

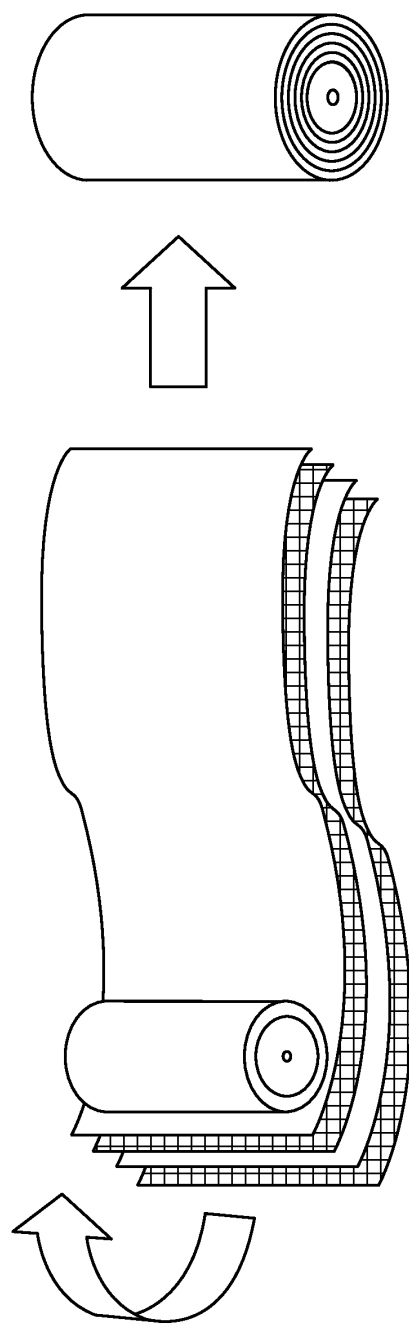


FIG. 1A

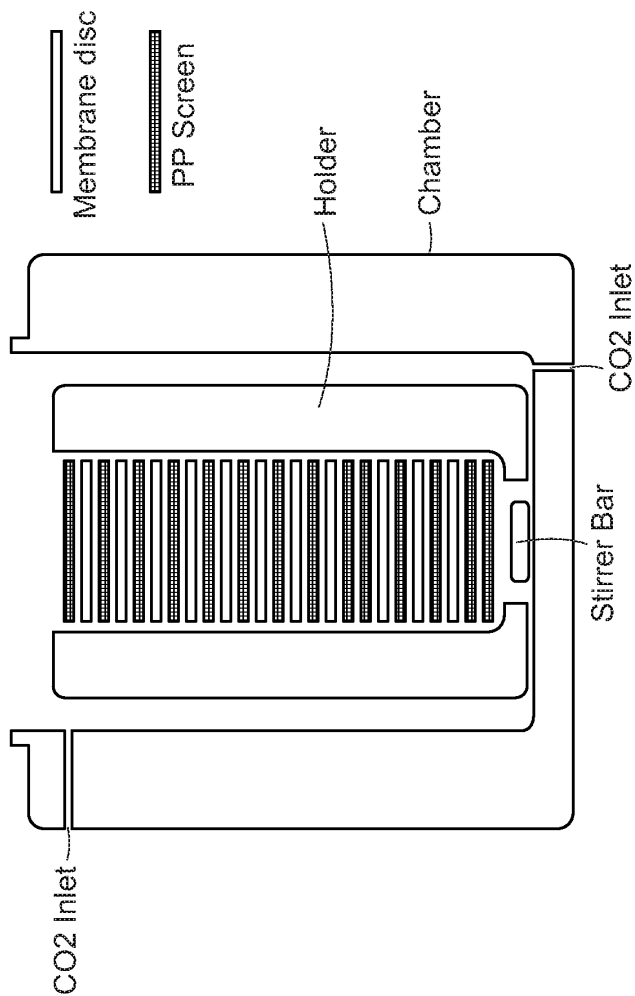


FIG. 1B

FIG. 2

Table 3. Exchange Protocols with Alcohol, Buffers, and Salt Components

Exchange Protocol	Step	Solvent Type	Solvent %	Co-solvent or Buffer	Co-solvent or Buffer %	Solvent (mL)/disc	Soaking Time (min)
C	1	Anhy. Alcohol (mainly ethanol)	30	H ₂ O	70	5	10
	2		70	H ₂ O	30	5	10
	3		90	H ₂ O	10	5	10
	4		100	-	0	5	10
	5		100	-	0	5	10
AwB3	1	Anhy. Alcohol (mainly ethanol)	0	5X PBS	100	5	20
	2		90	H ₂ O	10	5	10
	3		90	H ₂ O	10	5	10
	4		100	-	0	5	10
	5		100	-	0	5	10
AwB7	1	Anhy. Alcohol (mainly ethanol)	0	10X PBS	100	5	20
	2		90	H ₂ O	10	5	10
	3		90	H ₂ O	10	5	10
	4		100	-	0	5	10
	5		100	-	0	5	10
AwB9	1	Anhy. Alcohol (mainly ethanol)	0	2M CaCl ₂ in H ₂ O	100	5	20
	2		90	2M CaCl ₂ in H ₂ O	10	5	10
	3		100	0.88g solid CaCl ₂	0	5	10
	4		100	-	0	5	10
	5		100	-	0	5	10

FIG. 3A

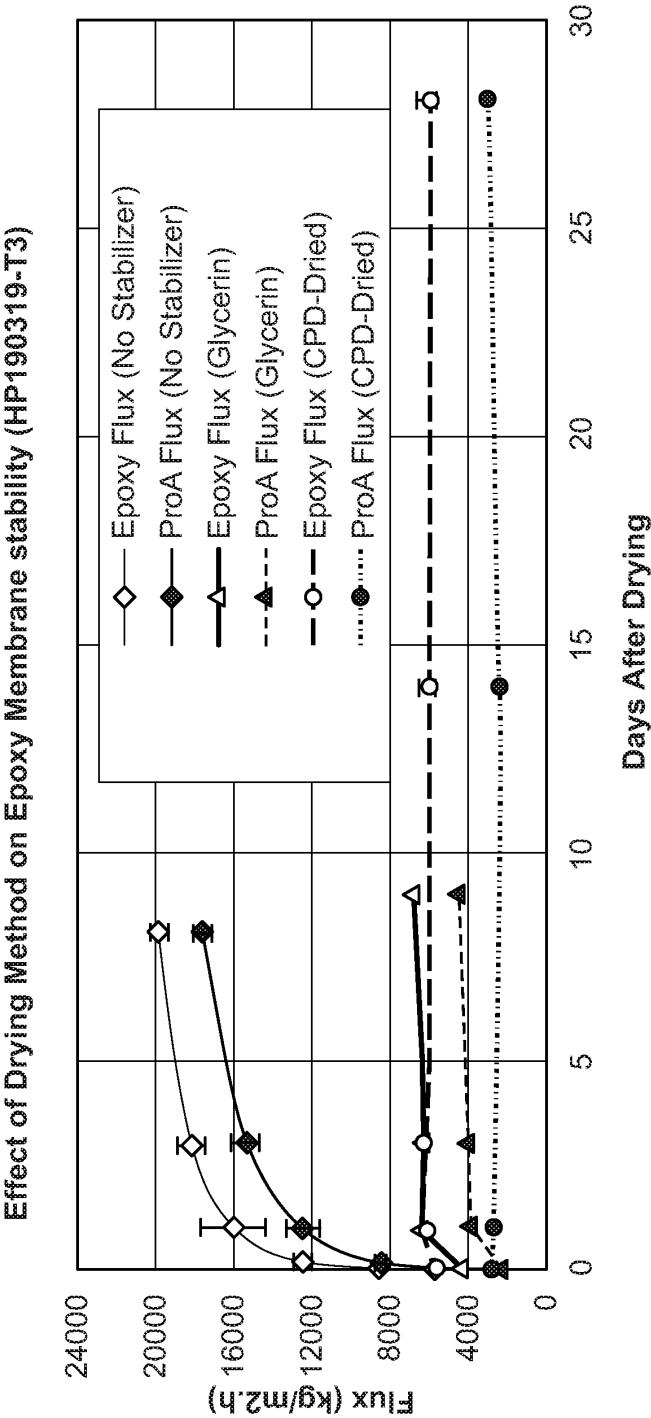


FIG. 3B

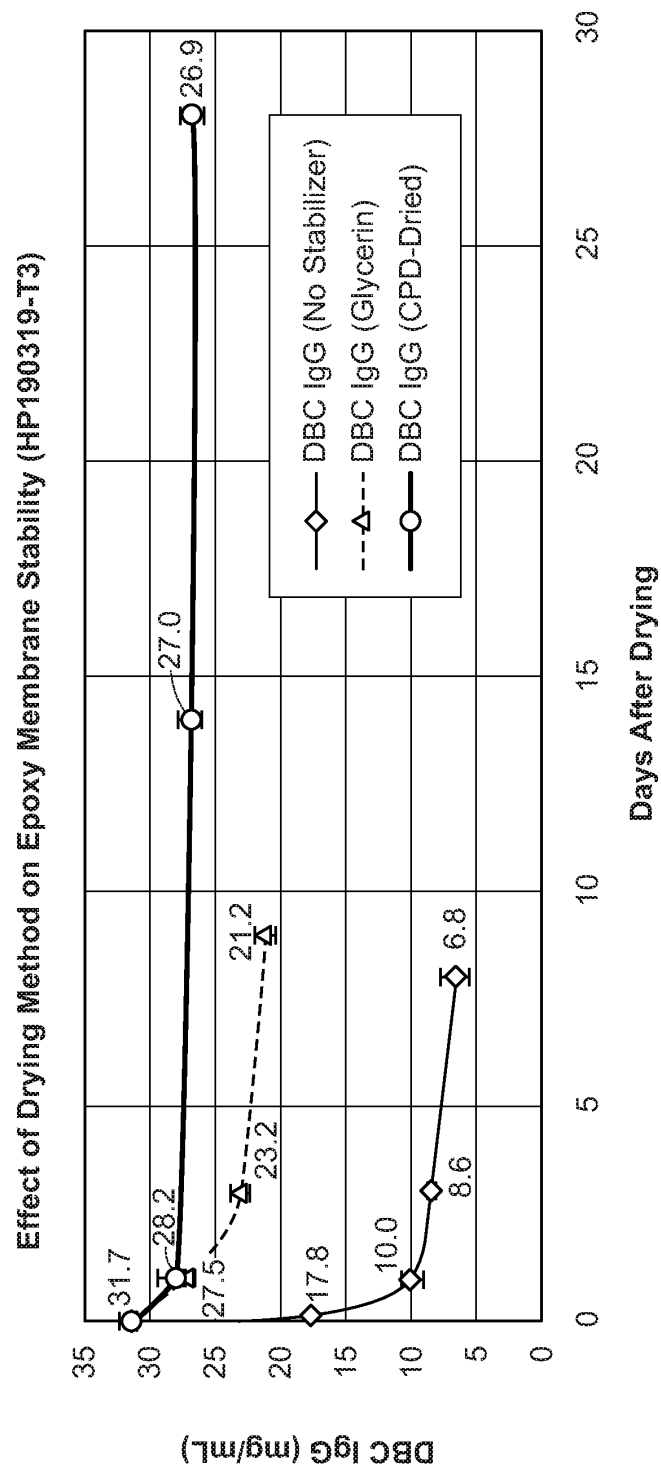


FIG. 4A

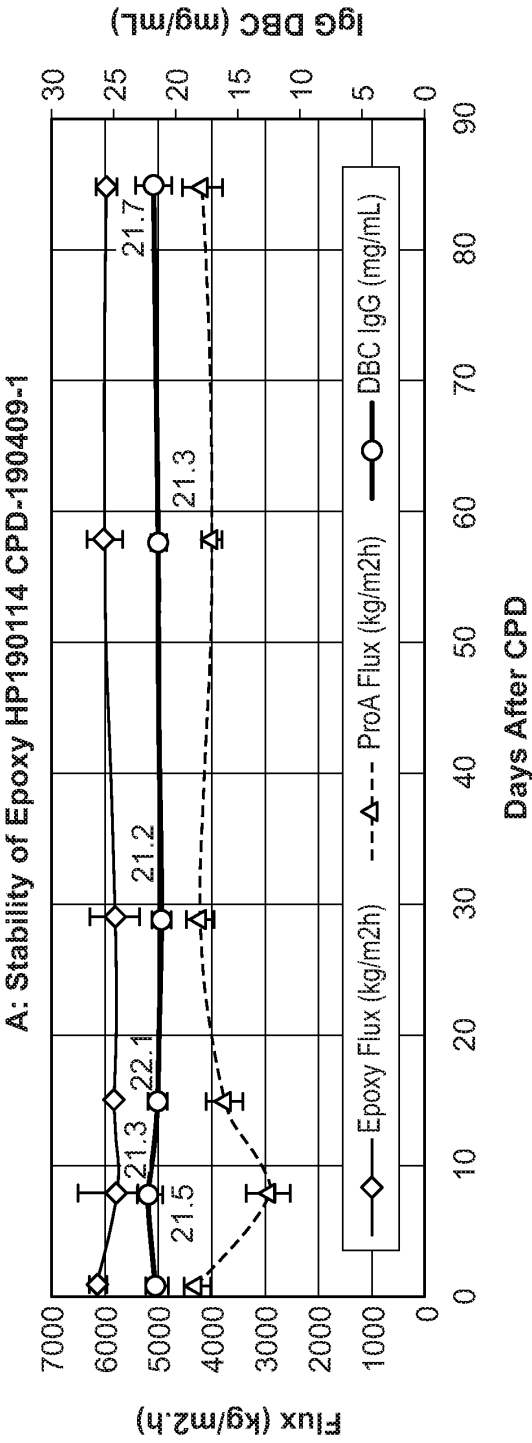


FIG. 4B

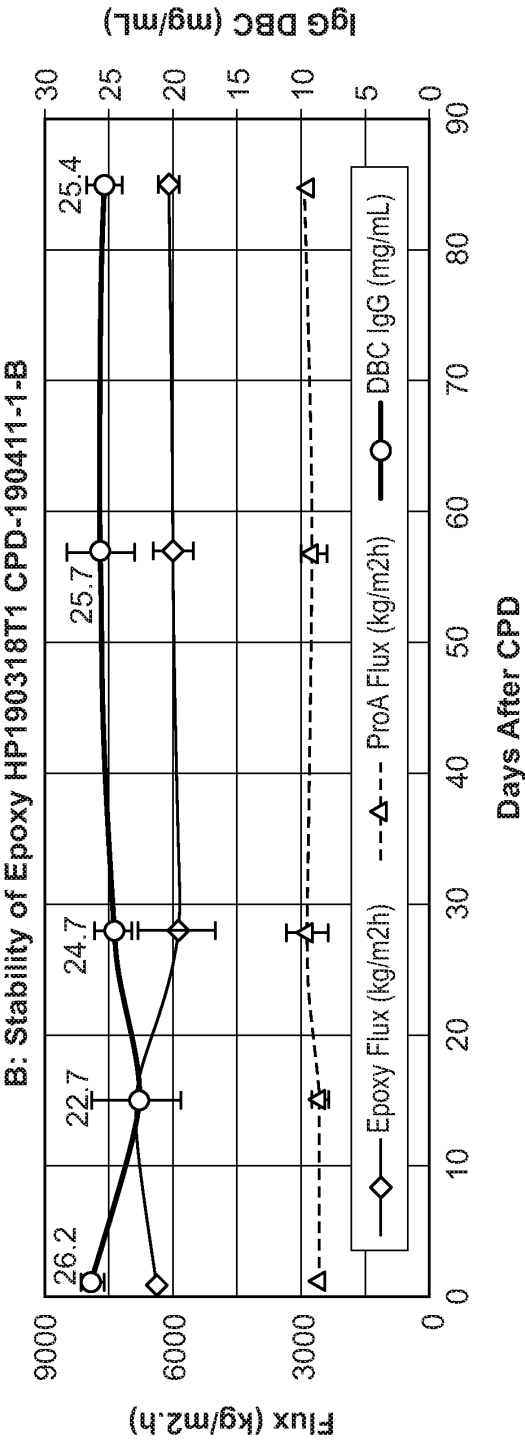


FIG. 4C

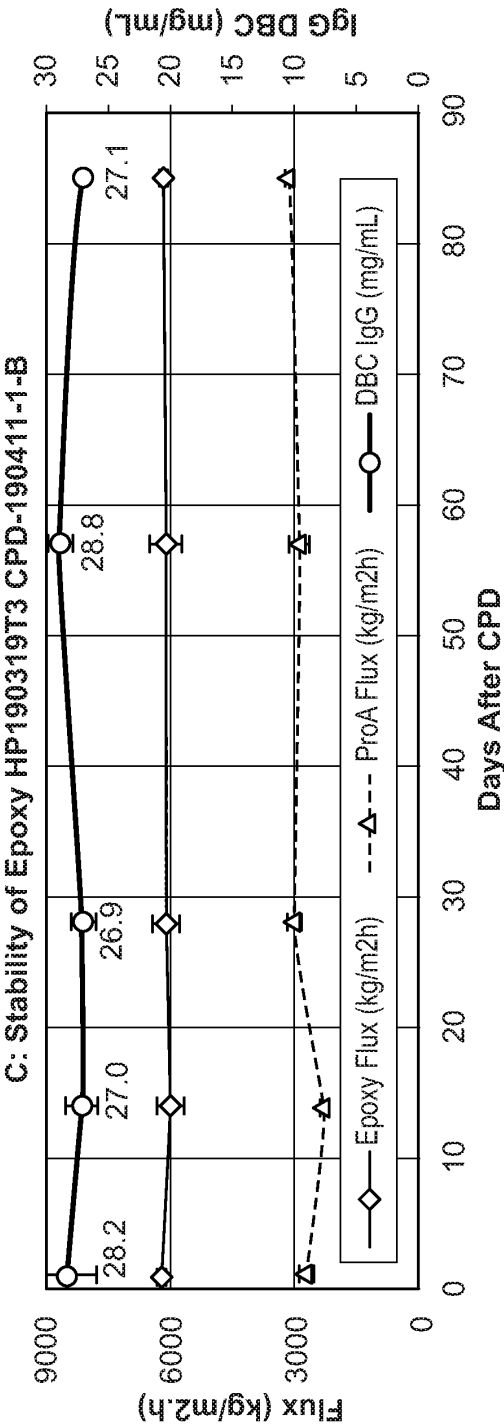


FIG. 4D

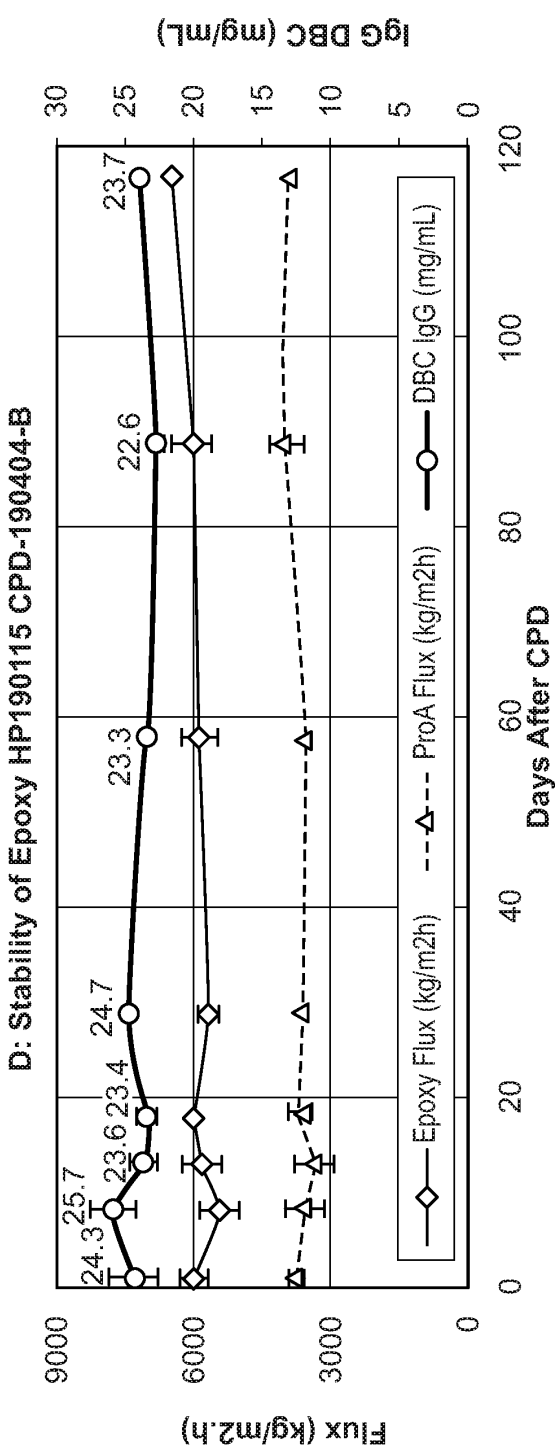


FIG. 5A

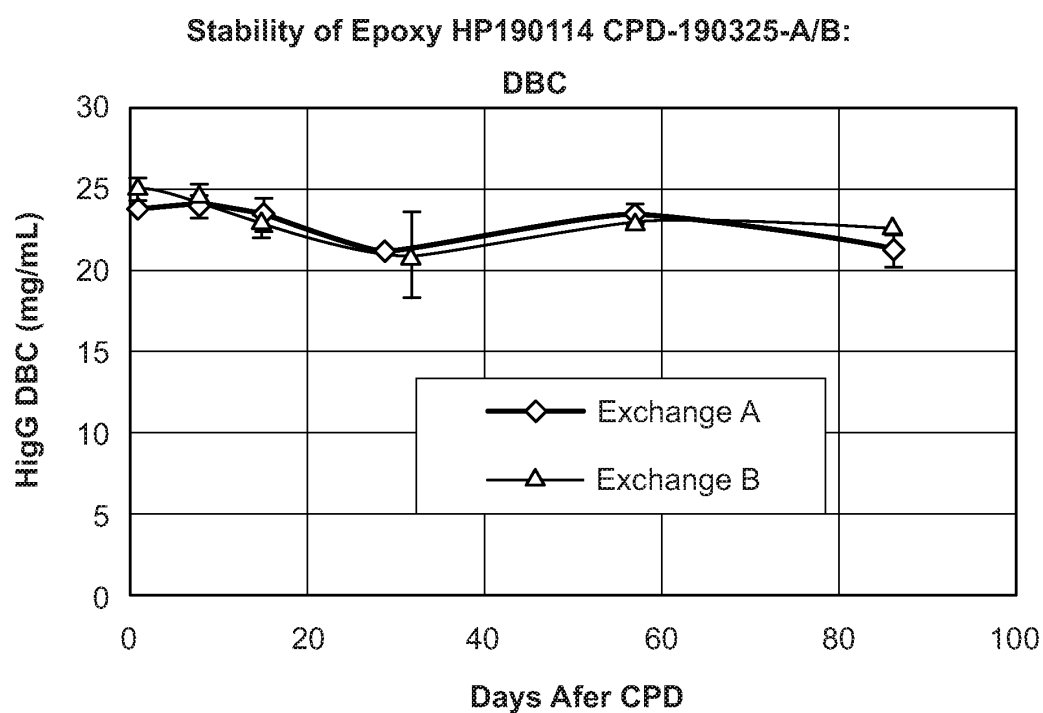


FIG. 5B

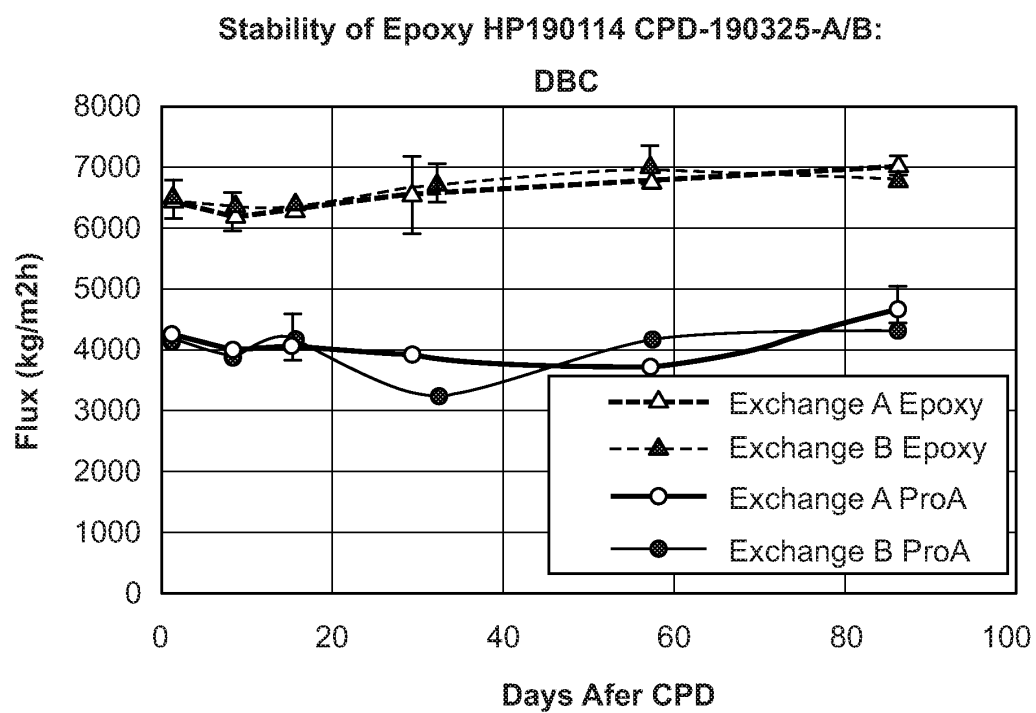


FIG. 5C

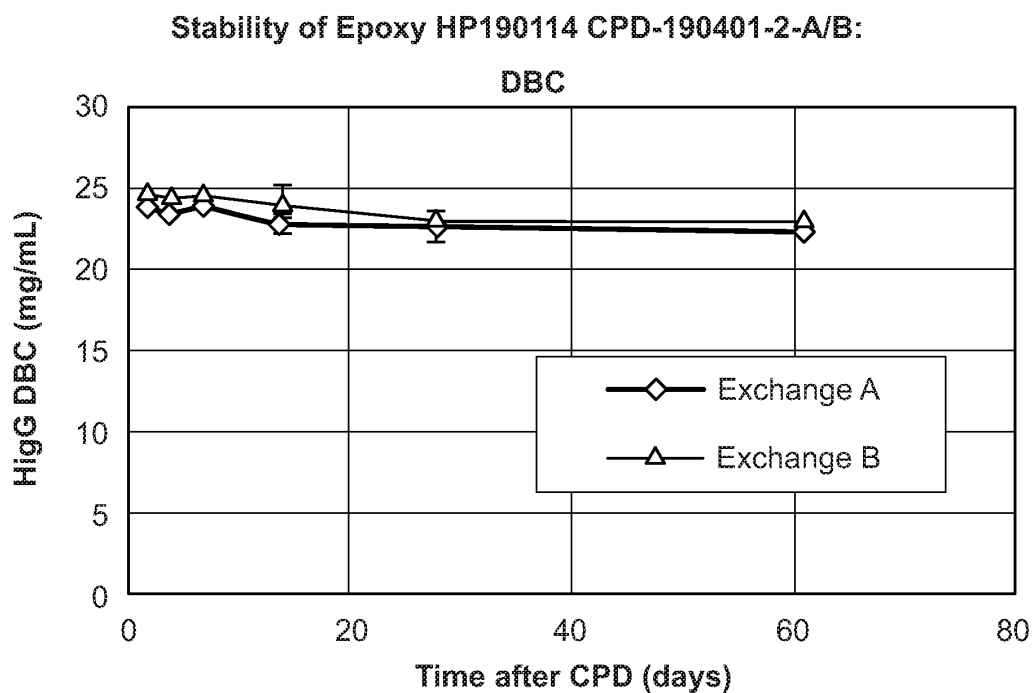


FIG. 5D

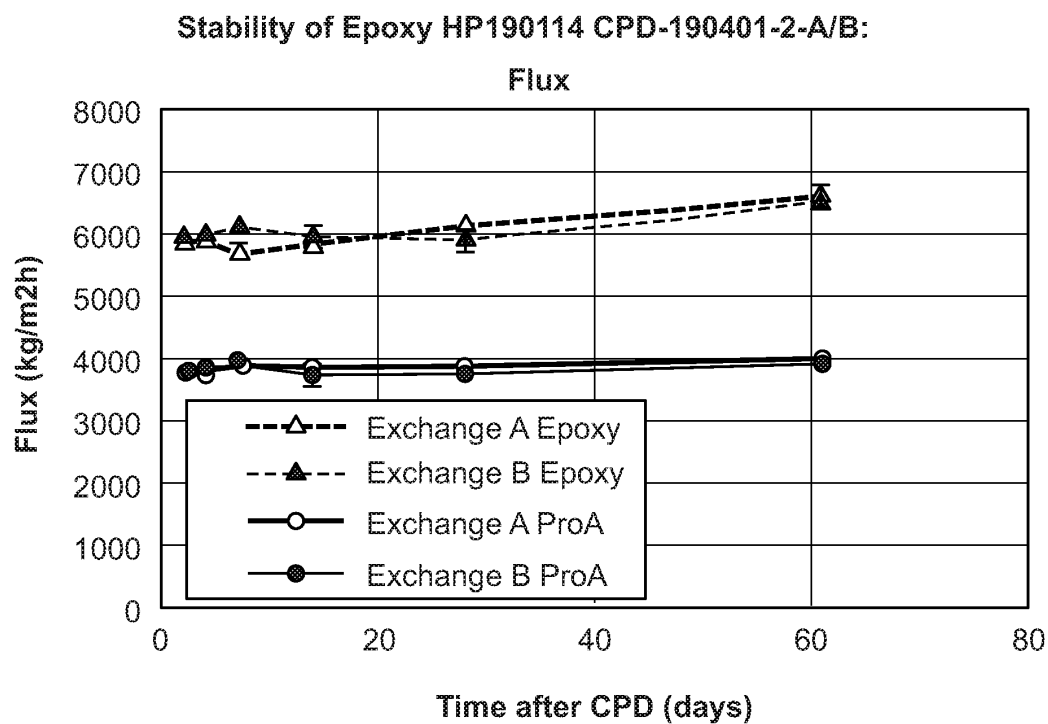


FIG. 6

Table 4. Critical Point Drying Parameters and Related Membrane Ethanol Extraction Volume

CPD Run ID	Stirrer	CO ₂ IN			CO ₂ Exchange			CO ₂ Out		Cool Temp	Heat Temp	Exchange Protocol	Solvent Vol. (mL)	Memb. Volume (mL)	Solvent/ Memb. Ratio
		Speed %	Speed	Fillers %	Delay (min)	Speed	Cycles	Heat	Speed						
CPD190325 A	100%	med	med	17	5	3	15	fast	fast	15°C	34°C	A	50	5.3	9.5
CPD190325 B	100%	med	med	17	5	3	15	fast	fast	15°C	34°C	B	50	5.3	9.5
CPD190401-2-A	100%	med	med	17	5	3	15	fast	fast	15°C	34°C	A	50	5.3	9.5
CPD190401-2-B	100%	med	med	17	5	3	15	fast	fast	15°C	34°C	B	50	5.3	9.5
CPD190404	100%	med	med	17	5	3	15	fast	fast	15°C	34°C	B	50	8.9	5.6
CPD190409-1	100%	med	med	17	5	3	15	fast	fast	15°C	34°C	B	70	21.0	3.3
CPD190411-1	100%	med	med	17	5	3	15	fast	fast	15°C	34°C	B	90	21.0	4.3

FIG. 7

Table 5. Critical point drying parameters for membranes with varying binding capacities (A > B > C) and permeabilities (C > B > A)

CPD Run ID	Stirrer	CO ₂ IN			CO ₂ Exchange			CO ₂ Out		Cool Temp	Heat Temp	Exchange Protocol	Solvent Vol. (mL)	Memb. Volume (mL)	Solvent/ Memb. Ratio
		Speed %	Speed	Fillers %	Delay (min)	Speed	Cycles	Heat	Speed						
Mem-A (CPD190410-B)	100%	med	17	5	3	15	fast	fast	fast	15°C	34°C	B	70	5.3	13.3
Mem-B (CPD190528)	100%	fast	17	5	3	25	med	fast	fast	10°C	34°C	B	90	15.8	5.7
Mem-C (CPD190401-2-B)	100%	med	17	5	3	15	fast	fast	fast	15°C	34°C	B	50	5.3	9.5

FIG. 8A

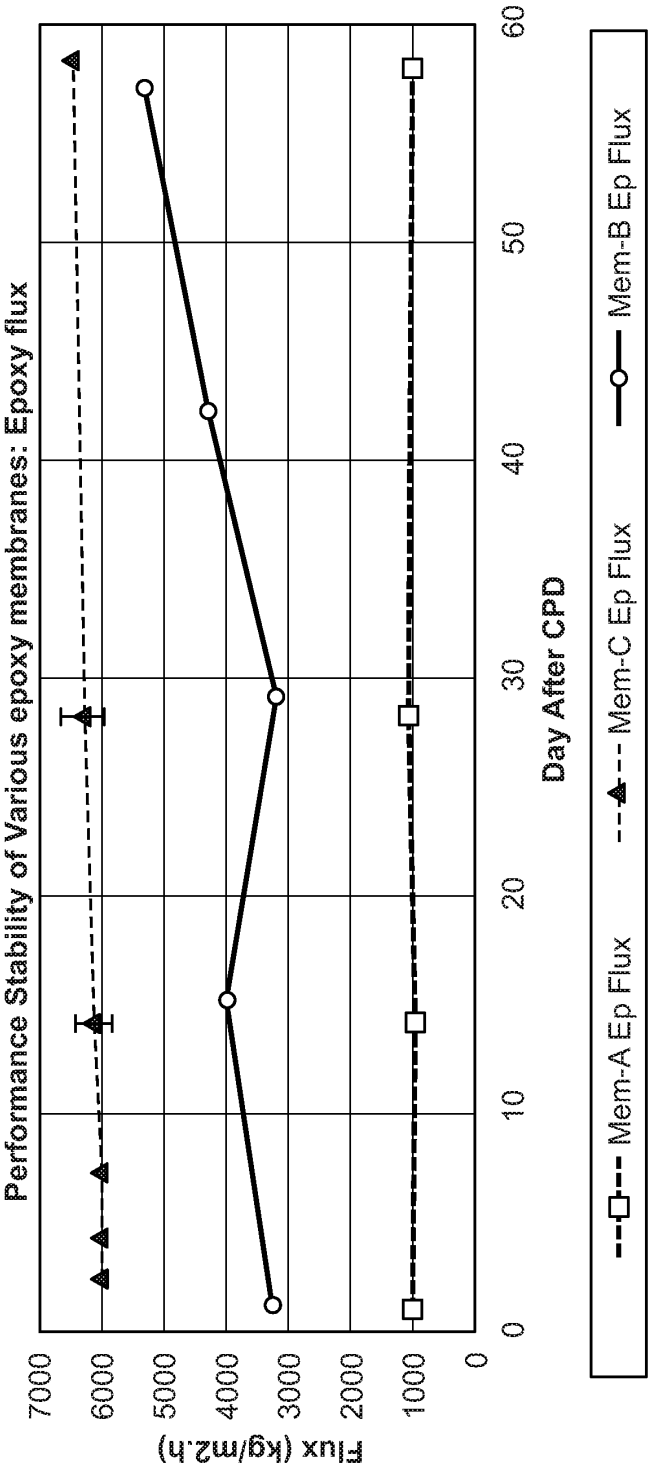


FIG. 8B

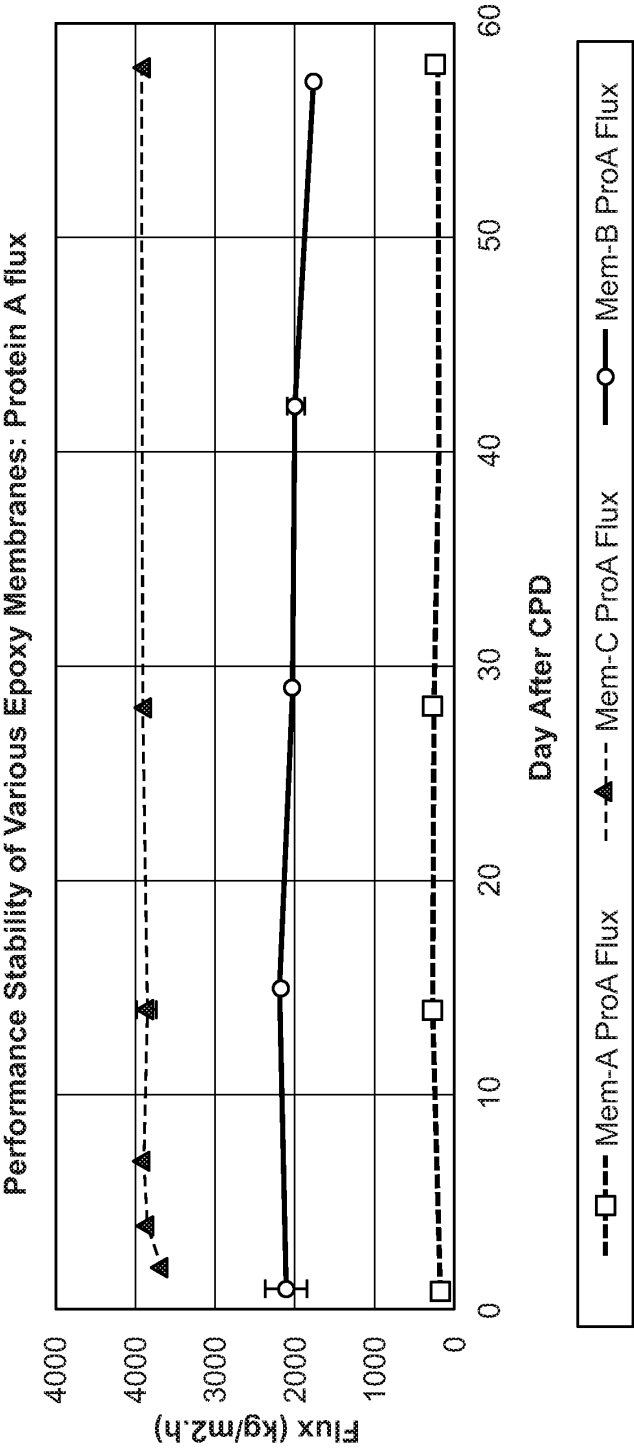


FIG. 8C

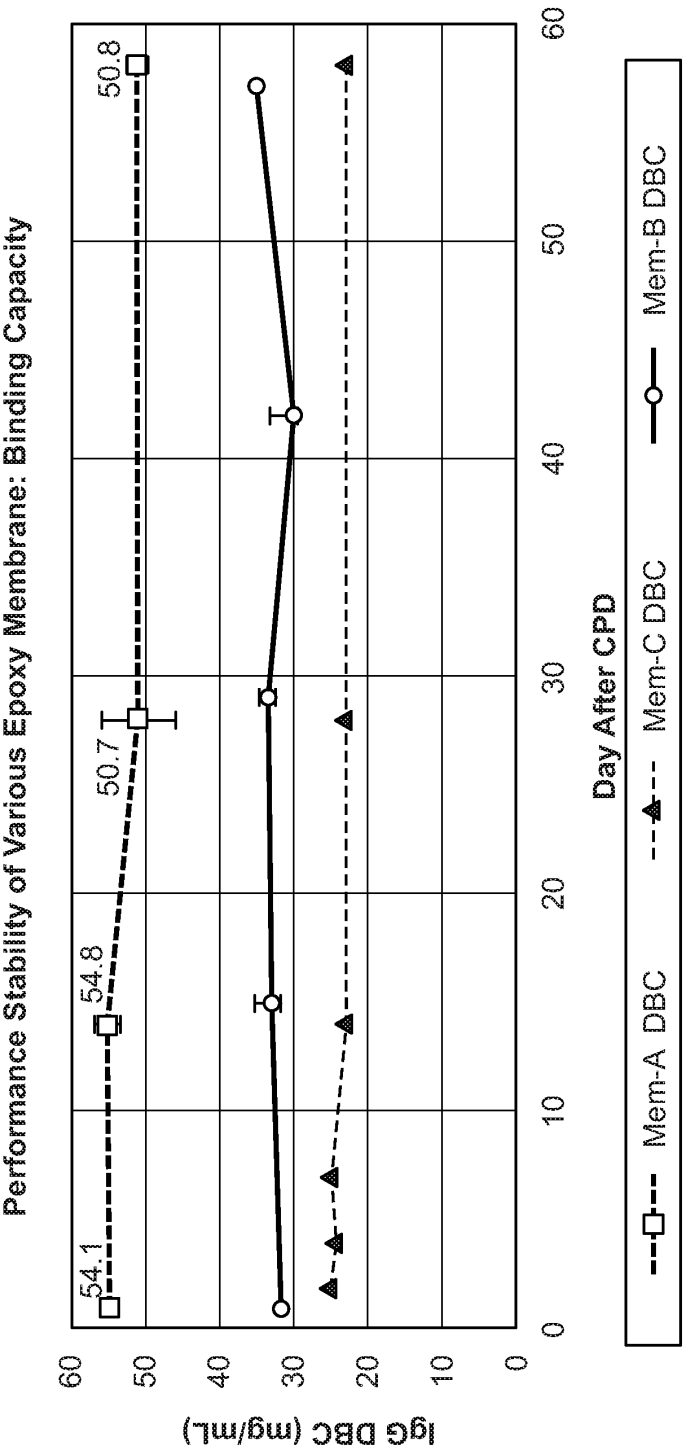


FIG. 9A

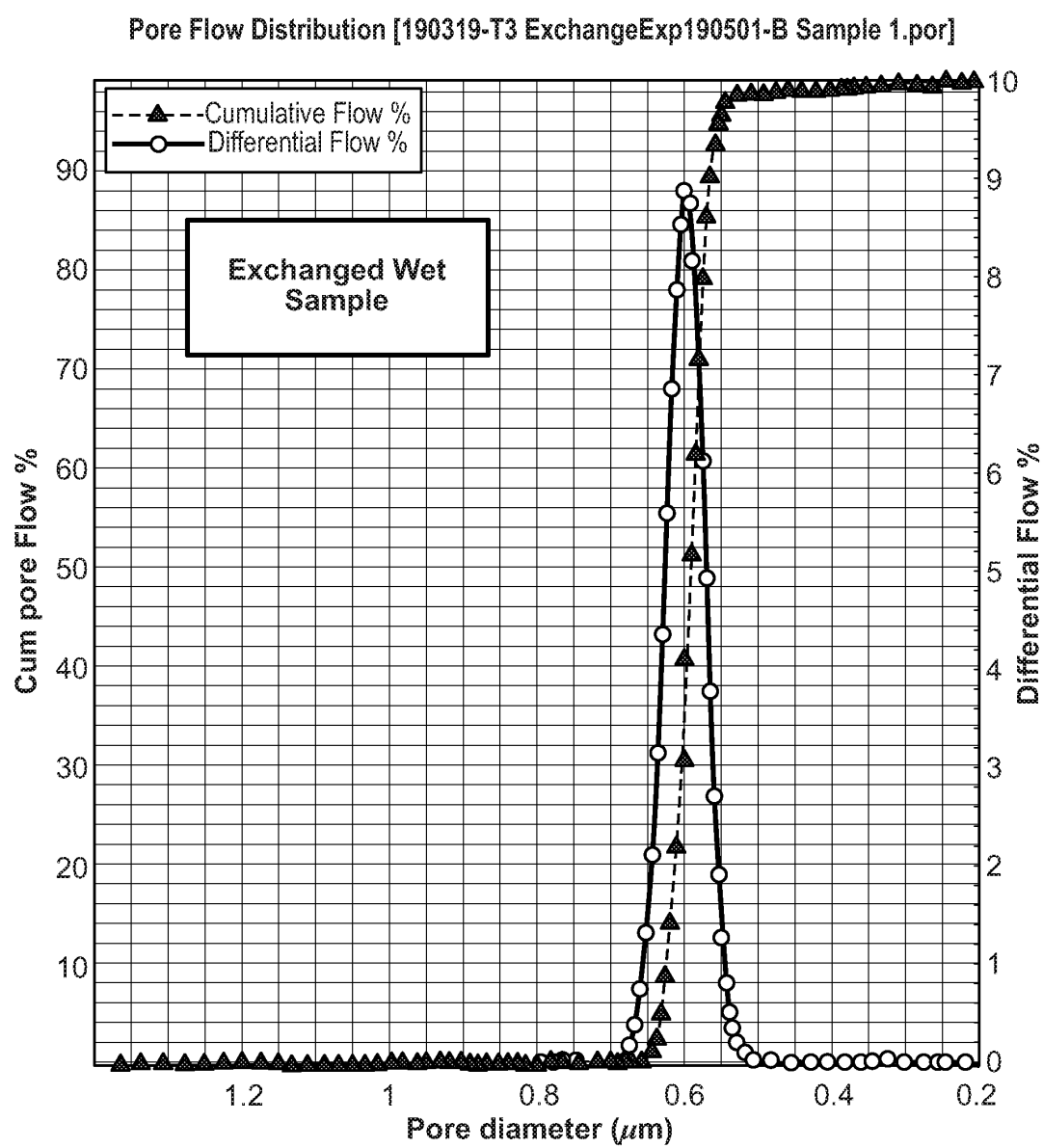


FIG. 9B

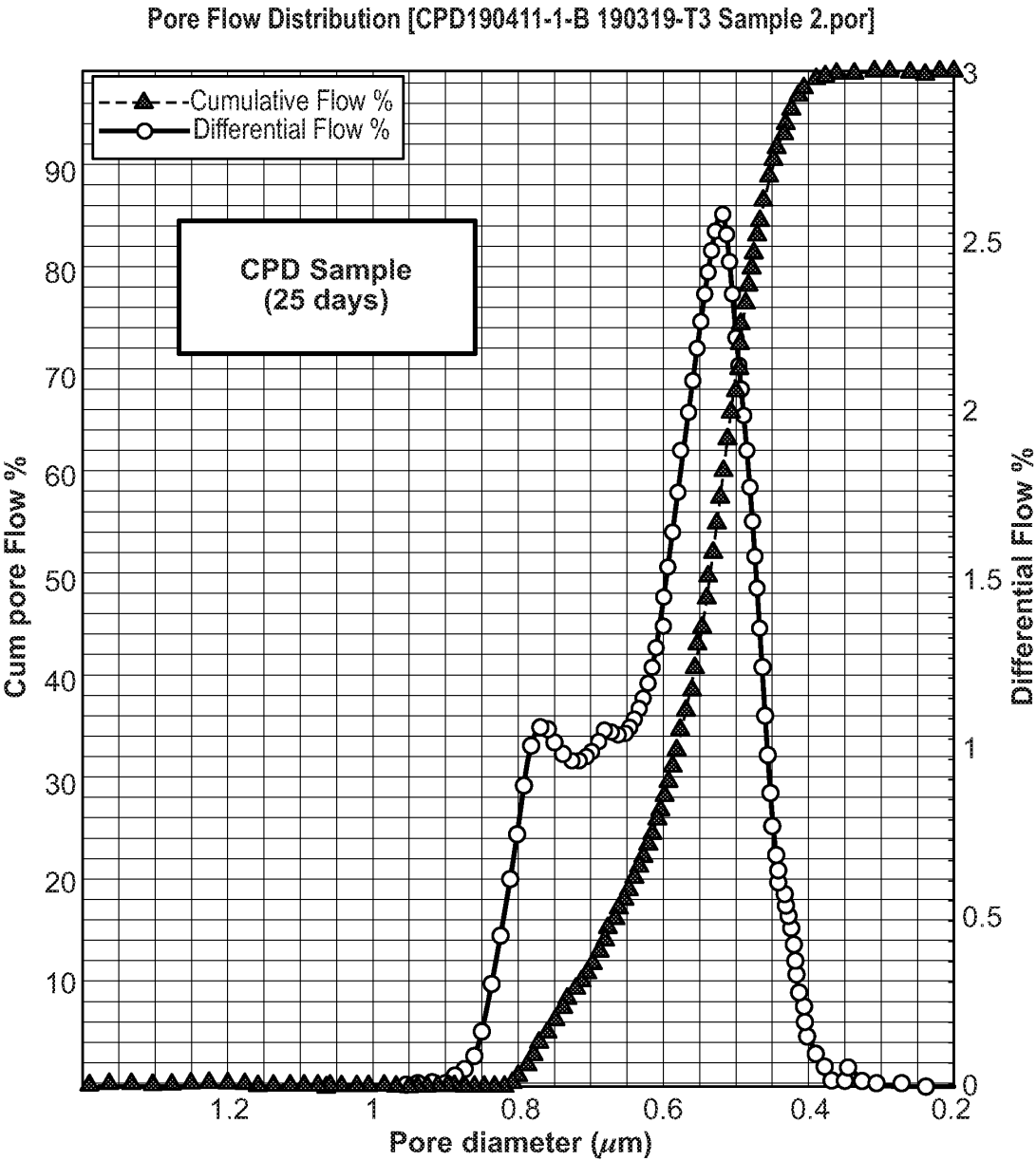


FIG. 9C

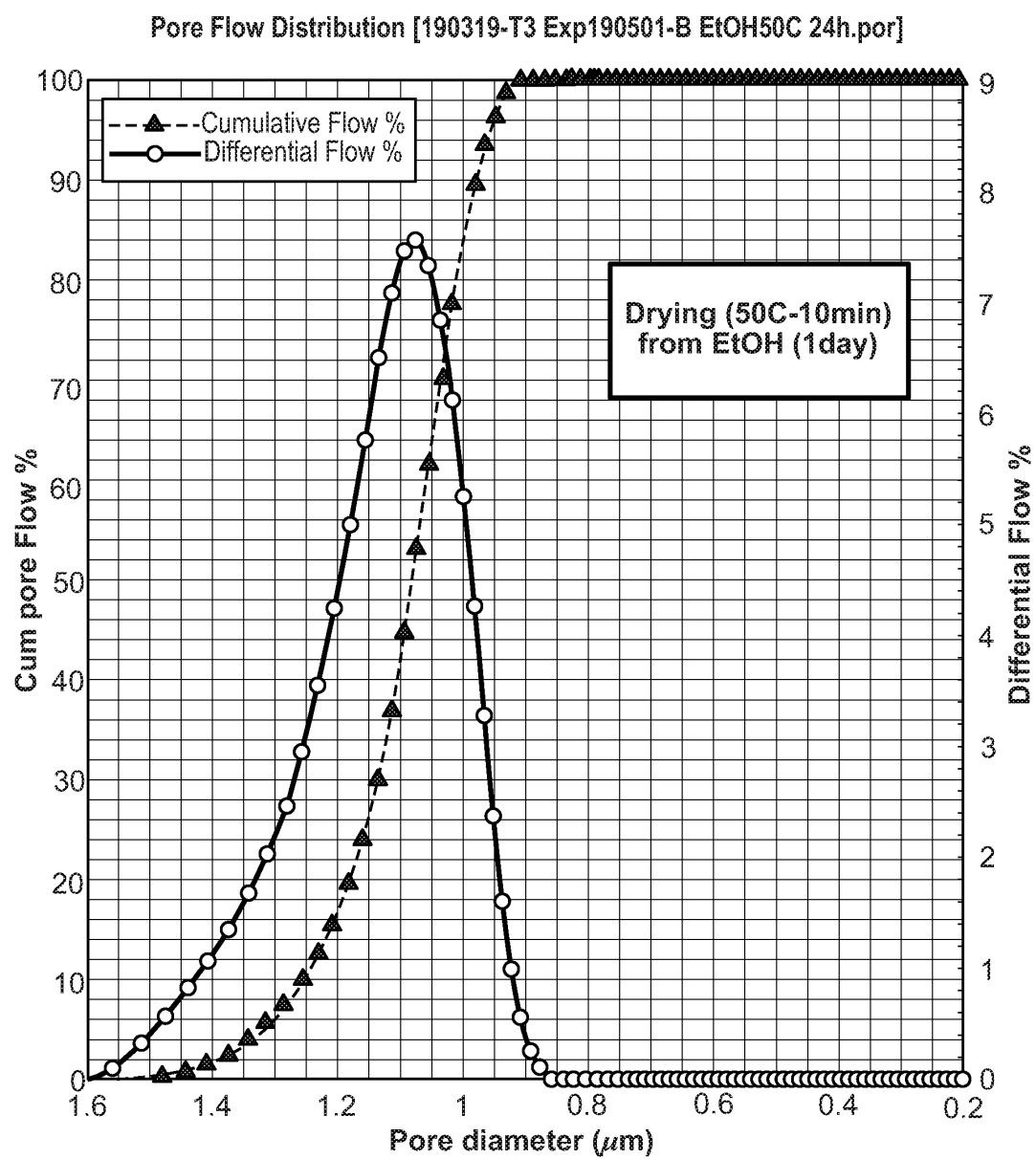


FIG. 9D

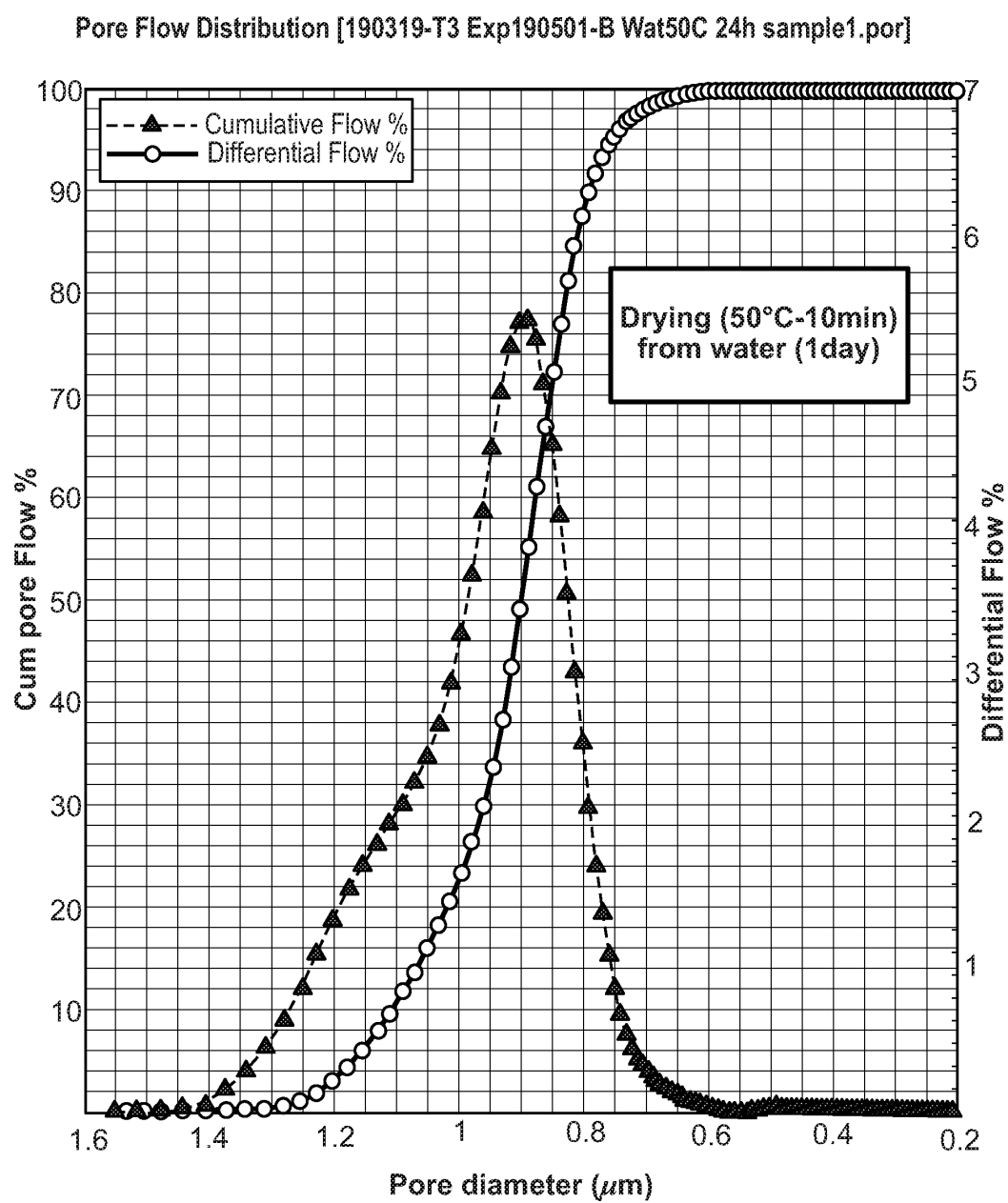


FIG. 10A

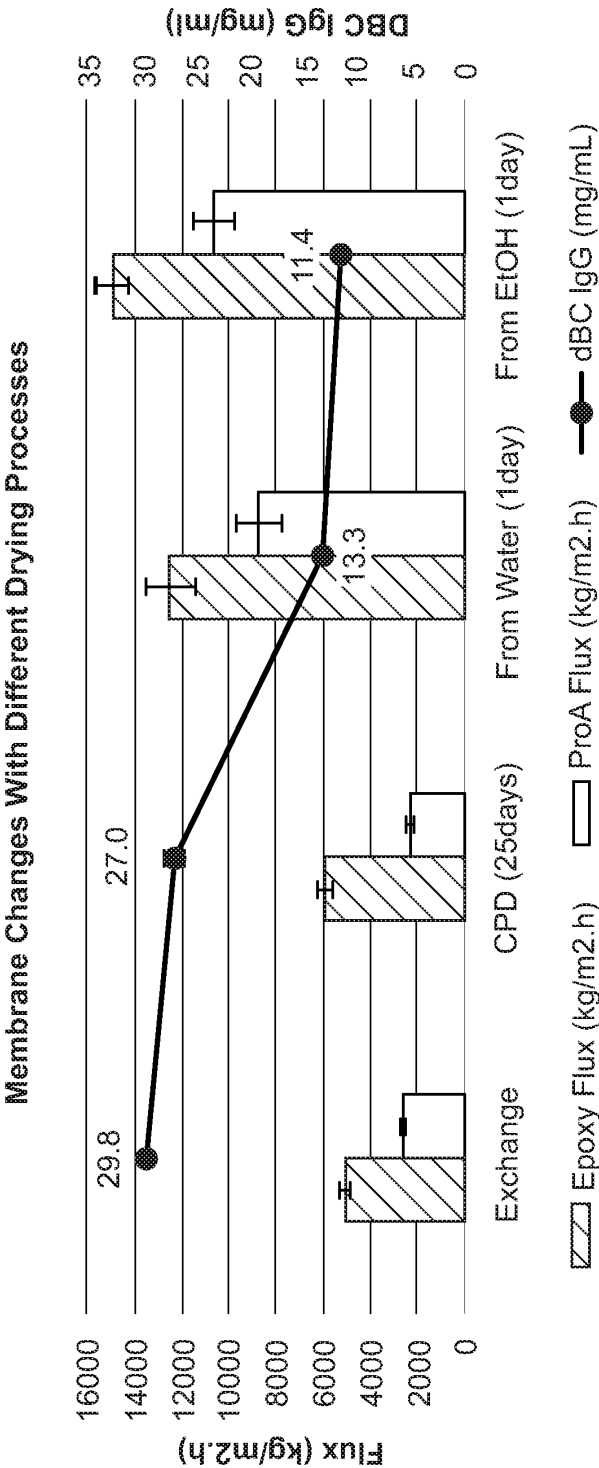


FIG. 10B

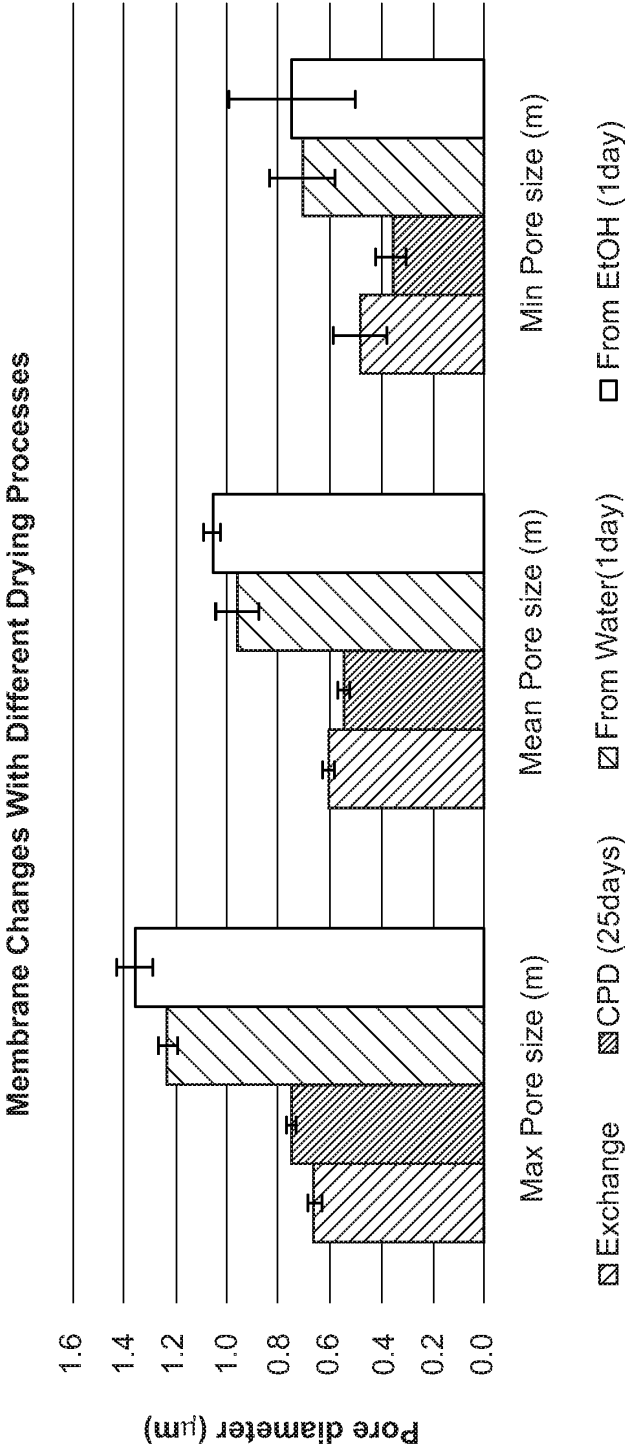


FIG. 11

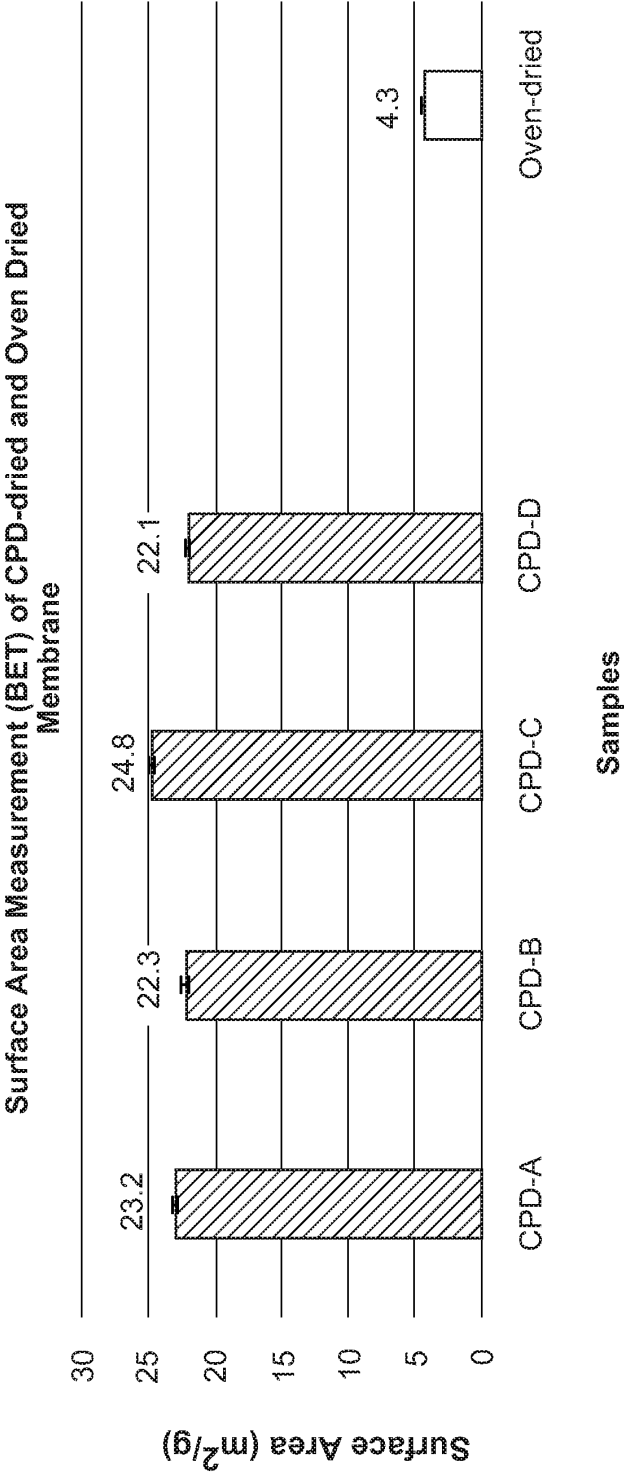


FIG. 12

Table 6. CPD Run Key Parameters and Related Membrane Alcohol Extraction Volume

CPD Program	Stirrer	CO ₂ IN			CO ₂ Exchange		CO ₂ Out		Cooling Temp	Heating Temp
	Speed %	Speed	Fillers %	Delay (min)	Speed	Cycles	Heat	Speed		
8	100%	Fast	50	5	3	15	Medium	Fast	15°C	35°C
10	100%	Fast	17	5	3	15	Medium	Fast	15°C	34°C

FIG. 13A

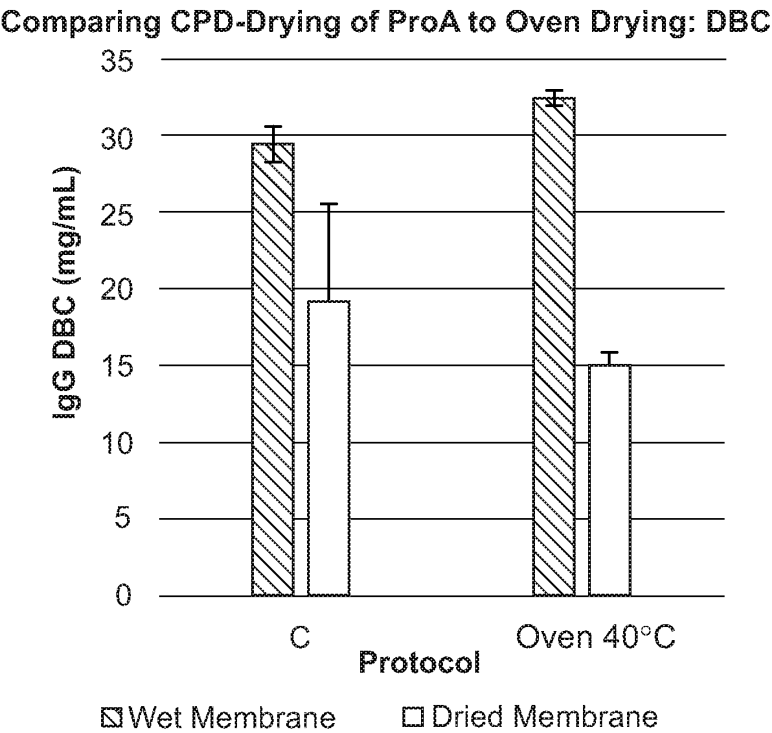


FIG. 13B

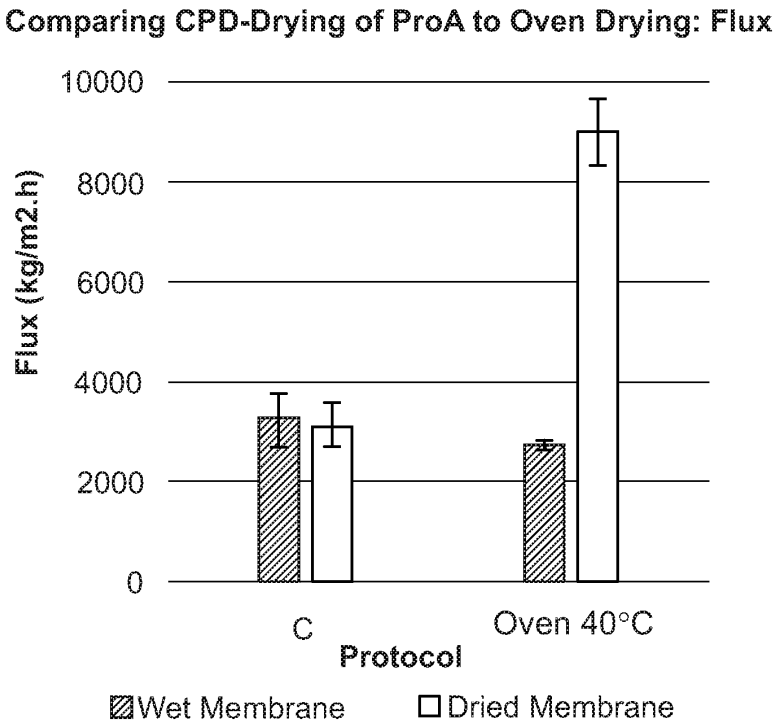


FIG. 14A

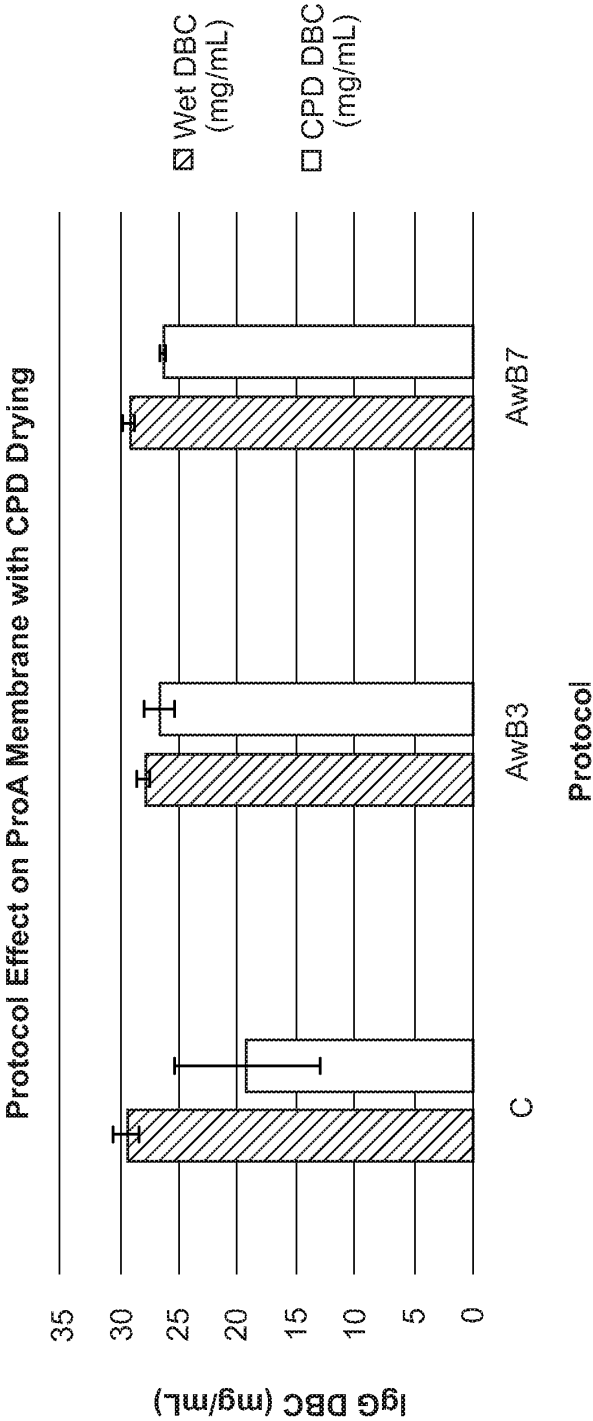


FIG. 14B

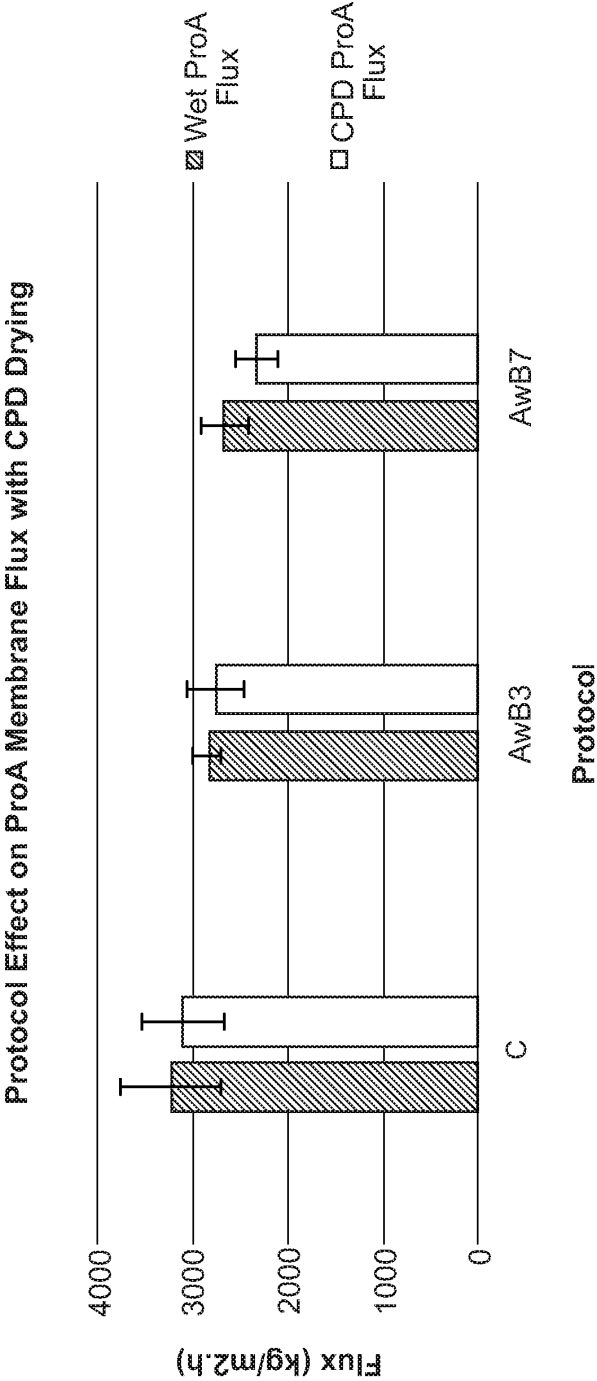


FIG. 15

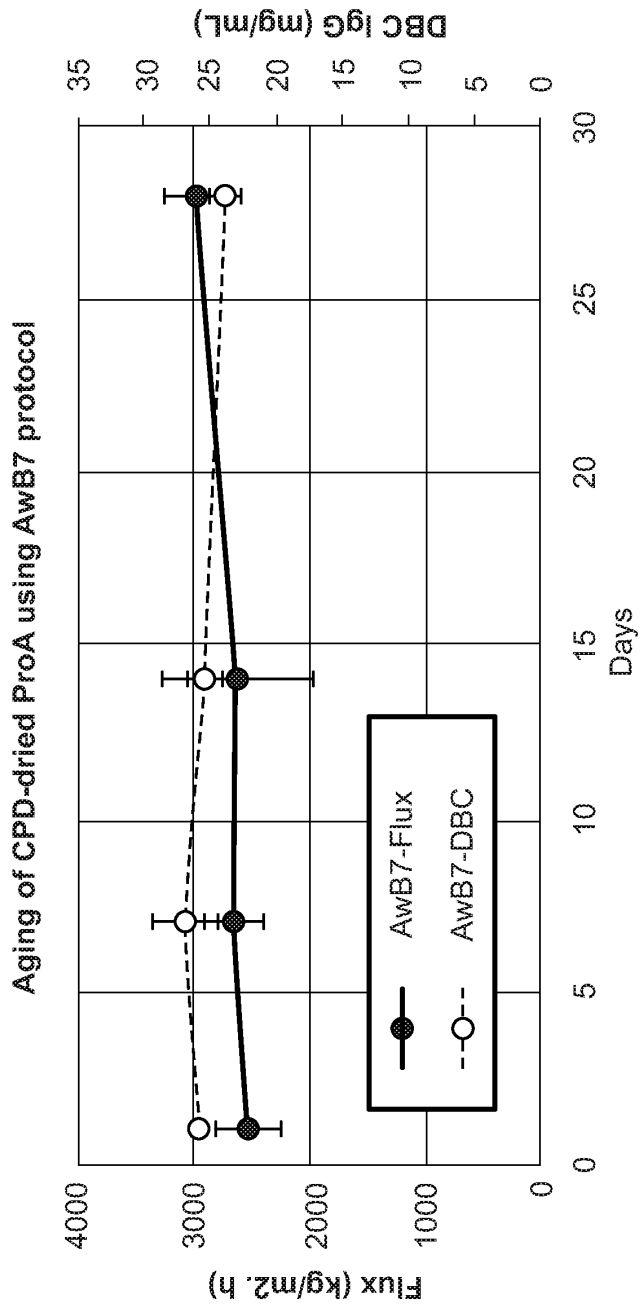


FIG. 16A

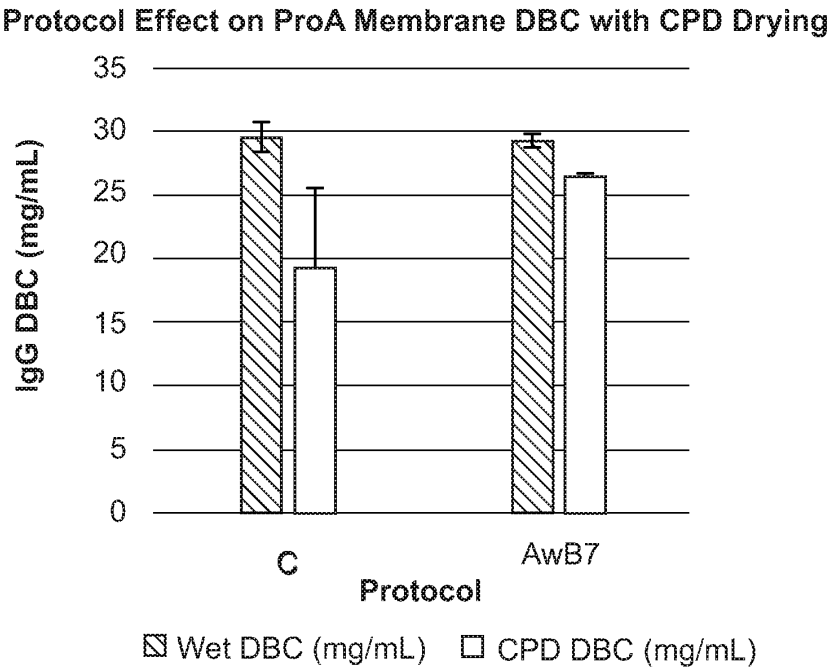


FIG. 16B

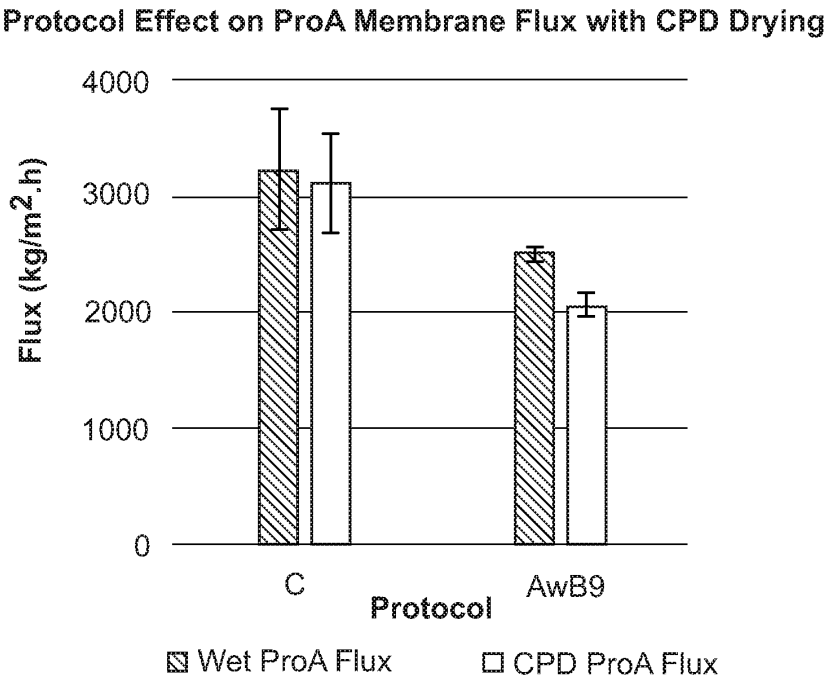


FIG. 17

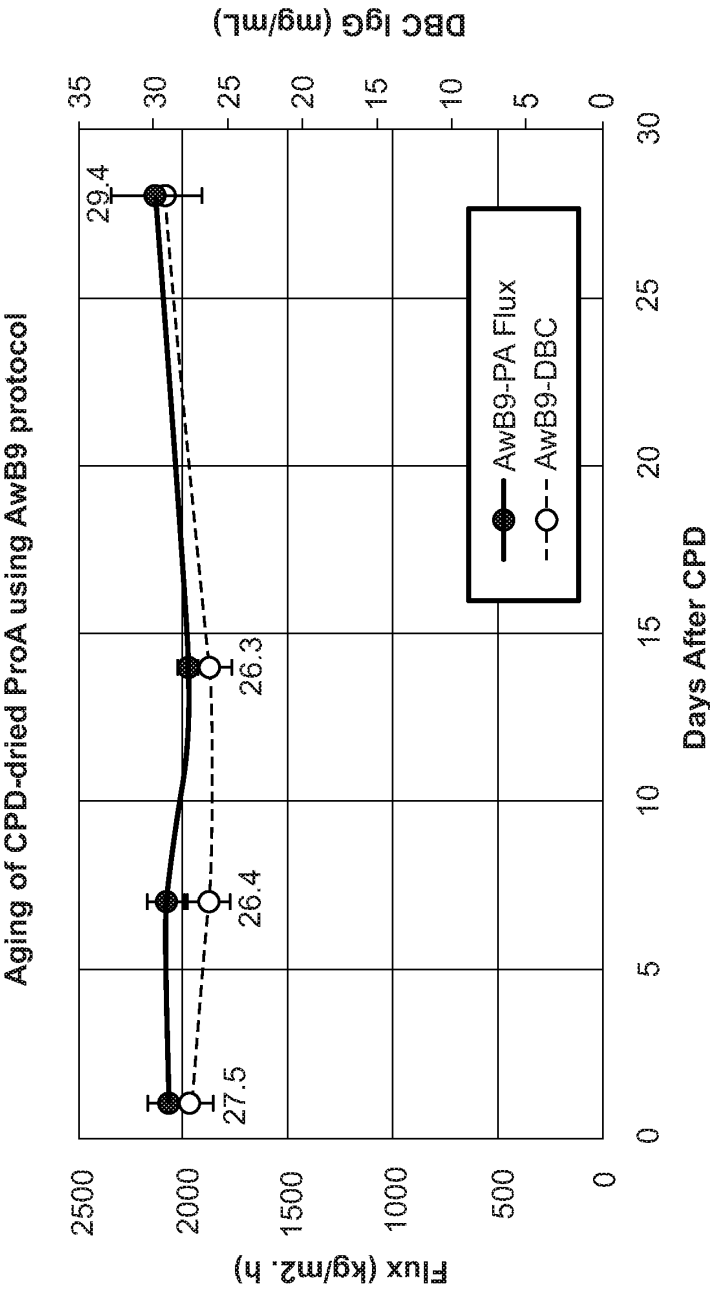


FIG. 18

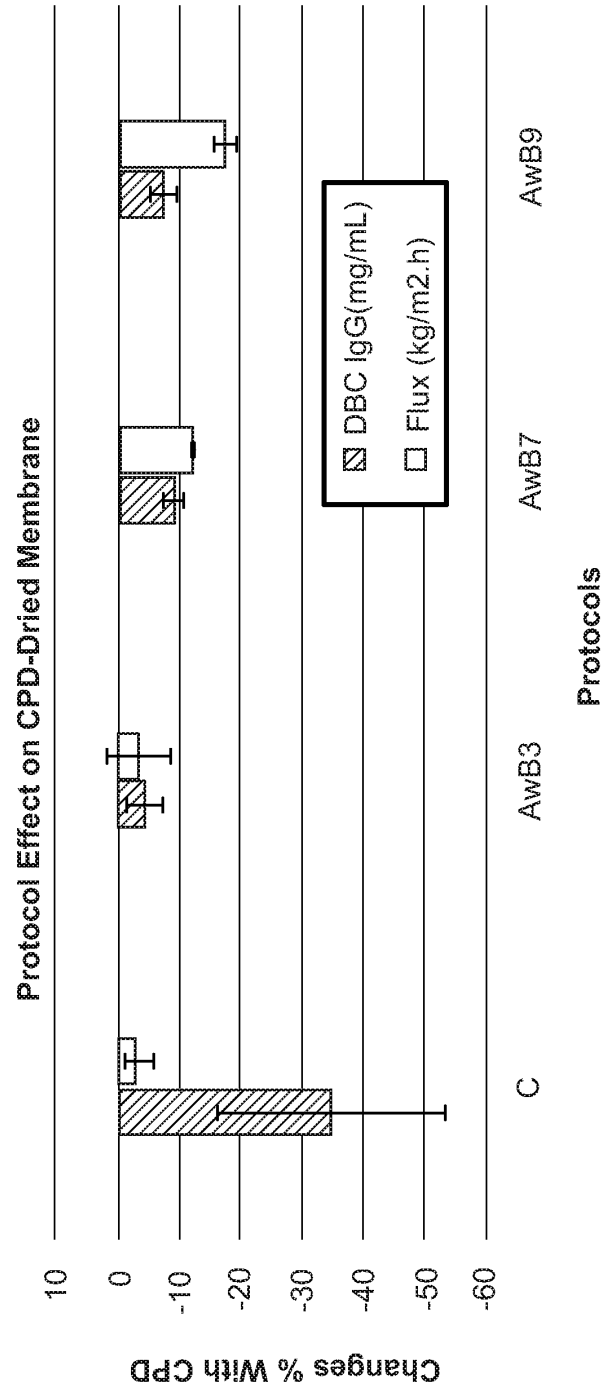
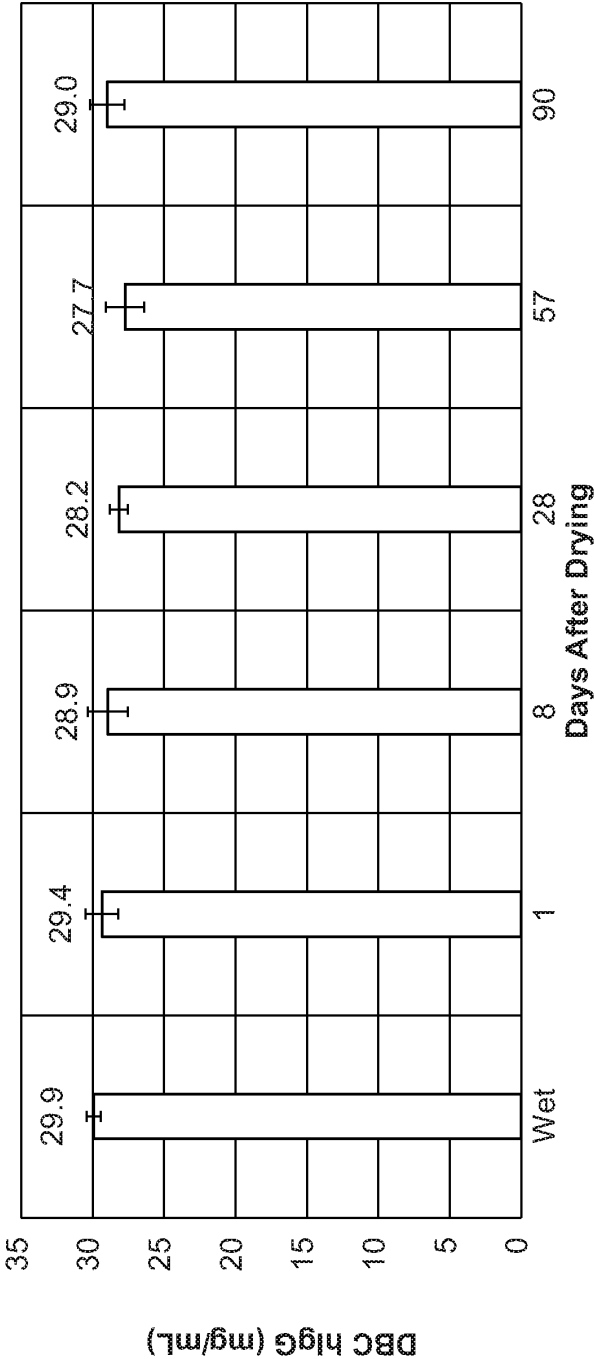


FIG. 19A

Aging Stability of CPD-Dried Protein A Membrane Roll Using Alcohol Exchange Protocol AwB3: DBC



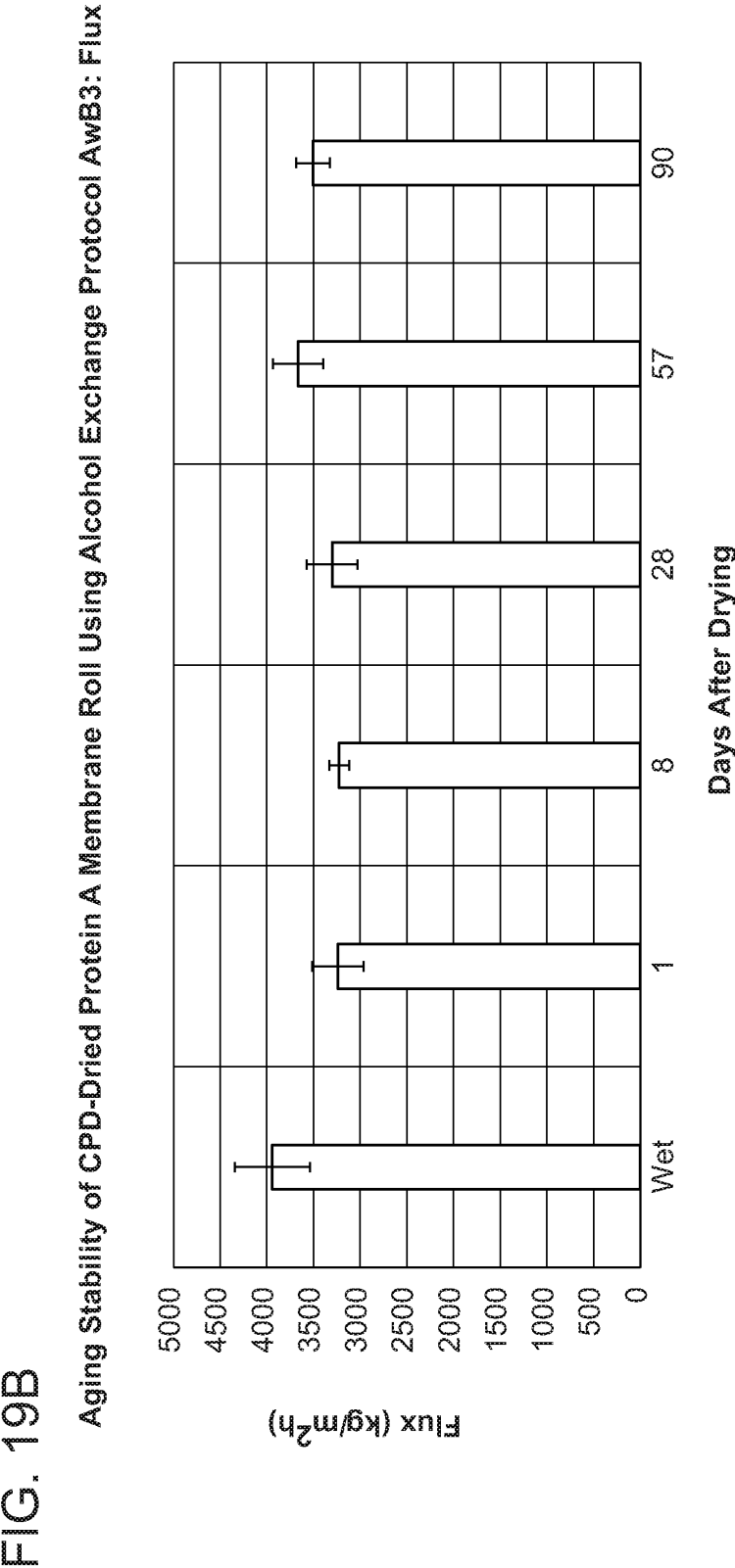


FIG. 20A

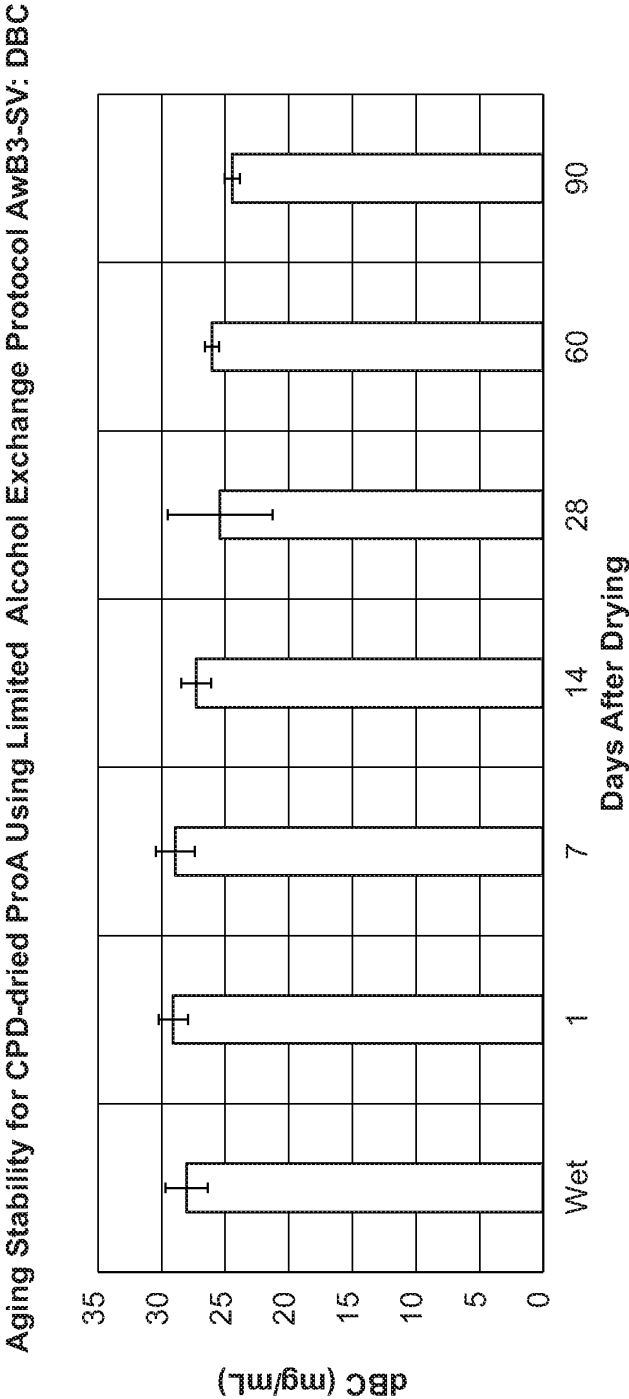


FIG. 20B

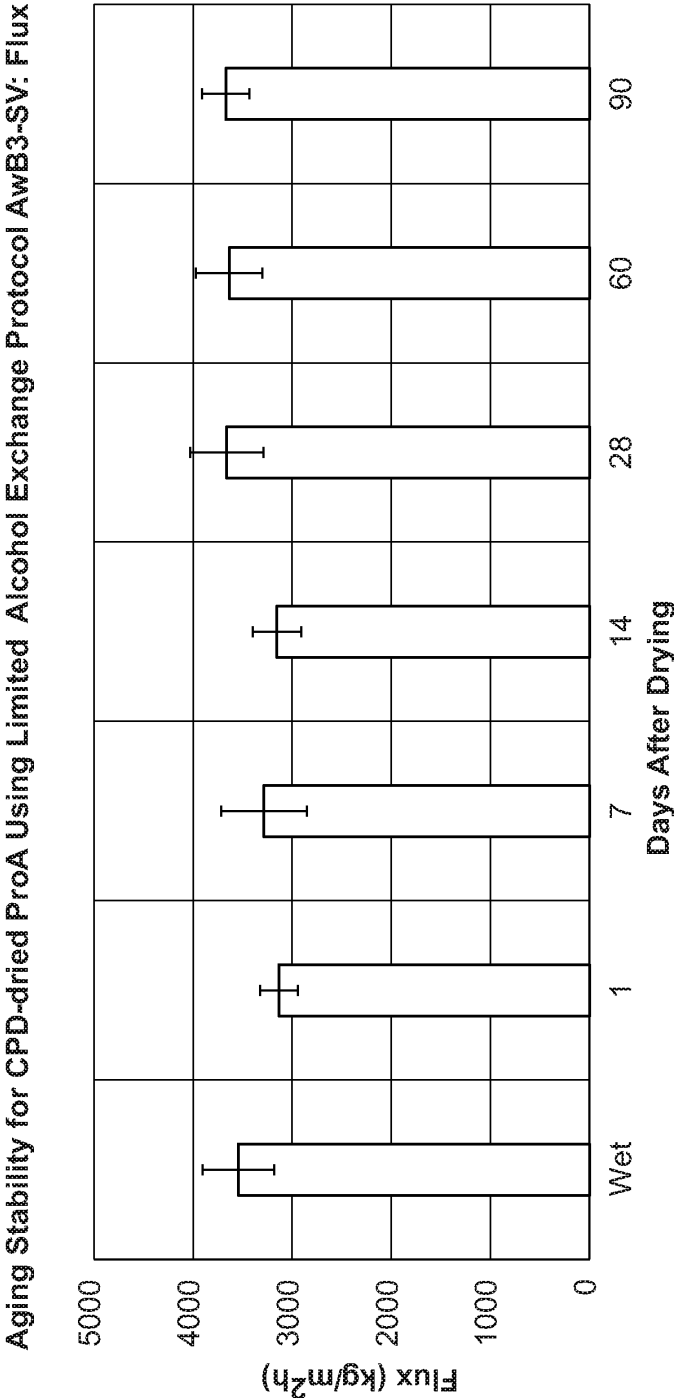


FIG. 21A

Aging Stability for CPD-dried ProA Membrane Exchanged Using Protocol with Biostatic Storage
(1 day in 20% alcohol): DBC

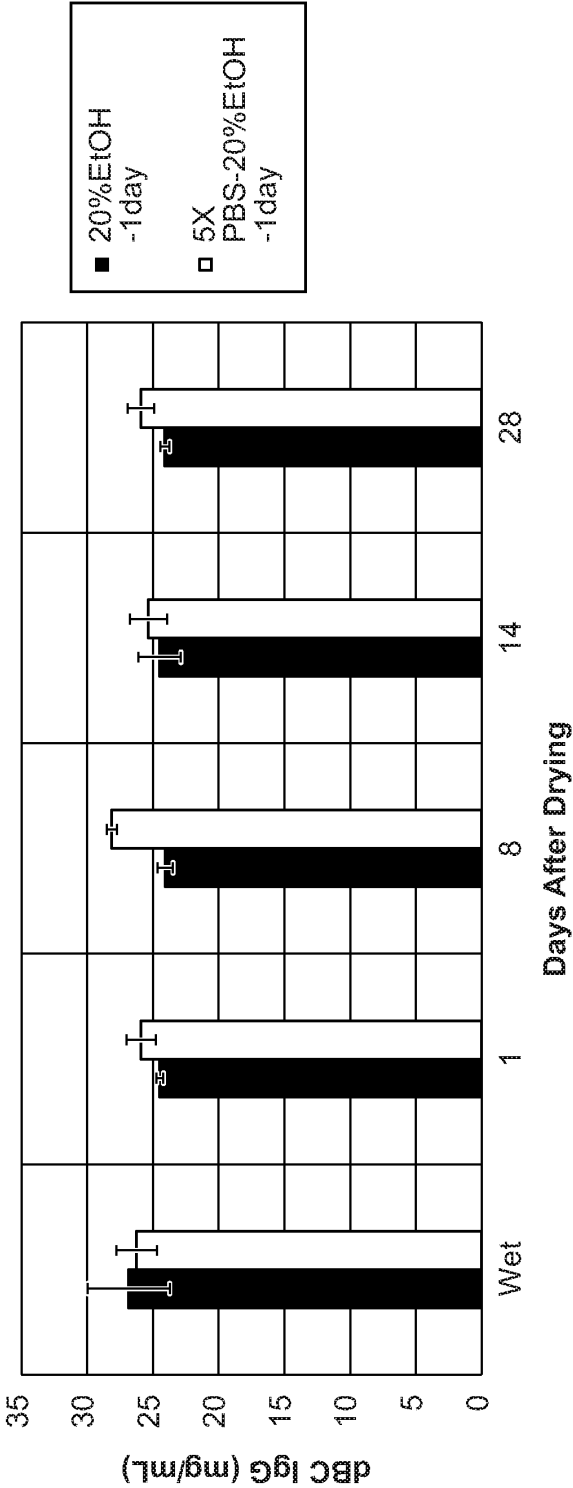


FIG. 21B
Aging Stability for CPD-dried ProA Membrane Exchanged Using Protocol with Biostatic Storage
(1 day in 20% alcohol): Flux

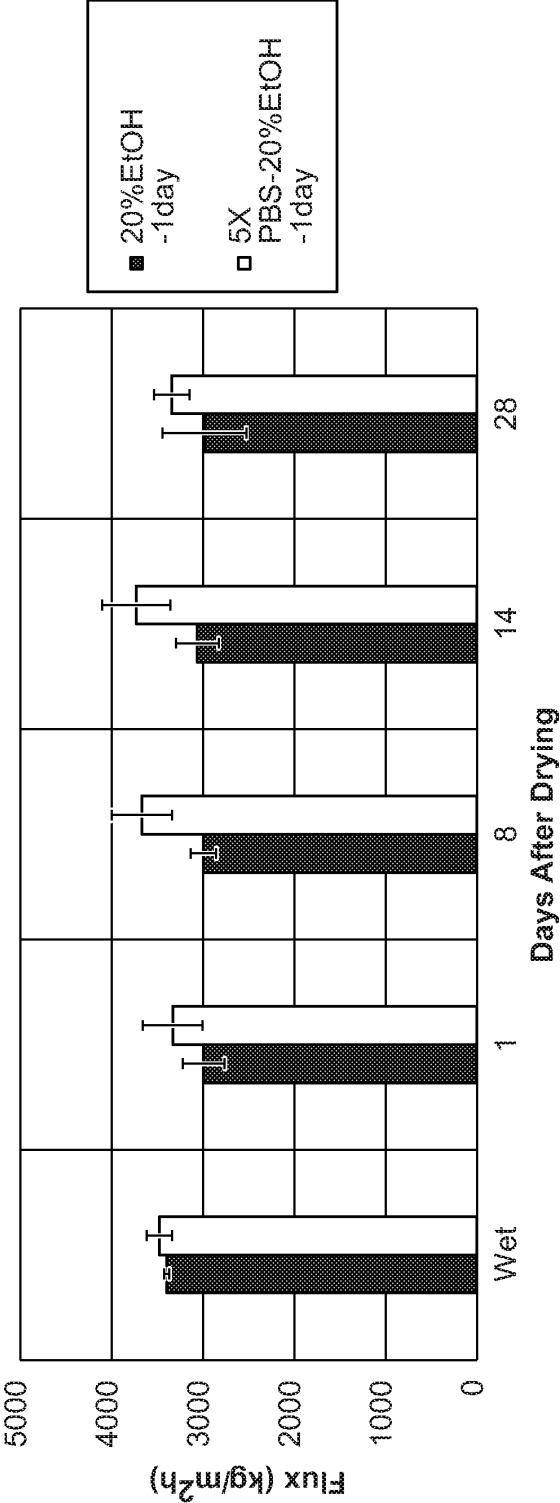


FIG. 22A

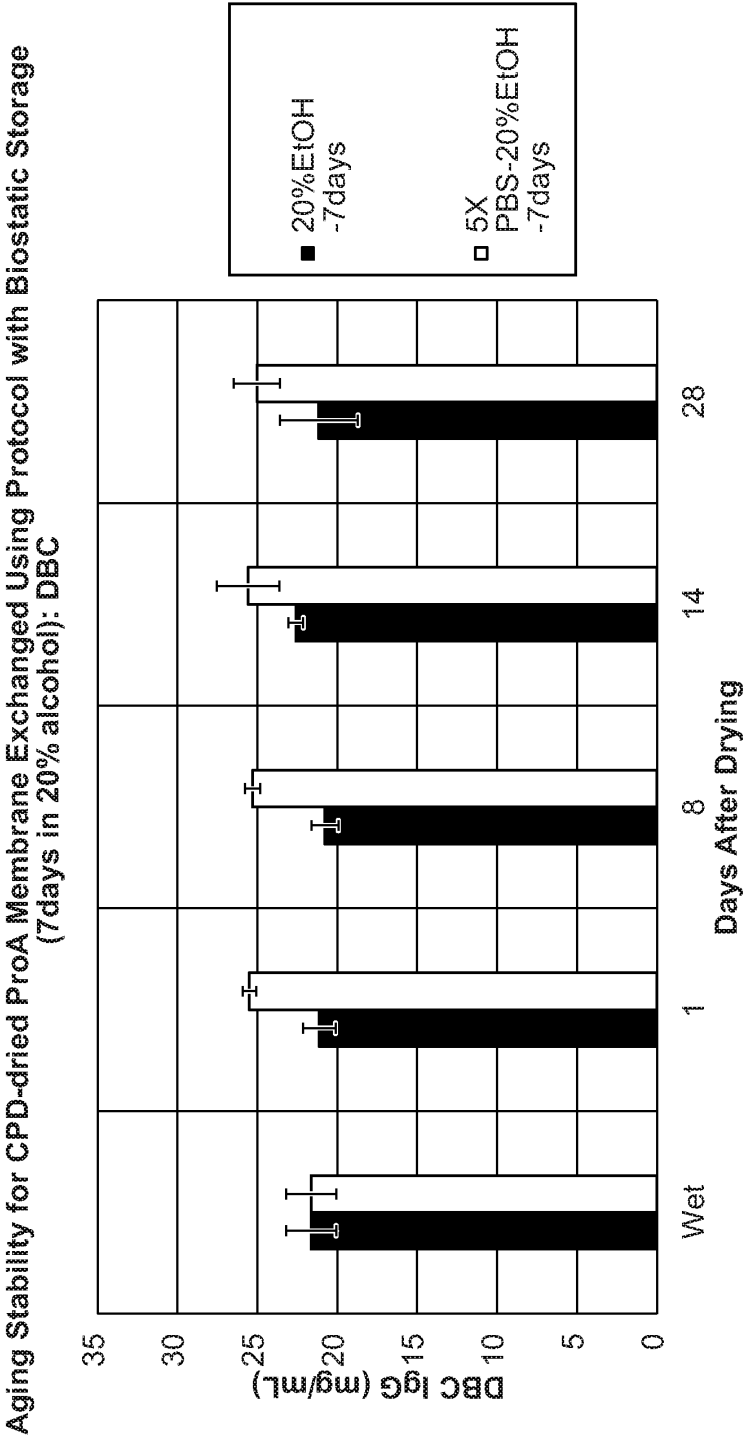


FIG. 22B

Aging Stability for CPD-dried ProA Membrane Exchanged Using Protocol with Biostatic Storage
(7 days in 20% alcohol): Flux

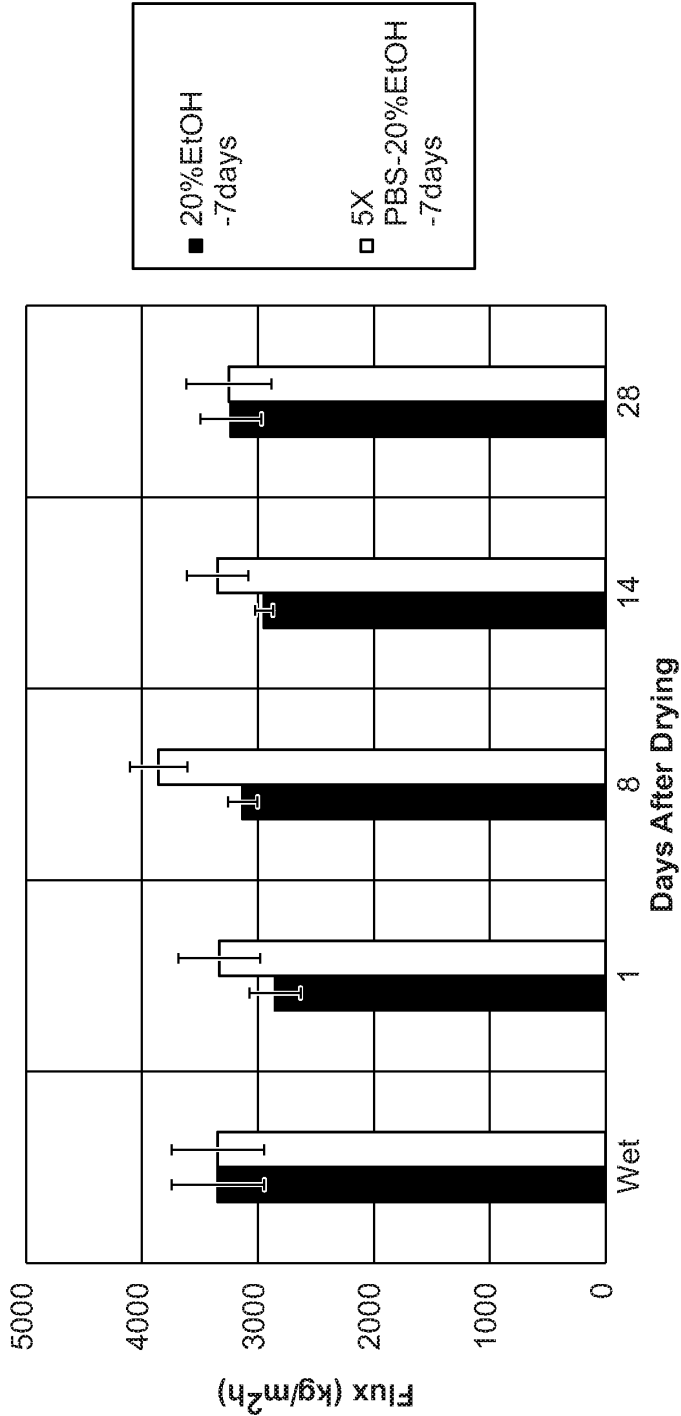


FIG. 23A

Aging Stability for CPD-dried ProA Membrane Exchanged Using Protocol with Biostatic Storage
(7 days in 16% Alcohol in 20mM Phosphate pH7.5)

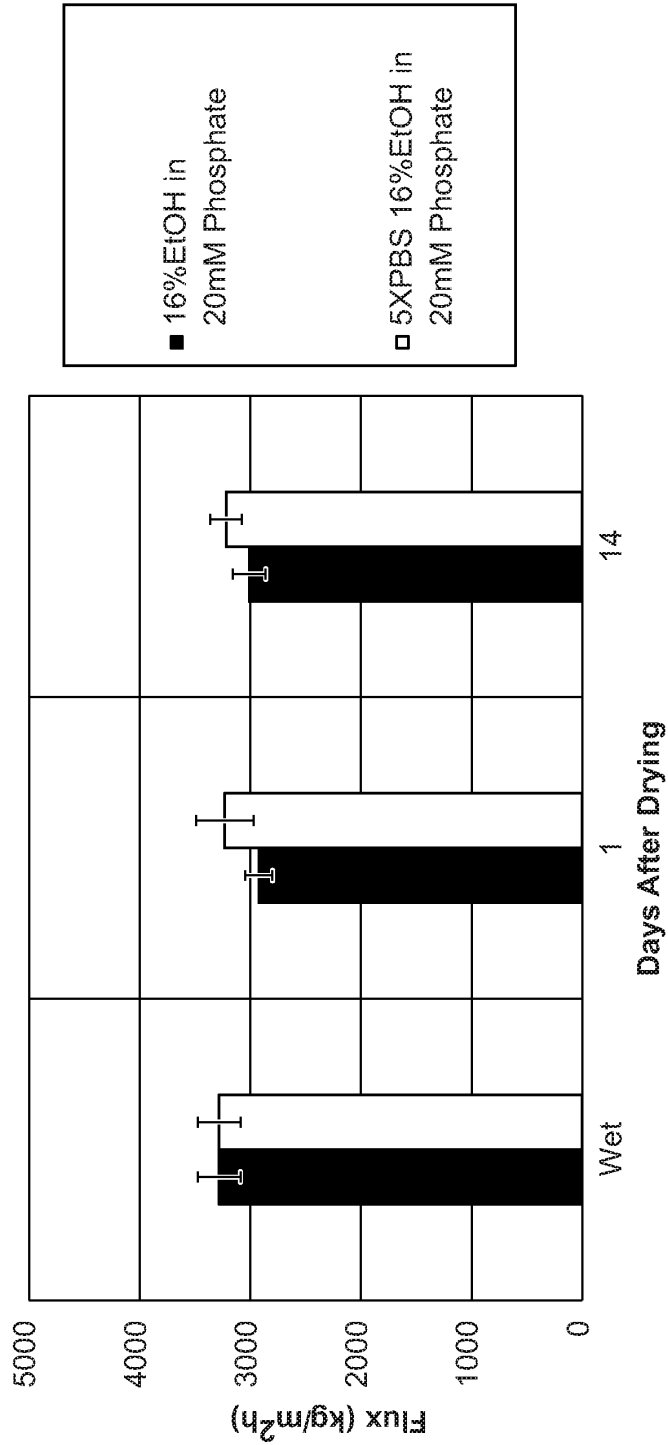


FIG. 23B

Aging Stability for CPD-dried ProA Membrane Exchanged Using Protocol with Biostatic Storage
(7 days in 16% alcohol in 20mM Phosphate pH7.5)

