



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 12:45 PM UTC

PDB ID : 4EK7 / pdb_00004ek7
Title : High speed X-ray analysis of plant enzymes at room temperature
Authors : Xia, L.; Rajendran, C.; Ruppert, M.; Panjikar, S.; Wang, M.; Stoeckigt, J.
Deposited on : 2012-04-09
Resolution : 2.30 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

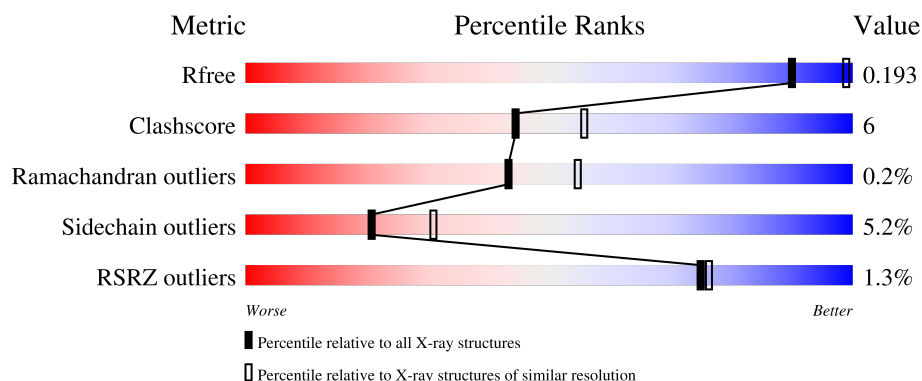
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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))
R_{free}	180053	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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 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 $\leq 5\%$. 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.

Mol	Chain	Length	Quality of chain
1	A	513	%
1	B	513	%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	CL	B	601	-	-	X	-

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7792 atoms, of which 12 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.

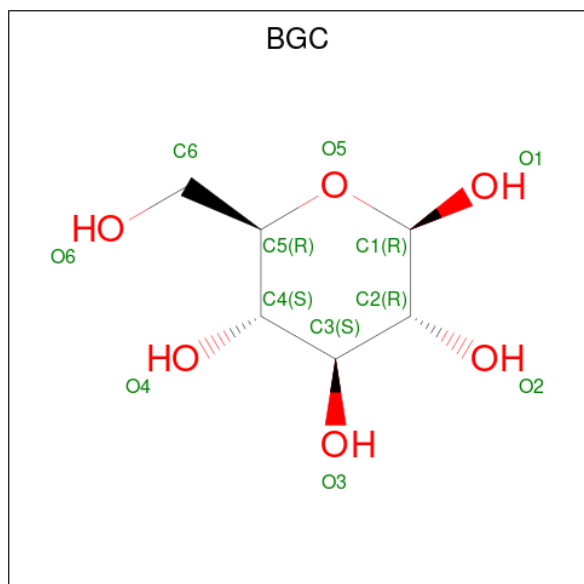
- Molecule 1 is a protein called Raucaffricine-O-beta-D-glucosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	470	Total	C	N	O	S	0	0	0
			3766	2410	640	703	13			
1	B	470	Total	C	N	O	S	0	0	0
			3766	2410	640	703	13			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	186	GLN	GLU	engineered mutation	UNP Q9SPP9
B	186	GLN	GLU	engineered mutation	UNP Q9SPP9

- Molecule 2 is beta-D-glucopyranose (CCD ID: BGC) (formula: C₆H₁₂O₆).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	0	0
			24	6	12	6		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			12	6	6		

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	2	Total	Cl	0	0
			2	2		

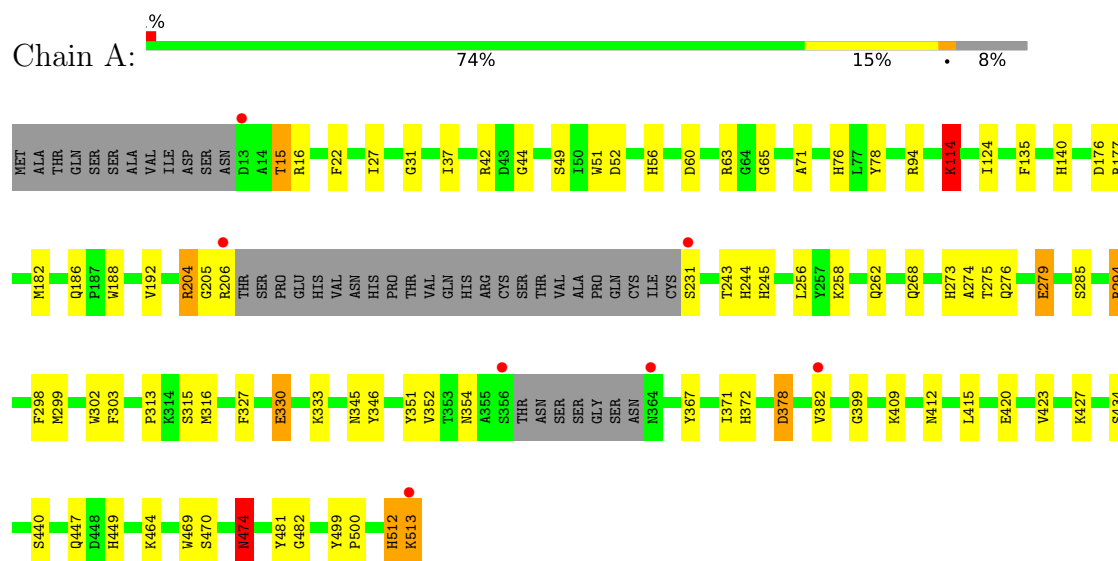
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	109	Total	O	0	0
			109	109		
4	B	113	Total	O	0	0
			113	113		

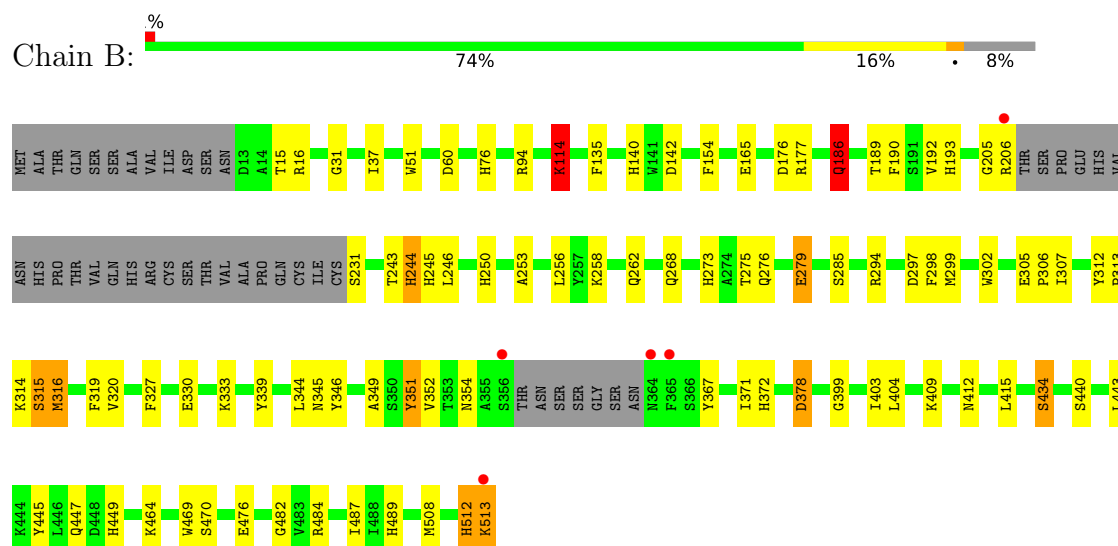
3 Residue-property plots [i](#)

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: Raucaffricine-O-beta-D-glucosidase



• Molecule 1: Raucaffricine-O-beta-D-glucosidase



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	105.56Å 129.52Å 216.64Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.75 – 2.30 47.75 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.3 (47.75-2.30) 99.6 (47.75-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.91 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.151 , 0.192 0.156 , 0.193	Depositor DCC
R_{free} test set	3288 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	41.4	Xtriage
Anisotropy	0.056	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 39.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7792	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.58% 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

5.1 Standard geometry

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

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	1.44	20/3877 (0.5%)	1.23	17/5263 (0.3%)
1	B	1.44	25/3877 (0.6%)	1.26	13/5263 (0.2%)
All	All	1.44	45/7754 (0.6%)	1.25	30/10526 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
All	All	0	2

All (45) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	245	HIS	CE1-NE2	8.16	1.40	1.32
1	B	449	HIS	ND1-CE1	7.50	1.40	1.32
1	A	245	HIS	CE1-NE2	7.33	1.39	1.32
1	B	245	HIS	CG-CD2	6.95	1.43	1.35
1	B	351	TYR	C-O	6.87	1.32	1.23
1	B	140	HIS	CG-CD2	6.78	1.43	1.35
1	A	449	HIS	ND1-CE1	6.73	1.39	1.32
1	B	243	THR	C-O	6.73	1.32	1.24
1	B	489	HIS	CE1-NE2	6.62	1.39	1.32
1	B	489	HIS	CG-CD2	6.57	1.43	1.35
1	B	250	HIS	ND1-CE1	6.41	1.39	1.32
1	A	60	ASP	C-O	-6.38	1.15	1.24
1	B	76	HIS	CG-CD2	6.35	1.42	1.35
1	A	65	GLY	C-O	-6.30	1.15	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	245	HIS	CG-CD2	6.25	1.42	1.35
1	B	273	HIS	CG-ND1	-6.16	1.31	1.38
1	B	190	PHE	C-O	6.07	1.31	1.24
1	A	76	HIS	CG-CD2	6.06	1.42	1.35
1	A	42	ARG	CZ-NH1	6.05	1.41	1.32
1	B	449	HIS	CG-CD2	5.99	1.42	1.35
1	A	204	ARG	CZ-NH1	-5.93	1.24	1.32
1	B	489	HIS	ND1-CE1	5.91	1.38	1.32
1	A	382	VAL	CA-C	5.85	1.57	1.53
1	A	245	HIS	ND1-CE1	5.62	1.38	1.32
1	A	268	GLN	CA-C	-5.60	1.45	1.52
1	B	487	ILE	N-CA	-5.57	1.40	1.46
1	B	349	ALA	CA-C	-5.56	1.45	1.52
1	A	188	TRP	CD2-CE2	5.55	1.50	1.41
1	A	56	HIS	CG-ND1	-5.53	1.32	1.38
1	B	268	GLN	CA-C	-5.51	1.46	1.52
1	A	449	HIS	CG-CD2	5.50	1.41	1.35
1	B	484	ARG	N-CA	-5.44	1.39	1.46
1	B	60	ASP	C-O	-5.40	1.17	1.24
1	A	140	HIS	CG-CD2	5.39	1.41	1.35
1	A	423	VAL	CA-CB	5.39	1.61	1.55
1	A	49	SER	C-O	5.31	1.30	1.23
1	B	250	HIS	CG-CD2	5.30	1.41	1.35
1	A	78	TYR	CA-C	5.25	1.59	1.52
1	B	245	HIS	N-CA	5.19	1.52	1.46
1	B	253	ALA	N-CA	5.15	1.52	1.46
1	B	279	GLU	C-O	5.15	1.30	1.24
1	B	193	HIS	CA-C	-5.09	1.45	1.52
1	A	124	ILE	N-CA	5.08	1.52	1.46
1	A	279	GLU	C-O	5.07	1.30	1.24
1	B	244	HIS	CG-CD2	5.03	1.41	1.35

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	37	ILE	N-CA-C	8.47	121.44	112.96
1	A	37	ILE	N-CA-C	6.94	119.90	112.96
1	A	192	VAL	N-CA-C	6.77	116.89	110.53
1	B	114	LYS	CB-CA-C	-6.59	99.86	110.79
1	B	37	ILE	CB-CA-C	-6.37	105.45	111.06
1	B	186	GLN	CB-CA-C	-6.36	104.73	110.71
1	B	482	GLY	N-CA-C	6.25	121.98	113.99

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	440	SER	N-CA-C	6.02	118.33	111.11
1	B	51	TRP	N-CA-C	5.96	118.74	111.82
1	A	44	GLY	N-CA-C	-5.93	104.67	114.76
1	B	312	TYR	CA-C-N	-5.93	113.85	120.14
1	B	312	TYR	C-N-CA	-5.93	113.85	120.14
1	B	378	ASP	N-CA-C	5.56	118.47	109.40
1	A	37	ILE	CB-CA-C	-5.45	106.27	111.06
1	A	114	LYS	CB-CG-CD	-5.36	98.97	111.30
1	A	135	PHE	CA-C-N	-5.35	116.13	123.14
1	A	135	PHE	C-N-CA	-5.35	116.13	123.14
1	A	294	ARG	N-CA-C	-5.35	105.89	112.90
1	B	165	GLU	N-CA-C	-5.33	105.47	111.28
1	A	382	VAL	N-CA-C	5.32	112.40	107.56
1	A	114	LYS	N-CA-CB	5.21	118.38	110.14
1	A	482	GLY	N-CA-C	5.21	120.66	113.99
1	B	192	VAL	N-CA-C	5.21	115.42	110.53
1	A	474	ASN	N-CA-C	5.14	114.92	108.45
1	A	378	ASP	N-CA-C	5.13	118.11	109.95
1	B	316	MET	CG-SD-CE	-5.12	89.64	100.90
1	A	52	ASP	N-CA-C	-5.12	105.61	111.14
1	A	51	TRP	N-CA-C	5.03	117.66	111.82
1	A	22	PHE	CA-C-N	-5.00	115.41	120.21
1	A	22	PHE	C-N-CA	-5.00	115.41	120.21

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	512	HIS	Peptide
1	B	512	HIS	Peptide

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	3766	0	3566	40	0
1	B	3766	0	3566	46	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	12	12	12	0	0
2	B	12	0	11	2	0
3	B	2	0	0	3	0
4	A	109	0	0	0	0
4	B	113	0	0	3	0
All	All	7780	12	7155	88	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 6.

All (88) 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:313:PRO:HD2	1:A:316:MET:HE3	1.36	1.02
3:B:602:CL:CL	4:B:795:HOH:O	2.15	1.00
3:B:601:CL:CL	4:B:779:HOH:O	2.21	0.96
1:B:313:PRO:HD2	1:B:316:MET:HE3	1.48	0.92
1:A:276:GLN:H	1:A:299:MET:HE1	1.40	0.86
1:A:276:GLN:N	1:A:299:MET:HE1	1.92	0.84
1:B:276:GLN:H	1:B:299:MET:HE1	1.51	0.76
1:A:313:PRO:CD	1:A:316:MET:HE3	2.16	0.75
1:B:434:SER:OG	3:B:601:CL:CL	2.42	0.74
1:B:276:GLN:N	1:B:299:MET:HE1	2.03	0.72
1:A:15:THR:HA	1:A:447:GLN:OE1	1.95	0.67
1:A:302:TRP:HA	1:A:316:MET:HE1	1.77	0.65
1:A:256:LEU:C	1:A:256:LEU:HD23	2.23	0.63
1:A:313:PRO:HD2	1:A:316:MET:CE	2.21	0.62
1:A:512:HIS:O	1:A:513:LYS:HB2	1.99	0.62
1:B:205:GLY:O	1:B:206:ARG:CB	2.48	0.62
1:B:294:ARG:HD2	1:B:371:ILE:O	2.00	0.62
1:B:279:GLU:O	1:B:351:TYR:HA	2.00	0.61
1:A:275:THR:HA	1:A:299:MET:HE3	1.83	0.60
1:B:302:TRP:HA	1:B:316:MET:HE1	1.85	0.59
1:B:469:TRP:CZ2	2:B:603:BGC:H3	2.38	0.59
1:A:279:GLU:O	1:A:351:TYR:HA	2.03	0.58
1:A:294:ARG:HD2	1:A:371:ILE:O	2.02	0.58
1:A:313:PRO:CD	1:A:316:MET:CE	2.83	0.56
1:B:298:PHE:O	1:B:367:TYR:OH	2.24	0.55
1:A:186:GLN:HE21	1:A:274:ALA:HB2	1.70	0.55
1:A:469:TRP:CD2	1:A:470:SER:HB3	2.41	0.55
1:A:256:LEU:HD23	1:A:256:LEU:O	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:297:ASP:OD2	1:B:315:SER:OG	2.24	0.54
1:B:313:PRO:CD	1:B:316:MET:HE3	2.31	0.52
1:B:512:HIS:O	1:B:513:LYS:HB2	2.10	0.52
1:A:346:TYR:C	1:A:346:TYR:CD1	2.88	0.52
1:B:186:GLN:HG2	1:B:345:ASN:HD22	1.75	0.52
1:A:499:TYR:CD1	1:A:500:PRO:HD2	2.44	0.52
1:B:244:HIS:CE1	1:B:327:PHE:CE1	2.98	0.52
1:B:476:GLU:OE1	2:B:603:BGC:O4	2.24	0.51
1:A:302:TRP:CA	1:A:316:MET:HE1	2.42	0.50
1:B:294:ARG:NH1	1:B:372:HIS:O	2.44	0.50
1:B:316:MET:O	1:B:320:VAL:HG23	2.12	0.49
1:A:31:GLY:O	1:A:470:SER:HB2	2.12	0.49
1:A:205:GLY:O	1:A:206:ARG:CB	2.59	0.49
1:B:302:TRP:CA	1:B:316:MET:HE1	2.44	0.48
1:A:346:TYR:OH	1:A:399:GLY:HA3	2.13	0.48
1:A:273:HIS:CE1	1:A:303:PHE:HB3	2.49	0.47
1:B:258:LYS:HG2	1:B:262:GLN:OE1	2.14	0.47
1:A:345:ASN:HB3	1:A:420:GLU:HB2	1.96	0.47
1:A:469:TRP:CE2	1:A:470:SER:HB3	2.49	0.47
1:A:469:TRP:HA	1:A:470:SER:HA	1.62	0.46
1:A:294:ARG:NH1	1:A:372:HIS:O	2.49	0.46
1:A:258:LYS:HG2	1:A:262:GLN:OE1	2.15	0.45
1:B:508:MET:O	1:B:512:HIS:HB2	2.16	0.45
1:B:275:THR:HA	1:B:299:MET:HE3	1.99	0.45
1:B:114:LYS:HE2	1:B:114:LYS:HB3	1.77	0.45
1:B:469:TRP:CD2	1:B:470:SER:HB3	2.51	0.45
1:A:244:HIS:CE1	1:A:327:PHE:CE1	3.05	0.45
1:A:313:PRO:HG2	1:A:316:MET:CE	2.47	0.44
1:A:474:ASN:C	1:A:474:ASN:HD22	2.27	0.43
1:B:176:ASP:CG	1:B:177:ARG:HD3	2.43	0.43
1:B:464:LYS:HA	1:B:464:LYS:HD2	1.75	0.43
1:A:176:ASP:CG	1:A:177:ARG:HD3	2.43	0.43
1:B:186:GLN:NE2	1:B:189:THR:OG1	2.51	0.43
1:A:186:GLN:HG3	1:A:345:ASN:HD22	1.84	0.43
1:A:298:PHE:O	1:A:367:TYR:OH	2.35	0.43
1:B:114:LYS:NZ	4:B:810:HOH:O	2.51	0.43
1:B:305:GLU:HB3	1:B:306:PRO:HD3	1.99	0.43
1:B:403:ILE:HD12	1:B:403:ILE:HA	1.89	0.43
1:B:443:LEU:HD11	1:B:447:GLN:HE21	1.83	0.42
1:B:344:LEU:HD12	1:B:404:LEU:HD23	2.02	0.42
1:B:94:ARG:HA	1:B:135:PHE:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:346:TYR:OH	1:B:399:GLY:HA3	2.20	0.42
1:B:154:PHE:CE1	1:B:246:LEU:HD23	2.55	0.42
1:B:313:PRO:HD2	1:B:316:MET:CE	2.34	0.42
1:B:469:TRP:CE2	1:B:470:SER:HB3	2.55	0.42
1:B:315:SER:O	1:B:319:PHE:HD1	2.02	0.41
1:A:176:ASP:OD2	1:A:177:ARG:HD3	2.21	0.41
1:B:142:ASP:OD1	1:B:142:ASP:N	2.49	0.41
1:A:71:ALA:HA	1:A:481:TYR:OH	2.21	0.41
1:A:330:GLU:H	1:A:330:GLU:CD	2.29	0.41
1:B:445:TYR:CD1	1:B:445:TYR:C	2.98	0.41
1:A:114:LYS:HB3	1:A:114:LYS:HE2	1.31	0.41
1:B:186:GLN:CG	1:B:345:ASN:HD22	2.32	0.41
1:A:243:THR:HG23	1:A:303:PHE:CE1	2.56	0.40
1:B:31:GLY:O	1:B:470:SER:HB2	2.21	0.40
1:B:339:TYR:CD1	1:B:339:TYR:C	2.99	0.40
1:B:176:ASP:OD2	1:B:177:ARG:HD3	2.21	0.40
1:B:469:TRP:HA	1:B:470:SER:HA	1.57	0.40
1:B:256:LEU:HD23	1:B:256:LEU:C	2.47	0.40
1:A:464:LYS:HD2	1:A:464:LYS:HA	1.83	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	464/513 (90%)	445 (96%)	18 (4%)	1 (0%)	43	55
1	B	464/513 (90%)	444 (96%)	19 (4%)	1 (0%)	43	55
All	All	928/1026 (90%)	889 (96%)	37 (4%)	2 (0%)	43	55

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	285	SER
1	B	285	SER

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	395/435 (91%)	372 (94%)	23 (6%)	18	26
1	B	395/435 (91%)	377 (95%)	18 (5%)	24	36
All	All	790/870 (91%)	749 (95%)	41 (5%)	21	31

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	THR
1	A	16	ARG
1	A	27	ILE
1	A	63	ARG
1	A	94	ARG
1	A	114	LYS
1	A	182	MET
1	A	204	ARG
1	A	231	SER
1	A	315	SER
1	A	330	GLU
1	A	333	LYS
1	A	352	VAL
1	A	354	ASN
1	A	378	ASP
1	A	409	LYS
1	A	412	ASN
1	A	415	LEU
1	A	427	LYS
1	A	434	SER
1	A	440	SER
1	A	474	ASN

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Mol	Chain	Res	Type
1	A	513	LYS
1	B	15	THR
1	B	16	ARG
1	B	114	LYS
1	B	186	GLN
1	B	231	SER
1	B	307	ILE
1	B	314	LYS
1	B	315	SER
1	B	330	GLU
1	B	333	LYS
1	B	352	VAL
1	B	354	ASN
1	B	378	ASP
1	B	409	LYS
1	B	412	ASN
1	B	415	LEU
1	B	434	SER
1	B	513	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	421	ASN
1	A	474	ASN
1	B	36	GLN
1	B	186	GLN
1	B	345	ASN
1	B	354	ASN
1	B	421	ASN
1	B	447	GLN
1	B	462	ASN

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 [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	$\# Z > 2$
2	BGC	A	601	-	12,12,12	1.01	1 (8%)	17,17,17	1.89	5 (29%)
2	BGC	B	603	-	12,12,12	0.46	0	17,17,17	3.25	4 (23%)

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	BGC	A	601	-	-	2/2/22/22	0/1/1/1
2	BGC	B	603	-	-	2/2/22/22	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	601	BGC	O5-C5	-2.16	1.39	1.44

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	603	BGC	C3-C4-C5	11.12	130.39	110.23
2	B	603	BGC	C4-C3-C2	-5.04	101.98	110.83
2	A	601	BGC	O1-C1-O5	-3.99	98.57	110.41
2	A	601	BGC	O5-C1-C2	3.70	116.80	110.30
2	B	603	BGC	C6-C5-C4	3.02	120.44	113.02

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	603	BGC	O3-C3-C2	-2.87	103.62	110.38
2	A	601	BGC	O5-C5-C6	-2.57	100.08	106.44
2	A	601	BGC	C1-O5-C5	2.23	117.97	113.65
2	A	601	BGC	O2-C2-C1	-2.19	104.19	109.25

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	BGC	O5-C5-C6-O6
2	B	603	BGC	O5-C5-C6-O6
2	A	601	BGC	C4-C5-C6-O6
2	B	603	BGC	C4-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	603	BGC	2	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 [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, 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	470/513 (91%)	-0.56	7 (1%) 72 73	26, 40, 74, 107	0
1	B	470/513 (91%)	-0.47	5 (1%) 78 79	27, 42, 73, 118	0
All	All	940/1026 (91%)	-0.51	12 (1%) 75 76	26, 41, 74, 118	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	206	ARG	4.1
1	A	356	SER	4.1
1	B	206	ARG	3.5
1	B	356	SER	2.9
1	A	231	SER	2.8
1	B	364	ASN	2.4
1	B	513	LYS	2.3
1	A	513	LYS	2.2
1	B	365	PHE	2.2
1	A	364	ASN	2.1
1	A	13	ASP	2.1
1	A	382	VAL	2.1

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	BGC	A	601	12/12	0.77	0.27	20,20,20,20	0
2	BGC	B	603	12/12	0.84	0.13	36,55,58,60	0
3	CL	B	602	1/1	0.98	0.06	58,58,58,58	0
3	CL	B	601	1/1	0.99	0.03	55,55,55,55	0

6.5 Other polymers [i](#)

There are no such residues in this entry.