FIG. 1

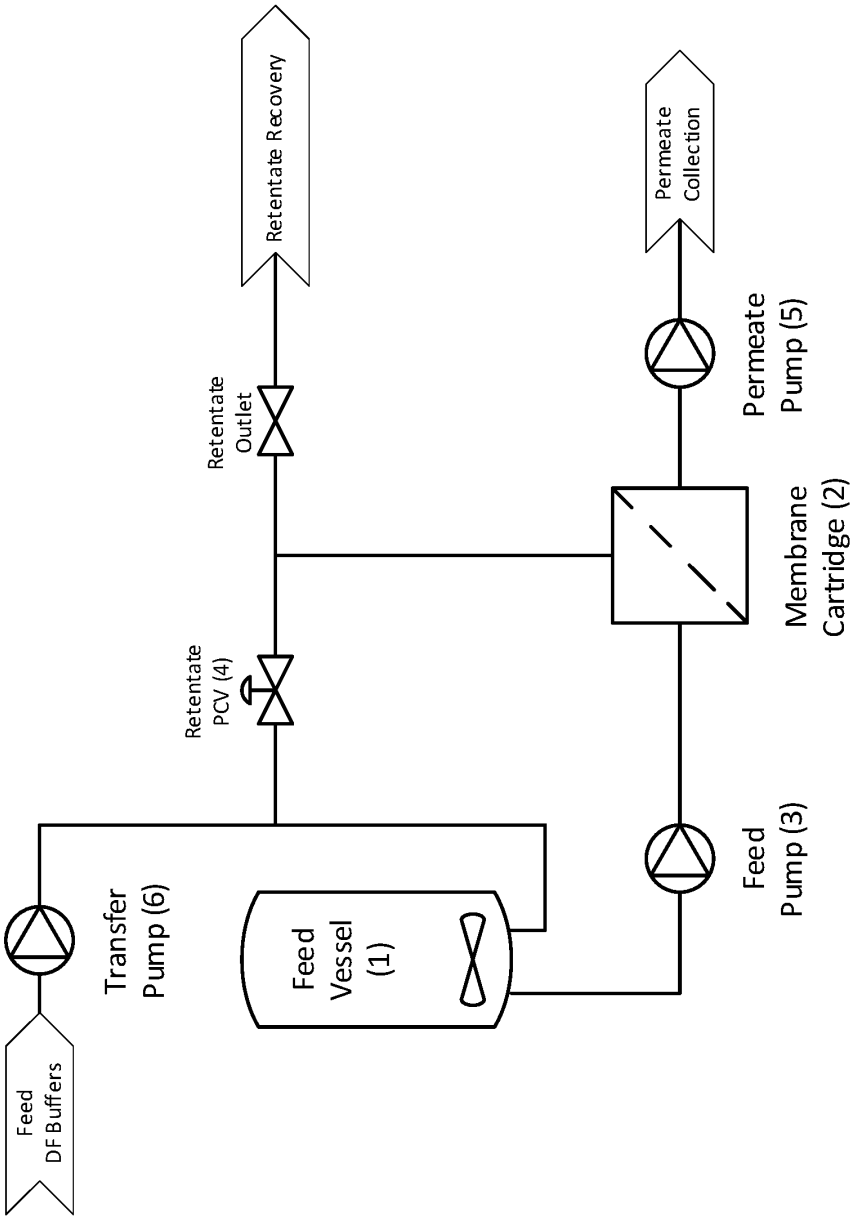

Retentate Recovery
Permeate Collection
Retentate Outlet
Permeate Pump (5)
Membrane Cartridge (2)
Retentate PCV (4)
Feed Pump (3)
Transfer Pump (6)
Feed Vessel (1)
Feed DF Buffers

FIG. 2

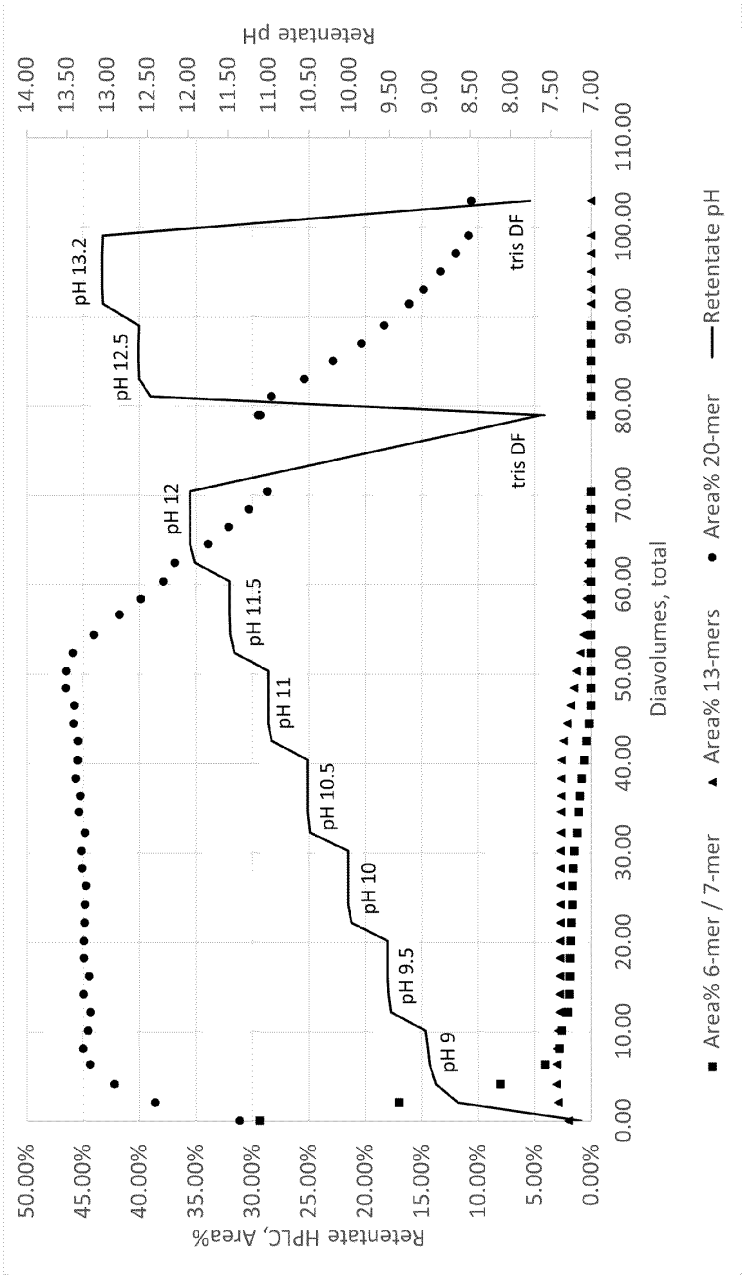

Retentate pH
14.00
13.50
13.00
12.50
12.00
11.50
11.00
10.50
10.00
9.50
9.00
8.50
8.00
7.50
7.00
Retentate HPLC, Area%
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
100.00
110.00
Diavolumes, total
pH 13.2
pH 12.5
pH 12
pH 11.5
pH 11
pH 10.5
pH 10
pH 9.5
pH 9
tris DF
tris DF
Area% 6-mer / 7-mer
Area% 13-mers
Area% 20-mer
Retentate pH

FIG. 3

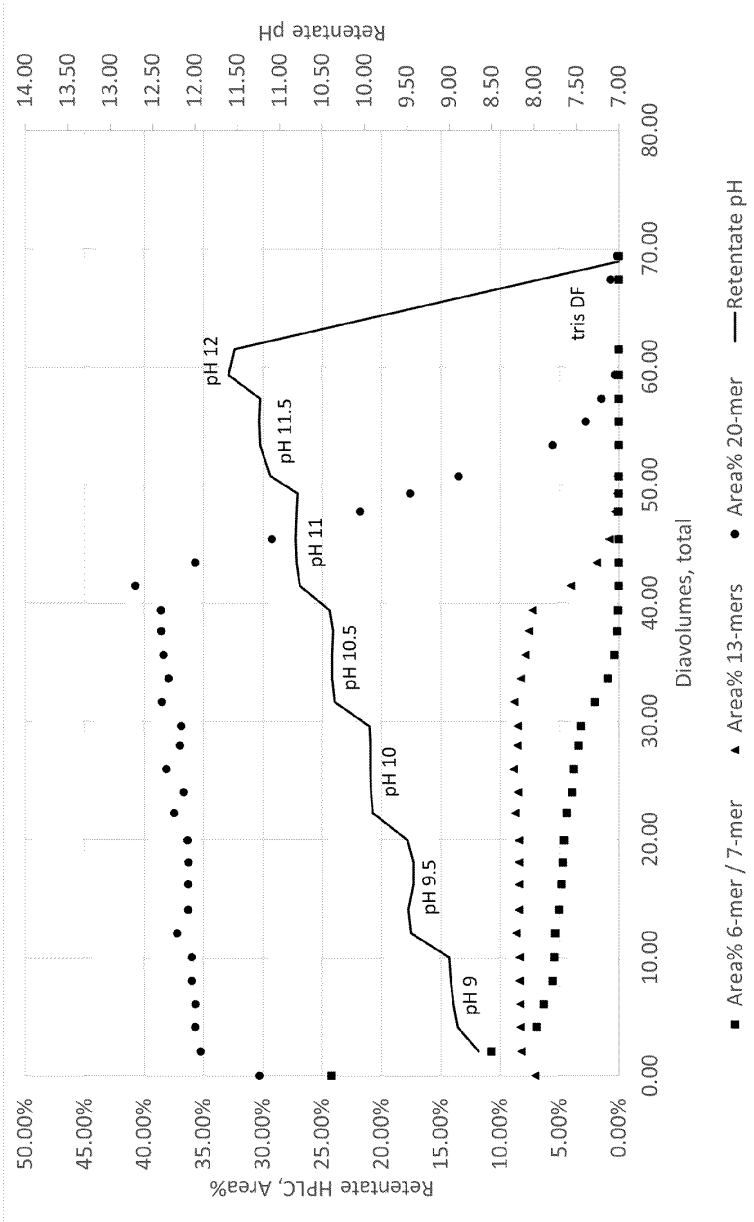

Retentate pH
14.00
13.50
13.00
12.50
12.00
11.50
11.00
10.50
10.00
9.50
9.00
8.50
8.00
7.50
7.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Retentate HPLC, Area%
Diavolumes, total
pH 12
pH 11.5
pH 11
pH 10.5
pH 10
pH 9.5
pH 9
tris DF
Area% 6-mer / 7-mer
Area% 13-mers
Area% 20-mer
Retentate pH

FIG. 4

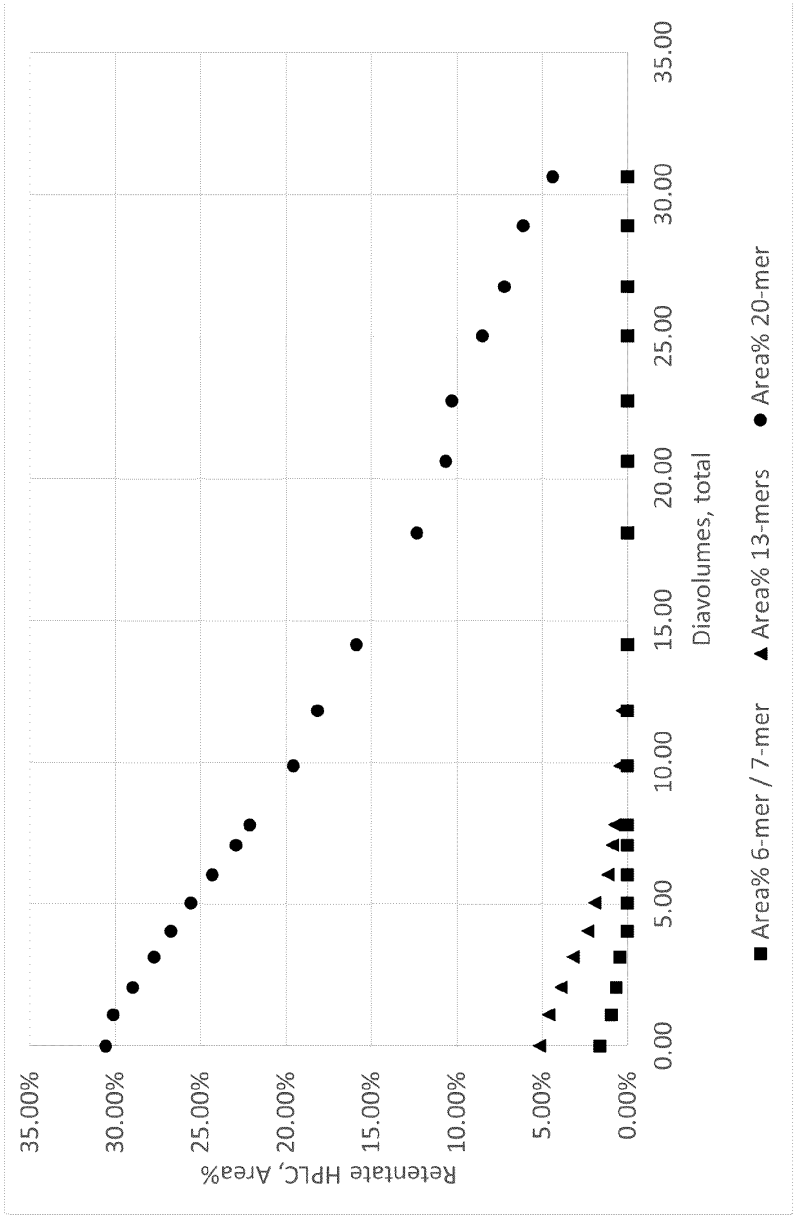

35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Retentate HPLC, Area%
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Diavolumes, total
Area% 6-mer / 7-mer
Area% 13-mers
Area% 20-mer

FIG. 5

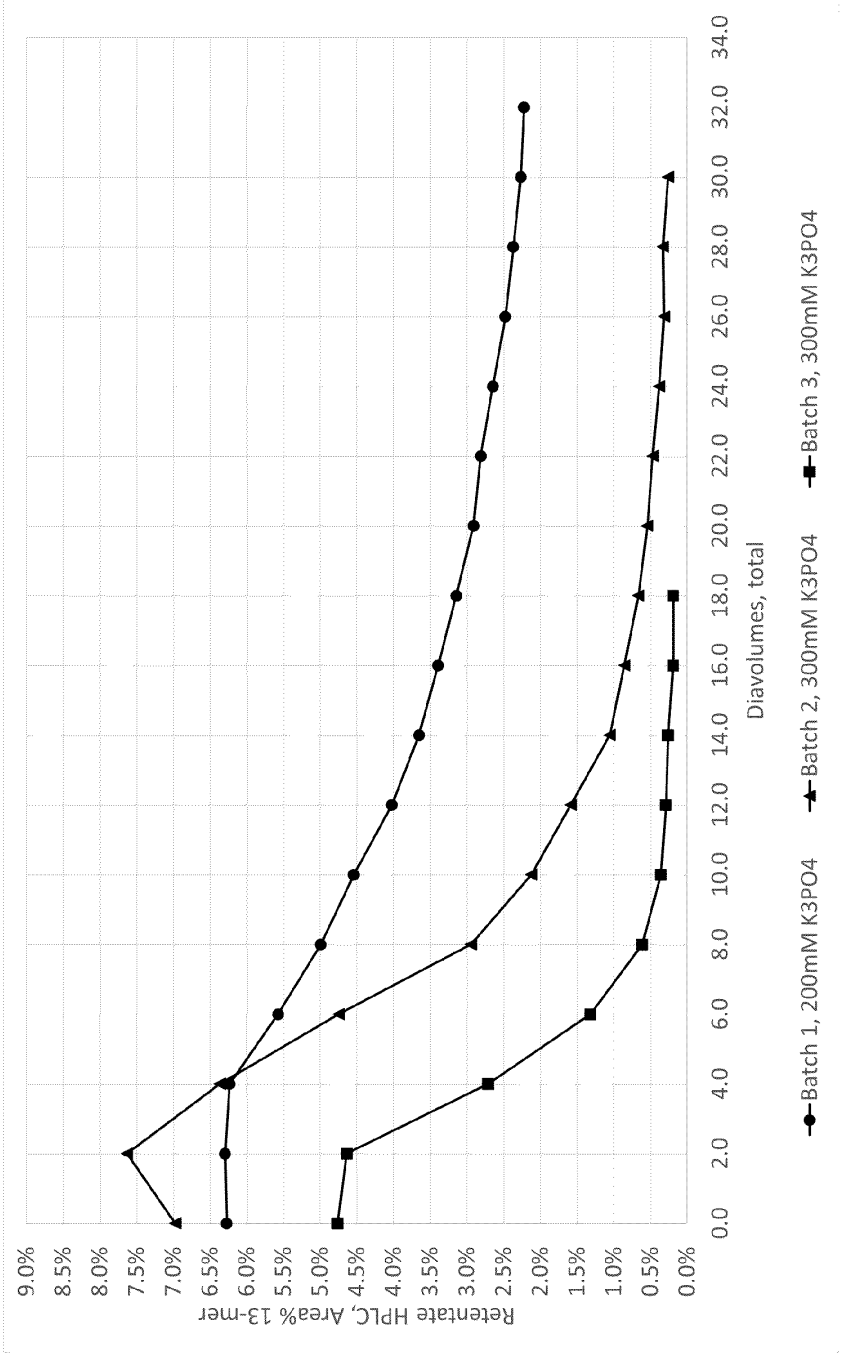

Retentate HPLC, Area% 13-mer
9.0%
8.5%
8.0%
7.5%
7.0%
6.5%
6.0%
5.5%
5.0%
4.5%
4.0%
3.5%
3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
30.0
32.0
34.0
Diavolumes, total
Batch 1, 200mM K3PO4
Batch 2, 300mM K3PO4
Batch 3, 300mM K3PO4

FIG. 6

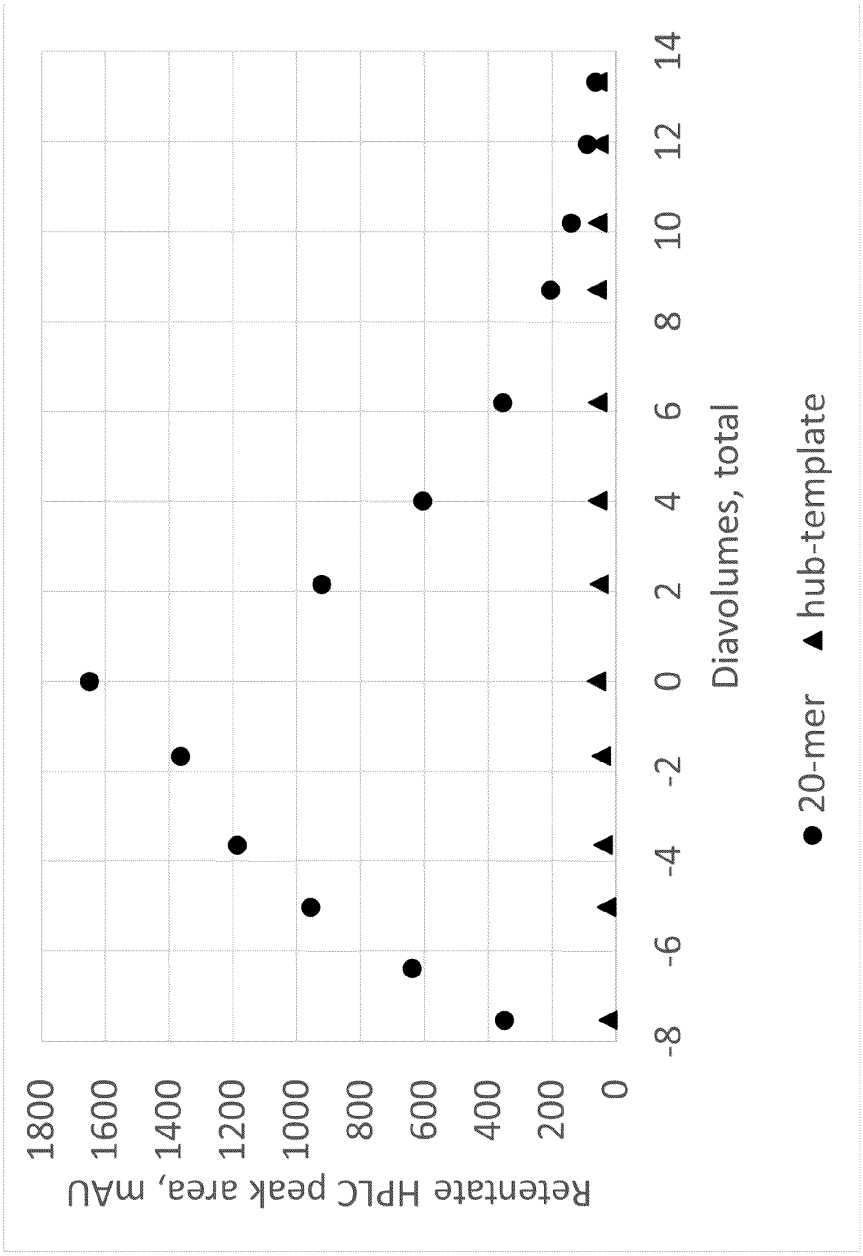
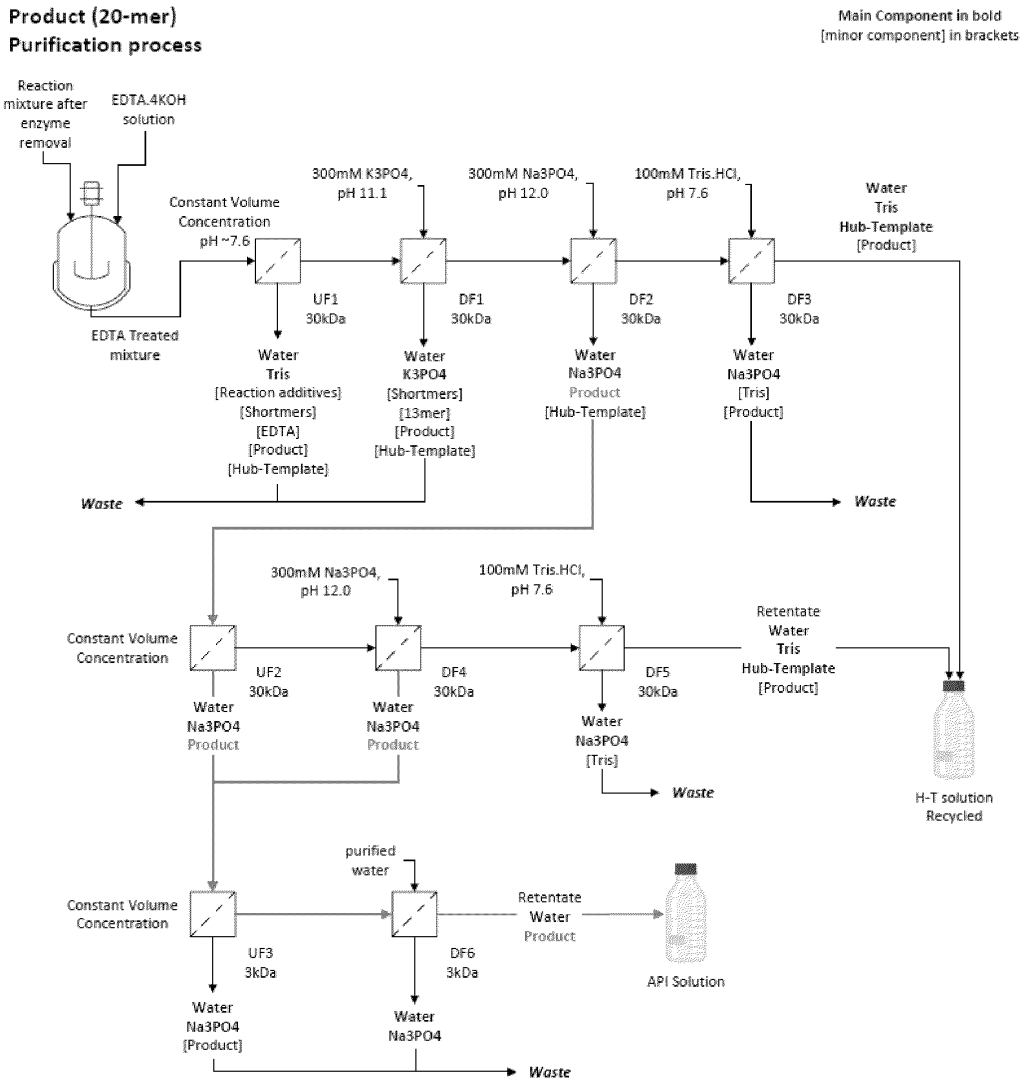

Retentate HPLC peak area, mAU
1800
1600
1400
1200
1000
800
600
400
200
0
-8
-6
-4
-2
0
2
4
6
8
10
12
14
Diavolumes, total
20-mer
hub-template

FIG. 7


Product (20-mer)
Purification process
Main Component in bold
[minor component] in brackets
Reaction mixture after enzyme removal
EDTA.4KOH solution
Constant Volume Concentration pH ~7.6
300mM K3PO4, pH 11.1
300mM Na3PO4, pH 12.0
100mM Tris.HCl, pH 7.6
Water
Tris
Hub-Template
[Product]
UF1 30kDa
DF1 30kDa
DF2 30kDa
DF3 30kDa
EDTA Treated mixture
Water
Tris
[Reaction additives]
[Shortmers]
[EDTA]
[Product]
[Hub-Template]
Water
K3PO4
[Shortmers]
[13mer]
[Product]
[Hub-Template]
Water
Na3PO4
Product
[Hub-Template]
Water
Na3PO4
[Tris]
[Product]
Waste
Waste
Constant Volume Concentration
300mM Na3PO4, pH 12.0
100mM Tris.HCl, pH 7.6
Retentate
Water
Tris
Hub-Template
[Product]
UF2 30kDa
DF4 30kDa
DF5 30kDa
Water
Na3PO4
Product
Water
Na3PO4
Product
Water
Na3PO4
[Tris]
Waste
H-T solution Recycled
purified water
Constant Volume Concentration
Retentate
Water
Product
UF3 3kDa
DF6 3kDa
API Solution
Water
Na3PO4
[Product]
Water
Na3PO4
Waste