



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 13, 2025 – 03:50 pm GMT

PDB ID : 9HTX / pdb_00009htx
Title : Glycosyltransferase C from the *Limosilactobacillus reuteri* accessory secretion system. Apo form.
Authors : Pfalzgraf, H.E.; Griffiths, R.; Juge, N.; Hemmings, A.M.
Deposited on : 2024-12-20
Resolution : 2.00 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

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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 : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
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) : 2.46

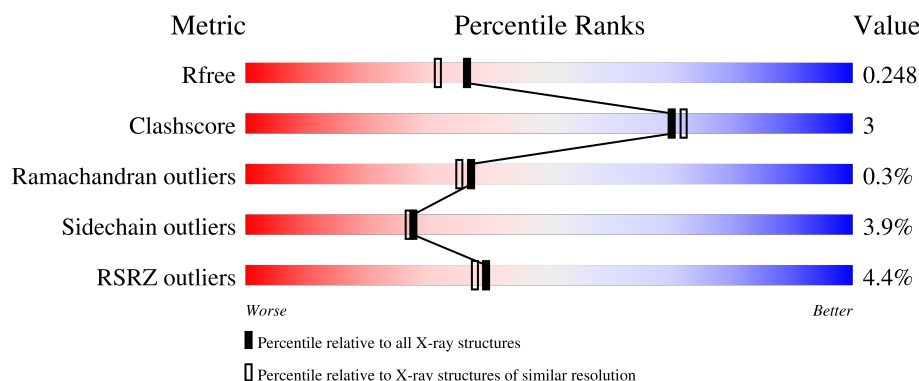
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (2.00-2.00)

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	354	5% 82% 11% • 5%
1	B	354	2% 83% 11% •• 5%
1	C	354	2% 81% 11% •• 5%
1	D	354	8% 80% 13% •• 5%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 21219 atoms, of which 10218 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 Glucosyltransferase 3.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	335	Total	C	H	N	O	S	0	0	0
			5255	1744	2552	449	503	7			
1	B	338	Total	C	H	N	O	S	0	0	0
			5303	1757	2576	455	508	7			
1	C	335	Total	C	H	N	O	S	0	0	0
			5244	1736	2548	452	502	6			
1	D	336	Total	C	H	N	O	S	0	0	0
			5206	1725	2522	449	503	7			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP B3XPQ7
A	-18	GLY	-	expression tag	UNP B3XPQ7
A	-17	SER	-	expression tag	UNP B3XPQ7
A	-16	SER	-	expression tag	UNP B3XPQ7
A	-15	HIS	-	expression tag	UNP B3XPQ7
A	-14	HIS	-	expression tag	UNP B3XPQ7
A	-13	HIS	-	expression tag	UNP B3XPQ7
A	-12	HIS	-	expression tag	UNP B3XPQ7
A	-11	HIS	-	expression tag	UNP B3XPQ7
A	-10	HIS	-	expression tag	UNP B3XPQ7
A	-9	SER	-	expression tag	UNP B3XPQ7
A	-8	SER	-	expression tag	UNP B3XPQ7
A	-7	GLY	-	expression tag	UNP B3XPQ7
A	-6	LEU	-	expression tag	UNP B3XPQ7
A	-5	VAL	-	expression tag	UNP B3XPQ7
A	-4	PRO	-	expression tag	UNP B3XPQ7
A	-3	ARG	-	expression tag	UNP B3XPQ7
A	-2	GLY	-	expression tag	UNP B3XPQ7
A	-1	SER	-	expression tag	UNP B3XPQ7
A	0	HIS	-	expression tag	UNP B3XPQ7
A	1	LEU	-	expression tag	UNP B3XPQ7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-19	MET	-	initiating methionine	UNP B3XPQ7
B	-18	GLY	-	expression tag	UNP B3XPQ7
B	-17	SER	-	expression tag	UNP B3XPQ7
B	-16	SER	-	expression tag	UNP B3XPQ7
B	-15	HIS	-	expression tag	UNP B3XPQ7
B	-14	HIS	-	expression tag	UNP B3XPQ7
B	-13	HIS	-	expression tag	UNP B3XPQ7
B	-12	HIS	-	expression tag	UNP B3XPQ7
B	-11	HIS	-	expression tag	UNP B3XPQ7
B	-10	HIS	-	expression tag	UNP B3XPQ7
B	-9	SER	-	expression tag	UNP B3XPQ7
B	-8	SER	-	expression tag	UNP B3XPQ7
B	-7	GLY	-	expression tag	UNP B3XPQ7
B	-6	LEU	-	expression tag	UNP B3XPQ7
B	-5	VAL	-	expression tag	UNP B3XPQ7
B	-4	PRO	-	expression tag	UNP B3XPQ7
B	-3	ARG	-	expression tag	UNP B3XPQ7
B	-2	GLY	-	expression tag	UNP B3XPQ7
B	-1	SER	-	expression tag	UNP B3XPQ7
B	0	HIS	-	expression tag	UNP B3XPQ7
B	1	LEU	-	expression tag	UNP B3XPQ7
C	-19	MET	-	initiating methionine	UNP B3XPQ7
C	-18	GLY	-	expression tag	UNP B3XPQ7
C	-17	SER	-	expression tag	UNP B3XPQ7
C	-16	SER	-	expression tag	UNP B3XPQ7
C	-15	HIS	-	expression tag	UNP B3XPQ7
C	-14	HIS	-	expression tag	UNP B3XPQ7
C	-13	HIS	-	expression tag	UNP B3XPQ7
C	-12	HIS	-	expression tag	UNP B3XPQ7
C	-11	HIS	-	expression tag	UNP B3XPQ7
C	-10	HIS	-	expression tag	UNP B3XPQ7
C	-9	SER	-	expression tag	UNP B3XPQ7
C	-8	SER	-	expression tag	UNP B3XPQ7
C	-7	GLY	-	expression tag	UNP B3XPQ7
C	-6	LEU	-	expression tag	UNP B3XPQ7
C	-5	VAL	-	expression tag	UNP B3XPQ7
C	-4	PRO	-	expression tag	UNP B3XPQ7
C	-3	ARG	-	expression tag	UNP B3XPQ7
C	-2	GLY	-	expression tag	UNP B3XPQ7
C	-1	SER	-	expression tag	UNP B3XPQ7
C	0	HIS	-	expression tag	UNP B3XPQ7
C	1	LEU	-	expression tag	UNP B3XPQ7

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-19	MET	-	initiating methionine	UNP B3XPQ7
D	-18	GLY	-	expression tag	UNP B3XPQ7
D	-17	SER	-	expression tag	UNP B3XPQ7
D	-16	SER	-	expression tag	UNP B3XPQ7
D	-15	HIS	-	expression tag	UNP B3XPQ7
D	-14	HIS	-	expression tag	UNP B3XPQ7
D	-13	HIS	-	expression tag	UNP B3XPQ7
D	-12	HIS	-	expression tag	UNP B3XPQ7
D	-11	HIS	-	expression tag	UNP B3XPQ7
D	-10	HIS	-	expression tag	UNP B3XPQ7
D	-9	SER	-	expression tag	UNP B3XPQ7
D	-8	SER	-	expression tag	UNP B3XPQ7
D	-7	GLY	-	expression tag	UNP B3XPQ7
D	-6	LEU	-	expression tag	UNP B3XPQ7
D	-5	VAL	-	expression tag	UNP B3XPQ7
D	-4	PRO	-	expression tag	UNP B3XPQ7
D	-3	ARG	-	expression tag	UNP B3XPQ7
D	-2	GLY	-	expression tag	UNP B3XPQ7
D	-1	SER	-	expression tag	UNP B3XPQ7
D	0	HIS	-	expression tag	UNP B3XPQ7
D	1	LEU	-	expression tag	UNP B3XPQ7

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

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

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	B	1	Total	C	H	O	0	0
			11	3	5	3		
3	B	1	Total	C	H	O	0	0
			11	3	5	3		
3	B	1	Total	C	H	O	0	0
			11	3	5	3		
3	C	1	Total	C	H	O	0	0
			11	3	5	3		

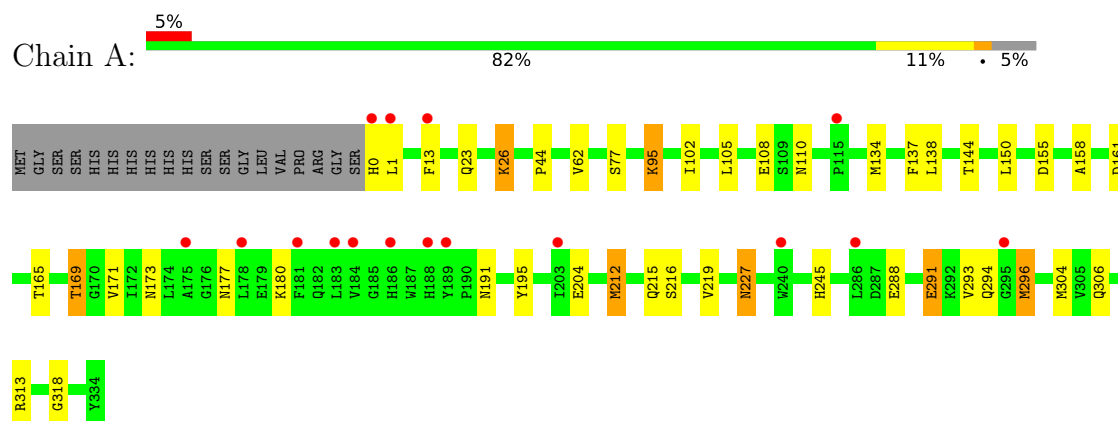
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	25	Total	O	0	0
			25	25		
4	B	70	Total	O	0	0
			70	70		
4	C	59	Total	O	0	0
			59	59		
4	D	11	Total	O	0	0
			11	11		

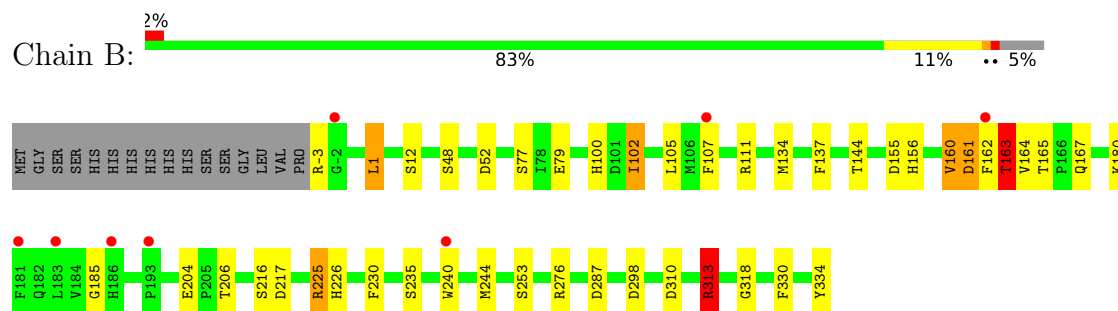
3 Residue-property plots [i](#)

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.

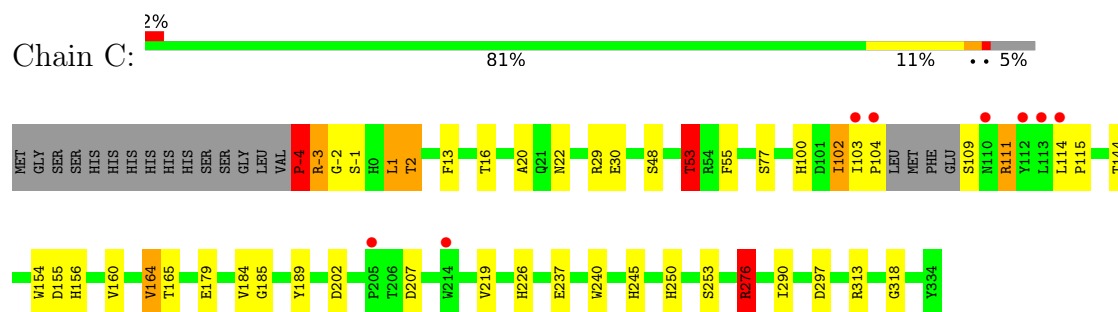
• Molecule 1: Glucosyltransferase 3



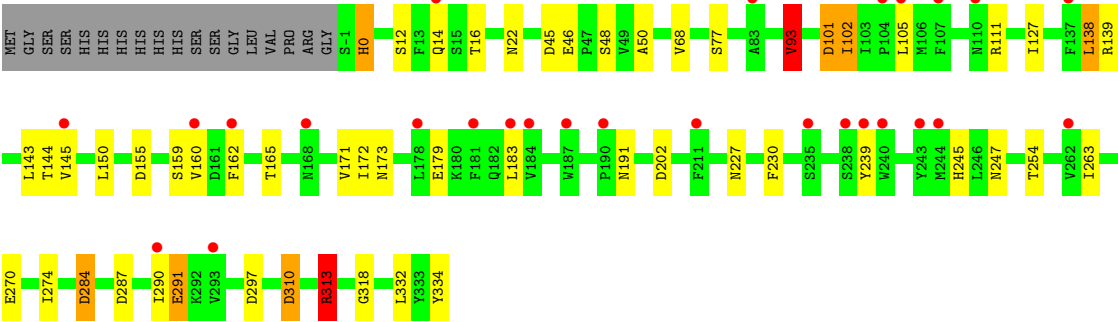
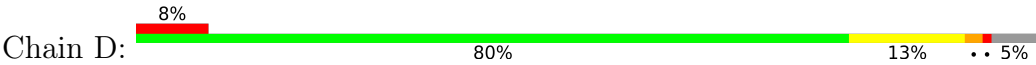
• Molecule 1: Glucosyltransferase 3



• Molecule 1: Glucosyltransferase 3



• Molecule 1: Glucosyltransferase 3



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	70.44Å 140.49Å 145.32Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	72.77 – 2.00 72.77 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (72.77-2.00) 88.8 (72.77-2.00)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.12 (at 1.80Å)	Xtriage
Refinement program	REFMAC 5.8.0430 (refmacat 0.4.105)	Depositor
R, R_{free}	0.207 , 0.253 0.202 , 0.248	Depositor DCC
R_{free} test set	5089 reflections (3.80%)	wwPDB-VP
Wilson B-factor (Å ²)	30.2	Xtriage
Anisotropy	0.459	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 48.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.000 for -h,l,k	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	21219	wwPDB-VP
Average B, all atoms (Å ²)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.47% 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: GOL, CA

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	0.84	0/2776	1.37	21/3785 (0.6%)
1	B	1.10	5/2800 (0.2%)	1.49	23/3814 (0.6%)
1	C	1.08	2/2768 (0.1%)	1.49	26/3770 (0.7%)
1	D	0.85	1/2754 (0.0%)	1.36	20/3758 (0.5%)
All	All	0.98	8/11098 (0.1%)	1.43	90/15127 (0.6%)

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	2
1	B	0	3
1	C	0	5
All	All	0	10

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	100	HIS	CG-CD2	-8.19	1.26	1.35
1	D	45	ASP	CG-OD1	7.47	1.39	1.25
1	B	253	SER	CA-CB	7.17	1.64	1.53
1	B	313	ARG	C-O	-5.74	1.17	1.24
1	B	230	PHE	C-N	5.68	1.36	1.33
1	B	225	ARG	NE-CZ	-5.40	1.27	1.33
1	C	253	SER	CA-CB	5.16	1.61	1.53
1	C	100	HIS	CG-CD2	-5.05	1.30	1.35

All (90) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	225	ARG	CD-NE-CZ	15.88	146.63	124.40
1	A	227	ASN	CB-CA-C	12.38	133.48	109.72
1	D	334	TYR	CA-C-O	-9.39	104.83	120.80
1	C	313	ARG	NE-CZ-NH2	9.07	127.37	119.20
1	B	1	LEU	CD1-CG-CD2	-8.84	91.34	110.80
1	B	79	GLU	CB-CG-CD	8.79	127.55	112.60
1	C	-4	PRO	CB-CA-C	8.12	125.53	110.10
1	D	165	THR	CA-CB-OG1	-7.91	97.73	109.60
1	C	237	GLU	N-CA-CB	-7.66	98.50	110.06
1	C	-4	PRO	CA-C-N	7.48	131.45	120.90
1	C	-4	PRO	C-N-CA	7.48	131.45	120.90
1	B	144	THR	CA-CB-OG1	-7.25	98.72	109.60
1	C	30	GLU	CB-CA-C	7.21	124.52	110.67
1	C	276	ARG	CA-CB-CG	7.13	128.37	114.10
1	B	161	ASP	CA-CB-CG	7.08	119.68	112.60
1	B	225	ARG	NE-CZ-NH2	-6.99	112.91	119.20
1	C	16	THR	OG1-CB-CG2	-6.99	95.33	109.30
1	B	313	ARG	NE-CZ-NH2	-6.97	112.93	119.20
1	D	101	ASP	CA-CB-CG	6.89	119.49	112.60
1	B	287	ASP	CA-CB-CG	6.78	119.38	112.60
1	A	23	GLN	OE1-CD-NE2	6.77	129.37	122.60
1	C	2	THR	OG1-CB-CG2	6.72	122.74	109.30
1	A	13	PHE	CB-CA-C	6.62	122.88	110.63
1	C	53	THR	N-CA-CB	-6.60	100.40	110.16
1	D	144	THR	CA-CB-OG1	-6.58	99.72	109.60
1	A	293	VAL	N-CA-CB	6.55	120.41	110.58
1	B	276	ARG	NE-CZ-NH2	6.52	125.07	119.20
1	C	13	PHE	CA-CB-CG	6.49	120.29	113.80
1	C	53	THR	OG1-CB-CG2	-6.34	96.62	109.30
1	C	55	PHE	CA-CB-CG	6.32	120.12	113.80
1	A	288	GLU	N-CA-CB	6.30	119.48	110.16
1	B	167	GLN	OE1-CD-NE2	6.28	128.88	122.60
1	A	165	THR	CA-CB-OG1	-6.25	100.22	109.60
1	B	225	ARG	CG-CD-NE	-6.20	98.36	112.00
1	C	22	ASN	OD1-CG-ND2	-6.08	116.52	122.60
1	A	291	GLU	CB-CA-C	6.07	119.26	109.07
1	B	313	ARG	CB-CA-C	-6.03	100.73	110.74
1	B	107	PHE	CB-CA-C	6.00	120.03	110.19
1	A	245	HIS	CA-CB-CG	5.97	119.77	113.80
1	A	227	ASN	CA-CB-CG	5.89	118.49	112.60
1	A	161	ASP	CA-CB-CG	5.85	118.45	112.60
1	C	144	THR	CA-CB-OG1	-5.81	100.88	109.60
1	B	102	ILE	CA-C-N	5.79	123.89	120.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	102	ILE	C-N-CA	5.79	123.89	120.24
1	B	225	ARG	CB-CG-CD	-5.79	97.97	111.30
1	D	284	ASP	CA-CB-CG	5.78	118.38	112.60
1	D	254	THR	CA-CB-OG1	-5.78	100.93	109.60
1	D	245	HIS	CA-CB-CG	5.78	119.58	113.80
1	C	165	THR	CA-CB-OG1	-5.76	100.95	109.60
1	B	165	THR	CA-CB-OG1	-5.71	101.03	109.60
1	C	202	ASP	CA-CB-CG	5.71	118.31	112.60
1	C	2	THR	N-CA-C	-5.64	106.95	113.88
1	D	0	HIS	CA-CB-CG	5.63	119.43	113.80
1	C	-4	PRO	CA-CB-CG	-5.57	93.92	104.50
1	A	169	THR	OG1-CB-CG2	-5.56	98.19	109.30
1	A	144	THR	CA-CB-OG1	-5.55	101.27	109.60
1	D	332	LEU	N-CA-CB	5.54	118.27	110.12
1	B	180	LYS	CA-CB-CG	5.52	125.14	114.10
1	C	297	ASP	CA-CB-CG	5.52	118.12	112.60
1	D	16	THR	OG1-CB-CG2	-5.46	98.38	109.30
1	D	165	THR	OG1-CB-CG2	5.40	120.11	109.30
1	D	291	GLU	CB-CG-CD	5.39	121.77	112.60
1	C	1	LEU	CD1-CG-CD2	-5.38	98.95	110.80
1	C	2	THR	CA-CB-OG1	-5.37	101.55	109.60
1	B	163	THR	CA-CB-OG1	-5.36	101.56	109.60
1	D	46	GLU	O-C-N	-5.34	117.31	121.47
1	D	45	ASP	N-CA-C	-5.31	106.39	112.92
1	C	237	GLU	CA-CB-CG	5.31	124.71	114.10
1	D	313	ARG	N-CA-CB	5.29	118.00	110.06
1	D	102	ILE	CA-C-N	5.27	123.56	120.24
1	D	102	ILE	C-N-CA	5.27	123.56	120.24
1	B	79	GLU	N-CA-CB	5.27	117.87	110.12
1	A	204	GLU	CB-CG-CD	5.24	121.50	112.60
1	A	212	MET	N-CA-CB	5.24	118.33	110.53
1	C	179	GLU	CB-CG-CD	5.23	121.50	112.60
1	A	0	HIS	CA-CB-CG	5.22	119.02	113.80
1	C	-4	PRO	CA-N-CD	-5.21	104.71	112.00
1	A	26	LYS	CB-CG-CD	5.20	123.26	111.30
1	A	191	ASN	CA-CB-CG	-5.20	107.40	112.60
1	D	0	HIS	CB-CA-C	5.19	118.20	109.89
1	D	297	ASP	CA-CB-CG	5.18	117.78	112.60
1	A	26	LYS	N-CA-CB	5.13	117.66	110.12
1	A	95	LYS	CB-CG-CD	5.10	123.03	111.30
1	B	111	ARG	CB-CA-C	5.06	120.00	110.63
1	B	330	PHE	CA-CB-CG	5.04	118.84	113.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	93	VAL	N-CA-CB	-5.04	101.67	110.49
1	C	313	ARG	NE-CZ-NH1	-5.04	116.46	121.50
1	B	313	ARG	CG-CD-NE	-5.01	100.97	112.00
1	A	62	VAL	CA-C-N	-5.01	114.40	122.82
1	A	62	VAL	C-N-CA	-5.01	114.40	122.82

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	158	ALA	Peptide
1	A	313	ARG	Sidechain
1	B	1	LEU	Peptide
1	B	225	ARG	Sidechain
1	B	313	ARG	Sidechain
1	C	-3	ARG	Sidechain
1	C	111	ARG	Sidechain
1	C	185	GLY	Peptide
1	C	276	ARG	Sidechain
1	C	29	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	2703	2552	2614	14	1
1	B	2727	2576	2639	21	0
1	C	2696	2548	2608	21	0
1	D	2684	2522	2585	20	1
2	A	1	0	0	0	0
2	C	1	0	0	0	0
3	B	18	15	24	2	0
3	C	6	5	8	3	0
4	A	25	0	0	0	0
4	B	70	0	0	1	0
4	C	59	0	0	0	0
4	D	11	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	11001	10218	10478	70	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 3.

All (70) 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:C:53:THR:HG21	1:D:50:ALA:O	1.60	1.02
1:C:53:THR:CG2	1:D:50:ALA:O	2.23	0.87
1:C:250:HIS:HB3	3:C:402:GOL:O1	1.90	0.71
1:C:102:ILE:HG22	1:C:104:PRO:HD2	1.72	0.71
1:B:52:ASP:HB3	3:B:401:GOL:H12	1.73	0.70
1:C:156:HIS:ND1	3:C:402:GOL:H32	2.07	0.69
1:A:169:THR:HG21	1:A:227:ASN:O	1.95	0.67
1:B:310:ASP:O	1:B:313:ARG:CD	2.42	0.67
1:B:334:TYR:OXT	1:C:276:ARG:NH2	2.29	0.63
1:B:163:THR:HG22	1:B:164:VAL:HG23	1.82	0.62
1:C:103:ILE:HG13	1:C:104:PRO:HD3	1.81	0.62
1:C:184:VAL:O	1:C:207:ASP:OD2	2.18	0.62
1:A:1:LEU:HD13	1:D:313:ARG:HD3	1.82	0.61
1:B:298:ASP:OD2	4:B:501:HOH:O	2.16	0.61
1:B:310:ASP:O	1:B:313:ARG:HD3	2.00	0.60
1:B:164:VAL:HG21	1:B:226:HIS:NE2	2.16	0.60
1:A:177:ASN:OD1	1:A:180:LYS:HB2	2.02	0.59
1:C:53:THR:HG21	1:D:50:ALA:C	2.27	0.59
1:B:160:VAL:HG13	1:B:162:PHE:CD2	2.39	0.58
1:B:240:TRP:HB3	1:B:244:MET:HE3	1.87	0.56
1:D:230:PHE:HB3	1:D:263:ILE:HD12	1.86	0.56
1:A:296:MET:HE1	1:A:304:MET:HE3	1.89	0.55
1:D:270:GLU:O	1:D:274:ILE:HD12	2.06	0.55
1:B:105:LEU:HD11	1:B:137:PHE:CE2	2.41	0.55
1:D:127:ILE:HG12	1:D:145:VAL:HG11	1.90	0.54
1:A:215:GLN:HB3	1:A:219:VAL:HG23	1.91	0.53
1:D:287:ASP:O	1:D:290:ILE:HG13	2.10	0.51
1:C:-4:PRO:O	1:C:-1:SER:O	2.29	0.51
1:A:296:MET:HE1	1:A:304:MET:CE	2.41	0.51
1:B:161:ASP:OD1	1:B:163:THR:HB	2.12	0.50
1:B:185:GLY:HA2	1:B:204:GLU:OE1	2.12	0.49
1:A:195:TYR:HB3	1:A:212:MET:HE1	1.94	0.48
1:D:139:ARG:HH11	1:D:139:ARG:HG3	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:101:ASP:HA	1:D:247:ASN:HD21	1.78	0.48
1:B:156:HIS:ND1	3:B:402:GOL:C1	2.78	0.47
1:A:173:ASN:ND2	1:A:227:ASN:OD1	2.35	0.47
1:A:216:SER:HB3	1:A:219:VAL:HG22	1.96	0.46
1:D:230:PHE:CB	1:D:263:ILE:HD12	2.45	0.46
1:C:104:PRO:HB3	1:C:111:ARG:H	1.81	0.46
1:D:127:ILE:CG1	1:D:145:VAL:HG11	2.45	0.46
1:C:-2:GLY:HA2	1:D:22:ASN:OD1	2.15	0.46
1:A:155:ASP:CG	1:A:318:GLY:HA2	2.41	0.45
1:C:155:ASP:CG	1:C:318:GLY:HA2	2.42	0.45
1:C:20:ALA:HB1	1:C:154:TRP:CH2	2.51	0.45
1:A:105:LEU:HD21	1:A:137:PHE:CE2	2.53	0.44
1:B:310:ASP:O	1:B:313:ARG:HD2	2.17	0.44
1:C:156:HIS:ND1	3:C:402:GOL:C3	2.78	0.44
1:C:240:TRP:CE2	1:C:245:HIS:HE1	2.36	0.44
1:C:114:LEU:N	1:C:115:PRO:HD2	2.33	0.43
1:B:-3:ARG:HG3	1:B:-3:ARG:HH11	1.83	0.43
1:B:156:HIS:HE2	1:B:217:ASP:CG	2.26	0.43
1:C:164:VAL:HG11	1:C:226:HIS:NE2	2.34	0.43
1:D:310:ASP:O	1:D:313:ARG:HG2	2.18	0.43
1:B:235:SER:CB	1:B:244:MET:HE1	2.49	0.43
1:D:68:VAL:HG23	1:D:93:VAL:HG11	2.00	0.43
1:A:102:ILE:HD12	1:A:134:MET:SD	2.59	0.42
1:D:102:ILE:HD11	1:D:138:LEU:HD21	2.00	0.42
1:B:204:GLU:CB	1:B:206:THR:HG22	2.49	0.42
1:D:14:GLN:N	1:D:14:GLN:CD	2.77	0.42
1:D:155:ASP:CG	1:D:318:GLY:HA2	2.44	0.42
1:D:171:VAL:C	1:D:172:ILE:HD12	2.45	0.42
1:B:155:ASP:CG	1:B:318:GLY:HA2	2.45	0.41
1:A:169:THR:HG23	1:A:171:VAL:H	1.85	0.41
1:C:189:TYR:CD2	1:C:290:ILE:HD13	2.54	0.41
1:C:189:TYR:CD1	1:C:290:ILE:HG21	2.55	0.41
1:B:160:VAL:HG13	1:B:162:PHE:CE2	2.56	0.41
1:D:173:ASN:ND2	1:D:227:ASN:HD22	2.17	0.41
1:A:102:ILE:HD13	1:A:138:LEU:HD21	2.03	0.40
1:C:102:ILE:HG22	1:C:104:PRO:CD	2.48	0.40
1:B:102:ILE:HD12	1:B:134:MET:SD	2.61	0.40

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:A:291:GLU:OE1	1:D:239:TYR:H[3_545]	1.60	0.00

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	333/354 (94%)	326 (98%)	6 (2%)	1 (0%)	37	35
1	B	336/354 (95%)	325 (97%)	10 (3%)	1 (0%)	37	35
1	C	331/354 (94%)	323 (98%)	7 (2%)	1 (0%)	37	35
1	D	334/354 (94%)	324 (97%)	9 (3%)	1 (0%)	37	35
All	All	1334/1416 (94%)	1298 (97%)	32 (2%)	4 (0%)	37	35

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	77	SER
1	B	77	SER
1	D	77	SER
1	C	77	SER

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	291/309 (94%)	282 (97%)	9 (3%)	35	36
1	B	293/309 (95%)	288 (98%)	5 (2%)	56	61

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	290/309 (94%)	279 (96%)	11 (4%)	28	28
1	D	287/309 (93%)	267 (93%)	20 (7%)	12	9
All	All	1161/1236 (94%)	1116 (96%)	45 (4%)	27	27

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	LYS
1	A	44	PRO
1	A	95	LYS
1	A	108	GLU
1	A	110	ASN
1	A	150	LEU
1	A	294	GLN
1	A	296	MET
1	A	306	GLN
1	B	12	SER
1	B	48	SER
1	B	160	VAL
1	B	163	THR
1	B	216	SER
1	C	-4	PRO
1	C	-3	ARG
1	C	1	LEU
1	C	2	THR
1	C	48	SER
1	C	53	THR
1	C	102	ILE
1	C	109	SER
1	C	160	VAL
1	C	164	VAL
1	C	219	VAL
1	D	0	HIS
1	D	12	SER
1	D	48	SER
1	D	93	VAL
1	D	105	LEU
1	D	111	ARG
1	D	138	LEU
1	D	143	LEU
1	D	150	LEU

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Mol	Chain	Res	Type
1	D	159	SER
1	D	160	VAL
1	D	162	PHE
1	D	179	GLU
1	D	183	LEU
1	D	191	ASN
1	D	202	ASP
1	D	284	ASP
1	D	291	GLU
1	D	310	ASP
1	D	313	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	ASN
1	A	34	ASN
1	A	110	ASN
1	A	226	HIS
1	B	34	ASN
1	B	42	ASN
1	B	132	GLN
1	B	152	HIS
1	B	167	GLN
1	B	191	ASN
1	B	242	ASN
1	B	267	ASN
1	C	34	ASN
1	C	92	ASN
1	C	132	GLN
1	C	167	GLN
1	C	245	HIS
1	C	306	GLN
1	D	34	ASN
1	D	64	ASN
1	D	141	ASN
1	D	173	ASN
1	D	191	ASN
1	D	192	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 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	$\# Z > 2$
3	GOL	C	402	-	5,5,5	0.30	0	5,5,5	0.56	0
3	GOL	B	402	-	5,5,5	0.40	0	5,5,5	0.87	0
3	GOL	B	401	-	5,5,5	0.47	0	5,5,5	1.16	1 (20%)
3	GOL	B	403	-	5,5,5	0.30	0	5,5,5	0.72	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
3	GOL	C	402	-	-	3/4/4/4	-
3	GOL	B	402	-	-	2/4/4/4	-
3	GOL	B	401	-	-	2/4/4/4	-
3	GOL	B	403	-	-	2/4/4/4	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	B	401	GOL	O1-C1-C2	2.17	120.60	110.20

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	403	GOL	O1-C1-C2-C3
3	C	402	GOL	C1-C2-C3-O3
3	C	402	GOL	O2-C2-C3-O3
3	B	401	GOL	C1-C2-C3-O3
3	B	402	GOL	C1-C2-C3-O3
3	C	402	GOL	O1-C1-C2-C3
3	B	401	GOL	O2-C2-C3-O3
3	B	403	GOL	O1-C1-C2-O2
3	B	402	GOL	O2-C2-C3-O3

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	402	GOL	3	0
3	B	402	GOL	1	0
3	B	401	GOL	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

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	335/354 (94%)	0.44	16 (4%) 36 35	37, 76, 138, 174	0
1	B	338/354 (95%)	0.04	8 (2%) 59 58	33, 53, 103, 157	0
1	C	335/354 (94%)	-0.04	8 (2%) 59 58	34, 52, 89, 150	0
1	D	336/354 (94%)	0.65	27 (8%) 20 18	43, 85, 140, 199	0
All	All	1344/1416 (94%)	0.27	59 (4%) 39 38	33, 64, 127, 199	0

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	183	LEU	4.5
1	D	183	LEU	4.4
1	A	184	VAL	4.3
1	D	187	TRP	4.2
1	D	178	LEU	4.0
1	D	181	PHE	4.0
1	C	214	TRP	3.8
1	A	13	PHE	3.5
1	A	188	HIS	3.5
1	B	-2	GLY	3.5
1	B	240	TRP	3.4
1	C	112	TYR	3.3
1	D	240	TRP	3.2
1	A	1	LEU	3.2
1	A	181	PHE	3.1
1	C	113	LEU	3.1
1	B	186	HIS	3.1
1	C	114	LEU	3.1
1	C	104	PRO	3.0
1	D	160	VAL	3.0
1	D	239	TYR	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	240	TRP	2.9
1	D	162	PHE	2.8
1	A	186	HIS	2.8
1	D	105	LEU	2.8
1	A	175	ALA	2.6
1	A	203	ILE	2.6
1	B	193	PRO	2.6
1	D	238	SER	2.6
1	D	243	TYR	2.6
1	A	178	LEU	2.6
1	D	107	PHE	2.5
1	D	137	PHE	2.5
1	D	293	VAL	2.5
1	B	107	PHE	2.5
1	A	286	LEU	2.5
1	D	145	VAL	2.5
1	D	290	ILE	2.5
1	A	189	TYR	2.4
1	D	235	SER	2.4
1	B	183	LEU	2.4
1	D	244	MET	2.4
1	D	168	ASN	2.4
1	D	104	PRO	2.3
1	B	181	PHE	2.3
1	C	103	ILE	2.3
1	D	110	ASN	2.3
1	D	83	ALA	2.3
1	D	190	PRO	2.2
1	B	162	PHE	2.2
1	A	0	HIS	2.2
1	A	115	PRO	2.1
1	D	211	PHE	2.1
1	C	205	PRO	2.1
1	D	184	VAL	2.1
1	D	262	VAL	2.1
1	C	110	ASN	2.0
1	D	14	GLN	2.0
1	A	295	GLY	2.0

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

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
3	GOL	B	403	6/6	0.83	0.15	60,69,90,96	0
3	GOL	B	401	6/6	0.86	0.12	60,66,75,75	0
3	GOL	C	402	6/6	0.90	0.13	69,80,82,88	0
3	GOL	B	402	6/6	0.91	0.14	50,74,85,98	0
2	CA	C	401	1/1	0.97	0.06	50,50,50,50	0
2	CA	A	401	1/1	0.99	0.04	45,45,45,45	0

6.5 Other polymers [i](#)

There are no such residues in this entry.