Molecular Dimensions

Membrane Proteins

MemTrans™ 10 mL, HT-96 and FX-96 pre-filled plate*
MD1-112/MD1-113/MD1-113-FX

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

MD1-112 is presented as 96 x 10 mL conditions./MD1-113 is presented as 96 x 1 mL conditions./MD1-113-FX is presented as 96 x 100 µL

Improve the likelihood of crystallizing your transporter protein:

- Data-mined from approximately 150 transporter protein structures found in the pdb.
- **MemTrans** includes the crystallization conditions most commonly associated with transporter proteins.
- From the laboratory of **MemGold**™ developer, Prof. Simon Newstead.
- Hand-curated database[3] to remove false positives and ensure only transporter protein crystallization conditions contributed to screen development.

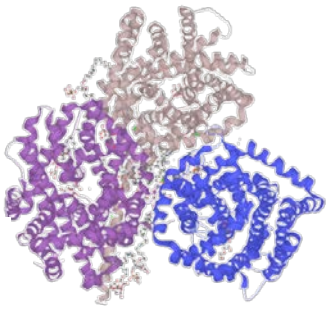
Introduction

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.

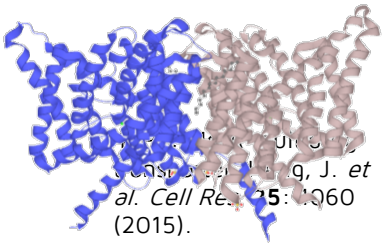
MemTrans, developed by Prof. Simon Newstead and Dr Joanne Parker and exclusively licensed to Molecular Dimensions by Oxford University Innovation, is a rational sparse-matrix screen that has been developed specifically for transporter proteins. It contains the most common crystallization conditions identified for transporter proteins by Prof. Newstead and Dr Parker in their regularly-updated, hand-curated database of α-helical membrane proteins. It gives you the best chance of crystallizing your transporter protein target.

Examples of structures solved from crystals grown in co nditions similar to those in MemTrans include:



4C7R: BetP betaine transporter. Koshy, C. *et al. EMBO J.* **32**: 3096 (2013).

1KPL: ClC *S. typhimuram* Chloride transporter. Dutzler, R., *et al. Nature* **415**: 287 (2002).



[illegible] J. *et al. Cell Re* **25**: 1060 (2015).

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Formulation Notes:

MemTrans™ 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 MemTrans™ 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, **Tris-HCl**; 2-Amino-2-(hydroxymethyl)propane-1,3-diol, hydrochloride.].

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/memtrans-msds

RE-ORDERING INFORMATION

	Pack Size	Description
MD1-112	96 x 10 mL	MemTrans
MD1-113	96 x 1 mL	MemTrans HT-96
MD1-113-FX	96 x 100 µL	MemTrans FX-96 pre-filled plate
Eco Screens		
MD1-112-ECO	96 x 10 mL	MemTrans ECO
MD1-113-ECO	96 x 1 mL	MemTrans ECO HT-96
MD1-113-ECO-FX	96 x 100 µL	MemTrans ECO FX-96 pre-filled plate
Single Reagents		
MDSR-112-tube number	100 mL	MemTrans single reagents
MDSR-112-ECO-tube number	100 mL	MemTrans ECO single reagents
MDSR-113-well number	100 mL	MemTrans HT-96 single reagents
MDSR-113-ECO well number	100 mL	MemTrans HT-96 ECO single reagents

For MemTrans™ 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

MemTrans™
MemTrans™HT-96
MemTrans™ FX-96

MD1–112 (Box 1)
MD1-113
MD1-113-FX

Conditions 1-48
Conditions A1-D12
Conditions A-D12

Membrane Proteins

Well #	Tube #	Conc.		Salt 1	Conc.		Salt 2	Conc.		Buffer	pH	Conc.		Precipitant 1	Conc.		Precipitant 2
A1	1-1	0.4	M	Ammonium thiocyanate	0.1	M	Sodium chloride	0.1	M	Citrate	4.3	10	% w/v	PEG 4000			
A2	1-2	0.1	M	Lithium sulfate				0.1	M	ADA	5.2	26	% v/v	PEG 400			
A3	1-3	0.14	M	Potassium nitrate				0.1	M	MES	7.1	14	% v/v	PEG 3350			
A4	1-4	0.125	M	Sodium chloride	0.04	M	Calcium chloride dihydrate	0.1	M	MES	5.5	22	% v/v	PEG 400			
A5	1-5	0.05	M	Sodium chloride				0.05	M	MES	6.5	30	% v/v	PEG 200			
A6	1-6							0.1	M	Glycine	9	38	% v/v	PEG 350 MME			
A7	1-7	0.06	M	Calcium chloride dihydrate	0.06	M	Magnesium chloride hexahydrate	0.1	M	BICINE	8.5	25	% w/v	PEG 4000			
A8	1-8	0.2	M	Ammonium sulfate	0.02	M	Sodium chloride	0.1	M	Sodium acetate	4	24	% v/v	PEG 400			
A9	1-9	0.2	M	Potassium thiocyanate				0.1	M	Glycine	9	8	% w/v	PEG 3350			
A10	1-10	0.15	M	Sodium sulfate				0.025	M	Tris	7	29	% v/v	PEG 400			
A11	1-11	0.2	M	Sodium chloride				0.05	M	MES	6.2	17	% w/v	PEG 2000 MME			
A12	1-12	0.1	M	Calcium chloride dihydrate				0.05	M	Sodium cacodylate	5.5	29	% v/v	PEG 400			
B1	1-13	0.115	M	Sodium chloride				0.1	M	HEPES	7	18	% v/v	PEG 550 MME			
B2	1-14							0.1	M	Sodium citrate	5.5	10	% w/v	PEG 2000			
B3	1-15							0.1	M	MOPS	7	36	% v/v	PEG 600			
B4	1-16	0.075	M	Potassium citrate tribasic monohydrate				0.1	M	MES	5.5	21	% v/v	PEG 550 MME			
B5	1-17	0.2	M	Ammonium sulfate				0.1	M	Sodium cacodylate	5	24	% v/v	PEG 400			
B6	1-18	0.1	M	Sodium chloride	0.1	M	Magnesium chloride hexahydrate	0.1	M	Sodium citrate	5	12	% w/v	PEG 4000			
B7	1-19	0.225	M	Magnesium chloride hexahydrate				0.1	M	Tris	8.5	20	% w/v	PEG 2000			
B8	1-20	0.2	M	Magnesium chloride hexahydrate				0.05	M	MES	6.5	8	% w/v	PEG 4000			
B9	1-21	0.1	M	Ammonium formate				0.1	M	MES	6.2	25	% v/v	PEG 400			
B10	1-22							0.05	M	Tris	8.7	28	% v/v	PEG 400			
B11	1-23	0.1	M	Sodium chloride				0.05	M	ADA	6.5	25	% v/v	PEG 400			
B12	1-24	0.055	M	Calcium chloride dihydrate	0.04	M	Potassium chloride	0.05	M	MOPS	7	5	% w/v	PEG 2000 MME			
C1	1-25	0.03	M	Sodium acetate trihydrate	0.02	M	Sodium chloride	0.1	M	Tris	8	24	% v/v	PEG 400			
C2	1-26	0.25	M	Magnesium chloride hexahydrate				0.05	M	MES	6.5	23	% w/v	PEG 2000			
C3	1-27	0.06	M	Sodium chloride				0.05	M	Sodium citrate	4.5	24	% v/v	PEG 400			
C4	1-28	0.1	M	Magnesium nitrate hexahydrate				0.05	M	Tris	7	15	% w/v	PEG 2000 MME			
C5	1-29	0.01	M	Manganese(II) chloride tetrahydrate				0.1	M	MES	6.5	30	% v/v	PEG 400			
C6	1-30	0.05	M	Lithium citrate tribasic tetrahydrate				0.05	M	MOPS	6.5	30	% w/v	PEG 1000			
C7	1-31	0.05	M	Lithium phosphate	0.05	M	Lithium sulfate	0.025	M	Sodium acetate	5	32	% v/v	PEG 300			
C8	1-32	0.05	M	Sodium citrate tribasic dihydrate	0.05	M	Potassium citrate tribasic monohydrate	0.05	M	ADA	6.8	25	% v/v	PEG 400			
C9	1-33	0.05	M	Nickel(II) sulfate hexahydrate	0.05	M	Lithium sulfate	0.05	M	Tris	8.5	30	% v/v	PEG 400			
C10	1-34	0.2	M	Sodium chloride				0.1	M	CHES	9.5	10	% w/v	PEG 8000			
C11	1-35	0.05	M	Lithium nitrate				0.1	M	ADA	6.5	30	% v/v	PEG 550 MME			
C12	1-36	0.2	M	Magnesium chloride hexahydrate				0.1	M	MES	6.2	17	% w/v	PEG 2000 MME			
D1	1-37	0.1	M	Magnesium chloride hexahydrate				0.03	M	Tris	8	17	% w/v	PEG 4000			
D2	1-38	0.1	M	Calcium chloride dihydrate				0.1	M	Tris	8.5	28	% v/v	PEG 300			
D3	1-39							0.1	M	MES	6.5	15	% w/v	PEG 2000 MME			
D4	1-40	0.1	M	Sodium chloride	0.1	M	Magnesium chloride hexahydrate	0.1	M	MES	6.2	30	% v/v	PEG 300			
D5	1-41							0.1	M	Potassium citrate	5.4	17	% v/v	PEG 400			
D6	1-42	0.11	M	Lithium sulfate	0.04	M	Sodium phosphate monobasic monohydrate	0.05	M	Citrate	4.3	15	% w/v	PEG 1000			
D7	1-43	0.1	M	Sodium chloride	0.05	M	Calcium chloride dihydrate	0.1	M	MES	6.5	36	% v/v	PEG 400			
D8	1-44	0.12	M	Zinc chloride				0.1	M	Potassium citrate	4.2	40	% v/v	PEG 300			
D9	1-45	0.1	M	Lithium nitrate				0.1	M	Glycine	9.5	45	% v/v	PEG 400			
D10	1-46	0.06	M	Sodium citrate tribasic dihydrate	0.05	M	Sodium chloride	0.05	M	HEPES	8	28	% v/v	PEG 550 MME			
D11	1-47	0.1	M	Calcium acetate hydrate	0.02	M	Lithium sulfate	0.1	M	Tris-HCl	7.2	32	% v/v	PEG 400			
D12	1-48	0.01	M	Praseodymium(III) acetate hydrate	0.05	M	Magnesium acetate tetrahydrate	0.05	M	Sodium acetate	5.8	25	% v/v	PEG 400			

Molecular Dimensions

MemTrans™ **MD1–112 (Box 2)** **Conditions 49-96**
MemTrans™HT-96 **MD1-113** **Conditions E1-H12**
MemTrans™FX-96 **MD1-113-FX** **Conditions E1-H12**

Membrane Proteins

Well #	Tube #	Conc.		Salt 1	Conc.		Salt 2	Conc.		Buffer	pH	Conc.		Precipitant 1	Conc.		Precipitant 2
E1	2-1	0.2	M	Ammonium acetate	0.1	M	Sodium chloride	0.1	M	Bis-Tris	6.3	12	% w/v	PEG 4000			
E2	2-2	0.2	M	Potassium chloride				0.1	M	Sodium citrate	5.5	27	% v/v	Pentaerythritol propoxylate (5/4 PO/OH)	8	% v/v	PEG 400
E3	2-3	0.1	M	Calcium acetate hydrate	0.1	M	Sodium chloride	0.1	M	MOPS	7	24	% v/v	PEG 400			
E4	2-4	0.2	M	Magnesium chloride hexahydrate				0.1	M	BICINE	8.5	21	% w/v	PEG 2000			
E5	2-5	0.075	M	Lithium sulfate	0.075	M	Lithium phosphate	0.1	M	MOPS	7.4	24	% v/v	PEG 550 MME			
E6	2-6	0.045	M	Calcium chloride dihydrate				0.1	M	HEPES	7	5	% w/v	PEG 8000			
E7	2-7	0.15	M	Barium chloride dihydrate				0.1	M	HEPES	7	26	% v/v	PEG 400			
E8	2-8	0.125	M	Sodium chloride	0.125	M	Lithium sulfate	0.1	M	HEPES	8	33	% v/v	PEG 300			
E9	2-9	0.1	M	Magnesium nitrate hexahydrate	0.05	M	Magnesium acetate tetrahydrate	0.1	M	Sodium citrate	5	18	% w/v	PEG 1500			
E10	2-10	0.1	M	Sodium chloride				0.08	M	Tris-HCl	9	17	% v/v	PEG 600			
E11	2-11	0.01	M	Nickel(II) chloride hexahydrate				0.05	M	Sodium cacodylate	5.5	45	% v/v	PEG 400			
E12	2-12	0.4	M	Sodium chloride				0.05	M	Sodium citrate	6	37	% v/v	PEG 400			
F1	2-13	0.2	M	Lithium sulfate				0.05	M	MES	6.5	20	% v/v	PEG 400			
F2	2-14	0.075	M	Sodium chloride				0.05	M	CHES	9.5	32	% v/v	PEG 300			
F3	2-15	0.4	M	Sodium chloride				0.05	M	Tris	8	26	% v/v	PEG 600			
F4	2-16							0.1	M	Succinic acid	7	15	% w/v	PEG 3350			
F5	2-17	0.08	M	Calcium acetate hydrate	0.05	M	Sodium chloride	0.1	M	MOPS	7	28	% v/v	PEG 400			
F6	2-18	0.07	M	Sodium chloride				0.05	M	Sodium citrate	4.5	22	% v/v	PEG 400	2	% v/v	PEG 600
F7	2-19	0.2	M	Sodium malonate dibasic monohydrate				0.075	M	HEPES	7	20	% w/v	PEG 2000 MME			
F8	2-20	0.08	M	Potassium phosphate monobasic				0.05	M	ADA	6.5	35	% v/v	PEG 400			
F9	2-21	0.1	M	Lithium sulfate				0.05	M	HEPES	7	31	% w/v	PEG 3350			
F10	2-22	0.25	M	Potassium acetate				0.1	M	Tris-HCl	8	24	% v/v	PEG 300			
F11	2-23	0.125	M	Magnesium acetate tetrahydrate	0.04	M	Magnesium chloride hexahydrate	0.08	M	Tris	8.7	12	% w/v	PEG 4000			
F12	2-24	0.1	M	Magnesium chloride hexahydrate				0.1	M	Tris	8.7	38	% v/v	PEG 550 MME			
G1	2-25	0.05	M	Nickel(II) chloride hexahydrate				0.1	M	Sodium acetate	4	17	% w/v	PEG 2000 MME			
G2	2-26	0.05	M	Magnesium chloride hexahydrate				0.1	M	Sodium cacodylate	5.5	40	% v/v	PEG 400			
G3	2-27	0.15	M	Sodium chloride				0.075	M	MOPS	7	20	% w/v	PEG 2000 MME			
G4	2-28							0.1	M	Sodium acetate	4.5	30	% v/v	PEG 300	3	% v/v	MPD
G5	2-29	0.1	M	Ammonium sulfate				0.05	M	HEPES	7.5	22	% v/v	PEG 400			
G6	2-30	0.2	M	Ammonium sulfate				0.1	M	MES	6.5	25	% v/v	PEG 400			
G7	2-31	0.12	M	Calcium chloride dihydrate				0.075	M	Bis-tris	6.3	15	% w/v	PEG 2000 MME			
G8	2-32	0.005	M	Cadmium chloride hemi(pentahydrate)				0.1	M	HEPES	7.5	31	% v/v	PEG 400			
G9	2-33	0.1	M	Potassium chloride				0.1	M	MES	5	22	% v/v	PEG 550 MME			
G10	2-34	0.1	M	Lithium chloride				0.05	M	Glycine	9.5	40	% v/v	PEG 400			
G11	2-35	0.05	M	Sodium citrate tribasic dihydrate	0.08	M	Potassium phosphate monobasic	0.08	M	Bis-Tris	6.3	11	% w/v	PEG 4000	0.06	M	Potassium chloride
G12	2-36	0.05	M	Calcium chloride dihydrate				0.02	M	Tris	7.4	14	% w/v	PEG 3000			
H1	2-37	0.2	M	Zinc sulfate heptahydrate				0.1	M	Sodium acetate	4.5	15	% w/v	PEG 4000			
H2	2-38	0.3	M	Sodium chloride				0.1	M	Sodium citrate	5.5	21	% v/v	PEG 400			
H3	2-39	0.08	M	Magnesium chloride hexahydrate				0.1	M	Tris	8.5	19	% w/v	PEG 1500			
H4	2-40	0.125	M	Sodium chloride	0.1	M	Magnesium chloride hexahydrate	0.1	M	Tris	8.5	34	% v/v	PEG 400			
H5	2-41	0.05	M	Magnesium chloride hexahydrate	0.02	M	Potassium chloride	0.05	M	Sodium cacodylate	5.8	40	% v/v	PEG 200			
H6	2-42	0.2	M	Ammonium acetate				0.05	M	Tris	8.5	24	% w/v	PEG 3350			
H7	2-43	0.08	M	Lithium sulfate	0.06	M	Sodium phosphate monobasic monohydrate	0.05	M	Citrate	4.7	16	% w/v	PEG 1000			
H8	2-44	0.125	M	Potassium thiocyanate	0.01	M	Calcium chloride dihydrate	0.05	M	HEPES	7.5	8	% w/v	PEG 4000			
H9	2-45	0.06	M	Magnesium nitrate hexahydrate				0.1	M	Sodium citrate	5.5	24	% v/v	PEG 550 MME			
H10	2-46	0.08	M	Sodium chloride	0.025	M	Lithium sulfate	0.05	M	HEPES	7.5	27	% v/v	PEG 400			
H11	2-47	0.5	M	Sodium chloride				0.1	M	MES	6.5	40	% v/v	PEG 400			
H12	2-48	0.2	M	Ammonium phosphate monobasic				0.1	M	HEPES	7	20	% w/v	PEG 1500			