



wwPDB X-ray Structure Validation Summary Report

Feb 27, 2014 – 03:44 PM GMT

PDB ID : 2FYW
Title : Crystal Structure of a Conserved Protein of Unknown Function from Streptococcus pneumoniae
Authors : Nocek, B.; Hatzos, C.; Abdullah, J.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2006-02-08
Resolution : 2.40 Å(reported)

This is a wwPDB validation summary 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>

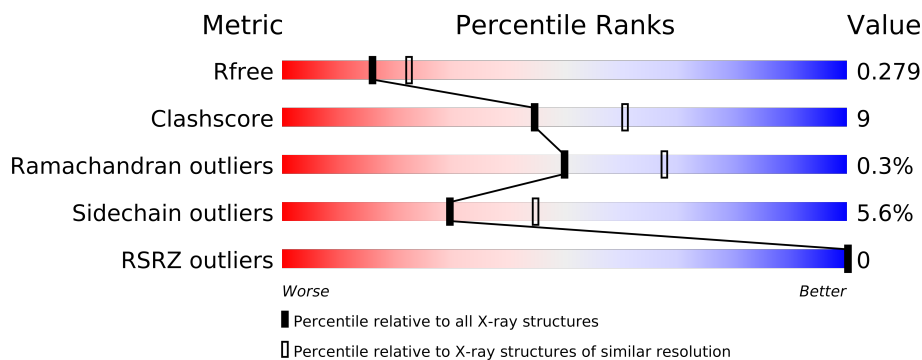
The following versions of software and data (see [references](#)) were used in the production of this report:

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 2.40 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	2207 (2.40-2.40)
Clashscore	79885	2789 (2.40-2.40)
Ramachandran outliers	78287	2736 (2.40-2.40)
Sidechain outliers	78261	2737 (2.40-2.40)
RSRZ outliers	66119	2210 (2.40-2.40)

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	267	
1	B	267	
1	C	267	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6575 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 conserved hypothetical protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	267	Total	C	N	O	S	Se	0	4	0
			2131	1357	356	409	3	6			
1	B	267	Total	C	N	O	S	Se	0	3	0
			2124	1353	356	406	3	6			
1	C	266	Total	C	N	O	S	Se	4	4	0
			2123	1353	352	409	3	6			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	ASN	-	CLONING ARTIFACT	GB 14973101
A	0	ALA	-	CLONING ARTIFACT	GB 14973101
A	1	MSE	MET	MODIFIED RESIDUE	GB 14973101
A	20	MSE	MET	MODIFIED RESIDUE	GB 14973101
A	40	MSE	MET	MODIFIED RESIDUE	GB 14973101
A	116	MSE	MET	MODIFIED RESIDUE	GB 14973101
A	163	MSE	MET	MODIFIED RESIDUE	GB 14973101
A	213	MSE	MET	MODIFIED RESIDUE	GB 14973101
B	-1	ASN	-	CLONING ARTIFACT	GB 14973101
B	0	ALA	-	CLONING ARTIFACT	GB 14973101
B	1	MSE	MET	MODIFIED RESIDUE	GB 14973101
B	20	MSE	MET	MODIFIED RESIDUE	GB 14973101
B	40	MSE	MET	MODIFIED RESIDUE	GB 14973101
B	116	MSE	MET	MODIFIED RESIDUE	GB 14973101
B	163	MSE	MET	MODIFIED RESIDUE	GB 14973101
B	213	MSE	MET	MODIFIED RESIDUE	GB 14973101
C	-1	ASN	-	CLONING ARTIFACT	GB 14973101
C	0	ALA	-	CLONING ARTIFACT	GB 14973101
C	1	MSE	MET	MODIFIED RESIDUE	GB 14973101
C	20	MSE	MET	MODIFIED RESIDUE	GB 14973101
C	40	MSE	MET	MODIFIED RESIDUE	GB 14973101
C	116	MSE	MET	MODIFIED RESIDUE	GB 14973101
C	163	MSE	MET	MODIFIED RESIDUE	GB 14973101

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
C	213	MSE	MET	MODIFIED RESIDUE	GB 14973101

- Molecule 2 is water.

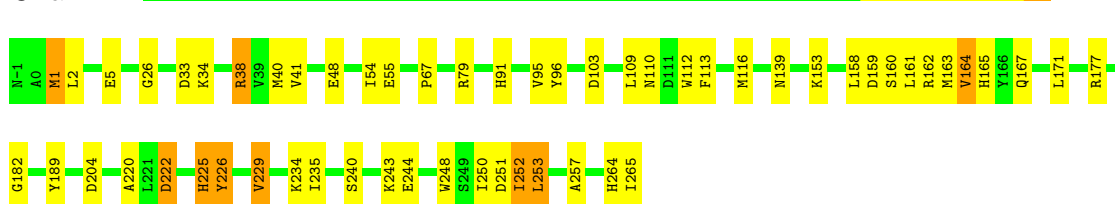
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	72	Total O 72 72	0	0
2	B	61	Total O 61 61	0	0
2	C	64	Total O 64 64	0	0

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.

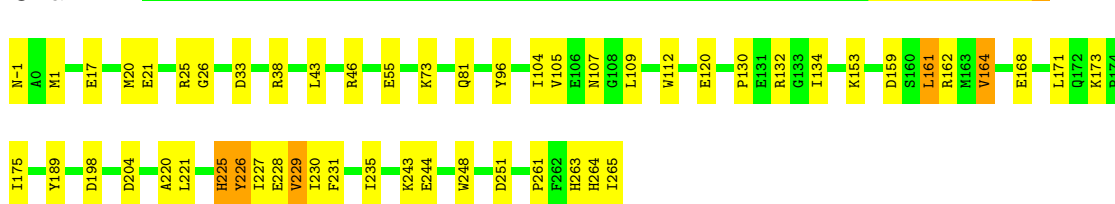
- Molecule 1: conserved hypothetical protein

Chain A:



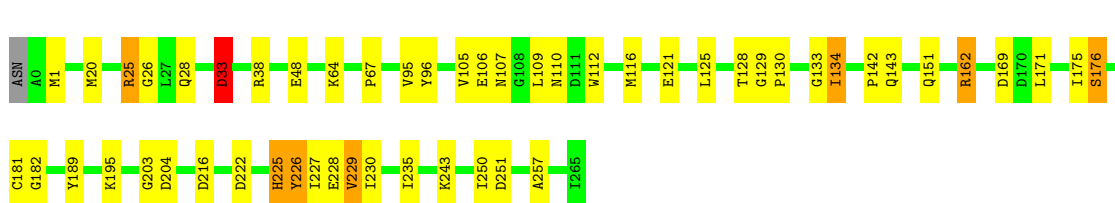
- Molecule 1: conserved hypothetical protein

Chain B:



- Molecule 1: conserved hypothetical protein

Chain C:



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	96.48Å 167.02Å 122.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 2.40 34.47 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.6 (40.00-2.40) 99.4 (34.47-2.30)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.92 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.200 , 0.259 0.224 , 0.279	Depositor DCC
R_{free} test set	1946 reflections (5.29%)	DCC
Wilson B-factor (Å ²)	36.4	Xtriage
Anisotropy	0.255	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 13.0	EDS
Estimated twinning fraction	0.146 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.176 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtriage
L-test for twinning	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	2 of 43793 reflections (0.005%)	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	6575	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.75% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	0.89	0/2169	0.82	1/2932 (0.0%)
1	B	0.89	0/2162	0.82	1/2922 (0.0%)
1	C	0.89	2/2161 (0.1%)	0.82	2/2921 (0.1%)
All	All	0.89	2/6492 (0.0%)	0.82	4/8775 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	181	CYS	CB-SG	-6.42	1.71	1.82
1	C	121	GLU	CB-CG	5.93	1.63	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	222	ASP	CB-CG-OD1	6.21	123.88	118.30
1	C	33	ASP	CB-CG-OD2	5.81	123.53	118.30
1	B	33	ASP	CB-CG-OD2	5.79	123.51	118.30
1	C	216	ASP	CB-CG-OD1	5.78	123.50	118.30

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	2131	0	2074	50	0
1	B	2124	0	2072	33	0
1	C	2123	0	2064	36	0
2	A	72	0	0	7	0
2	B	61	0	0	4	0
2	C	64	0	0	4	0
All	All	6575	0	6210	108	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 9.

The worst 5 of 108 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:105:VAL:HB	2:C:287:HOH:O	1.62	0.97
1:C:110:ASN:HD21	1:C:182:GLY:H	1.13	0.94
1:A:1:MSE:HE2	1:A:5:GLU:HG3	1.48	0.91
1:A:34:LYS:HE2	2:A:310:HOH:O	1.71	0.88
1:A:160:SER:HA	2:A:280:HOH:O	1.79	0.83

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

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	267/267 (100%)	259 (97%)	8 (3%)	0	100	100
1	B	266/267 (100%)	258 (97%)	7 (3%)	1 (0%)	43	61
1	C	266/267 (100%)	254 (96%)	11 (4%)	1 (0%)	43	61
All	All	799/801 (100%)	771 (96%)	26 (3%)	2 (0%)	50	68

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	130	PRO

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	130	PRO

5.3.2 Protein sidechains ⓘ

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	230/222 (104%)	219 (95%)	11 (5%)	35	53
1	B	229/222 (103%)	213 (93%)	16 (7%)	21	33
1	C	229/222 (103%)	218 (95%)	11 (5%)	35	53
All	All	688/666 (103%)	650 (94%)	38 (6%)	30	46

5 of 38 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	134	ILE
1	B	173	LYS
1	C	225	HIS
1	B	161	LEU
1	B	189	TYR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	139	ASN
1	B	211	GLN
1	C	110	ASN
1	B	81	GLN
1	C	82	ASN

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 ⓘ

There are no ligands in this entry.

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	267/267 (100%)	-0.27	0 100 100	21, 31, 44, 53	0
1	B	267/267 (100%)	-0.28	0 100 100	21, 31, 44, 53	0
1	C	266/267 (99%)	-0.31	0 100 100	20, 31, 44, 54	1 (0%)
All	All	800/801 (99%)	-0.29	0 100 100	20, 31, 45, 54	1 (0%)

There are no RSRZ outliers to report.

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 ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.