



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 14, 2020 – 04:28 AM BST

PDB ID : 6M4K
Title : X-ray crystal structure of wild type alpha-amylase I from Eisenia fetida
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Deposited on : 2020-03-07
Resolution : 1.30 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 ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : **FAILED**
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.14.4.dev1

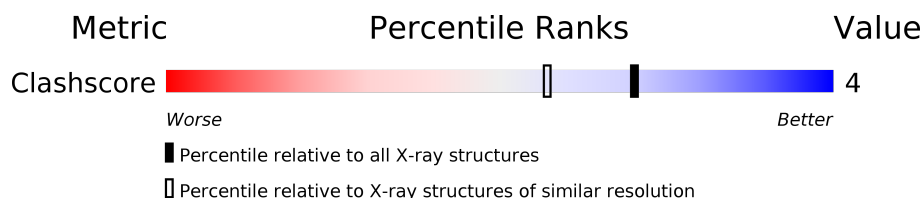
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.30 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	141614	1101 (1.30-1.30)

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 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 $\leq 5\%$

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	520	88% 7% 5%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 5312 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 Alpha-amylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	496	4506	2826	789	866	25	0	87	0

There are 27 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	14	GLU	-	expression tag	UNP A0A173N065
A	15	ALA	-	expression tag	UNP A0A173N065
A	16	GLU	-	expression tag	UNP A0A173N065
A	17	PHE	-	expression tag	UNP A0A173N065
A	511	PHE	-	expression tag	UNP A0A173N065
A	512	LEU	-	expression tag	UNP A0A173N065
A	513	GLU	-	expression tag	UNP A0A173N065
A	514	GLN	-	expression tag	UNP A0A173N065
A	515	LYS	-	expression tag	UNP A0A173N065
A	516	LEU	-	expression tag	UNP A0A173N065
A	517	ILE	-	expression tag	UNP A0A173N065
A	518	SER	-	expression tag	UNP A0A173N065
A	519	GLU	-	expression tag	UNP A0A173N065
A	520	GLU	-	expression tag	UNP A0A173N065
A	521	ASP	-	expression tag	UNP A0A173N065
A	522	LEU	-	expression tag	UNP A0A173N065
A	523	ASN	-	expression tag	UNP A0A173N065
A	524	SER	-	expression tag	UNP A0A173N065
A	525	ALA	-	expression tag	UNP A0A173N065
A	526	VAL	-	expression tag	UNP A0A173N065
A	527	ASP	-	expression tag	UNP A0A173N065
A	528	HIS	-	expression tag	UNP A0A173N065
A	529	HIS	-	expression tag	UNP A0A173N065
A	530	HIS	-	expression tag	UNP A0A173N065
A	531	HIS	-	expression tag	UNP A0A173N065
A	532	HIS	-	expression tag	UNP A0A173N065
A	533	HIS	-	expression tag	UNP A0A173N065

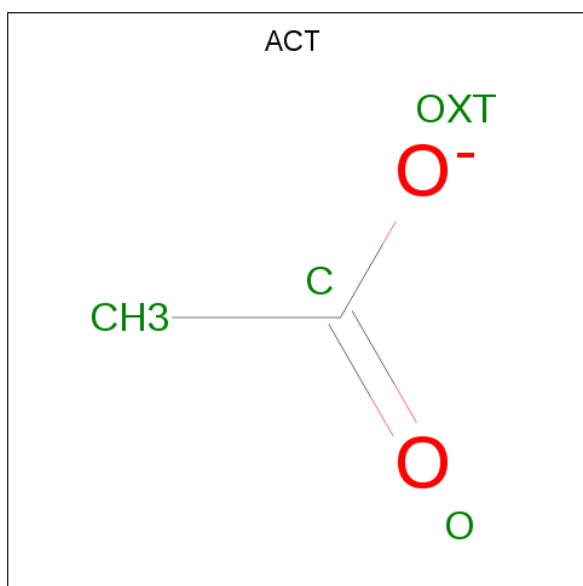
- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by author).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Ca 1 1	0	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl) (labeled as "Ligand of Interest" by author).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Cl 1 1	0	0

- Molecule 4 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



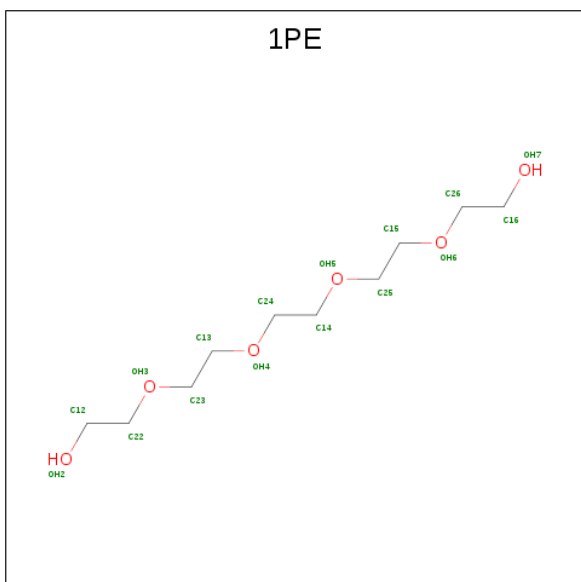
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



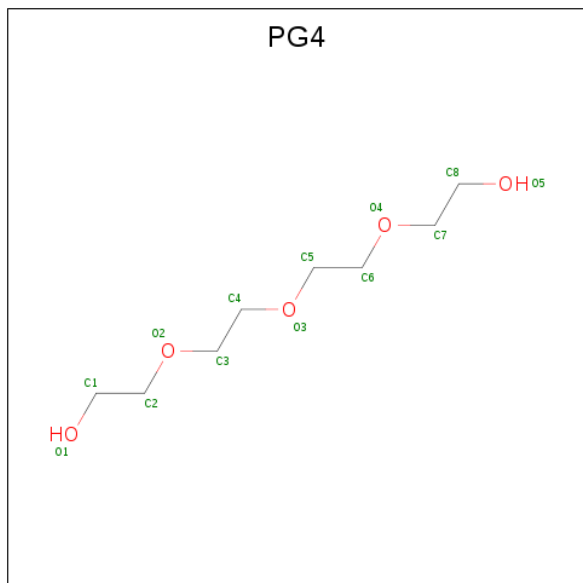
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 6 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: $C_{10}H_{22}O_6$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			16	10	6		

- Molecule 7 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			13	8	5		
7	A	1	Total	C	O	0	0
			13	8	5		

- Molecule 8 is water.


Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	733	Total	O	0	0
			733	733		

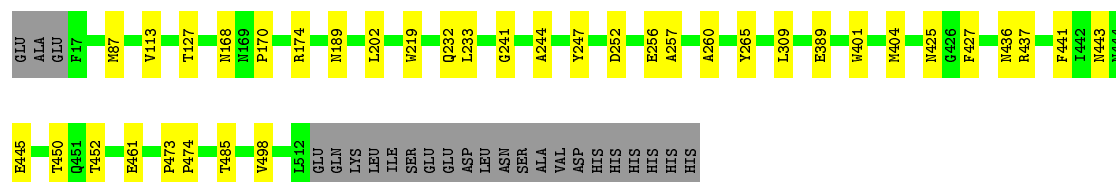
3 Residue-property plots [i](#)

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. 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. 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: Alpha-amylase

Chain A: 



4 Data and refinement statistics

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	96.25Å 96.25Å 121.98Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	49.22 – 1.30	Depositor
% Data completeness (in resolution range)	100.0 (49.22-1.30)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.64 (at 1.30Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.167 , 0.183	Depositor
Wilson B-factor (Å ²)	16.5	Xtriage
Anisotropy	0.215	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.021 for -h,-k,l	Xtriage
Total number of atoms	5312	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.01% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 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: CL, CA, 1PE, PG4, SO4, ACT

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	0.33	0/4678	0.58	0/6362

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	4506	0	4145	30	0
2	A	1	0	0	0	0
3	A	1	0	0	0	0
4	A	4	0	3	0	0
5	A	25	0	0	2	0
6	A	16	0	22	0	0
7	A	26	0	36	0	0
8	A	733	0	0	12	0
All	All	5312	0	4206	32	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 4.

All (32) 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:A:437[B]:ARG:NH1	8:A:705:HOH:O	2.17	0.77
5:A:606:SO4:O1	8:A:701:HOH:O	2.05	0.74
1:A:452[B]:THR:OG1	8:A:702:HOH:O	2.08	0.71
1:A:450[A]:THR:HG22	8:A:702:HOH:O	1.92	0.70
1:A:425[A]:ASN:ND2	1:A:445[A]:GLU:OE2	2.21	0.69
1:A:461[B]:GLU:HG3	1:A:485:THR:HG21	1.76	0.67
5:A:605:SO4:O3	8:A:703:HOH:O	2.10	0.65
1:A:461[B]:GLU:HG2	1:A:473:PRO:HG2	1.83	0.60
1:A:168:ASN:HA	1:A:257[B]:ALA:HB2	1.84	0.60
1:A:436:ASN:OD1	8:A:705:HOH:O	2.16	0.60
1:A:461[B]:GLU:HG3	1:A:485:THR:CG2	2.36	0.55
1:A:441[A]:PHE:CD1	1:A:498[A]:VAL:HG21	2.43	0.52
1:A:441[A]:PHE:HE1	1:A:443[A]:ASN:HB2	1.74	0.51
1:A:189[A]:ASN:OD1	8:A:706:HOH:O	2.19	0.51
1:A:265[B]:TYR:OH	8:A:704:HOH:O	2.16	0.51
1:A:87:MET:CE	1:A:202[B]:LEU:HD21	2.42	0.50
1:A:174[A]:ARG:HD3	1:A:219:TRP:CD2	2.48	0.49
1:A:252:ASP:HB3	1:A:260[B]:ALA:HB2	1.95	0.49
1:A:401:TRP:HB2	1:A:404[B]:MET:HG3	1.97	0.46
1:A:252:ASP:OD2	1:A:260[B]:ALA:N	2.36	0.44
1:A:113:VAL:HG21	1:A:202[A]:LEU:HD23	2.00	0.43
1:A:265[B]:TYR:HB3	8:A:741:HOH:O	2.17	0.43
1:A:127[B]:THR:HG22	8:A:1161:HOH:O	2.18	0.42
1:A:473:PRO:HA	1:A:474:PRO:C	2.39	0.42
1:A:425[A]:ASN:C	1:A:427[A]:PHE:H	2.23	0.42
1:A:170:PRO:O	1:A:174[B]:ARG:HD3	2.19	0.42
1:A:461[B]:GLU:HG2	1:A:473:PRO:CG	2.47	0.42
1:A:389[A]:GLU:OE1	8:A:707:HOH:O	2.21	0.41
1:A:232:GLN:OE1	1:A:241:GLY:HA2	2.20	0.41
1:A:247:TYR:CD2	1:A:309:LEU:HG	2.55	0.41
1:A:256[A]:GLU:OE2	8:A:708:HOH:O	2.21	0.41
1:A:233:LEU:HD21	1:A:244:ALA:HA	2.02	0.40

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 [i](#)

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

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](#)

Of 11 ligands modelled in this entry, 2 are monoatomic - leaving 9 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	$\# Z > 2$
4	ACT	A	603	-	1,3,3	1.22	0	0,3,3	0.00	-
6	1PE	A	609	-	15,15,15	0.53	0	14,14,14	0.16	0
5	SO4	A	605	-	4,4,4	0.12	0	6,6,6	0.16	0
5	SO4	A	606	-	4,4,4	0.12	0	6,6,6	0.28	0
5	SO4	A	608	-	4,4,4	0.16	0	6,6,6	0.12	0
5	SO4	A	604	-	4,4,4	0.13	0	6,6,6	0.14	0
7	PG4	A	610	-	12,12,12	0.52	0	11,11,11	0.27	0
5	SO4	A	607	-	4,4,4	0.14	0	6,6,6	0.05	0
7	PG4	A	611	-	12,12,12	0.51	0	11,11,11	0.22	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
7	PG4	A	610	-	-	0/10/10/10	-
6	1PE	A	609	-	-	3/13/13/13	-
7	PG4	A	611	-	-	0/10/10/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	609	1PE	OH4-C13-C23-OH3
6	A	609	1PE	C23-C13-OH4-C24
6	A	609	1PE	C14-C24-OH4-C13

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	605	SO4	1	0
5	A	606	SO4	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

6.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

6.4 Ligands

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers

EDS failed to run properly - this section is therefore empty.