



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 03:36 PM UTC

PDB ID : 3TWB / pdb_00003twb
Title : Crystal structure of gluconate dehydratase (TARGET EFI-501679) from Salmonella enterica subsp. enterica serovar Enteritidis str. P125109 complexed with magnesium and gluconic acid
Authors : Patskovsky, Y.; Toro, R.; Bhosle, R.; Hillerich, B.; Seidel, R.D.; Washington, E.; Scott Glenn, A.; Chowdhury, S.; Evans, B.; Hammonds, J.; Zencheck, W.D.; Imker, H.J.; Gerlt, J.A.; Almo, S.C.; Enzyme Function Initiative (EFI)
Deposited on : 2011-09-21
Resolution : 1.76 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)

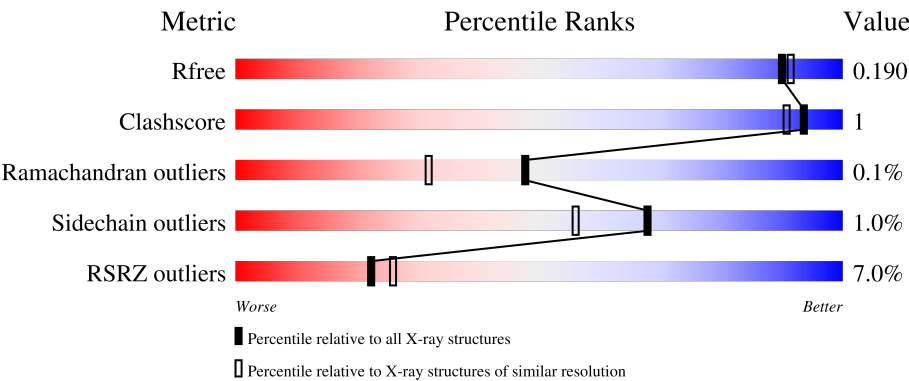
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.76 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	3183 (1.76-1.76)
Clashscore	190562	3299 (1.76-1.76)
Ramachandran outliers	187476	3274 (1.76-1.76)
Sidechain outliers	187428	3274 (1.76-1.76)
RSRZ outliers	180081	3183 (1.76-1.76)

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	442	4% 90% 6%
1	B	442	5% 91% 6%
1	C	442	% 91% 6%
1	D	442	2% 91% 6%

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Mol	Chain	Length	Quality of chain
1	E	442	21% 86% 7% 6%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 18525 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 Putative dehydratase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	415	Total	C	N	O	S	0	5	0
			3248	2064	555	609	20			
1	B	416	Total	C	N	O	S	0	10	0
			3278	2085	558	614	21			
1	C	417	Total	C	N	O	S	0	13	0
			3302	2103	563	616	20			
1	D	416	Total	C	N	O	S	0	15	0
			3314	2113	568	612	21			
1	E	415	Total	C	N	O	S	0	4	0
			3252	2066	560	606	20			

There are 115 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-22	MET	-	expression tag	UNP B5R541
A	-21	HIS	-	expression tag	UNP B5R541
A	-20	HIS	-	expression tag	UNP B5R541
A	-19	HIS	-	expression tag	UNP B5R541
A	-18	HIS	-	expression tag	UNP B5R541
A	-17	HIS	-	expression tag	UNP B5R541
A	-16	HIS	-	expression tag	UNP B5R541
A	-15	SER	-	expression tag	UNP B5R541
A	-14	SER	-	expression tag	UNP B5R541
A	-13	GLY	-	expression tag	UNP B5R541
A	-12	VAL	-	expression tag	UNP B5R541
A	-11	ASP	-	expression tag	UNP B5R541
A	-10	LEU	-	expression tag	UNP B5R541
A	-9	GLY	-	expression tag	UNP B5R541
A	-8	THR	-	expression tag	UNP B5R541
A	-7	GLU	-	expression tag	UNP B5R541
A	-6	ASN	-	expression tag	UNP B5R541
A	-5	LEU	-	expression tag	UNP B5R541
A	-4	TYR	-	expression tag	UNP B5R541

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	PHE	-	expression tag	UNP B5R541
A	-2	GLN	-	expression tag	UNP B5R541
A	-1	SER	-	expression tag	UNP B5R541
A	0	MET	-	expression tag	UNP B5R541
B	-22	MET	-	expression tag	UNP B5R541
B	-21	HIS	-	expression tag	UNP B5R541
B	-20	HIS	-	expression tag	UNP B5R541
B	-19	HIS	-	expression tag	UNP B5R541
B	-18	HIS	-	expression tag	UNP B5R541
B	-17	HIS	-	expression tag	UNP B5R541
B	-16	HIS	-	expression tag	UNP B5R541
B	-15	SER	-	expression tag	UNP B5R541
B	-14	SER	-	expression tag	UNP B5R541
B	-13	GLY	-	expression tag	UNP B5R541
B	-12	VAL	-	expression tag	UNP B5R541
B	-11	ASP	-	expression tag	UNP B5R541
B	-10	LEU	-	expression tag	UNP B5R541
B	-9	GLY	-	expression tag	UNP B5R541
B	-8	THR	-	expression tag	UNP B5R541
B	-7	GLU	-	expression tag	UNP B5R541
B	-6	ASN	-	expression tag	UNP B5R541
B	-5	LEU	-	expression tag	UNP B5R541
B	-4	TYR	-	expression tag	UNP B5R541
B	-3	PHE	-	expression tag	UNP B5R541
B	-2	GLN	-	expression tag	UNP B5R541
B	-1	SER	-	expression tag	UNP B5R541
B	0	MET	-	expression tag	UNP B5R541
C	-22	MET	-	expression tag	UNP B5R541
C	-21	HIS	-	expression tag	UNP B5R541
C	-20	HIS	-	expression tag	UNP B5R541
C	-19	HIS	-	expression tag	UNP B5R541
C	-18	HIS	-	expression tag	UNP B5R541
C	-17	HIS	-	expression tag	UNP B5R541
C	-16	HIS	-	expression tag	UNP B5R541
C	-15	SER	-	expression tag	UNP B5R541
C	-14	SER	-	expression tag	UNP B5R541
C	-13	GLY	-	expression tag	UNP B5R541
C	-12	VAL	-	expression tag	UNP B5R541
C	-11	ASP	-	expression tag	UNP B5R541
C	-10	LEU	-	expression tag	UNP B5R541
C	-9	GLY	-	expression tag	UNP B5R541
C	-8	THR	-	expression tag	UNP B5R541

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-7	GLU	-	expression tag	UNP B5R541
C	-6	ASN	-	expression tag	UNP B5R541
C	-5	LEU	-	expression tag	UNP B5R541
C	-4	TYR	-	expression tag	UNP B5R541
C	-3	PHE	-	expression tag	UNP B5R541
C	-2	GLN	-	expression tag	UNP B5R541
C	-1	SER	-	expression tag	UNP B5R541
C	0	MET	-	expression tag	UNP B5R541
D	-22	MET	-	expression tag	UNP B5R541
D	-21	HIS	-	expression tag	UNP B5R541
D	-20	HIS	-	expression tag	UNP B5R541
D	-19	HIS	-	expression tag	UNP B5R541
D	-18	HIS	-	expression tag	UNP B5R541
D	-17	HIS	-	expression tag	UNP B5R541
D	-16	HIS	-	expression tag	UNP B5R541
D	-15	SER	-	expression tag	UNP B5R541
D	-14	SER	-	expression tag	UNP B5R541
D	-13	GLY	-	expression tag	UNP B5R541
D	-12	VAL	-	expression tag	UNP B5R541
D	-11	ASP	-	expression tag	UNP B5R541
D	-10	LEU	-	expression tag	UNP B5R541
D	-9	GLY	-	expression tag	UNP B5R541
D	-8	THR	-	expression tag	UNP B5R541
D	-7	GLU	-	expression tag	UNP B5R541
D	-6	ASN	-	expression tag	UNP B5R541
D	-5	LEU	-	expression tag	UNP B5R541
D	-4	TYR	-	expression tag	UNP B5R541
D	-3	PHE	-	expression tag	UNP B5R541
D	-2	GLN	-	expression tag	UNP B5R541
D	-1	SER	-	expression tag	UNP B5R541
D	0	MET	-	expression tag	UNP B5R541
E	-22	MET	-	expression tag	UNP B5R541
E	-21	HIS	-	expression tag	UNP B5R541
E	-20	HIS	-	expression tag	UNP B5R541
E	-19	HIS	-	expression tag	UNP B5R541
E	-18	HIS	-	expression tag	UNP B5R541
E	-17	HIS	-	expression tag	UNP B5R541
E	-16	HIS	-	expression tag	UNP B5R541
E	-15	SER	-	expression tag	UNP B5R541
E	-14	SER	-	expression tag	UNP B5R541
E	-13	GLY	-	expression tag	UNP B5R541
E	-12	VAL	-	expression tag	UNP B5R541

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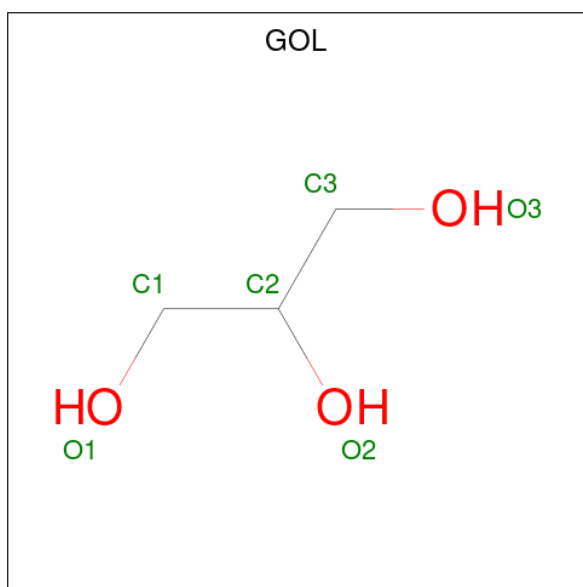
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Chain	Residue	Modelled	Actual	Comment	Reference
E	-11	ASP	-	expression tag	UNP B5R541
E	-10	LEU	-	expression tag	UNP B5R541
E	-9	GLY	-	expression tag	UNP B5R541
E	-8	THR	-	expression tag	UNP B5R541
E	-7	GLU	-	expression tag	UNP B5R541
E	-6	ASN	-	expression tag	UNP B5R541
E	-5	LEU	-	expression tag	UNP B5R541
E	-4	TYR	-	expression tag	UNP B5R541
E	-3	PHE	-	expression tag	UNP B5R541
E	-2	GLN	-	expression tag	UNP B5R541
E	-1	SER	-	expression tag	UNP B5R541
E	0	MET	-	expression tag	UNP B5R541

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Mg 1 1	0	0
2	B	1	Total Mg 1 1	0	0
2	C	1	Total Mg 1 1	0	0
2	D	1	Total Mg 1 1	0	0
2	E	1	Total Mg 1 1	0	0

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

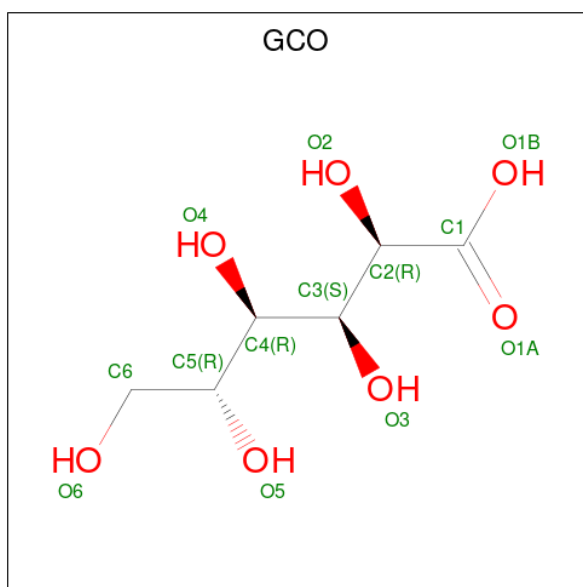


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	D	1	Total	C	O	0	0
			6	3	3		
3	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		
4	C	1	Total	Cl	0	0
			1	1		
4	E	1	Total	Cl	0	0
			1	1		

- Molecule 5 is D-gluconic acid (CCD ID: GCO) (formula: C₆H₁₂O₇).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			13	6	7		
5	B	1	Total	C	O	0	0
			13	6	7		
5	C	1	Total	C	O	0	0
			13	6	7		
5	D	1	Total	C	O	0	0
			13	6	7		
5	E	1	Total	C	O	0	0
			13	6	7		

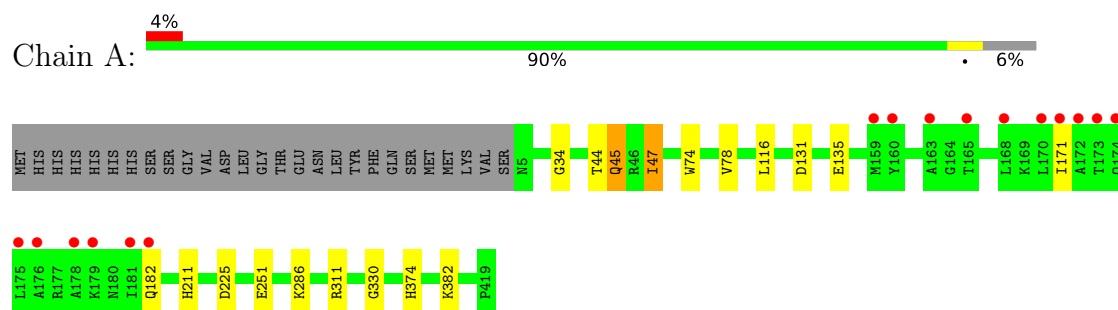
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	466	Total	O	0	0
			466	466		
6	B	388	Total	O	0	0
			388	388		
6	C	465	Total	O	0	0
			465	465		
6	D	447	Total	O	0	0
			447	447		
6	E	250	Total	O	0	0
			250	250		

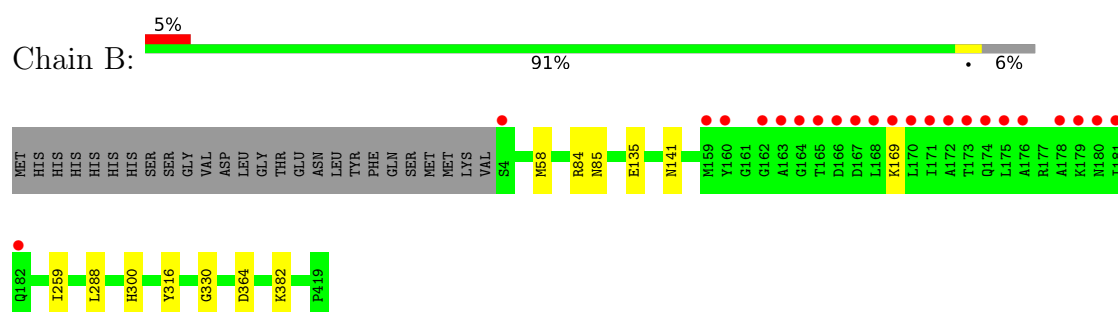
3 Residue-property plots [i](#)

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.

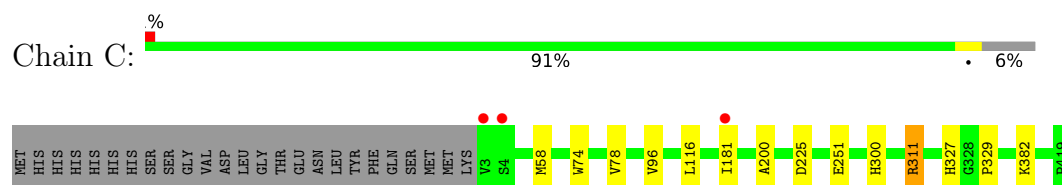
- Molecule 1: Putative dehydratase



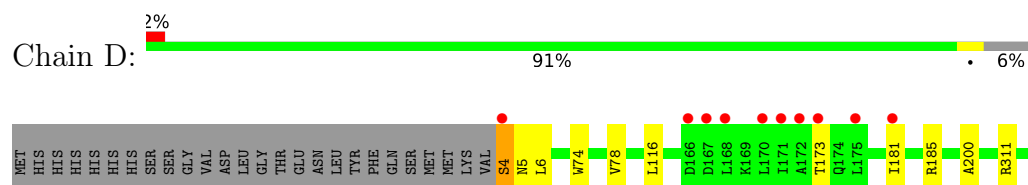
- Molecule 1: Putative dehydratase



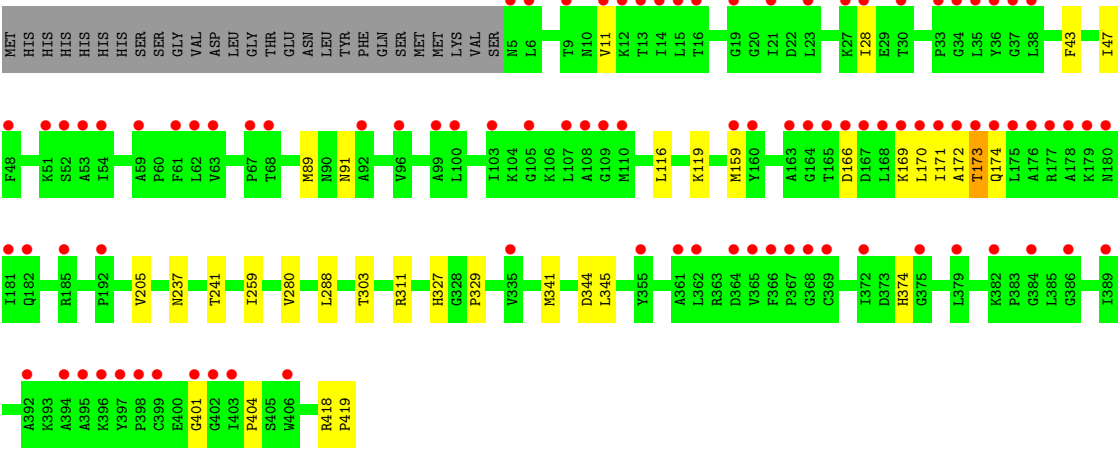
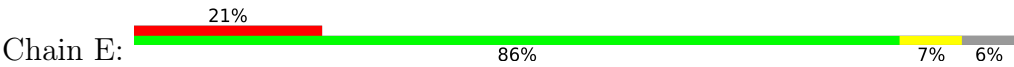
- Molecule 1: Putative dehydratase



- Molecule 1: Putative dehydratase



- Molecule 1: Putative dehydratase



4 Data and refinement statistics

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α , β , γ	144.73Å 144.73Å 447.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 1.76 40.00 – 1.76	Depositor EDS
% Data completeness (in resolution range)	99.9 (40.00-1.76) 99.9 (40.00-1.76)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.18	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.18 (at 1.76Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.170 , 0.206 (Not available) , 0.190	Depositor DCC
R_{free} test set	6988 reflections (3.01%)	wwPDB-VP
Wilson B-factor (Å ²)	18.0	Xtriage
Anisotropy	0.005	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 43.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	18525	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.57% 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: MG, GOL, GCO, 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	0.84	1/3342 (0.0%)	0.89	2/4542 (0.0%)
1	B	0.82	4/3388 (0.1%)	0.88	1/4604 (0.0%)
1	C	0.79	1/3421 (0.0%)	0.87	0/4648
1	D	0.83	2/3439 (0.1%)	0.88	0/4666
1	E	0.72	1/3343 (0.0%)	0.94	0/4540
All	All	0.80	9/16933 (0.1%)	0.89	3/23000 (0.0%)

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	6	LEU	C-O	-7.49	1.15	1.23
1	B	84	ARG	C-O	-6.98	1.17	1.24
1	B	300	HIS	C-O	-6.70	1.15	1.24
1	A	131	ASP	C-O	-6.15	1.16	1.23
1	B	141[A]	ASN	C-O	-5.55	1.17	1.24
1	B	141[B]	ASN	C-O	-5.55	1.17	1.24
1	E	205	VAL	CA-CB	5.38	1.57	1.54
1	D	327	HIS	C-O	-5.31	1.17	1.23
1	C	300	HIS	C-O	-5.11	1.17	1.24

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	286	LYS	CA-C-N	-5.42	113.45	119.19
1	A	286	LYS	C-N-CA	-5.42	113.45	119.19
1	B	85	ASN	N-CA-C	5.18	118.77	111.52

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	3248	0	3218	9	0
1	B	3278	0	3252	4	1
1	C	3302	0	3303	7	0
1	D	3314	0	3334	5	0
1	E	3252	0	3227	22	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
3	A	12	0	16	2	0
3	B	6	0	8	1	0
3	C	12	0	16	0	0
3	D	12	0	16	1	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0
4	E	1	0	0	1	0
5	A	13	0	10	0	0
5	B	13	0	11	0	0
5	C	13	0	10	1	0
5	D	13	0	10	0	0
5	E	13	0	11	1	0
6	A	466	0	0	0	1
6	B	388	0	0	1	0
6	C	465	0	0	1	0
6	D	447	0	0	1	0
6	E	250	0	0	3	0
All	All	18525	0	16442	47	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 1.

All (47) 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:E:89:MET:HG2	4:E:421:CL:CL	2.21	0.77
1:E:171:ILE:HG22	6:E:1611:HOH:O	1.85	0.75
1:E:170:LEU:HD12	1:E:170:LEU:O	1.91	0.70
1:E:170:LEU:HD12	1:E:170:LEU:C	2.18	0.68
1:E:169:LYS:NZ	1:E:401:GLY:O	2.28	0.66
1:B:58[B]:MET:HA	1:B:58[B]:MET:HE2	1.79	0.64
1:C:382:LYS:NZ	6:C:778:HOH:O	2.33	0.60
1:E:159:MET:HE3	1:E:170:LEU:HD21	1.84	0.59
1:A:34:GLY:H	3:A:424:GOL:H2	1.67	0.57
1:A:116:LEU:HD22	1:A:311:ARG:HD3	1.88	0.54
1:C:327:HIS:NE2	5:C:424:GCO:H2	2.23	0.53
1:E:166:ASP:O	1:E:174:GLN:NE2	2.41	0.53
1:D:4:SER:HA	6:D:1845:HOH:O	2.09	0.52
1:B:330:GLY:HA2	3:B:421:GOL:H11	1.92	0.50
1:C:116:LEU:O	1:C:311[A]:ARG:NH1	2.44	0.50
1:E:11:VAL:HG22	1:E:28:ILE:HG12	1.93	0.50
1:E:169:LYS:HG2	6:E:443:HOH:O	2.12	0.50
1:A:44:THR:HA	1:A:47:ILE:HD13	1.93	0.49
1:C:74:TRP:CH2	1:C:78[B]:VAL:HG21	2.47	0.49
1:E:116:LEU:HD22	1:E:311[A]:ARG:HD3	1.95	0.47
1:B:259:ILE:HB	1:B:288:LEU:HD21	1.96	0.47
1:A:45:GLN:HE21	1:A:45:GLN:H	1.63	0.47
1:D:74:TRP:CH2	1:D:78[B]:VAL:HG21	2.49	0.47
1:E:171:ILE:O	1:E:172:ALA:HB3	2.15	0.46
1:E:171:ILE:O	1:E:171:ILE:HG13	2.15	0.46
1:C:181:ILE:HG23	1:C:200:ALA:HB1	1.99	0.45
1:A:74:TRP:CH2	1:A:78[B]:VAL:HG21	2.52	0.44
1:E:119:LYS:HG2	1:E:345:LEU:HG	1.99	0.44
1:E:237:ASN:O	1:E:241:THR:HG23	2.17	0.44
1:E:341:MET:HA	1:E:344:ASP:HB2	2.00	0.43
1:C:58:MET:HE2	1:C:96:VAL:HG21	2.01	0.43
1:B:169:LYS:HA	6:B:465:HOH:O	2.18	0.43
1:E:327:HIS:NE2	5:E:422:GCO:H2	2.34	0.43
1:A:45:GLN:H	1:A:45:GLN:NE2	2.17	0.43
1:E:259:ILE:HB	1:E:288:LEU:HD21	2.00	0.42
1:D:181:ILE:HG23	1:D:200:ALA:HB1	2.02	0.42
1:E:418:ARG:HA	1:E:419:PRO:HD3	1.94	0.42
1:D:116:LEU:HD22	1:D:311[B]:ARG:HE	1.85	0.42
1:E:280:VAL:HG12	1:E:303:THR:HG22	2.01	0.41
1:A:330:GLY:HA2	3:A:421:GOL:H32	2.01	0.41
1:A:135:GLU:HB3	1:A:211:HIS:CD2	2.55	0.41
1:A:225:ASP:HA	1:A:251:GLU:HB3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:225:ASP:HA	1:C:251:GLU:HB3	2.02	0.41
1:E:171:ILE:HG23	1:E:173:THR:H	1.85	0.41
1:E:404:PRO:HD3	6:E:488:HOH:O	2.20	0.41
1:E:43:PHE:HB2	1:E:91:ASN:ND2	2.35	0.41
1:D:330:GLY:HA2	3:D:421:GOL:H32	2.04	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:B:316:TYR:OH	6:A:498:HOH:O[4_555]	2.16	0.04

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	418/442 (95%)	406 (97%)	12 (3%)	0	100	100
1	B	424/442 (96%)	416 (98%)	8 (2%)	0	100	100
1	C	428/442 (97%)	419 (98%)	8 (2%)	1 (0%)	43	27
1	D	429/442 (97%)	420 (98%)	9 (2%)	0	100	100
1	E	417/442 (94%)	401 (96%)	15 (4%)	1 (0%)	43	27
All	All	2116/2210 (96%)	2062 (97%)	52 (2%)	2 (0%)	48	32

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	329	PRO
1	E	329	PRO

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	350/370 (95%)	344 (98%)	6 (2%)	53	36
1	B	355/370 (96%)	352 (99%)	3 (1%)	73	64
1	C	360/370 (97%)	358 (99%)	2 (1%)	78	71
1	D	361/370 (98%)	356 (99%)	5 (1%)	59	44
1	E	349/370 (94%)	346 (99%)	3 (1%)	70	60
All	All	1775/1850 (96%)	1756 (99%)	19 (1%)	68	52

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	GLN
1	A	47	ILE
1	A	171	ILE
1	A	182	GLN
1	A	374	HIS
1	A	382	LYS
1	B	135	GLU
1	B	364	ASP
1	B	382	LYS
1	C	311[A]	ARG
1	C	311[B]	ARG
1	D	4	SER
1	D	5	ASN
1	D	173	THR
1	D	185[A]	ARG
1	D	185[B]	ARG
1	E	47	ILE
1	E	173	THR
1	E	374	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	10	ASN
1	A	45	GLN
1	A	182	GLN
1	A	246	GLN
1	A	291	ASN
1	B	10	ASN
1	B	291	ASN
1	C	237	ASN
1	D	291	ASN
1	E	75	GLN
1	E	174	GLN
1	E	214	ASN
1	E	246	GLN
1	E	291	ASN

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](#)

Of 20 ligands modelled in this entry, 8 are monoatomic - leaving 12 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	$\# Z > 2$
5	GCO	B	422	2	12,12,12	1.06	1 (8%)	15,16,16	1.66	3 (20%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	GOL	C	423	-	5,5,5	0.34	0	5,5,5	0.43	0
3	GOL	D	423	-	5,5,5	0.50	0	5,5,5	0.24	0
5	GCO	C	424	2	12,12,12	1.22	3 (25%)	15,16,16	0.91	0
5	GCO	A	423	2	12,12,12	1.05	1 (8%)	15,16,16	1.65	3 (20%)
3	GOL	D	421	-	5,5,5	0.44	0	5,5,5	0.52	0
5	GCO	E	422	2	12,12,12	1.07	2 (16%)	15,16,16	0.99	1 (6%)
3	GOL	A	424	-	5,5,5	0.43	0	5,5,5	0.72	0
3	GOL	A	421	-	5,5,5	0.60	0	5,5,5	0.61	0
5	GCO	D	422	2	12,12,12	1.02	0	15,16,16	1.48	2 (13%)
3	GOL	C	421	-	5,5,5	0.63	0	5,5,5	0.46	0
3	GOL	B	421	-	5,5,5	0.52	0	5,5,5	0.79	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
5	GCO	B	422	2	-	5/18/18/18	-
3	GOL	C	423	-	-	0/4/4/4	-
3	GOL	D	423	-	-	0/4/4/4	-
5	GCO	C	424	2	-	8/18/18/18	-
5	GCO	A	423	2	-	4/18/18/18	-
3	GOL	D	421	-	-	0/4/4/4	-
5	GCO	E	422	2	-	8/18/18/18	-
3	GOL	A	424	-	-	2/4/4/4	-
3	GOL	A	421	-	-	0/4/4/4	-
5	GCO	D	422	2	-	6/18/18/18	-
3	GOL	C	421	-	-	0/4/4/4	-
3	GOL	B	421	-	-	1/4/4/4	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	424	GCO	O5-C5	-2.43	1.38	1.43
5	C	424	GCO	O1B-C1	-2.26	1.23	1.30
5	E	422	GCO	O1B-C1	-2.23	1.23	1.30
5	B	422	GCO	O4-C4	-2.21	1.37	1.43
5	A	423	GCO	O4-C4	-2.18	1.37	1.43
5	C	424	GCO	O4-C4	-2.13	1.37	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	422	GCO	O5-C5	-2.01	1.39	1.43

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	422	GCO	O2-C2-C1	3.18	117.48	110.69
5	A	423	GCO	O2-C2-C1	3.16	117.45	110.69
5	D	422	GCO	O2-C2-C1	2.95	117.00	110.69
5	D	422	GCO	O2-C2-C3	2.92	116.72	110.38
5	B	422	GCO	C4-C3-C2	-2.36	109.45	113.62
5	A	423	GCO	C4-C3-C2	-2.34	109.47	113.62
5	E	422	GCO	O4-C4-C3	2.17	114.54	109.46
5	B	422	GCO	O4-C4-C5	2.05	113.59	108.93
5	A	423	GCO	O4-C4-C5	2.05	113.58	108.93

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	E	422	GCO	C2-C3-C4-C5
5	A	423	GCO	O1B-C1-C2-C3
5	B	422	GCO	O1B-C1-C2-C3
5	D	422	GCO	O1A-C1-C2-C3
5	D	422	GCO	O1B-C1-C2-C3
5	C	424	GCO	O1A-C1-C2-C3
5	A	423	GCO	C2-C3-C4-C5
5	B	422	GCO	C2-C3-C4-C5
5	D	422	GCO	C2-C3-C4-C5
5	A	423	GCO	O1A-C1-C2-C3
5	B	422	GCO	O1A-C1-C2-C3
5	C	424	GCO	O1B-C1-C2-C3
5	E	422	GCO	O1B-C1-C2-C3
5	A	423	GCO	O3-C3-C4-C5
5	B	422	GCO	O3-C3-C4-C5
5	E	422	GCO	C2-C3-C4-O4
3	A	424	GOL	C1-C2-C3-O3
3	B	421	GOL	O1-C1-C2-C3
5	D	422	GCO	C2-C3-C4-O4
5	E	422	GCO	O3-C3-C4-C5
5	C	424	GCO	C2-C3-C4-C5
5	E	422	GCO	O1A-C1-C2-C3
5	C	424	GCO	O1A-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
5	C	424	GCO	O3-C3-C4-C5
5	D	422	GCO	O3-C3-C4-C5
3	A	424	GOL	O2-C2-C3-O3
5	E	422	GCO	O1B-C1-C2-O2
5	C	424	GCO	O1B-C1-C2-O2
5	C	424	GCO	C2-C3-C4-O4
5	E	422	GCO	O3-C3-C4-O4
5	E	422	GCO	O1A-C1-C2-O2
5	C	424	GCO	O3-C3-C4-O4
5	D	422	GCO	O3-C3-C4-O4
5	B	422	GCO	C2-C3-C4-O4

There are no ring outliers.

6 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	424	GCO	1	0
3	D	421	GOL	1	0
5	E	422	GCO	1	0
3	A	424	GOL	1	0
3	A	421	GOL	1	0
3	B	421	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	415/442 (93%)	-0.40	16 (3%)	43	49	9, 16, 38, 74	5 (1%)
1	B	416/442 (94%)	-0.22	23 (5%)	30	35	9, 17, 49, 91	10 (2%)
1	C	417/442 (94%)	-0.64	3 (0%)	84	88	7, 14, 26, 70	13 (3%)
1	D	416/442 (94%)	-0.45	10 (2%)	59	66	7, 15, 32, 75	15 (3%)
1	E	415/442 (93%)	1.10	94 (22%)	2	2	13, 32, 62, 106	4 (0%)
All	All	2079/2210 (94%)	-0.12	146 (7%)	22	26	7, 17, 47, 106	47 (2%)

All (146) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	171	ILE	9.4
1	B	181	ILE	7.4
1	B	172	ALA	7.3
1	E	171	ILE	7.0
1	E	168	LEU	6.1
1	E	173	THR	6.1
1	B	175	LEU	6.1
1	E	172	ALA	5.9
1	D	171	ILE	5.8
1	E	170	LEU	5.6
1	A	181	ILE	5.5
1	A	171	ILE	5.1
1	B	170	LEU	4.8
1	E	181	ILE	4.7
1	C	3	VAL	4.7
1	B	173	THR	4.7
1	E	175	LEU	4.6
1	A	173	THR	4.4
1	B	168	LEU	4.2
1	E	63	VAL	4.0

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Mol	Chain	Res	Type	RSRZ
1	C	181	ILE	4.0
1	D	173	THR	4.0
1	D	4	SER	3.9
1	E	165	THR	3.9
1	E	34	GLY	3.9
1	B	176	ALA	3.9
1	E	159	MET	3.8
1	E	392	ALA	3.8
1	B	166	ASP	3.7
1	E	163	ALA	3.7
1	E	33	PRO	3.7
1	E	107	LEU	3.7
1	A	176	ALA	3.7
1	B	160	TYR	3.6
1	E	36	TYR	3.6
1	E	367	PRO	3.6
1	E	395	ALA	3.6
1	B	163	ALA	3.5
1	A	168	LEU	3.5
1	E	179	LYS	3.5
1	E	35	LEU	3.5
1	E	169	LYS	3.4
1	E	335	VAL	3.4
1	B	159	MET	3.4
1	E	160	TYR	3.4
1	B	164	GLY	3.4
1	B	169	LYS	3.3
1	D	181	ILE	3.3
1	D	172	ALA	3.3
1	B	4	SER	3.2
1	A	175	LEU	3.2
1	E	23	LEU	3.2
1	A	178	ALA	3.2
1	B	167	ASP	3.2
1	E	174	GLN	3.1
1	A	163	ALA	3.1
1	E	21	ILE	3.1
1	E	6	LEU	3.1
1	E	28	ILE	3.1
1	E	5	ASN	3.1
1	E	397	TYR	3.0
1	E	30	THR	3.0

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Mol	Chain	Res	Type	RSRZ
1	E	182	GLN	3.0
1	E	61	PHE	3.0
1	A	172	ALA	3.0
1	A	170	LEU	3.0
1	E	365	VAL	2.9
1	B	162	GLY	2.9
1	E	15	LEU	2.9
1	E	54	ILE	2.9
1	D	175	LEU	2.8
1	B	180	ASN	2.8
1	B	178	ALA	2.8
1	E	109	GLY	2.8
1	D	170	LEU	2.8
1	E	59	ALA	2.8
1	E	178	ALA	2.8
1	E	19	GLY	2.8
1	E	176	ALA	2.7
1	E	67	PRO	2.7
1	A	160	TYR	2.7
1	B	174	GLN	2.7
1	E	48	PHE	2.7
1	E	27	LYS	2.7
1	E	38	LEU	2.6
1	E	180	ASN	2.6
1	E	16	THR	2.6
1	E	62	LEU	2.6
1	E	108	ALA	2.6
1	A	179	LYS	2.6
1	E	399	CYS	2.5
1	E	368	GLY	2.5
1	D	168	LEU	2.5
1	A	182	GLN	2.5
1	E	372	ILE	2.5
1	E	386	GLY	2.5
1	E	396	LYS	2.5
1	E	12	LYS	2.5
1	E	375	GLY	2.4
1	E	401	GLY	2.4
1	E	92	ALA	2.4
1	E	167	ASP	2.4
1	E	398	PRO	2.4
1	A	165	THR	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	174	GLN	2.4
1	B	182	GLN	2.4
1	E	13	THR	2.4
1	E	103	ILE	2.4
1	E	364	ASP	2.4
1	E	100	LEU	2.4
1	E	96	VAL	2.4
1	E	105	GLY	2.3
1	E	9	THR	2.3
1	E	53	ALA	2.3
1	E	361	ALA	2.3
1	E	394	ALA	2.3
1	E	382	LYS	2.3
1	E	11	VAL	2.3
1	E	402	GLY	2.3
1	E	99	ALA	2.3
1	E	369	CYS	2.3
1	E	403	ILE	2.3
1	E	362	LEU	2.2
1	E	52	SER	2.2
1	E	51	LYS	2.2
1	D	166	ASP	2.2
1	C	4	SER	2.2
1	E	406	TRP	2.2
1	E	379	LEU	2.2
1	E	185[A]	ARG	2.2
1	E	389	ILE	2.2
1	E	68	THR	2.2
1	E	164	GLY	2.1
1	E	366	PHE	2.1
1	E	14	ILE	2.1
1	E	177	ARG	2.1
1	E	384	GLY	2.1
1	E	166	ASP	2.1
1	E	192	PRO	2.1
1	E	37	GLY	2.1
1	A	159	MET	2.1
1	E	110	MET	2.1
1	D	167	ASP	2.1
1	B	165	THR	2.1
1	E	355	TYR	2.1
1	B	179	LYS	2.0

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
3	GOL	A	424	6/6	0.86	0.14	27,47,50,55	0
4	CL	E	421	1/1	0.88	0.23	43,43,43,43	0
3	GOL	C	423	6/6	0.89	0.11	24,34,43,49	0
5	GCO	E	422	13/13	0.91	0.12	25,35,58,69	0
3	GOL	B	421	6/6	0.93	0.10	24,27,35,43	0
5	GCO	B	422	13/13	0.93	0.12	16,23,52,57	0
3	GOL	D	423	6/6	0.93	0.09	25,32,37,37	0
3	GOL	A	421	6/6	0.95	0.07	16,20,22,23	0
5	GCO	D	422	13/13	0.96	0.10	15,22,49,56	0
5	GCO	A	423	13/13	0.96	0.09	14,20,44,46	0
5	GCO	C	424	13/13	0.97	0.08	11,16,34,48	0
3	GOL	C	421	6/6	0.97	0.08	14,15,16,18	0
3	GOL	D	421	6/6	0.97	0.06	18,21,24,25	0
4	CL	A	422	1/1	0.98	0.05	19,19,19,19	0
4	CL	C	422	1/1	0.98	0.06	19,19,19,19	0
2	MG	E	420	1/1	0.99	0.02	24,24,24,24	0
2	MG	B	420	1/1	0.99	0.04	15,15,15,15	0
2	MG	C	420	1/1	1.00	0.02	12,12,12,12	0
2	MG	D	420	1/1	1.00	0.02	14,14,14,14	0
2	MG	A	420	1/1	1.00	0.01	14,14,14,14	0

6.5 Other polymers [i](#)

There are no such residues in this entry.