

## MemTrans™ 10 mL and HT-96\*

## MD1-112/MD1-113

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./MD-113 is presented as 96 x 1 mL conditions.

### 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<sup>3</sup> 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  $\alpha$ -helical membrane protein structures and their crystallization conditions.

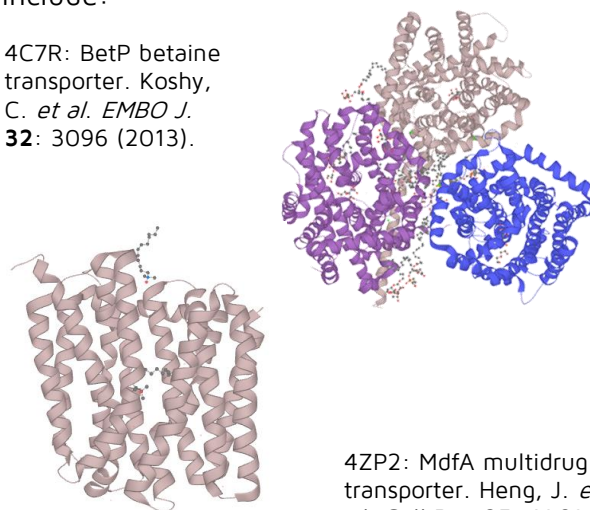
Today, the dataset (3) is sufficiently large that it is possible not just to identify the most common crystallisation conditions for membrane proteins in general, but also to analyse the differences in growth conditions between functionally-related sub-groups in a statistically robust manner. This has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

target important groups of  $\alpha$ -helical membrane proteins.

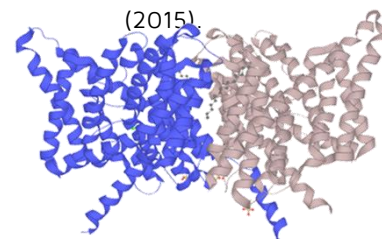
**MemTrans**, developed by Prof. Simon Newstead and Dr Joanne Parker and exclusively licensed to Molecular Dimensions by Oxford University Innovation, is a rational sparse-matrix screen that has been developed specifically for transporter proteins. It contains the most common crystallization conditions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

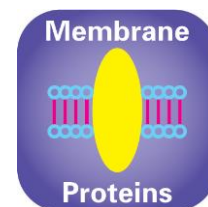
Examples of structures solved from crystals grown in conditions similar to those in MemTrans include:

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



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





## 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](http://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](http://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
<b>Eco Screens</b>		
MD1-112-ECO	96 x 10 mL	MemTrans ECO
MD1-113-ECO	96 x 1 mL	MemTrans ECO HT-96
<b>Single Reagents</b>		
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.

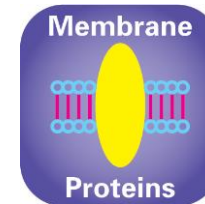


**Molecular  
Dimensions**

**MemTrans™  
MemTrans™HT-96**

**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
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		

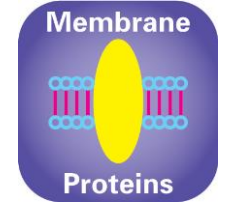


**Molecular  
Dimensions**

**MemTrans™  
MemTrans™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
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		