



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 03:32 AM UTC

PDB ID : 8TFH / pdb_00008tfh
Title : Ricin in complex with Fab JB4
Authors : Rudolph, M.J.; Mantis, N.
Deposited on : 2023-07-11
Resolution : 3.29 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

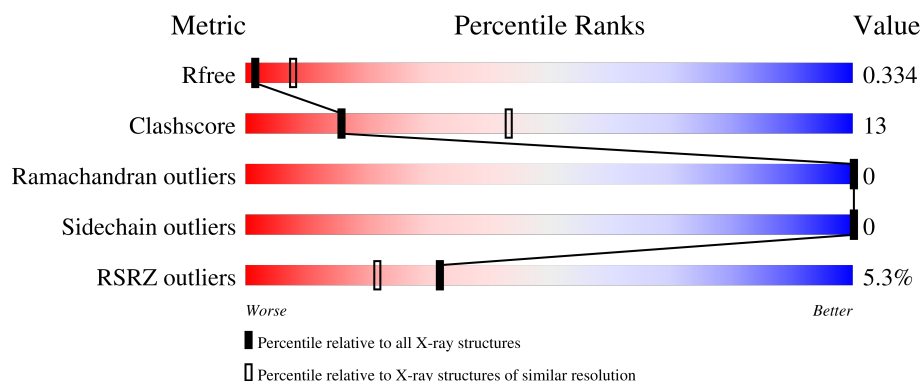
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.29 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	1169 (3.32-3.28)
Clashscore	190562	1209 (3.32-3.28)
Ramachandran outliers	187476	1188 (3.32-3.28)
Sidechain outliers	187428	1187 (3.32-3.28)
RSRZ outliers	180081	1169 (3.32-3.28)

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	260	4% 74% 25% .
2	B	262	3% 74% 26% .
3	H	223	8% 70% 27% .
4	L	210	7% 75% 24% .
5	C	3	67% 33%

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Mol	Chain	Length	Quality of chain
6	D	3	 67%33%
6	E	3	 33%67%

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 7598 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 Ricin A chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	260	Total	C	N	O	S	0	1	0
			2066	1308	368	385	5			

- Molecule 2 is a protein called Ricin B chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	262	Total	C	N	O	S	0	0	0
			2035	1273	357	393	12			

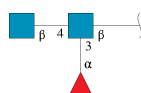
- Molecule 3 is a protein called JB4 monoclonal antibody heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	223	Total	C	N	O	S	0	0	0
			1701	1077	283	334	7			

- Molecule 4 is a protein called JB4 monoclonal antibody light chain.

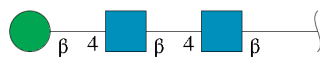
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	L	210	Total	C	N	O	S	0	0	0
			1637	1027	277	327	6			

- Molecule 5 is an oligosaccharide called alpha-L-fucopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose.



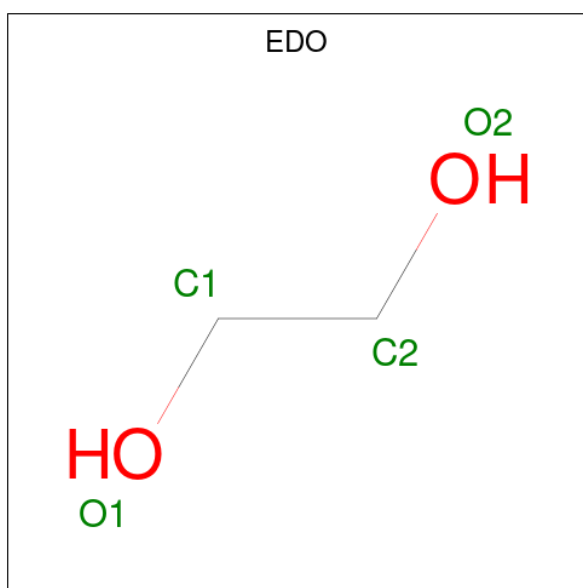
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	C	3	Total	C	N	O	0	0	0
			38	22	2	14			

- Molecule 6 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
6	D	3	Total	C	N	O	0	0
			39	22	2	15		
6	E	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 7 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			4	2	2		
7	B	1	Total	C	O	0	0
			4	2	2		
7	H	1	Total	C	O	0	0
			4	2	2		

- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

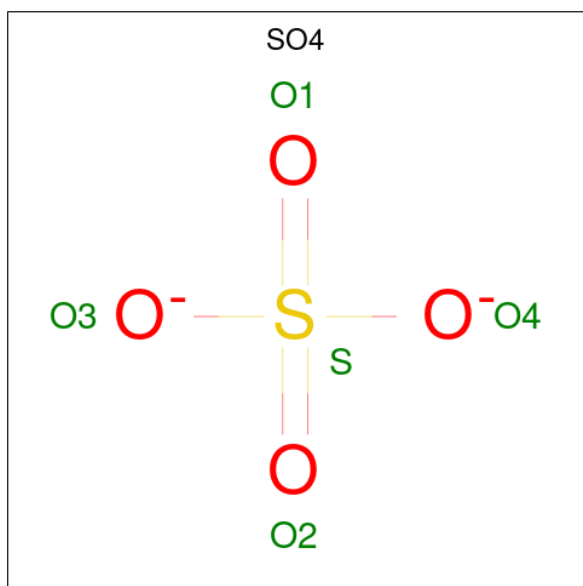
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Cl	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	L	2	Total	Cl	0	0
			2	2		

- Molecule 9 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	B	1	Total	O	S	0	0
			5	4	1		
9	H	1	Total	O	S	0	0
			5	4	1		

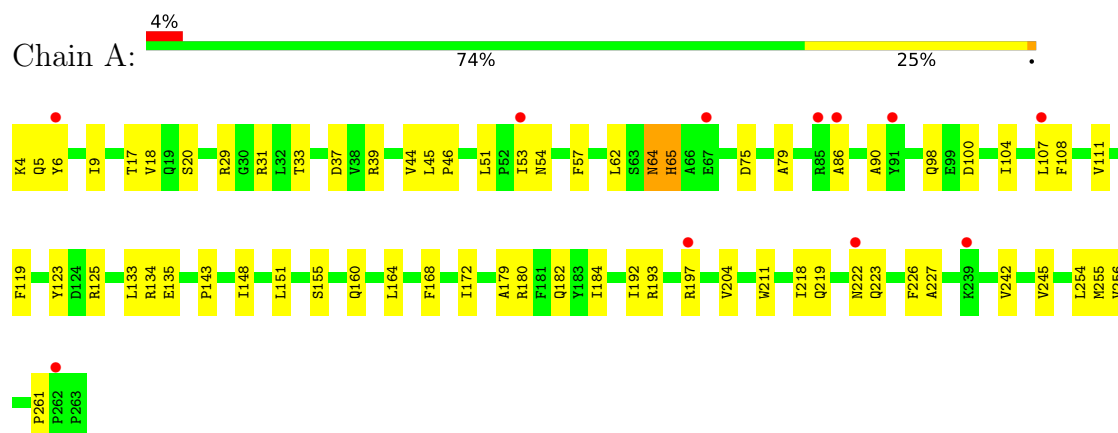
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	3	Total	O	0	0
			3	3		
10	B	6	Total	O	0	0
			6	6		
10	H	4	Total	O	0	0
			4	4		
10	L	5	Total	O	0	0
			5	5		

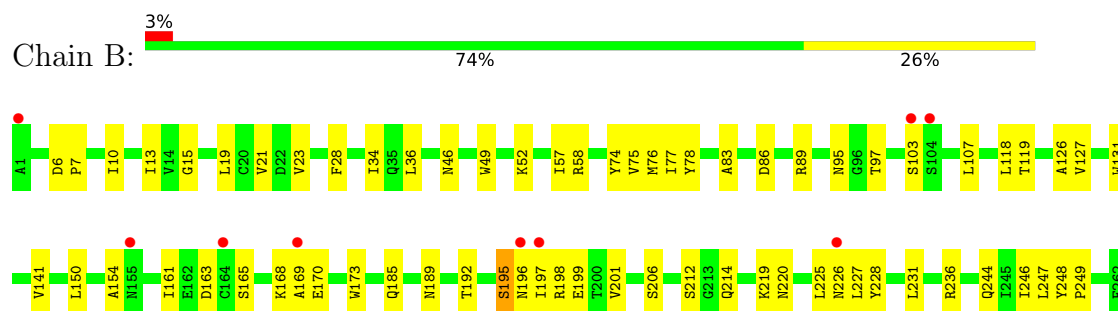
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

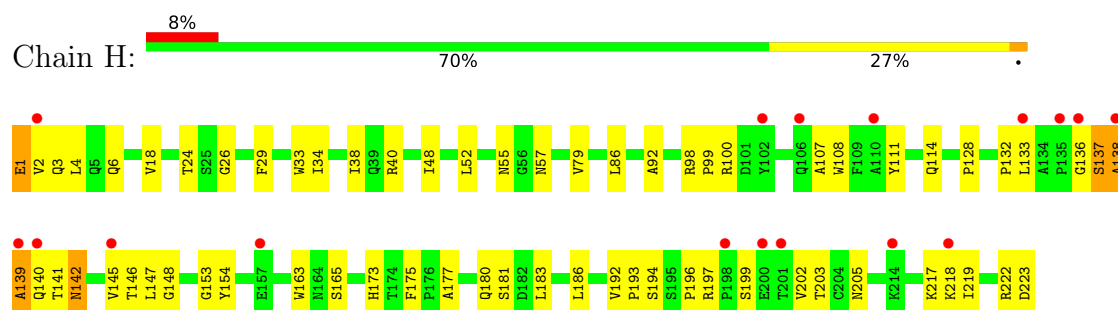
• Molecule 1: Ricin A chain



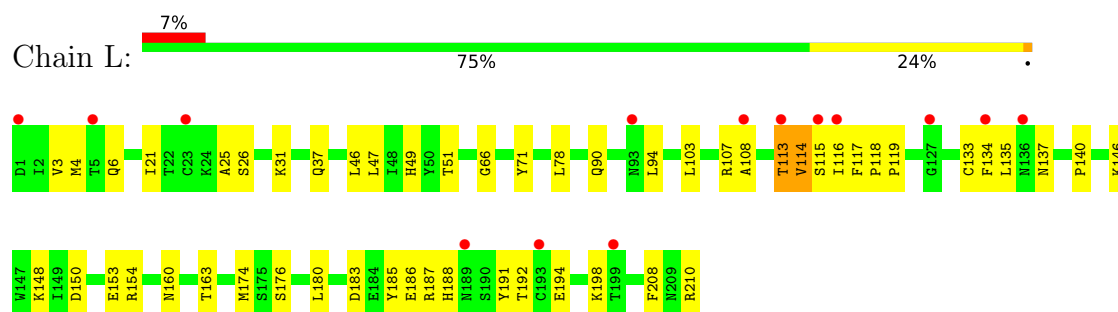
• Molecule 2: Ricin B chain



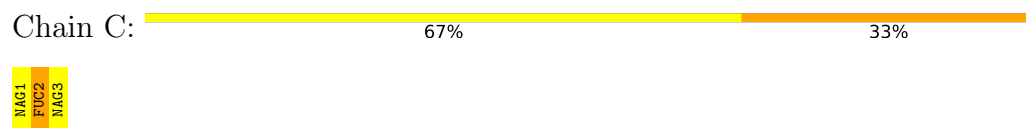
• Molecule 3: JB4 monoclonal antibody heavy chain



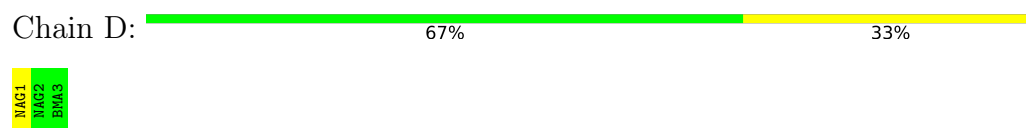
• Molecule 4: JB4 monoclonal antibody light chain



- Molecule 5: alpha-L-fucopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 6: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 6: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



4 Data and refinement statistics

Property	Value	Source
Space group	I 41 2 2	Depositor
Cell constants a, b, c, α , β , γ	139.36Å 139.36Å 444.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	33.84 – 3.29 33.84 – 3.29	Depositor EDS
% Data completeness (in resolution range)	96.5 (33.84-3.29) 96.5 (33.84-3.29)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.57 (at 3.32Å)	Xtriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.274 , 0.334 0.274 , 0.334	Depositor DCC
R_{free} test set	1614 reflections (4.76%)	wwPDB-VP
Wilson B-factor (Å ²)	64.1	Xtriage
Anisotropy	0.074	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 60.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.85	EDS
Total number of atoms	7598	wwPDB-VP
Average B, all atoms (Å ²)	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.32% 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: EDO, CL, SO4, FUC, NAG, BMA

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	0.11	0/2111	0.48	4/2872 (0.1%)
2	B	0.12	0/2080	0.45	2/2842 (0.1%)
3	H	0.18	0/1749	0.62	4/2393 (0.2%)
4	L	0.12	0/1676	0.43	2/2273 (0.1%)
All	All	0.13	0/7616	0.50	12/10380 (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
3	H	0	3
4	L	0	1
All	All	0	4

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	195	SER	CA-C-N	11.07	141.62	121.70
2	B	195	SER	C-N-CA	11.07	141.62	121.70
1	A	64	ASN	CA-C-N	10.84	141.21	121.70
1	A	64	ASN	C-N-CA	10.84	141.21	121.70
4	L	114	VAL	CA-C-N	8.45	136.92	121.70
4	L	114	VAL	C-N-CA	8.45	136.92	121.70
3	H	139	ALA	CA-C-N	8.44	136.89	121.70
3	H	139	ALA	C-N-CA	8.44	136.89	121.70
3	H	137	SER	CA-C-N	6.41	133.23	121.70
3	H	137	SER	C-N-CA	6.41	133.23	121.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	65	HIS	CA-C-N	6.05	132.59	121.70
1	A	65	HIS	C-N-CA	6.05	132.59	121.70

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	H	1	GLU	Peptide
3	H	138	ALA	Peptide
3	H	142	ASN	Peptide
4	L	113	THR	Peptide

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2066	0	2037	46	0
2	B	2035	0	1974	51	0
3	H	1701	0	1641	65	0
4	L	1637	0	1585	45	0
5	C	38	0	34	3	0
6	D	39	0	34	0	0
6	E	39	0	34	1	0
7	A	4	0	6	1	0
7	B	4	0	6	0	0
7	H	4	0	6	1	0
8	A	1	0	0	1	0
8	L	2	0	0	0	0
9	B	5	0	0	0	0
9	H	5	0	0	0	0
10	A	3	0	0	2	0
10	B	6	0	0	1	0
10	H	4	0	0	1	0
10	L	5	0	0	0	0
All	All	7598	0	7357	199	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 13.

All (199) 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)
3:H:147:LEU:HD13	3:H:219:ILE:HD12	1.36	1.04
3:H:99:PRO:HB3	3:H:107:ALA:HA	1.39	1.03
3:H:147:LEU:HD13	3:H:219:ILE:CD1	1.91	1.01
5:C:2:FUC:H5	5:C:3:NAG:H2	1.48	0.96
1:A:143:PRO:HD3	1:A:197[B]:ARG:HG2	1.52	0.90
1:A:193:ARG:NH2	8:A:302:CL:CL	2.44	0.88
3:H:147:LEU:CD1	3:H:219:ILE:HD12	2.06	0.85
4:L:114:VAL:HG21	4:L:133:CYS:HA	1.58	0.84
3:H:2:VAL:HG12	3:H:3:GLN:HB2	1.65	0.78
2:B:165:SER:HB3	2:B:168:LYS:HB2	1.64	0.78
2:B:231:LEU:HD23	2:B:247:LEU:HB3	1.67	0.74
2:B:236:ARG:NH1	2:B:244:GLN:OE1	2.19	0.74
1:A:222:ASN:HB2	2:B:6:ASP:HB2	1.71	0.72
3:H:4:LEU:HD22	3:H:24:THR:HG22	1.71	0.72
3:H:132:PRO:HD3	3:H:217:LYS:HD3	1.72	0.72
4:L:4:MET:HE3	4:L:25:ALA:HB2	1.72	0.72
4:L:160:ASN:HB3	4:L:176:SER:HA	1.72	0.71
1:A:64:ASN:HB2	1:A:65:HIS:C	2.15	0.71
1:A:6:TYR:OH	1:A:53:ILE:O	2.08	0.70
2:B:219:LYS:HD2	2:B:225:LEU:HD12	1.73	0.70
1:A:46:PRO:HB2	1:A:51:LEU:HD11	1.73	0.70
3:H:222:ARG:NH1	4:L:119:PRO:O	2.25	0.70
4:L:107:ARG:HG2	4:L:108:ALA:H	1.58	0.69
1:A:44:VAL:HG12	1:A:255:MET:HB2	1.75	0.69
2:B:225:LEU:HD22	2:B:227:LEU:H	1.57	0.68
4:L:90:GLN:NE2	4:L:94:LEU:O	2.28	0.67
3:H:1:GLU:HG2	3:H:111:TYR:HE1	1.60	0.67
1:A:4:LYS:NZ	10:A:402:HOH:O	2.28	0.66
3:H:147:LEU:HD12	3:H:148:GLY:N	2.12	0.65
1:A:104:ILE:HA	1:A:107:LEU:HD23	1.78	0.65
3:H:6:GLN:H	3:H:114:GLN:HE22	1.43	0.65
3:H:203:THR:HG22	3:H:218:LYS:HG3	1.79	0.65
5:C:2:FUC:H5	5:C:3:NAG:C2	2.24	0.65
3:H:147:LEU:HD13	3:H:219:ILE:HD13	1.77	0.64
3:H:26:GLY:H	7:H:302:EDO:H11	1.63	0.64
3:H:38:ILE:HB	3:H:48:ILE:HD11	1.78	0.64
4:L:3:VAL:HG22	4:L:26:SER:HB3	1.80	0.63
2:B:197:ILE:HG22	2:B:198:ARG:H	1.64	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:196:PRO:HA	3:H:199:SER:OG	2.00	0.62
3:H:137:SER:OG	3:H:223:ASP:O	2.18	0.61
4:L:186:GLU:O	4:L:210:ARG:NH2	2.33	0.61
3:H:197:ARG:HE	3:H:197:ARG:C	2.07	0.61
4:L:114:VAL:HB	4:L:115:SER:C	2.26	0.61
3:H:34:ILE:HG13	3:H:79:VAL:HG21	1.83	0.60
2:B:225:LEU:CD2	2:B:227:LEU:H	2.15	0.59
4:L:154:ARG:HH21	4:L:180:LEU:HD22	1.66	0.59
1:A:222:ASN:O	1:A:223:GLN:HG2	2.03	0.58
3:H:173:HIS:NE2	4:L:137:ASN:OD1	2.32	0.58
2:B:75:VAL:HG21	2:B:107:LEU:HD12	1.86	0.58
3:H:128:PRO:HB3	3:H:154:TYR:HB3	1.84	0.58
2:B:86:ASP:HA	2:B:89:ARG:HG2	1.85	0.57
3:H:193:PRO:O	3:H:196:PRO:HD2	2.05	0.57
1:A:227:ALA:HB2	2:B:7:PRO:HG3	1.87	0.57
4:L:114:VAL:HG22	4:L:134:PHE:N	2.20	0.56
4:L:37:GLN:HB2	4:L:47:LEU:HD11	1.86	0.56
1:A:133:LEU:HD13	7:A:301:EDO:H11	1.87	0.56
2:B:52:LYS:HG3	2:B:58:ARG:HD2	1.86	0.56
3:H:1:GLU:HG2	3:H:111:TYR:CE1	2.39	0.56
1:A:182:GLN:NE2	2:B:220:ASN:O	2.39	0.56
3:H:137:SER:HA	3:H:138:ALA:C	2.31	0.56
2:B:13:ILE:HB	2:B:21:VAL:HB	1.88	0.55
1:A:64:ASN:OD1	1:A:148:ILE:HB	2.06	0.55
3:H:146:THR:OG1	4:L:114:VAL:O	2.23	0.55
3:H:55:ASN:ND2	3:H:57:ASN:OD1	2.40	0.55
3:H:139:ALA:HB3	3:H:140:GLN:HA	1.89	0.55
1:A:90:ALA:HB2	1:A:111:VAL:HG11	1.89	0.55
4:L:183:ASP:O	4:L:187:ARG:HD3	2.07	0.55
2:B:97:THR:OG1	10:B:401:HOH:O	2.17	0.54
4:L:146:LYS:NZ	4:L:153:GLU:HB3	2.22	0.54
3:H:147:LEU:HD11	3:H:202:VAL:HG11	1.90	0.54
3:H:136:GLY:HA2	3:H:222:ARG:HB2	1.90	0.54
1:A:222:ASN:ND2	2:B:6:ASP:OD2	2.41	0.53
2:B:195:SER:HB2	2:B:197:ILE:N	2.23	0.53
2:B:201:VAL:HG13	2:B:236:ARG:HH12	1.73	0.53
3:H:2:VAL:HB	3:H:26:GLY:HA3	1.91	0.53
1:A:4:LYS:O	1:A:5:GLN:NE2	2.31	0.53
3:H:100:ARG:HD2	3:H:108:TRP:CH2	2.44	0.52
3:H:193:PRO:C	3:H:196:PRO:HD2	2.34	0.52
3:H:192:VAL:HG22	3:H:193:PRO:HD2	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:197:ARG:O	3:H:197:ARG:NE	2.32	0.52
1:A:45:LEU:HD21	1:A:254:LEU:HD13	1.92	0.52
4:L:114:VAL:HG22	4:L:134:PHE:O	2.10	0.52
2:B:126:ALA:HA	2:B:212:SER:HA	1.92	0.51
3:H:141:THR:HG23	3:H:142:ASN:HB2	1.93	0.51
2:B:192:THR:HG23	2:B:214:GLN:HG2	1.92	0.51
3:H:165:SER:N	3:H:205:ASN:OD1	2.27	0.51
4:L:114:VAL:HB	4:L:116:ILE:N	2.26	0.51
3:H:177:ALA:HB2	3:H:186:LEU:HD23	1.93	0.50
3:H:177:ALA:HA	3:H:186:LEU:HB3	1.92	0.50
4:L:114:VAL:CG1	4:L:117:PHE:CE2	2.95	0.50
4:L:146:LYS:HZ1	4:L:153:GLU:HB3	1.75	0.50
1:A:29:ARG:NH1	1:A:179:ALA:O	2.40	0.50
4:L:113:THR:HG22	4:L:114:VAL:H	1.76	0.50
3:H:140:GLN:HG2	3:H:141:THR:H	1.74	0.50
1:A:86:ALA:HB3	1:A:155:SER:HB3	1.94	0.49
2:B:74:TYR:CE2	2:B:76:MET:HB3	2.46	0.49
2:B:127:VAL:HG21	2:B:214:GLN:HB2	1.94	0.49
2:B:154:ALA:HB2	2:B:173:TRP:CH2	2.47	0.49
5:C:2:FUC:C5	5:C:3:NAG:H2	2.33	0.49
4:L:31:LYS:O	4:L:51:THR:OG1	2.31	0.49
1:A:218:ILE:HG12	1:A:245:VAL:HG12	1.93	0.49
2:B:34:ILE:HD11	2:B:77:ILE:HB	1.93	0.49
2:B:103:SER:HB2	3:H:33:TRP:HZ2	1.78	0.49
3:H:193:PRO:HB2	3:H:196:PRO:HD3	1.94	0.49
4:L:135:LEU:N	4:L:174:MET:O	2.31	0.49
1:A:119:PHE:HB2	1:A:125:ARG:HG2	1.95	0.49
2:B:74:TYR:HA	2:B:119:THR:HG22	1.94	0.48
3:H:18:VAL:HG12	3:H:86:LEU:HD11	1.93	0.48
1:A:123:TYR:CD1	1:A:134:ARG:HD3	2.48	0.48
1:A:261:PRO:O	10:A:401:HOH:O	2.20	0.48
2:B:195:SER:HB2	2:B:197:ILE:HG13	1.96	0.48
2:B:150:LEU:HB2	2:B:161:ILE:HG23	1.95	0.48
2:B:163:ASP:N	2:B:163:ASP:OD1	2.47	0.47
3:H:145:VAL:HG23	3:H:194:SER:HB3	1.97	0.47
3:H:147:LEU:HD12	3:H:147:LEU:C	2.39	0.47
1:A:108:PHE:HB3	1:A:111:VAL:HG13	1.97	0.47
2:B:23:VAL:HB	2:B:46:ASN:HB2	1.97	0.47
4:L:114:VAL:HG12	4:L:117:PHE:CE2	2.50	0.47
4:L:118:PRO:HB3	4:L:208:PHE:CE1	2.50	0.47
1:A:17:THR:HG23	1:A:20:SER:H	1.80	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:78:TYR:CD2	2:B:83:ALA:HB2	2.50	0.47
2:B:95:ASN:HB2	2:B:227:LEU:HD11	1.96	0.47
3:H:141:THR:HA	3:H:142:ASN:HA	1.54	0.47
3:H:98:ARG:NH2	3:H:100:ARG:O	2.47	0.46
4:L:148:LYS:HB2	4:L:192:THR:HG22	1.96	0.46
1:A:168:PHE:O	1:A:172:ILE:HG13	2.15	0.46
4:L:133:CYS:N	4:L:176:SER:O	2.41	0.46
3:H:180:GLN:N	3:H:183:LEU:O	2.48	0.46
1:A:33:THR:HG22	1:A:45:LEU:HA	1.98	0.46
1:A:135:GLU:H	1:A:135:GLU:CD	2.24	0.46
1:A:18:VAL:HG12	1:A:192:ILE:HG22	1.97	0.46
3:H:24:THR:OG1	3:H:29:PHE:CD1	2.69	0.46
2:B:197:ILE:HG22	2:B:198:ARG:N	2.30	0.46
3:H:133:LEU:HD13	4:L:117:PHE:CE2	2.50	0.46
4:L:150:ASP:HB2	4:L:188:HIS:HD2	1.80	0.46
2:B:195:SER:HB2	2:B:196:ASN:C	2.40	0.46
4:L:185:TYR:O	4:L:191:TYR:OH	2.31	0.45
4:L:66:GLY:HA3	4:L:71:TYR:CD1	2.51	0.45
1:A:75:ASP:O	1:A:79:ALA:N	2.42	0.45
2:B:199:GLU:O	2:B:246:ILE:HB	2.17	0.45
1:A:226:PHE:HE2	1:A:242:VAL:HG12	1.81	0.45
3:H:203:THR:CG2	3:H:218:LYS:HG3	2.46	0.45
1:A:184:ILE:HG12	1:A:204:VAL:HG13	1.99	0.45
4:L:113:THR:HG22	4:L:114:VAL:HG23	1.98	0.44
4:L:46:LEU:HD21	4:L:49:HIS:HB3	2.00	0.44
3:H:148:GLY:HA2	3:H:163:TRP:CZ2	2.52	0.44
3:H:163:TRP:CD1	3:H:202:VAL:HG12	2.52	0.44
3:H:33:TRP:CE2	3:H:52:LEU:HD22	2.53	0.44
1:A:53:ILE:HD12	1:A:54:ASN:N	2.33	0.43
1:A:9:ILE:HD11	1:A:31:ARG:HG3	2.00	0.43
2:B:168:LYS:HD3	2:B:169:ALA:H	1.83	0.43
3:H:40:ARG:HB3	3:H:92:ALA:HB2	2.00	0.43
3:H:141:THR:CG2	3:H:142:ASN:HB2	2.48	0.43
2:B:15:GLY:HA3	2:B:131:TRP:CE3	2.54	0.43
3:H:180:GLN:O	3:H:181:SER:C	2.61	0.43
4:L:146:LYS:HB3	4:L:194:GLU:HB3	2.00	0.43
3:H:141:THR:HG23	3:H:142:ASN:CB	2.48	0.43
3:H:24:THR:OG1	3:H:29:PHE:HD1	2.01	0.43
1:A:37:ASP:HB3	1:A:44:VAL:HG23	2.01	0.42
1:A:180:ARG:HA	1:A:254:LEU:HB2	2.01	0.42
2:B:169:ALA:HA	2:B:170:GLU:HA	1.76	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:L:6:GLN:HE21	4:L:21:ILE:HG21	1.84	0.42
2:B:23:VAL:HG21	2:B:28:PHE:HE1	1.83	0.42
2:B:189:ASN:HD22	2:B:206:SER:HA	1.83	0.42
2:B:225:LEU:HD22	2:B:227:LEU:N	2.31	0.42
4:L:187:ARG:O	4:L:188:HIS:CG	2.73	0.42
1:A:211:TRP:CH2	1:A:256:VAL:HB	2.54	0.42
2:B:36:LEU:HD13	2:B:118:LEU:HD11	2.00	0.42
4:L:78:LEU:HD11	4:L:103:LEU:HD21	2.00	0.42
1:A:39:ARG:NH1	1:A:219:GLN:OE1	2.53	0.42
1:A:143:PRO:HD3	1:A:197[A]:ARG:HG2	2.02	0.42
1:A:62:LEU:HD23	1:A:148:ILE:HD11	2.02	0.42
2:B:226:ASN:C	2:B:228:TYR:H	2.27	0.42
1:A:53:ILE:H	1:A:53:ILE:HG13	1.68	0.41
3:H:153:GLY:HA2	3:H:183:LEU:HD12	2.01	0.41
4:L:187:ARG:O	4:L:188:HIS:ND1	2.52	0.41
2:B:19:LEU:HB2	2:B:36:LEU:HG	2.01	0.41
2:B:195:SER:HA	2:B:196:ASN:HB2	2.02	0.41
3:H:33:TRP:CE3	3:H:52:LEU:HB2	2.55	0.41
3:H:147:LEU:CD1	3:H:219:ILE:CD1	2.76	0.41
4:L:94:LEU:HA	4:L:94:LEU:HD12	1.59	0.41
2:B:49:TRP:CE3	2:B:57:ILE:HG22	2.55	0.41
2:B:170:GLU:HG2	2:B:185:GLN:HG2	2.02	0.41
3:H:193:PRO:HB2	3:H:196:PRO:CD	2.50	0.41
3:H:133:LEU:HD12	3:H:133:LEU:O	2.20	0.41
2:B:10:ILE:HG21	6:E:2:NAG:H83	2.03	0.41
1:A:98:GLN:C	1:A:100:ASP:H	2.28	0.41
4:L:117:PHE:HE2	4:L:134:PHE:CE2	2.39	0.41
2:B:248:TYR:CG	2:B:249:PRO:HD2	2.56	0.41
1:A:151:LEU:HD12	1:A:164:LEU:HD22	2.03	0.41
3:H:175:PHE:CD1	4:L:163:THR:HG23	2.56	0.41
10:H:401:HOH:O	4:L:94:LEU:HD11	2.20	0.41
2:B:10:ILE:HD12	2:B:10:ILE:H	1.85	0.41
3:H:133:LEU:HD13	4:L:117:PHE:CD2	2.57	0.41
1:A:6:TYR:CE2	1:A:57:PHE:HB2	2.55	0.40
1:A:160:GLN:H	1:A:160:GLN:HG3	1.67	0.40
4:L:107:ARG:HG2	4:L:108:ALA:N	2.33	0.40
2:B:141:VAL:HA	2:B:173:TRP:O	2.21	0.40
4:L:140:PRO:HG2	4:L:198:LYS:HE2	2.04	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	259/260 (100%)	246 (95%)	13 (5%)	0	100	100
2	B	260/262 (99%)	242 (93%)	18 (7%)	0	100	100
3	H	221/223 (99%)	201 (91%)	20 (9%)	0	100	100
4	L	208/210 (99%)	198 (95%)	10 (5%)	0	100	100
All	All	948/955 (99%)	887 (94%)	61 (6%)	0	100	100

There are no Ramachandran outliers to report.

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	220/219 (100%)	220 (100%)	0	100	100
2	B	227/227 (100%)	227 (100%)	0	100	100
3	H	190/190 (100%)	190 (100%)	0	100	100
4	L	186/186 (100%)	186 (100%)	0	100	100
All	All	823/822 (100%)	823 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	128	GLN
2	B	186	ASN
2	B	189	ASN
3	H	142	ASN
4	L	123	GLN
4	L	160	ASN
4	L	188	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 ⓘ

9 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	$\# Z > 2$
5	NAG	C	1	1,5	14,14,15	0.70	0	17,19,21	1.37	3 (17%)
5	FUC	C	2	5	10,10,11	1.29	1 (10%)	14,14,16	1.62	2 (14%)
5	NAG	C	3	5	14,14,15	0.32	0	17,19,21	0.77	0
6	NAG	D	1	2,6	14,14,15	0.63	0	17,19,21	1.72	4 (23%)
6	NAG	D	2	6	14,14,15	0.25	0	17,19,21	0.70	0
6	BMA	D	3	6	11,11,12	0.65	0	15,15,17	0.71	0
6	NAG	E	1	2,6	14,14,15	0.70	1 (7%)	17,19,21	1.20	3 (17%)
6	NAG	E	2	6	14,14,15	0.25	0	17,19,21	0.48	0
6	BMA	E	3	6	11,11,12	0.58	0	15,15,17	0.74	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	C	1	1,5	-	1/6/23/26	0/1/1/1
5	FUC	C	2	5	-	-	0/1/1/1
5	NAG	C	3	5	-	2/6/23/26	0/1/1/1
6	NAG	D	1	2,6	-	1/6/23/26	0/1/1/1
6	NAG	D	2	6	-	2/6/23/26	0/1/1/1
6	BMA	D	3	6	-	2/2/19/22	0/1/1/1
6	NAG	E	1	2,6	-	2/6/23/26	0/1/1/1
6	NAG	E	2	6	-	4/6/23/26	0/1/1/1
6	BMA	E	3	6	-	2/2/19/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	2	FUC	C4-C5	3.26	1.60	1.52
6	E	1	NAG	C1-C2	2.04	1.55	1.52

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	2	FUC	O5-C5-C4	4.35	117.38	109.55
6	D	1	NAG	C1-O5-C5	3.90	117.42	112.19
6	D	1	NAG	O4-C4-C3	-3.35	102.49	110.38
5	C	1	NAG	C1-O5-C5	3.23	116.51	112.19
6	E	1	NAG	C1-C2-N2	3.00	115.16	110.43
5	C	2	FUC	C1-O5-C5	3.00	120.03	112.97
6	D	1	NAG	C1-C2-N2	2.87	114.95	110.43
6	D	1	NAG	O5-C5-C6	-2.73	102.36	107.66
5	C	1	NAG	O5-C5-C6	-2.27	103.25	107.66
6	E	1	NAG	C1-O5-C5	2.26	115.21	112.19
6	E	1	NAG	O4-C4-C3	-2.17	105.25	110.38
5	C	1	NAG	O4-C4-C3	-2.10	105.43	110.38

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	E	1	NAG	O5-C5-C6-O6

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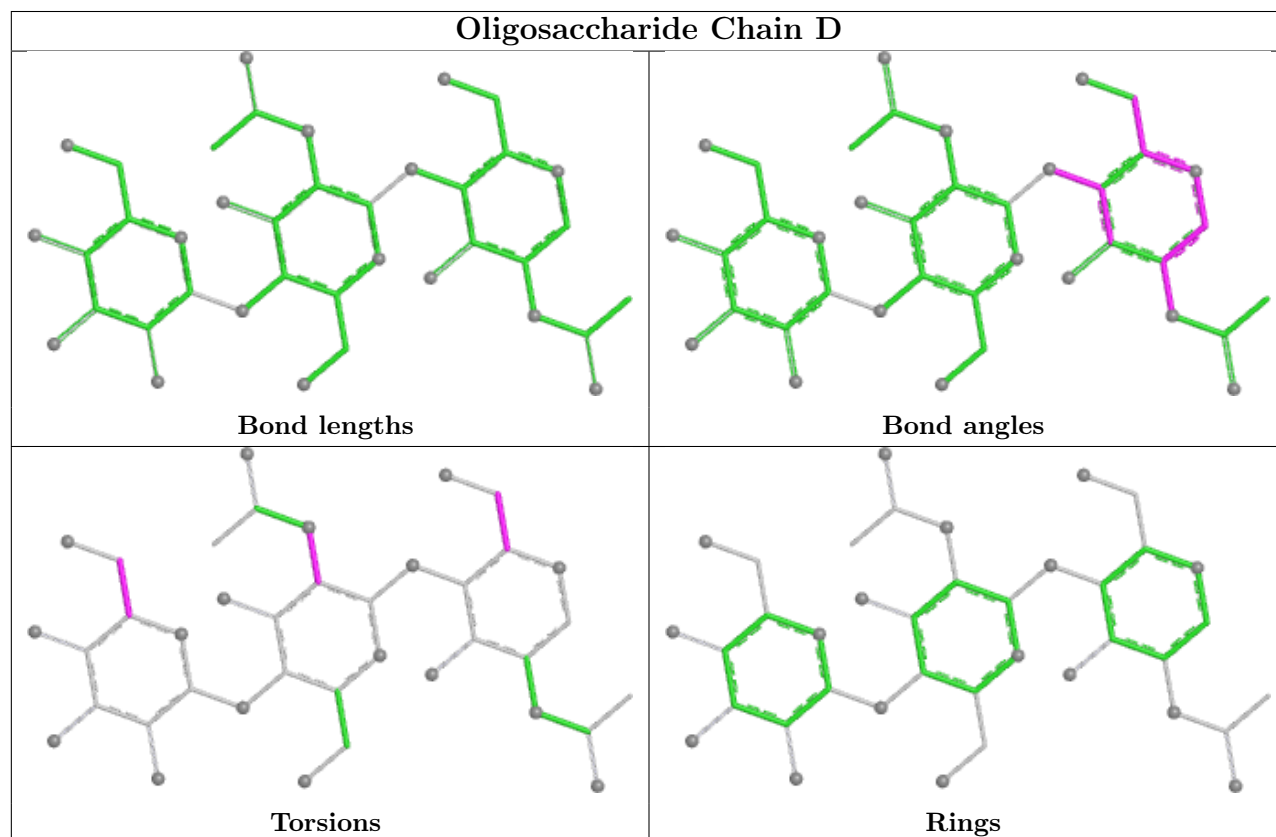
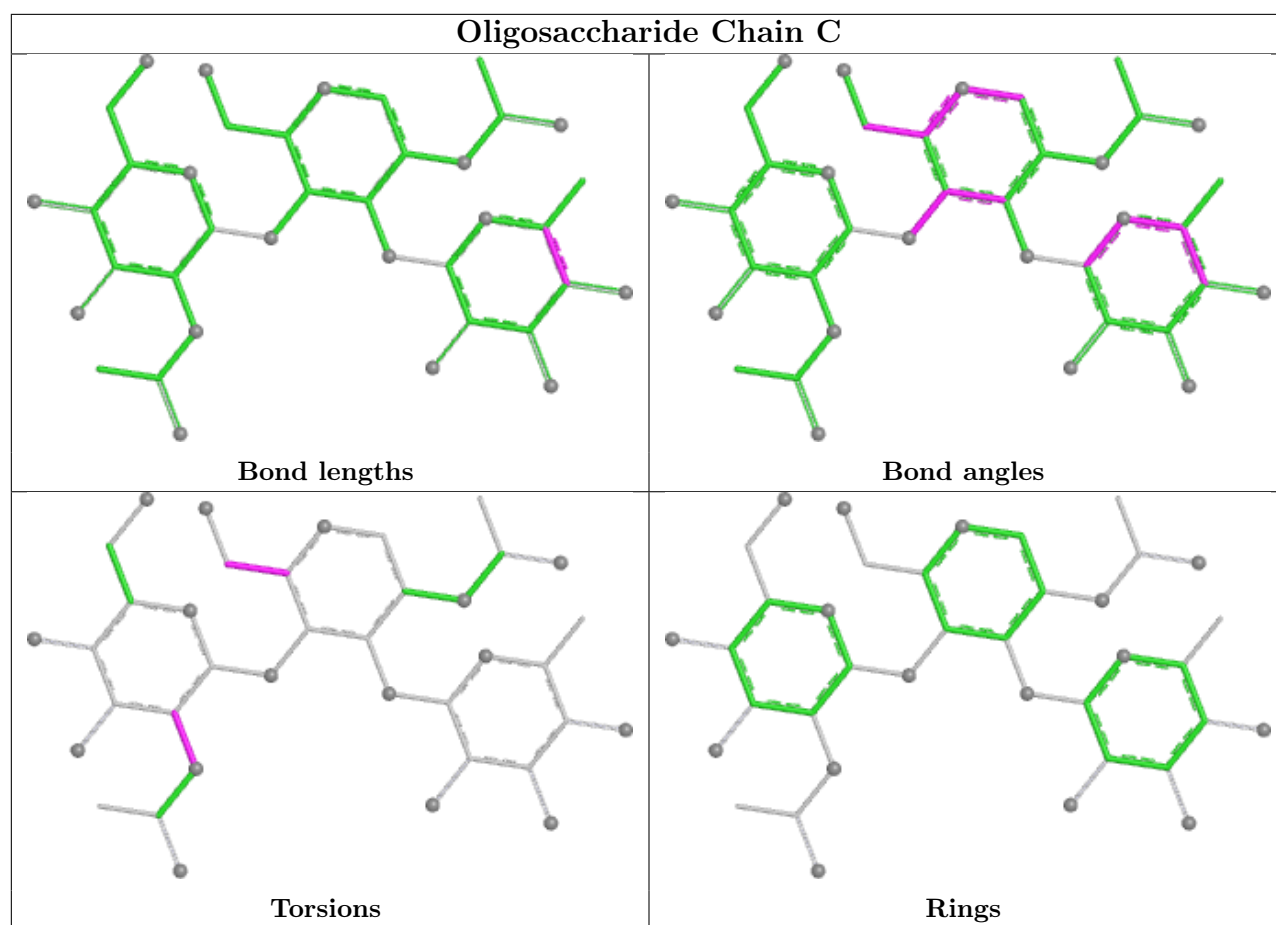
Mol	Chain	Res	Type	Atoms
6	E	3	BMA	O5-C5-C6-O6
6	E	1	NAG	C4-C5-C6-O6
6	E	2	NAG	O5-C5-C6-O6
6	E	2	NAG	C8-C7-N2-C2
6	E	2	NAG	O7-C7-N2-C2
6	E	2	NAG	C4-C5-C6-O6
5	C	1	NAG	O5-C5-C6-O6
6	D	1	NAG	O5-C5-C6-O6
6	E	3	BMA	C4-C5-C6-O6
5	C	3	NAG	C1-C2-N2-C7
6	D	2	NAG	C1-C2-N2-C7
6	D	3	BMA	C4-C5-C6-O6
6	D	3	BMA	O5-C5-C6-O6
5	C	3	NAG	C3-C2-N2-C7
6	D	2	NAG	C3-C2-N2-C7

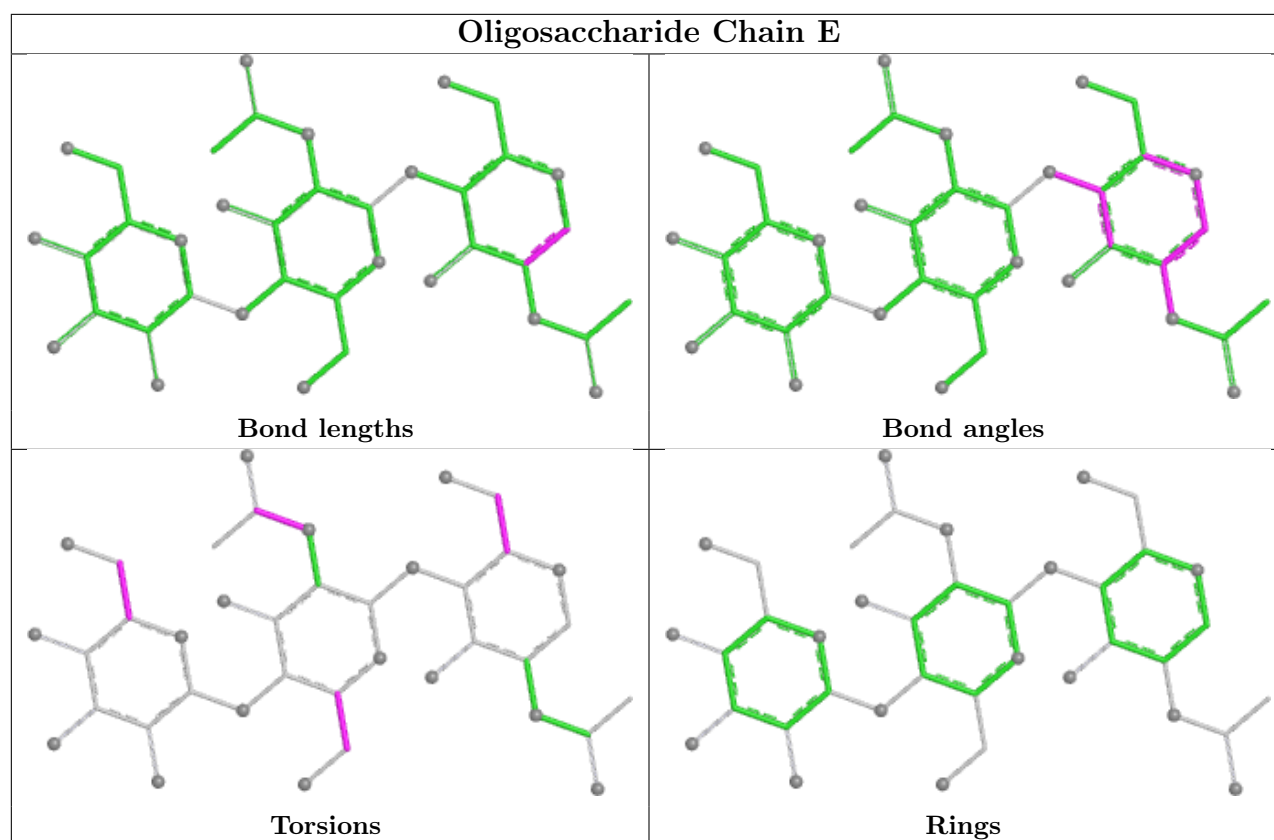
There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	E	2	NAG	1	0
5	C	3	NAG	3	0
5	C	2	FUC	3	0

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 8 ligands modelled in this entry, 3 are monoatomic - leaving 5 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	$\# Z > 2$
7	EDO	A	301	-	3,3,3	0.40	0	2,2,2	0.40	0
7	EDO	H	302	-	3,3,3	0.40	0	2,2,2	0.45	0
7	EDO	B	302	-	3,3,3	0.43	0	2,2,2	0.39	0
9	SO4	B	301	-	4,4,4	0.24	0	6,6,6	0.10	0
9	SO4	H	301	-	4,4,4	0.23	0	6,6,6	0.13	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	EDO	H	302	-	-	0/1/1/1	-
7	EDO	A	301	-	-	1/1/1/1	-
7	EDO	B	302	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	301	EDO	O1-C1-C2-O2

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	301	EDO	1	0
7	H	302	EDO	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	260/260 (100%)	0.55	11 (4%) 40 26	40, 82, 122, 170	1 (0%)
2	B	262/262 (100%)	0.35	9 (3%) 48 32	38, 57, 86, 146	0
3	H	223/223 (100%)	0.58	17 (7%) 20 14	36, 75, 122, 160	0
4	L	210/210 (100%)	0.71	14 (6%) 24 16	44, 81, 114, 159	0
All	All	955/955 (100%)	0.54	51 (5%) 32 22	36, 73, 117, 170	1 (0%)

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	1	ALA	4.4
1	A	239	LYS	3.7
4	L	199	THR	3.6
3	H	214	LYS	3.5
3	H	2	VAL	3.4
3	H	138	ALA	3.4
3	H	106	GLN	3.3
1	A	262	PRO	3.3
4	L	113	THR	3.1
4	L	116	ILE	3.1
3	H	136	GLY	3.1
1	A	91	TYR	3.0
1	A	222	ASN	3.0
2	B	104	SER	2.9
3	H	198	PRO	2.9
1	A	107	LEU	2.8
3	H	201	THR	2.7
1	A	86	ALA	2.6
2	B	155	ASN	2.6
2	B	226	ASN	2.6
3	H	110	ALA	2.6

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Mol	Chain	Res	Type	RSRZ
4	L	108	ALA	2.6
3	H	135	PRO	2.6
2	B	169	ALA	2.6
3	H	157	GLU	2.6
3	H	218	LYS	2.5
4	L	115	SER	2.5
1	A	53	ILE	2.4
4	L	1	ASP	2.4
4	L	127	GLY	2.4
2	B	197	ILE	2.4
2	B	196	ASN	2.3
4	L	136	ASN	2.3
1	A	197[A]	ARG	2.3
1	A	6	TYR	2.2
3	H	102	TYR	2.2
4	L	93	ASN	2.2
3	H	139	ALA	2.2
4	L	5	THR	2.1
2	B	103	SER	2.1
4	L	134	PHE	2.1
4	L	189	ASN	2.1
4	L	193	CYS	2.1
2	B	164	CYS	2.1
3	H	140	GLN	2.1
1	A	85	ARG	2.0
4	L	23	CYS	2.0
3	H	200	GLU	2.0
3	H	133	LEU	2.0
1	A	67	GLU	2.0
3	H	145	VAL	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 ⓘ

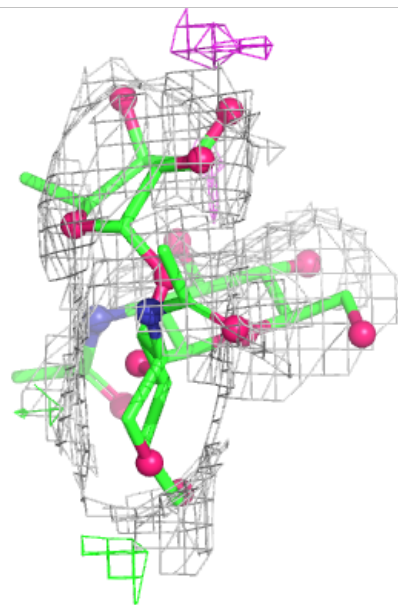
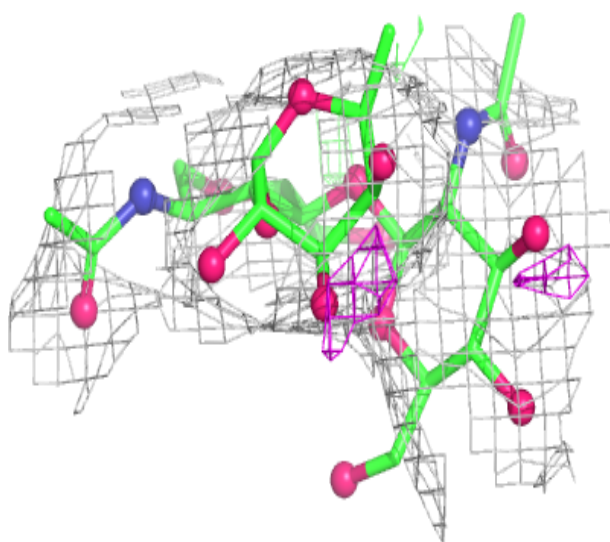
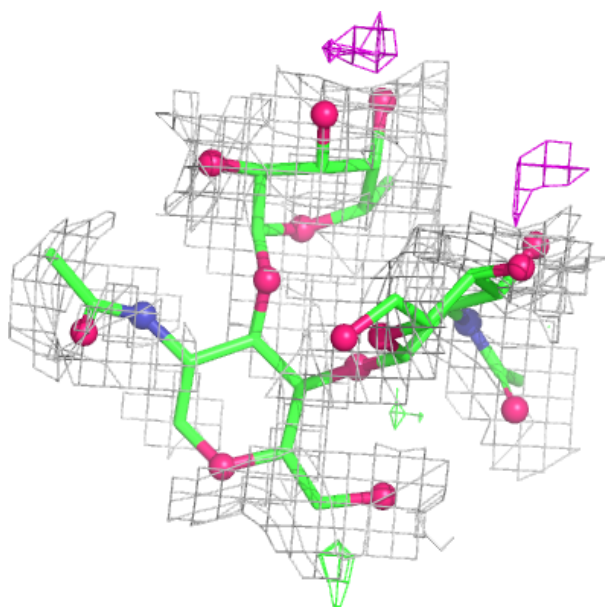
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	C	1	14/15	-	-	85,108,125,127	0
5	FUC	C	2	10/11	-	-	104,112,123,124	0
5	NAG	C	3	14/15	-	-	100,127,153,161	0
6	NAG	D	1	14/15	-	-	42,55,74,83	0
6	NAG	D	2	14/15	-	-	59,84,112,114	0
6	BMA	D	3	11/12	-	-	112,136,163,164	0
6	NAG	E	1	14/15	0.80	0.12	47,60,64,80	0
6	NAG	E	2	14/15	-	-	50,66,98,99	0
6	BMA	E	3	11/12	-	-	89,106,120,125	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.

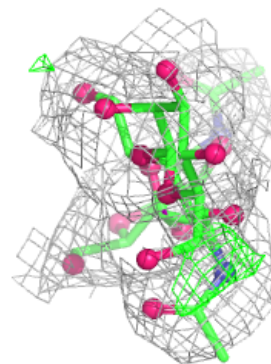
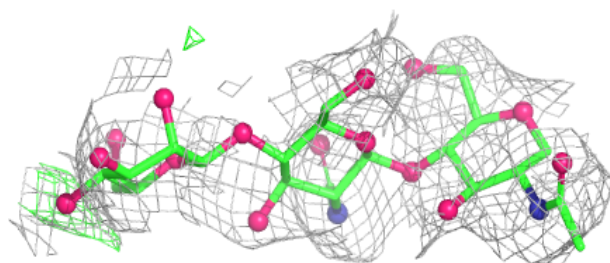
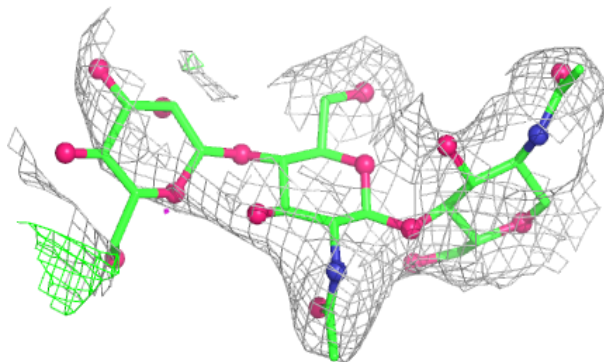
Electron density around Chain C:

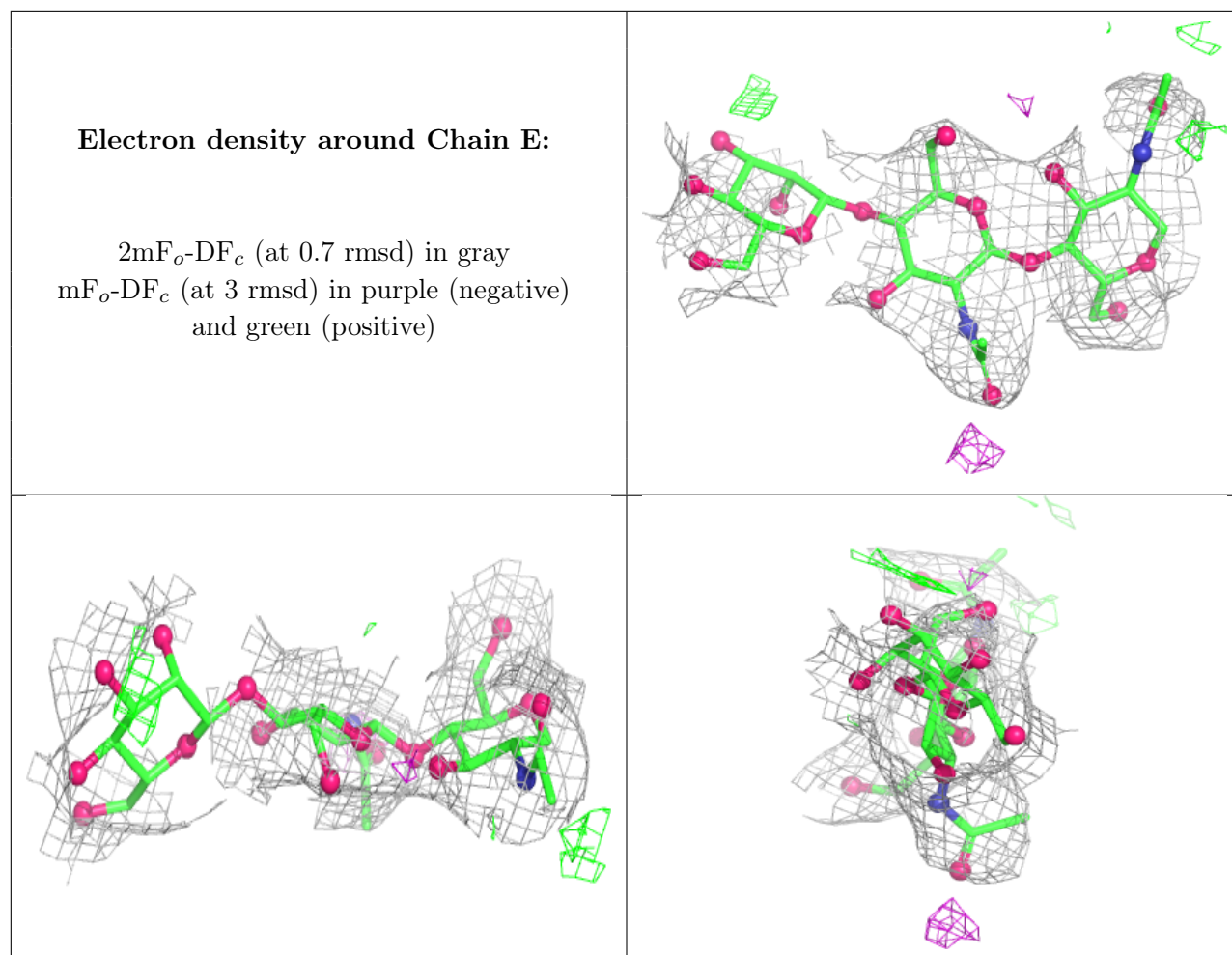
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain D:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





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(Å ²)	Q<0.9
7	EDO	A	301	4/4	0.66	0.16	89,93,101,103	0
7	EDO	B	302	4/4	0.86	0.13	28,35,38,43	0
9	SO4	B	301	5/5	0.86	0.21	80,87,89,107	0
9	SO4	H	301	5/5	0.87	0.12	84,93,98,108	0
8	CL	A	302	1/1	0.88	0.08	61,61,61,61	0
7	EDO	H	302	4/4	0.92	0.13	24,46,53,57	0
8	CL	L	301	1/1	0.93	0.10	62,62,62,62	0
8	CL	L	302	1/1	0.97	0.07	55,55,55,55	0

6.5 Other polymers [i](#)

There are no such residues in this entry.