

MemChannel™ 10 mL and HT-96*

MD1-110/MD1-111

MemChannel™* is rational sparse-matrix screen based on a hand-curated database of ion channel protein crystallization conditions data-mined from the Protein Data Bank.

MD1-110 is presented as 96 x 10 mL conditions./MD-111 is presented as 96 x 1 mL conditions.

The best screen for your ion channel:

- **MemChannel** includes the crystallisation conditions most commonly associated with ion channel proteins.
- Data-mined from approximately 150 ion channel structures found in the pdb.
- Hand-curated database³ to remove false positives and ensure only ion channel crystallisation conditions contributed to screen development.
- From the laboratory of **MemGold™** developer, Prof. Simon Newstead.

Introduction

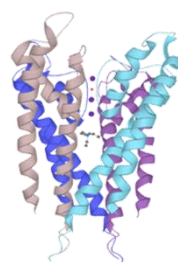
Our popular MemGold™ (1) and MemGold™ II (1,2) screens have enabled the crystallization of many membrane protein structures. The developer of those screens, Prof. Simon Newstead of Oxford University, has continued to maintain his hand-curated database (3) of α -helical membrane protein structures and their crystallization conditions.

Today, the dataset (3) is sufficiently large that it is possible not just to identify the most common crystallisation conditions for membrane proteins in general, but also to analyse the differences in growth conditions between functionally-related sub-groups in a statistically robust manner. This has resulted in the development of a new generation of screens from Prof. Newstead that

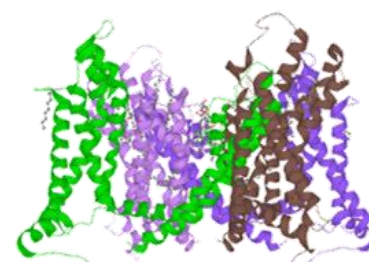
target important groups of α -helical membrane proteins.

MemChannel contains the most commonly occurring conditions for crystallising ion channel proteins found in the protein database, thus maximising your chance of crystallising a member of this large and therapeutically important group of membrane proteins.

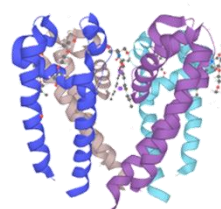
Examples of structures solved from crystals grown in conditions similar to those in MemChannel include:



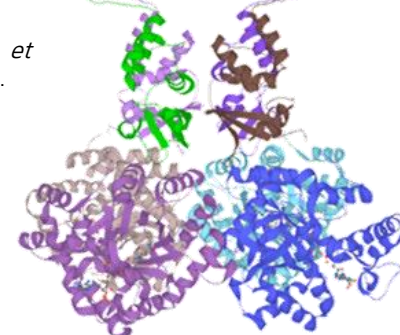
1JVM: KcSA Potassium channel. Morais-Cabral, JH *et al.* *Nature* **414**: 37 (2001).



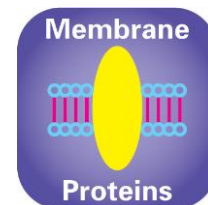
(Above) 5WIE: Voltage-gated potassium channel. Pau, V. *et al.* *NSMB* **24**: 857 (2017).



4P30: Voltage-gated Sodium channel. Bagnéris, C *et al.* *PNAS* **111**: 8428 (2014).



(Left) 5BN2: Aquaporin. Fischer, G. *et al.* To be published.



Formulation Notes:

MemChannel™ reagents are formulated using ultrapure water (>18.0 MΩ) and are sterile-filtered using 0.22 μm filters. No preservatives are added.

Final pH may vary from that specified on the datasheet. Molecular Dimensions will be happy to discuss the precise formulation of individual reagents.

Individual reagents and stock solutions for optimization are available from Molecular Dimensions.

Enquiries regarding MemChannel™ formulation, interpretation of results or optimization strategies are welcome. Please e-mail, fax or phone your query to Molecular Dimensions.

Contact and product details can be found at www.moleculardimensions.com.

References.

- (1) Newstead, S., Ferrandon, S., Iwata, S. Rationalizing alpha-helical membrane protein crystallization. *Protein Science* **17**: 466-472 (2008).
- (2) Parker, J. and Newstead, S. Current trends in alpha helical membrane protein crystallisation: an up-date. *Protein Science* **21**: 1358-1365 (2012).
- (3) Parker, JL and Newstead, S. Membrane protein crystallisation: current trends and future perspectives. *Adv. Exp. Med. Biol.* **922**: 61-72 (2016).

Abbreviations

ADA; 2-[(2-amino-2-oxoethyl)-(carboxymethyl)amino]acetic acid, **BICINE**; N,N-Bis(2-hydroxyethyl)glycine, **Bis-Tris**; 2-[Bis(2-hydroxyethyl)amino]-2-(hydroxymethyl)propane-1,3-diol, **CHES**; 2-(Cyclohexylamino)ethanesulfonic acid, **HEPES**; N-(2-hydroxyethyl)-piperazine-N'-2-ethanesulfonic acid, **MES**; 2-(N-morpholino)ethanesulfonic acid, **MME**; Monomethylether, **MOPS**; 3-Morpholinopropane-1-sulfonic acid, **PEG**; Polyethylene glycol, **Tris**; 2-Amino-2-(hydroxymethyl)propane-1,3-diol.

Images produced using LiteMol from the European Bioinformatics Institute and available to download from GitHub.

Manufacturer's safety data sheets are available from our website: moldim.com/memchannel-msds

RE-ORDERING INFORMATION

	Pack Size	Description
MD1-110	96 x 10 mL	MemChannel
MD1-111	96 x 1 mL	MemChannel HT-96
Eco Screens		
MD1-110-ECO	96 x 10 mL	MemChannel ECO
MD1-111-ECO	96 x 1 mL	MemChannel ECO HT-96
Single Reagents		
MDSR-110-tube number	100 mL	MemChannel single reagents
MDSR-110-ECO-tube number	100 mL	MemChannel ECO single reagents
MDSR-111-well number	100 mL	MemChannel HT-96 single reagents
MDSR-111-ECO-well number	100 mL	MemChannel ECO HT-96 single reagents

For MemChannel™ stock solutions please visit the Optimization section on our website

*Developed by Prof. Simon Newstead and Dr Joanne Parker of Oxford University and exclusively licensed to Molecular Dimensions Ltd by Oxford University Innovation.

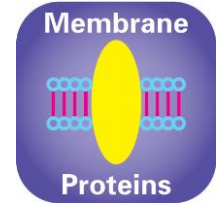


**Molecular
Dimensions**

**MemChannel™
MemChannel™HT-96**

**MD1-110 (Box 1)
MD1-111**

**Conditions 1-48
Conditions A1-D12**



Well #	Tube #	Conc.	Salt 1	Conc.	Salt 2	Conc.	Buffer	pH	Conc.	Precipitant 1	Conc.	Precipitant 2	Conc.	Precipitant 3
A1	1-1	0.05 M	Lithium phosphate			0.025 M	Sodium acetate	5	23 % v/v	PEG 300				
A2	1-2	0.3 M	Potassium thiocyanate			0.1 M	CHES	9.0	15 % w/v	PEG 3350				
A3	1-3	0.1 M	Sodium chloride			0.05 M	HEPES	7.5	25 % v/v	PEG 400				
A4	1-4	1 M	Sodium chloride			0.05 M	Sodium citrate	6.0	32 % v/v	PEG 400				
A5	1-5	0.1 M	Potassium chloride			0.1 M	Tris	8.0	30 % v/v	PEG 400				
A6	1-6	0.2 M	Magnesium chloride hexahydrate			0.05 M	MES	6.5	6 % w/v	PEG 4000				
A7	1-7	0.2 M	Potassium nitrate			0.1 M	MES	6.5	17 % w/v	PEG 3350				
A8	1-8					0.1 M	SPG	8.1	20 % w/v	PEG 1500				
A9	1-9	0.1 M	Sodium chloride	0.1 M	Magnesium chloride hexahydrate	0.1 M	HEPES	7.5	20 % v/v	Pentaerythritol ethoxylate (15/4 EO/OH)				
A10	1-10	0.2 M	Zinc sulfate heptahydrate			0.05 M	Sodium acetate	4.4	15 % w/v	PEG 4000				
A11	1-11	0.4 M	Sodium thiocyanate			0.1 M	Sodium acetate	4.0	8 % w/v	PEG 4000				
A12	1-12					0.05 M	Sodium citrate	5.6	10 % w/v	PEG 2000				
B1	1-13	0.1 M	Ammonium sulfate			0.1 M	HEPES	7.5	22 % v/v	PEG 400				
B2	1-14					0.1 M	MES	6.5	15 % w/v	PEG 2000 MME				
B3	1-15	0.2 M	Ammonium phosphate monobasic			0.1 M	Bis-Tris	6.7	20 % w/v	PEG 1500				
B4	1-16	0.2 M	Ammonium chloride			0.05 M	MOPS	7.5	17 % w/v	PEG 2000 MME				
B5	1-17	0.01 M	Magnesium chloride hexahydrate	0.045 M	Magnesium acetate tetrahydrate	0.08 M	HEPES	7.5	20 % v/v	PEG 400	2.5 % w/v	PEG 4000	2.5 % w/v	PEG 8000
B6	1-18	0.2 M	Sodium malonate dibasic monohydrate			0.1 M	HEPES	7	20 % w/v	PEG 2000 MME				
B7	1-19	0.2 M	Ammonium sulfate			0.05 M	Bis-Tris	6.7	25 % v/v	PEG 400				
B8	1-20	0.05 M	Nickel(II) sulfate hexahydrate			0.05 M	Tris	8.8	30 % v/v	PEG 400				
B9	1-21	0.2 M	Ammonium sulfate	0.02 M	Sodium chloride	0.1 M	Sodium citrate	3.7	19 % v/v	PEG 400				
B10	1-22	0.075 M	Magnesium acetate tetrahydrate			0.1 M	Tris	8.5	22 % w/v	PEG 1500	2 % v/v	MPD		
B11	1-23	0.1 M	Sodium chloride			0.1 M	CHES	9	16 % v/v	PEG 600				
B12	1-24	0.1 M	Magnesium chloride hexahydrate			0.1 M	Sodium citrate	5	11 % w/v	PEG 4000				
C1	1-25	0.12 M	Zinc chloride			0.1 M	Potassium citrate	4.0	42 % v/v	PEG 300				
C2	1-26	0.1 M	Calcium chloride dihydrate			0.05 M	Sodium cacodylate	5.5	29 % v/v	PEG 400				
C3	1-27	0.1 M	Magnesium nitrate hexahydrate			0.1 M	Tris	8	15 % w/v	PEG 2000 MME				
C4	1-28	0.2 M	Potassium thiocyanate	0.01 M	Calcium chloride dihydrate	0.1 M	HEPES	7.5	14 % w/v	PEG 4000				
C5	1-29					0.05 M	ADA	7	10 % w/v	PEG 1500	10 % w/v	PEG 1000		
C6	1-30					0.1 M	HEPES	7.0	65 % v/v	MPD				
C7	1-31	0.125 M	Lithium nitrate			0.1 M	Glycine	9.8	45 % v/v	PEG 400				
C8	1-32	0.1 M	Sodium chloride	0.2 M	Ammonium sulfate	0.1 M	Sodium citrate	6	10 % v/v	PEG 400	18 % w/v	PEG 2000		
C9	1-33	0.2 M	Lithium sulfate			0.1 M	MES	6.5	20 % v/v	PEG 400				
C10	1-34	0.27 M	Ammonium sulfate			0.1 M	BICINE	9.0	15 % w/v	PEG 3350				
C11	1-35	0.125 M	Sodium chloride	0.16 M	Lithium sulfate	0.075 M	HEPES	8.0	14 % v/v	PEG 300				
C12	1-36	0.05 M	Sodium citrate tribasic dihydrate	0.05 M	Potassium citrate tribasic monohydrate	0.1 M	ADA	7	12 % v/v	PEG 400				
D1	1-37	0.5 M	Sodium chloride	0.05 M	Calcium chloride dihydrate	0.1 M	MES	6.5	38 % v/v	PEG 400				
D2	1-38	0.05 M	Sodium citrate tribasic dihydrate	0.2 M	Potassium phosphate monobasic	0.08 M	Bis-Tris	6	10 % w/v	PEG 4000				
D3	1-39	0.05 M	Lithium sulfate	0.05 M	Sodium phosphate monobasic	0.08 M	Citrate	4.5	15 % w/v	PEG 1000				
D4	1-40	0.1 M	Potassium phosphate monobasic			0.1 M	ADA	6.5	35 % v/v	PEG 400				
D5	1-41					0.1 M	Succinic acid	7.0	15 % w/v	PEG 3350				
D6	1-42	0.1 M	Sodium sulfate			0.1 M	Tris	8.5	23 % w/v	PEG 10000				
D7	1-43	0.1 M	Lithium sulfate			0.1 M	MOPS	7.5	20 % v/v	PEG 550 MME	10 % w/v	PEG 20000		
D8	1-44	0.3 M	Magnesium chloride hexahydrate			0.1 M	BICINE	9.0	24 % w/v	PEG 2000				
D9	1-45	0.1 M	Sodium chloride	0.05 M	Ammonium formate	0.1 M	Tris	8.5	22 % v/v	PEG 350 MME				
D10	1-46	0.1 M	Calcium chloride dihydrate			0.1 M	HEPES	7.5	5 % w/v	PEG 8000				
D11	1-47	0.05 M	Nickel(II) chloride hexahydrate			0.1 M	Sodium acetate	4.0	12 % w/v	PEG 2000 MME				
D12	1-48	0.05 M	Lithium nitrate			0.1 M	ADA	6.2	26 % v/v	PEG 550 MME				

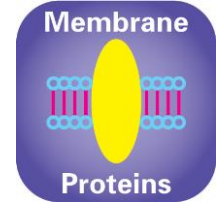


**Molecular
Dimensions**

**MemChannel™
MemChannel™HT-96**

**MD1-110 (Box 2)
MD1-111**

**Conditions 49-96
Conditions E1-H12**



Well #	Tube #	Conc.	Salt 1	Conc.	Salt 2	Conc.	Buffer	pH	Conc.	Precipitant 1	Conc.	Precipitant 2	Conc.	Precipitant 3
E1	2-1	0.1 M	Magnesium chloride hexahydrate			0.1 M	Tris	8.7	36 % v/v	PEG 550 MME				
E2	2-2	0.1 M	Potassium chloride			0.1 M	MES	6.5	36 % v/v	PEG 400				
E3	2-3	0.15 M	Sodium chloride			0.05 M	Sodium citrate	3.7	19 % v/v	PEG 2000 MME	6 % v/v	MPD		
E4	2-4	0.125 M	Ammonium sulfate			0.05 M	ADA	6.5	15 % w/v	PEG 4000				
E5	2-5	0.1 M	Magnesium nitrate hexahydrate			0.1 M	Sodium citrate	5.6	16 % w/v	PEG 1500				
E6	2-6	2 mM	Cadmium chloride hemi(pentahydrate)			0.1 M	HEPES	7	28 % v/v	PEG 400				
E7	2-7	0.34 M	Ammonium sulfate			0.1 M	Sodium citrate	5.6	10 % w/v	PEG 4000				
E8	2-8	0.1 M	Calcium acetate hydrate	0.075 M	Sodium chloride	0.1 M	MOPS	7.0	24 % v/v	PEG 400				
E9	2-9	0.25 M	Magnesium chloride hexahydrate			0.05 M	MOPS	6.5	23 % w/v	PEG 2000				
E10	2-10	0.04 M	Sodium chloride	0.01 M	Calcium chloride dihydrate	0.035 M	Sodium acetate	5.3	20 % v/v	PEG 400				
E11	2-11					0.075 M	HEPES	7.0	20 % v/v	PEG 400	5 % w/v	PEG 4000	2.5 % w/v	PEG 8000
E12	2-12	0.05 M	Magnesium nitrate hexahydrate			0.1 M	Sodium citrate	5.6	20 % v/v	PEG 550 MME				
F1	2-13	0.1 M	Lithium sulfate			0.1 M	Tris	7	31 % w/v	PEG 3350				
F2	2-14	0.4 M	Magnesium acetate tetrahydrate			0.08 M	Tris	8.8	12 % w/v	PEG 4000				
F3	2-15	0.05 M	Lithium nitrate			0.1 M	MES	6	36 % v/v	PEG 600				
F4	2-16	0.1 M	Lithium sulfate			0.1 M	Sodium citrate	5	26 % v/v	PEG 400				
F5	2-17	0.125 M	Calcium chloride dihydrate			0.02 M	Tris	7.4	16 % w/v	PEG 3000				
F6	2-18	0.2 M	Calcium chloride dihydrate			0.1 M	Tris	8	40 % v/v	PEG 400				
F7	2-19	0.04 M	Sodium chloride	0.125 M	Calcium chloride dihydrate	0.035 M	MES	5.5	20 % v/v	PEG 400				
F8	2-20	0.02 M	Magnesium chloride hexahydrate			0.06 M	ADA	7.0	12 % w/v	PEG 1500				
F9	2-21	0.01 M	Nickel(II) chloride hexahydrate			0.05 M	Sodium cacodylate	5.5	42 % v/v	PEG 400				
F10	2-22	0.055 M	Potassium chloride			0.05 M	MOPS	7	11 % w/v	PEG 2000 MME				
F11	2-23	0.075 M	Magnesium chloride hexahydrate			0.1 M	HEPES	8	22 % w/v	PEG 1500				
F12	2-24	0.1 M	Lithium chloride			0.05 M	Glycine	9.5	40 % v/v	PEG 400				
G1	2-25	0.325 M	Sodium acetate trihydrate			0.1 M	Tris	8.0	20 % v/v	PEG 400				
G2	2-26	0.25 M	Ammonium sulfate			0.1 M	MES	5.5	35 % v/v	Pentaerythritol ethoxylate (15/4 EO/OH)				
G3	2-27					0.1 M	Potassium citrate	4	17 % v/v	PEG 400				
G4	2-28	0.07 M	Sodium chloride			0.075 M	Sodium citrate	3.7	23 % v/v	PEG 400				
G5	2-29	0.15 M	Barium chloride dihydrate			0.1 M	HEPES	7	26 % v/v	PEG 400				
G6	2-30	1 M	Ammonium formate			0.1 M	MES	6	25 % v/v	PEG 400				
G7	2-31	0.06 M	Calcium chloride dihydrate	0.06 M	Magnesium chloride hexahydrate	0.075 M	CHES	9	22 % w/v	PEG 4000				
G8	2-32	0.1 M	Magnesium chloride hexahydrate			0.1 M	MES	6.0	28 % v/v	PEG 300				
G9	2-33	0.4 M	Ammonium thiocyanate			0.1 M	Citrate	4.5	10 % w/v	PEG 4000				
G10	2-34	0.18 M	Sodium acetate trihydrate			0.1 M	MES	6.0	12 % v/v	Pentaerythritol ethoxylate (15/4 EO/OH)	27 % v/v	PEG 400		
G11	2-35	0.2 M	Sodium chloride			0.1 M	CHES	9.5	10 % w/v	PEG 8000				
G12	2-36	0.01 M	Magnesium acetate tetrahydrate			0.05 M	Sodium acetate	5.0	23 % v/v	PEG 400				
H1	2-37	0.1 M	Barium chloride dihydrate			0.1 M	Tris	8.5	28 % v/v	PEG 300				
H2	2-38					0.05 M	Sodium citrate	5	25 % w/v	PEG 2000 MME				
H3	2-39	0.275 M	Sodium chloride			0.1 M	HEPES	7	25 % v/v	PEG 400				
H4	2-40	0.15 M	Sodium sulfate			0.1 M	Tris	7.0	27 % v/v	PEG 400				
H5	2-41					0.1 M	Sodium cacodylate	6.5	22 % w/v	PEG 1500				
H6	2-42	1 mM	Cadmium chloride hemi(pentahydrate)			0.1 M	Glycine	9.5	60 % v/v	MPD				
H7	2-43					0.05 M	Tris	8.5	27 % v/v	PEG 400				
H8	2-44	0.25 M	Potassium acetate			0.1 M	Tris	8.0	22 % v/v	PEG 300				
H9	2-45	0.125 M	Magnesium chloride hexahydrate			0.1 M	MES	6	14 % w/v	PEG 2000 MME				
H10	2-46	0.4 M	Sodium chloride			0.05 M	Tris	8.0	26 % v/v	PEG 600				
H11	2-47	0.2 M	Ammonium acetate	0.1 M	Sodium chloride	0.1 M	Bis-Tris	6	12 % w/v	PEG 4000				
H12	2-48					0.09 M	Sodium citrate	5.6	30 % v/v	PEG 400				