



wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 10, 2024 – 09:56 pm GMT

PDB ID : 8OZU
Title : Fucosidase crystal structure
Authors : Gallego del Sol, F.; Marina, A.
Deposited on : 2023-05-09
Resolution : 2.25 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

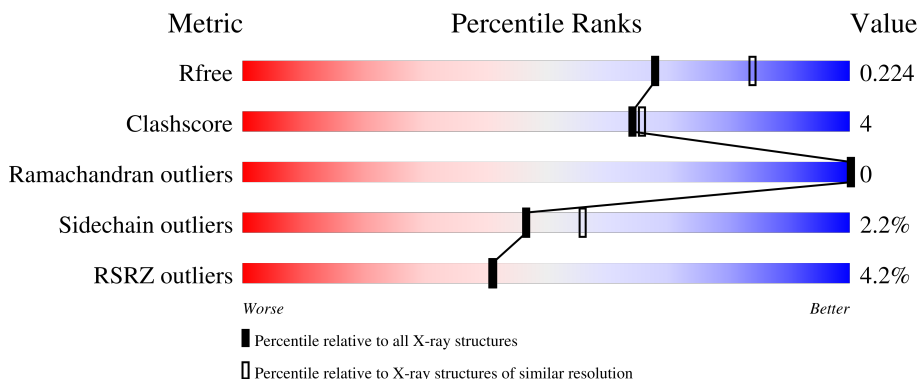
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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.



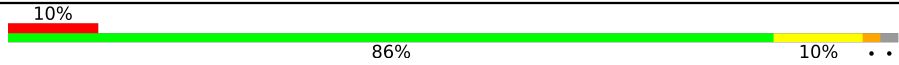

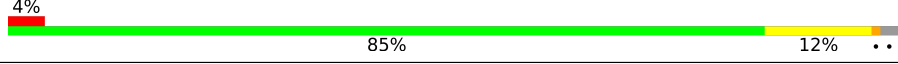
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1763 (2.26-2.26)
Clashscore	180529	1919 (2.26-2.26)
Ramachandran outliers	177936	1884 (2.26-2.26)
Sidechain outliers	177891	1885 (2.26-2.26)
RSRZ outliers	164620	1763 (2.26-2.26)

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	414	 90% 7% ..
1	B	414	 90% 7% ..
1	C	414	 90% 8% ..
1	D	414	 88% 9% ..
1	E	414	 88% 8% ..

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Mol	Chain	Length	Quality of chain
1	F	414	 10% 86% 10% ..
1	G	414	 % 87% 10% ..
1	H	414	 4% 85% 12% ..

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 52241 atoms, of which 25155 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-L-fucosidase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	407	Total 6406	C 2096	H 3148	N 554	O 599	S 9	103	0	0
1	B	406	Total 6381	C 2086	H 3138	N 553	O 595	S 9	102	0	0
1	C	408	Total 6434	C 2104	H 3163	N 558	O 600	S 9	103	1	0
1	D	406	Total 6388	C 2092	H 3138	N 553	O 596	S 9	101	0	0
1	E	405	Total 6385	C 2090	H 3138	N 552	O 596	S 9	102	0	0
1	F	405	Total 6385	C 2090	H 3138	N 552	O 596	S 9	102	0	0
1	G	408	Total 6418	C 2100	H 3153	N 556	O 600	S 9	102	0	0
1	H	406	Total 6390	C 2091	H 3139	N 553	O 598	S 9	103	0	0

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		
2	E	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	E	1	Total 5	O 4	S 1	0	0
2	F	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0
2	H	1	Total 5	O 4	S 1	0	0
2	H	1	Total 5	O 4	S 1	0	0

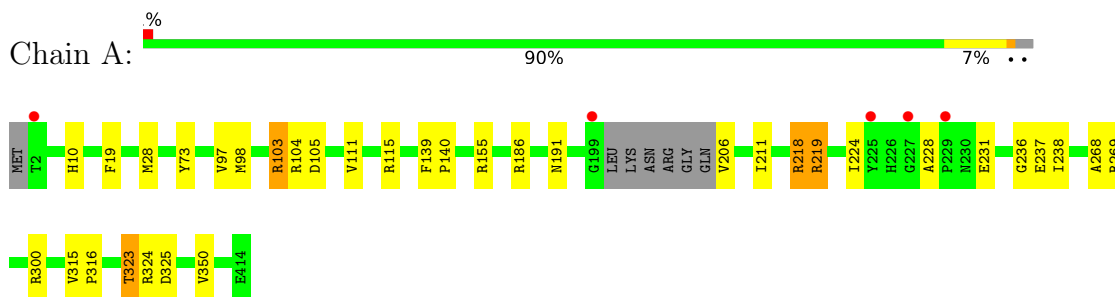
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	160	Total 160	O 160	0	0
3	B	207	Total 207	O 207	0	0
3	C	225	Total 225	O 225	0	0
3	D	59	Total 59	O 59	0	0
3	E	21	Total 21	O 21	0	0
3	F	30	Total 30	O 30	0	0
3	G	203	Total 203	O 203	0	0
3	H	34	Total 34	O 34	0	0

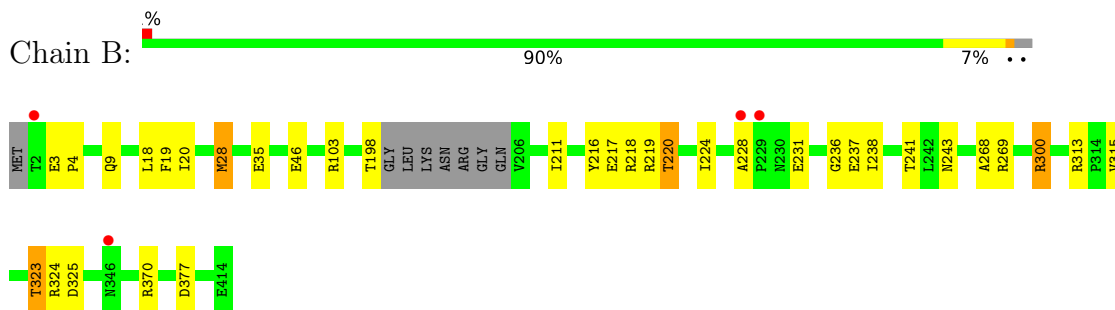
3 Residue-property plots i

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.

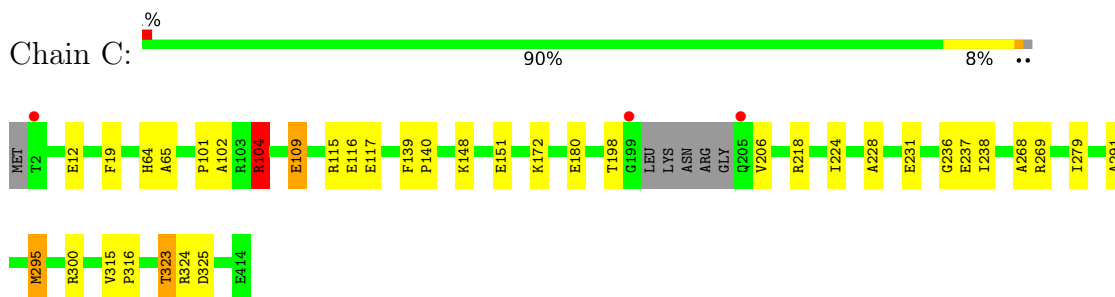
- Molecule 1: Alpha-L-fucosidase



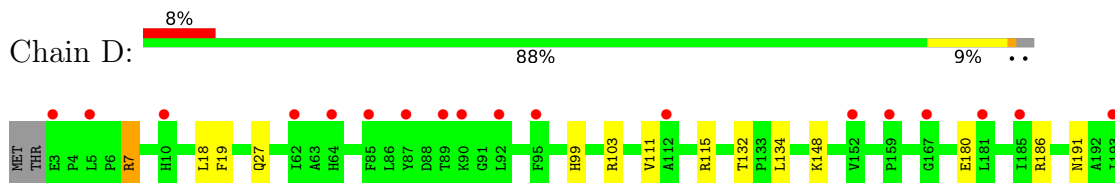
- Molecule 1: Alpha-L-fucosidase

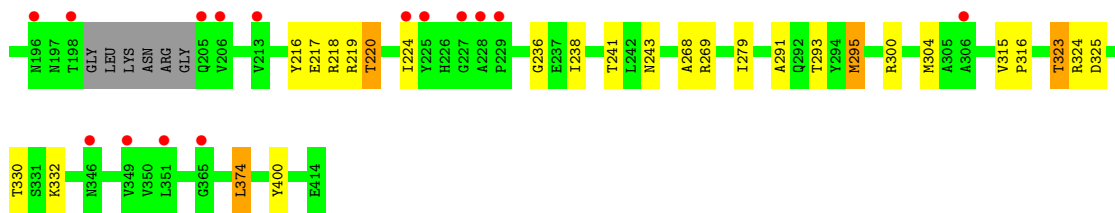


- Molecule 1: Alpha-L-fucosidase

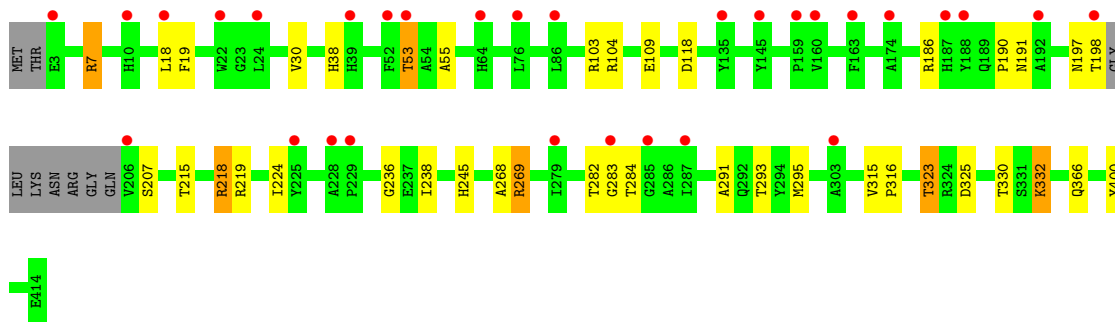
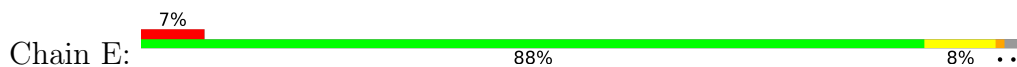


- Molecule 1: Alpha-L-fucosidase

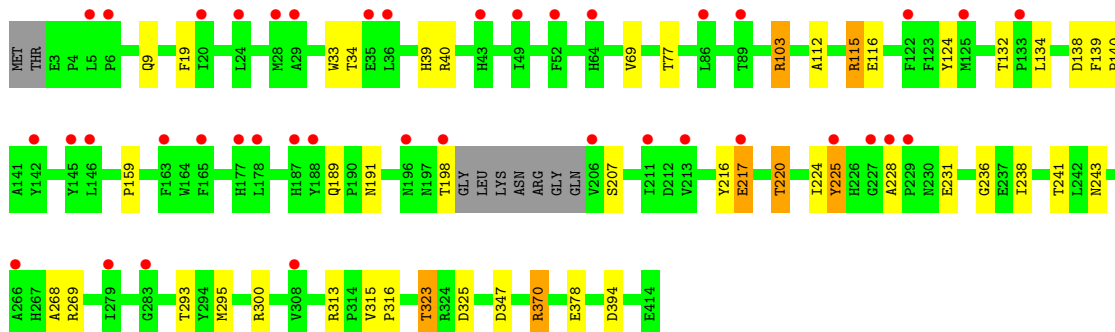
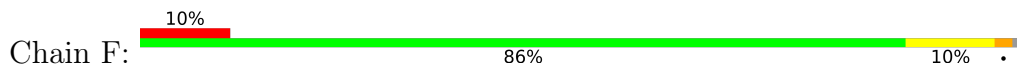




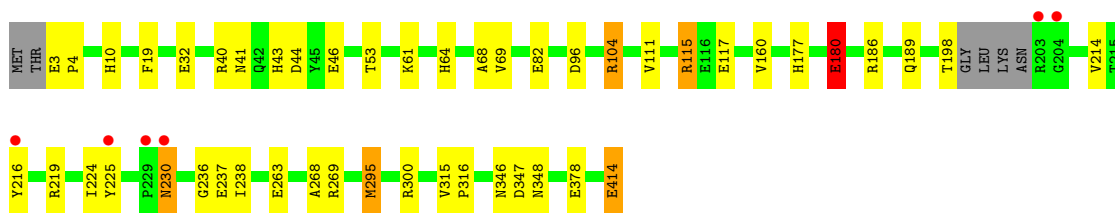
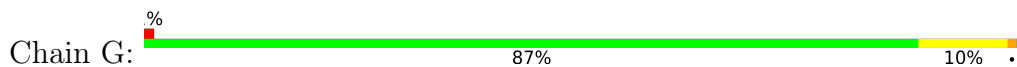
● Molecule 1: Alpha-L-fucosidase



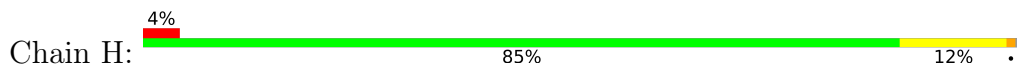
● Molecule 1: Alpha-L-fucosidase

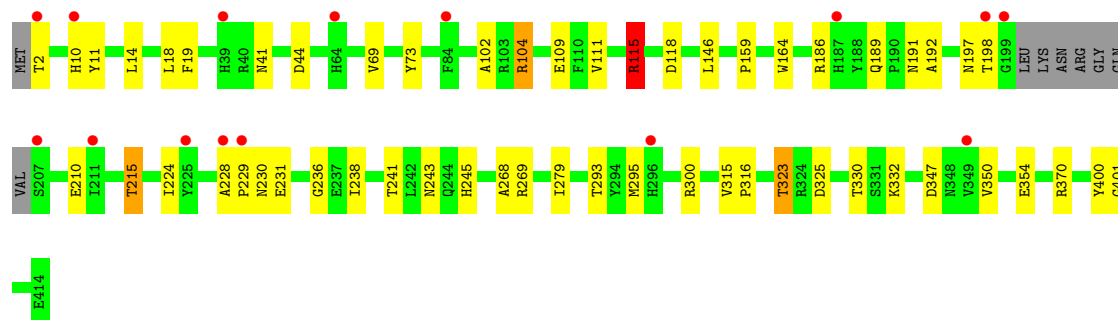


● Molecule 1: Alpha-L-fucosidase



● Molecule 1: Alpha-L-fucosidase





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	308.10Å 81.17Å 194.24Å 90.00° 123.88° 90.00°	Depositor
Resolution (Å)	148.63 – 2.25 148.63 – 2.25	Depositor EDS
% Data completeness (in resolution range)	100.0 (148.63-2.25) 100.0 (148.63-2.25)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.72 (at 2.25Å)	Xtrriage
Refinement program	REFMAC 5.8.0411	Depositor
R, R_{free}	0.193 , 0.224 0.193 , 0.224	Depositor DCC
R_{free} test set	9501 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	35.2	Xtrriage
Anisotropy	0.292	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 44.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	52241	wwPDB-VP
Average B, all atoms (Å ²)	57.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.42% 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: SO4

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	0.68	1/3355 (0.0%)	0.91	6/4578 (0.1%)
1	B	0.73	4/3339 (0.1%)	0.92	7/4557 (0.2%)
1	C	0.83	8/3371 (0.2%)	0.98	6/4599 (0.1%)
1	D	0.54	0/3347	0.84	4/4567 (0.1%)
1	E	0.50	0/3344	0.83	2/4563 (0.0%)
1	F	0.51	0/3344	0.85	6/4563 (0.1%)
1	G	0.84	8/3362 (0.2%)	0.99	12/4587 (0.3%)
1	H	0.53	0/3348	0.83	2/4568 (0.0%)
All	All	0.66	21/26810 (0.1%)	0.90	45/36582 (0.1%)

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	5
1	B	0	4
1	C	0	2
1	D	0	4
1	E	0	4
1	F	0	3
1	G	0	3
1	H	0	5
All	All	0	30

The worst 5 of 21 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	32	GLU	CD-OE1	10.07	1.36	1.25
1	C	180	GLU	CD-OE2	9.93	1.36	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	116	GLU	CD-OE2	9.01	1.35	1.25
1	G	237	GLU	CD-OE1	8.81	1.35	1.25
1	B	237	GLU	CD-OE2	6.95	1.33	1.25

The worst 5 of 45 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	104	ARG	NE-CZ-NH1	13.20	126.90	120.30
1	C	295	MET	CG-SD-CE	-10.00	84.19	100.20
1	G	104	ARG	NE-CZ-NH1	-9.33	115.63	120.30
1	C	104	ARG	NE-CZ-NH2	-9.28	115.66	120.30
1	C	300	ARG	NE-CZ-NH1	7.67	124.14	120.30

There are no chirality outliers.

5 of 30 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	103	ARG	Sidechain
1	A	155	ARG	Sidechain
1	A	219	ARG	Sidechain
1	A	269	ARG	Sidechain
1	A	324	ARG	Sidechain

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	3258	3148	3125	17	0
1	B	3243	3138	3111	13	0
1	C	3271	3163	3140	18	0
1	D	3250	3138	3112	30	0
1	E	3247	3138	3115	39	0
1	F	3247	3138	3115	28	1
1	G	3265	3153	3128	23	0
1	H	3251	3139	3116	39	0
2	A	20	0	0	1	0
2	B	15	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	20	0	0	0	0
2	D	10	0	0	1	0
2	E	10	0	0	1	0
2	F	5	0	0	0	0
2	G	25	0	0	2	0
2	H	10	0	0	0	0
3	A	160	0	0	2	0
3	B	207	0	0	3	0
3	C	225	0	0	4	0
3	D	59	0	0	4	0
3	E	21	0	0	1	0
3	F	30	0	0	3	0
3	G	203	0	0	5	0
3	H	34	0	0	1	0
All	All	27086	25155	24962	194	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 4.

The worst 5 of 194 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:217:GLU:O	1:B:220:THR:HG22	1.49	1.10
1:D:217:GLU:O	1:D:220:THR:HG22	1.49	1.09
1:E:53:THR:CG2	1:E:55:ALA:HB2	1.84	1.07
1:F:217:GLU:O	1:F:220:THR:HG23	1.68	0.92
1:H:197:ASN:OD1	1:H:215:THR:HG21	1.70	0.92

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	Interatomic distance (Å)	Clash overlap (Å)
1:F:138:ASP:OD2	1:F:138:ASP:OD2[2_656]	1.77	0.43

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	403/414 (97%)	390 (97%)	13 (3%)	0	100	100
1	B	402/414 (97%)	390 (97%)	12 (3%)	0	100	100
1	C	405/414 (98%)	392 (97%)	13 (3%)	0	100	100
1	D	402/414 (97%)	390 (97%)	12 (3%)	0	100	100
1	E	401/414 (97%)	386 (96%)	15 (4%)	0	100	100
1	F	401/414 (97%)	387 (96%)	14 (4%)	0	100	100
1	G	404/414 (98%)	387 (96%)	17 (4%)	0	100	100
1	H	402/414 (97%)	389 (97%)	13 (3%)	0	100	100
All	All	3220/3312 (97%)	3111 (97%)	109 (3%)	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	Percentiles	
1	A	340/346 (98%)	335 (98%)	5 (2%)	60	70
1	B	338/346 (98%)	332 (98%)	6 (2%)	54	64
1	C	341/346 (99%)	334 (98%)	7 (2%)	48	57
1	D	338/346 (98%)	332 (98%)	6 (2%)	54	64
1	E	339/346 (98%)	330 (97%)	9 (3%)	40	48
1	F	339/346 (98%)	328 (97%)	11 (3%)	34	42

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	340/346 (98%)	332 (98%)	8 (2%)	44	53
1	H	339/346 (98%)	331 (98%)	8 (2%)	44	53
All	All	2714/2768 (98%)	2654 (98%)	60 (2%)	47	56

5 of 60 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	191	ASN
1	H	191	ASN
1	F	103	ARG
1	H	164	TRP
1	H	347	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	H	189	GLN
1	H	230	ASN
1	H	292	GLN
1	G	64	HIS
1	G	189	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

23 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	SO4	C	502	-	4,4,4	0.07	0	6,6,6	0.56	0
2	SO4	C	504	-	4,4,4	0.20	0	6,6,6	0.49	0
2	SO4	G	501	-	4,4,4	0.33	0	6,6,6	0.47	0
2	SO4	G	505	-	4,4,4	0.25	0	6,6,6	0.25	0
2	SO4	F	501	-	4,4,4	0.51	0	6,6,6	0.41	0
2	SO4	A	503	-	4,4,4	0.25	0	6,6,6	0.43	0
2	SO4	D	502	-	4,4,4	0.20	0	6,6,6	0.32	0
2	SO4	C	501	-	4,4,4	0.50	0	6,6,6	0.71	0
2	SO4	H	502	-	4,4,4	0.26	0	6,6,6	0.20	0
2	SO4	B	503	-	4,4,4	0.29	0	6,6,6	0.31	0
2	SO4	B	501	-	4,4,4	0.34	0	6,6,6	0.18	0
2	SO4	C	503	-	4,4,4	0.15	0	6,6,6	0.46	0
2	SO4	D	501	-	4,4,4	0.53	0	6,6,6	0.51	0
2	SO4	E	501	-	4,4,4	0.25	0	6,6,6	0.45	0
2	SO4	G	504	-	4,4,4	0.40	0	6,6,6	0.21	0
2	SO4	H	501	-	4,4,4	0.39	0	6,6,6	0.42	0
2	SO4	G	502	-	4,4,4	0.35	0	6,6,6	0.76	0
2	SO4	G	503	-	4,4,4	0.23	0	6,6,6	0.40	0
2	SO4	A	504	-	4,4,4	0.56	0	6,6,6	0.75	0
2	SO4	E	502	-	4,4,4	0.25	0	6,6,6	0.32	0
2	SO4	A	501	-	4,4,4	0.35	0	6,6,6	0.50	0
2	SO4	B	502	-	4,4,4	0.19	0	6,6,6	0.30	0
2	SO4	A	502	-	4,4,4	0.16	0	6,6,6	0.51	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	501	SO4	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	504	SO4	1	0
2	G	503	SO4	1	0
2	E	502	SO4	1	0
2	A	502	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 [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	407/414 (98%)	-0.35	5 (1%) 76 77	25, 38, 77, 127	0
1	B	406/414 (98%)	-0.65	4 (0%) 79 80	25, 33, 63, 128	0
1	C	408/414 (98%)	-0.67	3 (0%) 84 85	21, 30, 56, 120	1 (0%)
1	D	406/414 (98%)	0.85	33 (8%) 19 19	44, 68, 98, 129	0
1	E	405/414 (97%)	0.84	30 (7%) 22 21	41, 83, 117, 168	0
1	F	405/414 (97%)	0.90	40 (9%) 14 14	38, 78, 115, 149	0
1	G	408/414 (98%)	-0.54	6 (1%) 71 73	24, 32, 71, 122	0
1	H	406/414 (98%)	0.38	15 (3%) 45 46	35, 69, 99, 130	0
All	All	3251/3312 (98%)	0.10	136 (4%) 41 41	21, 53, 105, 168	1 (0%)

The worst 5 of 136 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	198	THR	7.2
1	A	199	GLY	6.9
1	F	206	VAL	6.3
1	G	203	ARG	5.6
1	C	199	GLY	5.4

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](#)

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(Å ²)	Q<0.9
2	SO4	G	504	5/5	0.81	0.14	52,98,105,110	0
2	SO4	E	502	5/5	0.82	0.09	89,89,114,123	0
2	SO4	B	503	5/5	0.82	0.11	84,89,95,95	0
2	SO4	H	502	5/5	0.82	0.11	72,79,102,110	0
2	SO4	A	503	5/5	0.84	0.12	62,63,93,100	0
2	SO4	G	503	5/5	0.84	0.16	57,91,120,128	0
2	SO4	G	501	5/5	0.85	0.09	57,58,73,78	0
2	SO4	G	505	5/5	0.85	0.14	58,89,110,144	0
2	SO4	F	501	5/5	0.85	0.11	61,75,81,92	0
2	SO4	D	502	5/5	0.86	0.10	63,67,81,107	0
2	SO4	C	504	5/5	0.86	0.14	60,60,110,150	0
2	SO4	G	502	5/5	0.87	0.14	69,72,79,79	0
2	SO4	A	504	5/5	0.88	0.09	42,55,74,105	0
2	SO4	H	501	5/5	0.90	0.10	57,70,78,109	0
2	SO4	C	503	5/5	0.91	0.13	54,63,88,94	0
2	SO4	A	502	5/5	0.91	0.08	58,65,76,86	0
2	SO4	E	501	5/5	0.92	0.08	60,62,84,115	0
2	SO4	C	502	5/5	0.92	0.07	54,56,68,71	0
2	SO4	D	501	5/5	0.93	0.07	55,61,63,100	0
2	SO4	B	502	5/5	0.94	0.10	50,56,66,67	0
2	SO4	A	501	5/5	0.96	0.08	54,57,63,69	0
2	SO4	B	501	5/5	0.96	0.06	55,56,71,81	0
2	SO4	C	501	5/5	0.96	0.08	45,53,57,72	0

6.5 Other polymers [i](#)

There are no such residues in this entry.