



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 01:31 AM GMT

PDB ID : 2DBT
Title : Crystal structure of chitinase C from Streptomyces griseus HUT6037
Authors : Kezuka, Y.; Watanabe, T.; Nonaka, T.
Deposited on : 2005-12-16
Resolution : 3.14 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 ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
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

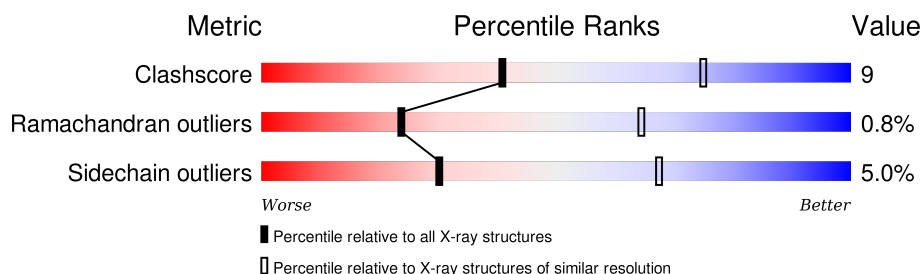
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.14 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	1202 (3.18-3.10)
Ramachandran outliers	100387	1162 (3.18-3.10)
Sidechain outliers	100360	1162 (3.18-3.10)

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 $\leq 5\%$. 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 was not executed.

Mol	Chain	Length	Quality of chain
1	A	265	
1	B	265	
1	C	265	

2 Entry composition [i](#)

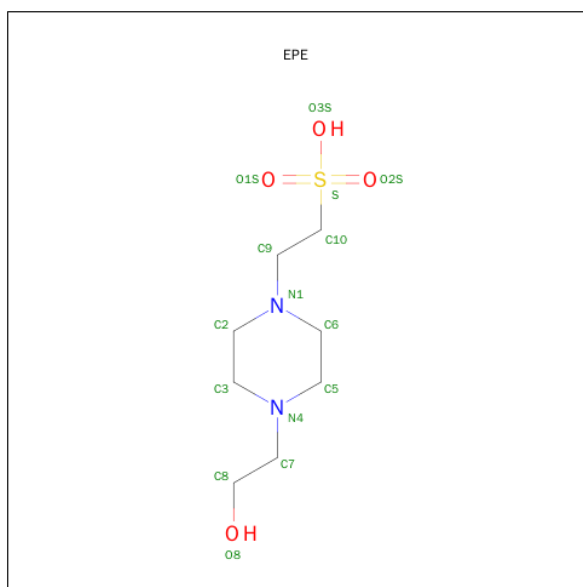
There are 3 unique types of molecules in this entry. The entry contains 4794 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 chitinase C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	205	Total	C	N	O	S	0	0	0
			1576	999	269	302	6			
1	B	205	Total	C	N	O	S	0	0	0
			1576	999	269	302	6			
1	C	205	Total	C	N	O	S	0	0	0
			1576	999	269	302	6			

- Molecule 2 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula: C₈H₁₈N₂O₄S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
2	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
2	C	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	8	Total 8	O 8	0	0
3	B	6	Total 6	O 6	0	0
3	C	7	Total 7	O 7	0	0

Note EDS was not executed.

- Chain A:
-
- 63% 13% 23%
- ALA THR CYS ALA THR ALA TRP SER SER SER VAL TYR THR ASN GLY GLY THR VAL SER SER TYR ASN GLY ARG ASN THR THR LYS TRP THR THR THR GLN ASN GLU ARG ARG PRO GLY THR SER ASP VAL TRP ALA LYS ASP GLY GLN THR GLY GLU GLY PRO GLY ASN
- G90 I99 F102 R105 Y109 K126 D130 E131 Y132 K133 E136 M143 L151 K155 M161 H164 Y165 Q178 S190 W191 Y211 L212 Q215 Y227 Q231 H240 N241 A242 I253 G258 C262 V263 G264 G265 N266 Q269
- S272 R273 K276 F277 T278 Q279 T286 C294

- Chain B:
-

- [illegible]

4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	153.12Å 153.12Å 90.03Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	58.32 – 3.14	Depositor
% Data completeness (in resolution range)	100.0 (58.32-3.14)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	0.07	Depositor
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.174 , 0.225	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4794	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: EPE

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	0.58	0/1620	0.65	0/2207
1	B	0.58	0/1620	0.64	0/2207
1	C	0.52	0/1620	0.61	0/2207
All	All	0.56	0/4860	0.64	0/6621

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

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	1576	0	1479	24	0
1	B	1576	0	1479	33	0
1	C	1576	0	1479	27	0
2	A	15	0	17	0	0
2	B	15	0	17	2	0
2	C	15	0	17	0	0
3	A	8	0	0	0	0
3	B	6	0	0	0	0
3	C	7	0	0	0	0
All	All	4794	0	4488	80	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 9.

All (80) 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:B:232:ASN:HB3	1:B:237:MET:O	1.72	0.90
1:A:164:HIS:ND1	1:C:164:HIS:HB3	1.95	0.81
1:A:126:LYS:HA	1:A:133:LYS:HD3	1.63	0.79
1:B:102:PHE:O	1:B:105:ARG:HG2	1.92	0.69
1:A:99:ASN:OD1	1:A:105:ARG:NH1	2.26	0.68
1:B:248:GLY:HA3	1:B:291:ASN:HB2	1.78	0.65
1:A:272:SER:O	1:A:276:LYS:HD2	1.97	0.64
1:B:99:ASN:OD1	1:B:105:ARG:NH1	2.31	0.64
1:B:232:ASN:HB3	1:B:237:MET:C	2.19	0.62
1:B:211:TYR:HB3	1:B:215:GLN:HE22	1.65	0.61
1:A:253:ILE:HG12	1:A:273:ARG:HD2	1.83	0.61
1:A:164:HIS:HA	1:C:164:HIS:HB3	1.84	0.60
1:A:190:SER:O	1:A:191:TRP:HB2	2.02	0.60
1:A:164:HIS:HA	1:C:164:HIS:CB	2.33	0.58
1:A:102:PHE:O	1:A:105:ARG:HG2	2.02	0.58
1:C:184:ARG:HB2	1:C:213:VAL:HG12	1.86	0.56
1:B:258:GLY:HA2	1:B:262:CYS:SG	2.47	0.54
1:C:257:ASN:HD22	1:C:261:GLU:HG3	1.73	0.53
1:B:190:SER:O	1:B:191:TRP:HB2	2.08	0.53
1:C:91:PHE:CE2	1:C:93:VAL:HB	2.44	0.53
1:B:232:ASN:CB	1:B:237:MET:O	2.54	0.51
1:C:165:TYR:CD2	1:C:182:TYR:HA	2.46	0.50
1:B:209:ASN:HD21	1:B:212:LEU:HG	1.77	0.50
1:B:143:ASN:O	1:B:147:GLU:HG2	2.12	0.50
1:C:204:ILE:HD13	1:C:219:VAL:HG22	1.93	0.50
1:B:114:LEU:HD13	1:B:221:TRP:CE3	2.48	0.49
1:B:146:HIS:CE1	1:B:269:GLN:HG3	2.46	0.49
1:B:134:LYS:HD2	1:B:284:LEU:HB3	1.94	0.48
1:B:109:TYR:CG	1:B:151:LEU:HD22	2.48	0.48
1:C:288:THR:HB	1:C:292:LEU:HD21	1.95	0.48
1:A:136:GLU:OE2	1:A:240:HIS:ND1	2.44	0.48
1:A:164:HIS:CG	1:C:164:HIS:HB3	2.48	0.47
1:C:281:THR:HG22	1:C:286:THR:HG23	1.96	0.47
1:B:181:TYR:CE1	1:B:210:PRO:HG3	2.49	0.47
1:A:241:ASN:O	1:A:242:ALA:C	2.53	0.47
1:A:266:ASN:OD1	1:A:269:GLN:HG3	2.15	0.47
1:A:164:HIS:CE1	1:C:163:PRO:HG2	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:257:ASN:ND2	1:C:261:GLU:HG3	2.29	0.46
1:B:257:ASN:O	1:B:259:ALA:N	2.49	0.46
1:B:196:LYS:HB2	1:B:207:LEU:HD13	1.96	0.46
1:C:184:ARG:HB2	1:C:213:VAL:CG1	2.46	0.46
2:B:295:EPE:H101	2:B:295:EPE:H22	1.64	0.46
1:B:205:ASN:ND2	1:B:208:ALA:HB2	2.30	0.46
1:C:161:ASN:C	1:C:163:PRO:HD2	2.35	0.46
1:A:227:TYR:HA	1:A:231:GLN:HG2	1.97	0.46
1:C:206:LEU:HD22	1:C:213:VAL:HG23	1.97	0.45
1:C:280:PHE:N	1:C:280:PHE:CD1	2.83	0.45
1:B:91:PHE:CE2	1:B:93:VAL:HB	2.52	0.45
1:B:115:THR:HA	1:B:118:LEU:HD12	1.99	0.45
1:B:211:TYR:HB3	1:B:215:GLN:NE2	2.32	0.44
1:B:266:ASN:ND2	1:B:269:GLN:HB2	2.31	0.44
1:A:264:GLY:O	1:A:265:GLY:C	2.55	0.44
1:A:131:GLU:HG2	1:A:286:THR:OG1	2.18	0.43
1:C:174:CYS:HB3	1:C:181:TYR:CE2	2.52	0.43
1:B:261:GLU:CD	1:B:269:GLN:HG2	2.38	0.43
1:B:109:TYR:CD2	1:B:151:LEU:HD22	2.54	0.43
1:A:143:ASN:OD1	1:A:273:ARG:HD3	2.19	0.43
1:B:198:ALA:HB2	1:B:226:TRP:CE3	2.54	0.42
1:A:258:GLY:HA2	1:A:262:CYS:SG	2.59	0.42
1:A:155:LYS:HG2	1:A:155:LYS:H	1.59	0.42
1:C:189:LEU:HD12	1:C:189:LEU:HA	1.86	0.42
1:A:165:TYR:O	1:A:191:TRP:HA	2.20	0.42
1:A:109:TYR:CG	1:A:151:LEU:HD22	2.55	0.42
1:B:229:ASN:OD1	1:B:240:HIS:HB2	2.19	0.42
1:C:253:ILE:HG12	1:C:273:ARG:HD2	2.01	0.42
1:C:172:TYR:OH	1:C:193:PHE:HA	2.19	0.42
1:C:121:TYR:CZ	1:C:226:TRP:HA	2.54	0.42
1:B:167:ASP:O	1:B:192:ASN:ND2	2.50	0.41
1:A:211:TYR:HB3	1:A:215:GLN:NE2	2.36	0.41
1:C:162:TYR:N	1:C:163:PRO:HD2	2.36	0.41
1:B:126:LYS:HA	1:B:133:LYS:HD3	2.03	0.41
1:A:211:TYR:HB3	1:A:215:GLN:HE22	1.86	0.41
1:C:174:CYS:HB3	1:C:181:TYR:HE2	1.85	0.41
1:B:239:PRO:O	1:B:242:ALA:HB3	2.20	0.41
1:B:92:VAL:HG21	1:B:134:LYS:HA	2.03	0.40
1:B:188:GLN:O	2:B:295:EPE:H101	2.22	0.40
1:C:192:ASN:N	1:C:192:ASN:OD1	2.54	0.40
1:C:159:GLU:HA	1:C:162:TYR:CD1	2.56	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:280:PHE:HD1	1:C:280:PHE:N	2.18	0.40
1:B:243:ILE:HD11	1:B:252:THR:HG21	2.03	0.40

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	203/265 (77%)	185 (91%)	17 (8%)	1 (0%)	34	74
1	B	203/265 (77%)	182 (90%)	18 (9%)	3 (2%)	13	48
1	C	203/265 (77%)	188 (93%)	14 (7%)	1 (0%)	34	74
All	All	609/795 (77%)	555 (91%)	49 (8%)	5 (1%)	24	64

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	258	GLY
1	B	258	GLY
1	B	129	SER
1	B	169	THR
1	C	191	TRP

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	160/203 (79%)	151 (94%)	9 (6%)	26	62
1	B	160/203 (79%)	153 (96%)	7 (4%)	35	72
1	C	160/203 (79%)	152 (95%)	8 (5%)	30	67
All	All	480/609 (79%)	456 (95%)	24 (5%)	30	67

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	105	ARG
1	A	130	ASP
1	A	155	LYS
1	A	161	ASN
1	A	178	GLN
1	A	212	LEU
1	A	276	LYS
1	A	278	THR
1	A	279	GLN
1	B	105	ARG
1	B	130	ASP
1	B	204	ILE
1	B	212	LEU
1	B	236	THR
1	B	237	MET
1	B	269	GLN
1	C	127	THR
1	C	243	ILE
1	C	269	GLN
1	C	271	GLN
1	C	272	SER
1	C	278	THR
1	C	281	THR
1	C	293	SER

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	161	ASN
1	A	178	GLN
1	A	194	ASN
1	A	215	GLN
1	A	241	ASN

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Mol	Chain	Res	Type
1	A	257	ASN
1	B	161	ASN
1	B	209	ASN
1	B	215	GLN
1	B	241	ASN
1	B	245	ASN
1	B	246	ASN
1	C	178	GLN
1	C	279	GLN
1	C	282	GLN

5.3.3 RNA ⓘ

There are no RNA molecules 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 ⓘ

3 ligands are modelled in this entry.

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	EPE	A	295	-	14,15,15	0.45	0	18,20,20	2.10	8 (44%)
2	EPE	B	295	-	14,15,15	0.41	0	18,20,20	2.32	7 (38%)
2	EPE	C	295	-	14,15,15	0.36	0	18,20,20	2.20	6 (33%)

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	EPE	A	295	-	-	0/9/19/19	0/1/1/1
2	EPE	B	295	-	-	0/9/19/19	0/1/1/1
2	EPE	C	295	-	-	0/9/19/19	0/1/1/1

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	295	EPE	O3S-S-O2S	-2.44	105.94	111.61
2	B	295	EPE	C9-N1-C6	-2.20	105.61	111.27
2	C	295	EPE	C9-N1-C6	-2.18	105.69	111.27
2	B	295	EPE	O3S-S-O1S	-2.15	106.60	111.61
2	A	295	EPE	O3S-S-O1S	-2.07	106.78	111.61
2	A	295	EPE	C5-C6-N1	2.22	114.60	110.63
2	A	295	EPE	C6-C5-N4	2.32	114.79	110.63
2	A	295	EPE	C7-N4-C3	2.33	117.23	111.27
2	B	295	EPE	C7-N4-C5	2.57	117.84	111.27
2	A	295	EPE	O2S-S-C10	2.65	109.17	106.91
2	C	295	EPE	C7-N4-C3	2.77	118.36	111.27
2	A	295	EPE	C7-N4-C5	2.79	118.43	111.27
2	B	295	EPE	C7-N4-C3	2.99	118.93	111.27
2	C	295	EPE	C6-C5-N4	3.03	116.05	110.63
2	B	295	EPE	C6-C5-N4	3.28	116.51	110.63
2	A	295	EPE	C5-N4-C3	3.38	116.22	108.90
2	B	295	EPE	O1S-S-C10	3.80	110.15	106.91
2	C	295	EPE	C5-N4-C3	4.03	117.62	108.90
2	A	295	EPE	O1S-S-C10	4.83	111.03	106.91
2	C	295	EPE	O2S-S-C10	5.85	111.89	106.91
2	B	295	EPE	C5-N4-C3	6.13	122.18	108.90

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	295	EPE	2	0

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 ⓘ

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.