



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 08:44 PM GMT

PDB ID : 1LRH  
Title : Crystal structure of auxin-binding protein 1 in complex with 1-naphthalene acetic acid  
Authors : Woo, E.J.; Marshall, J.; Bauly, J.; Chen, J.-G.; Venis, M.; Napier, R.M.; Pickersgill, R.W.  
Deposited on : 2002-05-15  
Resolution : 1.90 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](mailto: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.

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

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
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) : trunk26865

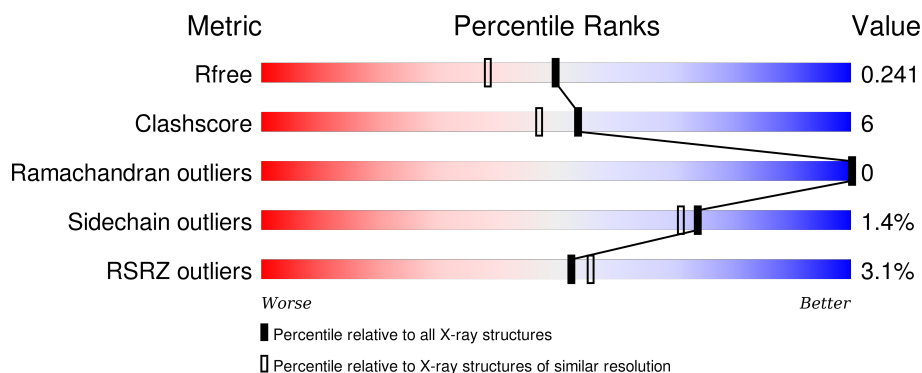
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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	4755 (1.90-1.90)
Clashscore	102246	5398 (1.90-1.90)
Ramachandran outliers	100387	5338 (1.90-1.90)
Sidechain outliers	100360	5339 (1.90-1.90)
RSRZ outliers	91569	4766 (1.90-1.90)

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  $\geq 3$ , 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	163	<div> <div>2%</div> <div>90%</div> <div>9%</div> <div>.</div> </div>
1	B	163	<div> <div>5%</div> <div>78%</div> <div>19%</div> <div>..</div> </div>
1	C	163	<div> <div>3%</div> <div>81%</div> <div>17%</div> <div>..</div> </div>
1	D	163	<div> <div>2%</div> <div>75%</div> <div>20%</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 criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	A	182	-	-	-	X
2	BMA	A	183	-	-	-	X
2	BMA	C	183	-	-	-	X
2	MAN	D	185	X	-	-	-
4	NLA	A	5190	-	-	-	X
4	NLA	B	6190	-	-	-	X

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5799 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 auxin-binding protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	160	Total	C	N	O	S	0	0	0
			1269	810	214	238	7			
1	B	160	Total	C	N	O	S	0	0	0
			1269	810	214	238	7			
1	C	160	Total	C	N	O	S	0	0	0
			1269	810	214	238	7			
1	D	160	Total	C	N	O	S	0	0	0
			1269	810	214	238	7			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	161	GLU	ASP	ENGINEERED	UNP P13689
A	162	GLN	GLU	ENGINEERED	UNP P13689
B	161	GLU	ASP	ENGINEERED	UNP P13689
B	162	GLN	GLU	ENGINEERED	UNP P13689
C	161	GLU	ASP	ENGINEERED	UNP P13689
C	162	GLN	GLU	ENGINEERED	UNP P13689
D	161	GLU	ASP	ENGINEERED	UNP P13689
D	162	GLN	GLU	ENGINEERED	UNP P13689

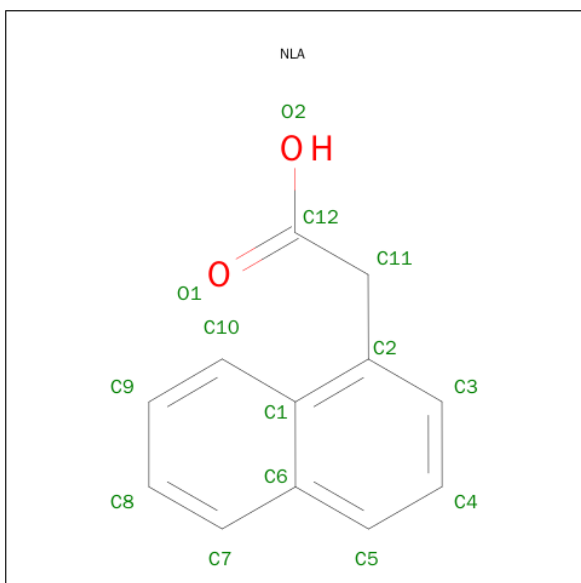
- Molecule 2 is a polymer of unknown type called SUGAR (6-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	6	Total	C	N	O	0	0
			72	40	2	30		
2	B	6	Total	C	N	O	0	0
			72	40	2	30		
2	C	6	Total	C	N	O	0	0
			72	40	2	30		
2	D	6	Total	C	N	O	0	0
			72	40	2	30		

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

- Molecule 4 is NAPHTHALEN-1-YL-ACETIC ACID (three-letter code: NLA) (formula: C<sub>12</sub>H<sub>10</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			14	12	2		
4	B	1	Total	C	O	0	0
			14	12	2		
4	C	1	Total	C	O	0	0
			14	12	2		
4	D	1	Total	C	O	0	0
			14	12	2		

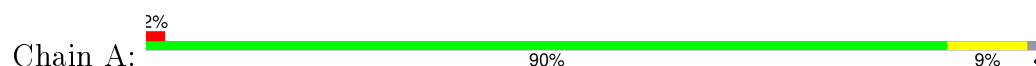
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	88	Total 88	O 88	0	0
5	B	96	Total 96	O 96	0	0
5	C	87	Total 87	O 87	0	0
5	D	104	Total 104	O 104	0	0

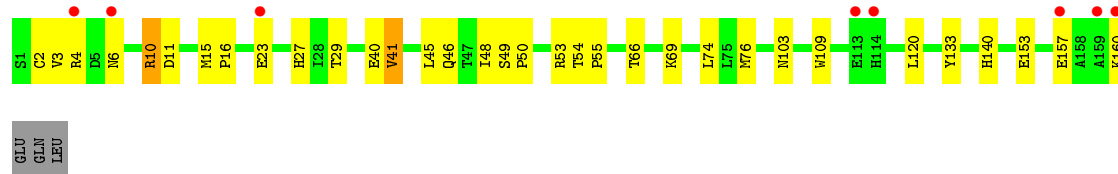
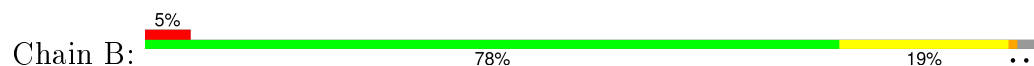
### 3 Residue-property plots [i](#)

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.

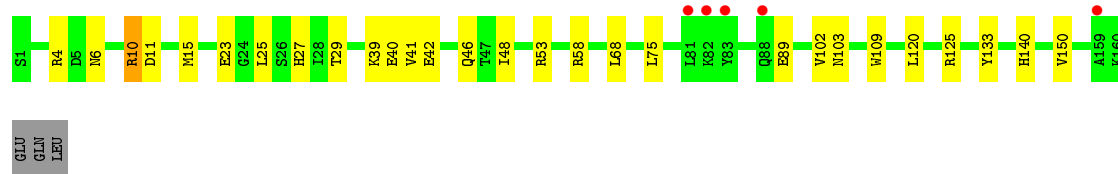
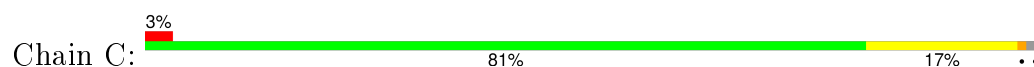
- Molecule 1: auxin-binding protein 1



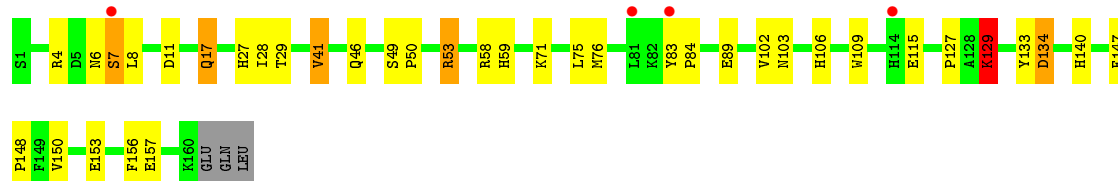
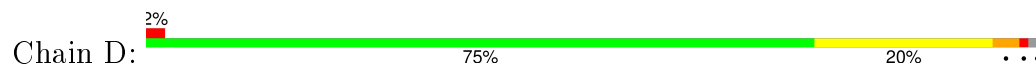
- Molecule 1: auxin-binding protein 1



- Molecule 1: auxin-binding protein 1



- Molecule 1: auxin-binding protein 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	61.58Å 82.43Å 69.96Å 90.00° 94.37° 90.00°	Depositor
Resolution (Å)	15.00 – 1.90 29.38 – 1.90	Depositor EDS
% Data completeness (in resolution range)	(Not available) (15.00-1.90) 98.7 (29.38-1.90)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	11.31 (at 1.91Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.200 , 0.240 0.193 , 0.241	Depositor DCC
$R_{free}$ test set	2714 reflections (5.27%)	DCC
Wilson B-factor (Å <sup>2</sup> )	12.1	Xtriage
Anisotropy	0.075	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 53.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 54263 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	5799	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.33% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: NLA, ZN, BMA, NAG, MAN

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	0.71	0/1306	1.29	2/1779 (0.1%)
1	B	0.67	0/1306	1.37	7/1779 (0.4%)
1	C	0.70	0/1306	1.46	9/1779 (0.5%)
1	D	0.73	0/1306	1.50	12/1779 (0.7%)
All	All	0.70	0/5224	1.41	30/7116 (0.4%)

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
2	D	1	0

There are no bond length outliers.

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	7	SER	N-CA-CB	19.28	139.42	110.50
1	C	10	ARG	NE-CZ-NH1	16.56	128.58	120.30
1	C	4	ARG	NE-CZ-NH2	-11.15	114.73	120.30
1	B	10	ARG	NE-CZ-NH1	10.64	125.62	120.30
1	D	7	SER	CB-CA-C	-8.53	93.89	110.10
1	C	4	ARG	NE-CZ-NH1	8.15	124.38	120.30
1	C	11	ASP	CB-CG-OD1	7.51	125.06	118.30
1	D	4	ARG	NE-CZ-NH2	7.15	123.87	120.30
1	B	10	ARG	NE-CZ-NH2	-6.93	116.84	120.30
1	C	125	ARG	NE-CZ-NH2	-6.89	116.86	120.30
1	D	11	ASP	CB-CG-OD1	6.72	124.35	118.30
1	D	53	ARG	NE-CZ-NH2	-6.60	117.00	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	134	ASP	CB-CG-OD1	-6.44	112.51	118.30
1	A	112	ASP	CB-CG-OD1	-6.30	112.63	118.30
1	C	42	GLU	OE1-CD-OE2	-6.25	115.80	123.30
1	C	10	ARG	NH1-CZ-NH2	-6.17	112.61	119.40
1	D	129	LYS	CB-CG-CD	6.13	127.54	111.60
1	B	69	LYS	CB-CA-C	-5.79	98.82	110.40
1	D	7	SER	O-C-N	5.71	131.83	122.70
1	B	40	GLU	OE1-CD-OE2	-5.59	116.59	123.30
1	C	10	ARG	CD-NE-CZ	-5.59	115.78	123.60
1	D	7	SER	CA-C-N	-5.53	105.04	117.20
1	B	41	VAL	CG1-CB-CG2	-5.46	102.17	110.90
1	D	41	VAL	CG1-CB-CG2	-5.44	102.20	110.90
1	D	115	GLU	CA-CB-CG	5.30	125.05	113.40
1	B	45	LEU	CB-CG-CD2	-5.18	102.19	111.00
1	B	11	ASP	CB-CG-OD1	5.12	122.91	118.30
1	D	58	ARG	NE-CZ-NH1	5.09	122.84	120.30
1	C	58	ARG	NE-CZ-NH1	5.04	122.82	120.30
1	A	104	ASP	CB-CG-OD2	-5.03	113.77	118.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	D	185	MAN	C1

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	1269	0	1228	11	0
1	B	1269	0	1228	18	0
1	C	1269	0	1228	17	0
1	D	1269	0	1228	26	0
2	A	72	0	60	0	0
2	B	72	0	61	0	0
2	C	72	0	61	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	72	0	61	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	14	0	9	0	0
4	B	14	0	9	1	0
4	C	14	0	9	0	0
4	D	14	0	9	0	0
5	A	88	0	0	0	0
5	B	96	0	0	3	0
5	C	87	0	0	2	0
5	D	104	0	0	6	0
All	All	5799	0	5191	69	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 6.

All (69) 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)
5:B:4008:HOH:O	1:C:40:GLU:HG3	1.65	0.96
1:D:27:HIS:HD2	1:D:46:GLN:HE21	1.17	0.92
1:D:7:SER:CB	5:D:4180:HOH:O	2.18	0.90
5:B:4008:HOH:O	1:C:39:LYS:HB2	1.72	0.89
1:B:74:LEU:HD21	1:B:76:MET:HE2	1.53	0.88
1:B:27:HIS:HD2	1:B:46:GLN:HE21	1.23	0.84
1:C:27:HIS:HD2	1:C:46:GLN:HE21	1.28	0.81
1:A:27:HIS:HD2	1:A:46:GLN:HE21	1.29	0.78
1:C:75:LEU:HD22	1:C:89:GLU:HG2	1.67	0.76
1:C:23:GLU:HG2	5:C:3348:HOH:O	1.84	0.75
1:D:7:SER:HB3	5:D:4180:HOH:O	1.85	0.74
1:D:75:LEU:HD22	1:D:89:GLU:HG2	1.73	0.70
1:A:75:LEU:HD22	1:A:89:GLU:HG2	1.72	0.70
1:D:150:VAL:HG13	5:D:4226:HOH:O	1.92	0.69
1:B:27:HIS:CD2	1:B:46:GLN:HE21	2.10	0.68
1:C:25:LEU:HA	1:C:48:ILE:HD13	1.76	0.67
1:D:83:TYR:HB2	1:D:84:PRO:HD2	1.78	0.65
1:C:10:ARG:HE	1:C:15:MET:HE1	1.62	0.65
1:C:150:VAL:HG13	5:C:3226:HOH:O	1.96	0.65
1:D:27:HIS:CD2	1:D:46:GLN:HE21	2.08	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:23:GLU:HG2	5:B:2348:HOH:O	1.96	0.64
1:B:3:VAL:HG21	1:B:16:PRO:HG3	1.80	0.62
1:B:157:GLU:HA	1:B:160:LYS:HE3	1.82	0.62
1:B:2:CYS:SG	1:B:4:ARG:HG3	2.40	0.62
1:A:27:HIS:CD2	1:A:46:GLN:HE21	2.15	0.62
1:C:133:TYR:OH	1:C:140:HIS:HD2	1.84	0.60
1:D:7:SER:OG	5:D:4180:HOH:O	1.82	0.59
1:C:53:ARG:HG2	1:C:109:TRP:HB2	1.85	0.58
1:D:83:TYR:HB2	1:D:84:PRO:CD	2.35	0.56
1:B:133:TYR:OH	1:B:140:HIS:HD2	1.88	0.56
1:C:68:LEU:HD11	1:C:120:LEU:HG	1.88	0.56
1:D:133:TYR:OH	1:D:140:HIS:HD2	1.90	0.55
1:A:133:TYR:OH	1:A:140:HIS:HD2	1.90	0.55
1:D:148:PRO:HG3	1:D:156:PHE:CG	2.42	0.54
1:B:41:VAL:HG12	1:C:41:VAL:HG12	1.90	0.54
1:C:27:HIS:CD2	1:C:46:GLN:HE21	2.17	0.54
1:C:102:VAL:O	1:C:103:ASN:HB2	2.08	0.53
1:B:53:ARG:HG2	1:B:109:TRP:HB2	1.91	0.53
1:A:75:LEU:CD2	1:A:89:GLU:HG2	2.39	0.52
1:B:49:SER:HB2	1:B:50:PRO:HD2	1.92	0.52
1:D:75:LEU:HD22	1:D:89:GLU:CG	2.40	0.51
1:B:48:ILE:HD11	4:B:6190:NLA:H91	1.93	0.50
1:B:10:ARG:HE	1:B:15:MET:CE	2.25	0.50
1:A:41:VAL:HG12	1:D:41:VAL:HG12	1.93	0.50
1:C:25:LEU:HD13	1:C:48:ILE:HD11	1.93	0.50
1:A:41:VAL:CG1	1:D:41:VAL:HG12	2.42	0.49
1:D:147:PHE:CD1	1:D:148:PRO:HA	2.47	0.49
1:B:23:GLU:OE1	2:C:186:MAN:O3	2.30	0.49
1:A:27:HIS:HE1	1:A:29:THR:OG1	1.95	0.48
1:B:153:GLU:O	1:B:157:GLU:HG2	2.13	0.48
1:D:153:GLU:O	1:D:157:GLU:HG2	2.13	0.48
1:A:54:THR:HB	1:A:55:PRO:HD2	1.95	0.48
1:D:76:MET:HG3	1:D:106:HIS:HB3	1.95	0.47
1:C:10:ARG:HE	1:C:15:MET:CE	2.27	0.46
1:D:8:LEU:HB3	5:D:4214:HOH:O	2.16	0.45
1:D:17:GLN:HB2	1:D:28:ILE:HG13	1.98	0.45
1:D:27:HIS:HE1	1:D:29:THR:OG1	2.01	0.44
1:D:53:ARG:HG2	1:D:109:TRP:HB2	1.99	0.44
1:B:66:THR:OG1	1:B:120:LEU:HB2	2.16	0.44
1:D:71:LYS:HE2	5:D:4438:HOH:O	2.17	0.43
1:A:10:ARG:HE	1:A:15:MET:CE	2.31	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:102:VAL:O	1:D:103:ASN:HB2	2.18	0.43
1:B:54:THR:HB	1:B:55:PRO:HD2	2.01	0.42
1:A:27:HIS:HD2	1:A:46:GLN:NE2	2.08	0.42
1:D:7:SER:HB3	1:D:8:LEU:H	1.39	0.41
1:C:27:HIS:HE1	1:C:29:THR:OG1	2.03	0.41
1:D:49:SER:HB2	1:D:50:PRO:CD	2.51	0.41
1:D:127:PRO:O	1:D:129:LYS:HD3	2.20	0.41
1:B:27:HIS:HE1	1:B:29:THR:OG1	2.04	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	158/163 (97%)	155 (98%)	3 (2%)	0	100	100
1	B	158/163 (97%)	156 (99%)	2 (1%)	0	100	100
1	C	158/163 (97%)	153 (97%)	5 (3%)	0	100	100
1	D	158/163 (97%)	156 (99%)	2 (1%)	0	100	100
All	All	632/652 (97%)	620 (98%)	12 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	144/147 (98%)	144 (100%)	0	100	100
1	B	144/147 (98%)	142 (99%)	2 (1%)	74	71
1	C	144/147 (98%)	143 (99%)	1 (1%)	88	88
1	D	144/147 (98%)	139 (96%)	5 (4%)	43	31
All	All	576/588 (98%)	568 (99%)	8 (1%)	74	71

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	6	ASN
1	B	103	ASN
1	C	6	ASN
1	D	6	ASN
1	D	17	GLN
1	D	59	HIS
1	D	129	LYS
1	D	134	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	27	HIS
1	A	52	GLN
1	A	103	ASN
1	A	140	HIS
1	B	6	ASN
1	B	27	HIS
1	B	86	GLN
1	B	140	HIS
1	C	6	ASN
1	C	27	HIS
1	C	52	GLN
1	C	103	ASN
1	C	140	HIS
1	D	6	ASN
1	D	27	HIS
1	D	86	GLN
1	D	88	GLN
1	D	103	ASN
1	D	140	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

24 carbohydrates 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	A	181	1,2	14,14,15	1.18	1 (7%)	15,19,21	1.81	4 (26%)
2	NAG	A	182	2	14,14,15	1.18	1 (7%)	15,19,21	0.96	0
2	BMA	A	183	2	11,11,12	1.47	1 (9%)	14,15,17	2.20	3 (21%)
2	MAN	A	184	2	11,11,12	0.98	0	14,15,17	2.80	4 (28%)
2	MAN	A	185	2	11,11,12	0.77	0	14,15,17	1.89	4 (28%)
2	MAN	A	186	2	11,11,12	0.85	0	14,15,17	2.15	3 (21%)
2	NAG	B	181	1,2	14,14,15	1.09	1 (7%)	15,19,21	1.32	2 (13%)
2	NAG	B	182	2	14,14,15	1.13	1 (7%)	15,19,21	1.38	3 (20%)
2	BMA	B	183	2	11,11,12	1.15	1 (9%)	14,15,17	1.98	5 (35%)
2	MAN	B	184	2	11,11,12	1.17	1 (9%)	14,15,17	3.55	7 (50%)
2	MAN	B	185	2	11,11,12	0.86	0	14,15,17	1.93	4 (28%)
2	MAN	B	186	2	11,11,12	1.07	0	14,15,17	2.05	4 (28%)
2	NAG	C	181	1,2	14,14,15	1.33	1 (7%)	15,19,21	1.42	3 (20%)
2	NAG	C	182	2	14,14,15	1.27	1 (7%)	15,19,21	0.92	0
2	BMA	C	183	2	11,11,12	0.95	0	14,15,17	2.30	5 (35%)
2	MAN	C	184	2	11,11,12	0.95	0	14,15,17	2.74	4 (28%)
2	MAN	C	185	2	11,11,12	0.75	0	14,15,17	1.91	2 (14%)
2	MAN	C	186	2	11,11,12	0.76	0	14,15,17	1.77	4 (28%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NAG	D	181	1,2	14,14,15	1.29	1 (7%)	15,19,21	1.07	0
2	NAG	D	182	2	14,14,15	1.36	2 (14%)	15,19,21	0.98	1 (6%)
2	BMA	D	183	2	11,11,12	0.96	0	14,15,17	2.44	4 (28%)
2	MAN	D	184	2	11,11,12	1.23	1 (9%)	14,15,17	2.64	8 (57%)
2	MAN	D	185	2	11,11,12	0.80	0	14,15,17	2.29	5 (35%)
2	MAN	D	186	2	11,11,12	0.87	0	14,15,17	1.71	3 (21%)

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	A	181	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	182	2	-	0/6/23/26	0/1/1/1
2	BMA	A	183	2	-	0/2/19/22	0/1/1/1
2	MAN	A	184	2	-	0/2/19/22	0/1/1/1
2	MAN	A	185	2	-	0/2/19/22	0/1/1/1
2	MAN	A	186	2	-	0/2/19/22	0/1/1/1
2	NAG	B	181	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	182	2	-	0/6/23/26	0/1/1/1
2	BMA	B	183	2	-	0/2/19/22	0/1/1/1
2	MAN	B	184	2	-	0/2/19/22	0/1/1/1
2	MAN	B	185	2	-	0/2/19/22	0/1/1/1
2	MAN	B	186	2	-	0/2/19/22	0/1/1/1
2	NAG	C	181	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	182	2	-	0/6/23/26	0/1/1/1
2	BMA	C	183	2	-	0/2/19/22	0/1/1/1
2	MAN	C	184	2	-	0/2/19/22	0/1/1/1
2	MAN	C	185	2	-	0/2/19/22	0/1/1/1
2	MAN	C	186	2	-	0/2/19/22	0/1/1/1
2	NAG	D	181	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	182	2	-	0/6/23/26	0/1/1/1
2	BMA	D	183	2	-	0/2/19/22	0/1/1/1
2	MAN	D	184	2	-	0/2/19/22	0/1/1/1
2	MAN	D	185	2	1/1/4/5	0/2/19/22	0/1/1/1
2	MAN	D	186	2	-	0/2/19/22	0/1/1/1

All (13) bond length outliers are listed below:



Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	181	NAG	O7-C7	-3.99	1.14	1.23
2	D	181	NAG	O7-C7	-3.79	1.14	1.23
2	A	181	NAG	O7-C7	-3.77	1.14	1.23
2	B	181	NAG	O7-C7	-3.55	1.15	1.23
2	D	182	NAG	O7-C7	-3.48	1.15	1.23
2	C	182	NAG	O7-C7	-3.48	1.15	1.23
2	A	182	NAG	O7-C7	-3.06	1.16	1.23
2	B	182	NAG	O7-C7	-2.85	1.16	1.23
2	B	184	MAN	O2-C2	-2.56	1.37	1.43
2	D	182	NAG	C2-N2	2.17	1.50	1.46
2	B	183	BMA	C1-C2	2.37	1.57	1.52
2	A	183	BMA	C1-C2	2.38	1.57	1.52
2	D	184	MAN	C1-C2	2.55	1.58	1.52

All (82) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	184	MAN	C1-C2-C3	-10.06	97.64	109.54
2	C	184	MAN	C1-C2-C3	-7.11	101.13	109.54
2	A	184	MAN	C1-C2-C3	-6.75	101.55	109.54
2	D	185	MAN	C1-C2-C3	-6.57	101.77	109.54
2	C	185	MAN	C1-C2-C3	-5.82	102.65	109.54
2	D	183	BMA	C1-O5-C5	-5.80	104.89	112.25
2	A	186	MAN	C1-C2-C3	-5.67	102.83	109.54
2	A	183	BMA	C1-O5-C5	-5.58	105.17	112.25
2	A	184	MAN	C3-C4-C5	-4.72	101.97	110.20
2	C	183	BMA	C1-O5-C5	-4.37	106.70	112.25
2	A	186	MAN	O3-C3-C2	-4.31	102.22	110.00
2	C	184	MAN	C3-C4-C5	-4.30	102.70	110.20
2	B	183	BMA	C3-C4-C5	-4.25	102.79	110.20
2	C	183	BMA	O3-C3-C2	-4.13	102.53	110.00
2	B	186	MAN	C1-C2-C3	-4.09	104.70	109.54
2	D	183	BMA	O5-C1-C2	-4.02	104.33	110.86
2	C	186	MAN	C1-C2-C3	-3.99	104.82	109.54
2	B	184	MAN	O3-C3-C2	-3.88	102.98	110.00
2	B	185	MAN	O3-C3-C2	-3.70	103.31	110.00
2	B	184	MAN	C3-C4-C5	-3.44	104.19	110.20
2	A	183	BMA	C3-C4-C5	-3.39	104.29	110.20
2	C	183	BMA	C3-C4-C5	-3.35	104.36	110.20
2	B	183	BMA	C1-O5-C5	-3.33	108.02	112.25
2	A	184	MAN	O6-C6-C5	-3.25	100.60	111.33
2	B	185	MAN	O6-C6-C5	-3.20	100.75	111.33
2	C	181	NAG	C3-C2-N2	-3.19	102.91	110.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	185	MAN	C1-C2-C3	-3.15	105.82	109.54
2	C	186	MAN	O3-C3-C2	-3.09	104.42	110.00
2	B	181	NAG	C3-C2-N2	-2.77	103.92	110.56
2	D	184	MAN	O3-C3-C2	-2.76	105.00	110.00
2	C	181	NAG	O4-C4-C3	-2.73	104.19	110.34
2	D	183	BMA	C3-C4-C5	-2.64	105.59	110.20
2	A	181	NAG	O4-C4-C3	-2.62	104.44	110.34
2	B	181	NAG	C8-C7-N2	-2.57	111.19	116.11
2	A	181	NAG	C3-C2-N2	-2.55	104.44	110.56
2	B	183	BMA	O3-C3-C4	-2.43	104.88	110.34
2	D	184	MAN	C3-C4-C5	-2.41	105.99	110.20
2	D	183	BMA	C1-C2-C3	-2.37	106.74	109.54
2	D	185	MAN	O3-C3-C2	-2.31	105.82	110.00
2	B	184	MAN	O6-C6-C5	-2.31	103.71	111.33
2	B	182	NAG	C2-N2-C7	-2.29	120.10	123.04
2	D	184	MAN	O5-C1-C2	-2.27	107.17	110.86
2	C	183	BMA	O2-C2-C3	-2.13	105.84	110.12
2	B	182	NAG	C4-C3-C2	-2.12	107.93	111.23
2	B	185	MAN	C1-C2-C3	-2.11	107.04	109.54
2	A	185	MAN	O2-C2-C1	-2.09	105.02	109.21
2	D	182	NAG	C1-O5-C5	-2.05	109.65	112.25
2	B	182	NAG	C8-C7-N2	-2.03	112.22	116.11
2	B	183	BMA	O5-C1-C2	-2.02	107.58	110.86
2	D	184	MAN	C1-O5-C5	-2.00	109.70	112.25
2	C	186	MAN	C1-O5-C5	2.03	114.83	112.25
2	D	185	MAN	O2-C2-C3	2.07	114.28	110.12
2	B	184	MAN	C6-C5-C4	2.08	118.15	113.02
2	B	186	MAN	O5-C1-C2	2.16	114.36	110.86
2	B	183	BMA	C2-C3-C4	2.17	114.73	111.04
2	C	184	MAN	C6-C5-C4	2.18	118.40	113.02
2	C	181	NAG	O7-C7-C8	2.36	126.39	122.06
2	D	185	MAN	C1-O5-C5	2.38	115.27	112.25
2	D	186	MAN	O4-C4-C3	2.39	115.71	110.34
2	B	186	MAN	O5-C5-C6	2.41	112.57	107.35
2	D	184	MAN	C6-C5-C4	2.46	119.09	113.02
2	D	185	MAN	O3-C3-C4	2.47	115.90	110.34
2	D	184	MAN	O4-C4-C5	2.67	116.30	109.24
2	A	186	MAN	O2-C2-C3	2.74	115.63	110.12
2	D	186	MAN	C2-C3-C4	2.85	115.88	111.04
2	C	185	MAN	O2-C2-C3	2.85	115.86	110.12
2	D	186	MAN	O2-C2-C3	2.86	115.87	110.12
2	A	181	NAG	O7-C7-C8	3.09	127.73	122.06

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	184	MAN	O2-C2-C3	3.10	116.35	110.12
2	A	185	MAN	C1-O5-C5	3.12	116.21	112.25
2	C	183	BMA	C1-C2-C3	3.13	113.24	109.54
2	B	184	MAN	O2-C2-C3	3.18	116.52	110.12
2	C	184	MAN	C2-C3-C4	3.33	116.70	111.04
2	C	186	MAN	O2-C2-C1	3.38	115.98	109.21
2	A	183	BMA	O5-C5-C6	3.61	115.17	107.35
2	A	181	NAG	C2-N2-C7	3.75	127.85	123.04
2	B	185	MAN	O5-C1-C2	3.83	117.07	110.86
2	A	184	MAN	C2-C3-C4	4.12	118.04	111.04
2	A	185	MAN	O2-C2-C3	4.35	118.86	110.12
2	B	186	MAN	O2-C2-C3	4.41	118.99	110.12
2	B	184	MAN	C2-C3-C4	4.45	118.60	111.04
2	D	184	MAN	C2-C3-C4	6.41	121.93	111.04

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	D	185	MAN	C1

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	186	MAN	1	0

## 5.6 Ligand geometry ⓘ

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
4	NLA	A	5190	3	12,15,15	1.61	2 (16%)	17,20,20	0.86	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	NLA	B	6190	3	12,15,15	1.49	2 (16%)	17,20,20	0.96	1 (5%)
4	NLA	C	7190	3	12,15,15	1.45	2 (16%)	17,20,20	0.78	1 (5%)
4	NLA	D	8190	3	12,15,15	1.52	1 (8%)	17,20,20	1.18	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
4	NLA	A	5190	3	-	0/2/4/4	0/2/2/2
4	NLA	B	6190	3	-	0/2/4/4	0/2/2/2
4	NLA	C	7190	3	-	0/2/4/4	0/2/2/2
4	NLA	D	8190	3	-	0/2/4/4	0/2/2/2

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	7190	NLA	C3-C2	2.01	1.41	1.37
4	B	6190	NLA	C11-C2	2.27	1.56	1.52
4	C	7190	NLA	C11-C2	2.35	1.56	1.52
4	A	5190	NLA	C3-C2	2.40	1.42	1.37
4	B	6190	NLA	C3-C2	2.68	1.42	1.37
4	A	5190	NLA	C11-C2	3.04	1.58	1.52
4	D	8190	NLA	C3-C2	3.31	1.43	1.37

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	7190	NLA	C11-C2-C3	-2.39	116.33	120.65
4	B	6190	NLA	C12-C11-C2	-2.19	109.62	114.71
4	A	5190	NLA	C12-C11-C2	-2.16	109.69	114.71
4	D	8190	NLA	C4-C3-C2	-2.11	117.40	121.51
4	D	8190	NLA	C12-C11-C2	-2.04	109.96	114.71

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	6190	NLA	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	160/163 (98%)	-0.10	3 (1%) 70 73	8, 13, 24, 34	0
1	B	160/163 (98%)	0.13	8 (5%) 32 35	8, 15, 30, 58	0
1	C	160/163 (98%)	0.01	5 (3%) 52 56	7, 15, 38, 50	0
1	D	160/163 (98%)	0.03	4 (2%) 61 64	7, 13, 26, 37	0
All	All	640/652 (98%)	0.02	20 (3%) 52 56	7, 14, 29, 58	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	81	LEU	4.7
1	C	83	TYR	4.3
1	D	81	LEU	4.3
1	B	160	LYS	4.1
1	B	157	GLU	3.3
1	B	159	ALA	3.3
1	D	83	TYR	3.2
1	D	7	SER	3.1
1	A	15	MET	2.5
1	B	113	GLU	2.5
1	A	122	ILE	2.5
1	B	6	ASN	2.4
1	B	4	ARG	2.4
1	D	114	HIS	2.4
1	B	23	GLU	2.3
1	C	82	LYS	2.3
1	C	159	ALA	2.2
1	A	121	VAL	2.2
1	C	88	GLN	2.2
1	B	114	HIS	2.0

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

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

## 6.3 Carbohydrates ⓘ

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, 95<sup>th</sup> 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(Å <sup>2</sup> )	Q<0.9
2	BMA	A	183	11/12	0.94	0.12	6.90	13,14,17,19	0
2	BMA	C	183	11/12	0.90	0.14	2.73	16,19,22,25	0
2	NAG	A	182	14/15	0.96	0.11	2.09	7,11,16,16	0
2	MAN	D	185	11/12	0.67	0.19	1.95	37,38,40,40	0
2	MAN	C	185	11/12	0.88	0.12	1.64	26,27,28,30	0
2	BMA	D	183	11/12	0.85	0.16	1.35	24,26,29,31	0
2	MAN	D	184	11/12	0.80	0.17	1.20	26,31,34,35	0
2	MAN	B	185	11/12	0.93	0.12	0.84	11,14,16,20	0
2	NAG	D	182	14/15	0.91	0.12	0.71	12,18,23,25	0
2	MAN	B	186	11/12	0.89	0.14	0.51	16,22,28,28	0
2	MAN	D	186	11/12	0.78	0.15	0.32	33,36,37,37	0
2	BMA	B	183	11/12	0.97	0.09	0.30	7,9,10,12	0
2	NAG	C	181	14/15	0.93	0.12	0.24	13,17,29,30	0
2	MAN	A	185	11/12	0.95	0.09	0.18	12,16,18,19	0
2	MAN	C	184	11/12	0.92	0.12	-0.29	22,24,26,31	0
2	NAG	C	182	14/15	0.94	0.10	-0.29	13,16,21,24	0
2	NAG	D	181	14/15	0.95	0.09	-0.49	14,16,25,25	0
2	MAN	A	186	11/12	0.95	0.08	-0.58	14,14,17,20	0
2	NAG	B	181	14/15	0.97	0.09	-0.58	8,10,19,21	0
2	MAN	A	184	11/12	0.97	0.07	-0.64	8,11,13,14	0
2	MAN	B	184	11/12	0.97	0.07	-0.74	9,11,13,13	0
2	NAG	A	181	14/15	0.96	0.08	-0.77	12,14,22,23	0
2	NAG	B	182	14/15	0.97	0.08	-0.84	7,9,11,12	0
2	MAN	C	186	11/12	0.72	0.18	-	39,41,43,43	0

## 6.4 Ligands ⓘ

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, 95<sup>th</sup> 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( $\text{\AA}^2$ )	Q<0.9
4	NLA	B	6190	14/14	0.89	0.16	3.06	22,27,27,28	0
4	NLA	A	5190	14/14	0.88	0.19	2.89	20,26,28,29	0
4	NLA	C	7190	14/14	0.92	0.14	1.51	18,21,23,23	0
4	NLA	D	8190	14/14	0.95	0.11	0.26	15,17,19,20	0
3	ZN	C	180	1/1	1.00	0.05	-	14,14,14,14	0
3	ZN	B	180	1/1	0.99	0.07	-	12,12,12,12	0
3	ZN	D	180	1/1	1.00	0.07	-	11,11,11,11	0
3	ZN	A	180	1/1	1.00	0.04	-	13,13,13,13	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.