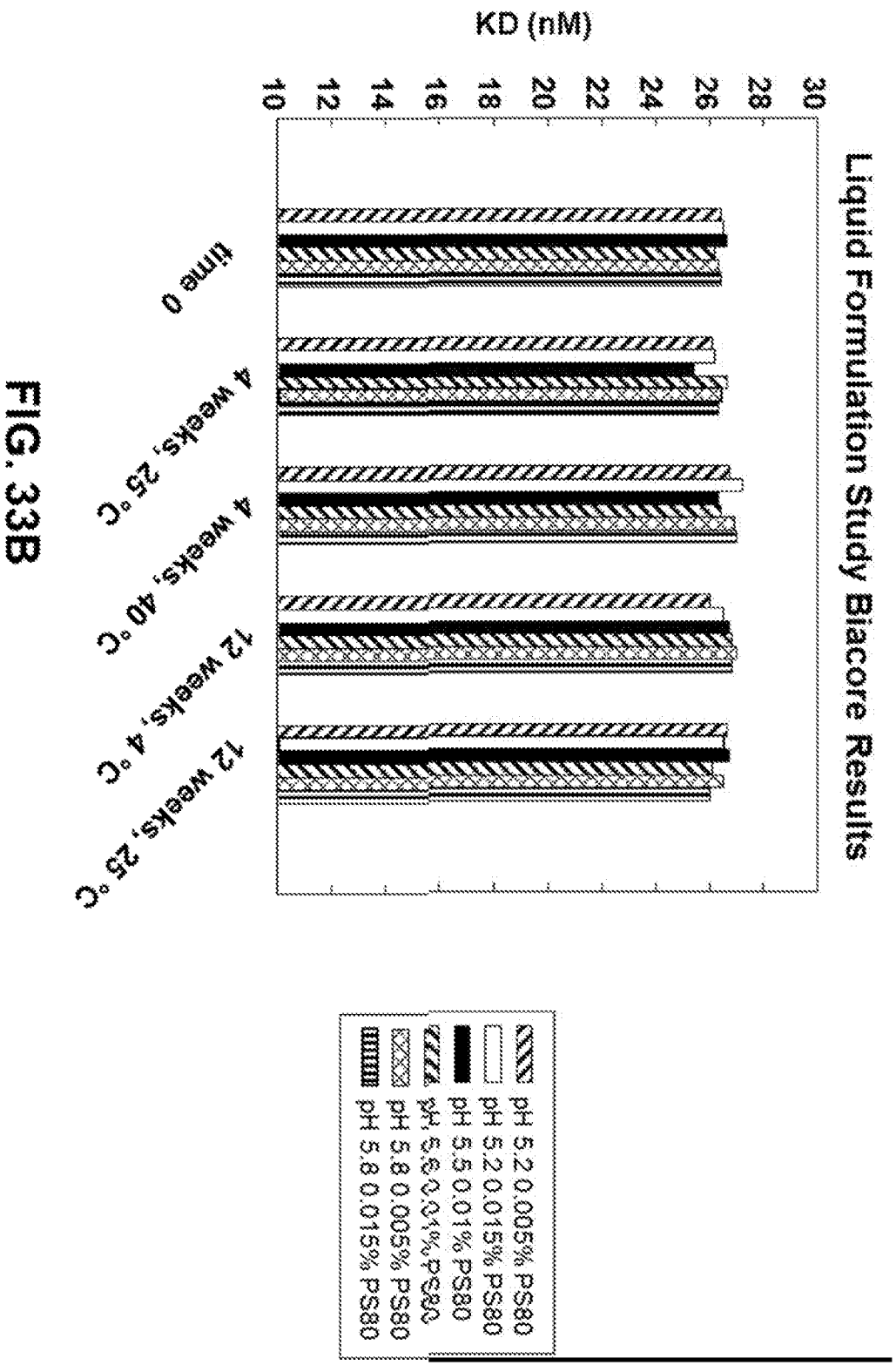

Liquid Formulation Study Biacore Results
KD (nM)
10
12
14
16
18
20
22
24
26
28
30
time 0
4 weeks, 25 °C
4 weeks, 40 °C
12 weeks, 4 °C
12 weeks, 25 °C
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 33B

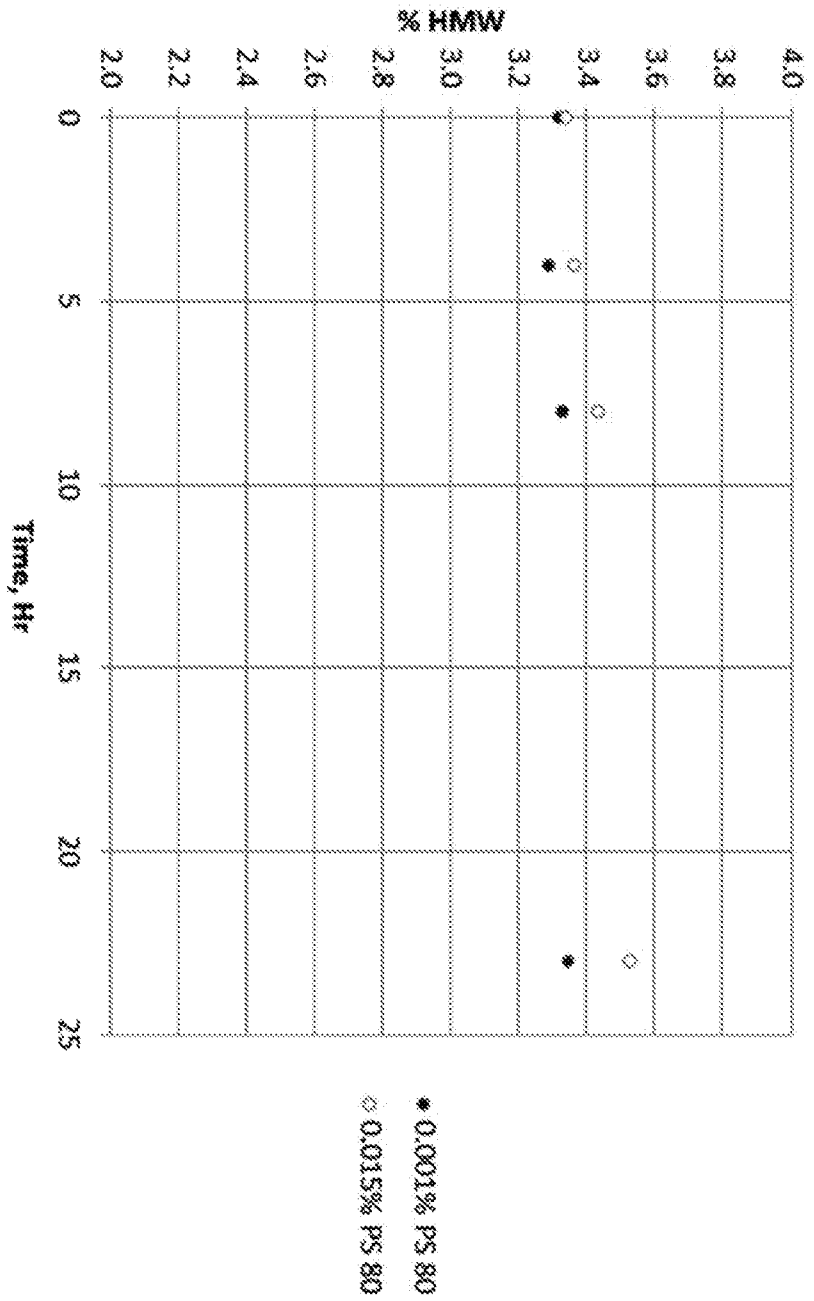

% HMW
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
Time, Hr
0
5
10
15
20
25
0.001% PS 80
0.015% PS 80

FIG. 34A

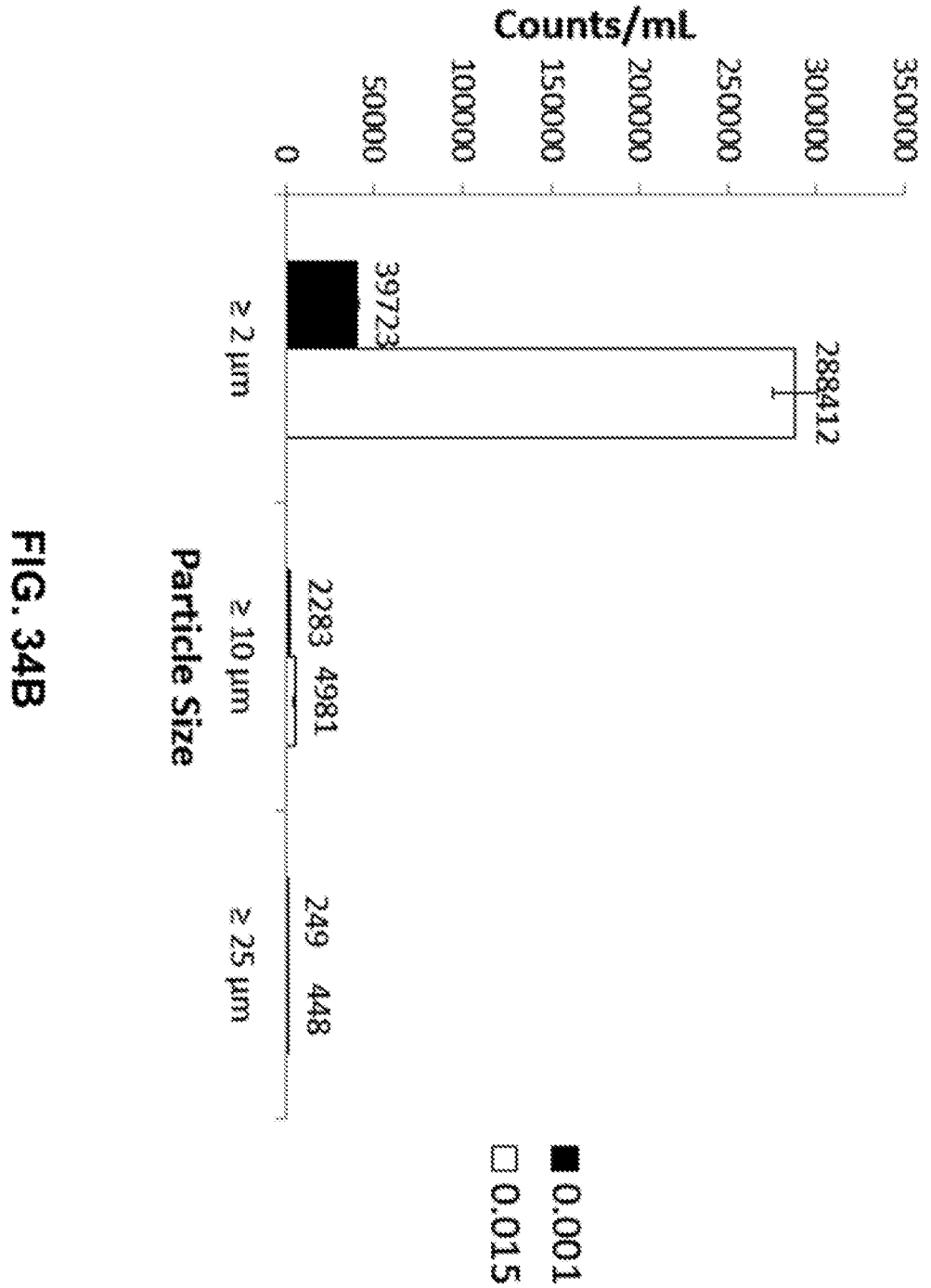

Counts/mL
0
50000
100000
150000
200000
250000
300000
350000
39723
288412
2283
4981
249
448
≥ 2 µm
≥ 10 µm
≥ 25 µm
Particle Size
0.001
0.015

FIG. 34B

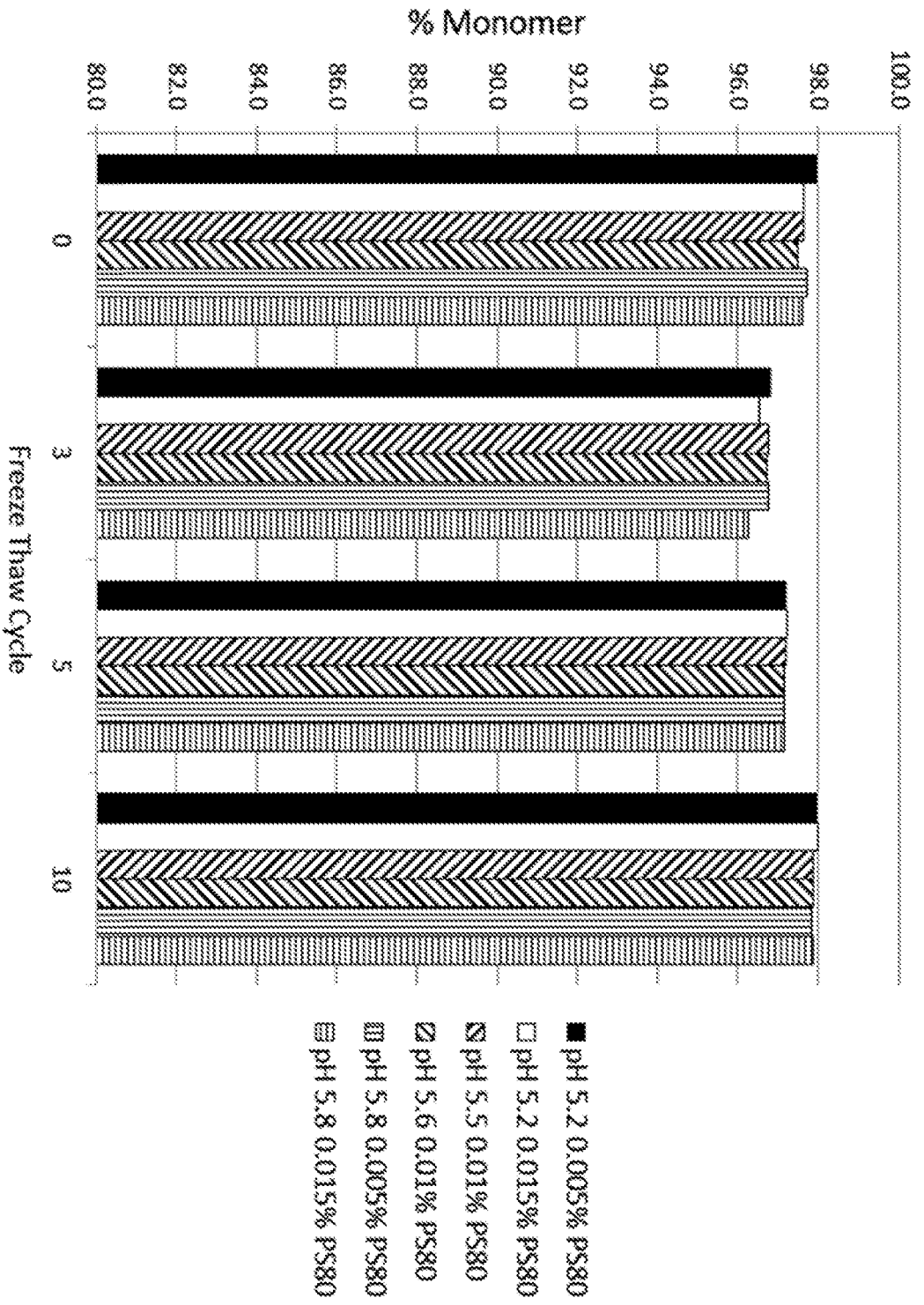

% Monomer
80.0
82.0
84.0
86.0
88.0
90.0
92.0
94.0
96.0
98.0
100.0
0
3
5
10
Freeze Thaw Cycle
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80

FIG. 35A

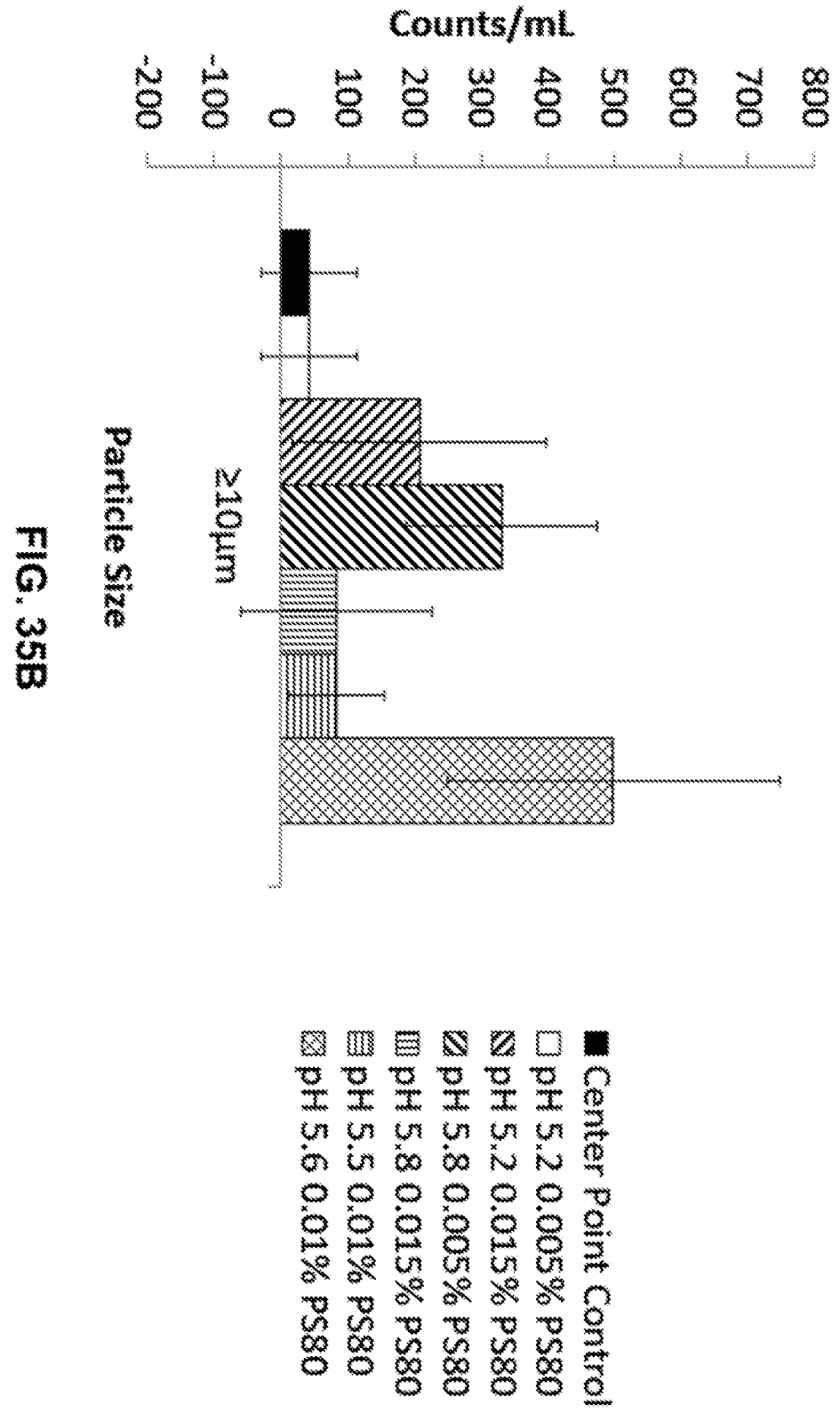

Counts/mL
-200
-100
0
100
200
300
400
500
600
700
800
≥10μm
Particle Size
Center Point Control
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80

FIG. 35B

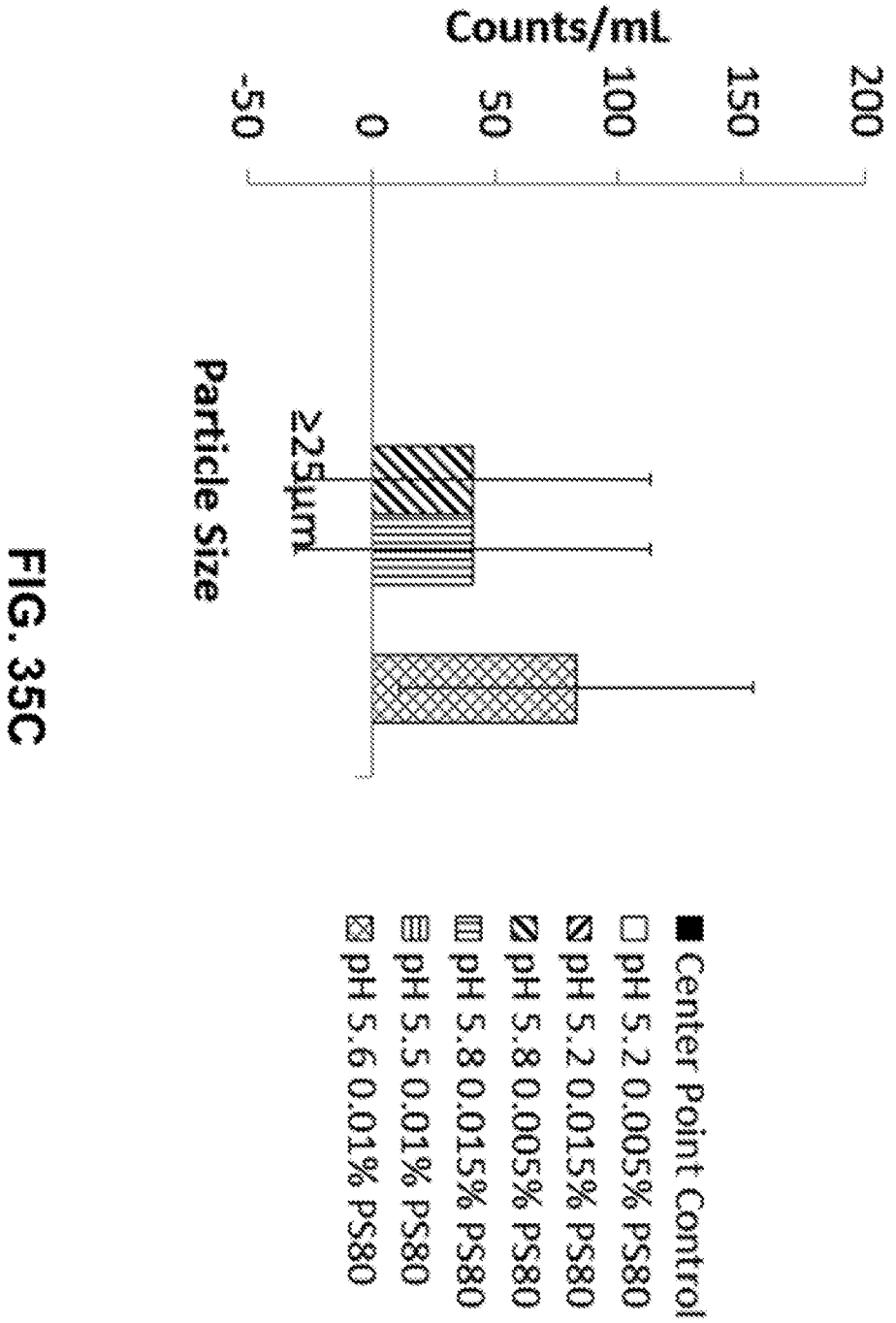

Counts/mL
-50
0
50
100
150
200
Particle Size
≥25μm
Center Point Control
pH 5.2 0.005% PS80
pH 5.2 0.015% PS80
pH 5.8 0.005% PS80
pH 5.8 0.015% PS80
pH 5.5 0.01% PS80
pH 5.6 0.01% PS80

FIG. 35C