



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 25, 2016 – 09:49 PM EDT

PDB ID : 5FIC
Title : Open form of murine Acid Sphingomyelinase in presence of lipid
Authors : Gorelik, A.; Illes, K.; Heinz, L.X.; Superti-Furga, G.; Nagar, B.
Deposited on : 2015-12-22
Resolution : 2.80 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.1 (RC1), CSD as537be (2016)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20027939
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20027939

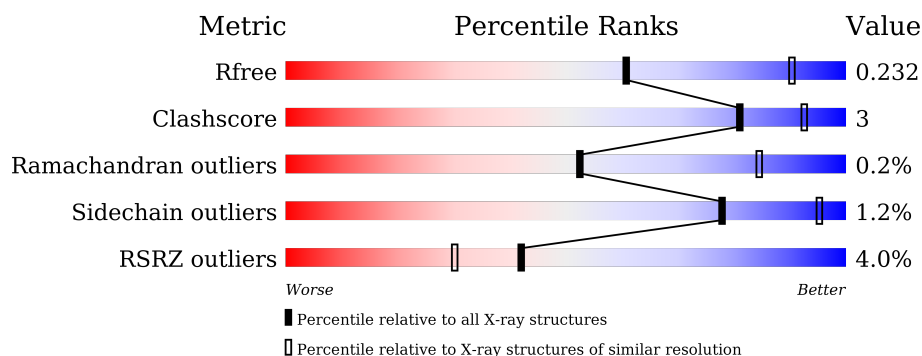
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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}	91344	2393 (2.80-2.80)
Clashscore	102246	2827 (2.80-2.80)
Ramachandran outliers	100387	2782 (2.80-2.80)
Sidechain outliers	100360	2784 (2.80-2.80)
RSRZ outliers	91569	2404 (2.80-2.80)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	538	<div> <div>3%</div> <div>87%</div> <div>11%</div> <div>.</div> </div>
1	B	538	<div> <div>4%</div> <div>87%</div> <div>10%</div> <div>.</div> </div>
1	C	538	<div> <div>4%</div> <div>88%</div> <div>10%</div> <div>.</div> </div>
1	D	538	<div> <div>4%</div> <div>91%</div> <div>7%</div> <div>.</div> </div>

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

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NAG	A	708	-	-	-	X
5	FUC	A	706	-	-	-	X
6	PO4	A	710	-	-	X	-
6	PO4	A	711	-	-	-	X
7	CL	B	708	-	-	-	X
8	6E0	A	714	-	-	-	X
8	6E0	D	711	-	-	-	X

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 33383 atoms, of which 16374 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 Spingomyelin phosphodiesterase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	527	Total	C	H	N	O	S	0	0	0
			8177	2678	4017	715	744	23			
1	B	527	Total	C	H	N	O	S	0	0	0
			8177	2678	4017	715	744	23			
1	C	527	Total	C	H	N	O	S	0	0	0
			8177	2678	4017	715	744	23			
1	D	527	Total	C	H	N	O	S	0	0	0
			8177	2678	4017	715	744	23			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	74	ASP	-	expression tag	UNP Q04519
A	75	ARG	-	expression tag	UNP Q04519
A	76	HIS	-	expression tag	UNP Q04519
A	77	HIS	-	expression tag	UNP Q04519
A	78	HIS	-	expression tag	UNP Q04519
A	79	HIS	-	expression tag	UNP Q04519
A	80	HIS	-	expression tag	UNP Q04519
A	81	HIS	-	expression tag	UNP Q04519
A	82	LYS	-	expression tag	UNP Q04519
A	83	LEU	-	expression tag	UNP Q04519
B	74	ASP	-	expression tag	UNP Q04519
B	75	ARG	-	expression tag	UNP Q04519
B	76	HIS	-	expression tag	UNP Q04519
B	77	HIS	-	expression tag	UNP Q04519
B	78	HIS	-	expression tag	UNP Q04519
B	79	HIS	-	expression tag	UNP Q04519
B	80	HIS	-	expression tag	UNP Q04519
B	81	HIS	-	expression tag	UNP Q04519
B	82	LYS	-	expression tag	UNP Q04519
B	83	LEU	-	expression tag	UNP Q04519
C	74	ASP	-	expression tag	UNP Q04519

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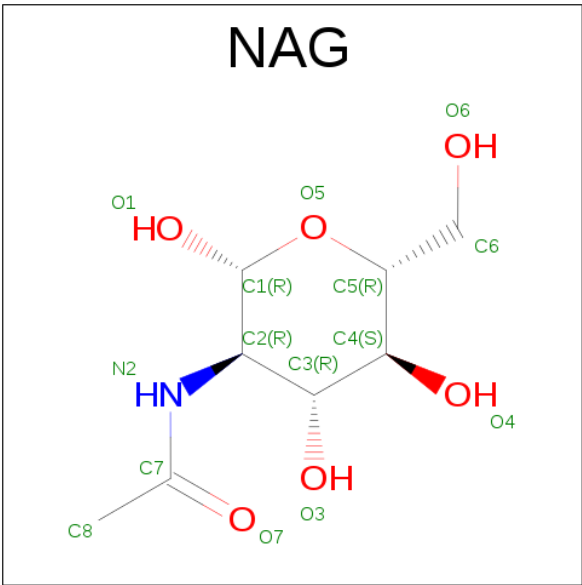
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Chain	Residue	Modelled	Actual	Comment	Reference
C	75	ARG	-	expression tag	UNP Q04519
C	76	HIS	-	expression tag	UNP Q04519
C	77	HIS	-	expression tag	UNP Q04519
C	78	HIS	-	expression tag	UNP Q04519
C	79	HIS	-	expression tag	UNP Q04519
C	80	HIS	-	expression tag	UNP Q04519
C	81	HIS	-	expression tag	UNP Q04519
C	82	LYS	-	expression tag	UNP Q04519
C	83	LEU	-	expression tag	UNP Q04519
D	74	ASP	-	expression tag	UNP Q04519
D	75	ARG	-	expression tag	UNP Q04519
D	76	HIS	-	expression tag	UNP Q04519
D	77	HIS	-	expression tag	UNP Q04519
D	78	HIS	-	expression tag	UNP Q04519
D	79	HIS	-	expression tag	UNP Q04519
D	80	HIS	-	expression tag	UNP Q04519
D	81	HIS	-	expression tag	UNP Q04519
D	82	LYS	-	expression tag	UNP Q04519
D	83	LEU	-	expression tag	UNP Q04519

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

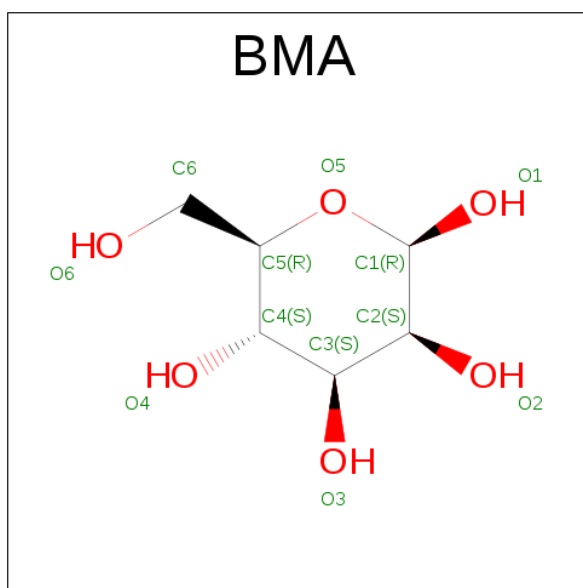
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	2	Total 2	Zn 2	0	0
2	A	2	Total 2	Zn 2	0	0
2	D	2	Total 2	Zn 2	0	0
2	C	2	Total 2	Zn 2	0	0

- Molecule 3 is N-ACETYL-D-GLUCOSAMINE (three-letter code: NAG) (formula: C₈H₁₅NO₆).



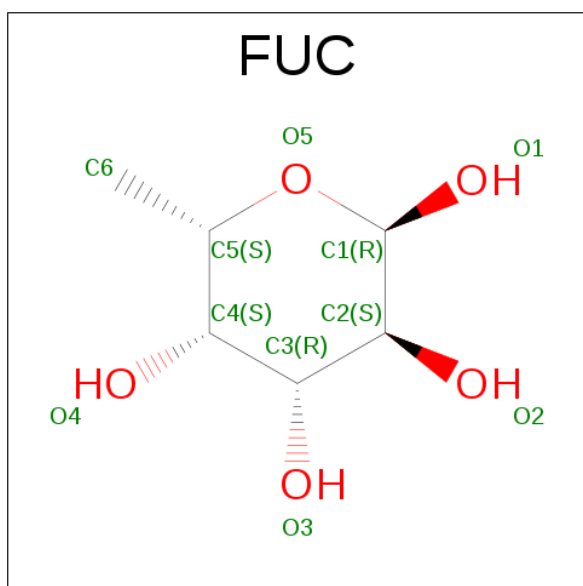
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	A	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	A	1	Total	C	H	N	O	0	0
			26	8	12	1	5		
3	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	B	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	B	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	B	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	C	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	C	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	C	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	D	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	D	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	D	1	Total	C	H	N	O	0	0
			26	8	12	1	5		
3	D	1	Total	C	H	N	O	0	0
			28	8	14	1	5		

- Molecule 4 is BETA-D-MANNOSE (three-letter code: BMA) (formula: $C_6H_{12}O_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			21	6	10	5		
4	D	1	Total	C	H	O	0	0
			22	6	11	5		

- Molecule 5 is ALPHA-L-FUCOSE (three-letter code: FUC) (formula: $C_6H_{12}O_5$).



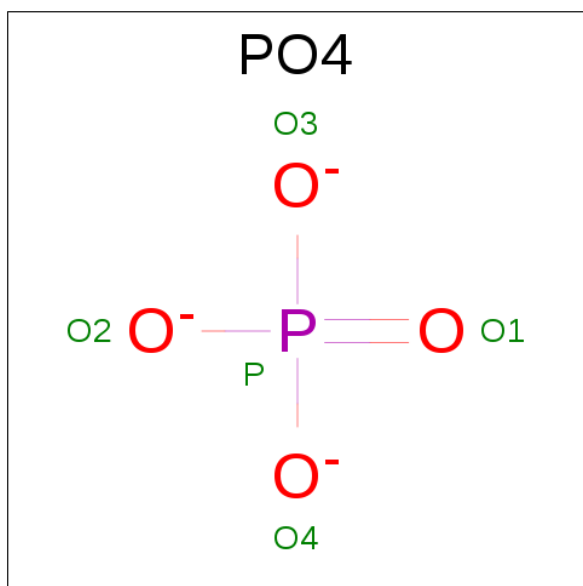
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	0	0
			21	6	11	4		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	D	1	Total	C	H	O	0	0
			20	6	10	4		

- Molecule 6 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	O	P	0	0
			5	4	1		
6	A	1	Total	O	P	0	0
			5	4	1		
6	A	1	Total	O	P	0	0
			5	4	1		
6	B	1	Total	O	P	0	0
			5	4	1		
6	B	1	Total	O	P	0	0
			5	4	1		
6	C	1	Total	O	P	0	0
			5	4	1		
6	D	1	Total	O	P	0	0
			5	4	1		

- Molecule 7 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

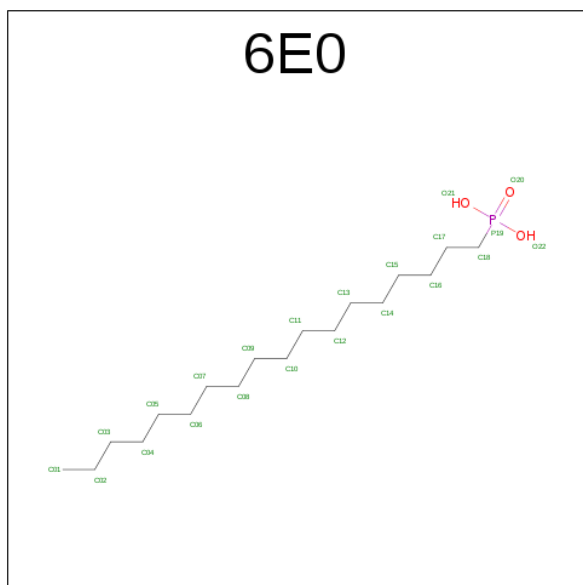
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	1	Total	Cl	0	0
			1	1		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	2	Total Cl 2 2	0	0
7	D	1	Total Cl 1 1	0	0
7	C	1	Total Cl 1 1	0	0

- Molecule 8 is octadecylphosphonic acid (three-letter code: 6E0) (formula: $C_{18}H_{39}O_3P$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total C H O P 61 18 39 3 1	0	0
8	D	1	Total C H O P 61 18 39 3 1	0	0

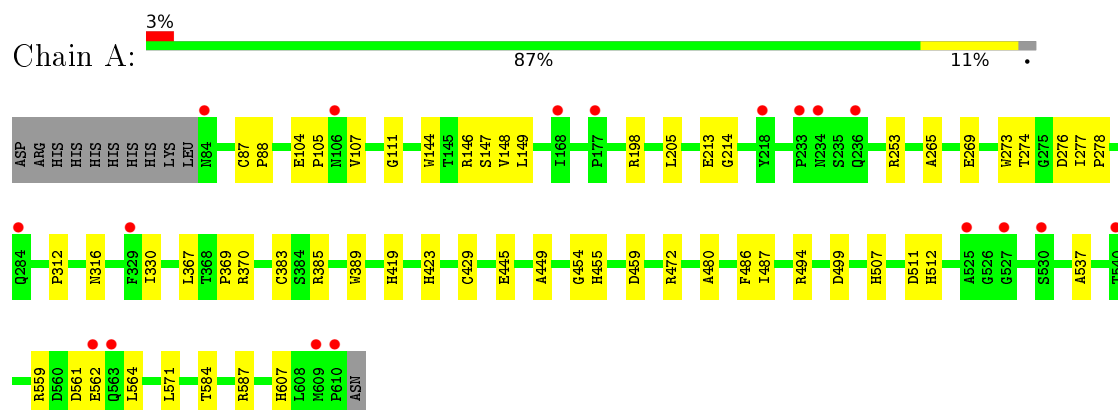
- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	10	Total O 10 10	0	0
9	B	11	Total O 11 11	0	0
9	C	12	Total O 12 12	0	0
9	D	6	Total O 6 6	0	0

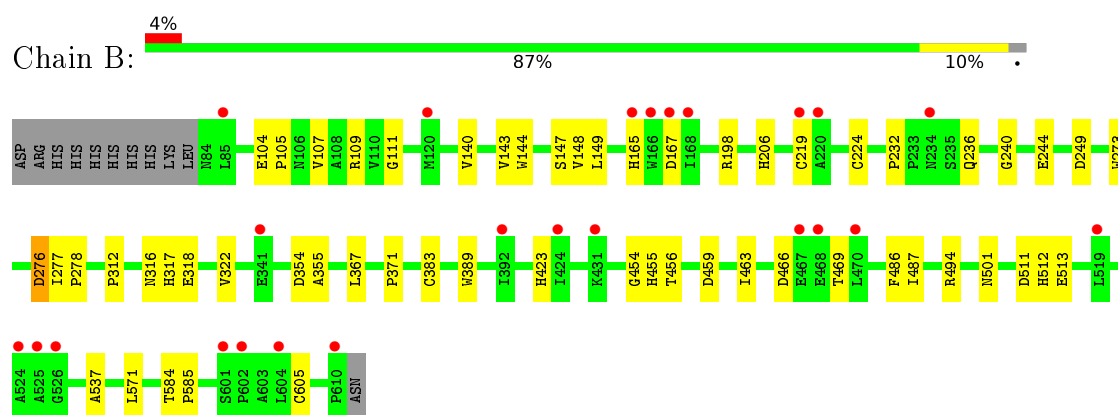
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

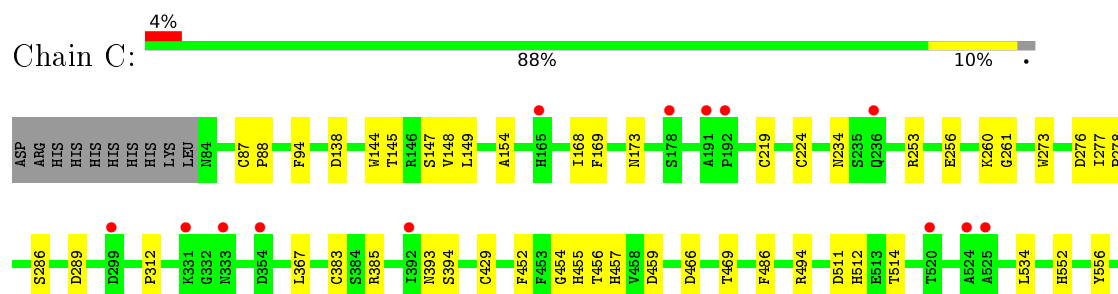
• Molecule 1: Spingomyelin phosphodiesterase

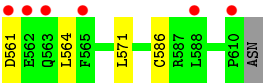


• Molecule 1: Spingomyelin phosphodiesterase

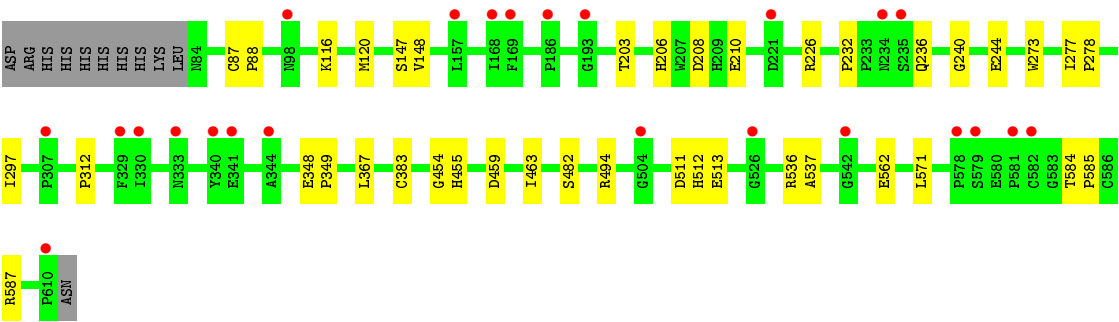
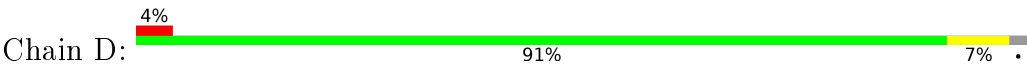


• Molecule 1: Spingomyelin phosphodiesterase





● Molecule 1: Spingomyelin phosphodiesterase



4 Data and refinement statistics

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	101.75Å 101.75Å 401.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.32 – 2.80 49.32 – 2.80	Depositor EDS
% Data completeness (in resolution range)	100.0 (49.32-2.80) 100.0 (49.32-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.36 (at 2.81Å)	Xtriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, R_{free}	0.189 , 0.236 0.191 , 0.232	Depositor DCC
R_{free} test set	968 reflections (0.98%)	DCC
Wilson B-factor (Å ²)	48.4	Xtriage
Anisotropy	0.413	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 50.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.22$	Xtriage
Estimated twinning fraction	0.477 for h,-k,-l	Xtriage
F_o, F_c correlation	0.86	EDS
Total number of atoms	33383	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.25% 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: ZN, BMA, NAG, 6E0, CL, PO4, FUC

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	0.26	0/4304	0.42	0/5893
1	B	0.27	0/4304	0.42	0/5893
1	C	0.27	0/4304	0.41	0/5893
1	D	0.27	0/4304	0.41	0/5893
All	All	0.27	0/17216	0.42	0/23572

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	4160	4017	4016	32	0
1	B	4160	4017	4016	31	0
1	C	4160	4017	4016	24	0
1	D	4160	4017	4016	20	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
3	A	56	52	48	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	42	41	38	1	0
3	C	42	41	38	3	0
3	D	56	52	48	0	0
4	A	11	10	10	0	0
4	D	11	11	10	0	0
5	A	10	11	10	0	0
5	D	10	10	10	0	0
6	A	15	0	0	2	0
6	B	10	0	0	2	0
6	C	5	0	0	0	0
6	D	5	0	0	0	0
7	A	2	0	0	2	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
8	A	22	39	0	0	0
8	D	22	39	0	0	0
9	A	10	0	0	3	0
9	B	11	0	0	5	0
9	C	12	0	0	2	0
9	D	6	0	0	1	0
All	All	17009	16374	16276	111	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 3.

All (111) 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:D:463:ILE:O	9:D:801:HOH:O	1.92	0.87
1:B:109:ARG:NH1	6:B:707:PO4:O2	2.10	0.85
1:D:562:GLU:OE1	1:D:587:ARG:NH2	2.14	0.80
3:C:705:NAG:O7	3:C:705:NAG:O3	2.04	0.76
1:A:449:ALA:O	9:A:801:HOH:O	2.05	0.74
1:C:394:SER:OG	9:C:801:HOH:O	2.04	0.74
1:A:459:ASP:OD1	1:A:494:ARG:NH2	2.22	0.72
1:A:480:ALA:O	9:A:802:HOH:O	2.08	0.70
1:C:511:ASP:OD1	1:C:512:HIS:N	2.23	0.70
1:A:253:ARG:NH2	7:A:713:CL:CL	2.63	0.68
1:A:511:ASP:OD1	1:A:512:HIS:N	2.26	0.68
1:B:459:ASP:OD1	1:B:494:ARG:NH2	2.28	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:511:ASP:OD1	1:B:512:HIS:N	2.30	0.64
1:B:466:ASP:OD2	1:B:469:THR:OG1	2.12	0.64
1:B:501:ASN:OD1	9:B:801:HOH:O	2.15	0.64
1:C:261:GLY:O	9:C:802:HOH:O	2.15	0.64
1:B:317:HIS:HE2	6:B:706:PO4:P	2.20	0.63
1:B:316:ASN:OD1	1:B:423:HIS:CD2	2.43	0.63
1:A:445:GLU:O	9:A:803:HOH:O	2.15	0.63
1:A:370:ARG:NH2	1:A:499:ASP:O	2.33	0.61
1:D:147:SER:OG	1:D:148:VAL:N	2.34	0.60
1:A:562:GLU:OE2	1:A:587:ARG:NH2	2.36	0.58
1:A:316:ASN:OD1	1:A:423:HIS:CD2	2.56	0.58
1:B:276:ASP:N	1:B:318:GLU:OE2	2.37	0.58
1:D:511:ASP:OD1	1:D:512:HIS:N	2.36	0.58
1:C:385:ARG:NH1	1:C:429:CYS:O	2.38	0.56
1:A:385:ARG:NH1	1:A:429:CYS:O	2.39	0.55
1:A:198:ARG:N	1:A:269:GLU:OE1	2.39	0.54
1:B:605:CYS:O	9:B:802:HOH:O	2.19	0.53
1:D:459:ASP:OD1	1:D:494:ARG:NH2	2.43	0.52
1:C:561:ASP:OD2	1:C:564:LEU:N	2.36	0.52
1:A:147:SER:OG	1:A:148:VAL:N	2.43	0.52
1:C:514:THR:O	1:C:534:LEU:N	2.42	0.52
3:C:705:NAG:HO3	3:C:705:NAG:C7	2.17	0.52
1:B:147:SER:OG	1:B:148:VAL:N	2.41	0.51
1:B:317:HIS:HA	1:B:322:VAL:HG23	1.93	0.51
1:C:459:ASP:OD1	1:C:494:ARG:NH2	2.44	0.51
1:B:463:ILE:O	9:B:803:HOH:O	2.19	0.50
1:A:198:ARG:NE	1:A:265:ALA:O	2.42	0.50
1:A:198:ARG:NH1	6:A:710:PO4:O2	2.43	0.50
1:B:371:PRO:O	9:B:801:HOH:O	2.20	0.50
1:C:87:CYS:HB3	1:C:88:PRO:HD3	1.94	0.50
1:D:240:GLY:N	1:D:244:GLU:OE1	2.42	0.50
1:B:104:GLU:N	1:B:105:PRO:HD2	2.27	0.50
1:A:87:CYS:HB3	1:A:88:PRO:HD3	1.95	0.49
1:A:274:THR:O	1:A:423:HIS:ND1	2.47	0.48
1:C:273:TRP:O	1:C:312:PRO:HA	2.14	0.48
1:B:456:THR:OG1	9:B:804:HOH:O	2.20	0.47
1:C:144:TRP:O	1:C:149:LEU:N	2.44	0.47
1:C:466:ASP:OD2	1:C:469:THR:OG1	2.25	0.47
1:B:240:GLY:N	1:B:244:GLU:OE1	2.43	0.47
1:A:277:ILE:HB	1:A:278:PRO:HD3	1.97	0.46
1:C:147:SER:OG	1:C:148:VAL:N	2.46	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:208:ASP:OD1	1:D:226:ARG:NH1	2.49	0.46
1:C:277:ILE:HB	1:C:278:PRO:HD3	1.98	0.46
1:D:206:HIS:HA	1:D:277:ILE:O	2.16	0.46
3:B:703:NAG:H62	3:B:704:NAG:O5	2.17	0.45
1:B:143:VAL:HG12	1:B:389:TRP:CE3	2.52	0.45
1:A:584:THR:OG1	1:C:234:ASN:ND2	2.48	0.45
1:A:472:ARG:NE	7:A:712:CL:CL	2.86	0.45
1:B:219:CYS:N	1:B:224:CYS:SG	2.89	0.45
1:B:232:PRO:HB2	1:B:236:GLN:HB2	1.98	0.45
1:C:168:ILE:HG22	1:C:169:PHE:N	2.31	0.45
1:D:116:LYS:O	1:D:120:MET:HG2	2.17	0.45
1:B:165:HIS:NE2	1:B:167:ASP:OD2	2.51	0.44
1:C:456:THR:O	1:C:457:HIS:HB2	2.18	0.44
1:A:107:VAL:O	1:A:111:GLY:N	2.41	0.43
1:B:198:ARG:NH2	1:B:513:GLU:OE1	2.51	0.43
1:C:219:CYS:N	1:C:224:CYS:SG	2.90	0.43
1:A:330:ILE:HD13	1:A:389:TRP:CE3	2.53	0.43
1:A:419:HIS:NE2	1:A:507:HIS:O	2.46	0.43
1:D:210:GLU:HB2	1:D:226:ARG:NH1	2.34	0.43
1:A:454:GLY:O	1:A:455:HIS:HB3	2.19	0.43
3:C:703:NAG:O4	3:C:704:NAG:O7	2.37	0.43
1:B:144:TRP:HB3	1:B:149:LEU:HD13	2.01	0.42
1:B:486:PHE:HA	1:B:487:ILE:HA	1.85	0.42
1:C:256:GLU:HG2	1:C:260:LYS:HE3	2.00	0.42
1:A:273:TRP:O	1:A:312:PRO:HA	2.18	0.42
1:B:140:VAL:O	1:B:143:VAL:HG22	2.20	0.42
1:B:277:ILE:HB	1:B:278:PRO:HD3	2.01	0.42
1:B:354:ASP:OD2	1:B:355:ALA:N	2.52	0.42
1:D:273:TRP:O	1:D:312:PRO:HA	2.20	0.42
1:D:203:THR:HG23	1:D:482:SER:HA	2.02	0.42
1:D:87:CYS:HB3	1:D:88:PRO:HD3	2.02	0.42
1:C:454:GLY:O	1:C:455:HIS:HB3	2.20	0.42
1:A:144:TRP:HB3	1:A:149:LEU:HD13	2.02	0.42
1:A:561:ASP:OD2	1:A:564:LEU:N	2.40	0.42
1:B:107:VAL:O	1:B:111:GLY:N	2.39	0.42
1:C:286:SER:OG	1:C:289:ASP:OD1	2.33	0.42
1:D:454:GLY:O	1:D:455:HIS:HB3	2.20	0.41
1:A:486:PHE:HA	1:A:487:ILE:HA	1.87	0.41
1:A:559:ARG:NH1	1:A:607:HIS:O	2.53	0.41
1:A:104:GLU:N	1:A:105:PRO:CD	2.84	0.41
1:A:205:LEU:HD12	1:A:205:LEU:N	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:584:THR:N	1:D:585:PRO:HD2	2.36	0.41
1:B:273:TRP:O	1:B:312:PRO:HA	2.20	0.41
1:D:277:ILE:HB	1:D:278:PRO:HD3	2.03	0.41
1:C:145:THR:HA	1:C:149:LEU:HB2	2.03	0.41
1:B:206:HIS:O	1:B:249:ASP:HB3	2.21	0.41
1:B:584:THR:N	1:B:585:PRO:HD2	2.36	0.40
1:C:94:PHE:CZ	1:C:154:ALA:HB1	2.56	0.40
1:C:552:HIS:CE1	1:C:556:TYR:HE2	2.39	0.40
1:C:138:ASP:OD1	1:C:138:ASP:N	2.55	0.40
1:D:277:ILE:CG2	1:D:297:ILE:HG13	2.52	0.40
1:D:232:PRO:HB2	1:D:236:GLN:HB2	2.04	0.40
1:D:513:GLU:HG3	1:D:536:ARG:HG3	2.03	0.40
1:A:213:GLU:HG2	1:A:214:GLY:N	2.37	0.40
3:A:707:NAG:O4	3:A:708:NAG:O7	2.39	0.40
1:D:348:GLU:N	1:D:349:PRO:CD	2.85	0.40
1:A:198:ARG:HG2	6:A:710:PO4:O1	2.20	0.40
1:B:454:GLY:O	1:B:455:HIS:HB3	2.21	0.40

There are no symmetry-related clashes.

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	525/538 (98%)	492 (94%)	32 (6%)	1 (0%)	52	84
1	B	525/538 (98%)	492 (94%)	32 (6%)	1 (0%)	52	84
1	C	525/538 (98%)	492 (94%)	32 (6%)	1 (0%)	52	84
1	D	525/538 (98%)	494 (94%)	30 (6%)	1 (0%)	52	84
All	All	2100/2152 (98%)	1970 (94%)	126 (6%)	4 (0%)	52	84

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	537	ALA
1	B	537	ALA
1	C	486	PHE
1	D	537	ALA

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	449/460 (98%)	443 (99%)	6 (1%)	76	94
1	B	449/460 (98%)	445 (99%)	4 (1%)	84	96
1	C	449/460 (98%)	440 (98%)	9 (2%)	63	90
1	D	449/460 (98%)	446 (99%)	3 (1%)	88	97
All	All	1796/1840 (98%)	1774 (99%)	22 (1%)	78	95

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	146	ARG
1	A	276	ASP
1	A	367	LEU
1	A	369	PRO
1	A	383	CYS
1	A	571	LEU
1	B	276	ASP
1	B	367	LEU
1	B	383	CYS
1	B	571	LEU
1	C	173	ASN
1	C	253	ARG
1	C	276	ASP
1	C	367	LEU
1	C	383	CYS
1	C	393	ASN
1	C	452	PHE
1	C	571	LEU

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Mol	Chain	Res	Type
1	C	586	CYS
1	D	367	LEU
1	D	383	CYS
1	D	571	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	334	GLN
1	A	566	GLN
1	B	334	GLN
1	C	334	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 40 ligands modelled in this entry, 13 are monoatomic - leaving 27 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	NAG	A	703	1,3	14,14,15	0.50	0	15,19,21	0.38	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	BMA	A	704	3	11,11,12	0.78	1 (9%)	15,15,17	0.69	0
3	NAG	A	705	3,4	14,14,15	0.49	0	15,19,21	0.33	0
5	FUC	A	706	3	10,10,11	1.13	1 (10%)	13,14,16	1.82	3 (23%)
3	NAG	A	707	1,3,5	14,14,15	0.61	0	15,19,21	0.84	1 (6%)
3	NAG	A	708	3	14,14,15	0.29	0	15,19,21	0.22	0
6	PO4	A	709	2	4,4,4	0.72	0	6,6,6	0.23	0
6	PO4	A	710	-	4,4,4	0.68	0	6,6,6	0.23	0
6	PO4	A	711	-	4,4,4	0.69	0	6,6,6	0.23	0
8	6E0	A	714	-	21,21,21	2.30	3 (14%)	23,23,23	1.02	1 (4%)
3	NAG	B	703	1,3	14,14,15	0.53	0	15,19,21	1.15	2 (13%)
3	NAG	B	704	3	14,14,15	0.53	0	15,19,21	0.33	0
3	NAG	B	705	1	14,14,15	0.26	0	15,19,21	0.21	0
6	PO4	B	706	2	4,4,4	0.68	0	6,6,6	0.24	0
6	PO4	B	707	-	4,4,4	0.66	0	6,6,6	0.23	0
3	NAG	C	703	1,3	14,14,15	0.27	0	15,19,21	0.37	0
3	NAG	C	704	3	14,14,15	0.28	0	15,19,21	0.29	0
3	NAG	C	705	1	14,14,15	0.48	0	15,19,21	0.38	0
6	PO4	C	706	2	4,4,4	0.69	0	6,6,6	0.24	0
4	BMA	D	703	3	11,11,12	0.68	0	15,15,17	0.84	0
3	NAG	D	704	1,3	14,14,15	0.37	0	15,19,21	0.31	0
3	NAG	D	705	3,4	14,14,15	1.21	1 (7%)	15,19,21	1.03	1 (6%)
5	FUC	D	706	3	10,10,11	1.02	1 (10%)	13,14,16	1.29	1 (7%)
3	NAG	D	707	1,3,5	14,14,15	1.00	1 (7%)	15,19,21	1.07	2 (13%)
3	NAG	D	708	3	14,14,15	0.39	0	15,19,21	0.32	0
6	PO4	D	709	2	4,4,4	0.71	0	6,6,6	0.23	0
8	6E0	D	711	-	21,21,21	2.32	3 (14%)	23,23,23	0.77	1 (4%)

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	NAG	A	703	1,3	-	0/6/23/26	0/1/1/1
4	BMA	A	704	3	-	0/2/19/22	0/1/1/1
3	NAG	A	705	3,4	-	0/6/23/26	0/1/1/1
5	FUC	A	706	3	-	0/0/17/20	0/1/1/1
3	NAG	A	707	1,3,5	-	0/6/23/26	0/1/1/1
3	NAG	A	708	3	-	0/6/23/26	0/1/1/1
6	PO4	A	709	2	-	0/0/0/0	0/0/0/0
6	PO4	A	710	-	-	0/0/0/0	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	PO4	A	711	-	-	0/0/0/0	0/0/0/0
8	6E0	A	714	-	-	0/19/19/19	0/0/0/0
3	NAG	B	703	1,3	-	0/6/23/26	0/1/1/1
3	NAG	B	704	3	-	0/6/23/26	0/1/1/1
3	NAG	B	705	1	-	0/6/23/26	0/1/1/1
6	PO4	B	706	2	-	0/0/0/0	0/0/0/0
6	PO4	B	707	-	-	0/0/0/0	0/0/0/0
3	NAG	C	703	1,3	-	0/6/23/26	0/1/1/1
3	NAG	C	704	3	-	0/6/23/26	0/1/1/1
3	NAG	C	705	1	-	0/6/23/26	0/1/1/1
6	PO4	C	706	2	-	0/0/0/0	0/0/0/0
4	BMA	D	703	3	-	0/2/19/22	0/1/1/1
3	NAG	D	704	1,3	-	0/6/23/26	0/1/1/1
3	NAG	D	705	3,4	-	0/6/23/26	0/1/1/1
5	FUC	D	706	3	-	0/0/17/20	0/1/1/1
3	NAG	D	707	1,3,5	-	0/6/23/26	0/1/1/1
3	NAG	D	708	3	-	0/6/23/26	0/1/1/1
6	PO4	D	709	2	-	0/0/0/0	0/0/0/0
8	6E0	D	711	-	-	0/19/19/19	0/0/0/0

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	705	NAG	O5-C1	-4.05	1.37	1.43
3	D	707	NAG	O5-C1	-3.64	1.37	1.43
4	A	704	BMA	O5-C1	-2.02	1.40	1.43
5	D	706	FUC	C1-C2	2.08	1.57	1.52
5	A	706	FUC	C1-C2	2.75	1.58	1.52
8	A	714	6E0	P19-O21	4.28	1.65	1.54
8	D	711	6E0	P19-O22	4.32	1.65	1.54
8	A	714	6E0	P19-O22	4.34	1.65	1.54
8	D	711	6E0	P19-O21	4.42	1.65	1.54
8	A	714	6E0	P19-C18	8.31	1.87	1.78
8	D	711	6E0	P19-C18	8.41	1.87	1.78

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	714	6E0	P19-C18-C17	-4.04	110.31	114.90
3	B	703	NAG	O4-C4-C3	-2.80	104.04	110.36
8	D	711	6E0	P19-C18-C17	-2.46	112.11	114.90
3	D	707	NAG	O4-C4-C3	-2.35	105.05	110.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	707	NAG	C4-C3-C2	2.01	114.46	111.34
3	B	703	NAG	C1-O5-C5	2.23	115.42	112.14
3	A	707	NAG	C1-O5-C5	2.52	115.84	112.14
3	D	705	NAG	C4-C3-C2	2.53	115.27	111.34
5	A	706	FUC	O5-C5-C4	2.64	114.14	109.58
5	A	706	FUC	O5-C1-C2	3.29	116.15	110.89
5	D	706	FUC	C1-C2-C3	3.47	113.75	109.55
5	A	706	FUC	C1-C2-C3	4.45	114.95	109.55

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

10 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	707	NAG	1	0
3	A	708	NAG	1	0
6	A	710	PO4	2	0
3	B	703	NAG	1	0
3	B	704	NAG	1	0
6	B	706	PO4	1	0
6	B	707	PO4	1	0
3	C	703	NAG	1	0
3	C	704	NAG	1	0
3	C	705	NAG	2	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

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	527/538 (97%)	0.41	18 (3%)	49	36	24, 52, 84, 143	0
1	B	527/538 (97%)	0.51	24 (4%)	36	25	25, 56, 87, 118	0
1	C	527/538 (97%)	0.36	19 (3%)	46	34	20, 55, 94, 141	0
1	D	527/538 (97%)	0.49	24 (4%)	36	25	25, 55, 91, 121	0
All	All	2108/2152 (97%)	0.44	85 (4%)	42	30	20, 55, 89, 143	0

All (85) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	234	ASN	10.4
1	A	610	PRO	6.1
1	A	233	PRO	5.7
1	C	562	GLU	4.7
1	C	192	PRO	4.6
1	B	526	GLY	4.6
1	A	525	ALA	4.6
1	D	610	PRO	4.5
1	A	236	GLN	4.4
1	C	525	ALA	4.4
1	C	561	ASP	4.4
1	D	579	SER	4.2
1	A	530	SER	3.9
1	C	191	ALA	3.7
1	C	524	ALA	3.7
1	C	354	ASP	3.6
1	A	218	TYR	3.6
1	C	610	PRO	3.5
1	B	602	PRO	3.4
1	B	525	ALA	3.4
1	B	168	ILE	3.4

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Mol	Chain	Res	Type	RSRZ
1	D	582	CYS	3.4
1	B	470	LEU	3.3
1	B	601	SER	3.2
1	D	186	PRO	3.1
1	B	467	GLU	3.0
1	D	193	GLY	2.9
1	B	524	ALA	2.9
1	C	236	GLN	2.9
1	B	468	GLU	2.9
1	A	540	THR	2.8
1	D	578	PRO	2.8
1	C	331	LYS	2.7
1	B	604	LEU	2.7
1	C	392	ILE	2.7
1	D	169	PHE	2.7
1	D	329	PHE	2.7
1	D	235	SER	2.6
1	D	307	PRO	2.6
1	D	330	ILE	2.6
1	B	219	CYS	2.5
1	C	299	ASP	2.5
1	B	165	HIS	2.5
1	C	588	LEU	2.5
1	D	542	GLY	2.5
1	D	168	ILE	2.5
1	C	333	ASN	2.5
1	D	581	PRO	2.5
1	A	177	PRO	2.4
1	C	565	PHE	2.4
1	A	168	ILE	2.4
1	D	221	ASP	2.4
1	B	341	GLU	2.3
1	B	424	ILE	2.3
1	B	519	LEU	2.3
1	B	220	ALA	2.3
1	D	333	ASN	2.3
1	B	167	ASP	2.3
1	C	563	GLN	2.3
1	D	341	GLU	2.3
1	C	520	THR	2.2
1	A	562	GLU	2.2
1	B	392	ILE	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	234	ASN	2.2
1	B	610	PRO	2.2
1	B	85	LEU	2.2
1	C	178	SER	2.2
1	D	526	GLY	2.1
1	A	563	GLN	2.1
1	D	504	GLY	2.1
1	A	329	PHE	2.1
1	C	165	HIS	2.1
1	B	166	TRP	2.1
1	B	431	LYS	2.1
1	A	609	MET	2.1
1	D	98	ASN	2.1
1	A	284	GLN	2.0
1	D	157	LEU	2.0
1	D	340	TYR	2.0
1	D	344	ALA	2.0
1	B	120	MET	2.0
1	B	234	ASN	2.0
1	A	84	ASN	2.0
1	A	527	GLY	2.0
1	A	106	ASN	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(\AA^2)	Q<0.9
8	6E0	D	711	22/22	0.87	0.85	11.51	42,68,90,127	0
8	6E0	A	714	22/22	0.83	0.82	10.51	52,71,87,133	0
7	CL	B	708	1/1	0.76	0.73	10.18	50,50,50,50	0
3	NAG	A	708	14/15	0.82	0.42	4.76	78,97,117,123	0
6	PO4	A	711	5/5	0.94	0.36	3.63	21,50,69,71	0
5	FUC	A	706	10/11	0.84	0.45	2.67	67,92,106,115	0
7	CL	C	707	1/1	0.81	0.30	1.78	44,44,44,44	0
3	NAG	D	708	14/15	0.78	0.36	1.71	71,91,112,124	0
6	PO4	B	707	5/5	0.87	0.38	1.50	63,74,92,102	0
3	NAG	A	707	14/15	0.85	0.29	1.25	81,99,119,129	0
6	PO4	A	709	5/5	0.93	0.22	0.94	46,51,59,60	0
6	PO4	C	706	5/5	0.96	0.19	0.60	24,32,39,40	0
6	PO4	D	709	5/5	0.96	0.21	0.43	36,45,56,56	0
3	NAG	D	707	14/15	0.88	0.28	0.38	72,87,98,108	0
3	NAG	B	703	14/15	0.86	0.27	0.37	41,69,87,90	0
3	NAG	A	703	14/15	0.89	0.30	0.35	44,66,85,95	0
5	FUC	D	706	10/11	0.88	0.27	0.03	73,84,95,100	0
2	ZN	A	701	1/1	0.98	0.19	0.01	37,37,37,37	0
3	NAG	B	705	14/15	0.81	0.22	-0.15	54,82,92,100	0
3	NAG	C	703	14/15	0.86	0.24	-0.37	58,81,102,105	0
3	NAG	D	704	14/15	0.90	0.21	-0.67	47,60,72,80	0
2	ZN	D	701	1/1	0.94	0.18	-0.73	42,42,42,42	0
2	ZN	C	701	1/1	0.98	0.13	-0.98	26,26,26,26	0
7	CL	A	713	1/1	0.95	0.20	-1.00	55,55,55,55	0
2	ZN	B	701	1/1	0.89	0.18	-1.12	56,56,56,56	0
6	PO4	B	706	5/5	0.92	0.19	-1.24	47,50,74,87	0
2	ZN	C	702	1/1	0.90	0.12	-1.61	44,44,44,44	0
2	ZN	A	702	1/1	0.86	0.15	-1.65	45,45,45,45	0
7	CL	A	712	1/1	0.92	0.17	-1.94	58,58,58,58	0
2	ZN	B	702	1/1	0.97	0.10	-2.38	42,42,42,42	0
2	ZN	D	702	1/1	0.99	0.12	-3.53	35,35,35,35	0
7	CL	D	710	1/1	0.96	0.10	-3.77	26,26,26,26	0
3	NAG	C	705	14/15	0.77	0.31	-	73,100,119,123	0
4	BMA	A	704	11/12	0.86	0.40	-	80,98,119,123	0
3	NAG	C	704	14/15	0.78	0.48	-	61,93,113,124	0
3	NAG	A	705	14/15	0.83	0.37	-	80,92,108,112	0
3	NAG	D	705	14/15	0.87	0.31	-	39,69,88,102	0
3	NAG	B	704	14/15	0.70	0.47	-	66,92,115,121	0
6	PO4	A	710	5/5	0.91	0.49	-	55,64,82,86	0
4	BMA	D	703	11/12	0.74	0.34	-	69,93,112,117	0

6.5 Other polymers [i](#)

There are no such residues in this entry.