



Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 09:30 AM GMT

PDB ID : 3B5D
Title : EmrE multidrug transporter in complex with TPP, C2 crystal form
Authors : Chang, G.; Chen, Y.J.
Deposited on : 2007-10-25
Resolution : 3.80 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

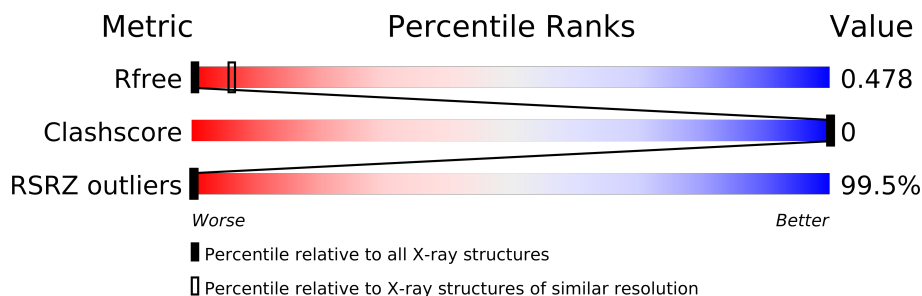
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance


The reported resolution of this entry is 3.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	66092	1162 (4.20-3.40)
Clashscore	79885	1100 (4.10-3.50)
RSRZ outliers	66119	1163 (4.20-3.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	110	
1	B	110	

The following table lists non-polymeric compounds that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Geometry	Electron density
2	P4P	A	350	-	X

2 Entry composition i

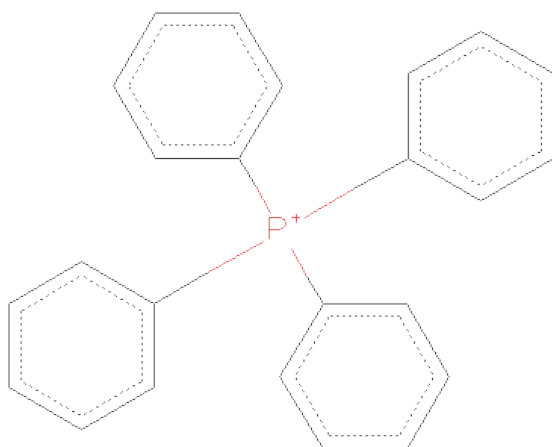
There are 2 unique types of molecules in this entry. The entry contains 224 atoms, of which 0 are hydrogen and 0 are deuterium.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Multidrug transporter emrE.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	Trace
1	A	100	Total	C	0	0	100
			100	100			
1	B	99	Total	C	0	0	99
			99	99			

- Molecule 2 is TETRAPHENYLPHOSPHONIUM (three-letter code: P4P) (formula: $C_{24}H_{20}P$).



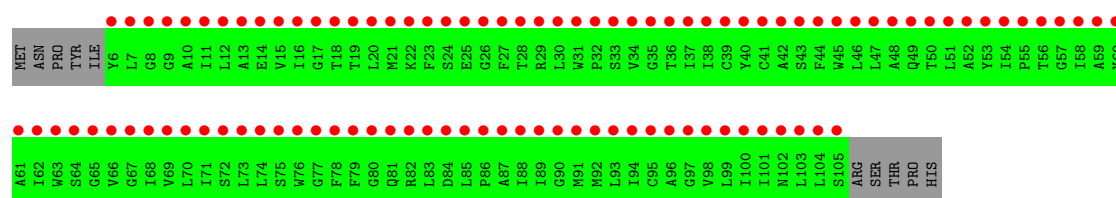
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	P	0	0
			25	24	1		

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

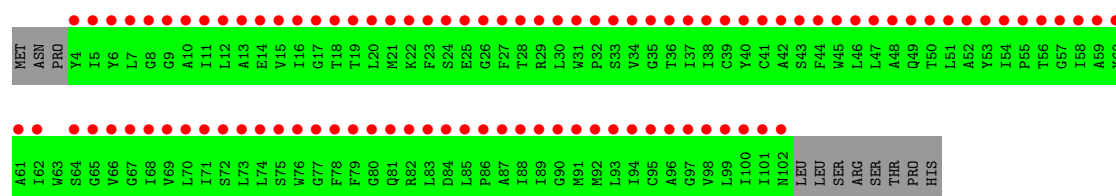
- Molecule 1: Multidrug transporter emrE

Chain A: 



- Molecule 1: Multidrug transporter emrE

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	115.10Å 43.70Å 76.40Å 90.00° 108.10° 90.00°	Depositor
Resolution (Å)	20.00 – 3.80 19.99 – 3.80	Depositor EDS
% Data completeness (in resolution range)	83.6 (20.00-3.80) 83.6 (19.99-3.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.71 (at 3.82Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.325 , 0.364 0.464 , 0.478	Depositor DCC
R_{free} test set	330 reflections (10.80%)	DCC
Wilson B-factor (Å ²)	142.5	Xtriage
Anisotropy	0.764	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	1.07 , 188.4	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 3077 reflections	Xtriage
F_o, F_c correlation	0.77	EDS
Total number of atoms	224	wwPDB-VP
Average B, all atoms (Å ²)	213.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.08% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: P4P

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	100	0	0	0	0
1	B	99	0	0	0	0
2	A	25	0	20	0	0
All	All	224	0	20	0	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 0.

There are no clashes within the asymmetric unit.

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

There are no protein backbone outliers to report in this entry.

5.3.2 Protein sidechains ⓘ

There are no protein residues with a non-rotameric sidechain to report in this entry.

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	P4P	A	350	-	28,28,28	3.23	22 (78%)	38,38,38	2.18	13 (34%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	P4P	A	350	-	-	0/24/24/24	0/4/4/4

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	350	P4P	C6D-C1D	5.38	1.50	1.39
2	A	350	P4P	C5A-C6A	5.09	1.50	1.39
2	A	350	P4P	C2D-C1D	5.06	1.50	1.39
2	A	350	P4P	C5D-C6D	5.03	1.50	1.39
2	A	350	P4P	C3B-C2B	4.31	1.49	1.39
2	A	350	P4P	P-C1D	4.10	1.87	1.79
2	A	350	P4P	C2C-C1C	3.97	1.47	1.39
2	A	350	P4P	C2B-C1B	3.85	1.47	1.39
2	A	350	P4P	C6C-C1C	3.58	1.46	1.39
2	A	350	P4P	C3C-C4C	3.46	1.47	1.37
2	A	350	P4P	P-C1B	3.45	1.86	1.79
2	A	350	P4P	P-C1C	3.29	1.86	1.79
2	A	350	P4P	C5A-C4A	3.05	1.46	1.37
2	A	350	P4P	C4C-C5C	2.95	1.46	1.37
2	A	350	P4P	C4D-C5D	2.94	1.46	1.37
2	A	350	P4P	C3A-C2A	2.77	1.45	1.39
2	A	350	P4P	C3D-C2D	2.50	1.44	1.39
2	A	350	P4P	C5B-C6B	2.45	1.44	1.39
2	A	350	P4P	P-C1A	2.26	1.84	1.79
2	A	350	P4P	C3D-C4D	2.05	1.43	1.37
2	A	350	P4P	C3B-C4B	2.02	1.43	1.37
2	A	350	P4P	C2A-C1A	2.00	1.43	1.39

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	350	P4P	C1D-P-C1C	6.15	121.42	109.43
2	A	350	P4P	C1D-P-C1A	-4.41	100.82	109.43
2	A	350	P4P	C6A-C1A-C2A	4.11	125.49	118.96
2	A	350	P4P	P-C1B-C2B	-3.98	112.62	120.04
2	A	350	P4P	C1B-P-C1A	3.18	115.64	109.43
2	A	350	P4P	P-C1B-C6B	2.94	125.53	120.04
2	A	350	P4P	C3A-C2A-C1A	-2.78	115.81	120.25
2	A	350	P4P	C4A-C5A-C6A	-2.69	115.69	120.17
2	A	350	P4P	P-C1C-C2C	-2.66	115.07	120.04
2	A	350	P4P	P-C1C-C6C	2.59	124.87	120.04
2	A	350	P4P	C3B-C2B-C1B	-2.56	116.16	120.25
2	A	350	P4P	C5A-C4A-C3A	2.03	124.21	119.97

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	350	P4P	C1B-P-C1D	-2.01	105.50	109.43

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	100/110 (90%)	13.87	100 (100%) 0 0	103, 189, 311, 311	0
1	B	99/110 (90%)	12.65	98 (98%) 0 0	77, 207, 311, 311	0
All	All	199/220 (90%)	13.26	198 (99%) 0 0	77, 198, 311, 311	0

All (198) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	95	CYS	39.3
1	A	81	GLN	36.2
1	A	104	LEU	34.2
1	B	79	PHE	33.0
1	B	27	PHE	33.0
1	B	39	CYS	31.4
1	A	28	THR	29.4
1	A	6	TYR	29.3
1	B	58	ILE	28.0
1	A	76	TRP	27.4
1	B	25	GLU	26.0
1	B	56	THR	25.5
1	B	55	PRO	24.5
1	B	78	PHE	24.0
1	A	29	ARG	23.9
1	A	46	LEU	23.6
1	A	51	LEU	22.7
1	A	57	GLY	22.4
1	A	84	ASP	22.1
1	A	88	ILE	22.0
1	B	87	ALA	21.9
1	A	80	GLY	21.4
1	A	27	PHE	21.4
1	B	30	LEU	21.3

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Mol	Chain	Res	Type	RSRZ
1	A	68	ILE	21.1
1	A	85	LEU	21.0
1	B	36	THR	21.0
1	A	86	PRO	20.9
1	A	90	GLY	20.8
1	B	52	ALA	20.7
1	B	69	VAL	20.6
1	B	14	GLU	20.3
1	A	30	LEU	20.3
1	A	41	CYS	20.1
1	B	99	LEU	19.9
1	A	16	ILE	19.0
1	A	87	ALA	18.5
1	B	76	TRP	18.5
1	B	88	ILE	18.4
1	A	78	PHE	18.4
1	A	71	ILE	18.1
1	B	29	ARG	17.8
1	B	54	ILE	17.6
1	B	73	LEU	17.4
1	A	83	LEU	17.1
1	A	58	ILE	17.1
1	B	19	THR	17.1
1	A	32	PRO	16.9
1	A	73	LEU	16.9
1	B	51	LEU	16.7
1	B	17	GLY	16.5
1	A	37	ILE	16.5
1	B	77	GLY	16.4
1	B	28	THR	16.2
1	B	5	ILE	16.1
1	A	31	TRP	16.1
1	A	62	ILE	15.9
1	A	24	SER	15.9
1	A	8	GLY	15.8
1	A	50	THR	15.7
1	A	23	PHE	15.3
1	A	56	THR	15.2
1	B	7	LEU	15.1
1	A	19	THR	14.8
1	A	77	GLY	14.5
1	B	92	MET	14.4

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Mol	Chain	Res	Type	RSRZ
1	A	74	LEU	14.3
1	B	67	GLY	14.3
1	A	48	ALA	14.3
1	A	36	THR	14.1
1	B	40	TYR	13.8
1	B	85	LEU	13.8
1	A	53	TYR	13.7
1	B	86	PRO	13.7
1	B	23	PHE	13.7
1	B	43	SER	13.6
1	A	54	ILE	13.6
1	A	96	ALA	13.6
1	A	55	PRO	13.5
1	A	61	ALA	13.4
1	B	74	LEU	13.2
1	B	47	LEU	13.2
1	B	24	SER	13.2
1	A	92	MET	13.1
1	A	34	VAL	13.0
1	B	84	ASP	13.0
1	B	83	LEU	12.8
1	B	31	TRP	12.8
1	A	100	ILE	12.7
1	B	102	ASN	12.5
1	A	66	VAL	12.5
1	A	99	LEU	12.4
1	B	64	SER	12.4
1	B	66	VAL	12.4
1	B	82	ARG	12.3
1	A	11	ILE	12.2
1	B	42	ALA	12.2
1	A	47	LEU	12.2
1	A	42	ALA	12.1
1	B	53	TYR	12.0
1	B	81	GLN	11.9
1	A	35	GLY	11.8
1	B	33	SER	11.7
1	A	70	LEU	11.6
1	A	14	GLU	11.5
1	B	38	ILE	11.5
1	A	65	GLY	11.4
1	B	90	GLY	11.3

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Mol	Chain	Res	Type	RSRZ
1	B	37	ILE	11.3
1	A	69	VAL	11.2
1	B	65	GLY	11.0
1	A	102	ASN	10.9
1	B	44	PHE	10.8
1	A	39	CYS	10.8
1	A	18	THR	10.6
1	B	6	TYR	10.6
1	A	91	MET	10.6
1	B	22	LYS	10.4
1	A	59	ALA	10.3
1	A	38	ILE	10.3
1	B	12	LEU	10.3
1	A	82	ARG	10.3
1	A	89	ILE	10.2
1	A	63	TRP	10.1
1	B	41	CYS	10.0
1	B	32	PRO	10.0
1	A	20	LEU	9.9
1	B	49	GLN	9.9
1	B	4	TYR	9.8
1	B	46	LEU	9.8
1	B	45	TRP	9.8
1	A	40	TYR	9.8
1	A	49	GLN	9.6
1	B	91	MET	9.5
1	B	70	LEU	9.5
1	A	67	GLY	9.3
1	B	94	ILE	9.3
1	B	35	GLY	9.3
1	A	17	GLY	9.3
1	A	45	TRP	9.3
1	A	101	ILE	9.2
1	A	15	VAL	9.2
1	B	89	ILE	9.1
1	B	8	GLY	9.1
1	A	103	LEU	9.0
1	B	9	GLY	9.0
1	B	101	ILE	8.9
1	B	26	GLY	8.8
1	B	21	MET	8.6
1	B	18	THR	8.5

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Mol	Chain	Res	Type	RSRZ
1	B	13	ALA	8.3
1	A	7	LEU	8.3
1	A	52	ALA	8.2
1	A	33	SER	8.1
1	A	79	PHE	8.0
1	A	25	GLU	8.0
1	B	20	LEU	7.9
1	B	11	ILE	7.9
1	B	75	SER	7.8
1	A	93	LEU	7.8
1	A	98	VAL	7.7
1	B	71	ILE	7.6
1	A	9	GLY	7.6
1	B	60	TYR	7.5
1	B	97	GLY	7.4
1	A	44	PHE	7.3
1	B	34	VAL	7.2
1	B	95	CYS	7.0
1	B	72	SER	6.9
1	B	10	ALA	6.7
1	A	26	GLY	6.7
1	B	50	THR	6.6
1	A	94	ILE	6.6
1	A	13	ALA	6.5
1	B	62	ILE	6.3
1	B	80	GLY	6.3
1	A	10	ALA	6.3
1	B	68	ILE	6.3
1	B	15	VAL	6.3
1	B	100	ILE	6.1
1	A	105	SER	6.0
1	A	12	LEU	6.0
1	A	60	TYR	5.7
1	A	75	SER	5.5
1	B	98	VAL	5.5
1	B	61	ALA	5.5
1	B	96	ALA	5.1
1	B	59	ALA	4.9
1	A	72	SER	4.4
1	A	21	MET	4.3
1	B	48	ALA	4.2
1	B	57	GLY	3.9

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Mol	Chain	Res	Type	RSRZ
1	A	43	SER	3.9
1	B	16	ILE	3.7
1	A	97	GLY	3.6
1	B	93	LEU	3.5
1	A	22	LYS	3.3
1	A	64	SER	3.2

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	P4P	A	350	25/25	1.02	-1.71	254,254,254,254	0

6.5 Other polymers ⓘ

There are no such residues in this entry.