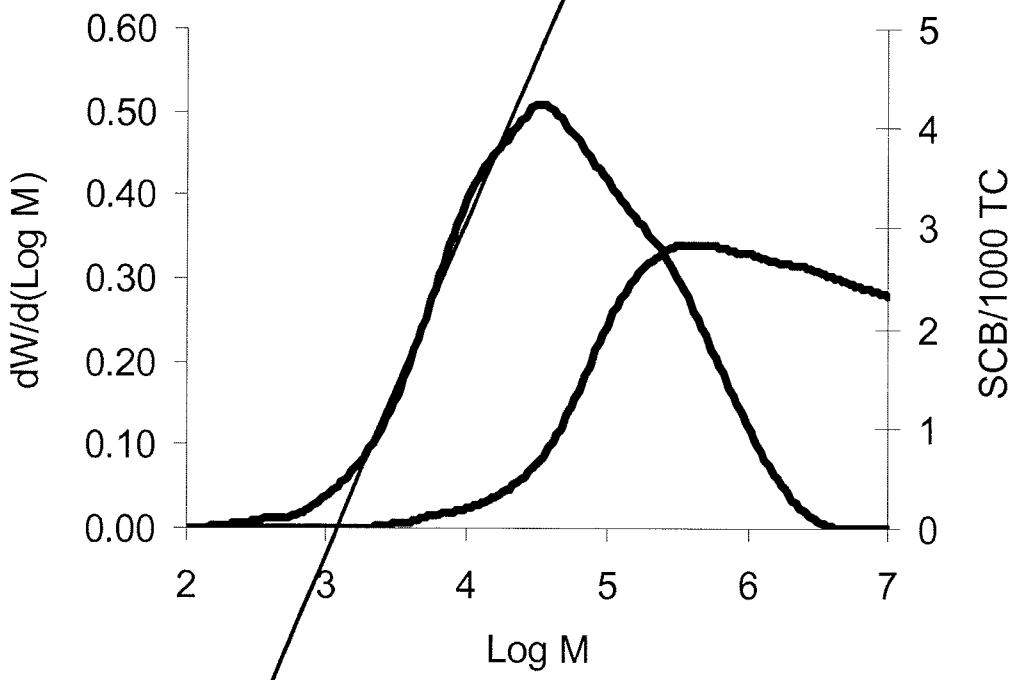
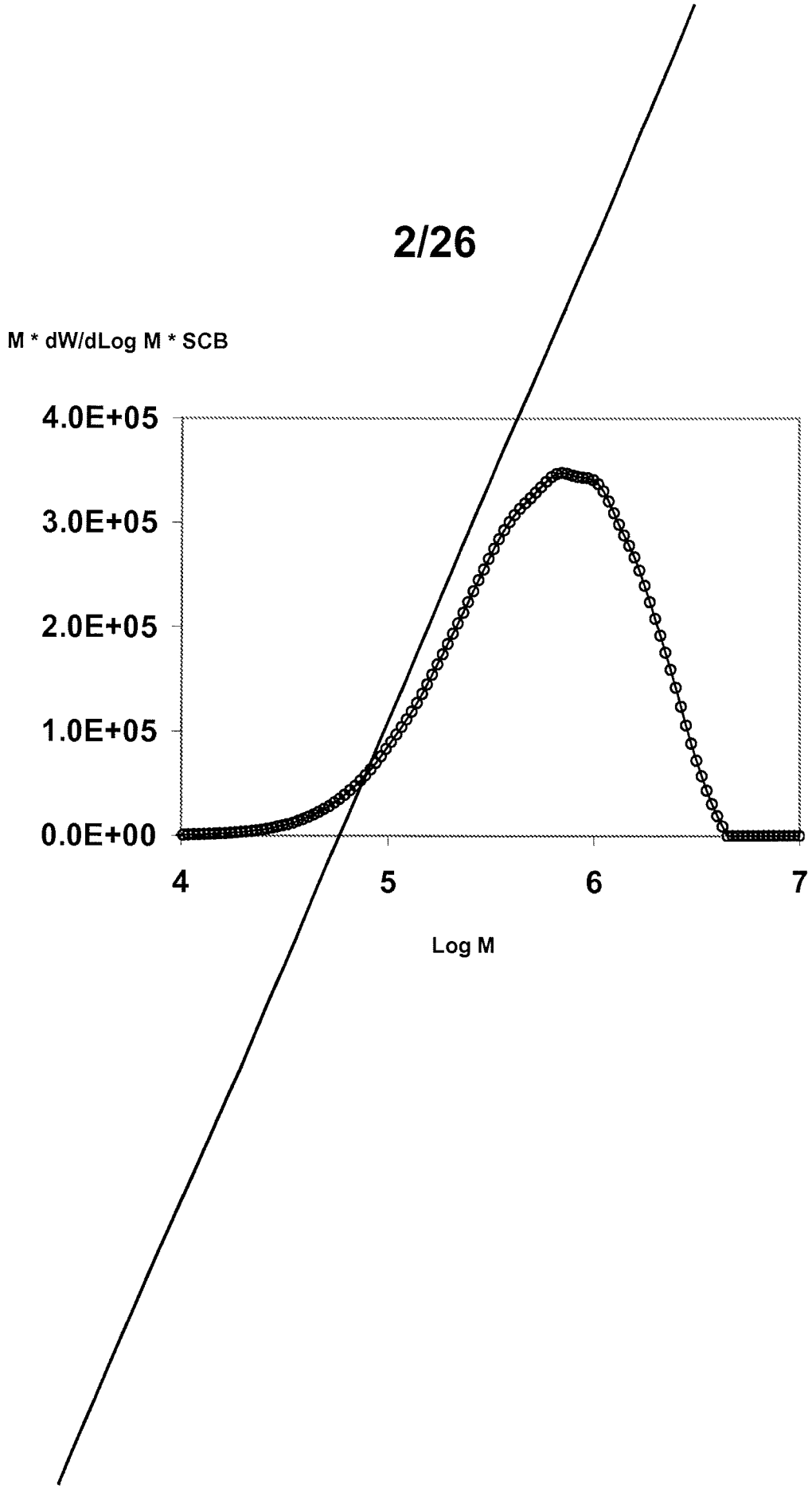
TITLE OF THE INVENTION:

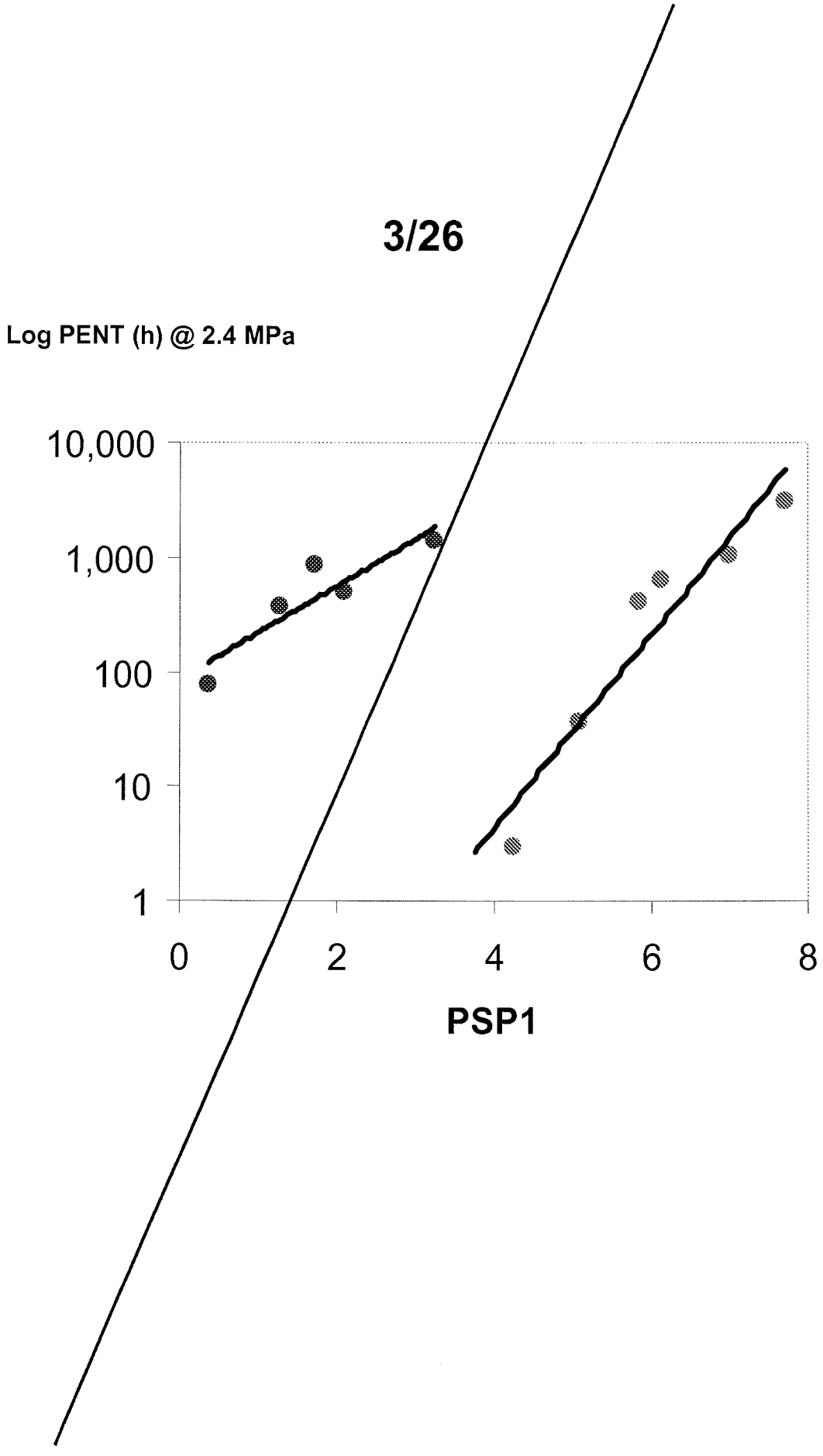
A METHOD FOR EMPLOYING SEC-FTIR DATA TO PREDICT MECHANICAL PROPERTIES OF POLYETHYLENE

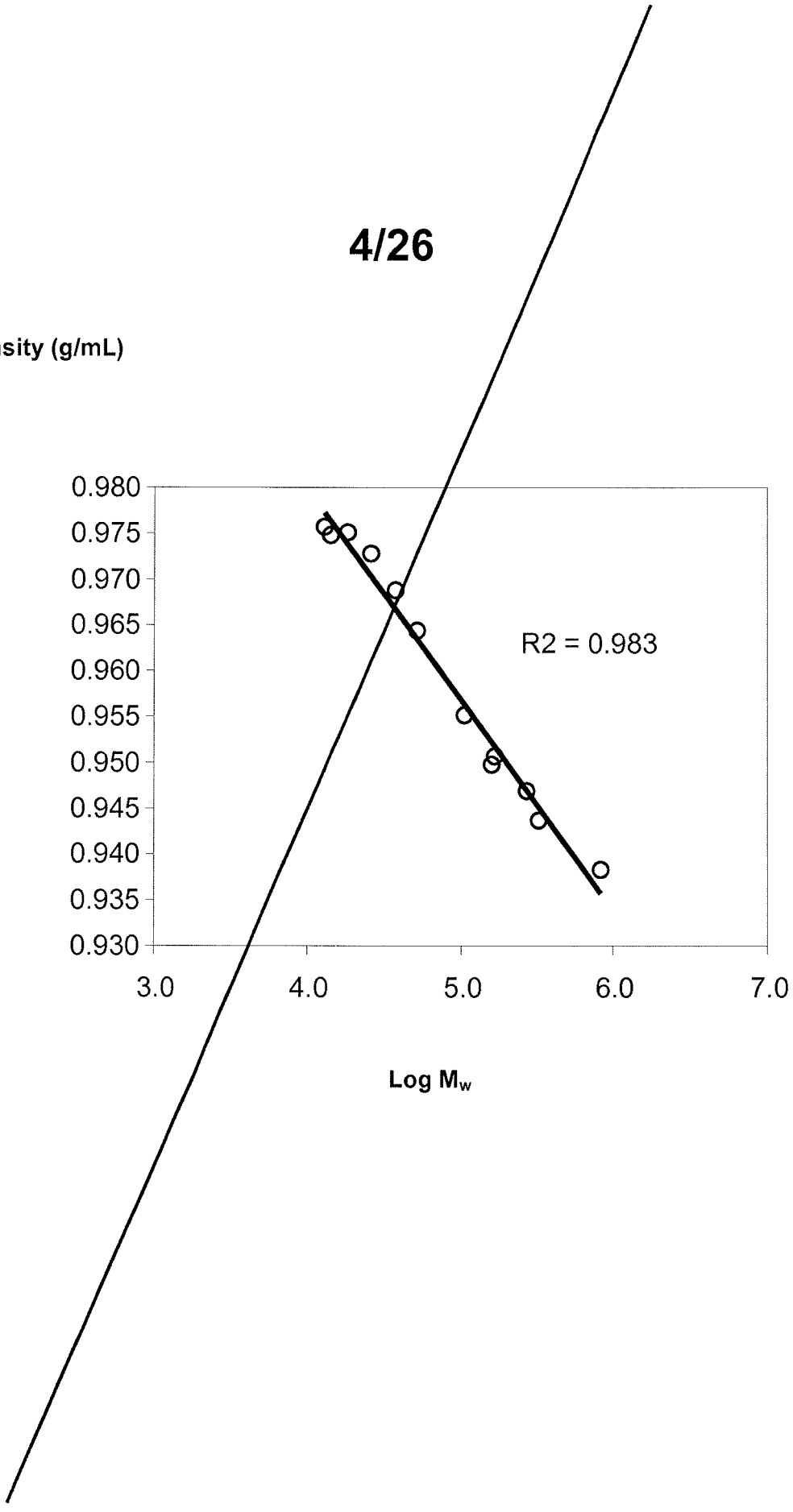
FIGURES

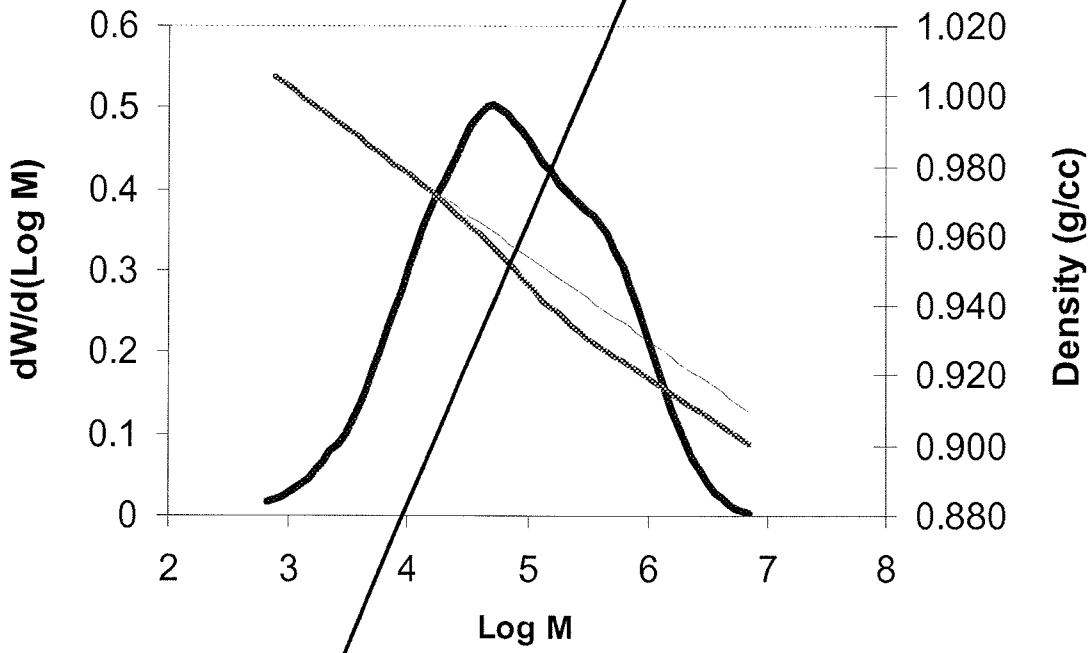
1/26

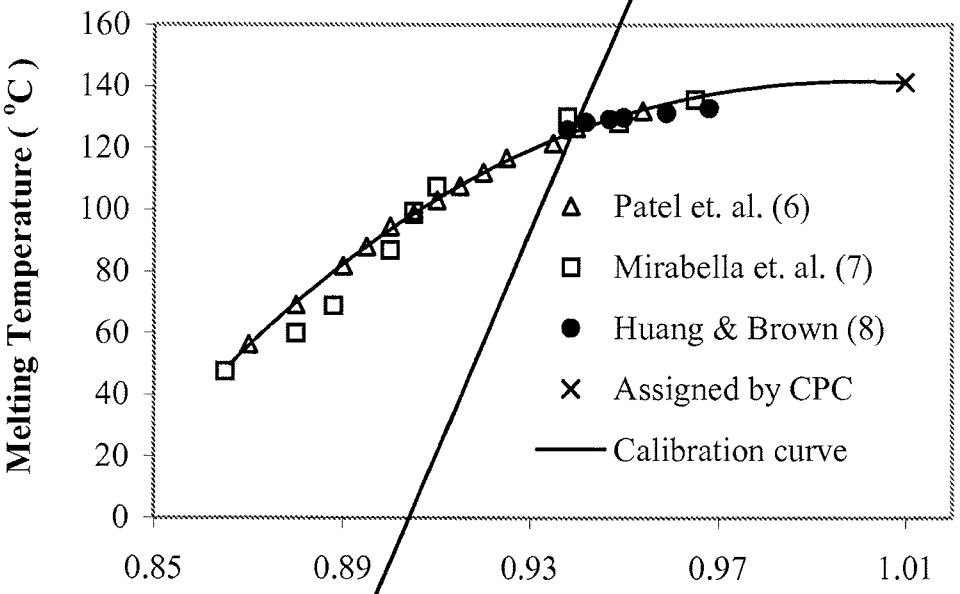


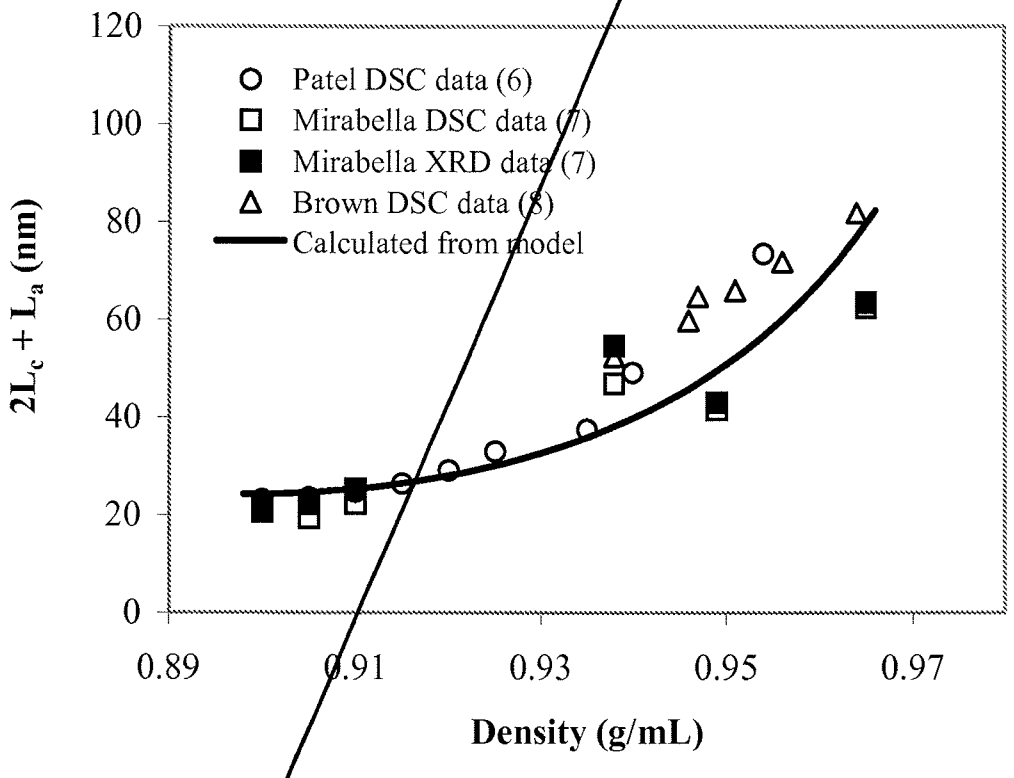

M * dW/dLog M * SCB
4.0E+05
3.0E+05
2.0E+05
1.0E+05
0.0E+00
4
5
6
7
Log M


Log PENT (h) @ 2.4 MPa
10,000
1,000
100
10
1
0
2
4
6
8
PSP1

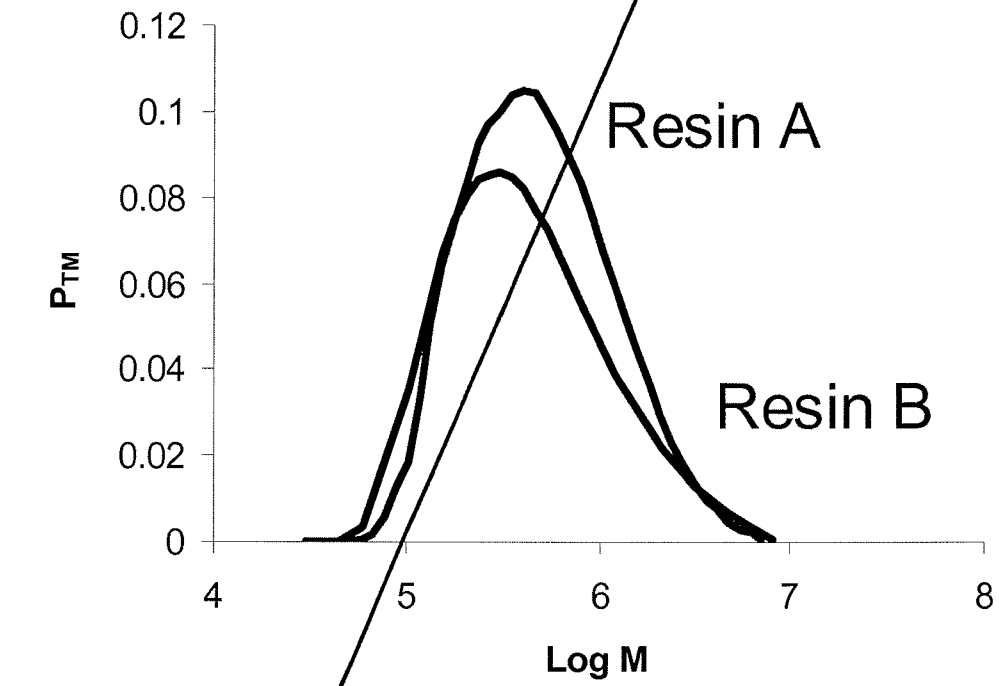

Density (g/mL)
0.980
0.975
0.970
0.965
0.960
0.955
0.950
0.945
0.940
0.935
0.930
R2 = 0.983
3.0
4.0
5.0
6.0
7.0
Log Mw


0.6
0.5
0.4
0.3
0.2
0.1
0
dW/d(Log M)
1.020
1.000
0.980
0.960
0.940
0.920
0.900
0.880
Density (g/cc)
2
3
4
5
6
7
8
Log M


Melting Temperature (°C)
160
140
120
100
80
60
40
20
0
0.85
0.89
0.93
0.97
1.01
Density (g/mL)
Patel et. al. (6)
Mirabella et. al. (7)
Huang & Brown (8)
Assigned by CPC
Calibration curve

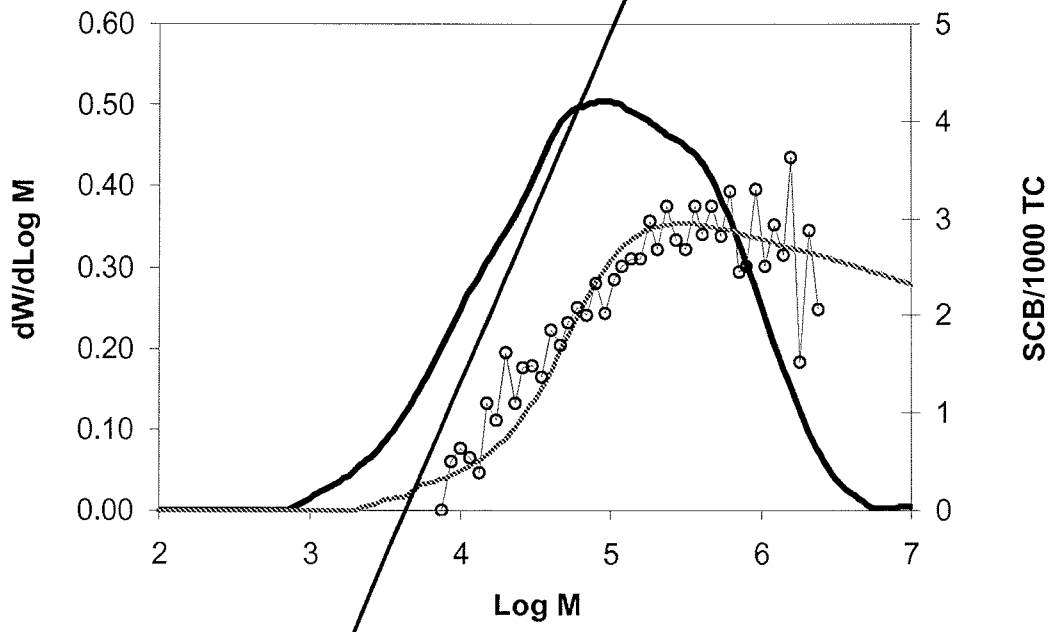

120
100
80
60
40
20
0
0.89
0.91
0.93
0.95
0.97
Density (g/mL)
2Lc + La (nm)
Patel DSC data (6)
Mirabella DSC data (7)
Mirabella XRD data (7)
Brown DSC data (8)
Calculated from model

8/26

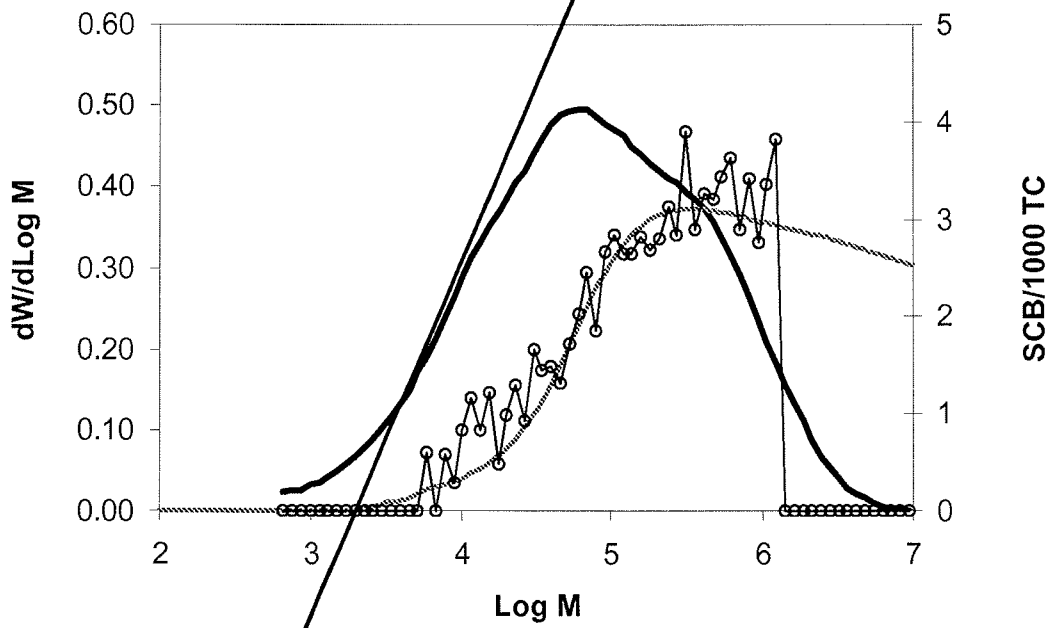


Y-AXIS SHOULD NOT BE LABELED P_{TM}

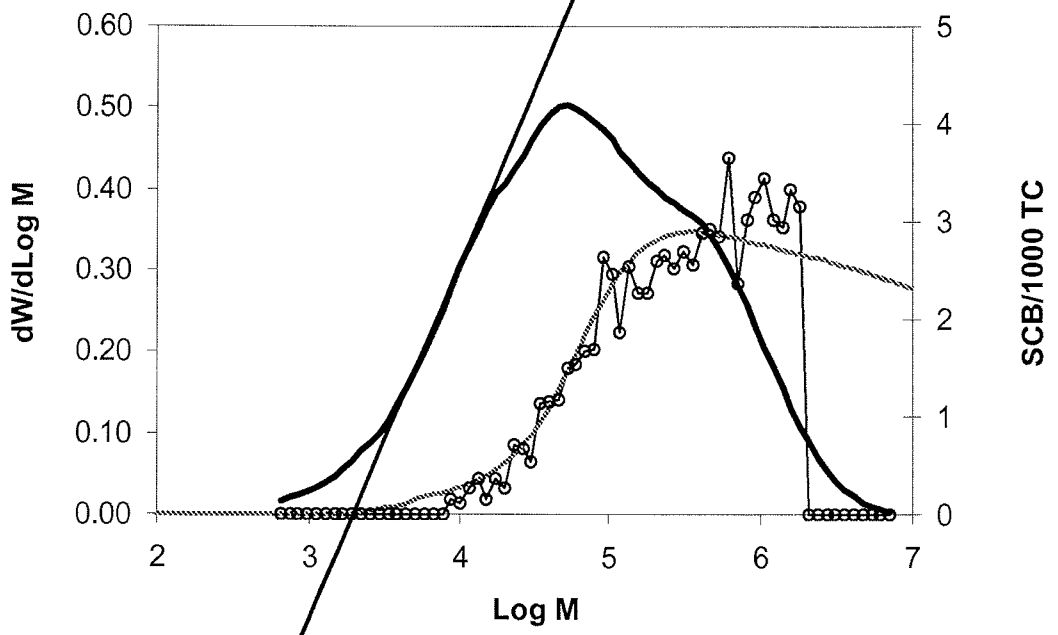
BM-1


0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

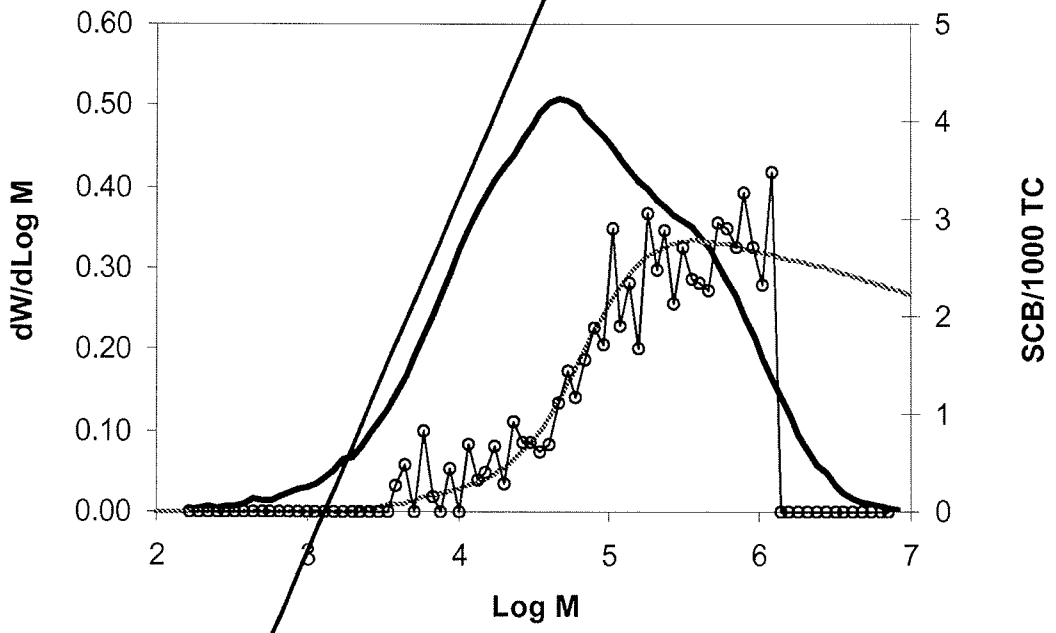
BM-2


0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

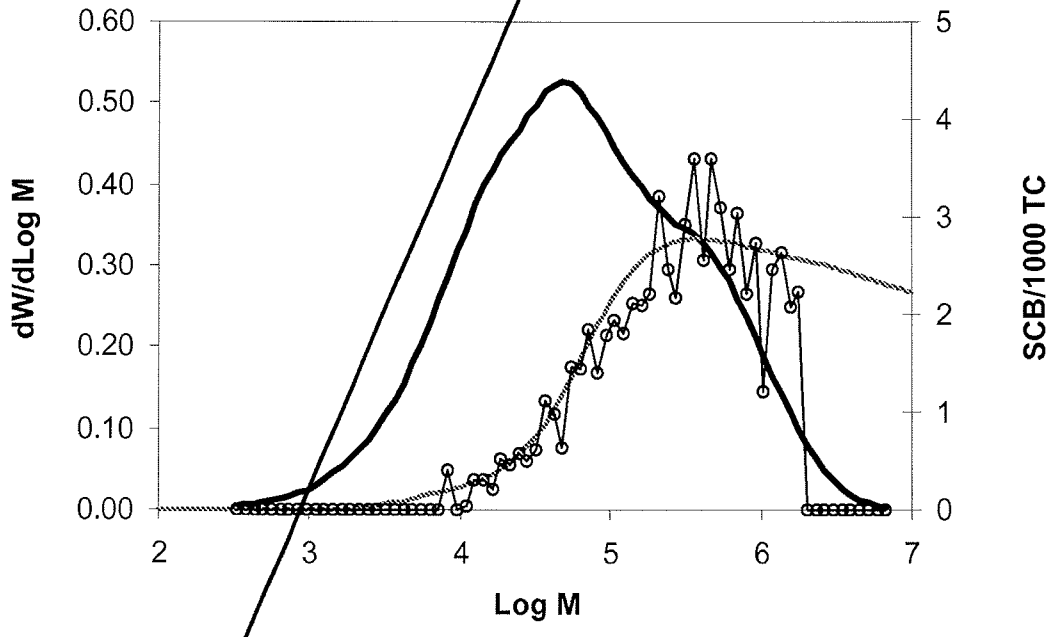
BM-3


0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

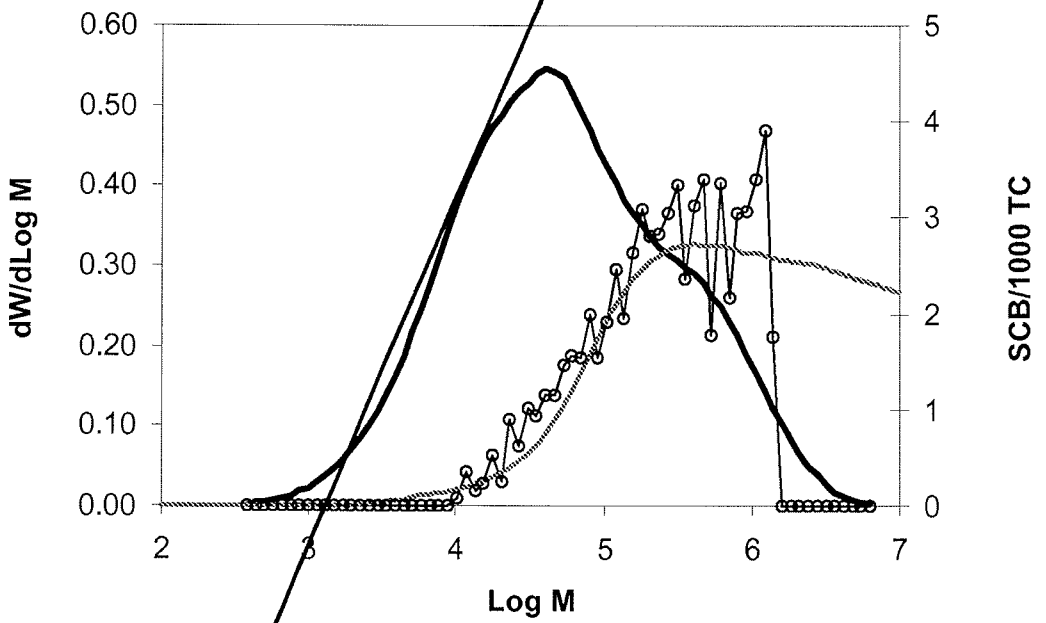
BM-4


0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

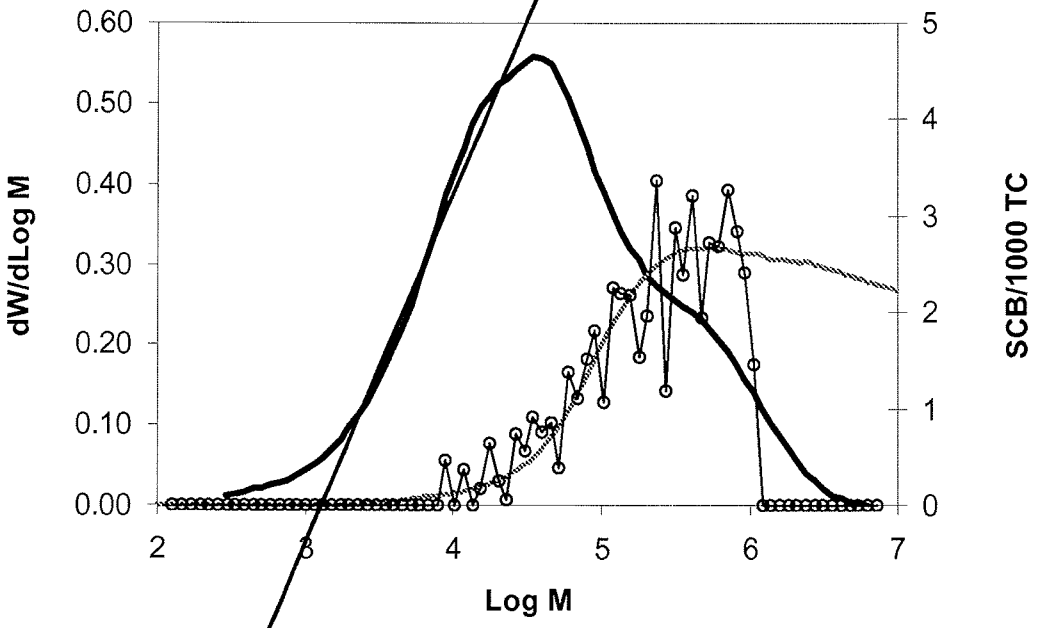
BM-5

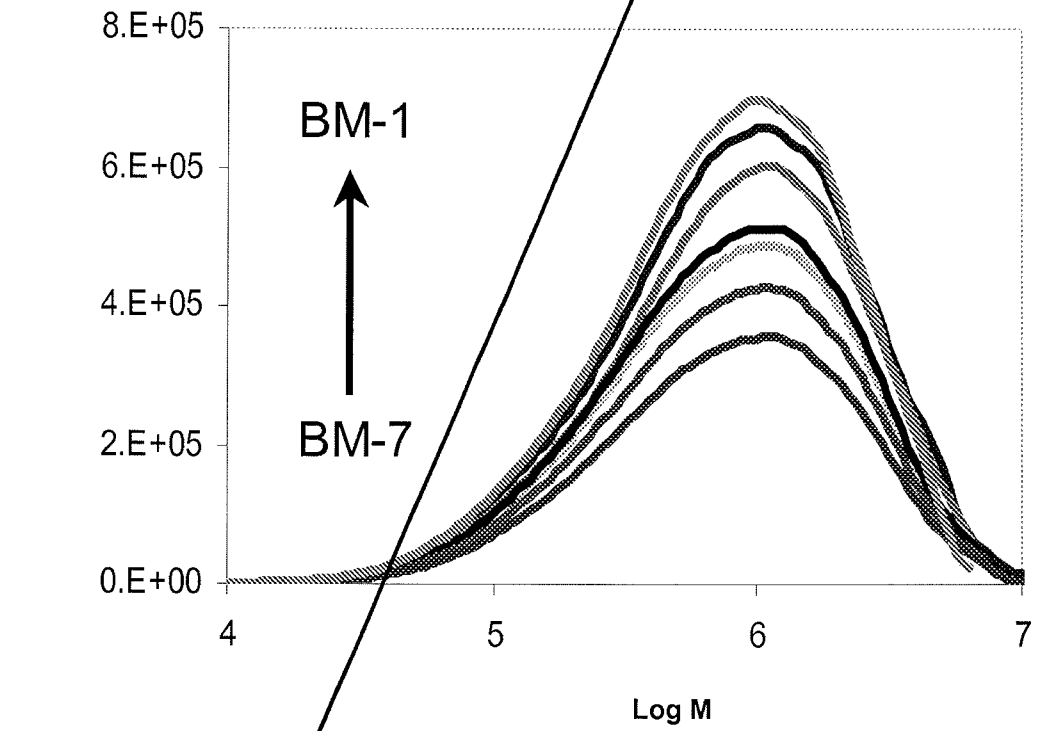

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

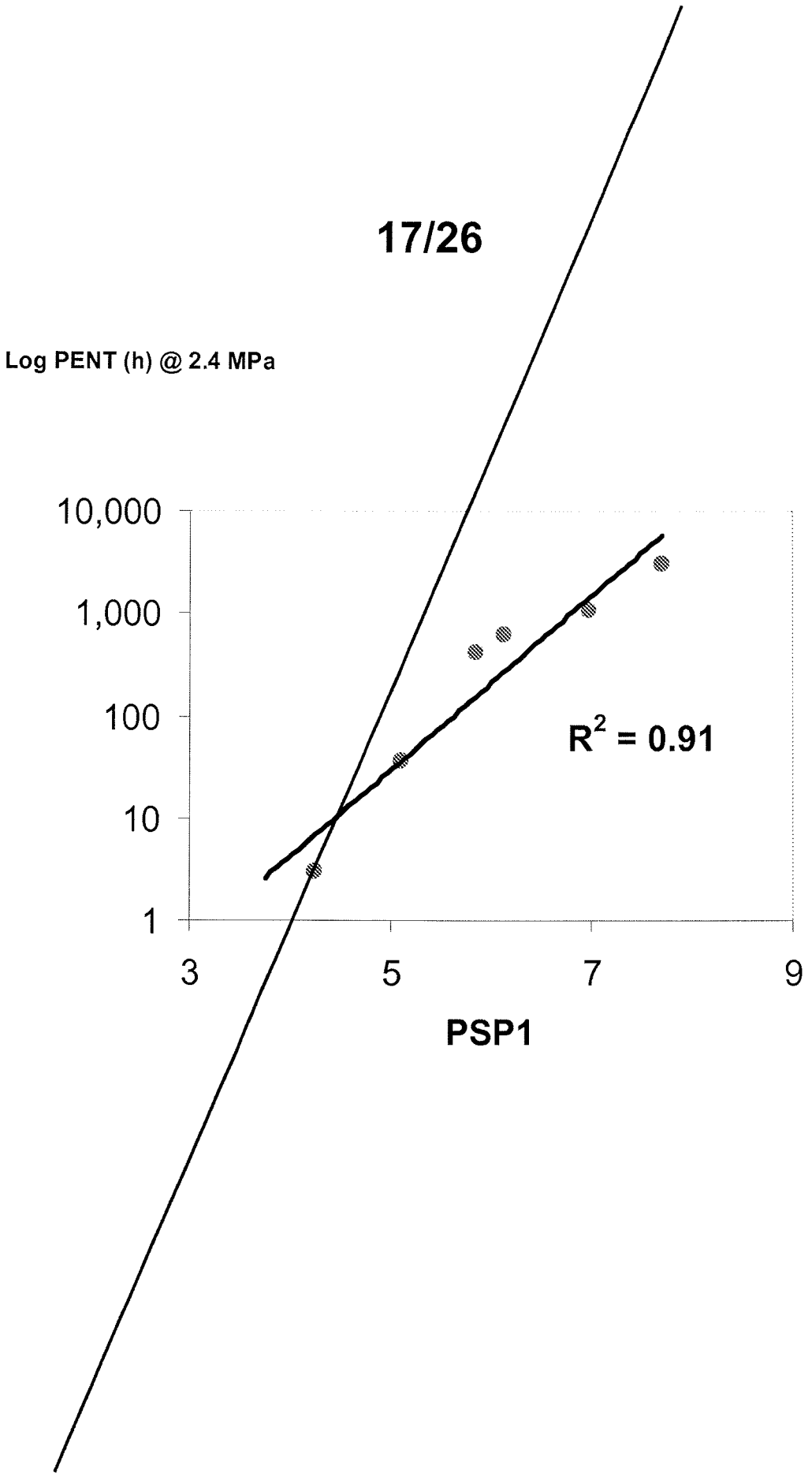
BM-6

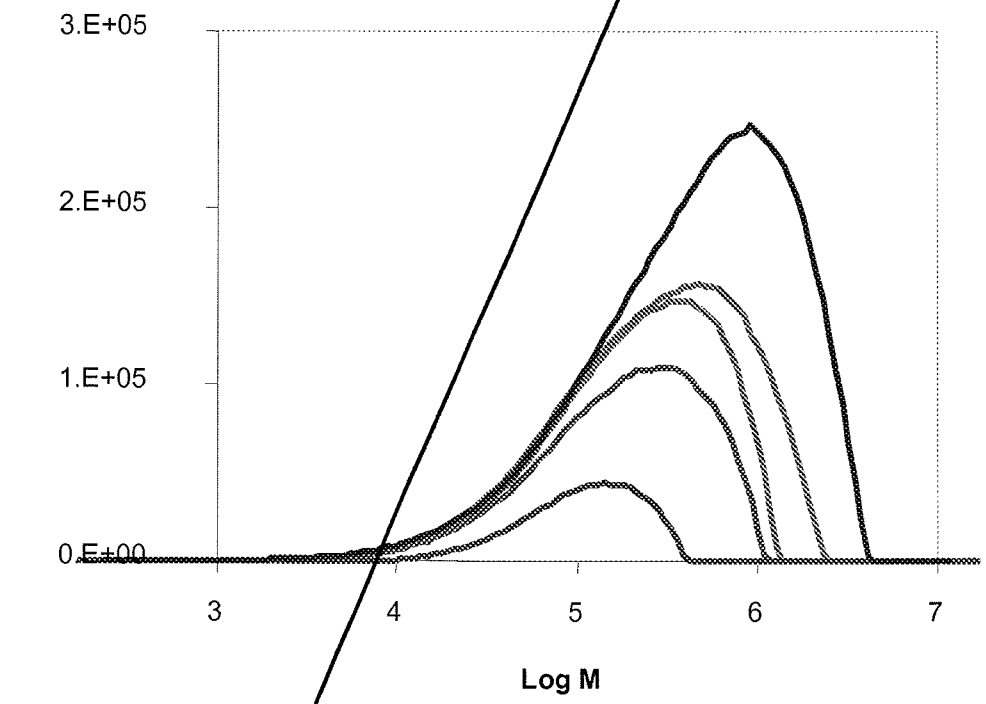

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

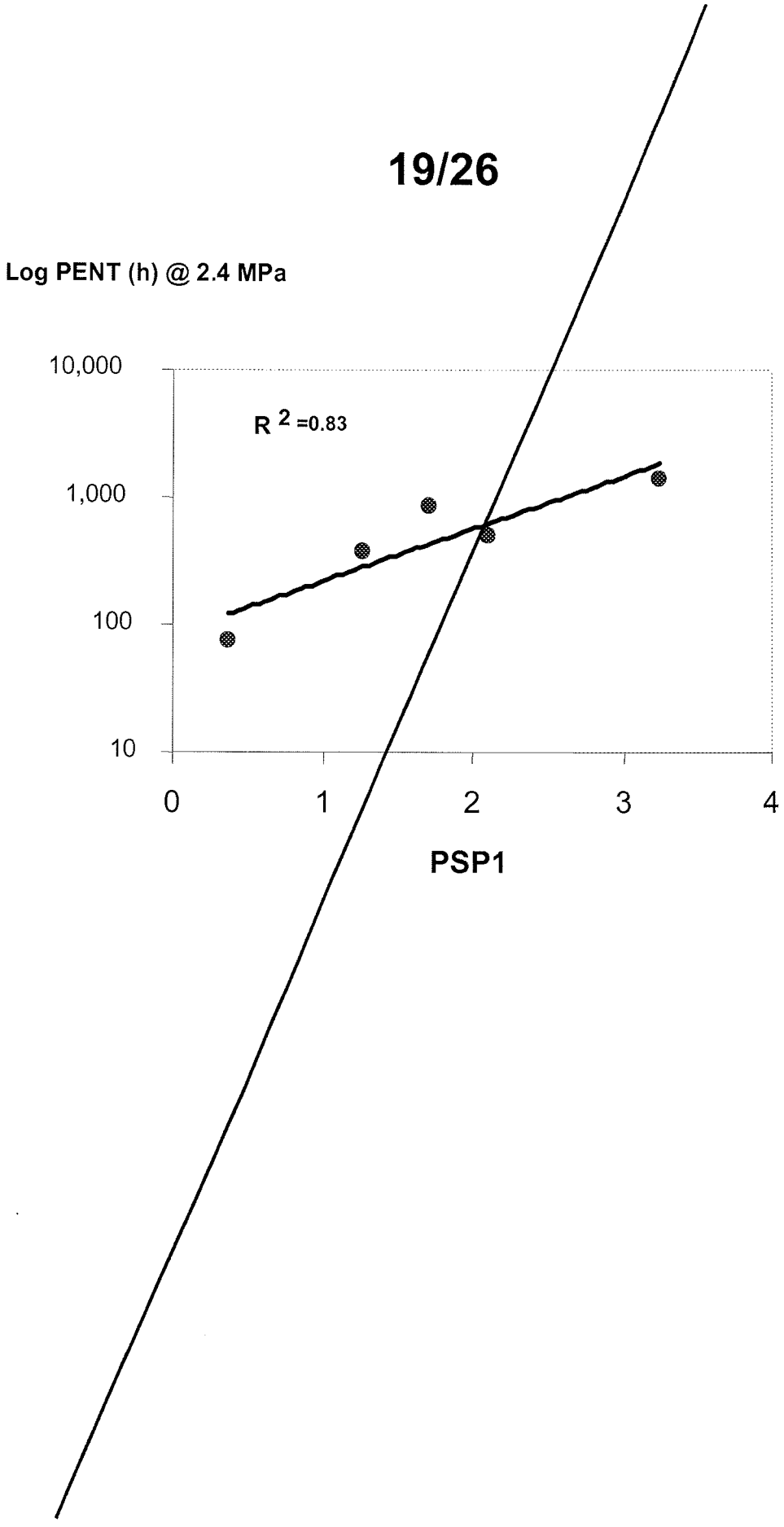
BM-7

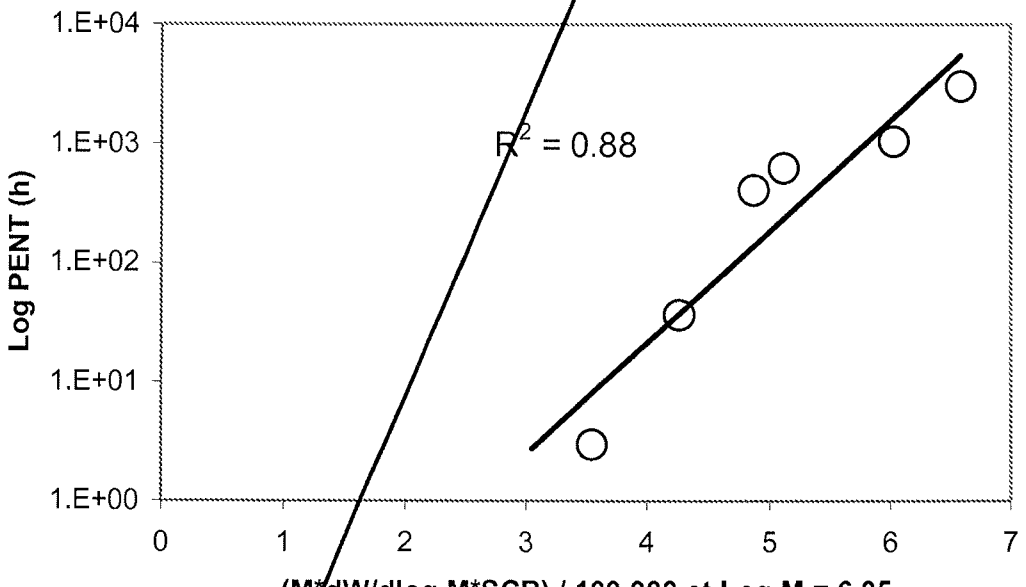

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

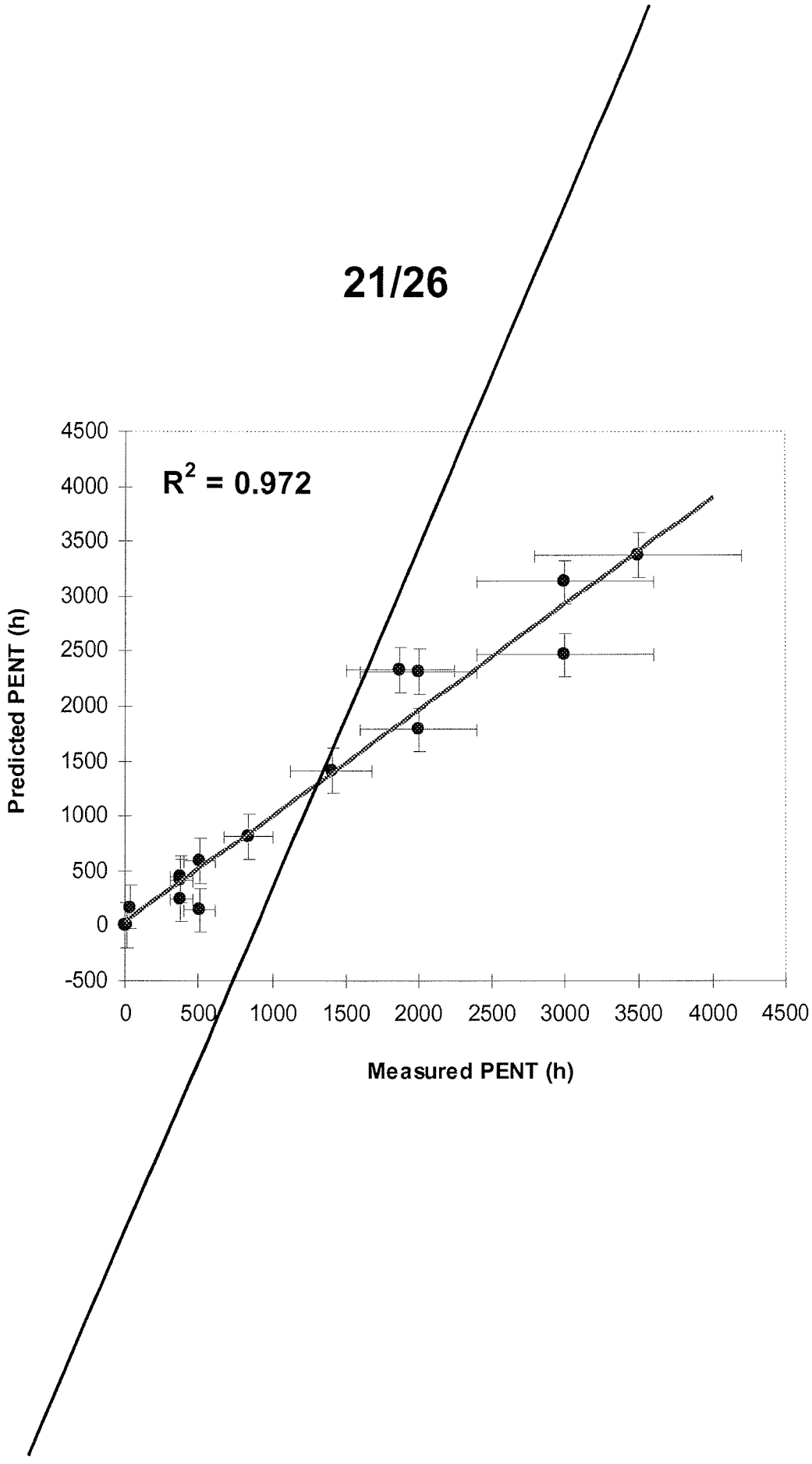

M * dW/dLog M * SCB
8.E+05
6.E+05
4.E+05
2.E+05
0.E+00
BM-1
BM-7
4
5
6
7
Log M

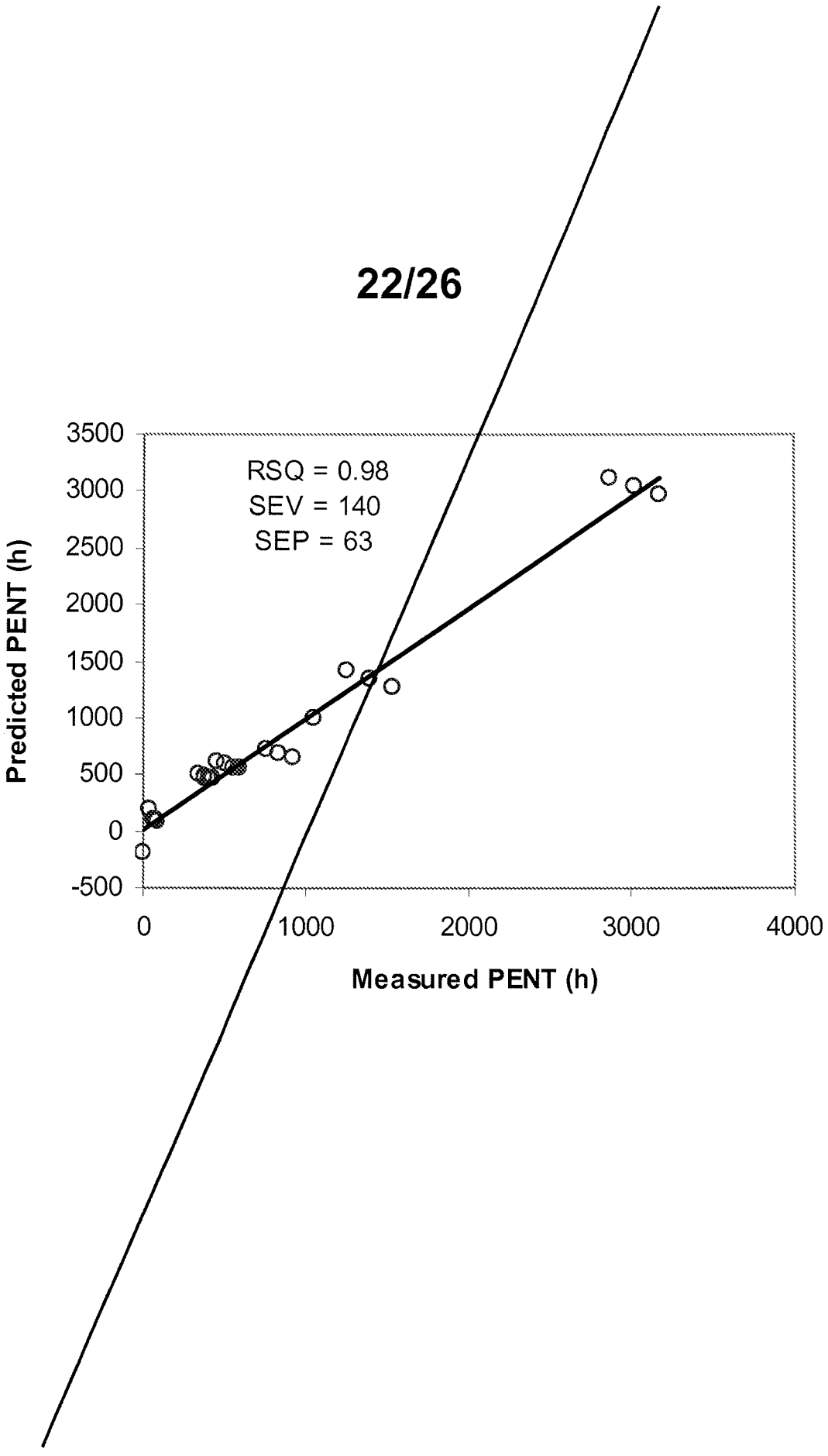

Log PENT (h) @ 2.4 MPa
10,000
1,000
100
10
1
3
5
7
9
PSP1
R2 = 0.91

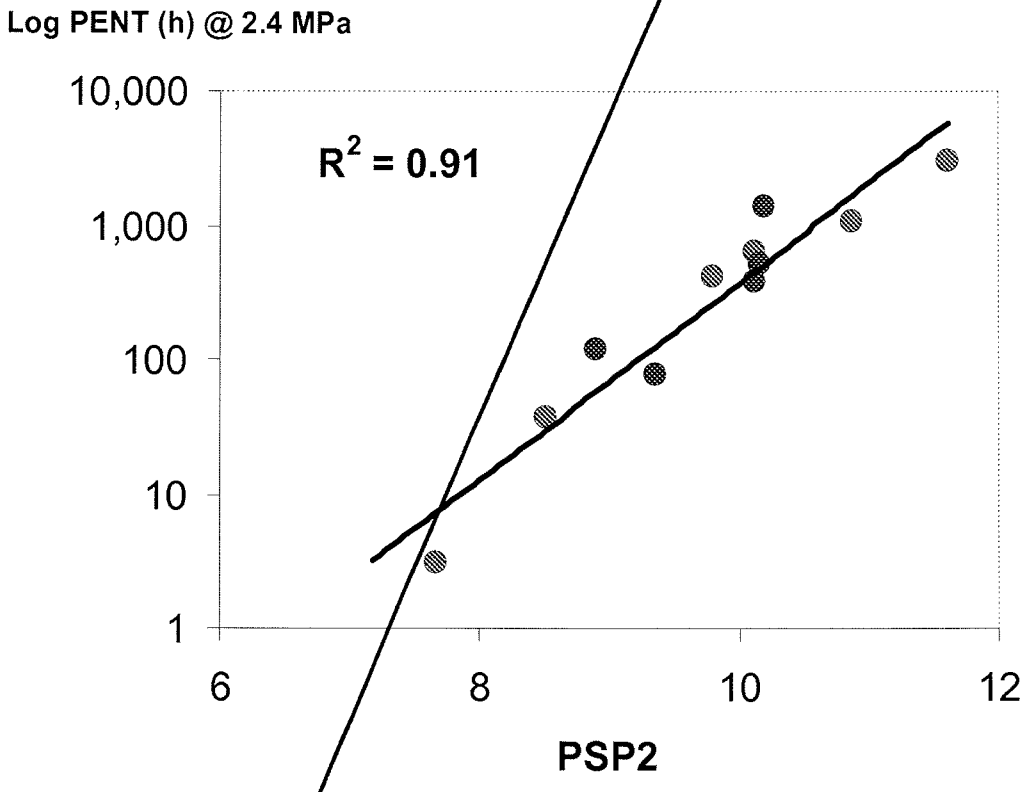

M * dW/dLog M * SCB
3.E+05
2.E+05
1.E+05
0.E+00
3
4
5
6
7
Log M

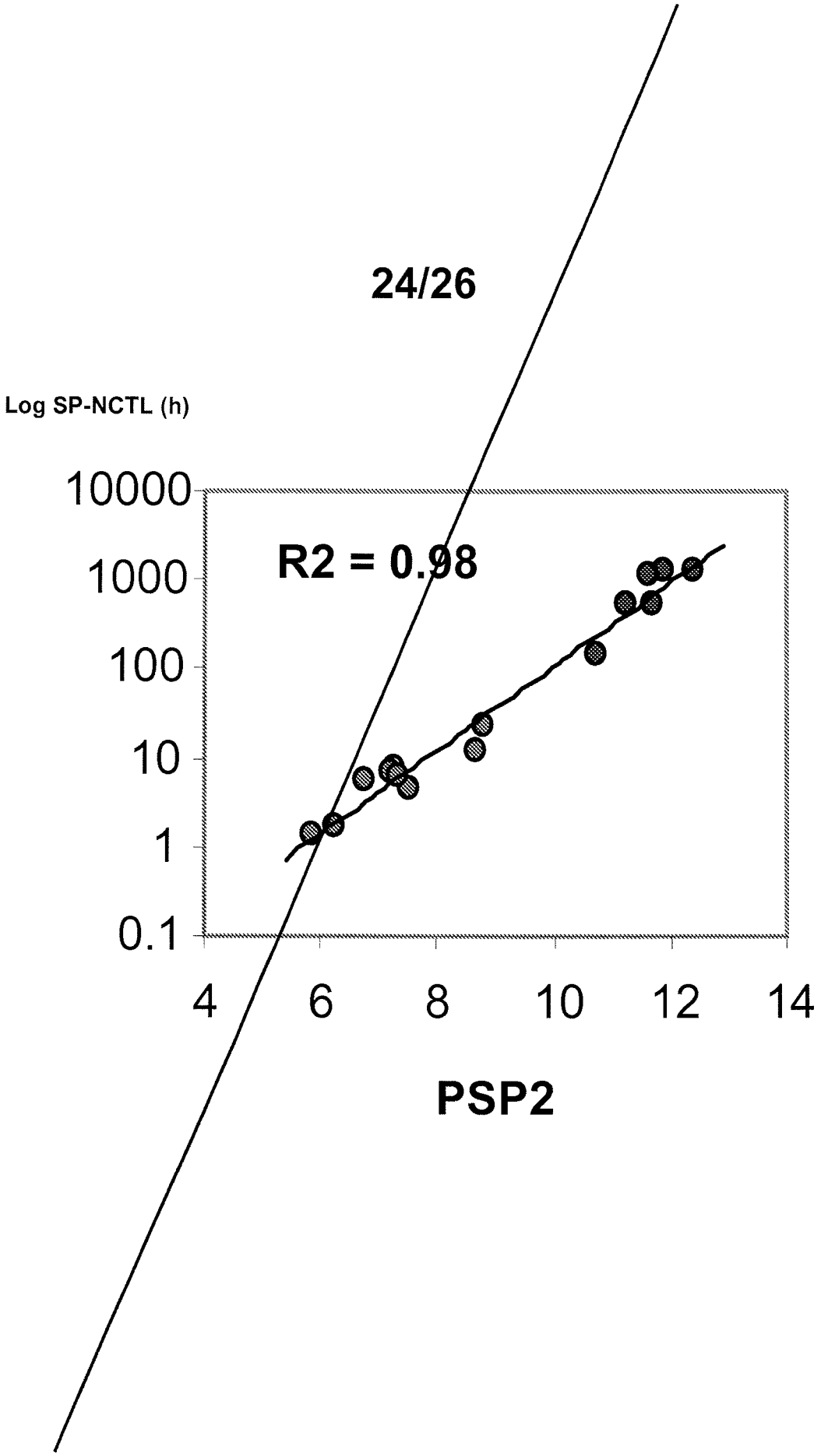

Log PENT (h) @ 2.4 MPa
10,000
1,000
100
10
R 2 =0.83
0
1
2
3
4
PSP1

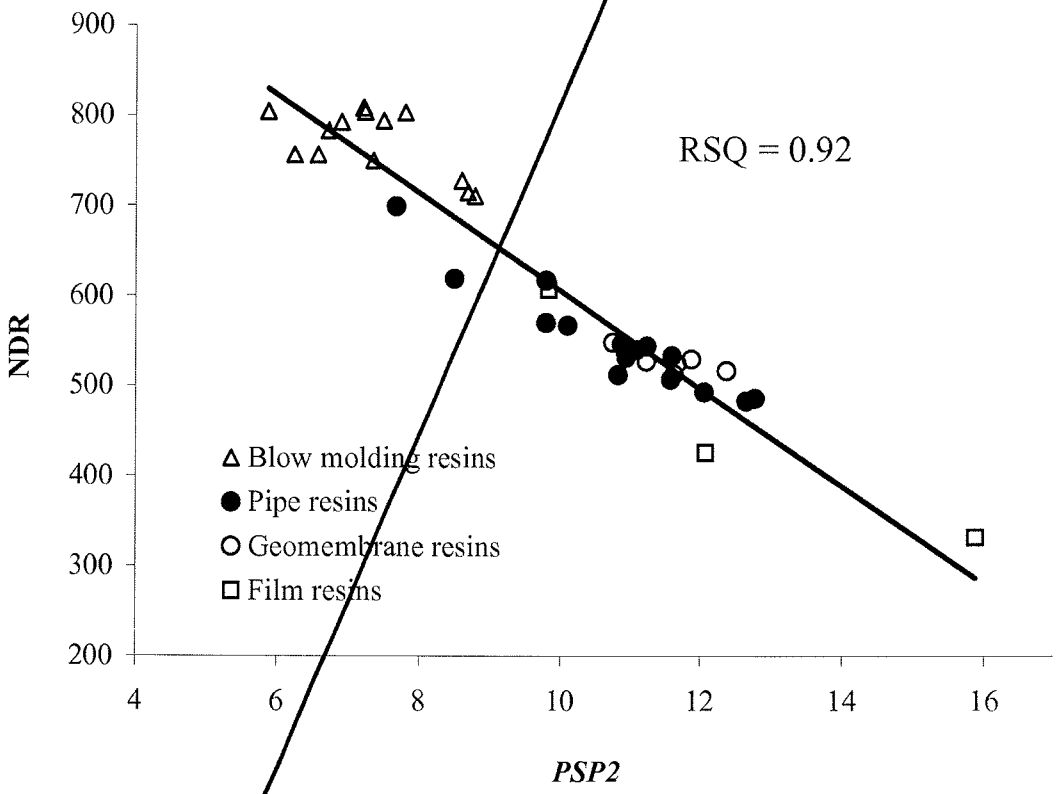

1.E+04
1.E+03
1.E+02
1.E+01
1.E+00
Log PENT (h)
R^2 = 0.88
0
1
2
3
4
5
6
7
(M*dW/dlog M*SCB) / 100,000 at Log M = 6.05


R^2 = 0.972
Predicted PENT (h)
Measured PENT (h)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
0
500
1000
1500
2000
2500
3000
3500
4000
4500


RSQ = 0.98
SEV = 140
SEP = 63
Predicted PENT (h)
Measured PENT (h)
3500
3000
2500
2000
1500
1000
500
0
-500
0
1000
2000
3000
4000


Log PENT (h) @ 2.4 MPa
10,000
1,000
100
10
1
R^2 = 0.91
6
8
10
12
PSP2


Log SP-NCTL (h)
10000
1000
100
10
1
0.1
R2 = 0.98
4
6
8
10
12
14
PSP2


900
800
700
600
500
400
300
200
NDR
4
6
8
10
12
14
16
PSP2
RSQ = 0.92
Blow molding resins
Pipe resins
Geomembrane resins
Film resins

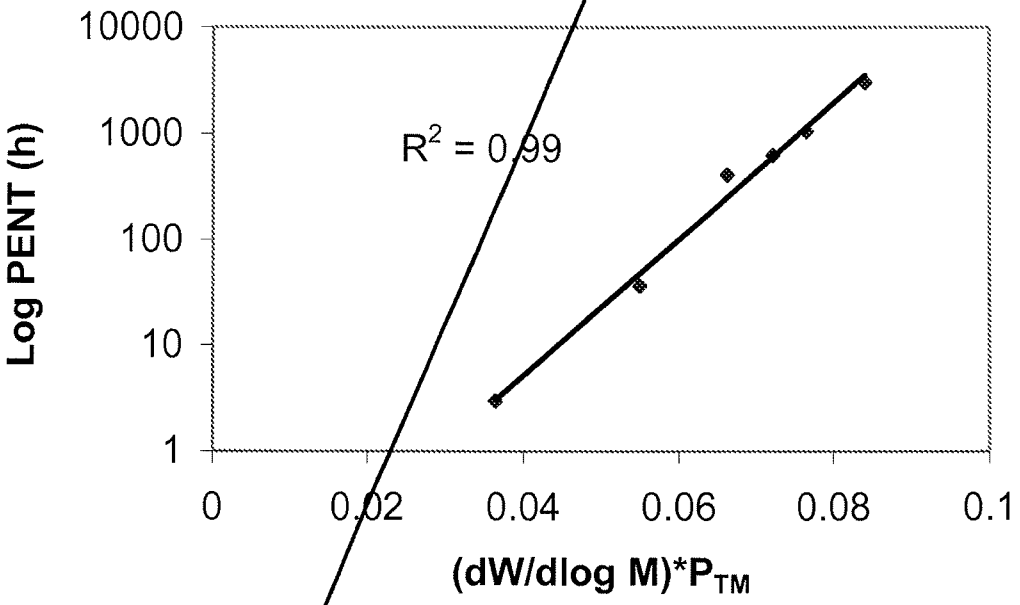

10000
1000
100
10
1
Log PENT (h)
R2 = 0.99
0
0.02
0.04
0.06
0.08
0.1
(dW/dlog M)*PTM

FIG. 1

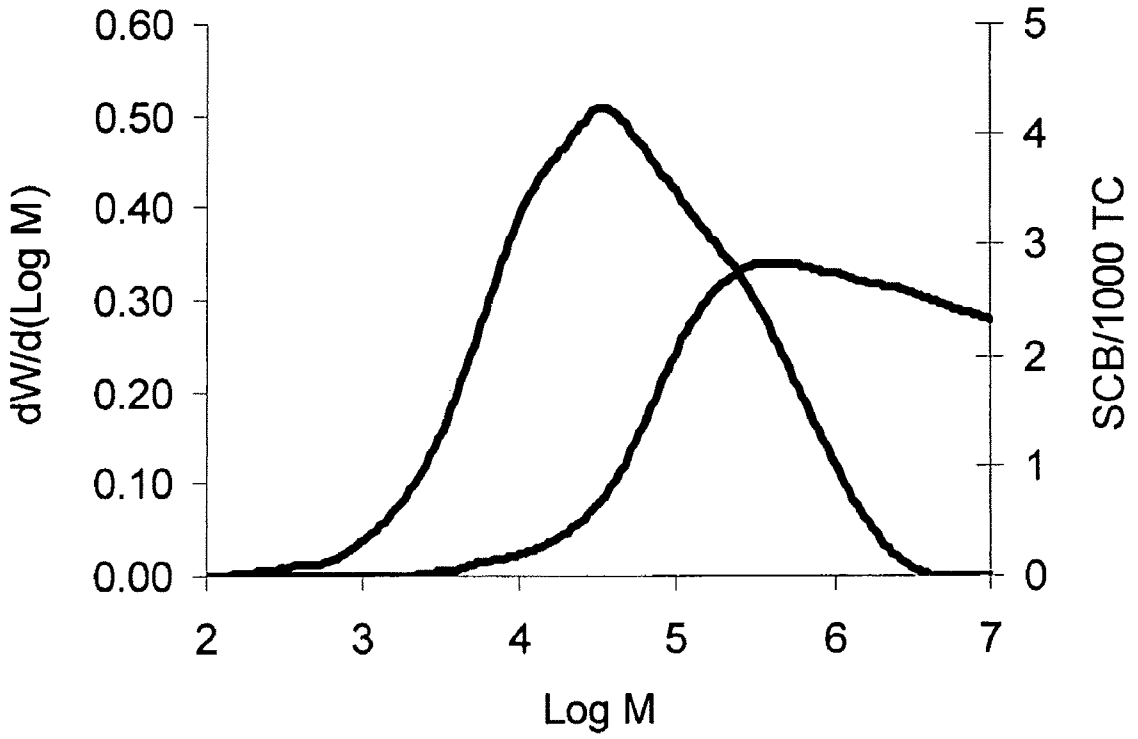

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/d(Log M)
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 2

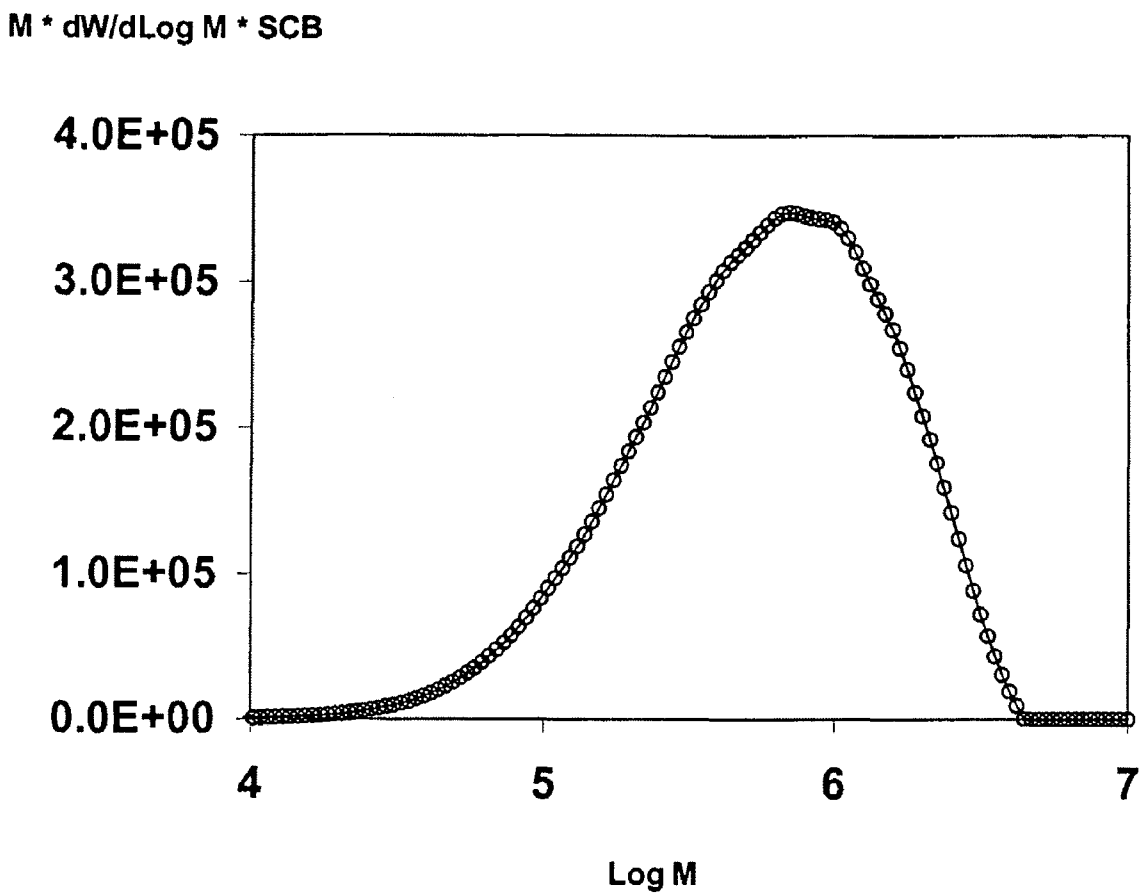


FIG. 3

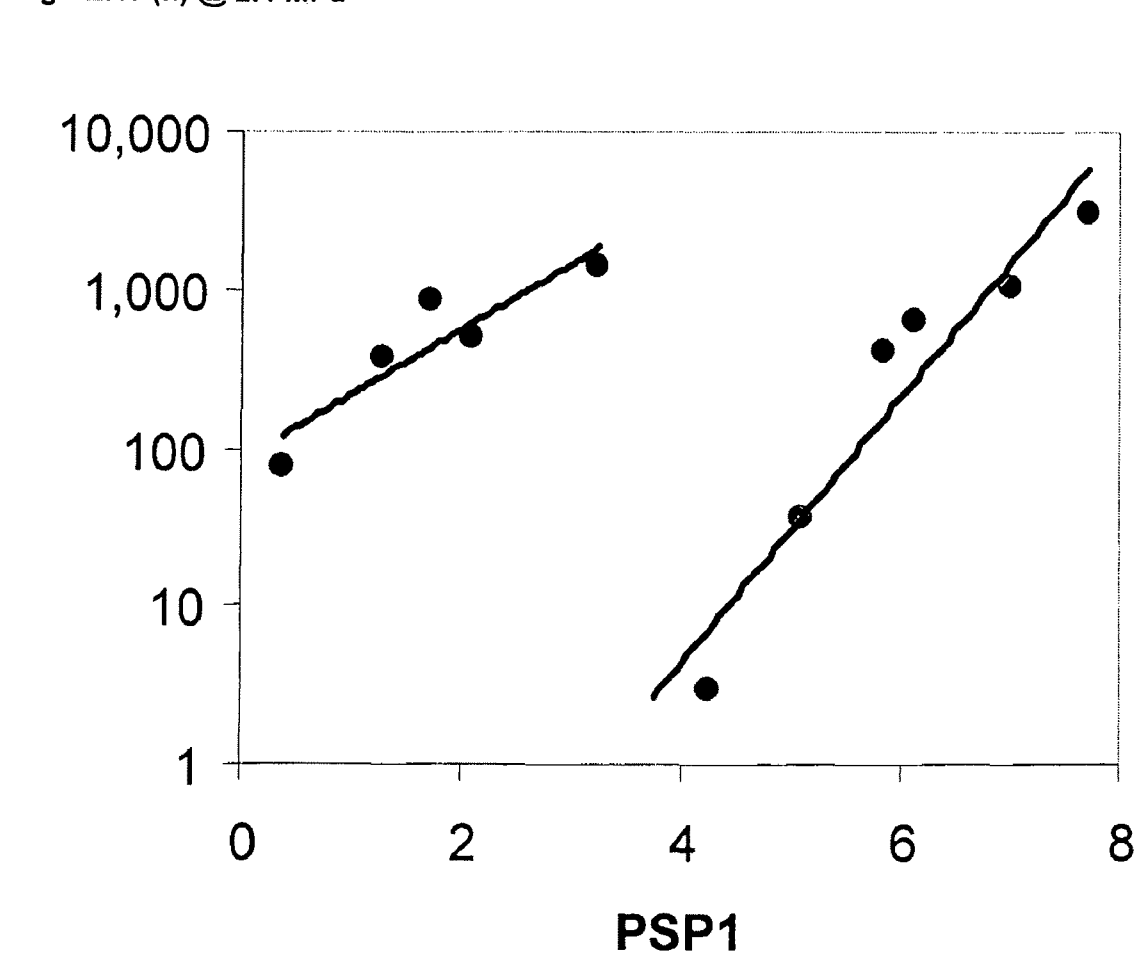


FIG. 4

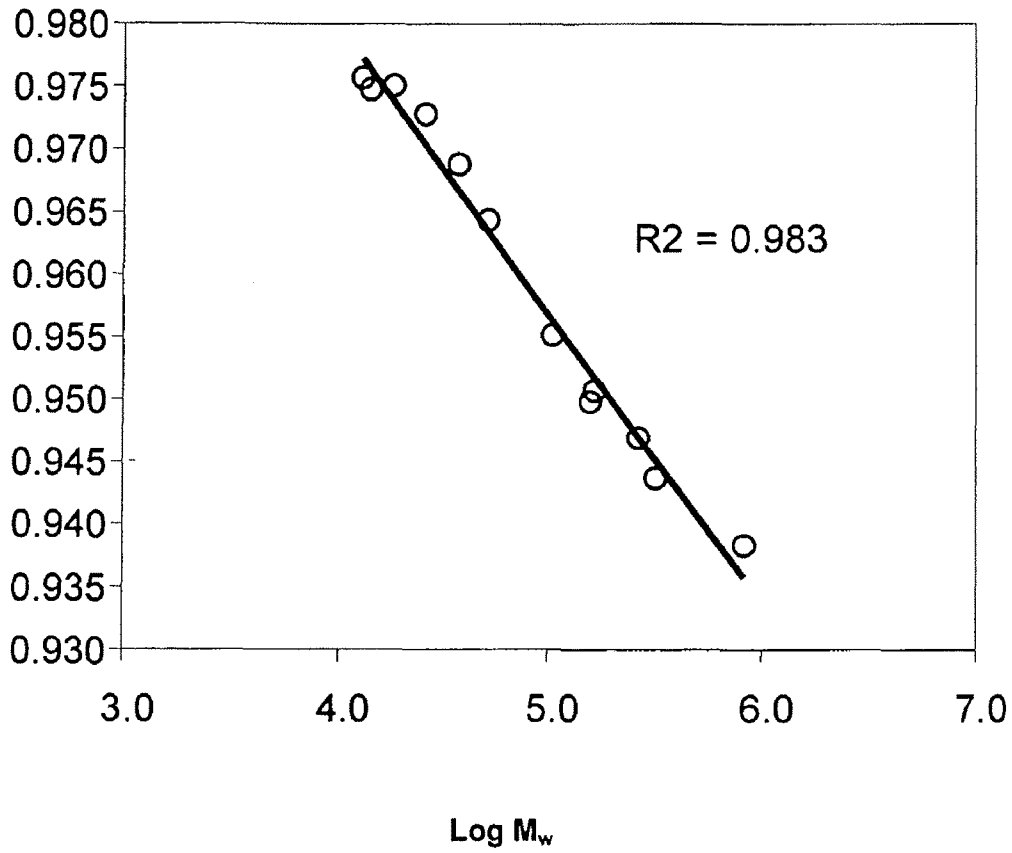

Density (g/mL)
0.980
0.975
0.970
0.965
0.960
0.955
0.950
0.945
0.940
0.935
0.930
R2 = 0.983
3.0
4.0
5.0
6.0
7.0
Log M_w

FIG. 5

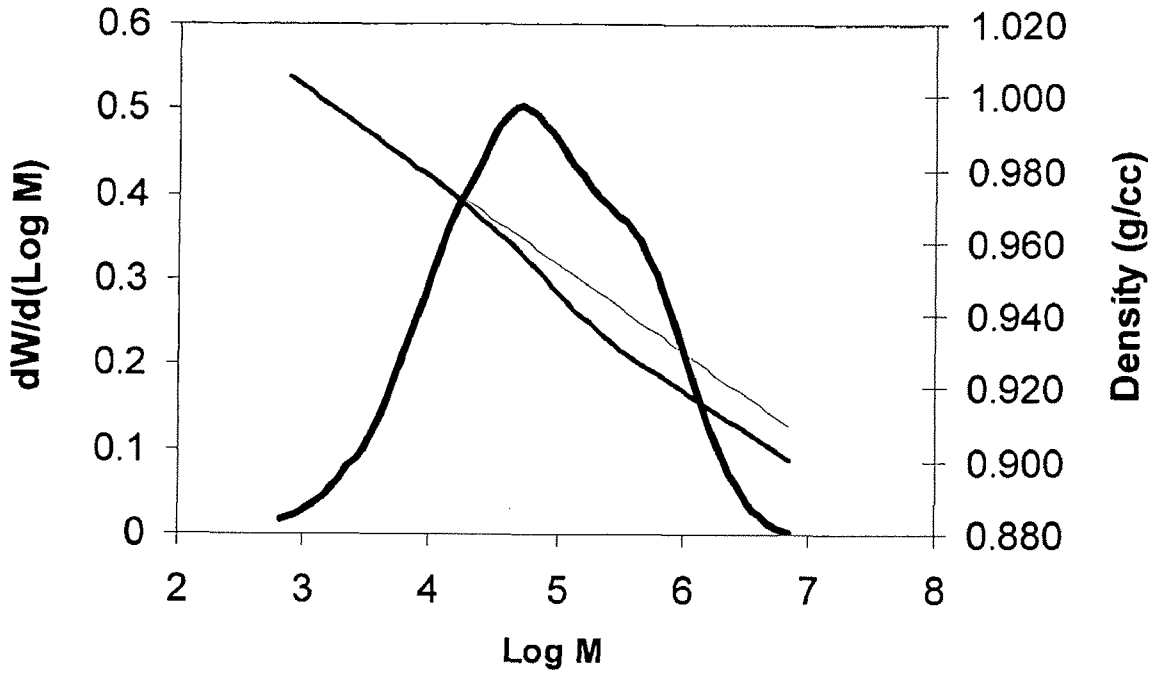

0.6
0.5
0.4
0.3
0.2
0.1
0
dW/d(Log M)
1.020
1.000
0.980
0.960
0.940
0.920
0.900
0.880
Density (g/cc)
2
3
4
5
6
7
8
Log M

FIG. 6

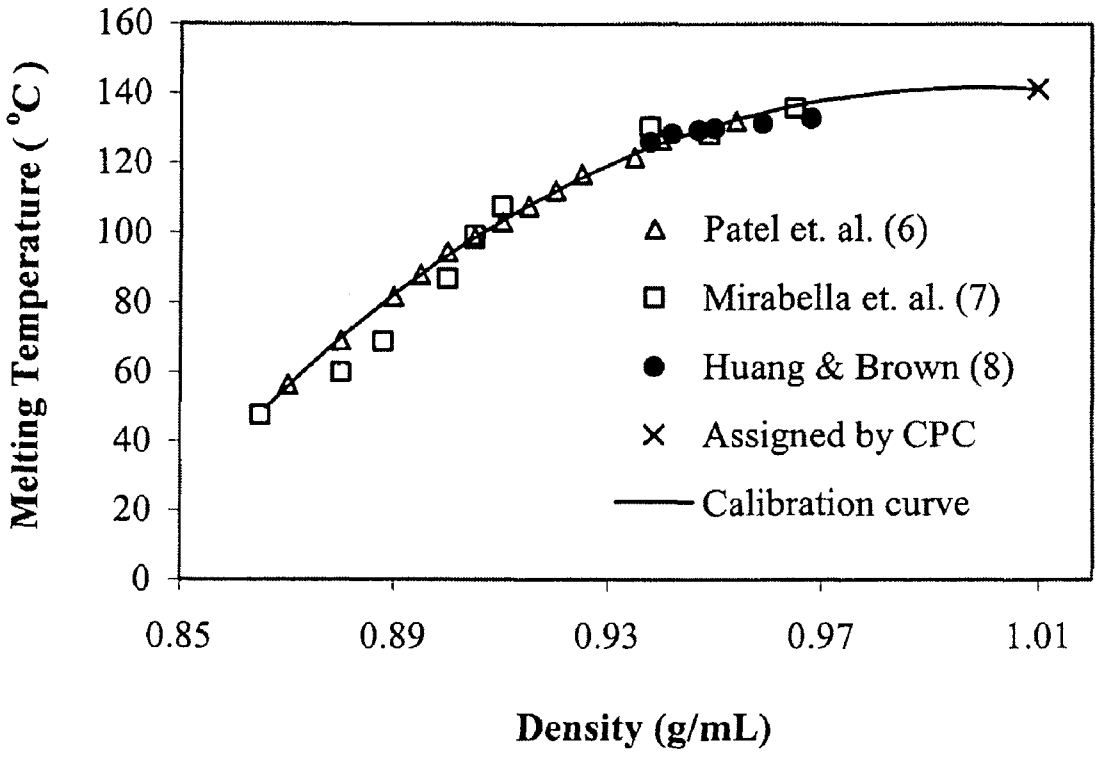

Melting Temperature (°C)
160
140
120
100
80
60
40
20
0
0.85
0.89
0.93
0.97
1.01
Density (g/mL)
Patel et. al. (6)
Mirabella et. al. (7)
Huang & Brown (8)
Assigned by CPC
Calibration curve

FIG. 7

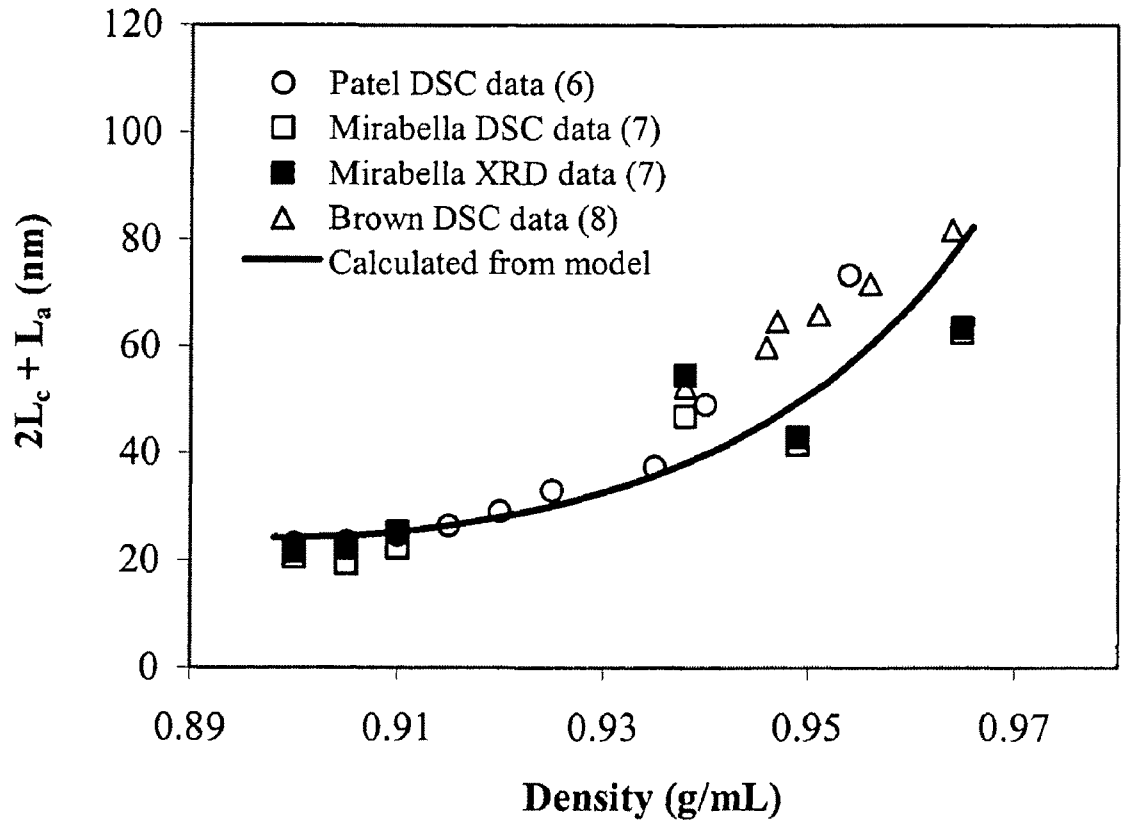

120
100
80
60
40
20
0
0.89
0.91
0.93
0.95
0.97
Density (g/mL)
$2L_c + L_a$ (nm)
Patel DSC data (6)
Mirabella DSC data (7)
Mirabella XRD data (7)
Brown DSC data (8)
Calculated from model

FIG. 8

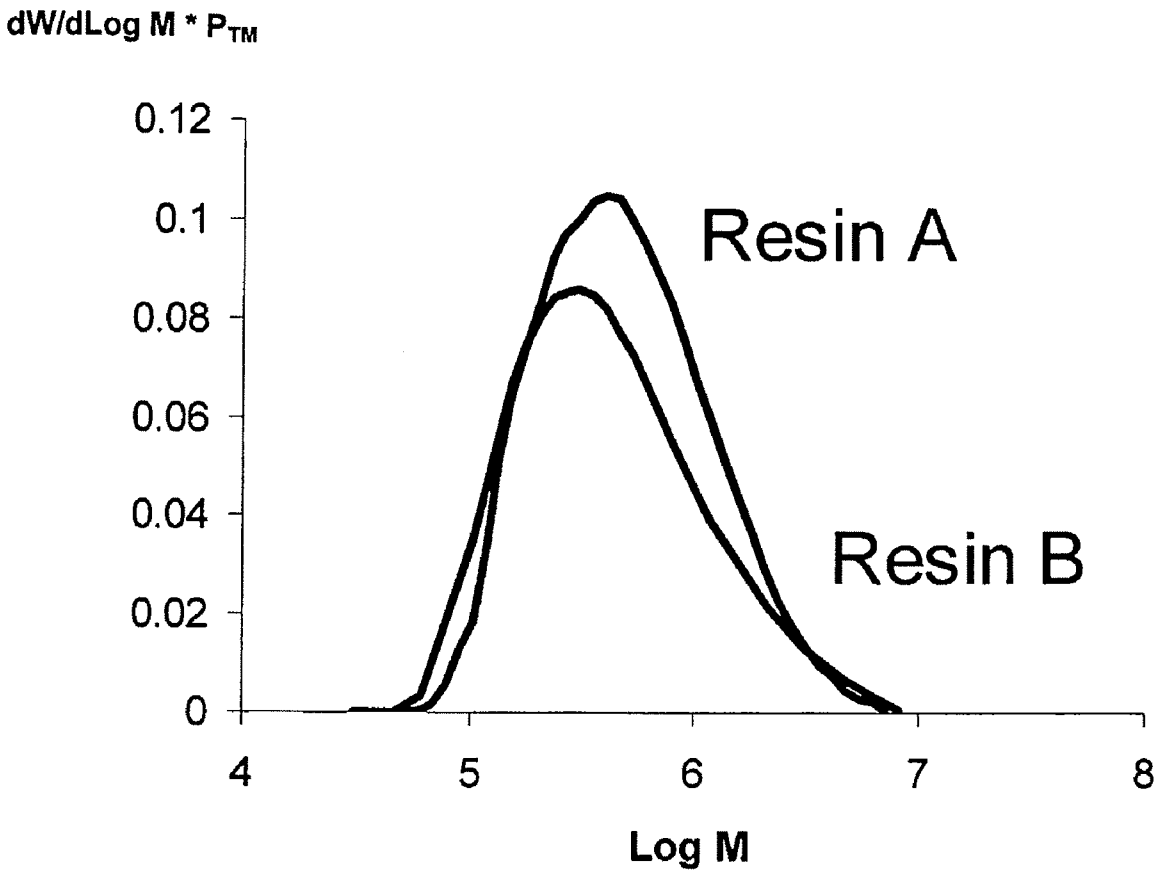


FIG. 9

BM-1

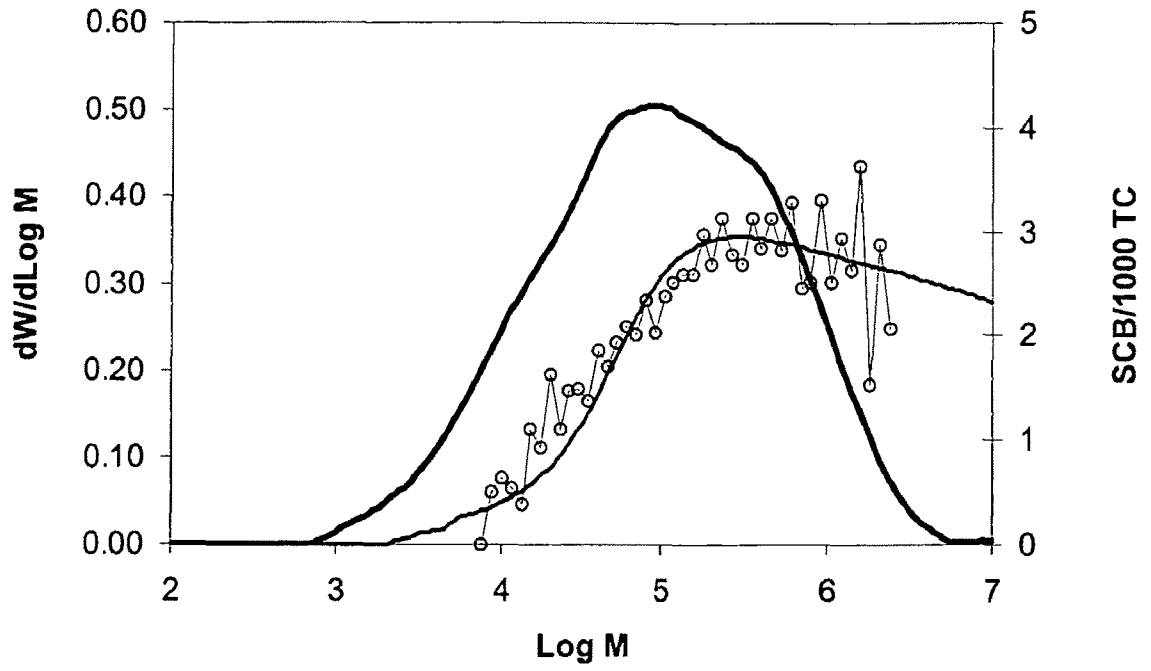

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 10

BM-2

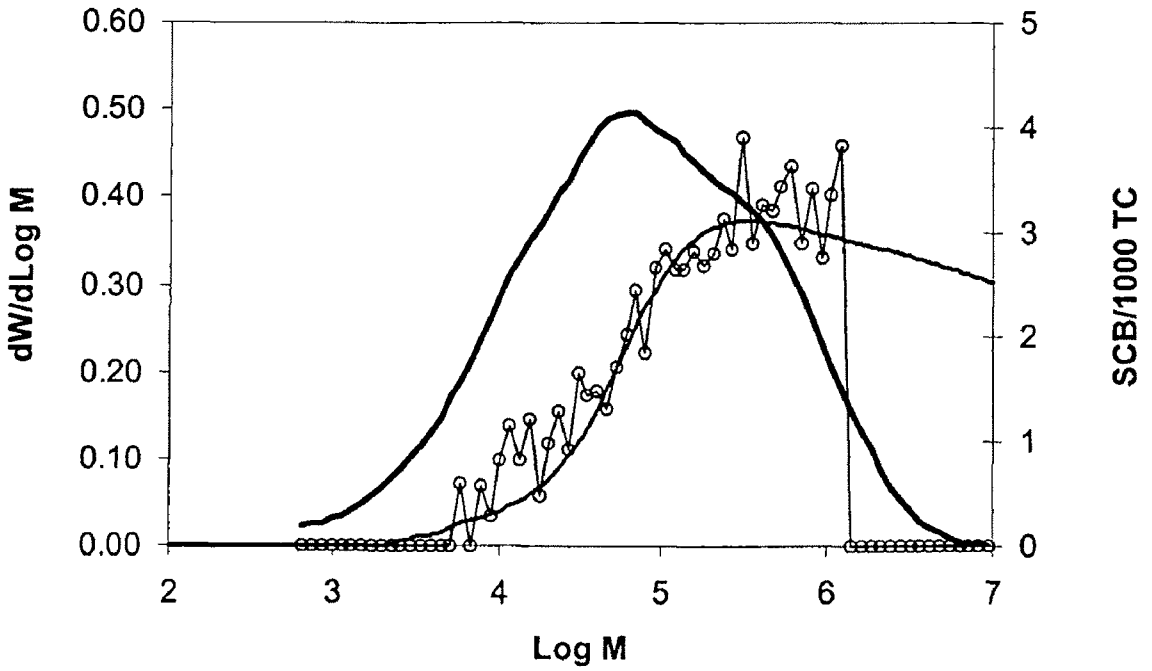

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 11

BM-3

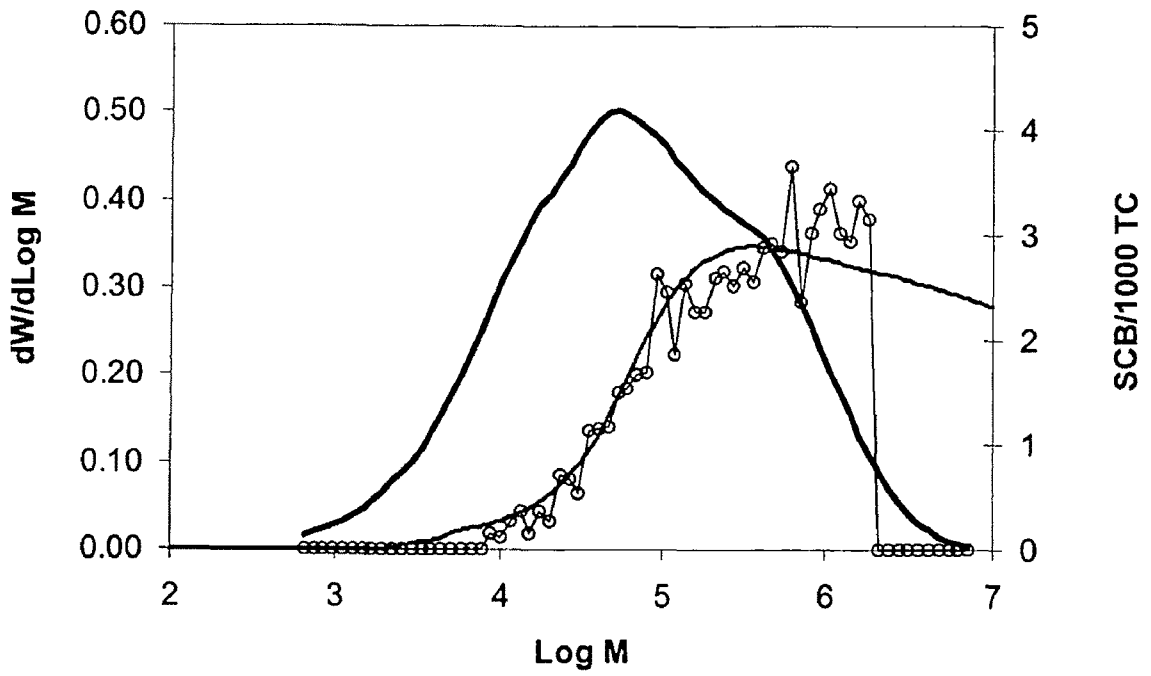

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 12

BM-4

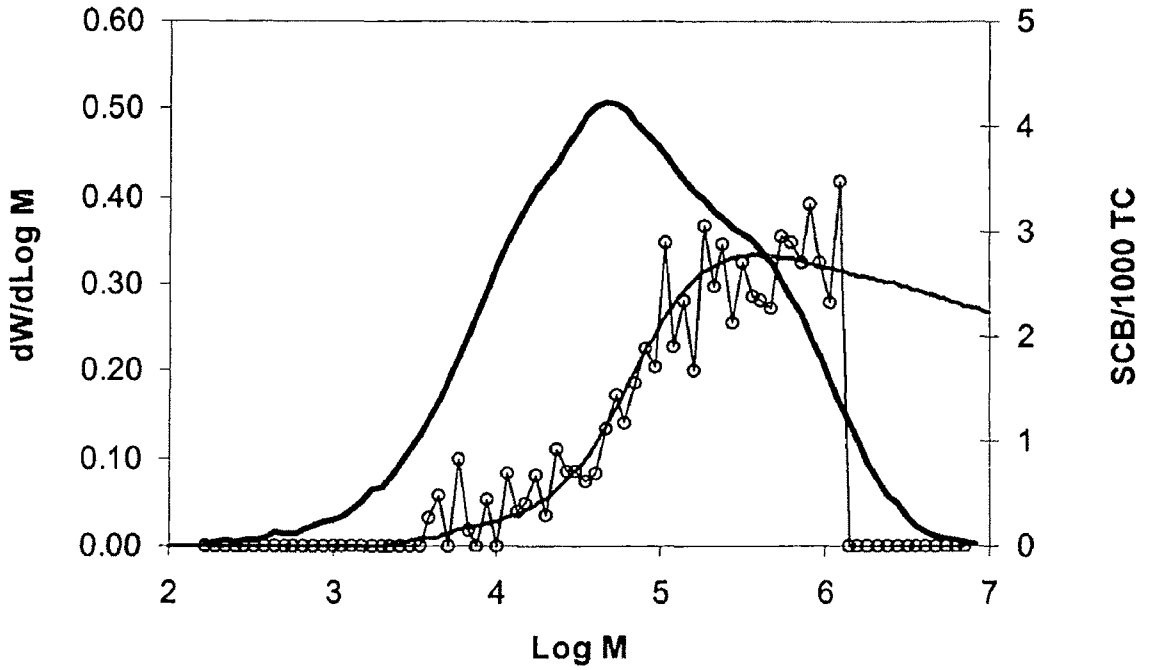

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 13

BM-5

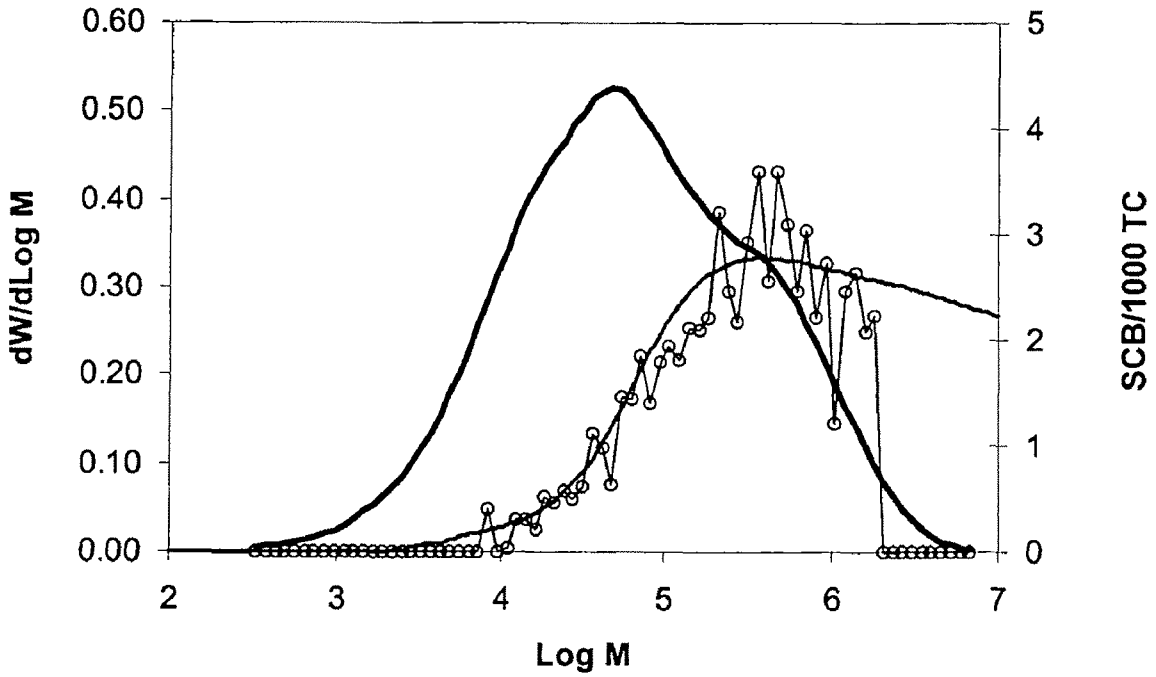

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 14

BM-6

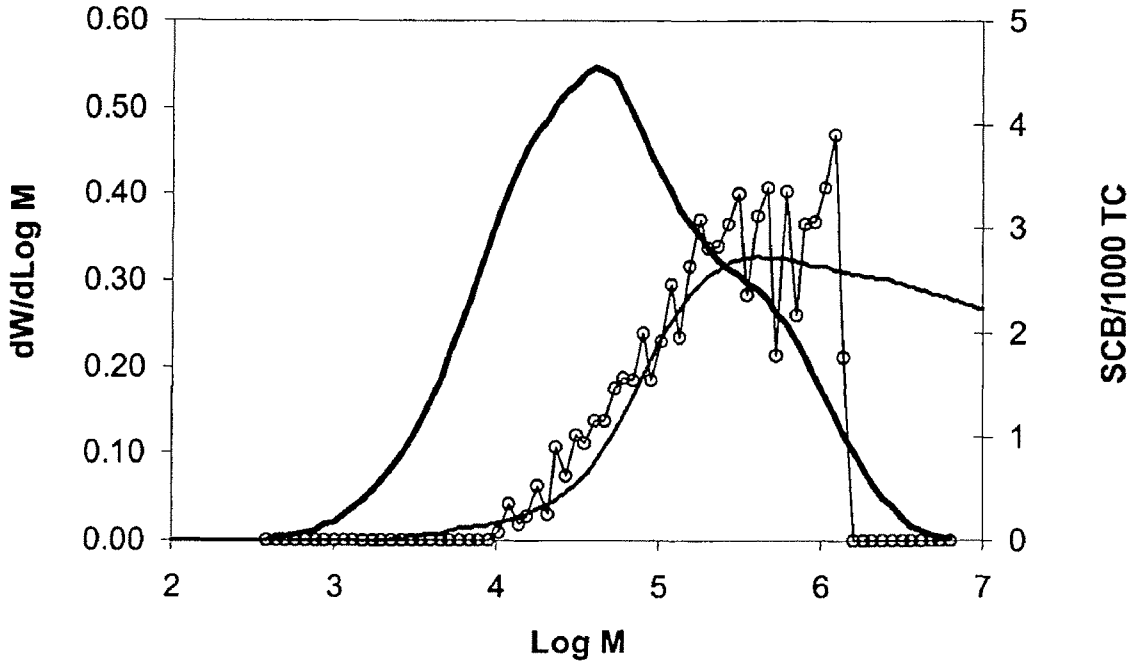

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 15

BM-7

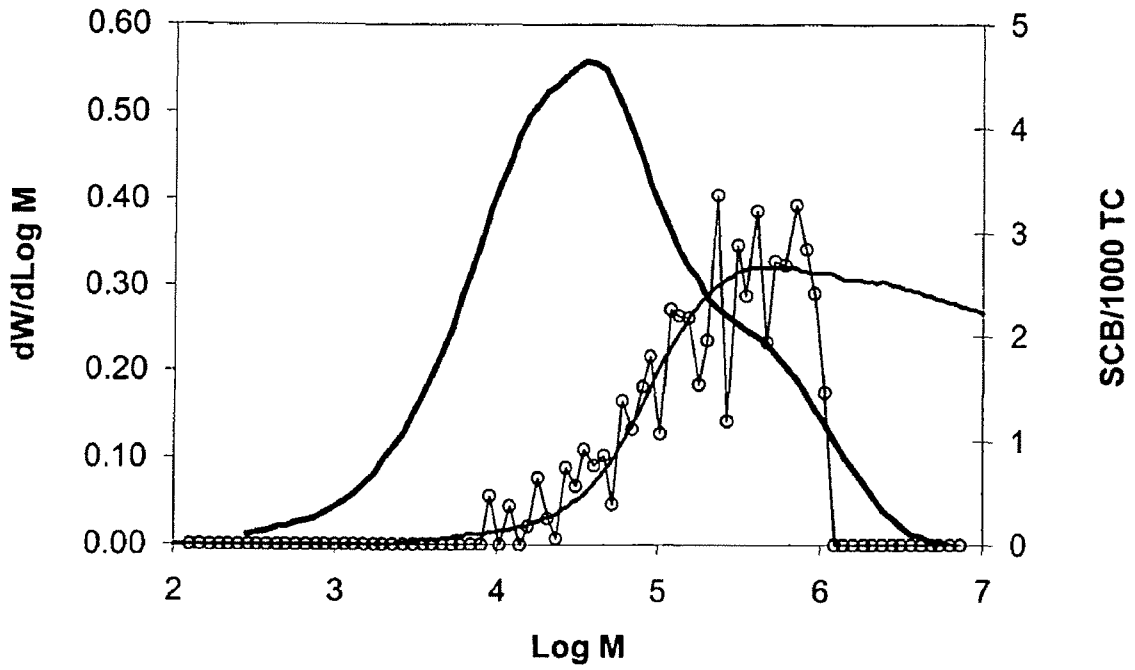

0.60
0.50
0.40
0.30
0.20
0.10
0.00
dW/dLog M
5
4
3
2
1
0
SCB/1000 TC
2
3
4
5
6
7
Log M

FIG. 16

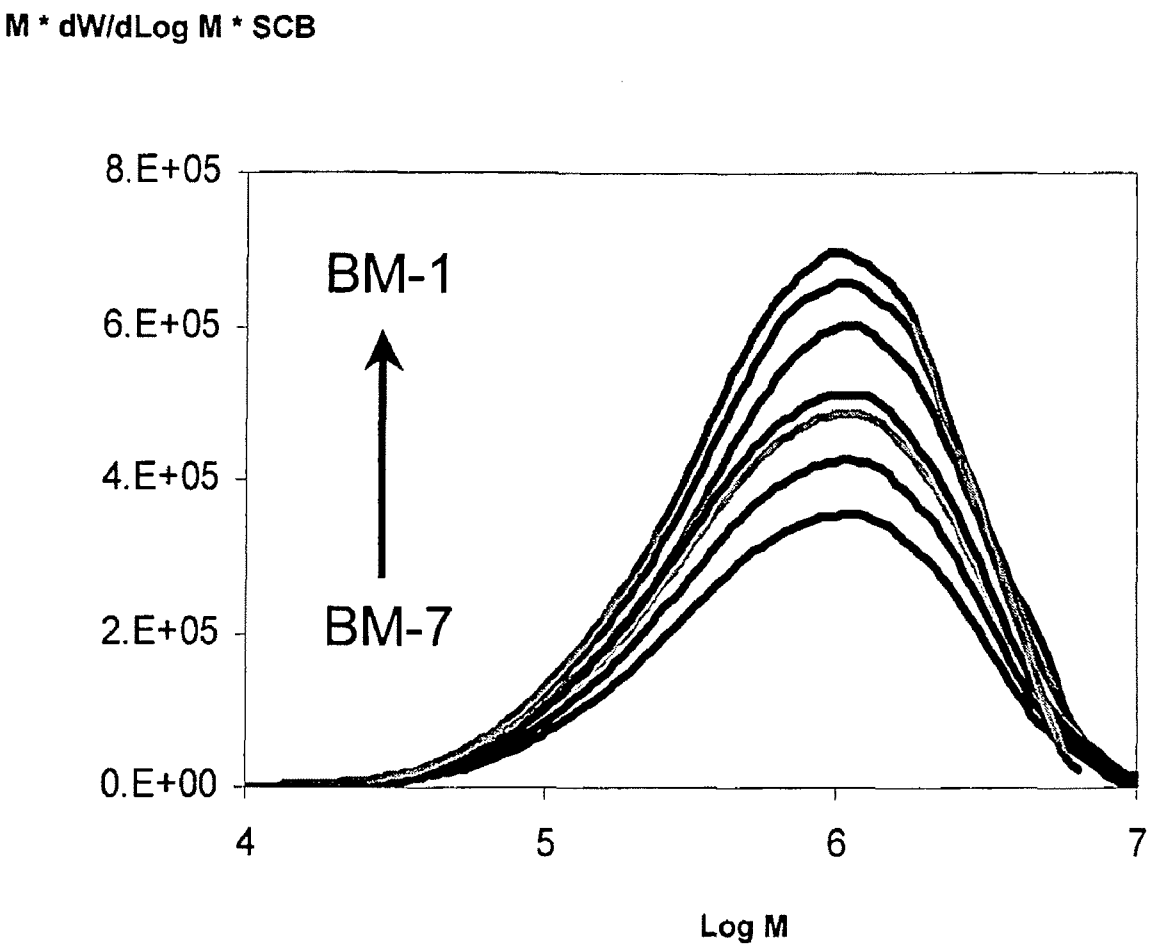


FIG. 17

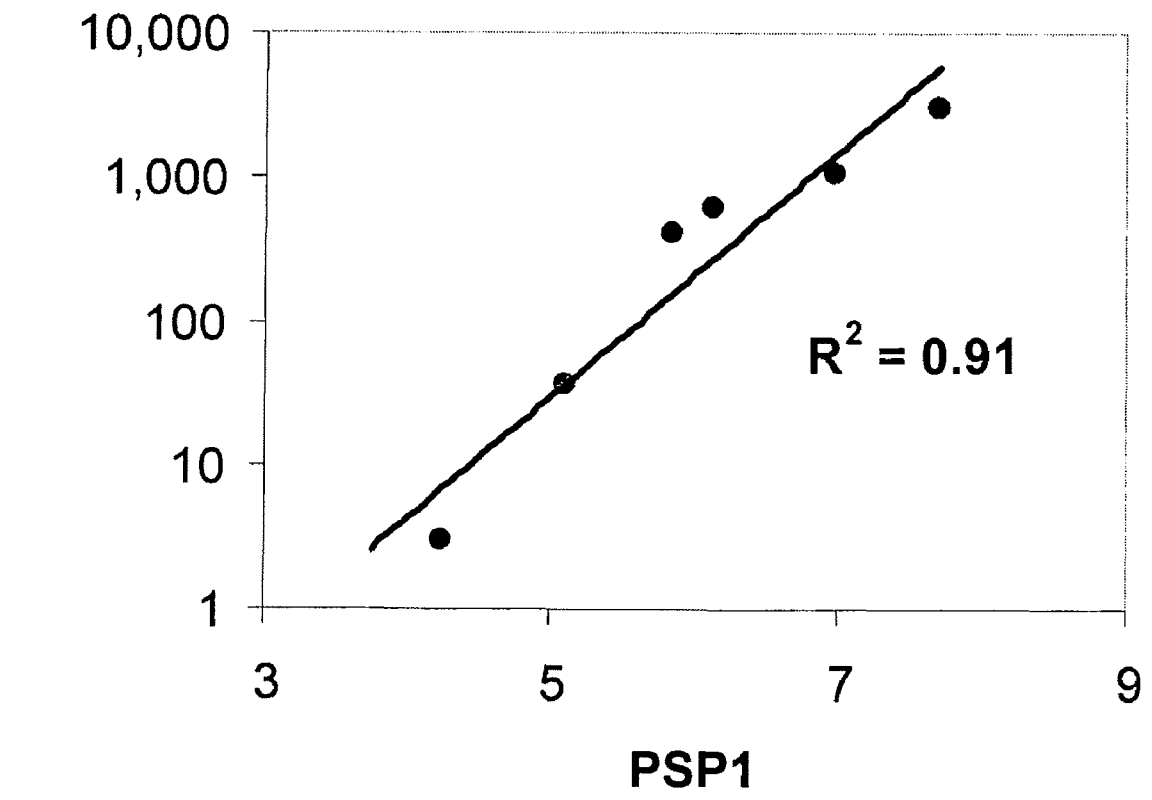


FIG. 18

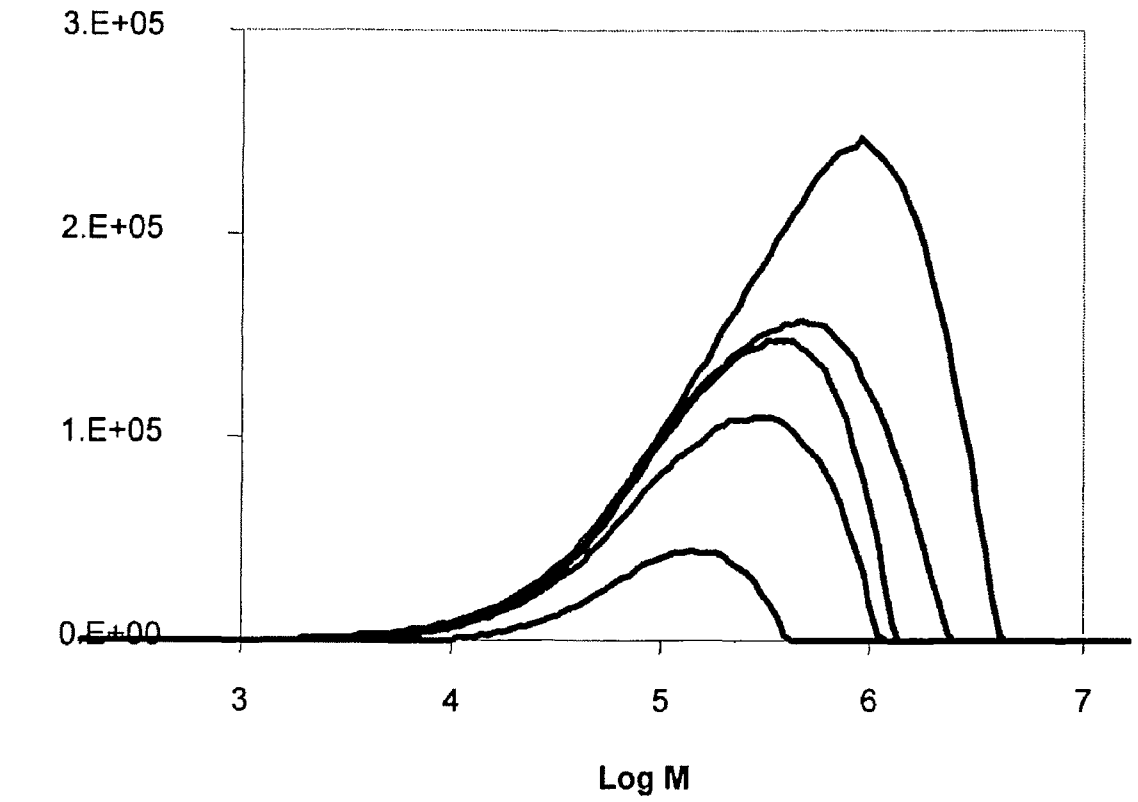


FIG. 19

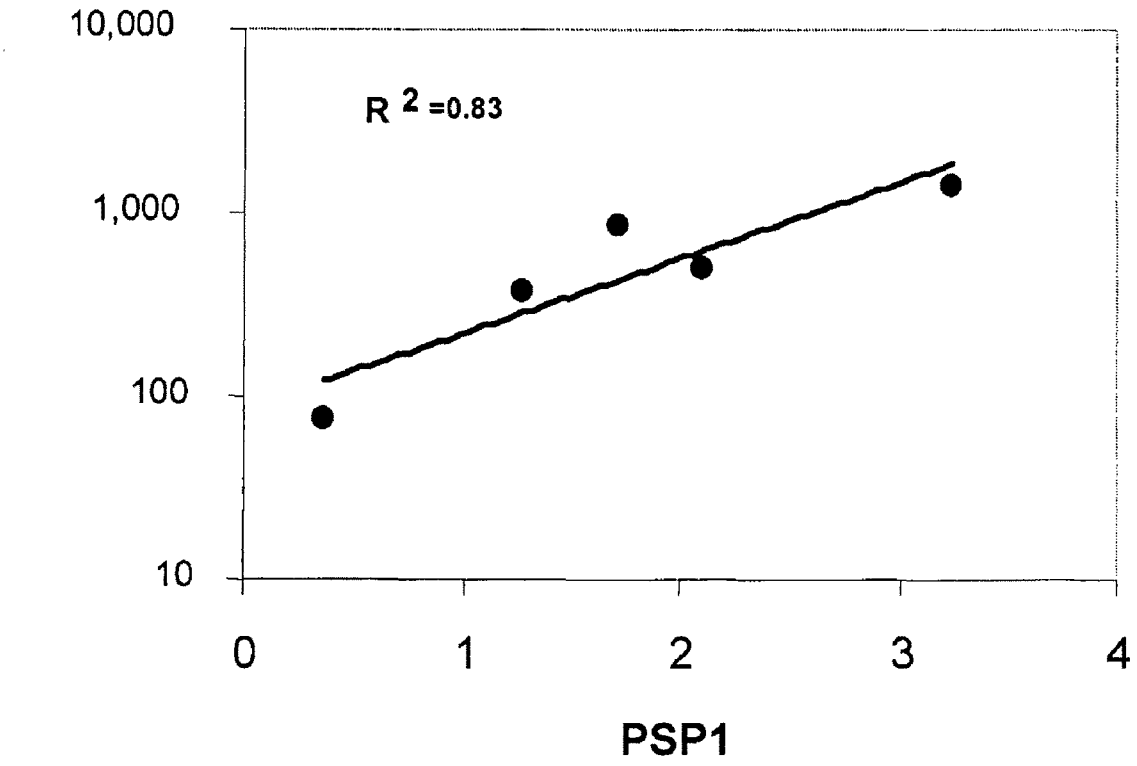


FIG. 20

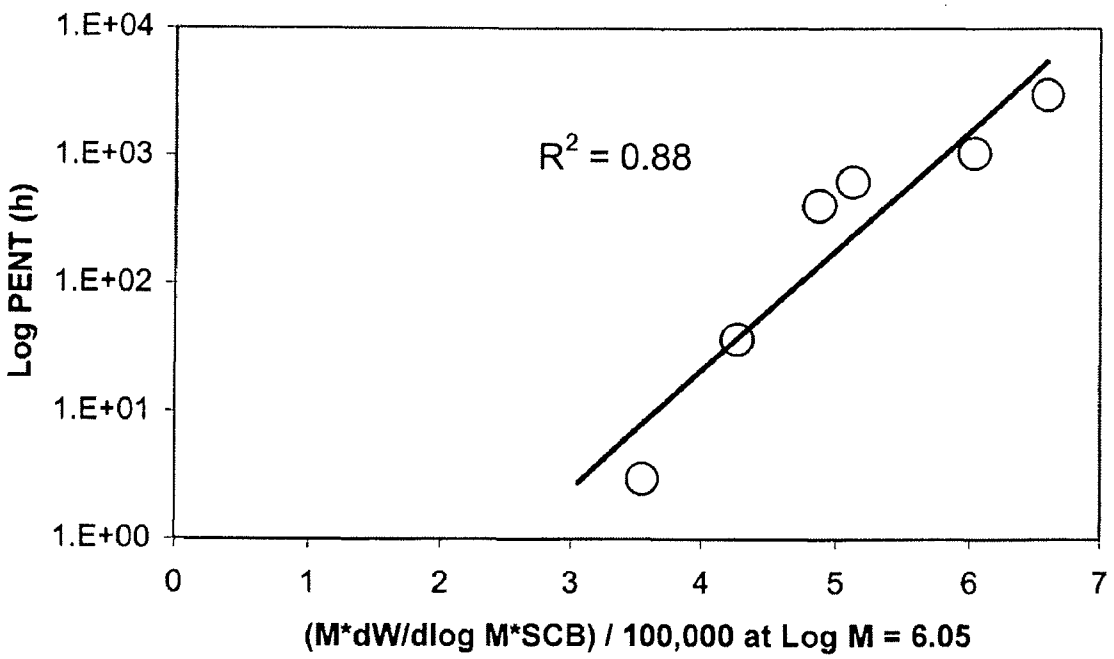

1.E+04
1.E+03
1.E+02
1.E+01
1.E+00
Log PENT (h)
R^2 = 0.88
0
1
2
3
4
5
6
7
(M*dW/dlog M*SCB) / 100,000 at Log M = 6.05

FIG. 21

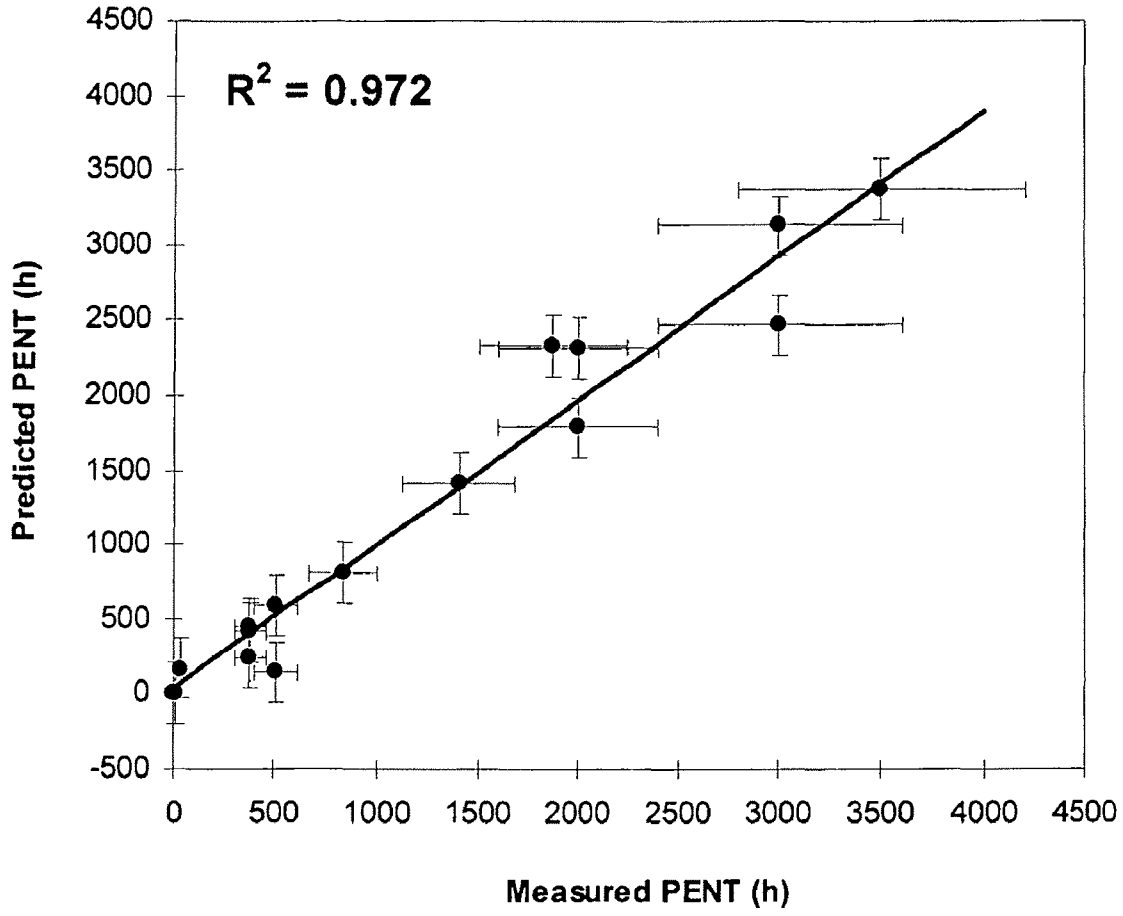

$R^2 = 0.972$
Predicted PENT (h)
Measured PENT (h)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
0
500
1000
1500
2000
2500
3000
3500
4000
4500

FIG. 22

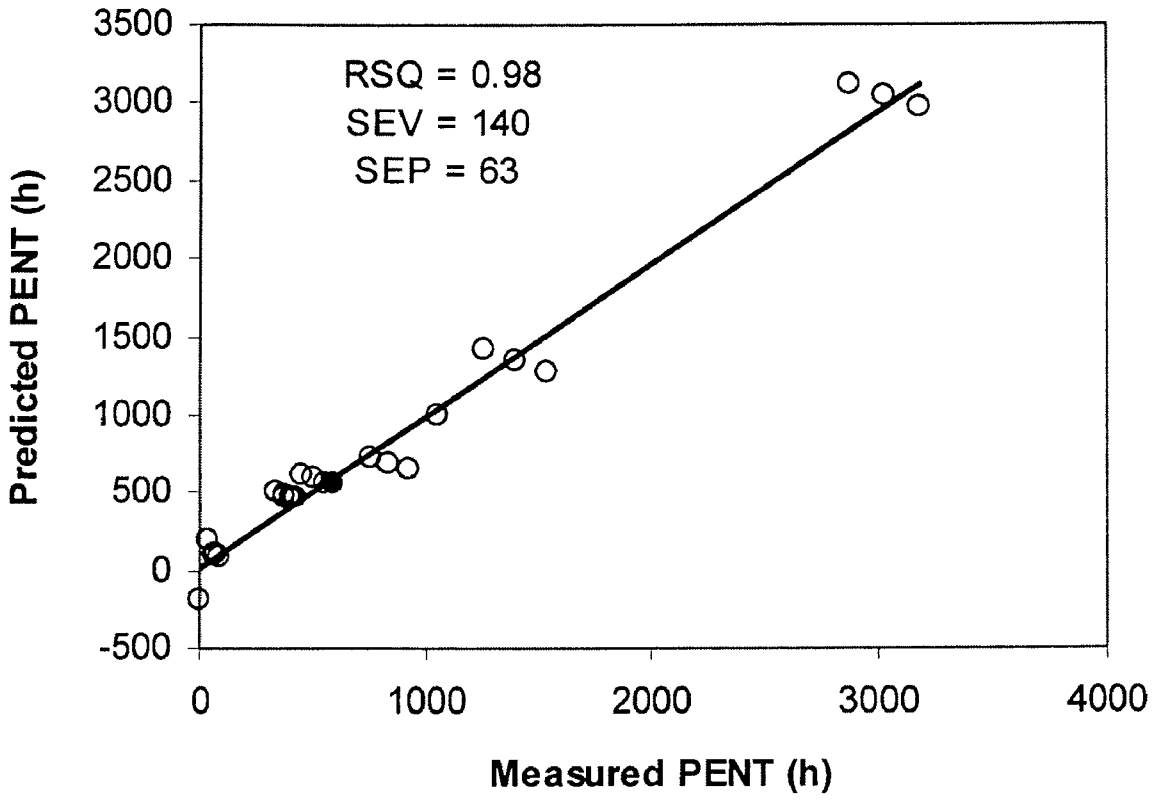

RSQ = 0.98
SEV = 140
SEP = 63
Predicted PENT (h)
Measured PENT (h)
3500
3000
2500
2000
1500
1000
500
0
-500
0
1000
2000
3000
4000

FIG. 23

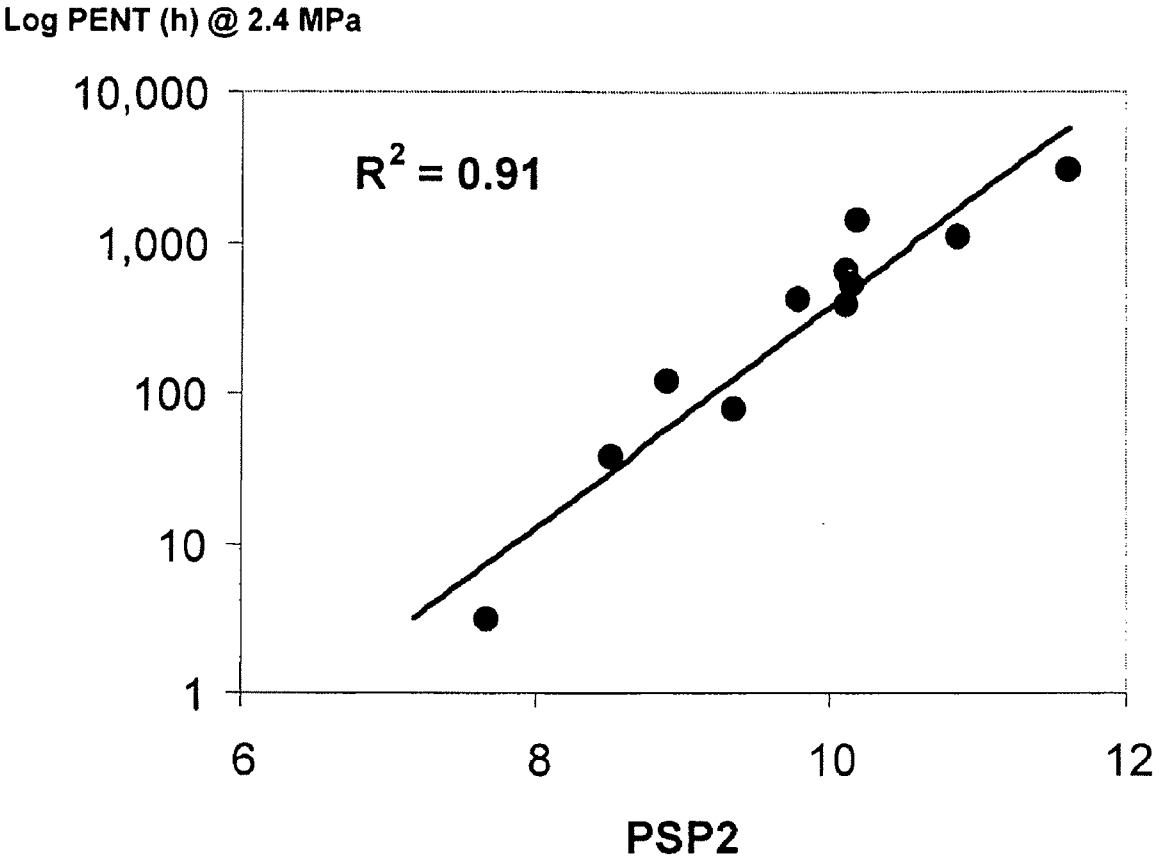


FIG. 24

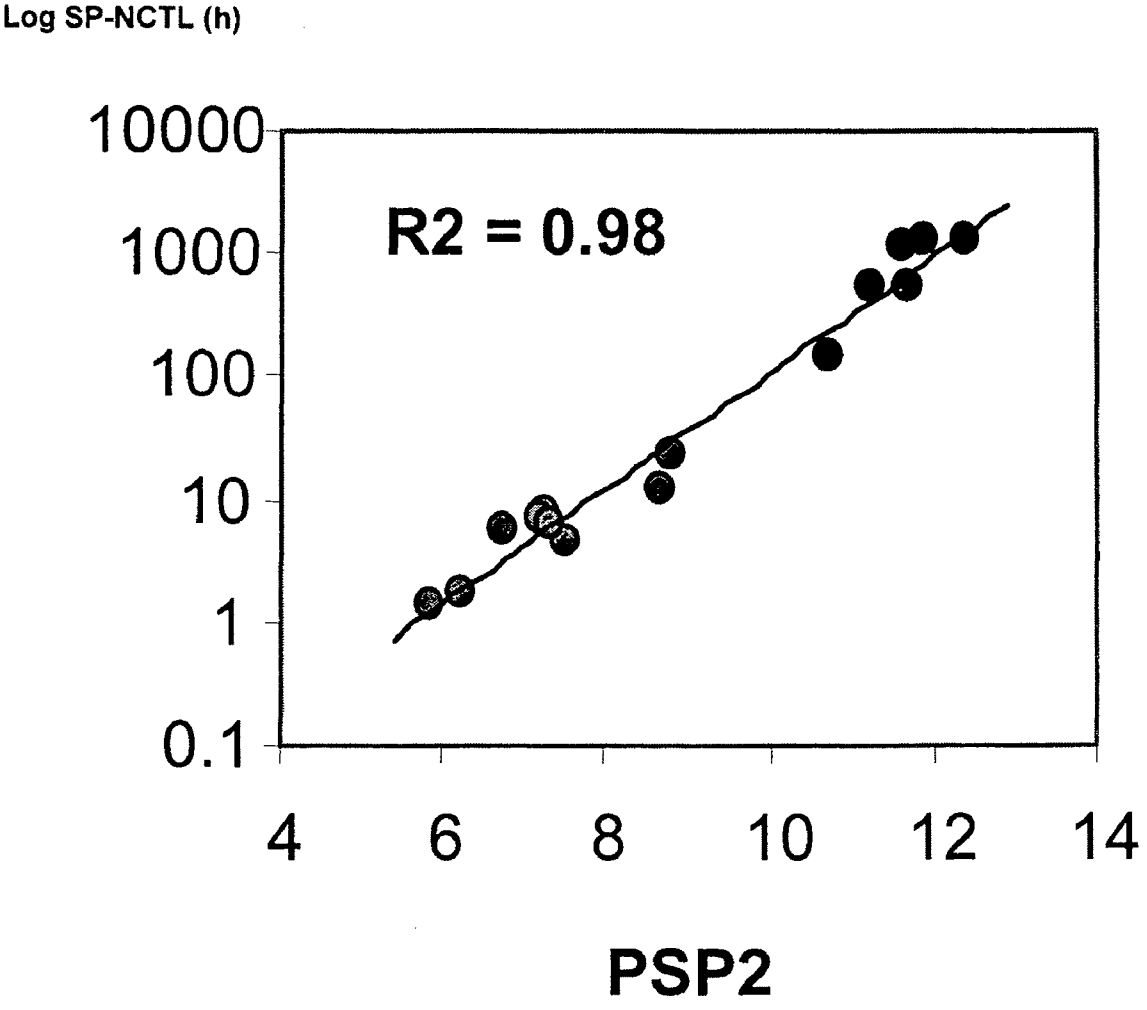


FIG. 25

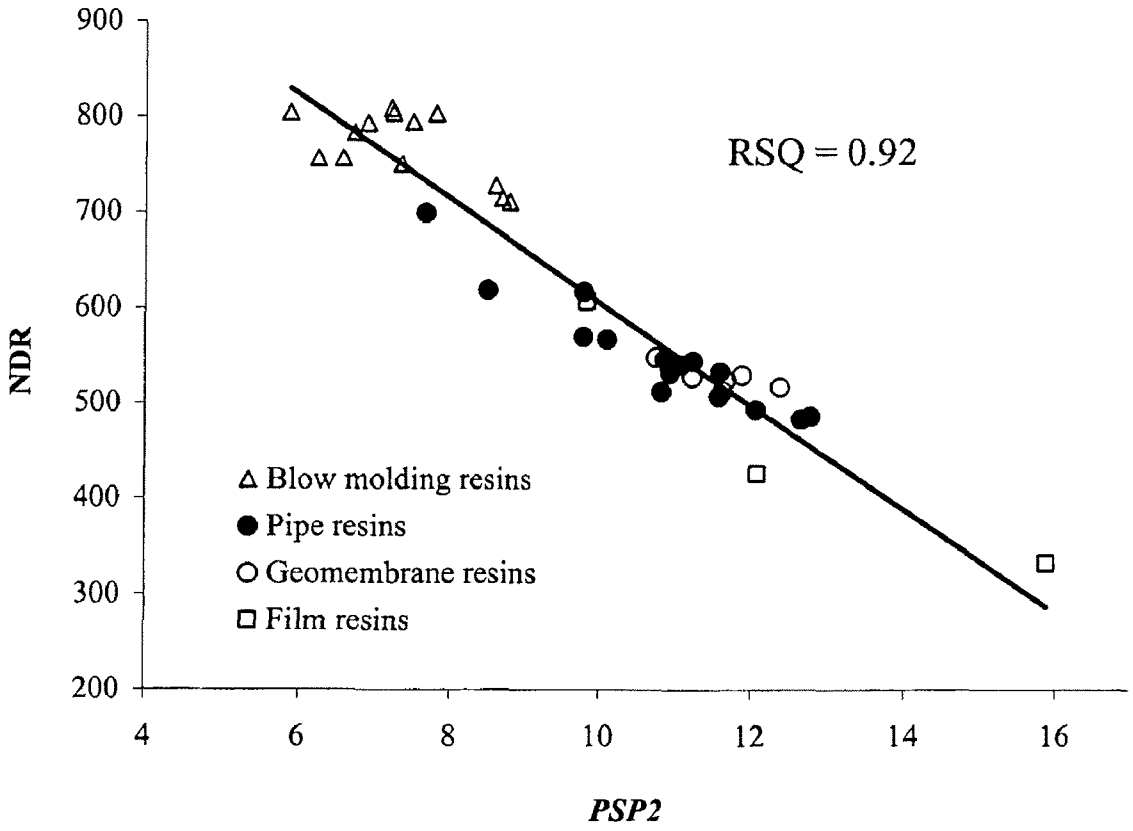
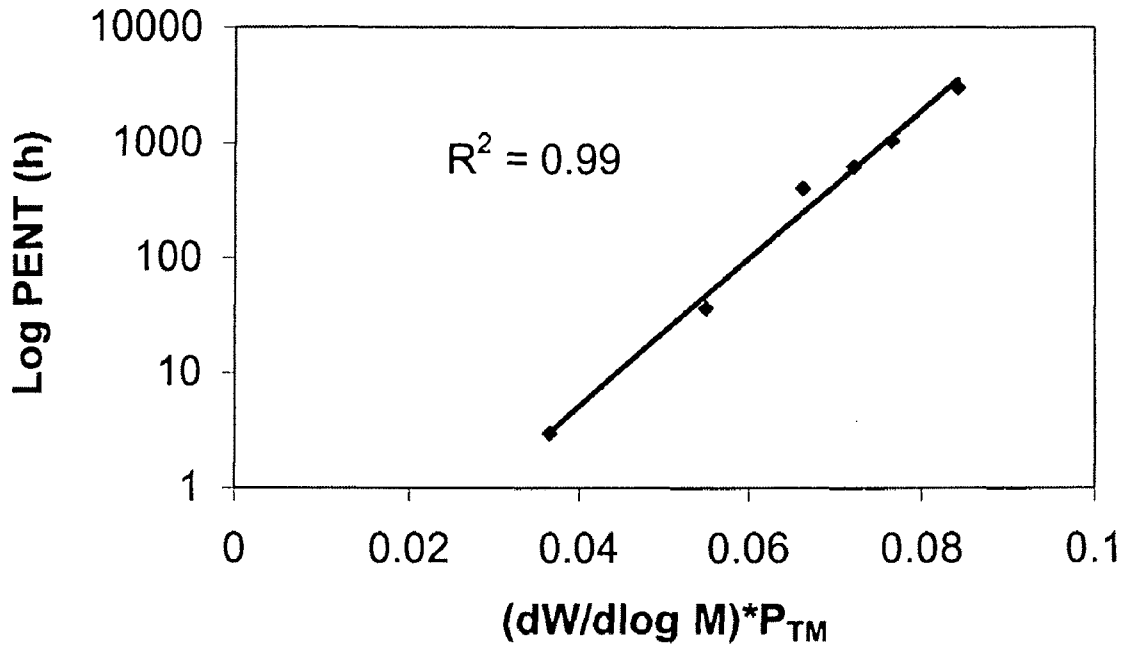

900
800
700
600
500
400
300
200
NDR
4
6
8
10
12
14
16
PSP2
RSQ = 0.92
Blow molding resins
Pipe resins
Geomembrane resins
Film resins

FIG. 26


10000
1000
100
10
1
Log PENT (h)
R^2 = 0.99
0
0.02
0.04
0.06
0.08
0.1
(dW/dlog M)*P_{TM}