

Full wwPDB X-ray Structure Validation Report (i)

Jan 16, 2024 – 12:34 am GMT

PDB ID : 6RZO

Title: Crystal structure of the N-terminal carbohydrate binding module family 48

and ferulic acid esterase from the multi-enzyme CE1-GH62-GH10

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Deposited on : 2019-06-13

Resolution : 1.63 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

https://www.wwpdb.org/validation/2017/XrayValidationReportHelp with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

MolProbity : 4.02b-467 Xtriage (Phenix) : 1.13

Phenix) : 1.13 EDS : 2.36

Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)

 $Refmac \quad : \quad 5.8.0158$

CCP4 : 7.0.044 (Gargrove)

Ideal geometry (proteins) : Engh & Huber (2001) Ideal geometry (DNA, RNA) : Parkinson et al. (1996)

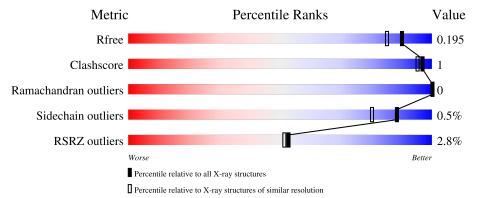
Validation Pipeline (wwPDB-VP) : 2.36

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 1.63 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	$\begin{array}{c} \text{Whole archive} \\ (\#\text{Entries}) \end{array}$	Similar resolution $(\# \text{Entries, resolution range}(\text{\AA}))$
R_{free}	130704	3122 (1.66-1.62)
Clashscore	141614	3268 (1.66-1.62)
Ramachandran outliers	138981	3215 (1.66-1.62)
Sidechain outliers	138945	3215 (1.66-1.62)
RSRZ outliers	127900	3079 (1.66-1.62)

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 of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. 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.

Mol	Chain	Length	Quality of chain
1	A	344	97%
2	В	345	94%



2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 11609 atoms, of which 5250 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 Ferulic acid esterase.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace		
1	A	344	Total 5389	C 1743	H 2638	N 489	O 509	S 10	0	1	0

• Molecule 2 is a protein called Ferulic acid esterase.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace			
2	В	339	Total 5344	C 1732	H 2612	N 483	O 506	S 11	0	3	0

• Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	439	Total O 439 439	0	0
3	В	437	Total O 437 437	0	0



3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes 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: Ferulic acid esterase

Chain A:

97%

• Molecule 2: Ferulic acid esterase

Chain B:

94%

• Molecule 2: Ferulic acid esterase



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants	66.59Å 99.82Å 114.43Å	Depositor
a, b, c, α , β , γ	90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.64 - 1.63	Depositor
rtesolution (A)	49.64 - 1.63	EDS
% Data completeness	94.4 (49.64-1.63)	Depositor
(in resolution range)	94.4 (49.64-1.63)	EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) > 1$	1.51 (at 1.63Å)	Xtriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
D D.	0.170 , 0.195	Depositor
R, R_{free}	0.171 , 0.195	DCC
R_{free} test set	4438 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	18.3	Xtriage
Anisotropy	0.235	Xtriage
Bulk solvent $k_{sol}(e/Å^3)$, $B_{sol}(Å^2)$	0.35, 43.9	EDS
L-test for twinning ²	$ < L >=0.49, < L^2>=0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11609	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: The largest off-origin peak in the Patterson function is 3.81% of the height of the origin peak. No significant pseudotranslation is detected.

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



¹Intensities estimated from amplitudes.

5 Model quality (i)

5.1 Standard geometry (i)

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		
IVIOI	Chain	RMSZ	# Z > 5	RMSZ	# Z > 5	
1	A	0.50	0/2825	0.60	0/3831	
2	В	0.52	0/2805	0.60	0/3803	
All	All	0.51	0/5630	0.60	0/7634	

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)

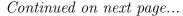
In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2751	2638	2653	4	0
2	В	2732	2612	2629	7	1
3	A	439	0	0	1	0
3	В	437	0	0	0	1
All	All	6359	5250	5282	10	1

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

Atom-1	Atom-2	$\begin{array}{c} {\rm Interatomic} \\ {\rm distance} \ ({\rm \AA}) \end{array}$	Clash overlap (Å)
2:B:298:PRO:O	2:B:301[B]:PHE:CD2	2.54	0.60





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	J	1	1

Atom-1	Atom-2	$egin{array}{c} ext{Interatomic} \ ext{distance} \ (ext{Å}) \end{array}$	Clash overlap (Å)
1:A:166[B]:ASN:OD1	3:A:401:HOH:O	2.17	0.59
1:A:68:TYR:CZ	1:A:88:GLY:HA3	2.48	0.48
2:B:119:ILE:HD12	2:B:222:TYR:CE1	2.50	0.46
2:B:297:ASN:O	2:B:300:ARG:HB2	2.17	0.45
1:A:337:PHE:CZ	1:A:341:LEU:HD21	2.52	0.44
2:B:337:PHE:CZ	2:B:341:LEU:HD21	2.53	0.43
1:A:74:ASP:OD2	2:B:74:ASP:OD2	2.39	0.41
2:B:27:ARG:HA	2:B:55:TRP:O	2.21	0.41
2:B:241:LEU:HA	2:B:265:PHE:O	2.21	0.41

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	$egin{aligned} & ext{Interatomic} \ & ext{distance} \ & ext{(Å)} \end{aligned}$	$egin{array}{c} { m Clash} \\ { m overlap} \ ({ m \AA}) \end{array}$
2:B:204:ARG:N	3:B:483:HOH:O[4_456]	2.18	0.02

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	Perce	\mathbf{ntiles}
1	A	343/344 (100%)	334 (97%)	9 (3%)	0	100	100
2	В	338/345 (98%)	330 (98%)	8 (2%)	0	100	100
All	All	681/689 (99%)	664 (98%)	17 (2%)	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	Percer	ntiles
1	A	291/290 (100%)	288 (99%)	3 (1%)	76	59
2	В	$290/291 \; (100\%)$	290 (100%)	0	100	100
All	All	581/581 (100%)	578 (100%)	3 (0%)	88	80

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	142	LYS
1	A	198	ILE
1	A	204	ARG

Sometimes 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 monosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

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)

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, 95^{th} 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	$\langle { m RSRZ} \rangle$	# RSRZ > 2	$OWAB(Å^2)$	Q<0.9
1	A	344/344 (100%)	-0.21	9 (2%) 56 55	12, 21, 43, 72	0
2	В	339/345~(98%)	-0.16	10 (2%) 51 50	12, 20, 40, 76	0
All	All	683/689 (99%)	-0.19	19 (2%) 53 51	12, 20, 41, 76	0

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	В	301[A]	PHE	6.2
1	A	200	PHE	5.2
2	В	300	ARG	4.8
1	A	198	ILE	4.4
2	В	204	ARG	4.3
2	В	0	MET	4.1
2	В	283	GLN	3.9
1	A	0	MET	3.6
1	A	199	ARG	3.5
2	В	144	LEU	3.2
2	В	299	GLY	3.2
2	В	298	PRO	2.9
2	В	297	ASN	2.7
2	В	51	GLU	2.4
1	A	310	GLN	2.2
1	A	312	GLY	2.2
1	A	283	GLN	2.1
1	A	313	ILE	2.1
1	A	302	ARG	2.0

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

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



6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.

