



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 13, 2025 – 02:56 PM JST

PDB ID : 8XY9
Title : Crystal structure of SARS-CoV-2 BF.7 RBD and human ACE2 complex
Authors : Lan, J.; Wang, C.H.
Deposited on : 2024-01-19
Resolution : 3.64 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.21
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.004 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

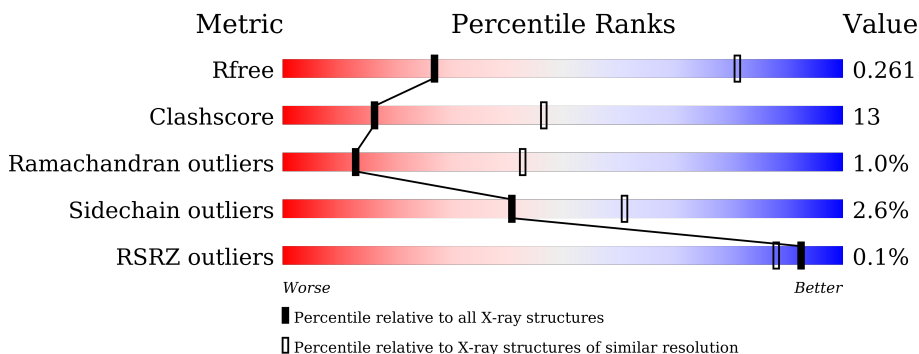
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.64 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}	164625	1000 (3.76-3.52)
Clashscore	180529	1046 (3.76-3.52)
Ramachandran outliers	177936	1031 (3.76-3.52)
Sidechain outliers	177891	1029 (3.76-3.52)
RSRZ outliers	164620	1682 (3.78-3.50)

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	85% (green), 15% (yellow)
1	C	597	84% (green), 16% (yellow), 0% (orange), 0% (red)
2	B	194	50% (green), 45% (yellow), 5% (orange), 0% (red)
2	D	194	41% (green), 52% (yellow), 6% (orange), 0% (red)
3	E	3	33% (green), 67% (yellow)
3	H	3	100% (yellow)

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Mol	Chain	Length	Quality of chain	
4	F	2	 50%	50%
4	G	2	 50%	50%

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
4	NAG	F	1	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 13154 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 Processed angiotensin-converting enzyme 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	597	4877	3120	808	920	29	0	1	0
1	C	597	4877	3120	808	920	29	0	1	0

- Molecule 2 is a protein called Spike protein S1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	194	1545	995	259	283	8	0	0	0
2	D	194	1545	995	259	283	8	0	0	0

There are 34 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	339	ASP	GLY	variant	UNP P0DTC2
B	346	THR	ARG	variant	UNP P0DTC2
B	371	PHE	SER	variant	UNP P0DTC2
B	373	PRO	SER	variant	UNP P0DTC2
B	375	PHE	SER	variant	UNP P0DTC2
B	405	ASN	ASP	variant	UNP P0DTC2
B	408	SER	ARG	variant	UNP P0DTC2
B	417	ASN	LYS	variant	UNP P0DTC2
B	440	LYS	ASN	variant	UNP P0DTC2
B	452	ARG	LEU	variant	UNP P0DTC2
B	477	ASN	SER	variant	UNP P0DTC2
B	478	LYS	THR	variant	UNP P0DTC2
B	484	ALA	GLU	variant	UNP P0DTC2
B	486	VAL	PHE	variant	UNP P0DTC2
B	498	ARG	GLN	variant	UNP P0DTC2
B	501	TYR	ASN	variant	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	505	HIS	TYR	variant	UNP P0DTC2
D	339	ASP	GLY	variant	UNP P0DTC2
D	346	THR	ARG	variant	UNP P0DTC2
D	371	PHE	SER	variant	UNP P0DTC2
D	373	PRO	SER	variant	UNP P0DTC2
D	375	PHE	SER	variant	UNP P0DTC2
D	405	ASN	ASP	variant	UNP P0DTC2
D	408	SER	ARG	variant	UNP P0DTC2
D	417	ASN	LYS	variant	UNP P0DTC2
D	440	LYS	ASN	variant	UNP P0DTC2
D	452	ARG	LEU	variant	UNP P0DTC2
D	477	ASN	SER	variant	UNP P0DTC2
D	478	LYS	THR	variant	UNP P0DTC2
D	484	ALA	GLU	variant	UNP P0DTC2
D	486	VAL	PHE	variant	UNP P0DTC2
D	498	ARG	GLN	variant	UNP P0DTC2
D	501	TYR	ASN	variant	UNP P0DTC2
D	505	HIS	TYR	variant	UNP P0DTC2

- Molecule 3 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
			Total	C	N	O			
3	E	3	39	22	2	15	0	0	0
3	H	3	39	22	2	15	0	0	0

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



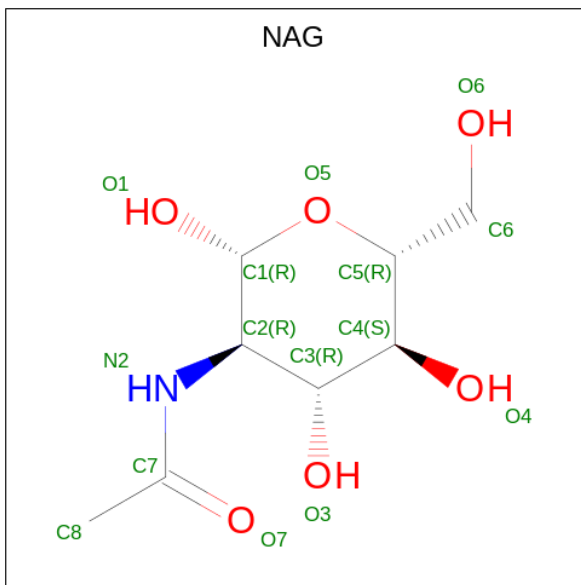
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	F	2	28	16	2	10	0	0	0

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

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



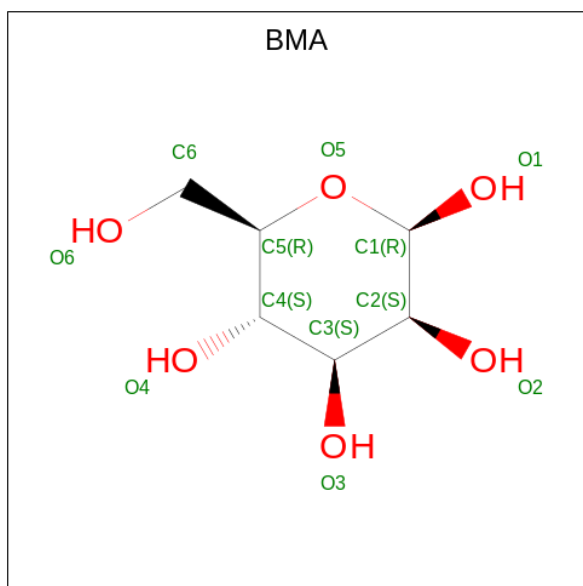
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0
5	A	1	14	8	1	5	0	0

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

- Molecule 6 is beta-D-mannopyranose (three-letter code: BMA) (formula: C₆H₁₂O₆).

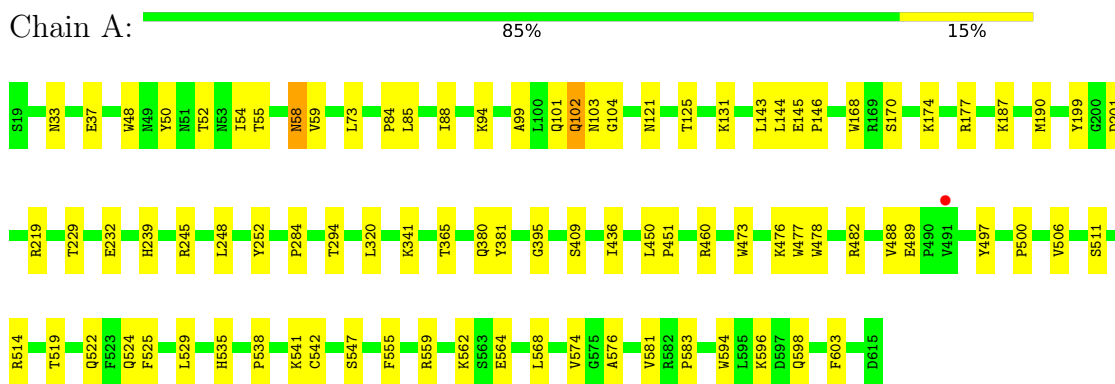


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	11	6	5	0	0
6	B	1	11	6	5	0	0

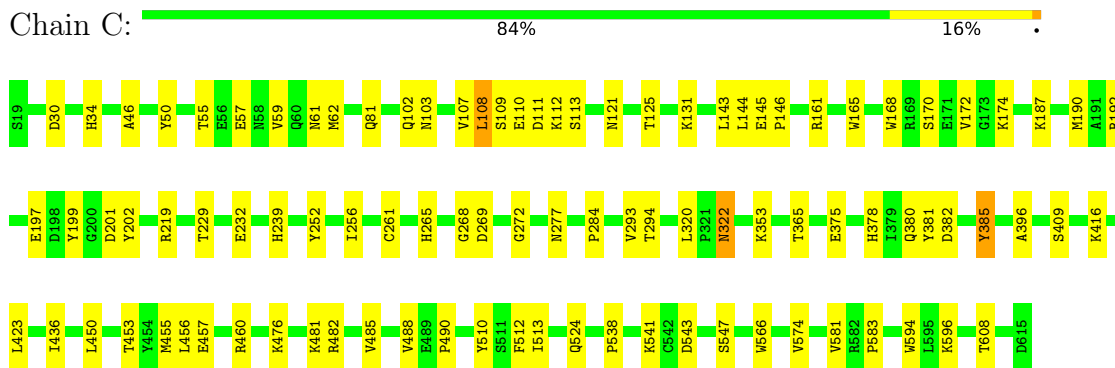
3 Residue-property plots

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.

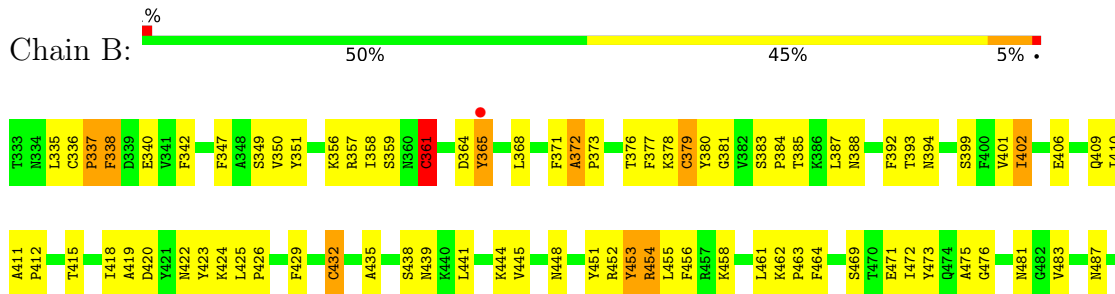
- Molecule 1: Processed angiotensin-converting enzyme 2

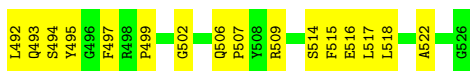


- Molecule 1: Processed angiotensin-converting enzyme 2



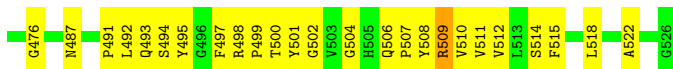
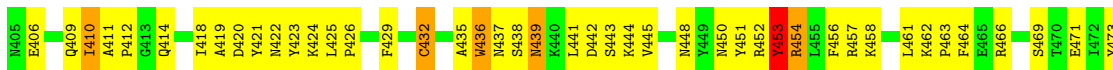
- Molecule 2: Spike protein S1





- Molecule 2: Spike protein S1

Chain D: 41% 52% 6%



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

Chain E: 33% 67%



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

Chain H: 100%



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

Chain F: 50% 50%



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

Chain G: 50% 50%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	73.47Å 152.68Å 116.69Å 90.00° 103.06° 90.00°	Depositor
Resolution (Å)	40.30 – 3.64 40.30 – 3.64	Depositor EDS
% Data completeness (in resolution range)	98.8 (40.30-3.64) 99.0 (40.30-3.64)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.37 (at 3.66Å)	Xtrriage
Refinement program	PHENIX (1.19.1_4122: ???)	Depositor
R, R_{free}	0.215 , 0.261 0.218 , 0.261	Depositor DCC
R_{free} test set	1377 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	116.4	Xtrriage
Anisotropy	0.635	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 88.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.26$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	13154	wwPDB-VP
Average B, all atoms (Å ²)	139.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: BMA, 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	0.28	0/5018	0.49	0/6818
1	C	0.29	0/5018	0.52	1/6818 (0.0%)
2	B	0.35	0/1591	0.66	1/2167 (0.0%)
2	D	0.58	3/1591 (0.2%)	0.76	1/2167 (0.0%)
All	All	0.34	3/13218 (0.0%)	0.56	3/17970 (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	A	0	1
2	D	0	2
All	All	0	3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	374	PHE	CD1-CE1	-8.47	1.22	1.39
2	D	374	PHE	CB-CG	-7.35	1.38	1.51
2	D	436	TRP	CZ3-CH2	-6.86	1.29	1.40

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	509	ARG	CG-CD-NE	10.13	133.08	111.80
2	B	361	CYS	CA-CB-SG	8.23	128.82	114.00
1	C	108	LEU	CB-CG-CD1	-7.53	98.21	111.00

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	58	ASN	Peptide
2	D	373	PRO	Peptide
2	D	453	TYR	Peptide

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	4877	0	4645	54	0
1	C	4877	0	4645	67	0
2	B	1545	0	1466	79	0
2	D	1545	0	1466	129	0
3	E	39	0	34	0	0
3	H	39	0	34	0	0
4	F	28	0	24	7	0
4	G	28	0	25	1	0
5	A	140	0	124	5	0
5	C	14	0	13	0	0
6	A	11	0	10	0	0
6	B	11	0	10	0	0
All	All	13154	0	12496	327	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 (327) 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)
2:B:401:VAL:HG11	2:B:451:TYR:HD2	1.31	0.96
1:C:103:ASN:HB2	4:F:1:NAG:H82	1.46	0.95
2:D:445:VAL:HG22	2:D:499:PRO:HG3	1.51	0.92
1:C:103:ASN:HD22	4:F:1:NAG:HN2	1.16	0.91
2:B:336:CYS:O	2:B:338:PHE:N	2.05	0.90
2:D:380:TYR:CD2	2:D:412:PRO:HD3	2.06	0.90

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:380:TYR:HD2	2:D:412:PRO:HD3	1.38	0.87
2:B:454:ARG:NH2	2:B:469:SER:O	2.09	0.85
2:B:453:TYR:CD2	2:B:495:TYR:HE1	1.97	0.83
2:B:401:VAL:HG11	2:B:451:TYR:CD2	2.14	0.82
2:D:422:ASN:HD21	2:D:454:ARG:H	1.25	0.82
2:B:393:THR:HA	2:B:522:ALA:HA	1.61	0.81
2:D:337:PRO:HG2	2:D:358:ILE:HD12	1.61	0.81
2:D:350:VAL:HG11	2:D:418:ILE:HD11	1.62	0.80
2:D:422:ASN:HD21	2:D:454:ARG:N	1.80	0.80
2:B:393:THR:HG21	2:B:518:LEU:HD23	1.62	0.80
2:D:393:THR:HA	2:D:522:ALA:HA	1.65	0.79
1:C:192:ARG:NH1	1:C:197:GLU:O	2.17	0.78
2:D:453:TYR:CD2	2:D:495:TYR:HE1	2.02	0.78
2:B:445:VAL:HG22	2:B:499:PRO:HG3	1.67	0.77
1:C:320:LEU:HD13	1:C:380:GLN:HG2	1.66	0.77
2:D:354:ASN:OD1	2:D:399:SER:OG	2.03	0.75
2:D:442:ASP:O	2:D:448:ASN:ND2	2.16	0.75
2:D:401:VAL:HG11	2:D:451:TYR:CD2	2.22	0.74
2:D:454:ARG:NH2	2:D:469:SER:O	2.20	0.74
1:C:81:GLN:HG2	4:F:1:NAG:C7	2.18	0.74
2:D:374:PHE:CE1	2:D:377:PHE:HB2	2.24	0.73
1:C:57:GLU:O	1:C:61:ASN:ND2	2.22	0.72
2:B:380:TYR:CD2	2:B:412:PRO:HD3	2.25	0.72
2:D:347:PHE:HD1	2:D:509:ARG:NE	1.88	0.72
2:D:436:TRP:HH2	2:D:509:ARG:CG	2.03	0.71
2:B:495:TYR:HD2	2:B:497:PHE:CZ	2.08	0.71
2:D:426:PRO:HB3	2:D:463:PRO:HB3	1.73	0.71
2:D:495:TYR:HD2	2:D:497:PHE:CZ	2.09	0.70
1:C:109:SER:OG	1:C:112:LYS:HG3	1.93	0.69
2:D:374:PHE:CE1	2:D:376:THR:N	2.61	0.69
1:A:229:THR:HB	1:A:581:VAL:HG13	1.75	0.68
2:D:453:TYR:CE1	2:D:493:GLN:HB3	2.29	0.68
1:A:320:LEU:HD13	1:A:380:GLN:HG2	1.74	0.68
2:B:444:LYS:HG2	2:B:448:ASN:HB2	1.73	0.68
2:D:374:PHE:CZ	2:D:377:PHE:N	2.62	0.68
2:D:436:TRP:CZ2	2:D:509:ARG:HB2	2.28	0.67
1:A:50:TYR:CE1	1:A:59:VAL:HG22	2.30	0.67
2:B:422:ASN:HA	2:B:461:LEU:HD12	1.77	0.67
2:B:438:SER:HB3	2:B:509:ARG:CG	2.25	0.67
2:B:335:LEU:HD21	2:B:364:ASP:HB2	1.75	0.67
2:D:436:TRP:HE3	2:D:437:ASN:N	1.93	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:337:PRO:HG2	2:B:358:ILE:HD12	1.77	0.66
2:B:349:SER:HB2	2:B:452:ARG:H	1.59	0.66
2:B:378:LYS:HB3	2:B:380:TYR:HE1	1.60	0.66
2:D:374:PHE:CD1	2:D:375:PHE:N	2.64	0.66
1:C:455:MET:HE2	1:C:485:VAL:HG21	1.78	0.66
2:D:436:TRP:CH2	2:D:509:ARG:HB2	2.31	0.65
2:D:442:ASP:OD2	2:D:509:ARG:HD2	1.96	0.65
2:B:419:ALA:O	2:B:424:LYS:HD3	1.97	0.65
2:D:371:PHE:C	2:D:373:PRO:HD3	2.18	0.64
2:D:347:PHE:CD1	2:D:509:ARG:NE	2.66	0.64
1:C:108:LEU:HD11	1:C:113:SER:CA	2.27	0.64
2:B:376:THR:HB	2:B:435:ALA:HB3	1.80	0.64
2:B:438:SER:HB3	2:B:509:ARG:HG3	1.80	0.63
2:B:456:PHE:HB3	2:B:473:TYR:CD2	2.33	0.63
2:D:383:SER:O	2:D:387:LEU:HD23	1.99	0.63
2:D:436:TRP:HH2	2:D:509:ARG:HD3	1.63	0.62
1:C:524:GLN:HG2	1:C:583:PRO:HG2	1.81	0.62
1:A:245:ARG:NH2	1:A:603:PHE:O	2.32	0.62
2:B:359:SER:OG	2:B:394:ASN:OD1	2.13	0.61
2:D:350:VAL:HA	2:D:400:PHE:HB2	1.82	0.61
2:B:402:ILE:HA	2:B:495:TYR:HE2	1.66	0.61
1:C:81:GLN:HG2	4:F:1:NAG:O7	2.00	0.60
2:D:435:ALA:HA	2:D:510:VAL:HG12	1.83	0.60
1:C:416:LYS:HD2	1:C:543:ASP:HB3	1.82	0.60
2:D:458:LYS:NZ	2:D:471:GLU:OE2	2.30	0.60
5:A:711:NAG:O7	5:A:711:NAG:O3	2.11	0.60
1:C:538:PRO:HD2	1:C:541:LYS:HD3	1.84	0.59
1:A:524:GLN:HG2	1:A:583:PRO:HG2	1.84	0.59
2:B:425:LEU:HD22	2:B:429:PHE:CE2	2.38	0.59
2:B:350:VAL:HG11	2:B:418:ILE:HD11	1.84	0.59
1:C:46:ALA:HB1	1:C:62:MET:HA	1.85	0.59
2:D:423:TYR:HE2	2:D:512:VAL:HG21	1.68	0.58
2:D:436:TRP:CH2	2:D:509:ARG:CG	2.84	0.58
2:B:378:LYS:HB3	2:B:380:TYR:CE1	2.38	0.58
2:D:453:TYR:CD2	2:D:495:TYR:CE1	2.90	0.58
2:B:349:SER:CB	2:B:452:ARG:H	2.17	0.58
2:D:374:PHE:HE1	2:D:376:THR:C	2.08	0.57
2:D:436:TRP:CH2	2:D:509:ARG:CB	2.87	0.57
2:D:357:ARG:HG3	2:D:396:TYR:HE1	1.68	0.57
1:A:103:ASN:HD22	5:A:706:NAG:C1	2.18	0.56
2:D:418:ILE:O	2:D:422:ASN:N	2.36	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:103:ASN:ND2	5:A:706:NAG:O5	2.39	0.56
2:D:421:TYR:CD1	2:D:457:ARG:HB3	2.41	0.56
1:A:55:THR:OG1	1:A:58:ASN:OD1	2.22	0.56
1:A:564:GLU:HB3	1:A:568:LEU:HD23	1.86	0.56
2:D:353:TRP:NE1	2:D:466:ARG:HG3	2.19	0.56
2:D:374:PHE:CZ	2:D:377:PHE:CB	2.88	0.56
1:C:103:ASN:HB2	4:F:1:NAG:C8	2.27	0.56
2:D:374:PHE:CZ	2:D:377:PHE:HB2	2.39	0.56
1:C:232:GLU:HB2	1:C:581:VAL:HG21	1.87	0.56
1:A:187:LYS:HD2	1:A:199:TYR:CZ	2.40	0.56
1:A:460:ARG:HH21	1:A:506:VAL:HA	1.71	0.56
2:B:409:GLN:O	2:B:411:ALA:N	2.39	0.56
2:D:387:LEU:HD22	2:D:515:PHE:HE2	1.70	0.56
2:D:402:ILE:HB	2:D:406:GLU:HB3	1.88	0.55
2:D:419:ALA:O	2:D:424:LYS:HD3	2.06	0.55
2:B:380:TYR:HD2	2:B:412:PRO:HD3	1.69	0.55
1:C:144:LEU:HB2	1:C:168:TRP:CH2	2.41	0.55
1:C:229:THR:HB	1:C:581:VAL:HG13	1.89	0.55
2:D:436:TRP:HH2	2:D:509:ARG:CD	2.19	0.55
2:B:383:SER:O	2:B:387:LEU:HD23	2.07	0.54
2:D:338:PHE:CE2	2:D:363:ALA:HB1	2.41	0.54
2:D:374:PHE:CE1	2:D:376:THR:C	2.80	0.54
2:D:402:ILE:HA	2:D:495:TYR:HE2	1.71	0.54
1:A:103:ASN:OD1	1:A:104:GLY:N	2.38	0.54
2:B:426:PRO:HB3	2:B:463:PRO:HB3	1.89	0.54
2:B:476:GLY:H	2:B:487:ASN:HB3	1.73	0.54
2:B:476:GLY:N	2:B:487:ASN:HB3	2.23	0.54
1:C:108:LEU:HD11	1:C:113:SER:OG	2.07	0.54
2:D:456:PHE:HB3	2:D:473:TYR:CD2	2.43	0.53
2:B:385:THR:O	2:B:388:ASN:ND2	2.40	0.53
2:B:392:PHE:HD1	2:B:517:LEU:HB2	1.73	0.53
2:B:349:SER:HB3	2:B:451:TYR:HA	1.91	0.53
1:A:294:THR:HG23	1:A:365:THR:HA	1.91	0.53
2:B:502:GLY:O	2:B:506:GLN:HG3	2.08	0.53
1:A:460:ARG:NH2	1:A:506:VAL:HA	2.24	0.52
1:C:187:LYS:HD2	1:C:199:TYR:CZ	2.44	0.52
2:D:336:CYS:HB2	2:D:363:ALA:HA	1.89	0.52
1:C:252:TYR:HB2	1:C:256:ILE:HD12	1.90	0.52
2:D:436:TRP:CH2	2:D:509:ARG:HD3	2.45	0.52
2:D:476:GLY:H	2:D:487:ASN:HB3	1.74	0.52
2:B:423:TYR:HE1	2:B:425:LEU:HD21	1.75	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:378:LYS:HB3	2:D:380:TYR:CE1	2.45	0.52
2:D:438:SER:O	2:D:438:SER:OG	2.27	0.52
2:D:453:TYR:HE1	2:D:493:GLN:HB3	1.75	0.51
2:D:347:PHE:CD2	2:D:399:SER:HB2	2.45	0.51
1:A:477:TRP:CE3	1:A:500:PRO:HG3	2.45	0.51
2:B:335:LEU:HD22	2:B:338:PHE:HD1	1.75	0.51
2:D:374:PHE:CE1	2:D:377:PHE:N	2.78	0.51
2:D:443:SER:HB3	2:D:507:PRO:HG3	1.91	0.51
1:A:538:PRO:HD2	1:A:541:LYS:HD3	1.93	0.51
2:D:498:ARG:HB2	2:D:501:TYR:CE1	2.46	0.51
1:C:261:CYS:HB2	1:C:488:VAL:HB	1.91	0.51
1:C:103:ASN:ND2	4:F:1:NAG:HN2	1.97	0.51
1:C:108:LEU:HD11	1:C:113:SER:N	2.26	0.51
2:D:359:SER:OG	2:D:394:ASN:OD1	2.14	0.51
5:A:704:NAG:O7	5:A:704:NAG:H3	2.10	0.51
2:B:337:PRO:HB3	2:B:340:GLU:HB3	1.92	0.51
1:C:457:GLU:HG2	1:C:513:ILE:HB	1.93	0.51
2:B:453:TYR:CE1	2:B:493:GLN:HB3	2.46	0.50
1:C:294:THR:HG23	1:C:365:THR:HA	1.92	0.50
2:D:372:ALA:N	2:D:373:PRO:HD3	2.26	0.50
2:D:502:GLY:O	2:D:506:GLN:HG3	2.11	0.50
1:C:268:GLY:O	1:C:277:ASN:ND2	2.33	0.50
2:D:439:ASN:ND2	2:D:506:GLN:HG2	2.27	0.50
1:A:102:GLN:O	1:A:102:GLN:HG3	2.11	0.50
1:C:293:VAL:HB	1:C:423:LEU:HB3	1.92	0.50
2:B:350:VAL:HG22	2:B:422:ASN:HD22	1.77	0.50
2:D:464:PHE:CZ	2:D:514:SER:HB2	2.47	0.50
1:A:121:ASN:O	1:A:125:THR:HG23	2.12	0.49
1:A:239:HIS:CE1	1:A:596:LYS:HG3	2.46	0.49
1:A:525:PHE:O	1:A:529:LEU:HG	2.11	0.49
2:D:401:VAL:HA	2:D:509:ARG:HA	1.93	0.49
2:D:436:TRP:CH2	2:D:509:ARG:HG3	2.47	0.49
2:B:387:LEU:HD22	2:B:515:PHE:HE2	1.76	0.49
2:D:374:PHE:CD1	2:D:374:PHE:C	2.84	0.49
2:B:415:THR:O	2:B:415:THR:OG1	2.29	0.49
2:B:471:GLU:HG3	1:C:197:GLU:HB3	1.94	0.49
2:D:365:TYR:HA	2:D:368:LEU:HB3	1.94	0.49
2:D:379:CYS:C	2:D:381:GLY:H	2.16	0.49
2:B:439:ASN:ND2	2:B:506:GLN:CD	2.66	0.48
1:C:168:TRP:CZ3	1:C:172:VAL:HG21	2.48	0.48
2:D:421:TYR:CE1	2:D:457:ARG:HB3	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:401:VAL:HG11	2:D:451:TYR:HD2	1.72	0.48
2:B:402:ILE:HB	2:B:406:GLU:HB3	1.95	0.48
2:D:436:TRP:HH2	2:D:509:ARG:HG3	1.78	0.48
2:B:342:PHE:CE2	2:B:368:LEU:HD21	2.48	0.48
2:B:335:LEU:HD22	2:B:338:PHE:CD1	2.48	0.48
2:D:439:ASN:HD22	2:D:506:GLN:CD	2.17	0.48
2:B:393:THR:HG22	2:B:517:LEU:HA	1.93	0.48
1:A:229:THR:HB	1:A:581:VAL:CG1	2.43	0.48
2:D:420:ASP:N	2:D:420:ASP:OD1	2.47	0.48
1:A:478:TRP:CD2	1:A:489:GLU:HB3	2.49	0.47
1:A:131:LYS:HB3	1:A:143:LEU:HD23	1.96	0.47
2:D:402:ILE:HA	2:D:495:TYR:CE2	2.48	0.47
1:C:353:LYS:HD3	2:D:501:TYR:CZ	2.49	0.47
2:D:335:LEU:HD21	2:D:364:ASP:HB2	1.96	0.47
2:D:411:ALA:HB3	2:D:414:GLN:HB2	1.96	0.47
1:A:48:TRP:O	1:A:52:THR:HG22	2.15	0.47
1:C:121:ASN:O	1:C:125:THR:HG23	2.14	0.47
1:A:284:PRO:HG2	1:A:436:ILE:HG22	1.96	0.47
2:B:420:ASP:OD1	2:B:420:ASP:N	2.47	0.47
2:D:351:TYR:CE2	2:D:492:LEU:HD21	2.50	0.47
2:B:336:CYS:N	2:B:361:CYS:SG	2.83	0.47
2:D:335:LEU:HD23	2:D:336:CYS:N	2.29	0.47
1:A:54:ILE:O	1:A:55:THR:HG23	2.15	0.47
2:D:404:GLY:N	2:D:504:GLY:O	2.48	0.47
2:D:444:LYS:HG2	2:D:448:ASN:HB2	1.96	0.47
1:C:55:THR:O	1:C:59:VAL:HG23	2.15	0.47
1:C:108:LEU:HD11	1:C:113:SER:HA	1.96	0.47
1:C:455:MET:HE1	1:C:481:LYS:HE2	1.97	0.47
2:B:439:ASN:HD21	2:B:506:GLN:CD	2.19	0.46
1:C:269:ASP:OD1	1:C:272:GLY:N	2.48	0.46
1:A:478:TRP:CE3	1:A:489:GLU:HB3	2.50	0.46
1:C:108:LEU:C	1:C:108:LEU:HD12	2.36	0.46
2:D:436:TRP:HZ3	2:D:438:SER:HB2	1.80	0.46
2:D:452:ARG:HG2	2:D:494:SER:HA	1.96	0.46
2:B:471:GLU:HG3	1:C:197:GLU:CB	2.45	0.46
1:C:34:HIS:ND1	2:D:453:TYR:OH	2.48	0.46
1:A:103:ASN:ND2	5:A:706:NAG:C1	2.77	0.46
2:B:372:ALA:N	2:B:373:PRO:HD3	2.30	0.46
2:D:369:TYR:HB2	2:D:377:PHE:CZ	2.50	0.46
2:B:368:LEU:HG	2:B:371:PHE:CE2	2.50	0.46
2:B:461:LEU:HD23	2:B:461:LEU:HA	1.72	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:131:LYS:HB3	1:C:143:LEU:HD23	1.97	0.46
1:C:30:ASP:O	1:C:34:HIS:HD2	1.99	0.46
1:C:375:GLU:O	1:C:378:HIS:HB2	2.16	0.46
2:B:365:TYR:HE1	2:B:388:ASN:HA	1.80	0.46
1:A:170:SER:O	1:A:174:LYS:HD2	2.16	0.45
1:C:199:TYR:O	1:C:202:TYR:HB3	2.17	0.45
2:D:435:ALA:CB	2:D:510:VAL:HG12	2.46	0.45
2:B:342:PHE:HE2	2:B:368:LEU:HD21	1.82	0.45
1:C:284:PRO:HB3	1:C:594:TRP:CH2	2.50	0.45
1:A:535:HIS:CE1	1:A:542:CYS:HB2	2.52	0.45
1:A:574:VAL:HG23	1:A:576:ALA:H	1.81	0.45
1:A:284:PRO:HB3	1:A:594:TRP:CZ2	2.51	0.45
2:B:419:ALA:O	2:B:424:LYS:HB2	2.17	0.45
1:C:322:ASN:HD22	4:G:1:NAG:C7	2.29	0.45
2:D:349:SER:HB2	2:D:452:ARG:H	1.81	0.45
2:D:350:VAL:O	2:D:353:TRP:HD1	1.98	0.45
2:D:342:PHE:HE1	2:D:511:VAL:HG11	1.81	0.45
2:D:379:CYS:HA	2:D:432:CYS:HA	1.98	0.45
2:D:441:LEU:HD11	2:D:509:ARG:NH1	2.32	0.45
1:A:555:PHE:O	1:A:559:ARG:HG2	2.17	0.45
2:D:374:PHE:HZ	2:D:377:PHE:N	2.11	0.45
2:D:448:ASN:OD1	2:D:450:ASN:HB2	2.18	0.45
1:A:201:ASP:CG	1:A:219:ARG:HE	2.20	0.44
2:B:464:PHE:CZ	2:B:514:SER:HB2	2.53	0.44
1:C:239:HIS:CE1	1:C:596:LYS:HG3	2.52	0.44
1:A:85:LEU:HB3	1:A:94:LYS:HE2	1.99	0.44
2:B:351:TYR:CE2	2:B:492:LEU:HD21	2.52	0.44
1:A:248:LEU:O	1:A:252:TYR:N	2.48	0.44
2:B:475:ALA:HB3	2:B:487:ASN:O	2.18	0.44
1:C:460:ARG:NH2	1:C:510:TYR:O	2.46	0.44
2:D:369:TYR:HB2	2:D:377:PHE:CE2	2.52	0.44
2:D:471:GLU:O	2:D:491:PRO:HG3	2.18	0.44
1:A:395:GLY:O	1:A:562:LYS:HB3	2.17	0.44
2:B:379:CYS:HA	2:B:432:CYS:HA	2.00	0.44
2:D:398:ASP:O	2:D:511:VAL:HA	2.18	0.44
2:D:495:TYR:HD2	2:D:497:PHE:CE2	2.36	0.44
2:D:368:LEU:HA	2:D:371:PHE:HE1	1.83	0.44
2:B:371:PHE:C	2:B:373:PRO:HD3	2.38	0.43
1:C:50:TYR:CE1	1:C:59:VAL:HG22	2.53	0.43
1:C:170:SER:O	1:C:174:LYS:HD2	2.18	0.43
1:C:201:ASP:CG	1:C:219:ARG:HE	2.20	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:396:ALA:HB1	1:C:566:TRP:HA	1.98	0.43
2:D:401:VAL:HG23	2:D:509:ARG:N	2.32	0.43
1:A:232:GLU:HB2	1:A:581:VAL:HG21	2.01	0.43
1:A:519:THR:O	1:A:522:GLN:HG2	2.18	0.43
1:A:50:TYR:HE1	1:A:59:VAL:HG22	1.80	0.43
2:D:374:PHE:HE1	2:D:376:THR:N	2.11	0.43
1:C:165:TRP:CH2	1:C:490:PRO:HD2	2.54	0.43
2:D:342:PHE:HE2	2:D:368:LEU:HD21	1.83	0.43
2:D:435:ALA:CA	2:D:510:VAL:HG12	2.48	0.43
1:A:99:ALA:O	1:A:102:GLN:HG2	2.19	0.43
1:C:103:ASN:O	1:C:107:VAL:HG12	2.19	0.43
1:C:375:GLU:OE1	1:C:378:HIS:HD2	2.02	0.43
2:D:409:GLN:OE1	2:D:418:ILE:N	2.47	0.43
1:A:145:GLU:HA	1:A:146:PRO:HA	1.88	0.43
2:B:464:PHE:HZ	2:B:514:SER:HB2	1.83	0.43
1:C:102:GLN:OE1	1:C:102:GLN:HA	2.19	0.42
1:C:453:THR:HG23	1:C:512:PHE:CD2	2.54	0.42
2:D:461:LEU:HA	2:D:461:LEU:HD23	1.73	0.42
2:D:347:PHE:HD1	2:D:509:ARG:HE	1.67	0.42
1:A:84:PRO:O	1:A:88:ILE:HG13	2.19	0.42
1:C:108:LEU:CD1	1:C:113:SER:N	2.82	0.42
2:B:422:ASN:HA	2:B:461:LEU:CD1	2.48	0.42
2:B:453:TYR:CE1	2:B:455:LEU:HB3	2.54	0.42
2:D:364:ASP:O	2:D:368:LEU:HB2	2.19	0.42
2:B:458:LYS:NZ	2:B:471:GLU:OE2	2.38	0.42
2:B:472:ILE:HG21	2:B:483:VAL:O	2.19	0.42
2:D:346:THR:HA	2:D:509:ARG:HH21	1.85	0.42
2:D:353:TRP:HB3	2:D:400:PHE:HB3	2.01	0.42
2:D:438:SER:OG	2:D:442:ASP:HB2	2.20	0.42
2:B:335:LEU:HD23	2:B:336:CYS:H	1.85	0.42
2:B:347:PHE:CE2	2:B:399:SER:HB2	2.55	0.42
1:C:382:ASP:HA	1:C:385:TYR:CZ	2.54	0.42
1:A:177:ARG:HD3	1:A:497:TYR:O	2.20	0.42
1:C:482:ARG:HD3	1:C:608:THR:O	2.20	0.42
2:D:378:LYS:CB	2:D:380:TYR:CE1	3.03	0.42
2:D:411:ALA:O	2:D:425:LEU:HB2	2.20	0.42
1:A:450:LEU:HB2	1:A:451:PRO:HD3	2.02	0.42
1:C:81:GLN:HG3	4:F:1:NAG:H81	1.63	0.42
1:A:535:HIS:HE1	1:A:538:PRO:O	2.03	0.41
2:B:438:SER:OG	2:B:507:PRO:HB2	2.19	0.41
2:D:410:ILE:HD12	2:D:423:TYR:HD2	1.84	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:101:GLN:O	1:A:103:ASN:N	2.53	0.41
2:B:441:LEU:HD11	2:B:509:ARG:NH1	2.35	0.41
2:D:418:ILE:C	2:D:420:ASP:H	2.23	0.41
2:D:436:TRP:O	2:D:508:TYR:CD2	2.73	0.41
1:A:511:SER:O	1:A:514:ARG:HD2	2.20	0.41
1:C:145:GLU:HA	1:C:146:PRO:HA	1.90	0.41
1:C:161:ARG:NE	1:C:265:HIS:O	2.50	0.41
1:C:284:PRO:HG2	1:C:436:ILE:HG22	2.03	0.41
2:D:374:PHE:HZ	2:D:377:PHE:H	1.69	0.41
2:D:398:ASP:OD2	2:D:464:PHE:HE1	2.03	0.41
1:A:594:TRP:CZ2	1:A:598:GLN:HG3	2.56	0.41
2:B:393:THR:CG2	2:B:516:GLU:HG3	2.51	0.41
2:D:425:LEU:HD22	2:D:429:PHE:CE2	2.56	0.41
2:B:336:CYS:O	2:B:338:PHE:HD1	2.03	0.41
2:B:452:ARG:HA	2:B:494:SER:HA	2.03	0.41
1:C:524:GLN:HB3	1:C:574:VAL:HG11	2.02	0.41
2:D:336:CYS:O	2:D:338:PHE:N	2.54	0.41
2:D:368:LEU:HA	2:D:371:PHE:CE1	2.56	0.41
2:D:436:TRP:CE3	2:D:436:TRP:C	2.94	0.41
1:A:144:LEU:HB2	1:A:168:TRP:CH2	2.56	0.41
2:B:453:TYR:HD2	2:B:495:TYR:HE1	1.61	0.41
1:A:54:ILE:HG21	1:A:341:LYS:HB2	2.03	0.40
1:A:73:LEU:HD23	1:A:73:LEU:HA	1.92	0.40
2:D:382:VAL:HG12	2:D:383:SER:N	2.36	0.40
1:A:482:ARG:CZ	1:A:488:VAL:HG23	2.52	0.40
1:C:229:THR:HB	1:C:581:VAL:CG1	2.51	0.40
1:C:456:LEU:HD23	1:C:460:ARG:HD2	2.02	0.40
2:D:380:TYR:HE2	2:D:411:ALA:HA	1.85	0.40
2:D:436:TRP:HE3	2:D:436:TRP:C	2.24	0.40
2:D:436:TRP:CE3	2:D:437:ASN:O	2.75	0.40
2:D:499:PRO:HG2	2:D:500:THR:HG23	2.03	0.40
1:A:33:ASN:O	1:A:37:GLU:HG3	2.22	0.40
2:B:380:TYR:CE2	2:B:412:PRO:HD3	2.56	0.40
1:C:450:LEU:HA	1:C:450:LEU:HD23	1.83	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	596/597 (100%)	572 (96%)	22 (4%)	2 (0%)	37	66
1	C	596/597 (100%)	571 (96%)	24 (4%)	1 (0%)	44	72
2	B	192/194 (99%)	156 (81%)	28 (15%)	8 (4%)	2	17
2	D	192/194 (99%)	149 (78%)	38 (20%)	5 (3%)	4	25
All	All	1576/1582 (100%)	1448 (92%)	112 (7%)	16 (1%)	13	43

All (16) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	337	PRO
2	B	338	PHE
2	B	372	ALA
2	B	481	ASN
2	D	439	ASN
1	A	102	GLN
1	C	110	GLU
2	D	373	PRO
2	D	384	PRO
2	B	410	ILE
1	A	473	TRP
2	B	381	GLY
2	B	384	PRO
2	B	402	ILE
2	D	402	ILE
2	D	410	ILE

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	528/527 (100%)	523 (99%)	5 (1%)	75	85
1	C	528/527 (100%)	520 (98%)	8 (2%)	60	76
2	B	167/167 (100%)	157 (94%)	10 (6%)	16	42
2	D	167/167 (100%)	154 (92%)	13 (8%)	10	33
All	All	1390/1388 (100%)	1354 (97%)	36 (3%)	41	61

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	190	MET
1	A	381	TYR
1	A	409	SER
1	A	476	LYS
1	A	547	SER
2	B	356	LYS
2	B	357	ARG
2	B	361	CYS
2	B	365	TYR
2	B	377	PHE
2	B	379	CYS
2	B	432	CYS
2	B	453	TYR
2	B	454	ARG
2	B	462	LYS
1	C	111	ASP
1	C	190	MET
1	C	322	ASN
1	C	381	TYR
1	C	385	TYR
1	C	409	SER
1	C	476	LYS
1	C	547	SER
2	D	356	LYS
2	D	357	ARG
2	D	365	TYR
2	D	369	TYR
2	D	370	ASN
2	D	374	PHE
2	D	377	PHE

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Mol	Chain	Res	Type
2	D	379	CYS
2	D	432	CYS
2	D	453	TYR
2	D	454	ARG
2	D	462	LYS
2	D	518	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	535	HIS
2	B	422	ASN
2	B	437	ASN
2	B	439	ASN
1	C	103	ASN
2	D	422	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

10 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	E	1	3,1	14,14,15	0.48	0	17,19,21	0.72	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	E	2	3	14,14,15	1.11	1 (7%)	17,19,21	1.13	1 (5%)
3	BMA	E	3	3	11,11,12	1.40	1 (9%)	15,15,17	1.20	1 (6%)
4	NAG	F	1	4	14,14,15	1.29	2 (14%)	17,19,21	1.14	2 (11%)
4	NAG	F	2	4	14,14,15	0.66	0	17,19,21	1.42	2 (11%)
4	NAG	G	1	4,1	14,14,15	0.43	0	17,19,21	1.01	1 (5%)
4	NAG	G	2	4	14,14,15	1.87	1 (7%)	17,19,21	1.75	3 (17%)
3	NAG	H	1	3,1	14,14,15	0.42	0	17,19,21	1.04	1 (5%)
3	NAG	H	2	3	14,14,15	0.39	0	17,19,21	1.35	2 (11%)
3	BMA	H	3	3	11,11,12	1.64	2 (18%)	15,15,17	2.06	2 (13%)

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	E	1	3,1	-	3/6/23/26	0/1/1/1
3	NAG	E	2	3	-	2/6/23/26	0/1/1/1
3	BMA	E	3	3	-	2/2/19/22	0/1/1/1
4	NAG	F	1	4	-	1/6/23/26	0/1/1/1
4	NAG	F	2	4	-	0/6/23/26	0/1/1/1
4	NAG	G	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	G	2	4	-	2/6/23/26	0/1/1/1
3	NAG	H	1	3,1	-	1/6/23/26	0/1/1/1
3	NAG	H	2	3	-	2/6/23/26	0/1/1/1
3	BMA	H	3	3	-	2/2/19/22	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	G	2	NAG	O5-C1	6.43	1.54	1.43
4	F	1	NAG	C1-C2	4.26	1.58	1.52
3	E	2	NAG	O5-C1	3.52	1.49	1.43
3	H	3	BMA	C1-C2	3.37	1.59	1.52
3	E	3	BMA	O5-C1	3.12	1.48	1.43
3	H	3	BMA	C2-C3	2.90	1.56	1.52
4	F	1	NAG	C3-C2	2.01	1.56	1.52

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	3	BMA	C1-O5-C5	-6.63	103.21	112.19
4	G	2	NAG	C2-N2-C7	4.54	129.37	122.90
4	G	2	NAG	C1-O5-C5	4.33	118.06	112.19
4	F	2	NAG	C3-C4-C5	4.04	117.44	110.24
3	H	2	NAG	C3-C4-C5	3.75	116.93	110.24
3	H	1	NAG	C1-O5-C5	3.30	116.66	112.19
4	F	1	NAG	C4-C3-C2	2.98	115.39	111.02
3	H	3	BMA	O5-C5-C6	2.55	111.21	107.20
3	H	2	NAG	O4-C4-C5	-2.53	103.03	109.30
3	E	2	NAG	C1-O5-C5	2.40	115.45	112.19
4	F	2	NAG	C4-C3-C2	2.26	114.34	111.02
4	G	1	NAG	C3-C4-C5	2.25	114.26	110.24
4	F	1	NAG	C1-O5-C5	-2.17	109.25	112.19
3	E	3	BMA	C1-O5-C5	2.03	114.94	112.19
4	G	2	NAG	C1-C2-N2	2.01	113.92	110.49

There are no chirality outliers.

All (17) torsion outliers are listed below:

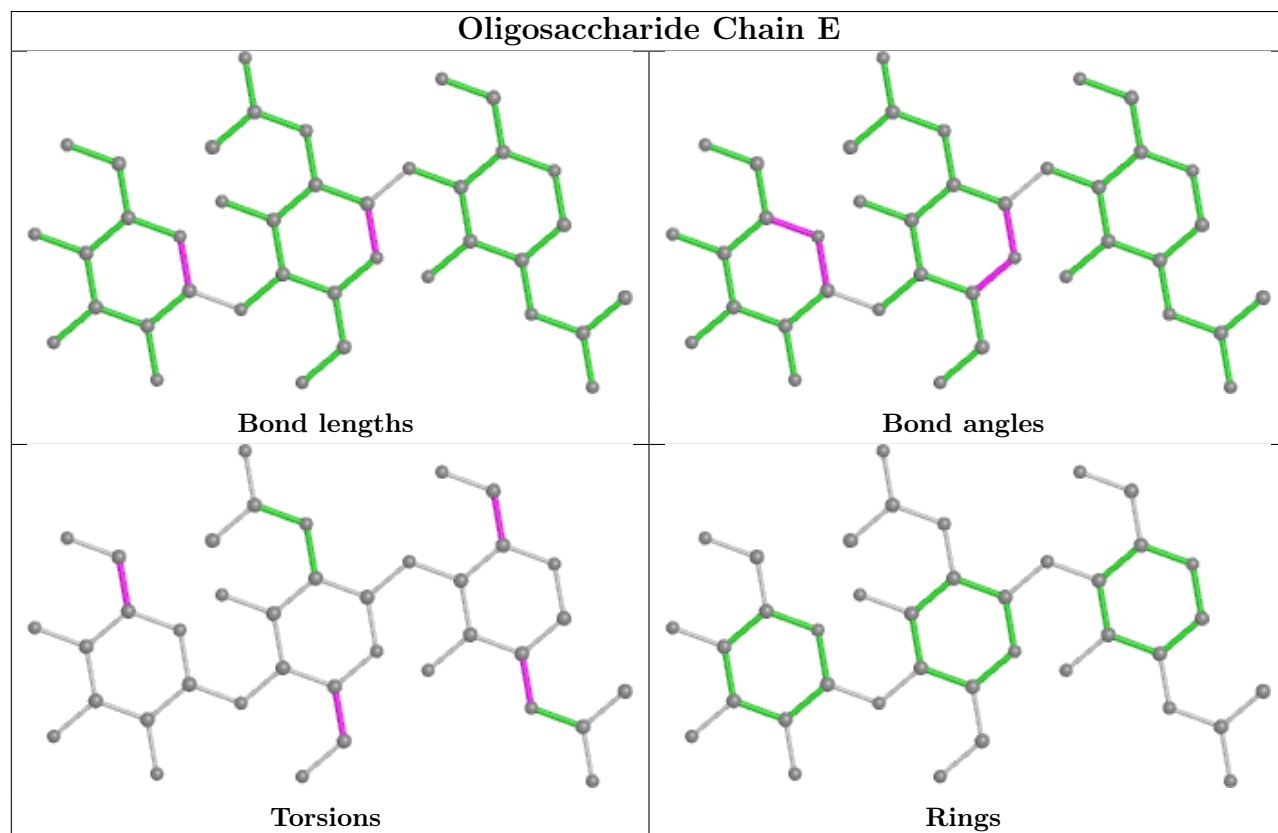
Mol	Chain	Res	Type	Atoms
4	G	2	NAG	C3-C2-N2-C7
3	E	3	BMA	O5-C5-C6-O6
3	H	3	BMA	O5-C5-C6-O6
4	G	1	NAG	O5-C5-C6-O6
3	H	3	BMA	C4-C5-C6-O6
3	E	2	NAG	C4-C5-C6-O6
3	E	2	NAG	O5-C5-C6-O6
4	G	1	NAG	C4-C5-C6-O6
3	E	3	BMA	C4-C5-C6-O6
3	E	1	NAG	C4-C5-C6-O6
4	F	1	NAG	O5-C5-C6-O6
4	G	2	NAG	O5-C5-C6-O6
3	H	2	NAG	O5-C5-C6-O6
3	H	2	NAG	C4-C5-C6-O6
3	E	1	NAG	O5-C5-C6-O6
3	E	1	NAG	C1-C2-N2-C7
3	H	1	NAG	C4-C5-C6-O6

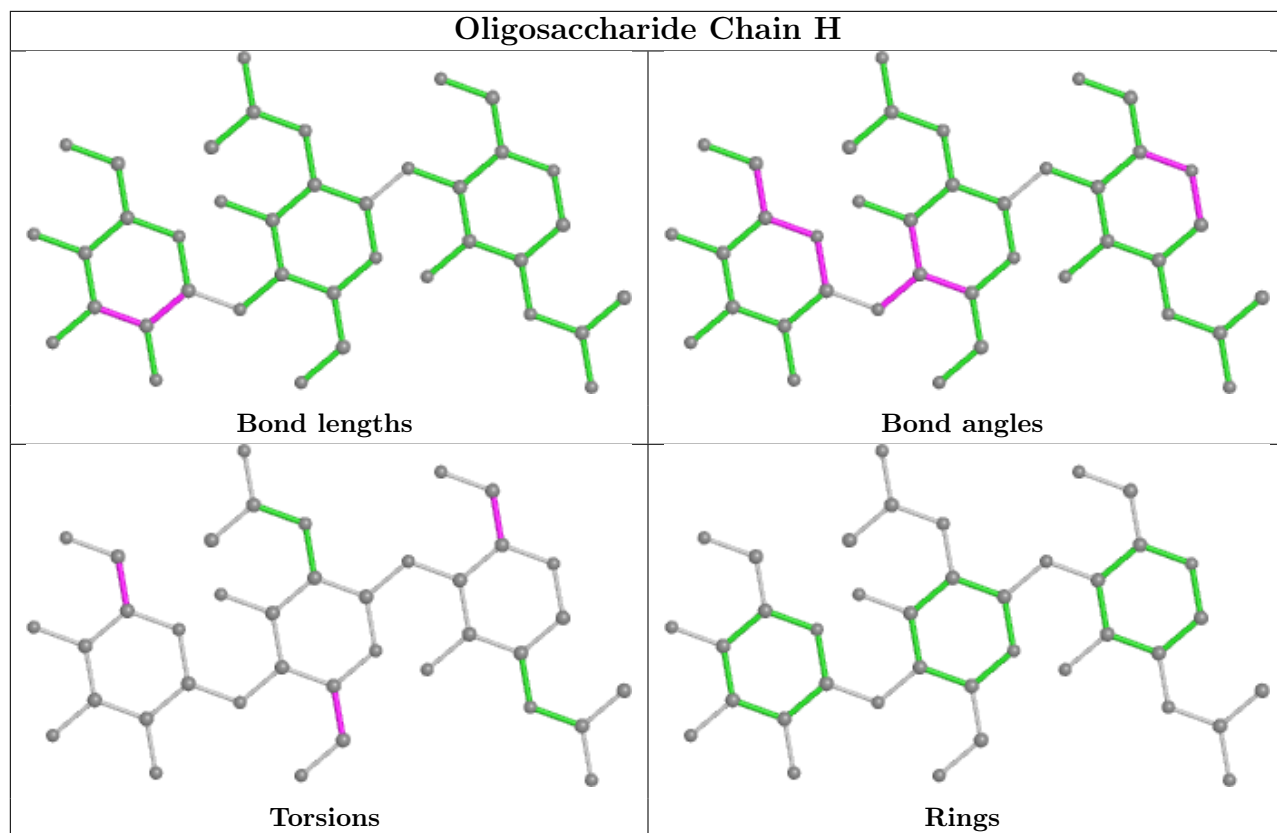
There are no ring outliers.

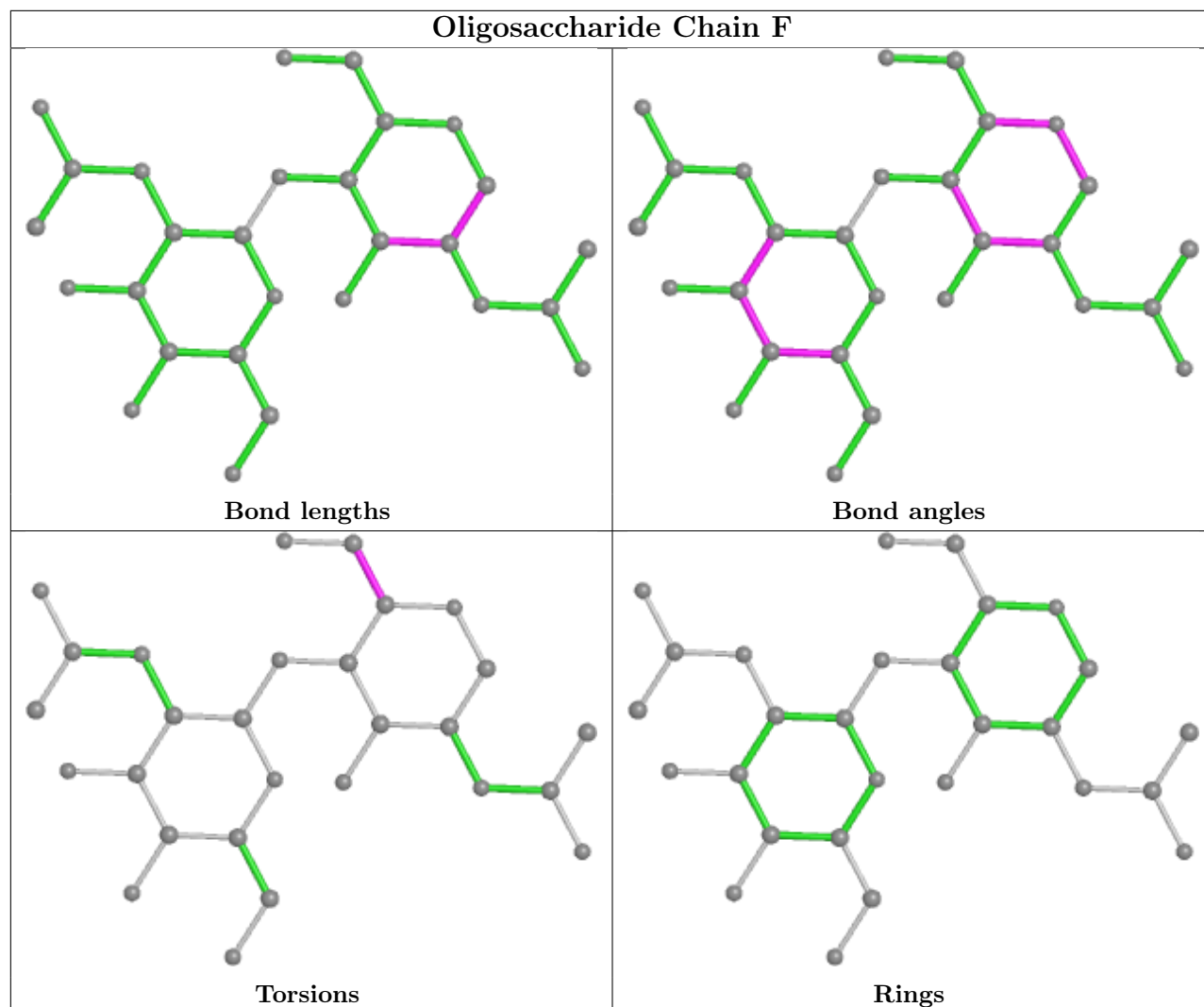
2 monomers are involved in 8 short contacts:

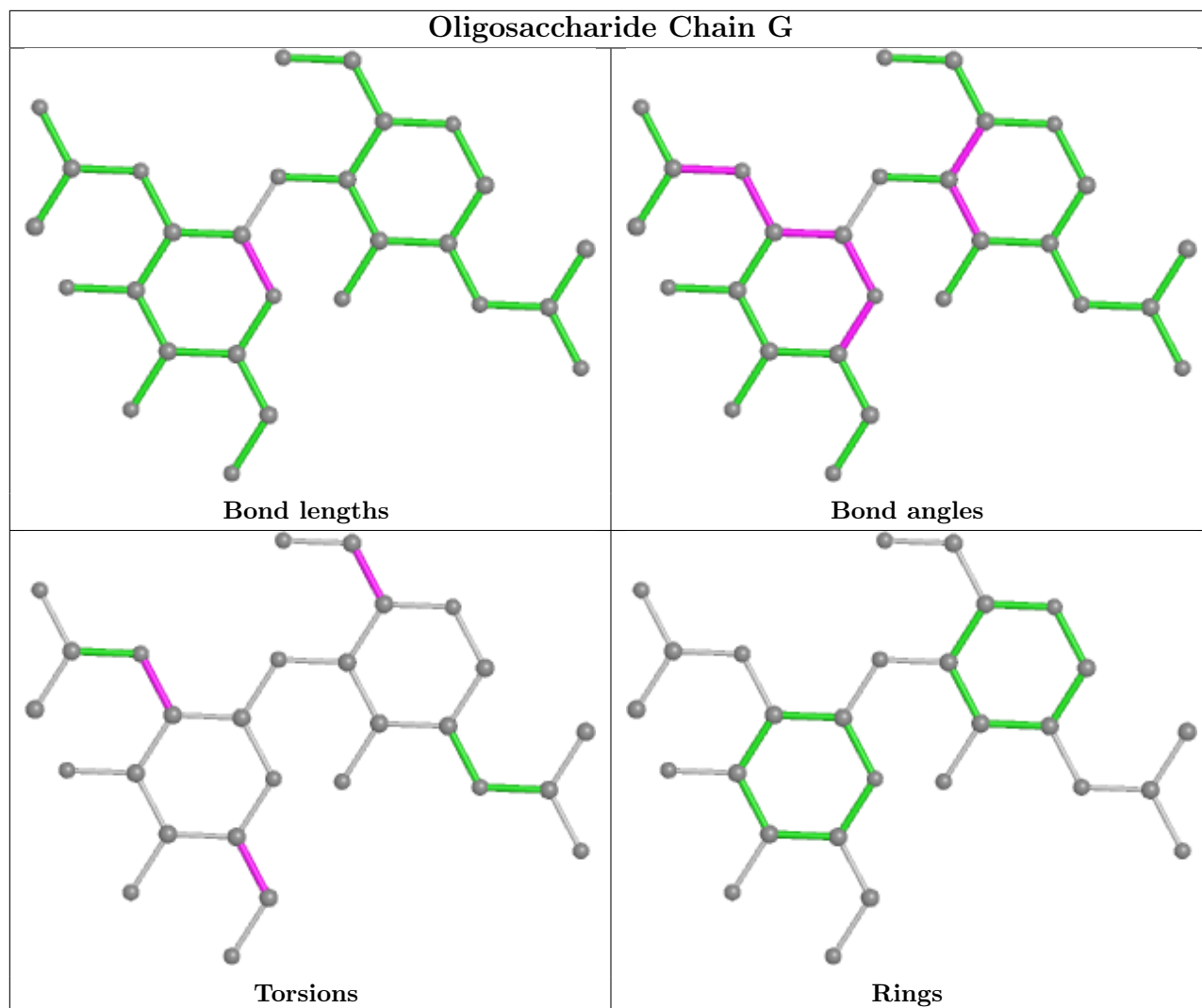
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	1	NAG	7	0
4	G	1	NAG	1	0

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](#)

13 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	A	704	5,1	14,14,15	0.70	0	17,19,21	1.09	2 (11%)
5	NAG	A	707	5,1	14,14,15	1.05	1 (7%)	17,19,21	0.92	1 (5%)
5	NAG	C	701	1	14,14,15	0.33	0	17,19,21	0.55	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	A	705	5,6	14,14,15	0.49	0	17,19,21	0.77	0
5	NAG	A	706	-	14,14,15	0.59	0	17,19,21	1.03	2 (11%)
5	NAG	A	709	5,1	14,14,15	0.50	0	17,19,21	0.78	0
5	NAG	A	708	5	14,14,15	0.51	0	17,19,21	0.71	1 (5%)
5	NAG	A	710	5	14,14,15	0.88	1 (7%)	17,19,21	1.08	2 (11%)
5	NAG	A	711	1	14,14,15	1.03	2 (14%)	17,19,21	1.17	1 (5%)
5	NAG	A	702	5,6	14,14,15	0.41	0	17,19,21	0.32	0
6	BMA	A	703	5	11,11,12	0.23	0	15,15,17	0.54	0
6	BMA	B	601	5	11,11,12	1.18	2 (18%)	15,15,17	0.88	0
5	NAG	A	701	5,1	14,14,15	0.39	0	17,19,21	0.54	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	A	704	5,1	-	3/6/23/26	0/1/1/1
5	NAG	A	707	5,1	-	2/6/23/26	0/1/1/1
5	NAG	C	701	1	-	2/6/23/26	0/1/1/1
5	NAG	A	705	5,6	-	2/6/23/26	0/1/1/1
5	NAG	A	706	-	-	3/6/23/26	0/1/1/1
5	NAG	A	709	5,1	-	1/6/23/26	0/1/1/1
5	NAG	A	708	5	-	2/6/23/26	0/1/1/1
5	NAG	A	710	5	-	1/6/23/26	0/1/1/1
5	NAG	A	711	1	-	2/6/23/26	0/1/1/1
5	NAG	A	702	5,6	-	2/6/23/26	0/1/1/1
6	BMA	A	703	5	-	0/2/19/22	0/1/1/1
6	BMA	B	601	5	-	2/2/19/22	0/1/1/1
5	NAG	A	701	5,1	-	4/6/23/26	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	707	NAG	C1-C2	3.58	1.57	1.52
5	A	711	NAG	O5-C1	3.06	1.48	1.43
6	B	601	BMA	C1-C2	2.87	1.58	1.52
5	A	710	NAG	C1-C2	2.21	1.55	1.52
6	B	601	BMA	C2-C3	2.06	1.55	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	711	NAG	C1-C2	2.02	1.55	1.52

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	711	NAG	C2-N2-C7	4.07	128.69	122.90
5	A	710	NAG	C4-C3-C2	2.86	115.21	111.02
5	A	704	NAG	C1-O5-C5	2.50	115.58	112.19
5	A	706	NAG	C2-N2-C7	2.42	126.34	122.90
5	A	704	NAG	O4-C4-C3	-2.29	105.05	110.35
5	A	710	NAG	C3-C4-C5	2.27	114.28	110.24
5	A	707	NAG	C4-C3-C2	2.17	114.19	111.02
5	A	706	NAG	C1-O5-C5	-2.08	109.38	112.19
5	A	708	NAG	C1-O5-C5	2.07	115.00	112.19

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	702	NAG	C8-C7-N2-C2
5	A	706	NAG	C1-C2-N2-C7
5	A	711	NAG	C3-C2-N2-C7
6	B	601	BMA	O5-C5-C6-O6
5	A	701	NAG	C4-C5-C6-O6
5	A	701	NAG	C8-C7-N2-C2
5	A	701	NAG	O7-C7-N2-C2
5	A	702	NAG	O7-C7-N2-C2
5	C	701	NAG	O5-C5-C6-O6
5	A	708	NAG	O5-C5-C6-O6
5	C	701	NAG	C4-C5-C6-O6
6	B	601	BMA	C4-C5-C6-O6
5	A	708	NAG	C4-C5-C6-O6
5	A	705	NAG	C8-C7-N2-C2
5	A	705	NAG	O7-C7-N2-C2
5	A	704	NAG	C4-C5-C6-O6
5	A	701	NAG	O5-C5-C6-O6
5	A	704	NAG	O5-C5-C6-O6
5	A	707	NAG	C1-C2-N2-C7
5	A	710	NAG	C1-C2-N2-C7
5	A	711	NAG	O5-C5-C6-O6
5	A	706	NAG	O5-C5-C6-O6
5	A	704	NAG	C3-C2-N2-C7

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Mol	Chain	Res	Type	Atoms
5	A	706	NAG	C3-C2-N2-C7
5	A	709	NAG	C1-C2-N2-C7
5	A	707	NAG	C3-C2-N2-C7

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	704	NAG	1	0
5	A	706	NAG	3	0
5	A	711	NAG	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	597/597 (100%)	-0.61	1 (0%) 92 84	75, 128, 188, 289	1 (0%)
1	C	597/597 (100%)	-0.56	0 100 100	70, 126, 186, 257	1 (0%)
2	B	194/194 (100%)	-0.31	1 (0%) 87 71	94, 139, 239, 320	0
2	D	194/194 (100%)	-0.30	0 100 100	103, 156, 273, 312	0
All	All	1582/1582 (100%)	-0.52	2 (0%) 92 88	70, 131, 217, 320	2 (0%)

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	365	TYR	2.3
1	A	491	VAL	2.0

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

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

6.3 Carbohydrates [i](#)

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.

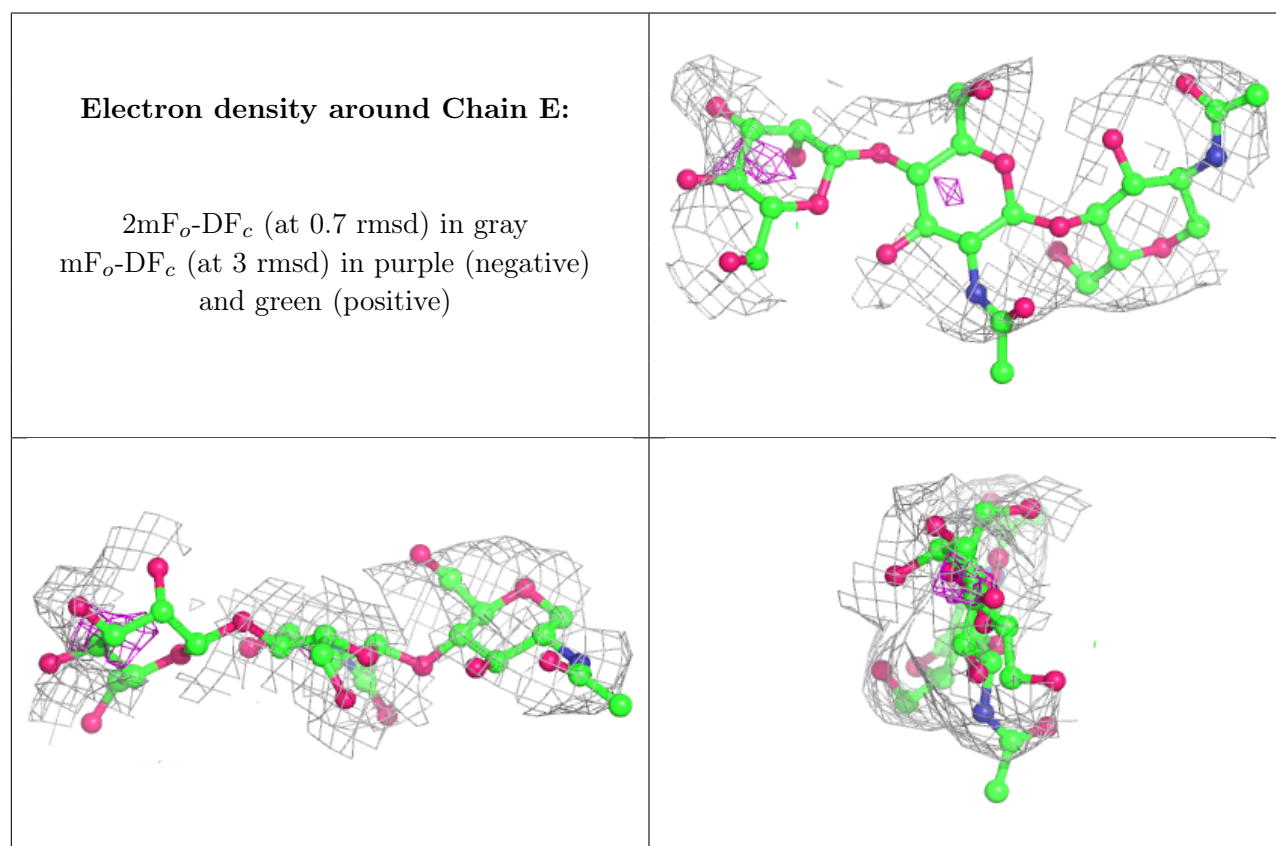
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAG	G	1	14/15	0.29	0.11	128,137,145,148	0
3	BMA	E	3	11/12	0.35	0.11	127,143,153,156	0
4	NAG	F	2	14/15	0.44	0.12	120,143,149,152	0
4	NAG	G	2	14/15	0.44	0.11	134,150,177,178	0
3	BMA	H	3	11/12	0.46	0.10	132,145,155,155	0

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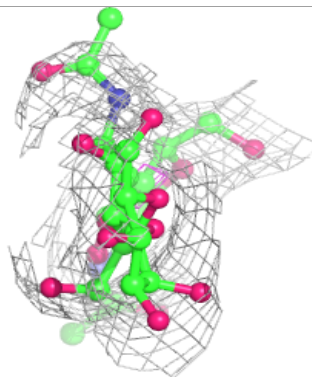
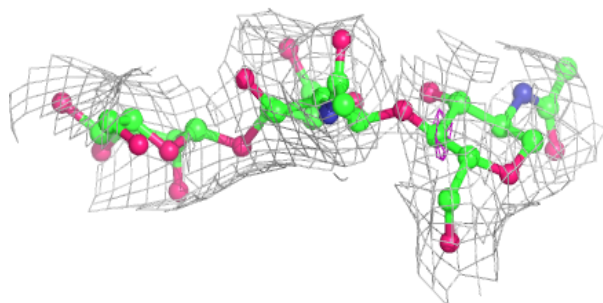
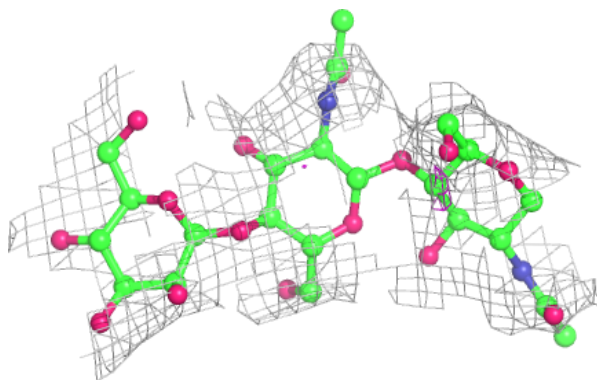
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	NAG	H	2	14/15	0.52	0.09	132,140,145,146	0
3	NAG	H	1	14/15	0.61	0.10	139,143,147,148	0
4	NAG	F	1	14/15	0.68	0.15	149,169,180,189	0
3	NAG	E	1	14/15	0.81	0.08	110,122,130,130	0
3	NAG	E	2	14/15	0.81	0.07	126,134,140,141	0

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.



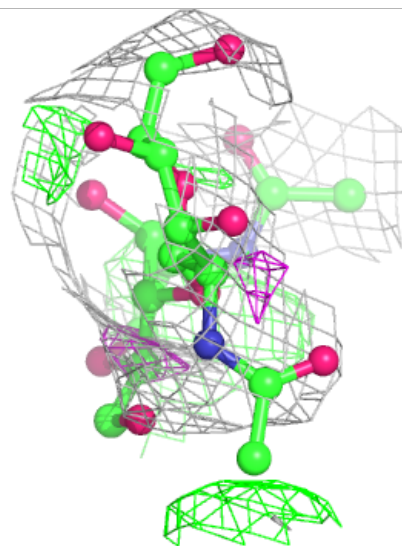
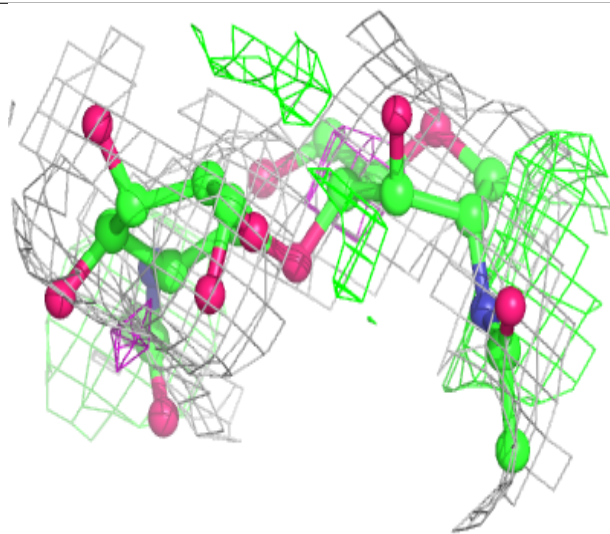
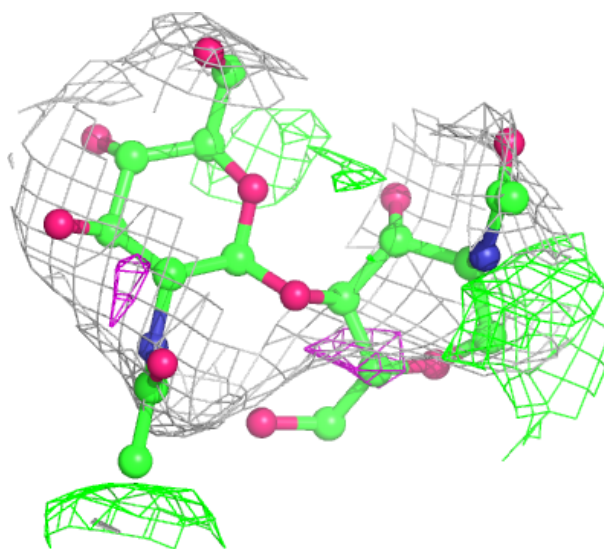
Electron density around Chain H:

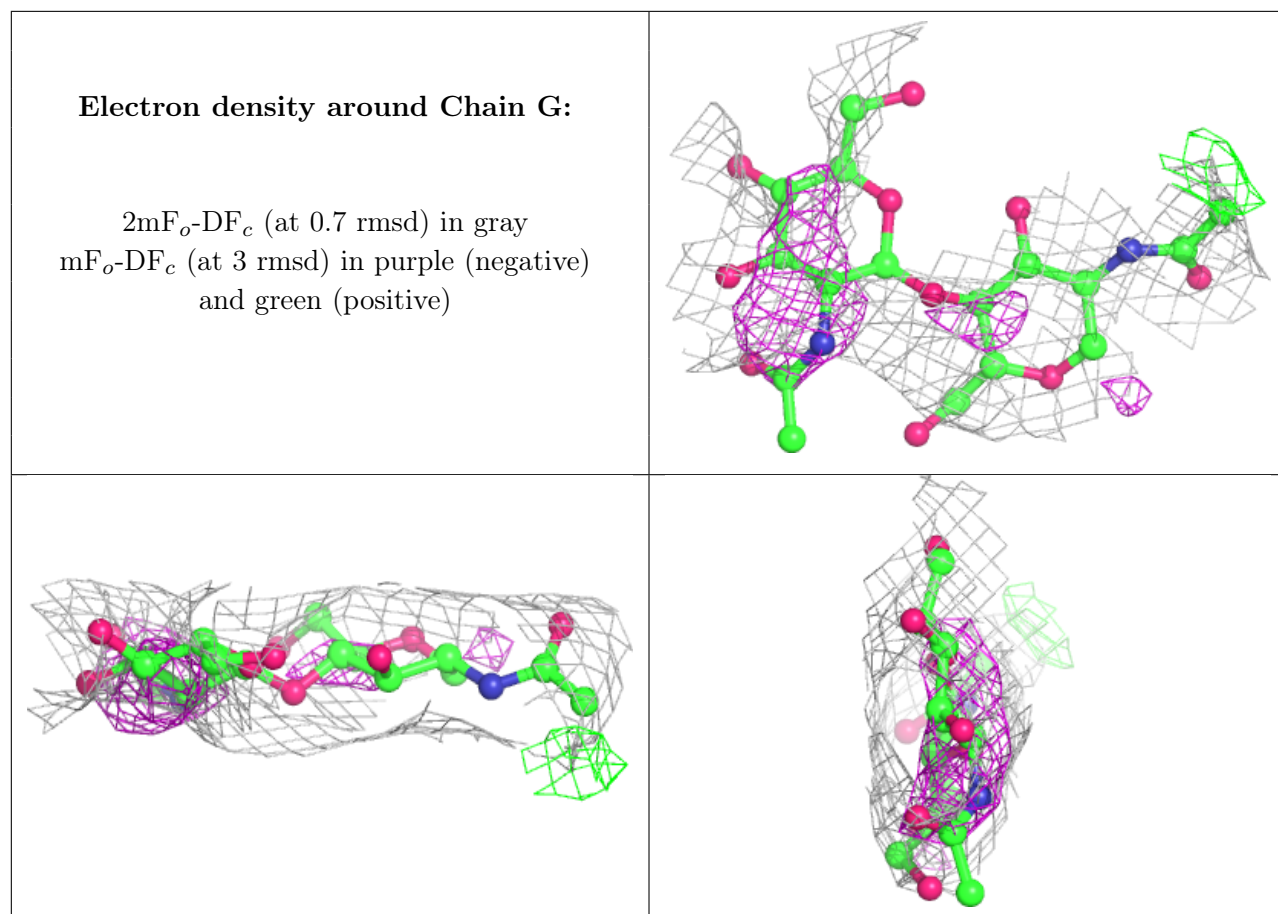
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain F:

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





6.4 Ligands [i](#)

LIGAND-RSR INFOmissingINFO

6.5 Other polymers [i](#)

There are no such residues in this entry.