



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 04:24 AM UTC

PDB ID : 4PJ6 / pdb_00004pj6
Title : Crystal Structure of Human Insulin Regulated Aminopeptidase with Lysine in Active Site
Authors : Hermans, S.J.; Ascher, D.B.; Hancock, N.C.; Holien, J.K.; Michell, B.; Morton, C.J.; Parker, M.W.
Deposited on : 2014-05-12
Resolution : 2.96 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

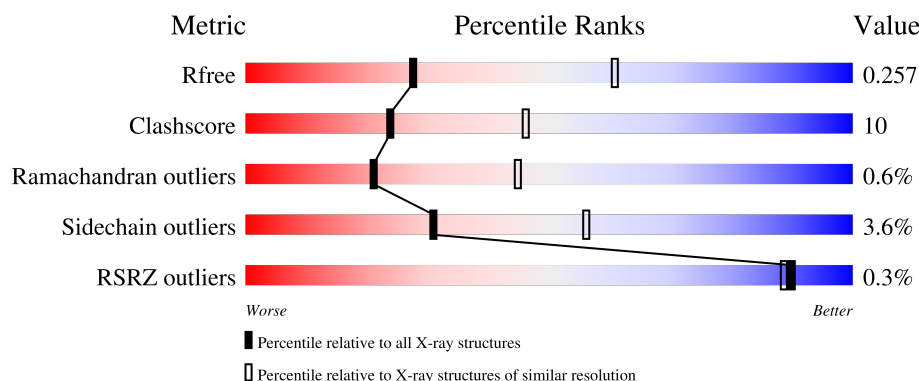
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

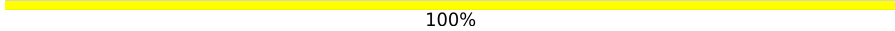
The reported resolution of this entry is 2.96 Å.

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	1130 (2.98-2.94)
Clashscore	190562	1157 (2.98-2.94)
Ramachandran outliers	187476	1101 (2.98-2.94)
Sidechain outliers	187428	1101 (2.98-2.94)
RSRZ outliers	180081	1130 (2.98-2.94)

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	872	 71% 26% ..
1	B	872	 71% 25% ..
2	C	2	 100%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 14244 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 Leucyl-cystinyl aminopeptidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	860	Total	C	N	O	S	0	2	0
			6967	4502	1132	1306	27			
1	B	849	Total	C	N	O	S	0	0	0
			6861	4442	1107	1287	25			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	154	SER	-	expression tag	UNP Q9UIQ6
B	154	SER	-	expression tag	UNP Q9UIQ6

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

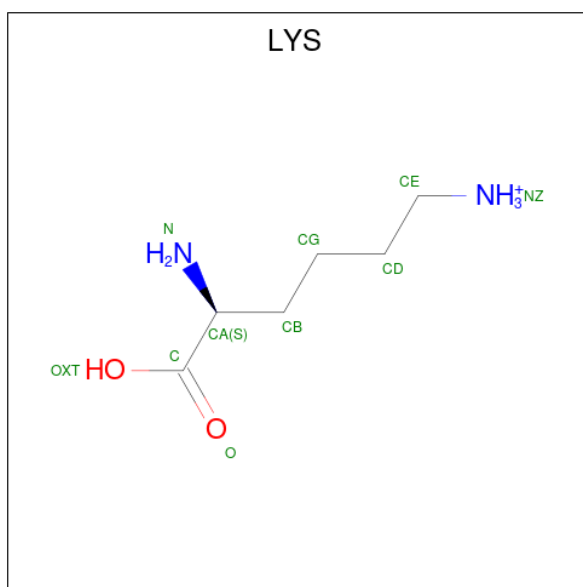


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn).

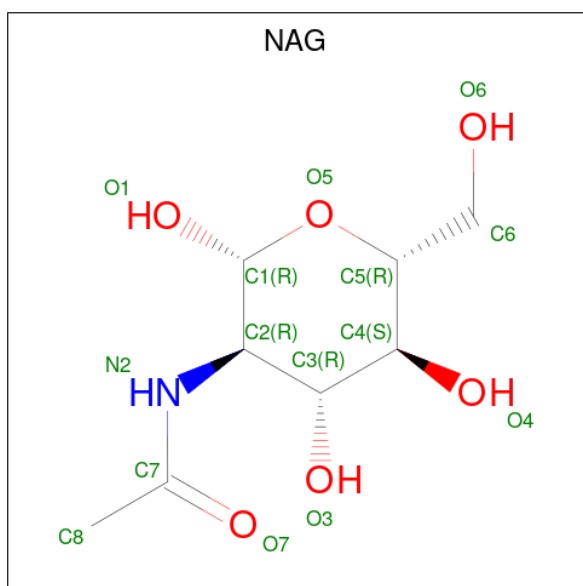
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Zn	0	0
			1	1		
3	B	1	Total	Zn	0	0
			1	1		

- Molecule 4 is LYSINE (CCD ID: LYS) (formula: C₆H₁₅N₂O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			9	6	2	1		
4	B	1	Total	C	N	O	0	0
			9	6	2	1		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		

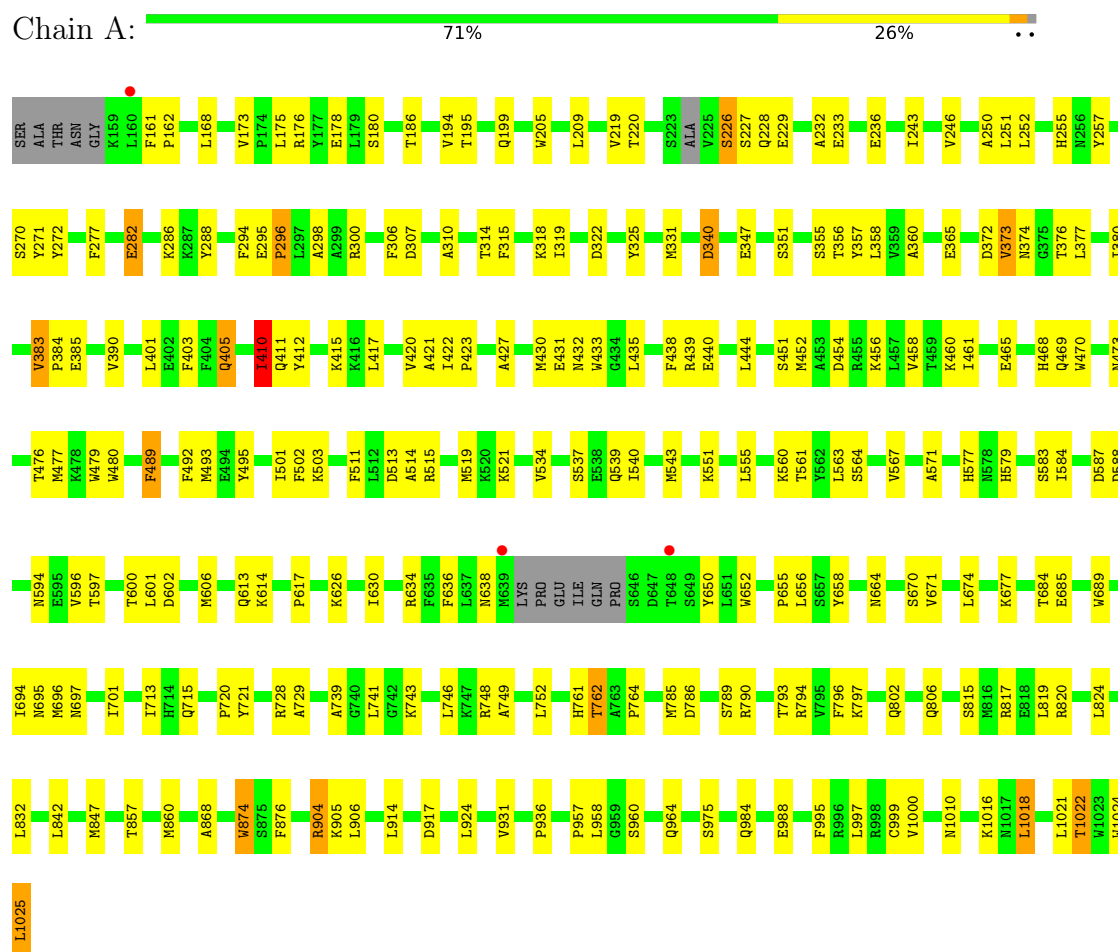
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	101	Total	O	0	0
			101	101		
6	B	57	Total	O	0	0
			57	57		

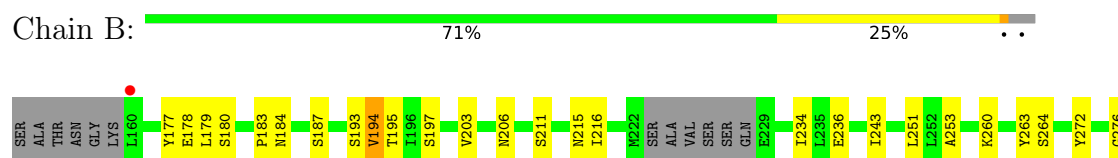
3 Residue-property plots

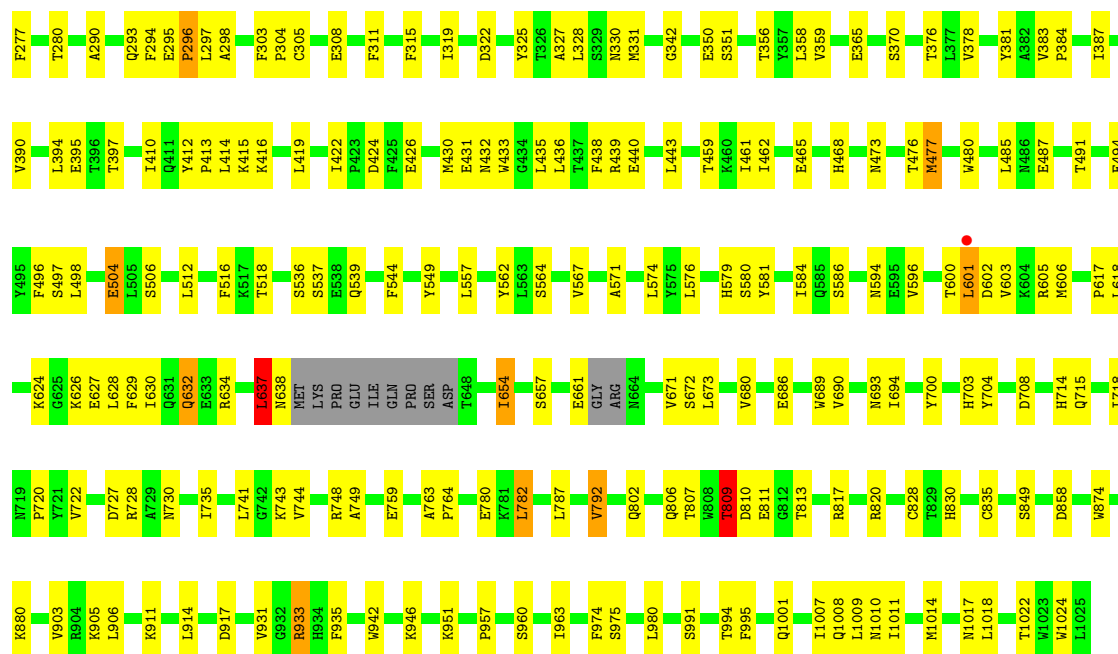
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Leucyl-cystinyl aminopeptidase



• Molecule 1: Leucyl-cystinyl aminopeptidase





- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:

100%

MAG1
MAG2

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	68.03Å 256.62Å 71.31Å 90.00° 114.35° 90.00°	Depositor
Resolution (Å)	48.32 – 2.96 48.32 – 2.96	Depositor EDS
% Data completeness (in resolution range)	99.6 (48.32-2.96) 99.7 (48.32-2.96)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.91 (at 2.96Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.185 , 0.257 0.185 , 0.257	Depositor DCC
R_{free} test set	2334 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	67.3	Xtriage
Anisotropy	0.119	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 71.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.034 for l,-k,h	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	14244	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.06% 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: NAG, ZN

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	0.87	1/7143 (0.0%)	1.11	10/9691 (0.1%)
1	B	0.84	2/7029 (0.0%)	1.06	14/9541 (0.1%)
All	All	0.85	3/14172 (0.0%)	1.09	24/19232 (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	B	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	637	LEU	CG-CD1	7.98	1.78	1.52
1	B	637	LEU	CB-CG	5.58	1.64	1.53
1	A	1000	VAL	CA-CB	5.01	1.61	1.54

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	917	ASP	N-CA-C	9.14	120.94	110.97
1	B	835	CYS	N-CA-C	7.65	119.52	111.03
1	B	654	ILE	N-CA-C	7.52	115.36	107.76
1	B	917	ASP	N-CA-C	7.09	118.91	111.03
1	A	427	ALA	N-CA-C	6.36	119.21	110.24
1	A	410	ILE	N-CA-C	-6.14	99.28	108.12
1	B	1024	TRP	N-CA-C	6.02	123.12	114.39
1	A	340	ASP	N-CA-C	5.87	119.96	112.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1018	LEU	N-CA-C	5.87	117.47	111.14
1	B	342	GLY	N-CA-C	-5.83	107.02	114.37
1	A	729	ALA	N-CA-C	-5.80	104.56	111.69
1	B	935	PHE	CA-C-N	-5.70	113.15	119.19
1	B	935	PHE	C-N-CA	-5.70	113.15	119.19
1	B	809	THR	N-CA-C	5.62	115.82	108.07
1	B	933	ARG	N-CA-C	-5.45	106.67	113.38
1	A	430	MET	N-CA-C	5.42	115.70	108.38
1	B	518	THR	N-CA-C	-5.41	105.07	110.97
1	A	874	TRP	N-CA-C	-5.25	105.45	111.07
1	B	743	LYS	N-CA-C	-5.24	106.84	113.18
1	A	786	ASP	N-CA-C	-5.20	105.53	111.14
1	B	806	GLN	N-CA-C	5.17	117.53	110.24
1	A	739	ALA	N-CA-C	-5.07	105.84	112.23
1	B	1017	ASN	N-CA-C	5.05	120.43	113.97
1	B	422	ILE	N-CA-C	5.01	114.42	108.96

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	632	GLN	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	6967	0	6817	146	0
1	B	6861	0	6701	139	0
2	C	28	0	25	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	9	0	12	0	0
4	B	9	0	12	1	0
5	A	98	0	91	0	0
5	B	112	0	104	1	0
6	A	101	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	57	0	0	1	0
All	All	14244	0	13762	282	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 10.

All (282) 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:637:LEU:CD1	1:B:637:LEU:CG	1.78	1.56
1:B:637:LEU:HD13	1:B:1009:LEU:CD2	1.80	1.11
1:B:637:LEU:HD13	1:B:1009:LEU:HD21	1.29	1.10
1:A:594:ASN:OD1	1:A:602:ASP:O	1.79	1.00
1:B:637:LEU:CD1	1:B:1009:LEU:HD21	2.03	0.87
1:A:597:THR:O	1:A:600:THR:HG22	1.79	0.83
1:A:307:ASP:HA	1:A:356:THR:HG21	1.61	0.81
1:B:397:THR:HG21	1:B:419:LEU:HD22	1.63	0.81
1:A:748:ARG:HG3	6:A:1202:HOH:O	1.81	0.79
1:A:600:THR:HG23	1:A:601:LEU:HD12	1.66	0.76
1:B:975:SER:HB3	1:B:1010:ASN:HB3	1.66	0.76
1:A:564:SER:HB3	1:A:567:VAL:HG23	1.67	0.75
1:B:637:LEU:HD12	1:B:638:ASN:N	2.02	0.75
1:A:600:THR:HG23	1:A:601:LEU:CD1	2.18	0.74
1:B:376:THR:HA	1:B:415:LYS:O	1.88	0.73
1:B:782:LEU:HD13	1:B:1014:MET:HE2	1.69	0.73
1:B:330:ASN:O	1:B:416:LYS:HE2	1.89	0.72
1:A:741:LEU:HD23	1:A:743:LYS:HG3	1.71	0.72
1:A:794:ARG:HH11	1:A:1025:LEU:HA	1.55	0.71
1:A:936:PRO:HA	1:B:903:VAL:HG21	1.72	0.71
1:A:741:LEU:CD2	1:A:743:LYS:HG3	2.22	0.70
1:A:432:ASN:HB2	1:A:435:LEU:O	1.93	0.69
1:B:637:LEU:HD13	1:B:1009:LEU:HD22	1.73	0.68
1:B:637:LEU:CD1	1:B:637:LEU:CB	2.71	0.68
1:B:637:LEU:HA	1:B:741:LEU:HG	1.76	0.67
1:B:906:LEU:HD22	1:B:931:VAL:HG22	1.76	0.67
1:B:632:GLN:OE1	1:B:654:ILE:HD12	1.94	0.67
1:A:806:GLN:HA	6:A:1263:HOH:O	1.95	0.66
1:B:763:ALA:HB3	1:B:764:PRO:HD3	1.77	0.66
1:A:614:LYS:HE3	1:A:634:ARG:HH21	1.62	0.65
1:A:820:ARG:HG3	1:A:824:LEU:HD12	1.79	0.65
1:B:571:ALA:HB2	1:B:596:VAL:HG21	1.78	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:372:ASP:OD1	1:A:374:ASN:O	2.16	0.64
1:A:958:LEU:HG	1:A:997:LEU:HD11	1.80	0.63
1:A:571:ALA:HB2	1:A:596:VAL:HG21	1.80	0.62
1:B:632:GLN:OE1	1:B:654:ILE:CD1	2.47	0.62
1:A:904:ARG:NH1	1:B:780:GLU:OE2	2.32	0.62
1:B:203:VAL:HG22	1:B:253:ALA:H	1.65	0.62
1:A:606:MET:CE	1:A:655:PRO:HG3	2.30	0.61
1:A:626:LYS:HE2	1:A:685:GLU:HA	1.81	0.61
1:A:906:LEU:HD22	1:A:931:VAL:HG22	1.82	0.61
1:B:628:LEU:HD22	1:B:690:VAL:HG21	1.83	0.61
1:B:184:ASN:O	1:B:187:SER:O	2.19	0.61
1:B:657:SER:HB2	1:B:694:ILE:HD12	1.83	0.60
1:B:628:LEU:CD1	1:B:630:ILE:HD11	2.31	0.60
1:A:658:TYR:CZ	1:A:670:SER:HB3	2.36	0.60
1:A:594:ASN:ND2	6:A:1285:HOH:O	2.29	0.60
1:A:477:MET:HG2	1:A:477:MET:O	2.02	0.59
1:B:624:LYS:O	1:B:627:GLU:HG3	2.01	0.59
1:A:233:GLU:HG2	1:A:246:VAL:HB	1.83	0.59
1:B:319:ILE:HD11	1:B:327:ALA:HB1	1.85	0.59
1:B:397:THR:CG2	1:B:419:LEU:HD22	2.33	0.59
1:B:295:GLU:HB3	1:B:430:MET:CE	2.33	0.59
1:A:205:TRP:CZ2	1:A:250:ALA:HB2	2.37	0.59
1:A:272:TYR:CZ	1:A:298:ALA:HB2	2.38	0.59
1:A:630:ILE:CD1	1:A:674:LEU:HD13	2.33	0.59
1:B:628:LEU:HD13	1:B:630:ILE:HD11	1.85	0.59
1:A:294:PHE:HA	1:A:298:ALA:HB3	1.83	0.58
1:A:431:GLU:HG3	1:A:468:HIS:HB3	1.84	0.58
1:A:380:ILE:HG21	1:A:390:VAL:HB	1.84	0.58
1:A:515:ARG:NH2	1:A:696:MET:O	2.34	0.58
1:B:177:TYR:CD2	1:B:315:PHE:CE2	2.91	0.58
1:B:294:PHE:HA	1:B:298:ALA:HB3	1.85	0.58
1:B:1014:MET:HE3	1:B:1018:LEU:HB2	1.84	0.58
1:B:564:SER:HB3	1:B:567:VAL:H	1.69	0.58
1:B:960:SER:HB3	1:B:963:ILE:HG22	1.86	0.58
1:B:991:SER:HB2	1:B:994:THR:OG1	2.04	0.58
1:A:175:LEU:HD11	1:A:199:GLN:HB2	1.86	0.57
1:B:432:ASN:HB2	1:B:435:LEU:O	2.04	0.57
1:A:975:SER:HB3	1:A:1010:ASN:HB3	1.86	0.57
1:B:914:LEU:HD11	1:B:951:LYS:HG2	1.86	0.57
1:A:495:TYR:CD1	1:A:511:PHE:HB2	2.39	0.57
1:A:168:LEU:HD13	1:A:306:PHE:HD2	1.70	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:874:TRP:CE2	1:A:905:LYS:HD3	2.40	0.57
1:A:689:TRP:CD1	1:A:715:GLN:HE21	2.23	0.56
1:B:331:MET:SD	1:B:351:SER:HA	2.45	0.56
1:A:220:THR:OG1	1:A:229:GLU:HB3	2.05	0.56
1:A:606:MET:HE1	1:A:655:PRO:HG3	1.88	0.56
1:A:634:ARG:HD3	1:A:636:PHE:HB2	1.86	0.56
1:A:543:MET:HE2	1:A:543:MET:HA	1.88	0.55
1:B:476:THR:O	1:B:584:ILE:HG13	2.06	0.55
1:B:319:ILE:CD1	1:B:327:ALA:HB1	2.36	0.55
1:B:397:THR:HG21	1:B:419:LEU:CD2	2.36	0.55
1:A:720:PRO:HB2	1:A:728:ARG:HD3	1.88	0.55
1:B:487:GLU:OE2	4:B:1102:LYS:N	2.41	0.55
1:B:504:GLU:H	1:B:504:GLU:CD	2.14	0.55
1:B:325:TYR:CD1	1:B:365:GLU:HG3	2.42	0.54
1:A:209:LEU:HD11	1:A:243:ILE:HD11	1.88	0.54
1:A:630:ILE:HD12	1:A:674:LEU:HD13	1.88	0.54
1:B:308:GLU:HB2	1:B:311:PHE:HD2	1.72	0.54
1:A:176:ARG:HG2	1:A:314:THR:OG1	2.07	0.54
1:B:383:VAL:HG23	1:B:384:PRO:HD2	1.89	0.54
1:A:1018:LEU:HA	1:A:1021:LEU:HD12	1.90	0.53
1:A:515:ARG:O	1:A:519:MET:HG3	2.08	0.53
1:A:936:PRO:HA	1:B:903:VAL:CG2	2.38	0.53
1:B:580:SER:HB3	1:B:581:TYR:CD2	2.43	0.53
1:A:205:TRP:CE2	1:A:250:ALA:HB2	2.43	0.53
1:A:282:GLU:N	1:A:385:GLU:OE1	2.41	0.53
1:B:735:ILE:HG12	1:B:749:ALA:HA	1.90	0.53
1:A:874:TRP:CD2	1:A:905:LYS:HD3	2.44	0.53
1:A:796:PHE:CG	1:A:832:LEU:HD13	2.44	0.52
1:A:458:VAL:HA	1:A:461:ILE:HG22	1.91	0.52
1:B:637:LEU:CD1	1:B:637:LEU:CD2	2.79	0.52
1:A:251:LEU:HD23	1:A:257:TYR:CD2	2.44	0.52
1:A:186:THR:HG22	1:A:288:TYR:CE1	2.45	0.52
1:B:236:GLU:HG2	1:B:243:ILE:HG22	1.91	0.52
1:A:405:GLN:HG2	1:A:411:GLN:HA	1.92	0.51
1:A:561:THR:HG21	1:A:697:ASN:ND2	2.24	0.51
1:A:358:LEU:CD2	1:A:473:ASN:OD1	2.58	0.51
1:A:537:SER:HA	1:A:540:ILE:HD12	1.93	0.51
1:A:318:LYS:HD3	1:A:347:GLU:HG3	1.93	0.51
1:A:761:HIS:O	1:A:764:PRO:HD2	2.10	0.51
1:A:584:ILE:HG23	1:A:588:ASP:HB2	1.91	0.51
1:A:762:THR:HA	1:A:819:LEU:HD13	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:421:ALA:HB1	1:A:440:GLU:HA	1.92	0.50
1:A:656:LEU:O	1:A:671:VAL:HG23	2.11	0.50
1:A:789:SER:O	1:A:793:THR:HG23	2.11	0.50
1:B:179:LEU:HD13	1:B:194:VAL:HG22	1.92	0.50
1:B:874:TRP:CD2	1:B:905:LYS:HD3	2.47	0.50
1:A:325:TYR:CD1	1:A:365:GLU:HG3	2.46	0.50
1:B:813:THR:O	1:B:817:ARG:HG2	2.11	0.50
1:A:310:ALA:HA	1:A:583:SER:OG	2.11	0.50
1:A:617:PRO:HB3	1:A:652:TRP:CE3	2.46	0.50
1:B:506:SER:N	6:B:1253:HOH:O	2.45	0.50
1:B:296:PRO:HB2	1:B:297:LEU:HD13	1.94	0.49
1:B:626:LYS:HG3	1:B:686:GLU:HG3	1.94	0.49
1:A:355:SER:HB2	1:A:358:LEU:HD12	1.93	0.49
1:A:502:PHE:O	1:A:503:LYS:C	2.55	0.49
1:A:762:THR:HB	1:A:819:LEU:HB2	1.94	0.49
1:B:459:THR:HG22	1:B:498:LEU:HD11	1.94	0.49
1:A:796:PHE:CD1	1:A:832:LEU:HD13	2.48	0.49
1:A:360:ALA:HB1	1:A:435:LEU:HD23	1.95	0.49
1:B:600:THR:HB	1:B:601:LEU:HD13	1.94	0.49
1:A:219:VAL:HG13	1:A:232:ALA:O	2.12	0.48
1:B:439:ARG:O	1:B:440:GLU:C	2.56	0.48
1:A:613:GLN:OE1	1:A:650:TYR:HA	2.12	0.48
1:A:403:PHE:HB2	1:A:501:ILE:HD11	1.95	0.48
1:B:394:LEU:O	1:B:395:GLU:C	2.57	0.48
1:A:451:SER:HB3	1:A:454:ASP:CG	2.38	0.48
1:A:476:THR:HG22	1:A:477:MET:N	2.29	0.48
1:B:703:HIS:ND1	1:B:704:TYR:N	2.62	0.48
1:B:397:THR:CG2	1:B:419:LEU:CD2	2.92	0.48
1:B:438:PHE:CD1	1:B:443:LEU:HD11	2.49	0.48
1:B:178:GLU:HB3	1:B:195:THR:HB	1.95	0.48
1:B:671:VAL:HG22	1:B:672:SER:H	1.79	0.48
1:B:974:PHE:O	1:B:1007:ILE:HG23	2.14	0.48
1:A:492:PHE:HZ	1:A:560:LYS:HD3	1.79	0.47
1:B:215:ASN:HB3	1:B:264:SER:HB2	1.95	0.47
1:A:180:SER:HA	1:A:318:LYS:O	2.14	0.47
1:B:562:TYR:CZ	1:B:673:LEU:HD13	2.49	0.47
1:A:456:LYS:O	1:A:460:LYS:HG3	2.14	0.47
1:B:496:PHE:O	1:B:497:SER:C	2.58	0.47
1:A:579:HIS:HB3	1:A:584:ILE:HD11	1.95	0.47
1:A:357:TYR:CE1	1:A:358:LEU:HG	2.50	0.47
1:B:296:PRO:HB2	1:B:297:LEU:CD1	2.44	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:322:ASP:HB2	1:B:325:TYR:CD2	2.50	0.47
1:A:439:ARG:O	1:A:440:GLU:C	2.58	0.47
1:B:624:LYS:HB2	1:B:629:PHE:HE2	1.79	0.47
1:A:331:MET:HE3	1:A:351:SER:HB2	1.97	0.46
1:A:469:GLN:O	1:A:473:ASN:HB2	2.15	0.46
1:B:574:LEU:HD11	5:B:1109:NAG:H81	1.97	0.46
1:B:807:THR:O	1:B:820:ARG:HD3	2.15	0.46
1:A:790:ARG:NH1	1:A:1024:TRP:O	2.48	0.46
1:B:272:TYR:OH	1:B:296:PRO:HD2	2.15	0.46
1:B:358:LEU:HD22	1:B:473:ASN:OD1	2.15	0.46
1:B:693:ASN:HB2	1:B:700:TYR:CE2	2.51	0.46
1:A:713:ILE:HG23	1:A:752:LEU:HA	1.97	0.46
1:A:373:VAL:HG11	1:A:401:LEU:HD23	1.98	0.46
1:B:211:SER:HB2	1:B:304:PRO:HB3	1.97	0.46
1:A:790:ARG:HH22	1:A:1022:THR:HA	1.80	0.46
1:B:387:ILE:O	1:B:390:VAL:HG22	2.16	0.46
1:B:810:ASP:HB3	1:B:817:ARG:CZ	2.46	0.46
1:B:637:LEU:H	1:B:637:LEU:HG	1.46	0.45
1:A:376:THR:HA	1:A:415:LYS:O	2.17	0.45
1:B:476:THR:HG22	1:B:477:MET:O	2.16	0.45
1:B:703:HIS:CE1	1:B:704:TYR:O	2.70	0.45
1:A:300:ARG:HH21	1:A:307:ASP:HB3	1.82	0.45
1:A:422:ILE:O	1:A:440:GLU:HB2	2.16	0.45
1:B:370:SER:HA	1:B:378:VAL:O	2.17	0.45
1:A:331:MET:SD	1:A:351:SER:HA	2.57	0.45
1:B:995:PHE:O	1:B:1001:GLN:NE2	2.48	0.45
1:B:1008:GLN:HA	1:B:1011:ILE:HD12	1.98	0.45
1:A:454:ASP:O	1:A:458:VAL:HG12	2.17	0.45
1:B:744:VAL:HG13	1:B:748:ARG:HD2	1.97	0.45
1:B:689:TRP:CD1	1:B:715:GLN:HE21	2.34	0.45
1:B:975:SER:CB	1:B:1010:ASN:HB3	2.42	0.45
1:A:984:GLN:HG2	1:A:988:GLU:OE2	2.17	0.44
1:B:328:LEU:HD21	1:B:381:TYR:CZ	2.52	0.44
1:B:536:SER:HB3	1:B:539:GLN:HB2	1.99	0.44
1:B:544:PHE:N	1:B:544:PHE:CD1	2.85	0.44
1:A:489:PHE:O	1:A:493:MET:HG2	2.17	0.44
1:A:857:THR:HA	1:A:860:MET:HE3	1.98	0.44
1:B:809:THR:HB	1:B:810:ASP:H	1.63	0.44
1:A:440:GLU:HG2	1:A:444:LEU:HD11	2.00	0.44
1:B:412:TYR:HA	1:B:413:PRO:HD3	1.91	0.44
1:B:809:THR:OG1	1:B:811:GLU:HG2	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:817:ARG:HB2	1:B:858:ASP:OD2	2.18	0.44
1:B:303:PHE:CE2	1:B:305:CYS:HB3	2.53	0.44
1:A:984:GLN:HG3	1:A:995:PHE:HE1	1.82	0.43
1:A:270:SER:OG	1:A:271:TYR:N	2.50	0.43
1:A:383:VAL:HG22	1:A:384:PRO:HD2	2.01	0.43
1:A:914:LEU:HD13	1:A:924:LEU:HD21	2.01	0.43
1:B:617:PRO:HG2	1:B:700:TYR:HB3	2.00	0.43
1:A:405:GLN:HG3	1:A:470:TRP:HZ2	1.84	0.43
1:B:277:PHE:CE2	1:B:424:ASP:HB2	2.54	0.43
1:B:594:ASN:OD1	1:B:602:ASP:O	2.36	0.43
1:A:564:SER:HB3	1:A:567:VAL:CG2	2.44	0.43
1:A:975:SER:CB	1:A:1010:ASN:HB3	2.49	0.43
1:B:957:PRO:O	1:B:960:SER:HB2	2.19	0.43
1:A:226:SER:C	1:A:228:GLN:H	2.26	0.43
1:B:476:THR:HG22	1:B:477:MET:N	2.33	0.43
1:B:975:SER:HB3	1:B:1010:ASN:CB	2.44	0.43
1:A:358:LEU:HD22	1:A:473:ASN:OD1	2.17	0.43
1:A:513:ASP:O	1:A:514:ALA:C	2.61	0.43
1:B:195:THR:OG1	1:B:260:LYS:HG3	2.18	0.43
1:B:491:THR:O	1:B:494:GLU:HB3	2.18	0.43
1:A:178:GLU:HB3	1:A:195:THR:HB	2.01	0.43
1:A:634:ARG:HG2	1:A:634:ARG:HH11	1.83	0.43
1:A:410:ILE:HD11	1:A:577:HIS:HB2	2.00	0.43
1:B:376:THR:HG22	1:B:414:LEU:O	2.19	0.43
1:A:796:PHE:HB2	1:A:832:LEU:HD13	2.01	0.42
1:A:587:ASP:O	1:A:588:ASP:C	2.62	0.42
1:B:410:ILE:CD1	1:B:576:LEU:HB3	2.49	0.42
1:B:438:PHE:CG	1:B:443:LEU:HD11	2.54	0.42
1:A:295:GLU:HA	1:A:296:PRO:HA	1.87	0.42
1:B:438:PHE:HE2	1:B:461:ILE:HG12	1.84	0.42
1:B:792:VAL:HG11	1:B:830:HIS:CE1	2.54	0.42
1:A:600:THR:HG23	1:A:601:LEU:HD13	1.99	0.42
1:A:720:PRO:HG2	1:A:721:TYR:CE2	2.54	0.42
1:B:704:TYR:HB3	1:B:708:ASP:HB2	2.01	0.42
1:A:252:LEU:O	1:A:255:HIS:HB2	2.18	0.42
1:A:272:TYR:CE2	1:A:298:ALA:HB2	2.55	0.42
1:B:436:LEU:HB3	1:B:438:PHE:CE1	2.55	0.42
1:A:161:PHE:HA	1:A:162:PRO:HD3	1.96	0.42
1:A:656:LEU:HD11	1:A:674:LEU:HB2	2.02	0.42
1:A:694:ILE:O	1:A:695:ASN:HB2	2.19	0.42
1:A:802:GLN:O	1:A:806:GLN:HG2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:964:GLN:HG2	1:A:999:CYS:HB3	2.01	0.42
1:B:178:GLU:O	1:B:194:VAL:HA	2.20	0.42
1:B:180:SER:HB3	1:B:193:SER:HB3	2.02	0.42
1:A:452:MET:HE2	1:A:817:ARG:NH1	2.35	0.42
1:A:461:ILE:O	1:A:465:GLU:HG2	2.19	0.42
1:B:759:GLU:O	1:B:802:GLN:NE2	2.42	0.42
1:A:403:PHE:CB	1:A:501:ILE:HD11	2.50	0.41
1:A:762:THR:CG2	1:A:815:SER:OG	2.68	0.41
1:B:431:GLU:HG3	1:B:468:HIS:HB3	2.01	0.41
1:B:720:PRO:HB2	1:B:728:ARG:HD3	2.01	0.41
1:A:412:TYR:CZ	1:A:417:LEU:HD13	2.55	0.41
1:A:479:TRP:CG	1:A:480:TRP:N	2.89	0.41
1:B:293:GLN:NE2	1:B:430:MET:HE2	2.36	0.41
1:A:315:PHE:N	1:A:351:SER:OG	2.53	0.41
1:B:787:LEU:HD12	1:B:787:LEU:HA	1.93	0.41
1:B:874:TRP:CE2	1:B:905:LYS:HD3	2.55	0.41
1:A:277:PHE:HZ	1:A:423:PRO:HD2	1.86	0.41
1:A:746:LEU:O	1:A:749:ALA:HB3	2.21	0.41
1:B:295:GLU:HG3	1:B:480:TRP:CH2	2.56	0.41
1:B:579:HIS:O	1:B:580:SER:C	2.63	0.41
1:B:727:ASP:O	1:B:730:ASN:HB3	2.21	0.41
1:A:957:PRO:O	1:A:960:SER:OG	2.35	0.41
1:B:356:THR:O	1:B:359:VAL:HG23	2.21	0.41
1:B:465:GLU:O	1:B:468:HIS:HB2	2.20	0.41
1:A:551:LYS:O	1:A:555:LEU:HG	2.20	0.41
1:B:980:LEU:HD13	1:B:1007:ILE:HB	2.02	0.41
1:B:194:VAL:HG23	1:B:263:TYR:HE2	1.86	0.41
1:B:203:VAL:HA	1:B:251:LEU:O	2.21	0.41
1:B:397:THR:HG22	1:B:462:ILE:CG2	2.50	0.41
1:B:618:LEU:HD11	1:B:703:HIS:HB2	2.03	0.41
1:B:942:TRP:O	1:B:946:LYS:HG3	2.21	0.41
1:A:422:ILE:HA	1:A:423:PRO:HD3	1.95	0.41
1:A:438:PHE:HE1	1:A:461:ILE:HG12	1.86	0.41
1:B:276:GLY:HA2	1:B:290:ALA:HA	2.03	0.40
1:B:512:LEU:HG	1:B:516:PHE:CE2	2.56	0.40
1:A:168:LEU:HD13	1:A:306:PHE:CD2	2.53	0.40
1:A:847:MET:HA	1:A:876:PHE:CE2	2.57	0.40
1:B:603:VAL:HA	1:B:606:MET:HE2	2.03	0.40
1:A:372:ASP:HA	1:A:377:LEU:HA	2.03	0.40
1:B:714:HIS:CE1	1:B:718:ILE:HG13	2.57	0.40
1:A:383:VAL:O	1:A:384:PRO:C	2.64	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:597:THR:HB	1:A:600:THR:HG22	2.03	0.40
1:A:534:VAL:HG13	1:A:539:GLN:HB3	2.03	0.40
1:B:485:LEU:HD22	1:B:586:SER:HA	2.04	0.40
1:B:661:GLU:OE1	1:B:722:VAL:HG21	2.22	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	856/872 (98%)	800 (94%)	48 (6%)	8 (1%)	14	34
1	B	841/872 (96%)	787 (94%)	52 (6%)	2 (0%)	43	66
All	All	1697/1744 (97%)	1587 (94%)	100 (6%)	10 (1%)	21	45

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	226	SER
1	A	638	ASN
1	A	664	ASN
1	A	282	GLU
1	A	227	SER
1	A	868	ALA
1	A	340	ASP
1	B	183	PRO
1	A	296	PRO
1	B	296	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	765/781 (98%)	739 (97%)	26 (3%)	32	58
1	B	751/781 (96%)	723 (96%)	28 (4%)	30	55
All	All	1516/1562 (97%)	1462 (96%)	54 (4%)	31	56

All (54) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	173	VAL
1	A	194	VAL
1	A	236	GLU
1	A	286	LYS
1	A	319	ILE
1	A	322	ASP
1	A	373	VAL
1	A	383	VAL
1	A	405	GLN
1	A	410	ILE
1	A	420	VAL
1	A	433	TRP
1	A	489	PHE
1	A	521	LYS
1	A	563	LEU
1	A	677	LYS
1	A	684	THR
1	A	701	ILE
1	A	762	THR
1	A	785	MET
1	A	797	LYS
1	A	842	LEU
1	A	904	ARG
1	A	1016	LYS
1	A	1022	THR
1	A	1025	LEU
1	B	194	VAL

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Mol	Chain	Res	Type
1	B	197	SER
1	B	206	ASN
1	B	216	ILE
1	B	234	ILE
1	B	280	THR
1	B	350	GLU
1	B	426	GLU
1	B	433	TRP
1	B	477	MET
1	B	504	GLU
1	B	537	SER
1	B	549	TYR
1	B	557	LEU
1	B	601	LEU
1	B	605	ARG
1	B	634	ARG
1	B	637	LEU
1	B	680	VAL
1	B	782	LEU
1	B	792	VAL
1	B	809	THR
1	B	828	CYS
1	B	849	SER
1	B	880	LYS
1	B	911	LYS
1	B	933	ARG
1	B	1022	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	242	GLN
1	A	255	HIS
1	A	293	GLN
1	A	535	GLN
1	A	539	GLN
1	A	579	HIS
1	A	599	GLN
1	A	622	GLN
1	A	631	GLN
1	A	697	ASN
1	A	733	ASN

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Mol	Chain	Res	Type
1	A	734	ASN
1	A	853	GLN
1	A	918	ASN
1	B	345	GLN
1	B	432	ASN
1	B	598	ASN
1	B	715	GLN
1	B	719	ASN
1	B	805	GLN
1	B	830	HIS
1	B	831	ASN
1	B	948	ASN
1	B	1008	GLN
1	B	1010	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

17 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
5	NAG	B	1103	1	14,14,15	0.86	0	17,19,21	1.83	3 (17%)
5	NAG	B	1106	1	14,14,15	0.55	0	17,19,21	1.79	3 (17%)
5	NAG	A	1103	1	14,14,15	0.80	1 (7%)	17,19,21	1.00	2 (11%)
5	NAG	B	1109	1	14,14,15	0.64	0	17,19,21	1.75	1 (5%)
5	NAG	A	1108	1	14,14,15	0.72	0	17,19,21	1.54	4 (23%)
5	NAG	A	1105	1	14,14,15	0.71	0	17,19,21	1.55	1 (5%)
5	NAG	A	1107	1	14,14,15	0.77	0	17,19,21	2.08	2 (11%)
5	NAG	B	1107	1	14,14,15	0.59	0	17,19,21	1.53	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	B	1110	1	14,14,15	0.59	0	17,19,21	1.03	1 (5%)
5	NAG	B	1111	1	14,14,15	0.55	0	17,19,21	1.38	2 (11%)
5	NAG	A	1106	1	14,14,15	0.74	0	17,19,21	1.44	2 (11%)
5	NAG	A	1109	1	14,14,15	1.04	1 (7%)	17,19,21	1.83	1 (5%)
2	NAG	C	2	2	14,14,15	0.64	0	17,19,21	0.96	1 (5%)
2	NAG	C	1	1,2	14,14,15	0.82	0	17,19,21	1.82	3 (17%)
5	NAG	A	1104	1	14,14,15	0.57	0	17,19,21	1.23	2 (11%)
5	NAG	B	1108	1	14,14,15	0.85	1 (7%)	17,19,21	1.48	2 (11%)
5	NAG	B	1112	1	14,14,15	0.58	0	17,19,21	1.01	2 (11%)

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	NAG	B	1103	1	-	2/6/23/26	0/1/1/1
5	NAG	B	1106	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1103	1	-	2/6/23/26	0/1/1/1
5	NAG	B	1109	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1108	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1105	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1107	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1107	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1110	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1111	1	-	1/6/23/26	0/1/1/1
5	NAG	A	1106	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1109	1	-	2/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	NAG	C	1	1,2	-	1/6/23/26	0/1/1/1
5	NAG	A	1104	1	-	1/6/23/26	0/1/1/1
5	NAG	B	1108	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1112	1	-	0/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1109	NAG	C1-C2	2.99	1.56	1.52
5	A	1103	NAG	C1-C2	2.27	1.55	1.52
5	B	1108	NAG	C1-C2	2.06	1.55	1.52

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1107	NAG	C1-O5-C5	6.67	121.13	112.19
5	B	1109	NAG	C1-O5-C5	6.34	120.69	112.19
5	A	1109	NAG	C1-O5-C5	5.82	119.98	112.19
2	C	1	NAG	C1-O5-C5	5.56	119.64	112.19
5	B	1106	NAG	C1-O5-C5	5.47	119.52	112.19
5	B	1107	NAG	C1-O5-C5	5.26	119.23	112.19
5	A	1105	NAG	C1-O5-C5	5.15	119.09	112.19
5	B	1103	NAG	C1-O5-C5	4.83	118.67	112.19
5	B	1108	NAG	C1-O5-C5	4.21	117.83	112.19
5	A	1106	NAG	C1-O5-C5	4.02	117.57	112.19
5	A	1108	NAG	C1-O5-C5	3.83	117.32	112.19
5	B	1111	NAG	C1-O5-C5	3.77	117.23	112.19
5	A	1107	NAG	C1-C2-N2	3.65	116.19	110.43
5	B	1103	NAG	O5-C1-C2	-3.42	106.01	111.29
5	A	1104	NAG	C4-C3-C2	3.34	115.92	111.02
5	B	1106	NAG	C1-C2-N2	-2.81	106.01	110.43
5	B	1110	NAG	C1-O5-C5	2.69	115.79	112.19
5	A	1108	NAG	C6-C5-C4	-2.65	106.52	113.02
5	A	1106	NAG	O5-C1-C2	-2.62	107.24	111.29
5	B	1111	NAG	C1-C2-N2	2.60	114.52	110.43
2	C	2	NAG	C1-O5-C5	2.50	115.53	112.19
5	A	1104	NAG	C1-O5-C5	2.45	115.46	112.19
2	C	1	NAG	O7-C7-N2	2.43	126.27	121.98
5	B	1108	NAG	C2-N2-C7	2.33	126.02	122.90
5	A	1108	NAG	C2-N2-C7	2.22	125.88	122.90
5	A	1108	NAG	O7-C7-C8	-2.19	118.15	122.05
5	A	1103	NAG	C2-N2-C7	2.17	125.81	122.90
5	B	1112	NAG	O5-C5-C6	2.17	111.88	107.66
5	B	1112	NAG	C1-O5-C5	2.15	115.07	112.19
5	B	1106	NAG	C4-C3-C2	2.15	114.17	111.02
5	B	1103	NAG	O7-C7-C8	-2.14	118.24	122.05
2	C	1	NAG	O7-C7-C8	-2.09	118.33	122.05
5	A	1103	NAG	C1-O5-C5	2.04	114.92	112.19

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1109	NAG	O5-C5-C6-O6
5	A	1103	NAG	C4-C5-C6-O6
5	B	1103	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
5	A	1104	NAG	O5-C5-C6-O6
5	A	1109	NAG	C4-C5-C6-O6
5	A	1103	NAG	O5-C5-C6-O6
2	C	1	NAG	O5-C5-C6-O6
5	B	1103	NAG	C1-C2-N2-C7
5	B	1111	NAG	C1-C2-N2-C7

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	1109	NAG	1	0

5.5 Carbohydrates [i](#)

2 monosaccharides 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	NAG	C	1	1,2	14,14,15	0.82	0	17,19,21	1.82	3 (17%)
2	NAG	C	2	2	14,14,15	0.64	0	17,19,21	0.96	1 (5%)

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	NAG	C	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1	NAG	C1-O5-C5	5.56	119.64	112.19
2	C	2	NAG	C1-O5-C5	2.50	115.53	112.19
2	C	1	NAG	O7-C7-N2	2.43	126.27	121.98
2	C	1	NAG	O7-C7-C8	-2.09	118.33	122.05

There are no chirality outliers.

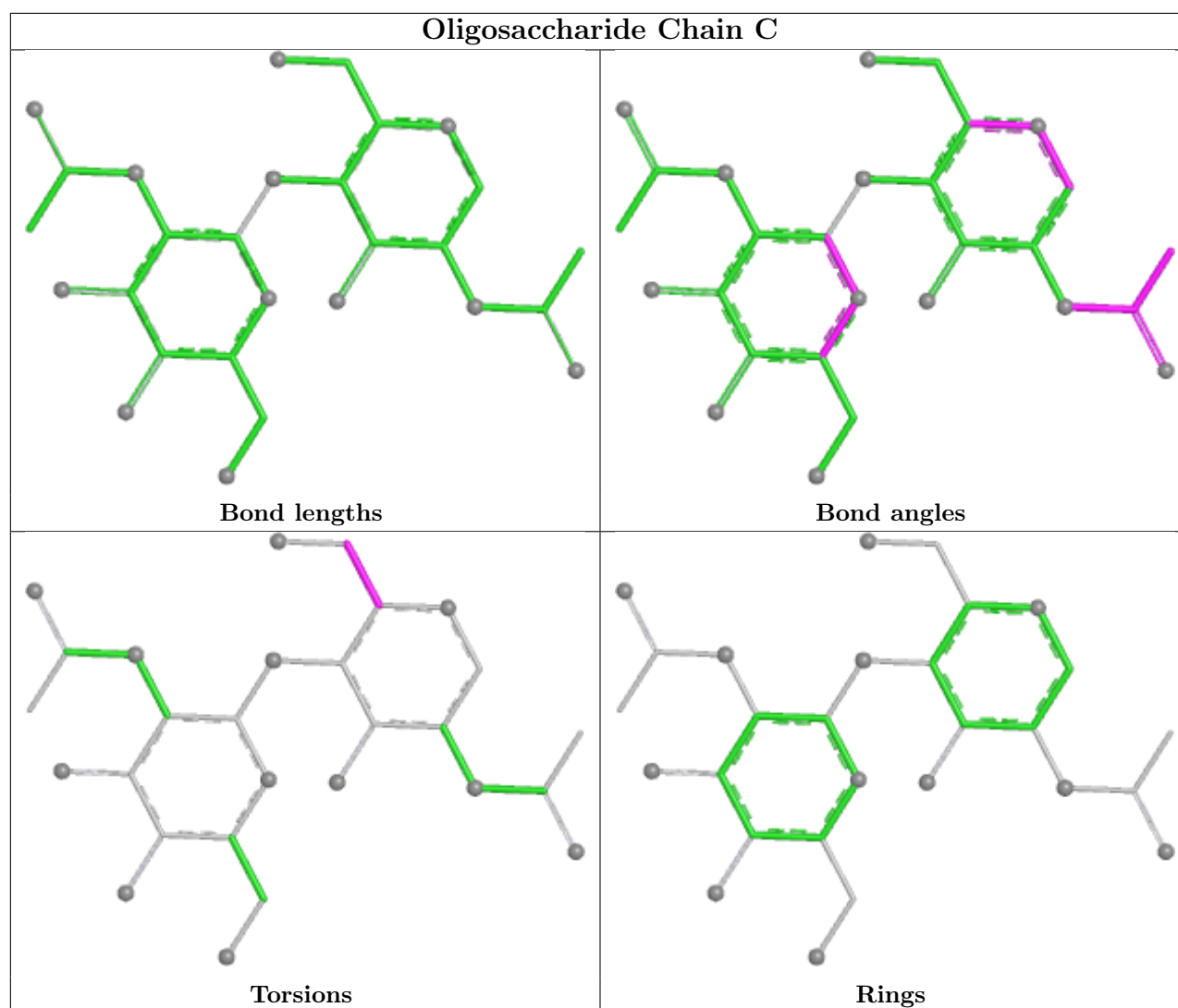
All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	1	NAG	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 2 are monoatomic - leaving 17 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	NAG	B	1103	1	14,14,15	0.86	0	17,19,21	1.83	3 (17%)
5	NAG	B	1106	1	14,14,15	0.55	0	17,19,21	1.79	3 (17%)
5	NAG	A	1103	1	14,14,15	0.80	1 (7%)	17,19,21	1.00	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	LYS	B	1102	-	7,8,9	0.59	0	3,8,10	0.52	0
5	NAG	B	1109	1	14,14,15	0.64	0	17,19,21	1.75	1 (5%)
4	LYS	A	1102	3	7,8,9	0.45	0	3,8,10	0.31	0
5	NAG	A	1108	1	14,14,15	0.72	0	17,19,21	1.54	4 (23%)
5	NAG	A	1105	1	14,14,15	0.71	0	17,19,21	1.55	1 (5%)
5	NAG	A	1107	1	14,14,15	0.77	0	17,19,21	2.08	2 (11%)
5	NAG	B	1107	1	14,14,15	0.59	0	17,19,21	1.53	1 (5%)
5	NAG	B	1110	1	14,14,15	0.59	0	17,19,21	1.03	1 (5%)
5	NAG	B	1111	1	14,14,15	0.55	0	17,19,21	1.38	2 (11%)
5	NAG	A	1106	1	14,14,15	0.74	0	17,19,21	1.44	2 (11%)
5	NAG	A	1109	1	14,14,15	1.04	1 (7%)	17,19,21	1.83	1 (5%)
5	NAG	A	1104	1	14,14,15	0.57	0	17,19,21	1.23	2 (11%)
5	NAG	B	1108	1	14,14,15	0.85	1 (7%)	17,19,21	1.48	2 (11%)
5	NAG	B	1112	1	14,14,15	0.58	0	17,19,21	1.01	2 (11%)

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	NAG	B	1103	1	-	2/6/23/26	0/1/1/1
5	NAG	B	1106	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1103	1	-	2/6/23/26	0/1/1/1
4	LYS	B	1102	-	-	0/6/7/9	-
5	NAG	B	1109	1	-	0/6/23/26	0/1/1/1
4	LYS	A	1102	3	-	1/6/7/9	-
5	NAG	A	1108	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1105	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1107	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1107	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1110	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1111	1	-	1/6/23/26	0/1/1/1
5	NAG	A	1106	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1109	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1104	1	-	1/6/23/26	0/1/1/1
5	NAG	B	1108	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1112	1	-	0/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1109	NAG	C1-C2	2.99	1.56	1.52
5	A	1103	NAG	C1-C2	2.27	1.55	1.52
5	B	1108	NAG	C1-C2	2.06	1.55	1.52

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1107	NAG	C1-O5-C5	6.67	121.13	112.19
5	B	1109	NAG	C1-O5-C5	6.34	120.69	112.19
5	A	1109	NAG	C1-O5-C5	5.82	119.98	112.19
5	B	1106	NAG	C1-O5-C5	5.47	119.52	112.19
5	B	1107	NAG	C1-O5-C5	5.26	119.23	112.19
5	A	1105	NAG	C1-O5-C5	5.15	119.09	112.19
5	B	1103	NAG	C1-O5-C5	4.83	118.67	112.19
5	B	1108	NAG	C1-O5-C5	4.21	117.83	112.19
5	A	1106	NAG	C1-O5-C5	4.02	117.57	112.19
5	A	1108	NAG	C1-O5-C5	3.83	117.32	112.19
5	B	1111	NAG	C1-O5-C5	3.77	117.23	112.19
5	A	1107	NAG	C1-C2-N2	3.65	116.19	110.43
5	B	1103	NAG	O5-C1-C2	-3.42	106.01	111.29
5	A	1104	NAG	C4-C3-C2	3.34	115.92	111.02
5	B	1106	NAG	C1-C2-N2	-2.81	106.01	110.43
5	B	1110	NAG	C1-O5-C5	2.69	115.79	112.19
5	A	1108	NAG	C6-C5-C4	-2.65	106.52	113.02
5	A	1106	NAG	O5-C1-C2	-2.62	107.24	111.29
5	B	1111	NAG	C1-C2-N2	2.60	114.52	110.43
5	A	1104	NAG	C1-O5-C5	2.45	115.46	112.19
5	B	1108	NAG	C2-N2-C7	2.33	126.02	122.90
5	A	1108	NAG	C2-N2-C7	2.22	125.88	122.90
5	A	1108	NAG	O7-C7-C8	-2.19	118.15	122.05
5	A	1103	NAG	C2-N2-C7	2.17	125.81	122.90
5	B	1112	NAG	O5-C5-C6	2.17	111.88	107.66
5	B	1112	NAG	C1-O5-C5	2.15	115.07	112.19
5	B	1106	NAG	C4-C3-C2	2.15	114.17	111.02
5	B	1103	NAG	O7-C7-C8	-2.14	118.24	122.05
5	A	1103	NAG	C1-O5-C5	2.04	114.92	112.19

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1109	NAG	O5-C5-C6-O6
5	A	1103	NAG	C4-C5-C6-O6
5	B	1103	NAG	O5-C5-C6-O6
5	A	1104	NAG	O5-C5-C6-O6
5	A	1109	NAG	C4-C5-C6-O6
5	A	1103	NAG	O5-C5-C6-O6
4	A	1102	LYS	CE-CD-CG-CB
5	B	1103	NAG	C1-C2-N2-C7
5	B	1111	NAG	C1-C2-N2-C7

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1102	LYS	1	0
5	B	1109	NAG	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	860/872 (98%)	-0.37	3 (0%) 90 88	23, 60, 96, 122	2 (0%)
1	B	849/872 (97%)	-0.24	2 (0%) 91 90	29, 70, 105, 139	0
All	All	1709/1744 (97%)	-0.31	5 (0%) 90 88	23, 65, 101, 139	2 (0%)

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	160	LEU	3.1
1	A	160	LEU	2.7
1	B	601	LEU	2.3
1	A	639	MET	2.1
1	A	648	THR	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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
5	NAG	B	1108	14/15	0.35	0.14	131,142,151,153	0
5	NAG	A	1105	14/15	0.50	0.15	110,128,154,156	0
5	NAG	A	1108	14/15	0.54	0.14	116,130,143,146	0
5	NAG	A	1107	14/15	0.64	0.12	86,93,100,106	0
5	NAG	B	1109	14/15	0.64	0.12	118,128,135,135	0
5	NAG	A	1106	14/15	0.67	0.10	100,121,130,139	0
5	NAG	B	1103	14/15	0.72	0.14	102,119,123,127	0
5	NAG	A	1103	14/15	0.73	0.12	101,116,119,122	0
5	NAG	B	1110	14/15	0.73	0.12	97,108,119,123	0

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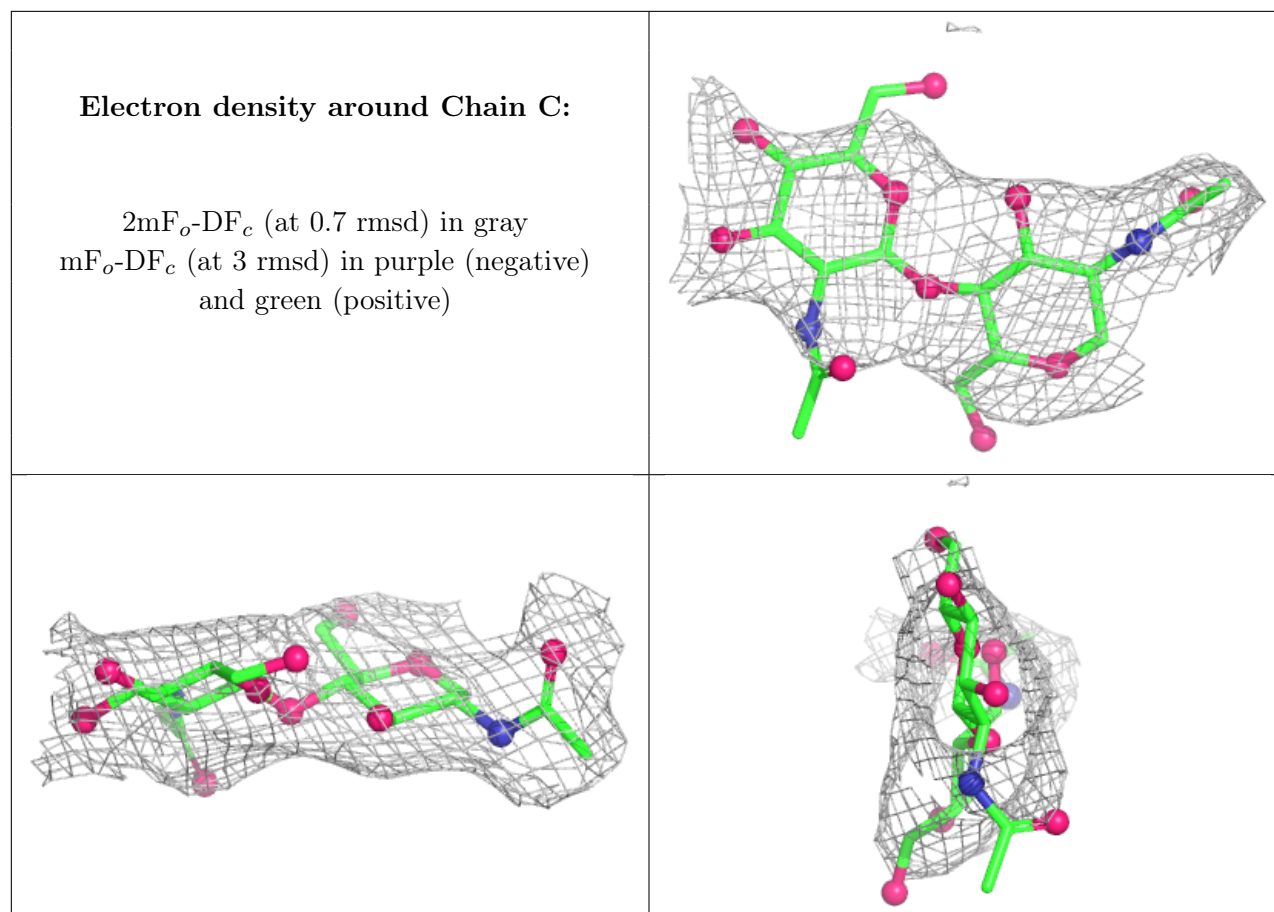
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	NAG	A	1109	14/15	0.74	0.13	99,106,118,118	0
5	NAG	B	1106	14/15	0.75	0.10	96,104,111,118	0
2	NAG	C	2	14/15	0.78	0.13	105,117,131,131	0
5	NAG	B	1112	14/15	0.79	0.09	84,97,111,116	0
5	NAG	B	1107	14/15	0.80	0.10	96,101,107,107	0
5	NAG	A	1104	14/15	0.81	0.10	101,111,114,116	0
5	NAG	B	1111	14/15	0.82	0.10	85,93,98,103	0
2	NAG	C	1	14/15	0.88	0.09	84,96,104,113	0

6.3 Carbohydrates

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	NAG	C	2	14/15	0.78	0.13	105,117,131,131	0
2	NAG	C	1	14/15	0.88	0.09	84,96,104,113	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



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
5	NAG	B	1108	14/15	0.35	0.14	131,142,151,153	0
5	NAG	A	1105	14/15	0.50	0.15	110,128,154,156	0
5	NAG	A	1108	14/15	0.54	0.14	116,130,143,146	0
5	NAG	A	1107	14/15	0.64	0.12	86,93,100,106	0
5	NAG	B	1109	14/15	0.64	0.12	118,128,135,135	0
5	NAG	A	1106	14/15	0.67	0.10	100,121,130,139	0
5	NAG	B	1103	14/15	0.72	0.14	102,119,123,127	0
5	NAG	A	1103	14/15	0.73	0.12	101,116,119,122	0
5	NAG	B	1110	14/15	0.73	0.12	97,108,119,123	0
5	NAG	A	1109	14/15	0.74	0.13	99,106,118,118	0
5	NAG	B	1106	14/15	0.75	0.10	96,104,111,118	0
5	NAG	B	1112	14/15	0.79	0.09	84,97,111,116	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	NAG	B	1107	14/15	0.80	0.10	96,101,107,107	0
5	NAG	A	1104	14/15	0.81	0.10	101,111,114,116	0
5	NAG	B	1111	14/15	0.82	0.10	85,93,98,103	0
4	LYS	B	1102	9/10	0.87	0.23	74,77,114,123	5
4	LYS	A	1102	9/10	0.91	0.20	41,63,88,93	4
3	ZN	A	1101	1/1	0.99	0.07	52,52,52,52	0
3	ZN	B	1101	1/1	1.00	0.03	46,46,46,46	0

6.5 Other polymers [i](#)

There are no such residues in this entry.