



Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 09:43 PM GMT

PDB ID : 3B8S
Title : Crystal structure of wild-type chitinase A from *Vibrio harveyi*
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Deposited on : 2007-11-01
Resolution : 2.00 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>

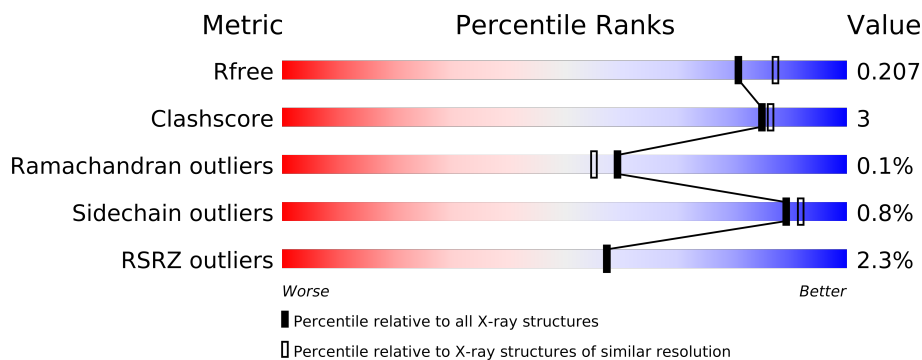
The following versions of software and data (see [references](#)) were used in the production of this report:

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 2.00 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	4888 (2.00-2.00)
Clashscore	79885	6188 (2.00-2.00)
Ramachandran outliers	78287	6102 (2.00-2.00)
Sidechain outliers	78261	6100 (2.00-2.00)
RSRZ outliers	66119	4890 (2.00-2.00)

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	584	
1	B	584	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9799 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 Chitinase A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	567	Total	C	N	O	S	0	0	0
			4354	2760	706	863	25			
1	B	567	Total	C	N	O	S	0	0	0
			4354	2760	706	863	25			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	598	ARG	-	EXPRESSION TAG	UNP Q9AMP1
A	599	SER	-	EXPRESSION TAG	UNP Q9AMP1
A	600	HIS	-	EXPRESSION TAG	UNP Q9AMP1
A	601	HIS	-	EXPRESSION TAG	UNP Q9AMP1
A	602	HIS	-	EXPRESSION TAG	UNP Q9AMP1
A	603	HIS	-	EXPRESSION TAG	UNP Q9AMP1
A	604	HIS	-	EXPRESSION TAG	UNP Q9AMP1
A	605	HIS	-	EXPRESSION TAG	UNP Q9AMP1
B	598	ARG	-	EXPRESSION TAG	UNP Q9AMP1
B	599	SER	-	EXPRESSION TAG	UNP Q9AMP1
B	600	HIS	-	EXPRESSION TAG	UNP Q9AMP1
B	601	HIS	-	EXPRESSION TAG	UNP Q9AMP1
B	602	HIS	-	EXPRESSION TAG	UNP Q9AMP1
B	603	HIS	-	EXPRESSION TAG	UNP Q9AMP1
B	604	HIS	-	EXPRESSION TAG	UNP Q9AMP1
B	605	HIS	-	EXPRESSION TAG	UNP Q9AMP1

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	562	Total	O	0	0
			562	562		
2	B	529	Total	O	0	0
			529	529		

4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	60.27Å 64.28Å 83.52Å 91.74° 91.18° 112.91°	Depositor
Resolution (Å)	24.62 – 2.00 24.62 – 2.00	Depositor EDS
% Data completeness (in resolution range)	94.6 (24.62-2.00) 94.6 (24.62-2.00)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.32 (at 1.99Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.168 , 0.205 0.169 , 0.207	Depositor DCC
R_{free} test set	3724 reflections (5.32%)	DCC
Wilson B-factor (Å ²)	15.8	Xtriage
Anisotropy	0.511	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 32.8	EDS
Estimated twinning fraction	0.033 for -h,-k,l	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 73693 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9799	wwPDB-VP
Average B, all atoms (Å ²)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.76% 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	0.36	0/4467	0.50	0/6075
1	B	0.37	0/4467	0.50	0/6075
All	All	0.36	0/8934	0.50	0/12150

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	4354	0	4103	19	0
1	B	4354	0	4103	29	0
2	A	562	0	0	1	1
2	B	529	0	0	4	0
All	All	9799	0	8206	48	1

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 3.

All (48) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:53:ASP:HB2	2:B:806:HOH:O	1.32	1.24

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:22:ALA:N	1:B:119:THR:HG1	1.76	0.83
1:B:313:ASP:HB3	2:B:702:HOH:O	1.86	0.74
1:A:22:ALA:N	1:A:119:THR:HG1	1.90	0.69
1:B:344:ARG:O	1:B:344:ARG:HD3	1.96	0.65
1:B:238:PHE:H	1:B:243:HIS:CD2	2.16	0.62
1:B:238:PHE:H	1:B:243:HIS:HD2	1.46	0.61
1:A:231:TRP:HA	1:A:235:GLN:HB2	1.83	0.60
1:A:344:ARG:O	1:A:344:ARG:HD3	2.04	0.58
1:A:231:TRP:HA	1:A:235:GLN:HE21	1.68	0.58
1:B:271:SER:OG	1:B:313:ASP:OD2	2.23	0.57
1:A:238:PHE:H	1:A:243:HIS:HD2	1.53	0.56
1:B:231:TRP:HA	1:B:235:GLN:HB2	1.86	0.55
1:B:270:PRO:HD3	1:B:307:TYR:CD2	2.42	0.54
1:A:238:PHE:H	1:A:243:HIS:CD2	2.25	0.54
1:A:410:GLY:HA2	1:A:530:ALA:HB2	1.93	0.51
1:A:380:VAL:HG22	1:A:453:LYS:HD2	1.93	0.51
1:A:176:THR:H	1:A:179:ASN:ND2	2.10	0.50
1:B:194:PRO:HB3	1:B:277:LEU:HD22	1.95	0.49
1:B:209:SER:O	1:B:228:HIS:HE1	1.95	0.49
1:B:188:ILE:HD12	1:B:266:LEU:HD21	1.93	0.49
1:A:270:PRO:HD3	1:A:307:TYR:CD2	2.48	0.49
1:A:313:ASP:HB3	2:A:739:HOH:O	2.12	0.49
1:B:165:PHE:HA	1:B:572:ILE:HD11	1.95	0.48
1:B:461:TYR:CE1	1:B:570:TRP:HD1	2.33	0.47
1:B:491:SER:H	1:B:494:GLN:HE21	1.62	0.47
1:A:407:LEU:HA	1:A:437:ALA:HB3	1.96	0.46
1:B:407:LEU:HA	1:B:437:ALA:HB3	1.98	0.46
1:B:419:ASP:HB2	2:B:755:HOH:O	2.14	0.46
1:B:572:ILE:H	1:B:572:ILE:HG13	1.67	0.45
1:B:117:ASP:OD1	1:B:119:THR:HG23	2.17	0.44
1:A:461:TYR:CE1	1:A:570:TRP:HD1	2.36	0.44
1:B:231:TRP:HA	1:B:235:GLN:HE21	1.83	0.44
1:A:188:ILE:HD12	1:A:266:LEU:HD21	1.99	0.44
1:B:78:TYR:HA	1:B:114:GLU:O	2.18	0.43
1:B:176:THR:H	1:B:179:ASN:ND2	2.16	0.43
1:A:191:GLY:HA2	1:A:192:PHE:HA	1.72	0.43
1:B:247:THR:HA	1:B:248:PRO:HD3	1.88	0.42
1:B:81:TYR:O	1:B:111:MET:HA	2.20	0.41
1:B:351:GLU:HG2	1:B:356:ARG:O	2.19	0.41
1:B:286:ASP:HB2	2:B:772:HOH:O	2.20	0.41
1:B:57:TYR:HB2	1:B:303:THR:HG23	2.01	0.41
1:A:209:SER:O	1:A:228:HIS:HE1	2.03	0.41

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:491:SER:H	1:A:494:GLN:HE21	1.67	0.41
1:A:234:TYR:HA	1:A:250:LYS:O	2.21	0.41
1:A:570:TRP:HA	1:A:571:GLU:HA	1.90	0.40
1:B:344:ARG:C	1:B:344:ARG:HD3	2.39	0.40
1:B:508:LYS:HA	1:B:512:LEU:HB2	2.03	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:A:1108:HOH:O	2:A:1112:HOH:O[1_445]	2.00	0.20

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	565/584 (97%)	552 (98%)	12 (2%)	1 (0%)	56	51
1	B	565/584 (97%)	547 (97%)	18 (3%)	0	100	100
All	All	1130/1168 (97%)	1099 (97%)	30 (3%)	1 (0%)	59	55

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	171	TYR

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.

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	454/469 (97%)	450 (99%)	4 (1%)	87	90
1	B	454/469 (97%)	451 (99%)	3 (1%)	91	93
All	All	908/938 (97%)	901 (99%)	7 (1%)	89	92

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	68	ASN
1	A	404	GLN
1	A	423	VAL
1	A	572	ILE
1	B	119	THR
1	B	423	VAL
1	B	572	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	34	ASN
1	A	179	ASN
1	A	228	HIS
1	A	235	GLN
1	A	243	HIS
1	A	403	HIS
1	A	494	GLN
1	A	516	ASN
1	A	529	GLN
1	B	179	ASN
1	B	228	HIS
1	B	235	GLN
1	B	243	HIS
1	B	403	HIS
1	B	494	GLN

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	567/584 (97%)	-0.44	6 (1%) 77 78	9, 14, 21, 29	0
1	B	567/584 (97%)	-0.24	20 (3%) 42 41	8, 14, 32, 38	0
All	All	1134/1168 (97%)	-0.34	26 (2%) 57 57	8, 14, 27, 38	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	22	ALA	7.6
1	B	118	ALA	7.0
1	B	119	THR	5.2
1	B	31	TYR	4.5
1	B	205	VAL	4.5
1	B	121	CYS	3.8
1	B	514	ALA	3.7
1	A	119	THR	3.7
1	A	245	TYR	3.5
1	B	120	GLY	3.2
1	B	428	GLU	3.1
1	B	92	ILE	2.9
1	A	425	GLU	2.8
1	B	204	SER	2.7
1	A	154	ASN	2.5
1	A	325	ASP	2.5
1	B	93	THR	2.5
1	B	425	GLU	2.4
1	B	117	ASP	2.4
1	B	116	CYS	2.3
1	B	245	TYR	2.3
1	B	426	ASN	2.3
1	B	73	THR	2.3
1	B	206	GLY	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	427	GLY	2.1
1	A	428	GLU	2.0

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.