Full wwPDB X-ray Structure Validation Report (i)

Feb 1, 2016 – 07:26 PM GMT

PDB ID	:	4OXS
Title	:	Structure of NavMS in complex with channel blocking compound
Authors	:	Naylor, C.E.; Bagneris, C.; Wallace, B.A.
Deposited on	:	2014-02-06
Resolution	:	2.80 Å(reported)

This is a Full wwPDB X-ray Structure 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/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

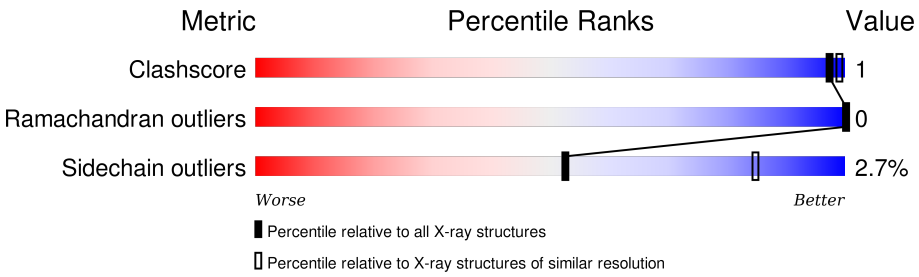
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	FAILED
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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))
Clashscore	102246	2827 (2.80-2.80)
Ramachandran outliers	100387	2782 (2.80-2.80)
Sidechain outliers	100360	2784 (2.80-2.80)

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. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	149	58% • 38%
1	B	149	59% • 38%
1	C	149	58% • 39%
1	D	149	57% • 39%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 3055 atoms, of which 0 are hydrogens and 0 are deuteriums.

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.

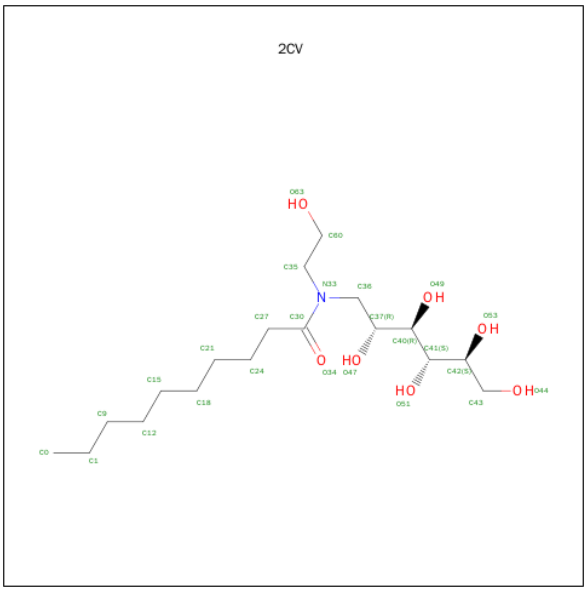
- Molecule 1 is a protein called Ion transport protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	92	710	479	106	119	6	0	0	0
1	B	92	706	476	106	119	5	0	0	0
1	C	91	701	471	105	119	6	0	1	0
1	D	91	692	464	105	118	5	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	126	GLY	-	expression tag	UNP A0L5S6
A	127	SER	-	expression tag	UNP A0L5S6
A	128	HIS	-	expression tag	UNP A0L5S6
A	129	MET	-	expression tag	UNP A0L5S6
B	126	GLY	-	expression tag	UNP A0L5S6
B	127	SER	-	expression tag	UNP A0L5S6
B	128	HIS	-	expression tag	UNP A0L5S6
B	129	MET	-	expression tag	UNP A0L5S6
C	126	GLY	-	expression tag	UNP A0L5S6
C	127	SER	-	expression tag	UNP A0L5S6
C	128	HIS	-	expression tag	UNP A0L5S6
C	129	MET	-	expression tag	UNP A0L5S6
D	126	GLY	-	expression tag	UNP A0L5S6
D	127	SER	-	expression tag	UNP A0L5S6
D	128	HIS	-	expression tag	UNP A0L5S6
D	129	MET	-	expression tag	UNP A0L5S6

- Molecule 2 is HEGA-10 (three-letter code: 2CV) (formula: $C_{18}H_{37}NO_7$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	17	13	1	3	0	0
			Total	C	N	O		
2	A	1	17	13	1	3	0	0
			Total	C	N	O		
2	C	1	17	13	1	3	0	0
			Total	C	N	O		
2	C	1	17	13	1	3	0	0

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Na		
3	B	2	2	2	0	0
			Total	Na		
3	A	1	1	1	0	0
			Total	Na		
3	D	1	1	1	0	0
			Total	Na		
3	C	2	2	2	0	0

- Molecule 4 is BROMIDE ION (three-letter code: BR) (formula: Br).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Br		
4	A	1	2	2	0	1

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Br		
4	C	1	2	2	0	1

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	A	42	42	42	0	0
			Total	O		
5	B	34	34	34	0	0
			Total	O		
5	C	46	46	46	0	0
			Total	O		
5	D	46	46	46	0	0

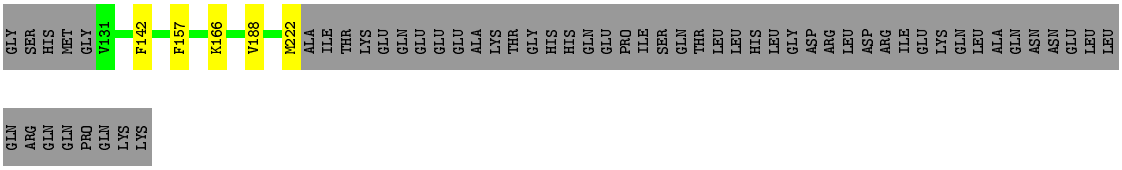
3 Residue-property plots (i)

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.

Note EDS failed to run properly.

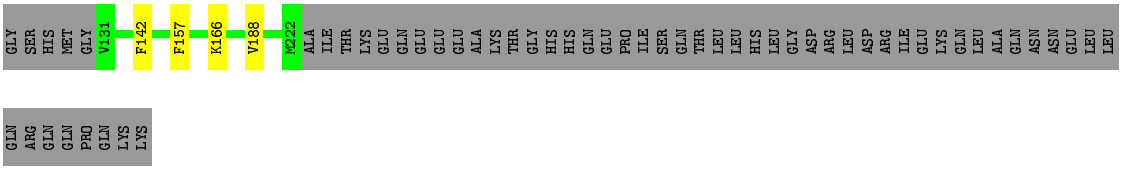
- Molecule 1: Ion transport protein

Chain A:



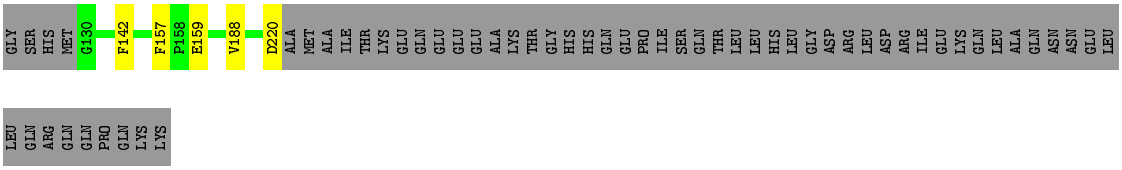
- Molecule 1: Ion transport protein

Chain B:



- Molecule 1: Ion transport protein

Chain C:



- Molecule 1: Ion transport protein

Chain D:

ASN
GLU
LEU
LEU
GLN
ARG
GLN
GLN
PRO
GLN
LYS
LYS

4 Data and refinement statistics (i)

EDS failed to run properly - this section will therefore be incomplete.

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	79.89Å 329.02Å 79.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	33.43 – 2.80	Depositor
% Data completeness (in resolution range)	100.0 (33.43-2.80)	Depositor
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.55 (at 2.81Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.266 , 0.285	Depositor
Wilson B-factor (Å^2)	38.0	Xtriage
Anisotropy	1.426	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Outliers	0 of 26531 reflections	Xtriage
Total number of atoms	3055	wwPDB-VP
Average B, all atoms (Å^2)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 48.74 % of the origin peak, indicating pseudo translational symmetry.The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 8.2347e-05.The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: NA, 2CV, BR

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	$\#\|Z\| >5$
1	A	0.52	0/732	0.68	0/1003
1	B	0.51	0/728	0.67	0/999
1	C	0.50	0/724	0.66	0/992
1	D	0.50	0/713	0.65	0/978
All	All	0.51	0/2897	0.66	0/3972

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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 hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	710	0	699	2	0
1	B	706	0	690	2	0
1	C	701	0	701	1	0
1	D	692	0	672	2	0
2	A	34	0	43	2	0
2	C	34	0	44	0	0
3	A	1	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	1	0	0	0	0
4	A	2	0	0	0	0
4	C	2	0	0	0	0
5	A	42	0	0	0	0
5	B	34	0	0	0	0
5	C	46	0	0	0	0
5	D	46	0	0	0	0
All	All	3055	0	2849	7	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

All (7) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:157:PHE:CZ	1:D:188:VAL:HA	2.46	0.51
1:A:157:PHE:CZ	1:A:188:VAL:HA	2.46	0.50
1:C:157:PHE:CZ	1:C:188:VAL:HA	2.46	0.50
1:B:157:PHE:CZ	1:B:188:VAL:HA	2.46	0.50
1:A:166:LYS:HA	2:A:301:2CV:H601	1.97	0.47
2:A:302:2CV:H602	1:B:166:LYS:HA	2.01	0.43
1:D:160:TRP:HB3	1:D:170:THR:HG21	2.01	0.41

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	90/149 (60%)	87 (97%)	3 (3%)	0	100 100
1	B	90/149 (60%)	87 (97%)	3 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	90/149 (60%)	86 (96%)	4 (4%)	0	100	100
1	D	89/149 (60%)	85 (96%)	4 (4%)	0	100	100
All	All	359/596 (60%)	345 (96%)	14 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	74/129 (57%)	72 (97%)	2 (3%)	52	85
1	B	73/129 (57%)	72 (99%)	1 (1%)	74	94
1	C	75/129 (58%)	72 (96%)	3 (4%)	38	73
1	D	71/129 (55%)	69 (97%)	2 (3%)	51	84
All	All	293/516 (57%)	285 (97%)	8 (3%)	52	85

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	142	PHE
1	A	222	MET
1	B	142	PHE
1	C	142	PHE
1	C	159	GLU
1	C	220	ASP
1	D	142	PHE
1	D	159	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no carbohydrates in this entry.

5.6 Ligand geometry (i)

Of 14 ligands modelled in this entry, 10 are monoatomic - leaving 4 for Mogul analysis.

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	2CV	A	301	-	16,16,25	0.25	0	17,17,30	0.34	0
2	2CV	A	302	-	16,16,25	0.32	0	18,18,30	0.87	1 (5%)
2	2CV	C	301	-	16,16,25	0.23	0	17,17,30	0.33	0
2	2CV	C	302	-	16,16,25	0.23	0	17,17,30	0.32	0

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	2CV	A	301	-	-	0/18/18/34	0/0/0/0
2	2CV	A	302	-	-	0/18/18/34	0/0/0/0
2	2CV	C	301	-	-	0/18/18/34	0/0/0/0
2	2CV	C	302	-	-	0/18/18/34	0/0/0/0

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	302	2CV	C35-N33-C36	3.15	118.51	115.45

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	2CV	1	0
2	A	302	2CV	1	0

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

EDS failed to run properly - this section will therefore be empty.

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

EDS failed to run properly - this section will therefore be empty.

6.3 Carbohydrates (i)

EDS failed to run properly - this section will therefore be empty.

6.4 Ligands (i)

EDS failed to run properly - this section will therefore be empty.

6.5 Other polymers (i)

EDS failed to run properly - this section will therefore be empty.