



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 02:09 PM UTC

PDB ID : 7F5R / pdb_00007f5r
Title : Crystal structure of SARS-CoV-2 Y453F-RBD bound to mink ACE2
Authors : Wang, X.Q.; Ding, Q.; Lan, J.; Ren, W.L.
Deposited on : 2021-06-22
Resolution : 3.01 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

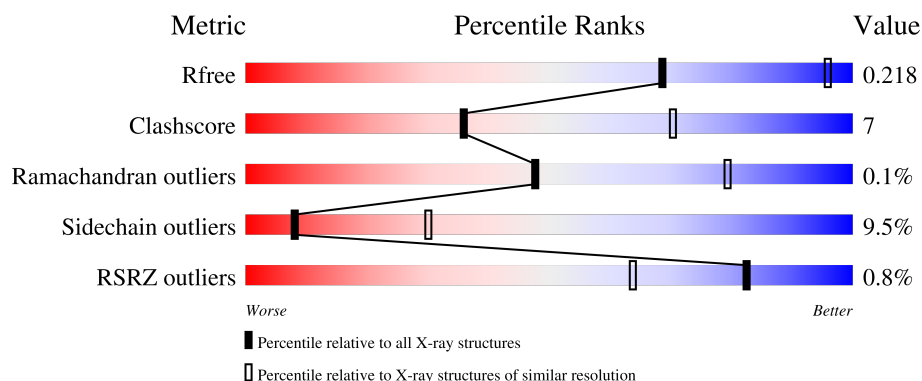
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.01 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	3131 (3.04-3.00)
Clashscore	190562	3444 (3.04-3.00)
Ramachandran outliers	187476	3319 (3.04-3.00)
Sidechain outliers	187428	3322 (3.04-3.00)
RSRZ outliers	180081	3130 (3.04-3.00)

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	597	77% 20% .
1	B	597	74% 23% .
1	D	597	76% 20% .
2	C	197	78% 16% 5%
2	E	197	71% 21% 6%

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Mol	Chain	Length	Quality of chain
2	F	197	% 81% 18%
3	G	2	100%
3	I	2	50% 50%
4	H	2	100%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 19386 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 mink ACE2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	596	Total	C	N	O	S	0	0	0
			4904	3132	823	920	29			
1	B	596	Total	C	N	O	S	0	0	0
			4904	3132	823	920	29			
1	D	596	Total	C	N	O	S	0	0	0
			4904	3132	823	920	29			

- Molecule 2 is a protein called Spike protein S1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	185	Total	C	N	O	S	0	0	0
			1468	942	247	271	8			
2	C	187	Total	C	N	O	S	0	0	0
			1483	950	250	275	8			
2	F	197	Total	C	N	O	S	0	0	0
			1559	1000	261	290	8			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	332	PRO	-	expression tag	UNP P0DTC2
E	453	PHE	TYR	variant	UNP P0DTC2
E	528	HIS	-	expression tag	UNP P0DTC2
C	332	PRO	-	expression tag	UNP P0DTC2
C	453	PHE	TYR	variant	UNP P0DTC2
C	528	HIS	-	expression tag	UNP P0DTC2
F	332	PRO	-	expression tag	UNP P0DTC2
F	453	PHE	TYR	variant	UNP P0DTC2
F	528	HIS	-	expression tag	UNP P0DTC2

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



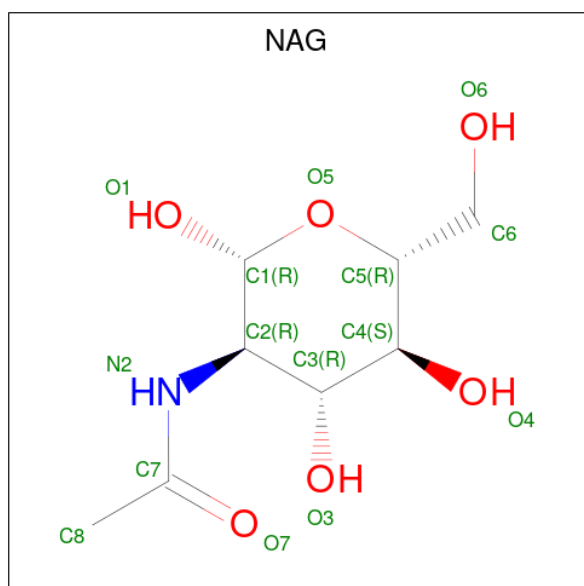
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	G	2	Total	C	N	O	0	0	0
			28	16	2	10			
3	I	2	Total	C	N	O	0	0	0
			28	16	2	10			

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	H	2	Total	C	N	O	0	0	0
			24	14	1	9			

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



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

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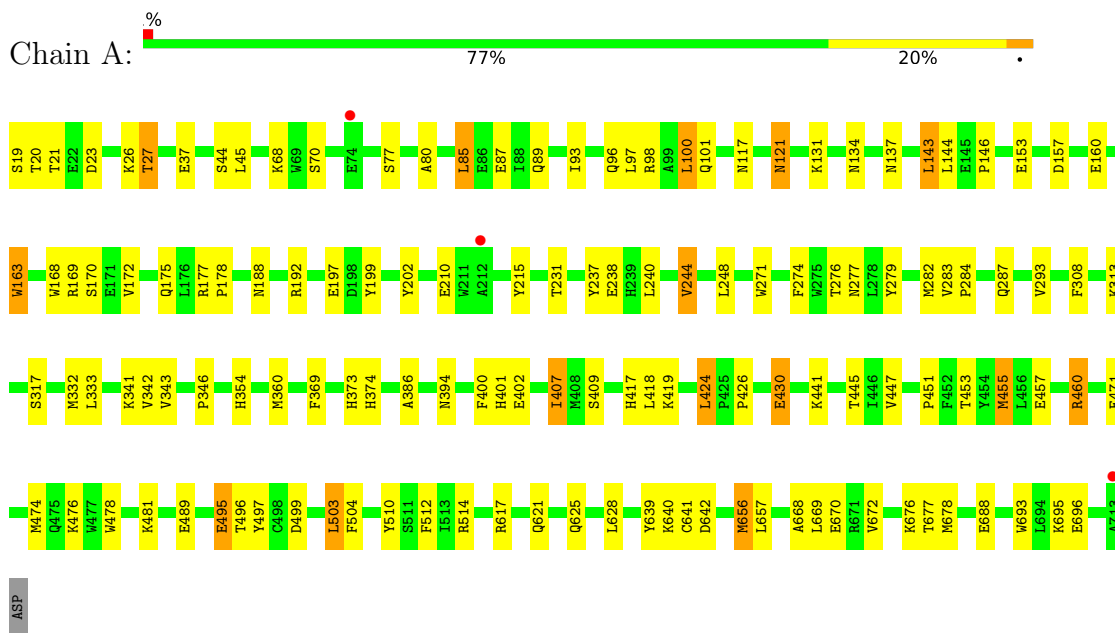
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	E	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	D	1	Total	C	N	O	0	0
			14	8	1	5		

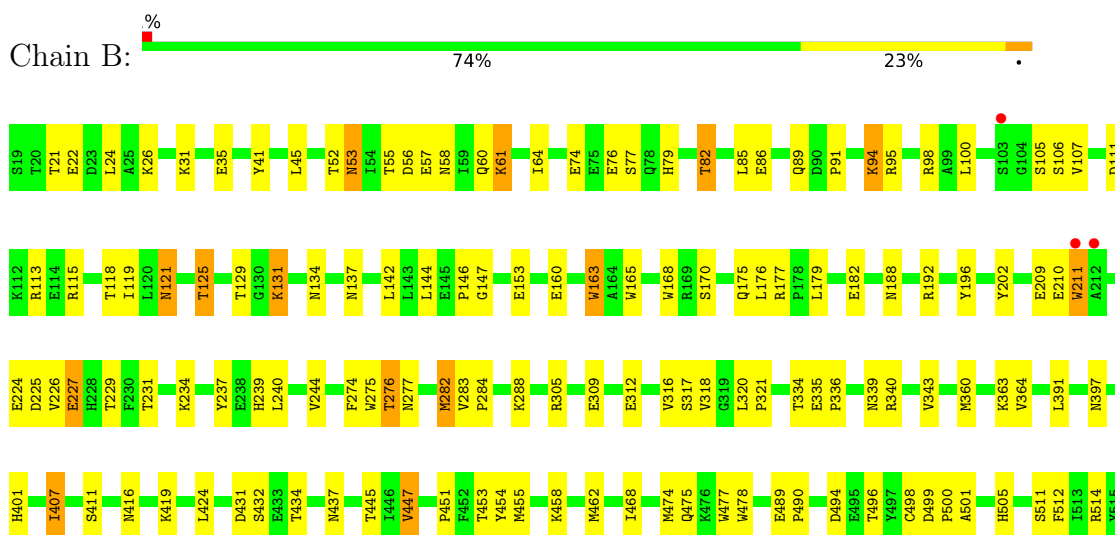
3 Residue-property plots

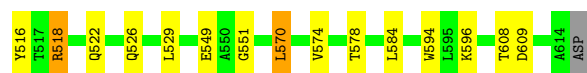
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

- Molecule 1: mink ACE2

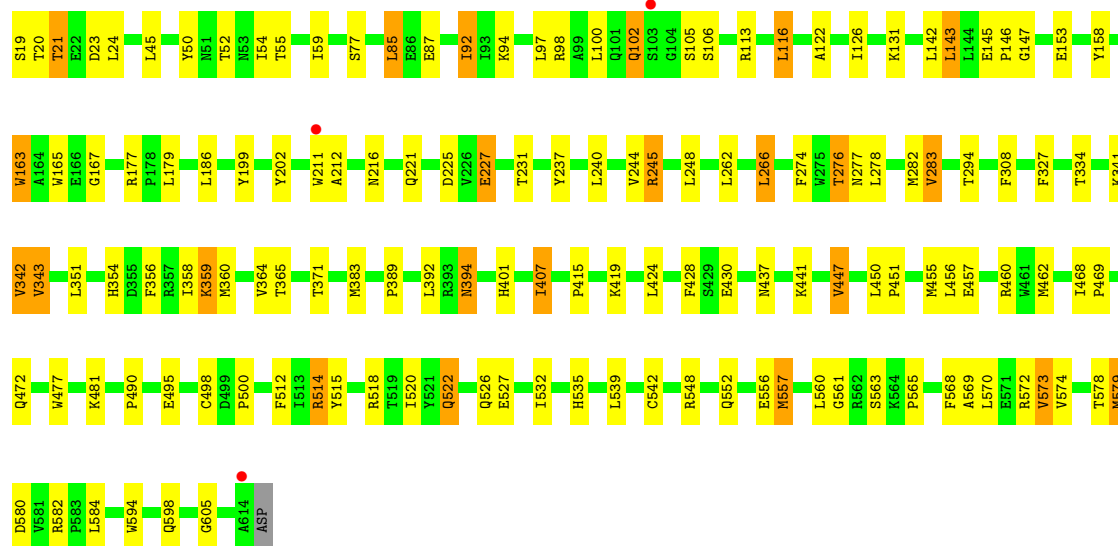
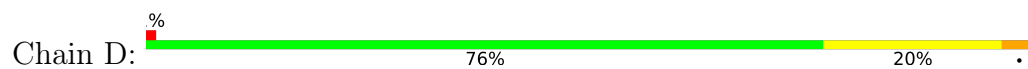


- Molecule 1: mink ACE2

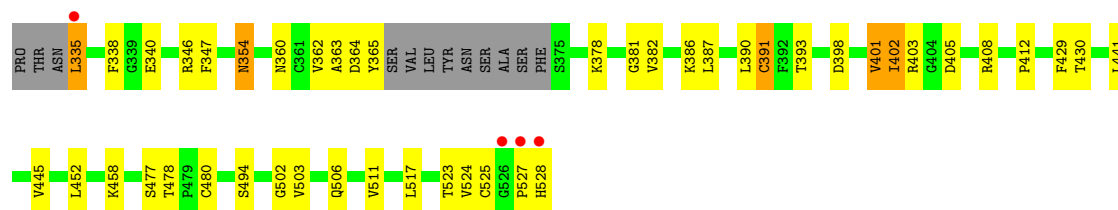




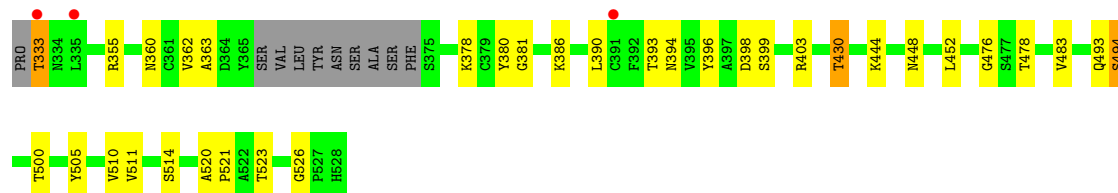
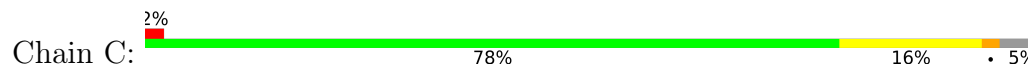
- Molecule 1: mink ACE2



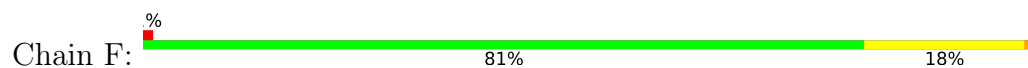
- Molecule 2: Spike protein S1

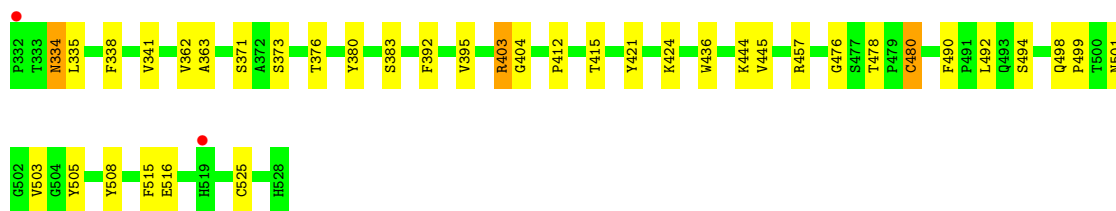


- Molecule 2: Spike protein S1



- Molecule 2: Spike protein S1





- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:  100%

MAG1
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I:  50%

MAG1
MAG2

- Molecule 4: alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H:  100%

MAG1
FUC2

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	290.19Å 130.19Å 136.89Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.53 – 3.01 43.53 – 3.01	Depositor EDS
% Data completeness (in resolution range)	98.1 (43.53-3.01) 98.1 (43.53-3.01)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.33 (at 3.01Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.181 , 0.218 0.183 , 0.218	Depositor DCC
R_{free} test set	5072 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	68.6	Xtriage
Anisotropy	0.285	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 41.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.015 for -h,l,k	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	19386	wwPDB-VP
Average B, all atoms (Å ²)	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.33% 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: FUC, NAG

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	0.44	0/5047	0.61	0/6855
1	B	0.42	0/5047	0.61	0/6855
1	D	0.40	0/5047	0.58	0/6855
2	C	0.43	0/1525	0.65	0/2074
2	E	0.48	0/1510	0.71	1/2053 (0.0%)
2	F	0.47	0/1605	0.68	2/2185 (0.1%)
All	All	0.43	0/19781	0.62	3/26877 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1
1	D	0	1
All	All	0	2

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	480	CYS	CA-C-N	-5.96	112.61	123.34
2	F	480	CYS	C-N-CA	-5.96	112.61	123.34
2	E	364	ASP	N-CA-C	5.28	116.60	109.11

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	52	THR	Peptide
1	D	102	GLN	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	4904	0	4657	67	0
1	B	4904	0	4656	78	0
1	D	4904	0	4658	82	0
2	C	1483	0	1402	18	0
2	E	1468	0	1390	18	0
2	F	1559	0	1475	16	0
3	G	28	0	25	0	0
3	I	28	0	25	0	0
4	H	24	0	22	0	0
5	A	14	0	13	0	0
5	B	42	0	39	1	0
5	D	14	0	13	0	0
5	E	14	0	13	0	0
All	All	19386	0	18388	275	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 7.

All (275) 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:A:457:GLU:OE1	1:A:460:ARG:NH1	1.95	0.98
1:B:288:LYS:HB3	1:B:434:THR:HG22	1.50	0.93
2:E:346:ARG:NH1	2:E:347:PHE:O	2.13	0.81
1:A:192:ARG:NH1	1:A:197:GLU:O	2.18	0.77
1:A:23:ASP:O	1:A:27:THR:HG22	1.85	0.76
1:B:53:ASN:HB3	1:B:340:ARG:HG2	1.68	0.76
2:E:381:GLY:HA3	2:E:430:THR:HG23	1.69	0.74
1:B:55:THR:HG22	1:B:58:ASN:H	1.54	0.73
1:A:271:TRP:CE2	1:A:503:LEU:HD23	2.24	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:229:THR:HG23	1:B:516:TYR:OH	1.90	0.72
1:B:340:ARG:HD2	5:B:904:NAG:H82	1.74	0.70
1:D:573:VAL:HG23	1:D:574:VAL:HG13	1.73	0.70
1:A:474:MET:N	1:A:495:GLU:OE1	2.25	0.69
1:D:177:ARG:NH1	1:D:495:GLU:O	2.26	0.69
1:B:98:ARG:HH22	1:B:211:TRP:NE1	1.91	0.68
1:A:419:LYS:NZ	1:A:426:PRO:O	2.28	0.67
1:A:474:MET:HE1	1:A:499:ASP:HB2	1.77	0.66
1:D:245:ARG:HH11	1:D:245:ARG:HG2	1.60	0.66
1:D:294:THR:HG23	1:D:365:THR:HA	1.78	0.65
1:A:460:ARG:NH2	1:A:510:TYR:O	2.29	0.65
2:E:335:LEU:HB2	2:E:362:VAL:HG12	1.79	0.65
1:B:94:LYS:HE3	1:B:211:TRP:CD1	2.32	0.64
1:B:98:ARG:HH12	1:B:211:TRP:CD1	2.15	0.64
2:E:360:ASN:HA	2:E:523:THR:HB	1.81	0.63
1:D:455:MET:HE1	1:D:481:LYS:HE2	1.81	0.62
1:A:77:SER:OG	1:A:100:LEU:O	2.16	0.62
2:F:334:ASN:OD1	2:F:334:ASN:N	2.33	0.62
2:E:403:ARG:NH1	2:E:405:ASP:OD2	2.32	0.62
1:D:557:MET:HE3	1:D:569:ALA:HB1	1.81	0.61
2:F:490:PHE:HE1	2:F:492:LEU:HB2	1.66	0.60
1:B:477:TRP:CE3	1:B:500:PRO:HG3	2.36	0.60
1:B:407:ILE:HD11	1:B:526:GLN:HB2	1.85	0.59
1:D:142:LEU:HD22	1:D:147:GLY:HA3	1.85	0.59
1:A:131:LYS:HB3	1:A:143:LEU:HD23	1.86	0.58
1:A:274:PHE:HB3	1:A:276:THR:HG22	1.85	0.58
1:D:274:PHE:HB3	1:D:276:THR:HG23	1.86	0.58
1:B:458:LYS:HE2	1:B:462:MET:HE2	1.86	0.58
1:D:343:VAL:O	1:D:359:LYS:HE2	2.04	0.58
1:B:274:PHE:HB3	1:B:276:THR:HG22	1.85	0.58
1:A:157:ASP:HB3	1:A:160:GLU:HB3	1.86	0.57
1:A:97:LEU:O	1:A:101:GLN:HG2	2.04	0.57
1:B:77:SER:HB2	1:B:100:LEU:O	2.04	0.57
1:A:80:ALA:HB2	1:A:100:LEU:HD13	1.87	0.57
1:D:212:ALA:O	1:D:216:ASN:ND2	2.37	0.57
1:D:389:PRO:HG2	1:D:392:LEU:HD12	1.86	0.57
1:D:457:GLU:OE1	1:D:460:ARG:NH1	2.33	0.57
2:C:363:ALA:O	2:C:526:GLY:HA2	2.05	0.57
1:D:163:TRP:CD1	1:D:163:TRP:C	2.83	0.57
1:D:77:SER:OG	1:D:100:LEU:O	2.23	0.56
1:A:346:PRO:HB3	1:A:360:MET:HG3	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:225:ASP:O	1:B:229:THR:HG22	2.06	0.55
2:C:355:ARG:HD3	2:C:396:TYR:HD2	1.72	0.55
1:D:308:PHE:HZ	1:D:360:MET:HE3	1.72	0.55
1:A:276:THR:HB	1:A:445:THR:OG1	2.06	0.55
1:B:318:VAL:O	1:B:551:GLY:HA3	2.06	0.55
1:A:240:LEU:O	1:A:244:VAL:HG13	2.07	0.55
1:A:168:TRP:CZ3	1:A:172:VAL:HG21	2.41	0.55
1:A:163:TRP:CD1	1:A:163:TRP:C	2.85	0.55
1:D:245:ARG:HB2	1:D:262:LEU:HD21	1.88	0.55
1:D:145:GLU:HB3	1:D:146:PRO:HD3	1.88	0.55
1:B:129:THR:O	1:B:131:LYS:NZ	2.40	0.54
1:D:244:VAL:HB	1:D:282:MET:HE1	1.89	0.54
2:C:333:THR:HG22	2:C:362:VAL:HG21	1.88	0.54
2:F:362:VAL:HA	2:F:525:CYS:O	2.08	0.54
1:D:514:ARG:HG2	1:D:515:TYR:N	2.21	0.54
1:B:55:THR:HB	1:B:58:ASN:HB2	1.90	0.54
1:B:153:GLU:HG2	1:B:277:ASN:ND2	2.23	0.54
1:D:520:ILE:HG21	1:D:579:MET:HE3	1.89	0.54
1:A:455:MET:HE1	1:A:481:LYS:HE2	1.90	0.53
1:B:79:HIS:O	1:B:82:THR:HG23	2.09	0.53
1:D:407:ILE:HD11	1:D:522:GLN:O	2.07	0.53
2:E:452:LEU:HD23	2:E:494:SER:HA	1.91	0.53
1:D:535:HIS:CE1	1:D:542:CYS:HA	2.44	0.53
1:B:121:ASN:O	1:B:125:THR:HG23	2.08	0.53
1:B:210:GLU:HB3	1:B:211:TRP:CE3	2.43	0.53
1:D:21:THR:HG21	1:D:87:GLU:OE2	2.09	0.53
1:A:144:LEU:HB2	1:A:168:TRP:CZ3	2.45	0.52
1:A:407:ILE:HD11	1:A:621:GLN:O	2.09	0.52
2:C:444:LYS:HG3	2:C:448:ASN:HB2	1.90	0.52
1:B:474:MET:HE1	1:B:499:ASP:HB2	1.92	0.52
1:A:354:HIS:HB2	2:E:502:GLY:HA3	1.92	0.52
1:B:284:PRO:HB3	1:B:594:TRP:CZ2	2.45	0.52
1:D:50:TYR:CE1	1:D:54:ILE:HG23	2.45	0.51
1:D:227:GLU:O	1:D:231:THR:HG23	2.10	0.51
1:D:240:LEU:HD22	1:D:447:VAL:HG22	1.90	0.51
1:A:284:PRO:HB3	1:A:693:TRP:CH2	2.46	0.51
2:C:380:TYR:O	2:C:430:THR:HA	2.11	0.51
2:C:381:GLY:HA3	2:C:430:THR:HG22	1.93	0.51
1:D:548:ARG:O	1:D:552:GLN:HG2	2.11	0.51
1:A:215:TYR:OH	1:A:670:GLU:OE1	2.17	0.51
1:B:237:TYR:CD1	1:B:451:PRO:HG2	2.46	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:52:THR:HA	1:D:342:VAL:HG22	1.93	0.51
1:D:477:TRP:CZ3	1:D:500:PRO:HB3	2.46	0.51
2:C:360:ASN:HA	2:C:523:THR:HB	1.92	0.50
2:E:338:PHE:HE2	2:E:363:ALA:HB1	1.76	0.50
1:D:20:THR:HG23	1:D:23:ASP:H	1.76	0.50
1:B:22:GLU:OE1	1:B:89:GLN:HG3	2.11	0.50
1:B:177:ARG:HB2	1:B:498:CYS:HB2	1.94	0.50
2:F:403:ARG:HD3	2:F:505:TYR:HA	1.93	0.50
1:D:557:MET:O	1:D:557:MET:HE2	2.12	0.50
1:B:24:LEU:HD21	2:C:476:GLY:HA2	1.94	0.50
1:A:85:LEU:HD22	1:A:101:GLN:OE1	2.12	0.50
1:B:160:GLU:HG3	1:B:163:TRP:HZ3	1.76	0.50
1:B:511:SER:O	1:B:514:ARG:NH1	2.45	0.50
1:D:158:TYR:CD2	1:D:266:LEU:HD21	2.47	0.50
1:A:656:MET:HE1	1:A:668:ALA:HB1	1.95	0.49
2:F:444:LYS:O	2:F:499:PRO:HD3	2.12	0.49
2:F:490:PHE:CE1	2:F:492:LEU:HB2	2.46	0.49
2:F:498:GLN:H	2:F:501:ASN:ND2	2.09	0.49
1:D:274:PHE:HB3	1:D:276:THR:CG2	2.43	0.49
1:D:245:ARG:NH2	1:D:605:GLY:O	2.45	0.49
1:A:407:ILE:HD12	1:A:625:GLN:HB2	1.95	0.49
1:B:163:TRP:CD1	1:B:163:TRP:C	2.90	0.49
1:B:237:TYR:CE1	1:B:451:PRO:HG2	2.48	0.49
1:A:453:THR:HG23	1:A:512:PHE:CD2	2.48	0.49
1:B:477:TRP:CZ3	1:B:500:PRO:HG3	2.49	0.48
1:A:400:PHE:HE2	1:A:656:MET:HE1	1.78	0.48
1:A:402:GLU:HG3	1:A:617:ARG:NH1	2.28	0.48
1:B:312:GLU:O	1:B:316:VAL:HG23	2.13	0.48
1:D:283:VAL:HG23	1:D:437:ASN:ND2	2.28	0.48
1:A:656:MET:CE	1:A:668:ALA:HB1	2.43	0.48
1:B:514:ARG:O	1:B:518:ARG:HG2	2.14	0.48
2:C:394:ASN:HB3	2:C:396:TYR:CE1	2.48	0.48
1:B:91:PRO:O	1:B:95:ARG:HG2	2.14	0.48
1:D:356:PHE:CE2	1:D:383:MET:HG2	2.49	0.48
1:A:471:GLU:CD	1:A:471:GLU:H	2.21	0.48
1:D:237:TYR:CE1	1:D:451:PRO:HG2	2.48	0.48
1:A:457:GLU:HG2	1:A:512:PHE:HB3	1.96	0.48
1:D:469:PRO:HG2	1:D:472:GLN:HG2	1.96	0.48
2:C:520:ALA:HB1	2:C:521:PRO:HD2	1.95	0.48
1:D:327:PHE:HE2	1:D:358:ILE:HG13	1.79	0.47
2:F:395:VAL:HG22	2:F:515:PHE:HD1	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:412:PRO:HG3	2:E:429:PHE:HB3	1.97	0.47
1:B:61:LYS:O	1:B:64:ILE:HG13	2.14	0.47
1:B:53:ASN:OD1	1:B:53:ASN:N	2.46	0.47
1:A:374:HIS:HE1	1:A:402:GLU:OE2	1.98	0.47
1:A:656:MET:HG3	1:A:657:LEU:N	2.29	0.47
2:E:527:PRO:O	2:E:528:HIS:HB2	2.15	0.47
1:D:237:TYR:CD1	1:D:451:PRO:HG2	2.50	0.47
1:D:308:PHE:CZ	1:D:360:MET:HE3	2.50	0.47
1:B:188:ASN:O	1:B:192:ARG:HG3	2.15	0.47
1:B:320:LEU:HB3	1:B:321:PRO:HD2	1.97	0.47
1:A:188:ASN:O	1:A:192:ARG:HG3	2.15	0.47
1:A:20:THR:O	1:A:23:ASP:HB2	2.15	0.46
1:B:407:ILE:CD1	1:B:526:GLN:HB2	2.44	0.46
1:D:116:LEU:HB2	1:D:186:LEU:HD13	1.98	0.46
1:A:134:ASN:HD22	1:A:137:ASN:HB3	1.79	0.46
1:A:639:TYR:O	1:A:640:LYS:HB2	2.15	0.46
1:D:199:TYR:O	1:D:202:TYR:HB3	2.16	0.46
1:B:115:ARG:NH1	1:B:182:GLU:OE2	2.49	0.46
1:D:142:LEU:HD23	1:D:142:LEU:HA	1.81	0.46
1:A:489:GLU:O	1:A:489:GLU:HG2	2.16	0.46
1:D:248:LEU:HD23	1:D:248:LEU:HA	1.80	0.46
1:A:656:MET:HG2	1:A:672:VAL:HG21	1.98	0.46
1:B:227:GLU:OE2	1:B:454:TYR:OH	2.30	0.46
2:C:399:SER:HA	2:C:510:VAL:O	2.16	0.46
1:D:122:ALA:O	1:D:126:ILE:HG23	2.16	0.46
1:B:94:LYS:HE3	1:B:211:TRP:NE1	2.31	0.45
1:A:244:VAL:HB	1:A:282:MET:HE1	1.97	0.45
2:C:403:ARG:HD2	2:C:505:TYR:HA	1.97	0.45
1:A:369:PHE:CE1	1:A:373:HIS:HE1	2.35	0.45
1:D:245:ARG:HG2	1:D:245:ARG:NH1	2.31	0.45
1:A:175:GLN:O	1:A:178:PRO:HD2	2.16	0.45
1:B:31:LYS:HE3	1:B:35:GLU:OE2	2.17	0.45
1:D:131:LYS:HE3	1:D:143:LEU:HD13	1.98	0.45
1:A:293:VAL:HG11	1:A:418:LEU:HD22	1.99	0.45
1:D:527:GLU:HG3	1:D:539:LEU:HD22	1.99	0.45
1:B:98:ARG:HH12	1:B:211:TRP:NE1	2.15	0.44
1:B:119:ILE:HD11	1:B:182:GLU:CD	2.42	0.44
1:B:239:HIS:CE1	1:B:596:LYS:HG2	2.52	0.44
1:A:424:LEU:HD12	1:A:424:LEU:HA	1.78	0.44
1:B:41:TYR:CE2	1:B:45:LEU:HD22	2.52	0.44
1:B:305:ARG:O	1:B:309:GLU:HG3	2.16	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:354:HIS:CE1	1:A:386:ALA:HB1	2.52	0.44
2:E:391:CYS:HA	2:E:524:VAL:O	2.17	0.44
2:E:402:ILE:HD12	2:E:402:ILE:HA	1.55	0.44
1:B:95:ARG:NH1	1:B:209:GLU:OE2	2.38	0.44
1:B:276:THR:HB	1:B:445:THR:OG1	2.17	0.44
2:C:386:LYS:HB3	2:C:386:LYS:HE3	1.86	0.44
1:A:503:LEU:HD22	1:A:504:PHE:H	1.82	0.44
1:D:447:VAL:HA	1:D:450:LEU:HD12	2.00	0.44
1:D:557:MET:HE2	1:D:557:MET:C	2.43	0.44
2:F:380:TYR:CE2	2:F:412:PRO:HD2	2.53	0.44
2:C:390:LEU:HD23	2:C:390:LEU:HA	1.77	0.44
1:D:594:TRP:CH2	1:D:598:GLN:HG3	2.52	0.44
1:A:26:LYS:HB2	1:A:93:ILE:HD11	1.99	0.43
1:B:240:LEU:HD22	1:B:447:VAL:CG2	2.48	0.43
1:B:391:LEU:HD23	1:B:391:LEU:HA	1.78	0.43
1:D:240:LEU:O	1:D:244:VAL:HG12	2.18	0.43
2:F:421:TYR:CD1	2:F:457:ARG:HB3	2.53	0.43
2:C:452:LEU:HD23	2:C:494:SER:HA	1.99	0.43
1:D:419:LYS:HE3	1:D:428:PHE:HB3	2.00	0.43
2:F:392:PHE:CD1	2:F:515:PHE:HB3	2.53	0.43
1:B:142:LEU:HB3	1:B:147:GLY:HA3	2.01	0.43
1:B:196:TYR:CD2	1:B:202:TYR:HA	2.53	0.43
1:B:416:ASN:O	1:B:419:LYS:HB2	2.19	0.43
1:D:98:ARG:HH21	1:D:211:TRP:HZ2	1.66	0.43
1:D:514:ARG:O	1:D:518:ARG:HG2	2.17	0.43
1:D:50:TYR:HE1	1:D:54:ILE:HG23	1.83	0.43
1:D:177:ARG:HB2	1:D:498:CYS:HB2	1.99	0.43
1:D:565:PRO:O	1:D:568:PHE:N	2.51	0.43
1:B:494:ASP:OD1	1:B:496:THR:HG22	2.18	0.43
2:F:516:GLU:HG3	2:F:516:GLU:O	2.18	0.43
2:E:378:LYS:HA	2:C:378:LYS:HA	2.00	0.43
1:B:431:ASP:HB3	1:B:434:THR:HG23	2.01	0.43
1:D:92:ILE:HA	1:D:92:ILE:HD12	1.79	0.43
1:D:457:GLU:HG2	1:D:512:PHE:HB3	2.01	0.43
2:F:371:SER:HG	2:F:373:SER:HG	1.66	0.43
1:A:308:PHE:CD1	1:A:333:LEU:HD13	2.53	0.43
1:A:678:MET:HB2	1:A:678:MET:HE3	1.58	0.43
1:D:179:LEU:HD23	1:D:179:LEU:HA	1.83	0.43
1:D:351:LEU:HD12	1:D:351:LEU:H	1.84	0.43
1:A:244:VAL:HG23	1:A:248:LEU:HD12	2.01	0.43
1:A:430:GLU:OE2	1:A:640:LYS:HD3	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:97:LEU:HD23	1:D:97:LEU:HA	1.74	0.43
1:D:165:TRP:CH2	1:D:490:PRO:HD2	2.54	0.43
1:D:580:ASP:OD1	1:D:582:ARG:HG3	2.18	0.43
2:E:401:VAL:HG23	2:E:402:ILE:N	2.33	0.42
2:E:398:ASP:O	2:E:511:VAL:HA	2.19	0.42
1:B:570:LEU:HD23	1:B:570:LEU:HA	1.81	0.42
1:D:462:MET:HE2	1:D:468:ILE:HD11	2.01	0.42
1:A:199:TYR:O	1:A:202:TYR:HB3	2.20	0.42
1:B:165:TRP:CH2	1:B:490:PRO:HD2	2.54	0.42
1:B:244:VAL:HG11	1:B:275:TRP:CZ3	2.54	0.42
1:D:145:GLU:OE1	1:D:145:GLU:HA	2.20	0.42
1:A:237:TYR:CD1	1:A:451:PRO:HG2	2.54	0.42
1:B:505:HIS:ND1	1:B:505:HIS:N	2.67	0.42
1:B:105:SER:HB3	1:B:113:ARG:HG3	2.02	0.42
1:B:55:THR:HG22	1:B:57:GLU:N	2.35	0.42
1:D:407:ILE:HD12	1:D:526:GLN:HB2	2.02	0.42
1:A:478:TRP:CE3	1:A:489:GLU:HB3	2.55	0.42
1:D:163:TRP:O	1:D:167:GLY:N	2.44	0.42
1:B:144:LEU:HD22	1:B:168:TRP:CZ2	2.54	0.42
1:B:210:GLU:HB3	1:B:211:TRP:CD2	2.55	0.42
1:D:221:GLN:NE2	1:D:225:ASP:OD1	2.51	0.42
1:D:153:GLU:HB3	1:D:277:ASN:ND2	2.35	0.42
1:D:568:PHE:O	1:D:572:ARG:HG2	2.20	0.42
1:A:134:ASN:HB2	1:A:163:TRP:CZ2	2.55	0.41
1:A:417:HIS:HB2	1:A:642:ASP:OD2	2.20	0.41
1:B:397:ASN:OD1	1:B:397:ASN:C	2.63	0.41
1:A:279:TYR:CE2	1:A:441:LYS:HB2	2.55	0.41
2:F:404:GLY:HA2	2:F:508:TYR:CD1	2.55	0.41
1:A:656:MET:HB2	1:A:656:MET:HE2	1.55	0.41
1:B:119:ILE:HG21	1:B:119:ILE:HD13	1.84	0.41
1:D:278:LEU:O	1:D:282:MET:HG2	2.20	0.41
1:A:153:GLU:HB3	1:A:277:ASN:ND2	2.36	0.41
2:E:354:ASN:O	2:E:398:ASP:HA	2.21	0.41
1:D:394:ASN:O	1:D:561:GLY:HA2	2.20	0.41
1:D:94:LYS:HE2	1:D:211:TRP:CE2	2.55	0.41
1:D:415:PRO:HG2	1:D:430:GLU:OE2	2.21	0.41
1:B:176:LEU:HD13	1:B:501:ALA:HB1	2.01	0.41
1:B:179:LEU:HD23	1:B:179:LEU:HA	1.72	0.41
1:B:244:VAL:HG23	1:B:282:MET:SD	2.61	0.41
1:D:392:LEU:HD13	1:D:563:SER:HA	2.01	0.41
1:D:24:LEU:HD21	2:F:476:GLY:HA2	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:117:ASN:O	1:A:121:ASN:HB2	2.21	0.41
1:A:641:CYS:SG	1:A:642:ASP:N	2.94	0.41
2:E:387:LEU:HA	2:E:387:LEU:HD23	1.81	0.41
1:B:453:THR:HG23	1:B:512:PHE:CD2	2.55	0.41
1:D:560:LEU:O	1:D:563:SER:OG	2.37	0.41
1:A:341:LYS:HD3	1:A:341:LYS:HA	1.80	0.41
1:A:474:MET:HE3	1:A:474:MET:HB3	1.92	0.41
1:B:226:VAL:HA	1:B:229:THR:HG22	2.03	0.41
1:D:85:LEU:HD12	1:D:85:LEU:HA	1.86	0.41
2:F:338:PHE:HE2	2:F:363:ALA:HB1	1.85	0.41
2:E:502:GLY:O	2:E:506:GLN:HG3	2.21	0.40
1:B:284:PRO:HD2	1:B:437:ASN:OD1	2.22	0.40
1:B:335:GLU:HA	1:B:336:PRO:HD3	1.94	0.40
1:D:100:LEU:HD23	1:D:100:LEU:HA	1.84	0.40
1:A:177:ARG:HD3	1:A:497:TYR:O	2.22	0.40
1:B:134:ASN:HB3	1:B:137:ASN:O	2.22	0.40
1:B:478:TRP:CD2	1:B:489:GLU:HB3	2.56	0.40
2:C:398:ASP:O	2:C:511:VAL:HA	2.21	0.40
1:B:86:GLU:H	1:B:86:GLU:CD	2.30	0.40
2:C:394:ASN:HB3	2:C:396:TYR:HE1	1.87	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	594/597 (100%)	574 (97%)	19 (3%)	1 (0%)	43	75
1	B	594/597 (100%)	574 (97%)	19 (3%)	1 (0%)	43	75
1	D	594/597 (100%)	574 (97%)	20 (3%)	0	100	100
2	C	183/197 (93%)	176 (96%)	7 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	E	181/197 (92%)	167 (92%)	14 (8%)	0	100	100
2	F	195/197 (99%)	183 (94%)	12 (6%)	0	100	100
All	All	2341/2382 (98%)	2248 (96%)	91 (4%)	2 (0%)	48	79

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	146	PRO
1	A	146	PRO

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	524/525 (100%)	472 (90%)	52 (10%)	7	28
1	B	524/525 (100%)	469 (90%)	55 (10%)	6	26
1	D	524/525 (100%)	480 (92%)	44 (8%)	10	35
2	C	161/170 (95%)	152 (94%)	9 (6%)	19	51
2	E	159/170 (94%)	138 (87%)	21 (13%)	4	17
2	F	170/170 (100%)	156 (92%)	14 (8%)	10	36
All	All	2062/2085 (99%)	1867 (90%)	195 (10%)	8	30

All (195) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	SER
1	A	21	THR
1	A	27	THR
1	A	37	GLU
1	A	44	SER
1	A	45	LEU
1	A	68	LYS
1	A	70	SER

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Mol	Chain	Res	Type
1	A	85	LEU
1	A	87	GLU
1	A	89	GLN
1	A	96	GLN
1	A	98	ARG
1	A	100	LEU
1	A	121	ASN
1	A	143	LEU
1	A	163	TRP
1	A	169	ARG
1	A	170	SER
1	A	210	GLU
1	A	231	THR
1	A	238	GLU
1	A	244	VAL
1	A	283	VAL
1	A	287	GLN
1	A	313	LYS
1	A	317	SER
1	A	332	MET
1	A	342	VAL
1	A	343	VAL
1	A	394	ASN
1	A	401	HIS
1	A	407	ILE
1	A	409	SER
1	A	424	LEU
1	A	430	GLU
1	A	447	VAL
1	A	455	MET
1	A	460	ARG
1	A	476	LYS
1	A	495	GLU
1	A	496	THR
1	A	503	LEU
1	A	514	ARG
1	A	628	LEU
1	A	656	MET
1	A	669	LEU
1	A	676	LYS
1	A	677	THR
1	A	688	GLU

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Mol	Chain	Res	Type
1	A	695	LYS
1	A	696	GLU
2	E	335	LEU
2	E	340	GLU
2	E	354	ASN
2	E	365	TYR
2	E	382	VAL
2	E	386	LYS
2	E	390	LEU
2	E	391	CYS
2	E	393	THR
2	E	401	VAL
2	E	402	ILE
2	E	408	ARG
2	E	441	LEU
2	E	445	VAL
2	E	458	LYS
2	E	477	SER
2	E	478	THR
2	E	480	CYS
2	E	503	VAL
2	E	517	LEU
2	E	525	CYS
1	B	21	THR
1	B	26	LYS
1	B	53	ASN
1	B	56	ASP
1	B	60	GLN
1	B	61	LYS
1	B	74	GLU
1	B	76	GLU
1	B	82	THR
1	B	85	LEU
1	B	94	LYS
1	B	106	SER
1	B	107	VAL
1	B	111	ASP
1	B	118	THR
1	B	121	ASN
1	B	125	THR
1	B	131	LYS
1	B	163	TRP

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Mol	Chain	Res	Type
1	B	170	SER
1	B	175	GLN
1	B	211	TRP
1	B	224	GLU
1	B	227	GLU
1	B	231	THR
1	B	234	LYS
1	B	276	THR
1	B	282	MET
1	B	283	VAL
1	B	317	SER
1	B	334	THR
1	B	339	ASN
1	B	343	VAL
1	B	360	MET
1	B	363	LYS
1	B	364	VAL
1	B	401	HIS
1	B	407	ILE
1	B	411	SER
1	B	424	LEU
1	B	432	SER
1	B	447	VAL
1	B	455	MET
1	B	468	ILE
1	B	475	GLN
1	B	518	ARG
1	B	522	GLN
1	B	529	LEU
1	B	549	GLU
1	B	570	LEU
1	B	574	VAL
1	B	578	THR
1	B	584	LEU
1	B	608	THR
1	B	609	ASP
2	C	333	THR
2	C	393	THR
2	C	430	THR
2	C	478	THR
2	C	483	VAL
2	C	493	GLN

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Mol	Chain	Res	Type
2	C	494	SER
2	C	500	THR
2	C	514	SER
1	D	19	SER
1	D	21	THR
1	D	45	LEU
1	D	55	THR
1	D	59	ILE
1	D	85	LEU
1	D	92	ILE
1	D	102	GLN
1	D	105	SER
1	D	106	SER
1	D	113	ARG
1	D	116	LEU
1	D	143	LEU
1	D	163	TRP
1	D	227	GLU
1	D	245	ARG
1	D	266	LEU
1	D	276	THR
1	D	283	VAL
1	D	334	THR
1	D	341	LYS
1	D	342	VAL
1	D	343	VAL
1	D	354	HIS
1	D	359	LYS
1	D	364	VAL
1	D	371	THR
1	D	394	ASN
1	D	401	HIS
1	D	407	ILE
1	D	424	LEU
1	D	441	LYS
1	D	447	VAL
1	D	456	LEU
1	D	514	ARG
1	D	522	GLN
1	D	532	ILE
1	D	556	GLU
1	D	557	MET

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Mol	Chain	Res	Type
1	D	570	LEU
1	D	573	VAL
1	D	578	THR
1	D	579	MET
1	D	584	LEU
2	F	334	ASN
2	F	335	LEU
2	F	341	VAL
2	F	376	THR
2	F	383	SER
2	F	403	ARG
2	F	415	THR
2	F	424	LYS
2	F	436	TRP
2	F	445	VAL
2	F	478	THR
2	F	480	CYS
2	F	494	SER
2	F	503	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (30) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	89	GLN
1	A	154	ASN
1	A	175	GLN
1	A	228	HIS
1	A	232	GLN
1	A	354	HIS
1	A	394	ASN
1	A	475	GLN
2	E	388	ASN
2	E	493	GLN
1	B	60	GLN
1	B	121	ASN
1	B	136	ASN
1	B	239	HIS
1	B	300	GLN
1	B	417	HIS
1	B	472	GLN
1	B	535	HIS
1	B	599	ASN

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Mol	Chain	Res	Type
2	C	460	ASN
2	C	487	ASN
1	D	194	ASN
1	D	300	GLN
1	D	354	HIS
1	D	416	ASN
1	D	535	HIS
1	D	555	HIS
1	D	607	ASN
2	F	370	ASN
2	F	487	ASN

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 ⓘ

6 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
3	NAG	G	1	3,1	14,14,15	1.01	1 (7%)	17,19,21	0.88	1 (5%)
3	NAG	G	2	3	14,14,15	0.98	1 (7%)	17,19,21	1.30	2 (11%)
4	NAG	H	1	4,1	14,14,15	1.42	2 (14%)	17,19,21	0.84	1 (5%)
4	FUC	H	2	4	10,10,11	2.48	5 (50%)	14,14,16	1.53	3 (21%)
3	NAG	I	1	3,1	14,14,15	0.38	0	17,19,21	0.64	0
3	NAG	I	2	3	14,14,15	0.30	0	17,19,21	0.97	1 (5%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	G	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	G	2	3	-	3/6/23/26	0/1/1/1
4	NAG	H	1	4,1	-	0/6/23/26	0/1/1/1
4	FUC	H	2	4	-	-	0/1/1/1
3	NAG	I	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	I	2	3	-	4/6/23/26	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	H	2	FUC	C4-C5	3.88	1.61	1.52
4	H	1	NAG	C1-C2	3.86	1.57	1.52
4	H	2	FUC	C4-C3	3.63	1.61	1.52
3	G	1	NAG	O5-C1	3.41	1.49	1.43
4	H	1	NAG	O5-C1	3.35	1.49	1.43
4	H	2	FUC	C2-C3	3.11	1.57	1.52
4	H	2	FUC	C1-C2	3.02	1.59	1.52
4	H	2	FUC	O5-C5	2.98	1.49	1.43
3	G	2	NAG	C1-C2	2.91	1.56	1.52

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	2	NAG	C2-N2-C7	3.63	127.76	122.90
4	H	2	FUC	O5-C5-C4	3.04	115.03	109.55
3	G	2	NAG	C1-C2-N2	3.04	115.22	110.43
3	G	1	NAG	C1-O5-C5	2.61	115.69	112.19
4	H	1	NAG	C1-O5-C5	2.50	115.54	112.19
3	I	2	NAG	C1-O5-C5	2.19	115.12	112.19
4	H	2	FUC	C1-C2-C3	2.17	112.80	109.64
4	H	2	FUC	C1-O5-C5	2.14	118.01	112.97

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	2	NAG	C1-C2-N2-C7

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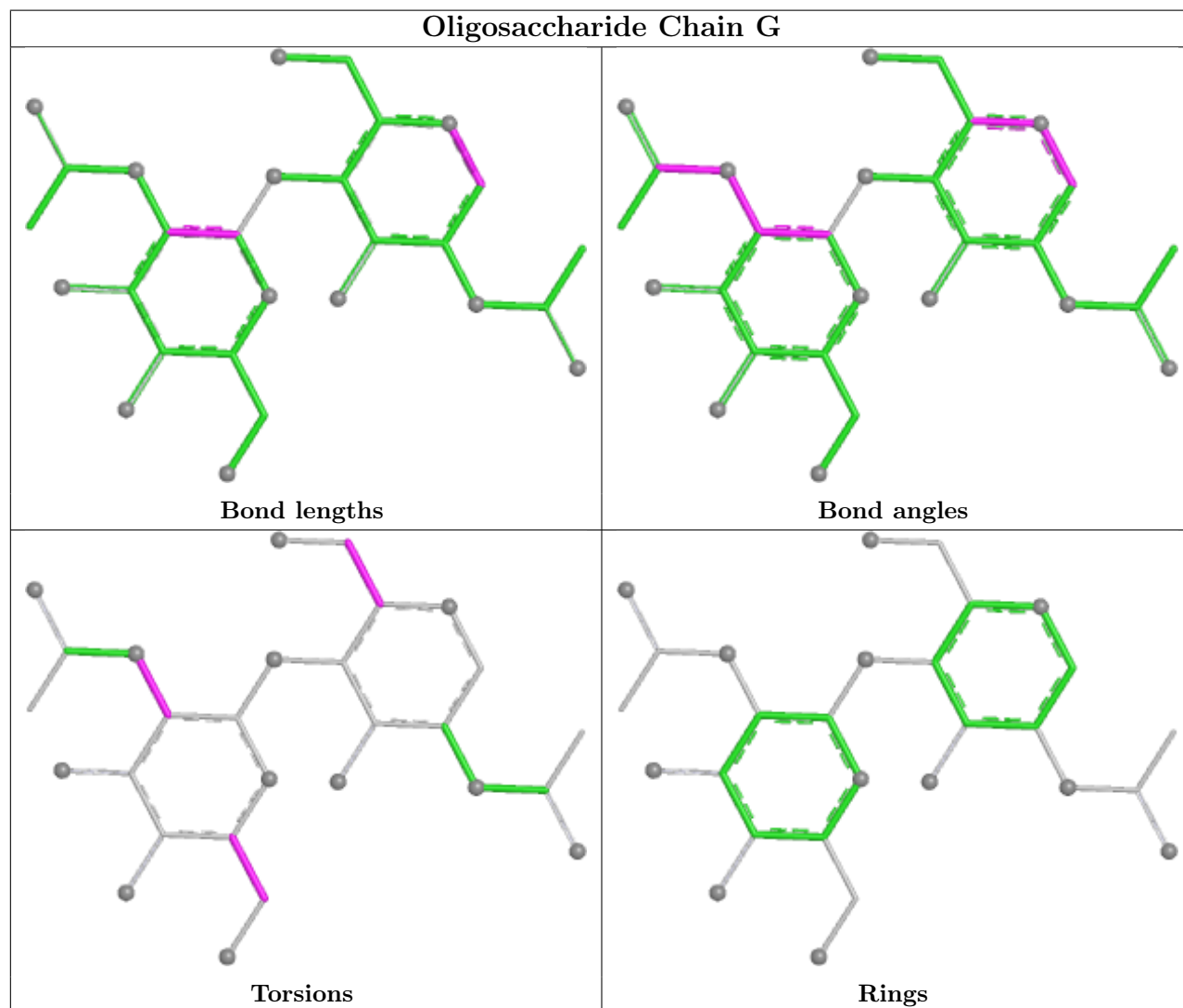
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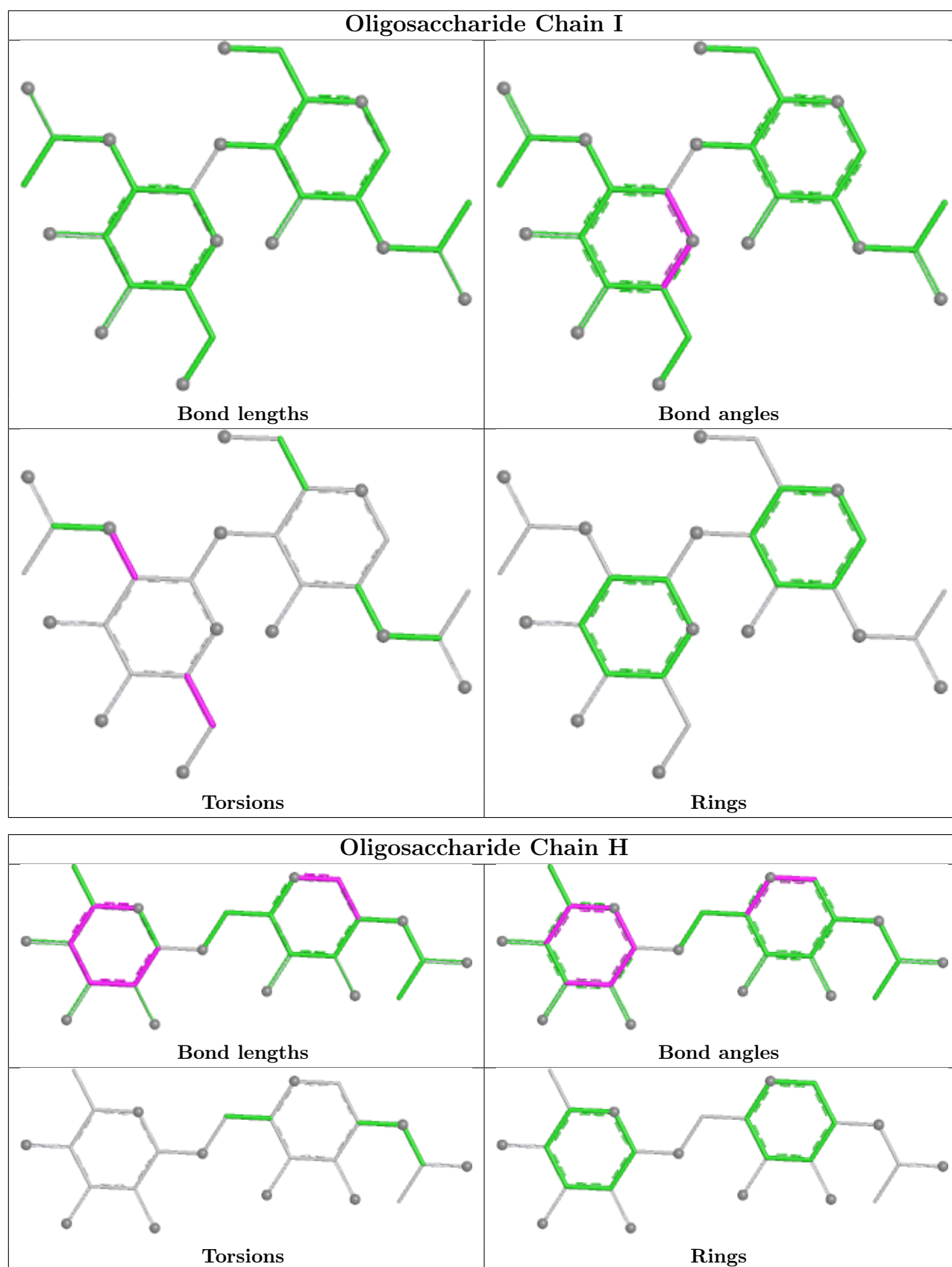
Mol	Chain	Res	Type	Atoms
3	G	2	NAG	O5-C5-C6-O6
3	G	1	NAG	O5-C5-C6-O6
3	G	2	NAG	C4-C5-C6-O6
3	I	2	NAG	O5-C5-C6-O6
3	I	2	NAG	C4-C5-C6-O6
3	G	1	NAG	C4-C5-C6-O6
3	I	2	NAG	C1-C2-N2-C7
3	I	2	NAG	C3-C2-N2-C7

There are no ring outliers.

No monomer is involved in short contacts.

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





5.6 Ligand geometry

6 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	B	904	1	14,14,15	0.57	0	17,19,21	0.96	1 (5%)
5	NAG	E	601	2	14,14,15	1.76	1 (7%)	17,19,21	1.61	4 (23%)
5	NAG	B	903	1	14,14,15	1.90	2 (14%)	17,19,21	1.26	2 (11%)
5	NAG	B	905	1	14,14,15	1.93	2 (14%)	17,19,21	0.90	1 (5%)
5	NAG	D	903	1	14,14,15	1.21	2 (14%)	17,19,21	0.59	0
5	NAG	A	903	1	14,14,15	0.63	0	17,19,21	1.11	2 (11%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	B	904	1	-	2/6/23/26	0/1/1/1
5	NAG	E	601	2	-	2/6/23/26	0/1/1/1
5	NAG	B	903	1	-	2/6/23/26	0/1/1/1
5	NAG	B	905	1	-	3/6/23/26	0/1/1/1
5	NAG	D	903	1	-	2/6/23/26	0/1/1/1
5	NAG	A	903	1	-	4/6/23/26	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	601	NAG	O5-C1	6.34	1.54	1.43
5	B	905	NAG	O5-C1	5.99	1.53	1.43
5	B	903	NAG	O5-C1	5.60	1.53	1.43
5	B	903	NAG	C1-C2	4.05	1.57	1.52
5	B	905	NAG	C1-C2	3.80	1.57	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	903	NAG	C1-C2	3.55	1.57	1.52
5	D	903	NAG	O5-C1	2.53	1.47	1.43

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	601	NAG	C1-O5-C5	3.99	117.53	112.19
5	B	903	NAG	C1-O5-C5	3.73	117.19	112.19
5	B	904	NAG	C1-O5-C5	3.39	116.73	112.19
5	E	601	NAG	C2-N2-C7	3.03	126.96	122.90
5	B	905	NAG	C1-O5-C5	2.73	115.84	112.19
5	E	601	NAG	C1-C2-N2	2.68	114.66	110.43
5	A	903	NAG	C1-O5-C5	2.44	115.46	112.19
5	A	903	NAG	C1-C2-N2	2.08	113.70	110.43
5	E	601	NAG	C4-C3-C2	-2.07	107.99	111.02
5	B	903	NAG	O6-C6-C5	2.04	118.27	111.33

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	903	NAG	O5-C5-C6-O6
5	A	903	NAG	C4-C5-C6-O6
5	D	903	NAG	O5-C5-C6-O6
5	D	903	NAG	C4-C5-C6-O6
5	B	904	NAG	O5-C5-C6-O6
5	B	904	NAG	C4-C5-C6-O6
5	B	905	NAG	C4-C5-C6-O6
5	B	903	NAG	C4-C5-C6-O6
5	E	601	NAG	O5-C5-C6-O6
5	B	905	NAG	O5-C5-C6-O6
5	B	903	NAG	O5-C5-C6-O6
5	E	601	NAG	C3-C2-N2-C7
5	A	903	NAG	C1-C2-N2-C7
5	B	905	NAG	C1-C2-N2-C7
5	A	903	NAG	C3-C2-N2-C7

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	904	NAG	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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	596/597 (99%)	-0.51	3 (0%) 87 72	44, 60, 87, 114	0
1	B	596/597 (99%)	-0.44	3 (0%) 87 72	42, 62, 92, 133	0
1	D	596/597 (99%)	-0.38	3 (0%) 87 72	48, 70, 94, 132	0
2	C	187/197 (94%)	-0.34	3 (1%) 70 47	43, 53, 100, 140	0
2	E	185/197 (93%)	-0.24	4 (2%) 62 39	44, 55, 98, 145	0
2	F	197/197 (100%)	-0.35	2 (1%) 79 59	46, 58, 87, 111	0
All	All	2357/2382 (98%)	-0.41	18 (0%) 82 64	42, 63, 94, 145	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	103	SER	5.2
2	E	335	LEU	4.3
2	F	332	PRO	3.9
1	D	614	ALA	3.8
1	D	211	TRP	3.7
1	B	211	TRP	3.5
2	C	333	THR	3.4
2	E	527	PRO	3.1
1	B	103	SER	3.1
1	B	212	ALA	3.0
2	C	335	LEU	2.6
2	E	526	GLY	2.5
1	A	212	ALA	2.3
1	A	713	ALA	2.3
2	E	528	HIS	2.3
2	C	391	CYS	2.1
1	A	74	GLU	2.1
2	F	519	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 ⓘ

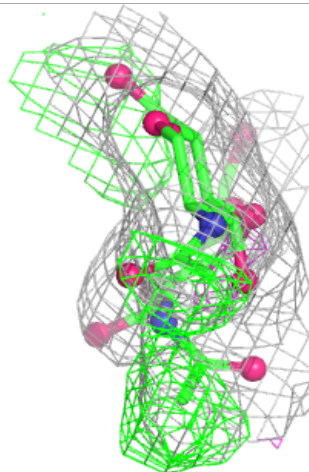
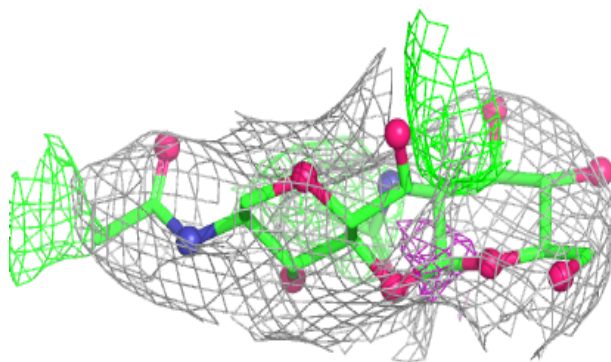
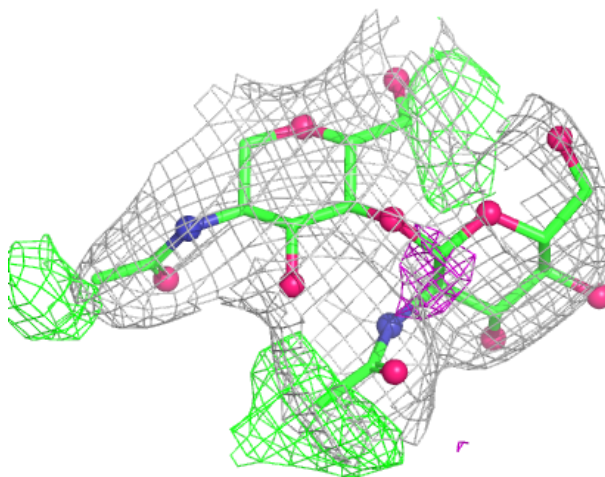
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NAG	G	2	14/15	0.59	0.17	87,105,109,110	0
3	NAG	I	2	14/15	0.70	0.16	117,126,134,138	0
3	NAG	G	1	14/15	0.74	0.15	67,87,98,107	0
4	FUC	H	2	10/11	0.83	0.15	86,99,102,102	0
4	NAG	H	1	14/15	0.84	0.13	71,85,97,105	0
3	NAG	I	1	14/15	0.94	0.09	81,87,104,119	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.

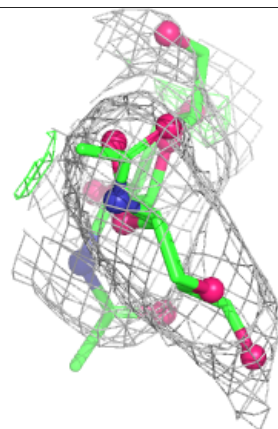
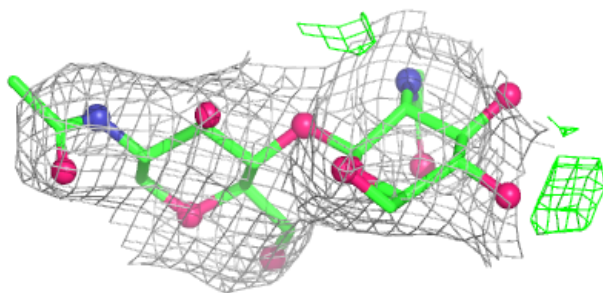
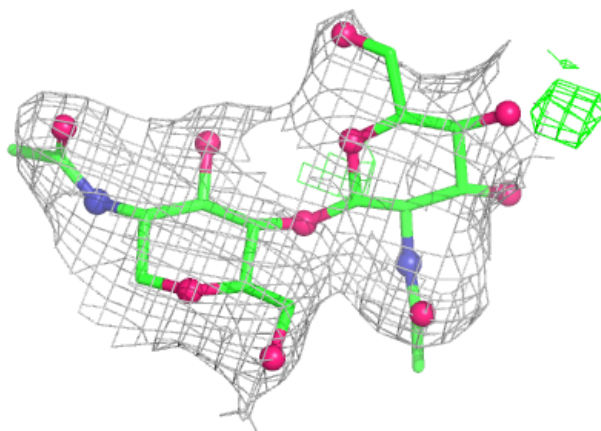
Electron density around Chain G:

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

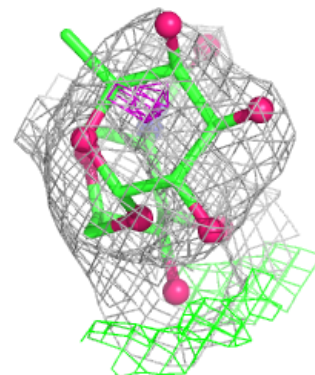
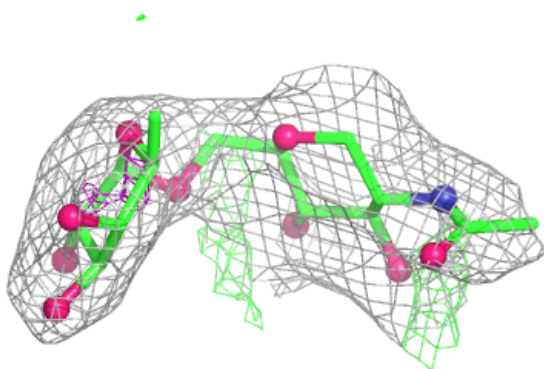


Electron density around Chain I:

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

**Electron density around Chain H:**

$2mF_o-DF_c$ (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
5	NAG	E	601	14/15	0.43	0.22	104,122,127,130	0
5	NAG	D	903	14/15	0.72	0.16	100,115,118,122	0
5	NAG	B	905	14/15	0.79	0.16	75,89,93,97	0
5	NAG	B	903	14/15	0.79	0.14	56,74,83,83	0
5	NAG	A	903	14/15	0.84	0.14	72,81,87,88	0
5	NAG	B	904	14/15	0.90	0.11	74,78,84,86	0

6.5 Other polymers [i](#)

There are no such residues in this entry.