



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 13, 2024 – 12:44 AM EDT

PDB ID : 1HGI
Title : BINDING OF INFLUENZA VIRUS HEMAGGLUTININ TO ANALOGS OF ITS CELL-SURFACE RECEPTOR, SIALIC ACID: ANALYSIS BY PROTON NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY AND X-RAY CRYSTALLOGRAPHY
Authors : Sauter, N.K.; Hanson, J.E.; Glick, G.D.; Brown, J.H.; Crowther, R.L.; Park, S.-J.; Skehel, J.J.; Wiley, D.C.
Deposited on : 1991-11-01
Resolution : 2.70 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)	:	1.13
EDS	:	2.36.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)

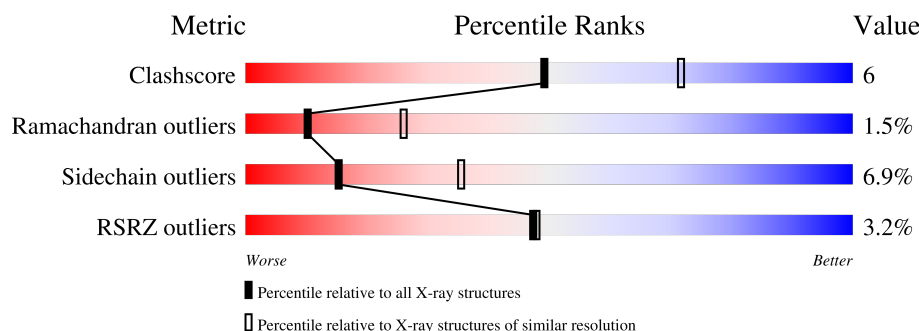
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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))
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)


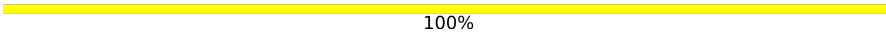
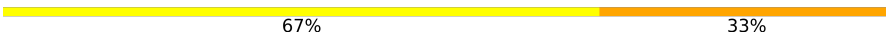
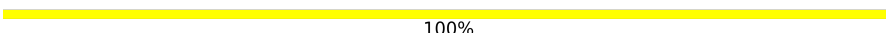
The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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	328	<div> <div>3%</div> <div> <div></div> <div>74%</div> <div>20%</div> <div>5%</div> </div> </div>
1	C	328	<div> <div>3%</div> <div> <div></div> <div>74%</div> <div>21%</div> <div></div> </div> </div>
1	E	328	<div> <div>3%</div> <div> <div></div> <div>75%</div> <div>21%</div> <div></div> </div> </div>
2	B	175	<div> <div>3%</div> <div> <div></div> <div>79%</div> <div>18%</div> <div></div> </div> </div>
2	D	175	<div> <div>3%</div> <div> <div></div> <div>77%</div> <div>19%</div> <div></div> </div> </div>

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Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

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Mol	Chain	Length	Quality of chain
2	F	175	 3% 78% 19%
3	G	3	 100%
3	H	3	 67% 33%
3	I	3	 100%

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 15519 atoms, of which 3228 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.

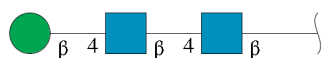
- Molecule 1 is a protein called HEMAGGLUTININ, CHAIN HA1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	328	Total	C	H	N	O	S	0	0	0
			3120	1581	588	445	493	13			
1	C	328	Total	C	H	N	O	S	0	0	0
			3120	1581	588	445	493	13			
1	E	328	Total	C	H	N	O	S	0	0	0
			3120	1581	588	445	493	13			

- Molecule 2 is a protein called HEMAGGLUTININ, CHAIN HA1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	175	Total	C	H	N	O	S	0	0	0
			1752	882	331	250	283	6			
2	D	175	Total	C	H	N	O	S	0	0	0
			1752	882	331	250	283	6			
2	F	175	Total	C	H	N	O	S	0	0	0
			1752	882	331	250	283	6			

- 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.



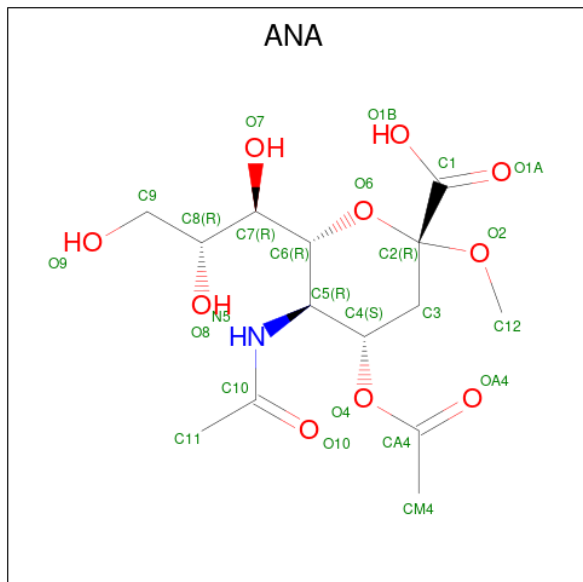
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	G	3	Total	C	H	N	O		0	0	0
			76	22	37	2	15				
3	H	3	Total	C	H	N	O		0	0	0
			76	22	37	2	15				
3	I	3	Total	C	H	N	O		0	0	0
			76	22	37	2	15				

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	B	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	C	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	C	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	C	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	D	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	E	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	E	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	E	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
4	F	1	Total	C	H	N	O	0	0
			28	8	14	1	5		

- Molecule 5 is methyl 4-O-acetyl-5-acetamido-3,5-dideoxy-D-glycero-alpha-D-galacto-non-2-ulopyranosidonic acid (three-letter code: ANA) (formula: $C_{14}H_{23}NO_{10}$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	H	N	O	0	0
			41	14	16	1	10		
5	C	1	Total	C	H	N	O	0	0
			41	14	16	1	10		
5	E	1	Total	C	H	N	O	0	0
			41	14	16	1	10		

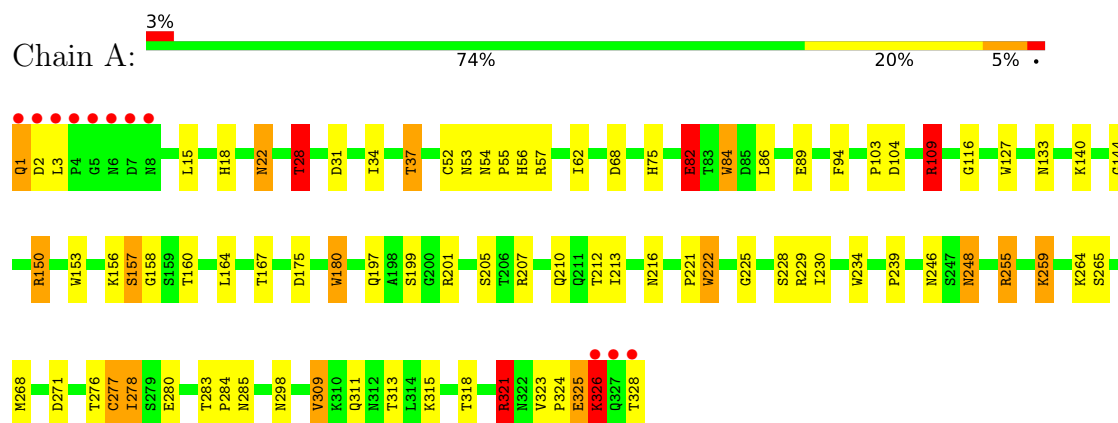
- Molecule 6 is water.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	11	Total	H	O	0	0
			33	22	11		
6	B	12	Total	H	O	0	0
			36	24	12		
6	C	10	Total	H	O	0	0
			30	20	10		
6	D	14	Total	H	O	0	0
			42	28	14		
6	E	12	Total	H	O	0	0
			36	24	12		
6	F	13	Total	H	O	0	0
			39	26	13		

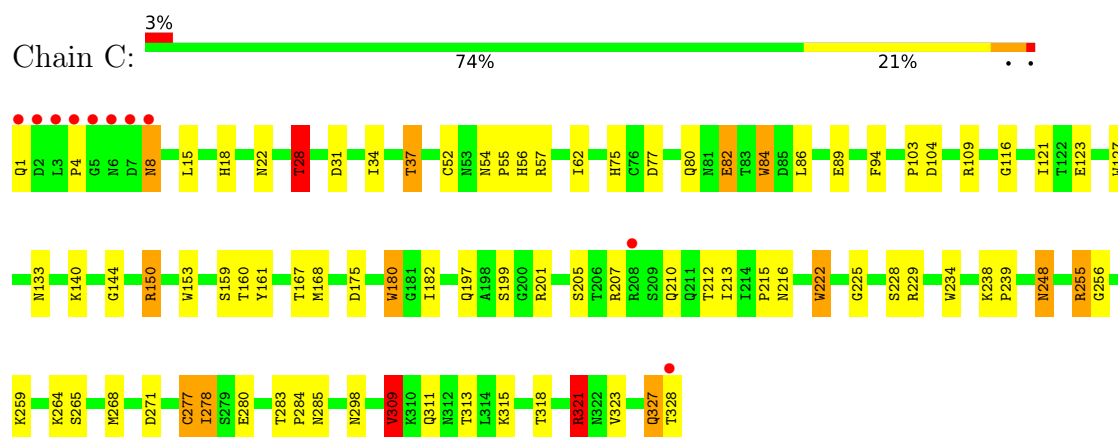
3 Residue-property plots

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.

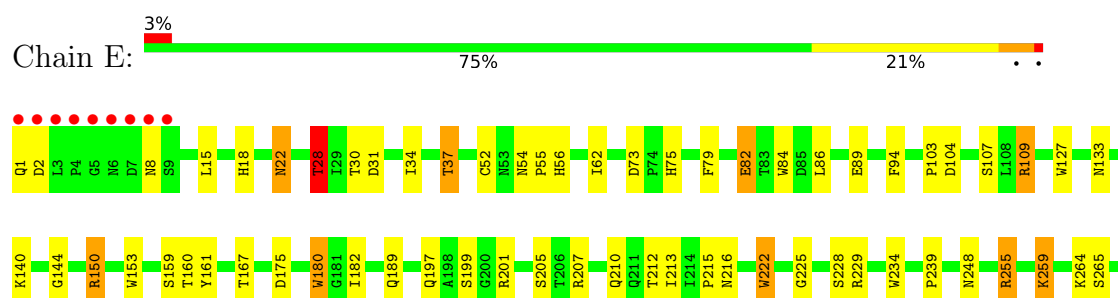
• Molecule 1: HEMAGGLUTININ, CHAIN HA1

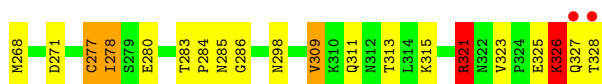


• Molecule 1: HEMAGGLUTININ, CHAIN HA1

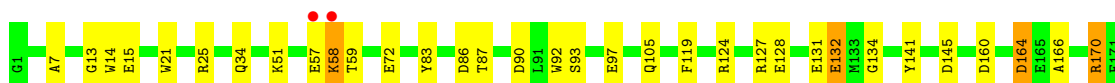
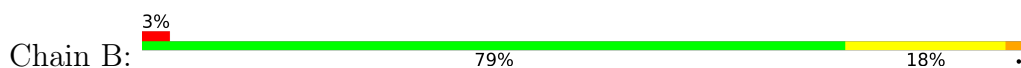


• Molecule 1: HEMAGGLUTININ, CHAIN HA1

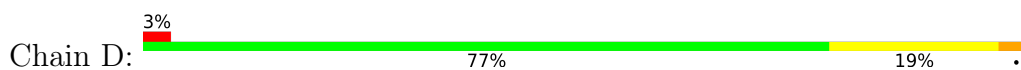




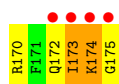
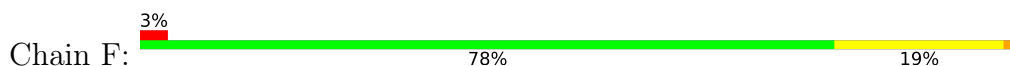
- Molecule 2: HEMAGGLUTININ, CHAIN HA1



- Molecule 2: HEMAGGLUTININ, CHAIN HA1



- Molecule 2: HEMAGGLUTININ, CHAIN HA1



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



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





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

Chain I:  100%



4 Data and refinement statistics

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	162.70Å 162.70Å 178.20Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	7.00 – 2.70 12.86 – 2.71	Depositor EDS
% Data completeness (in resolution range)	(Not available) (7.00-2.70) 55.0 (12.86-2.71)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.92 (at 2.71Å)	Xtriage
Refinement program	X-PLOR	Depositor
R, R_{free}	0.223 , (Not available) 0.212 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	37.1	Xtriage
Anisotropy	0.346	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 46.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.033 for h,-k,-l	Xtriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	15519	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.95% 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: ANA, 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	0.92	1/2589 (0.0%)	1.50	44/3527 (1.2%)
1	C	0.89	0/2589	1.47	36/3527 (1.0%)
1	E	0.92	0/2589	1.49	38/3527 (1.1%)
2	B	0.94	0/1445	1.47	15/1939 (0.8%)
2	D	0.96	0/1445	1.48	18/1939 (0.9%)
2	F	0.94	0/1445	1.47	13/1939 (0.7%)
All	All	0.92	1/12102 (0.0%)	1.48	164/16398 (1.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	234	TRP	CG-CD2	-5.12	1.34	1.43

All (164) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	321	ARG	NE-CZ-NH2	-14.67	112.96	120.30
1	C	321	ARG	NE-CZ-NH2	-14.29	113.16	120.30
1	A	321	ARG	NE-CZ-NH2	-13.67	113.47	120.30
1	E	321	ARG	NE-CZ-NH1	11.98	126.29	120.30
1	A	321	ARG	NE-CZ-NH1	11.50	126.05	120.30
1	C	321	ARG	NE-CZ-NH1	11.48	126.04	120.30
1	E	180	TRP	CD1-CG-CD2	10.21	114.47	106.30
2	B	124	ARG	NE-CZ-NH2	-10.08	115.26	120.30
1	C	255	ARG	NE-CZ-NH2	-9.35	115.63	120.30
1	A	180	TRP	CD1-CG-CD2	9.32	113.75	106.30
2	F	124	ARG	NE-CZ-NH2	-9.24	115.68	120.30
2	F	14	TRP	CD1-CG-CD2	9.11	113.59	106.30
1	C	229	ARG	NE-CZ-NH2	-8.97	115.81	120.30
2	B	14	TRP	CD1-CG-CD2	8.82	113.36	106.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	14	TRP	CD1-CG-CD2	8.70	113.26	106.30
1	E	127	TRP	CD1-CG-CD2	8.56	113.15	106.30
1	A	255	ARG	NE-CZ-NH2	-8.53	116.03	120.30
1	A	127	TRP	CD1-CG-CD2	8.42	113.03	106.30
1	C	180	TRP	CD1-CG-CD2	8.28	112.92	106.30
2	B	92	TRP	CD1-CG-CD2	8.19	112.85	106.30
1	C	127	TRP	CD1-CG-CD2	8.12	112.80	106.30
2	D	124	ARG	NE-CZ-NH2	-8.11	116.24	120.30
1	E	180	TRP	CE2-CD2-CG	-8.08	100.83	107.30
1	E	28	THR	CA-CB-CG2	8.04	123.66	112.40
1	E	222	TRP	CD1-CG-CD2	8.03	112.73	106.30
1	E	229	ARG	NE-CZ-NH2	-7.92	116.34	120.30
2	D	92	TRP	CD1-CG-CD2	7.92	112.63	106.30
1	E	255	ARG	NE-CZ-NH2	-7.88	116.36	120.30
1	C	255	ARG	NE-CZ-NH1	7.82	124.21	120.30
1	C	222	TRP	CD1-CG-CD2	7.82	112.55	106.30
1	A	222	TRP	CD1-CG-CD2	7.82	112.55	106.30
1	A	28	THR	CA-CB-CG2	7.81	123.33	112.40
1	E	207	ARG	NE-CZ-NH2	-7.73	116.43	120.30
1	C	161	TYR	CB-CG-CD2	-7.73	116.36	121.00
1	C	153	TRP	CD1-CG-CD2	7.71	112.47	106.30
2	F	57	GLU	CA-CB-CG	7.71	130.36	113.40
2	B	57	GLU	CA-CB-CG	7.69	130.31	113.40
2	D	14	TRP	CE2-CD2-CG	-7.67	101.16	107.30
2	D	57	GLU	CA-CB-CG	7.66	130.25	113.40
1	A	180	TRP	CE2-CD2-CG	-7.65	101.18	107.30
1	E	326	LYS	CA-CB-CG	7.63	130.18	113.40
2	B	21	TRP	CD1-CG-CD2	7.59	112.37	106.30
2	F	92	TRP	CD1-CG-CD2	7.57	112.36	106.30
1	A	229	ARG	NE-CZ-NH1	7.56	124.08	120.30
1	C	28	THR	CA-CB-CG2	7.54	122.95	112.40
2	F	21	TRP	CD1-CG-CD2	7.52	112.31	106.30
1	E	84	TRP	CD1-CG-CD2	7.49	112.29	106.30
1	E	229	ARG	NE-CZ-NH1	7.47	124.04	120.30
1	A	127	TRP	CE2-CD2-CG	-7.44	101.35	107.30
1	A	207	ARG	NE-CZ-NH2	-7.41	116.60	120.30
2	B	92	TRP	CE2-CD2-CG	-7.39	101.39	107.30
1	A	153	TRP	CD1-CG-CD2	7.38	112.20	106.30
1	E	161	TYR	CB-CG-CD2	-7.35	116.59	121.00
1	E	127	TRP	CE2-CD2-CG	-7.30	101.46	107.30
1	C	127	TRP	CE2-CD2-CG	-7.26	101.49	107.30
1	A	234	TRP	CD1-CG-CD2	7.25	112.10	106.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	14	TRP	CE2-CD2-CG	-7.25	101.50	107.30
1	E	84	TRP	CE2-CD2-CG	-7.17	101.56	107.30
2	D	21	TRP	CD1-CG-CD2	7.16	112.02	106.30
1	C	229	ARG	NE-CZ-NH1	7.14	123.87	120.30
2	D	153	ARG	NE-CZ-NH2	-7.14	116.73	120.30
1	C	180	TRP	CE2-CD2-CG	-7.14	101.59	107.30
1	E	222	TRP	CE2-CD2-CG	-7.12	101.61	107.30
2	B	14	TRP	CE2-CD2-CG	-7.11	101.61	107.30
1	A	1	GLN	N-CA-C	-7.11	91.81	111.00
1	A	325	GLU	CA-CB-CG	7.05	128.92	113.40
2	D	92	TRP	CE2-CD2-CG	-7.04	101.66	107.30
1	C	153	TRP	CE2-CD2-CG	-7.03	101.68	107.30
1	A	84	TRP	CD1-CG-CD2	6.96	111.87	106.30
1	C	222	TRP	CE2-CD2-CG	-6.96	101.73	107.30
1	E	153	TRP	CD1-CG-CD2	6.90	111.82	106.30
1	A	84	TRP	CE2-CD2-CG	-6.83	101.84	107.30
1	E	180	TRP	CG-CD1-NE1	-6.70	103.40	110.10
1	C	1	GLN	N-CA-C	-6.67	92.98	111.00
1	C	234	TRP	CD1-CG-CD2	6.63	111.60	106.30
1	E	150	ARG	NE-CZ-NH1	6.59	123.59	120.30
1	C	207	ARG	NE-CZ-NH2	-6.59	117.01	120.30
1	C	84	TRP	CE2-CD2-CG	-6.54	102.07	107.30
1	A	153	TRP	CE2-CD2-CG	-6.52	102.08	107.30
1	C	84	TRP	CD1-CG-CD2	6.50	111.50	106.30
2	B	21	TRP	CE2-CD2-CG	-6.50	102.10	107.30
1	A	222	TRP	CE2-CD2-CG	-6.49	102.11	107.30
1	E	234	TRP	CD1-CG-CD2	6.47	111.48	106.30
1	A	234	TRP	CE2-CD2-CG	-6.46	102.13	107.30
2	F	21	TRP	CE2-CD2-CG	-6.46	102.13	107.30
1	A	255	ARG	NE-CZ-NH1	6.44	123.52	120.30
1	A	180	TRP	CG-CD1-NE1	-6.43	103.67	110.10
1	A	229	ARG	NE-CZ-NH2	-6.37	117.11	120.30
2	F	92	TRP	CE2-CD2-CG	-6.36	102.21	107.30
2	D	170	ARG	NE-CZ-NH2	-6.33	117.13	120.30
1	E	255	ARG	NE-CZ-NH1	6.32	123.46	120.30
1	E	153	TRP	CE2-CD2-CG	-6.30	102.26	107.30
2	B	164	ASP	CB-CG-OD1	6.29	123.96	118.30
1	E	234	TRP	CE2-CD2-CG	-6.27	102.29	107.30
1	E	1	GLN	N-CA-C	-6.24	94.16	111.00
1	E	104	ASP	CB-CG-OD1	5.98	123.69	118.30
2	B	86	ASP	CB-CG-OD1	5.98	123.68	118.30
1	C	234	TRP	CE2-CD2-CG	-5.95	102.54	107.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	180	TRP	CG-CD1-NE1	-5.92	104.17	110.10
2	D	21	TRP	CE2-CD2-CG	-5.89	102.59	107.30
2	F	14	TRP	CG-CD1-NE1	-5.89	104.21	110.10
1	E	180	TRP	CG-CD2-CE3	5.85	139.16	133.90
2	D	86	ASP	CB-CG-OD1	5.84	123.55	118.30
1	A	28	THR	CA-CB-OG1	-5.83	96.76	109.00
1	A	271	ASP	CB-CG-OD1	5.83	123.54	118.30
2	D	162	TYR	CB-CG-CD1	-5.81	117.51	121.00
2	B	14	TRP	CG-CD1-NE1	-5.78	104.32	110.10
1	C	150	ARG	NE-CZ-NH1	5.72	123.16	120.30
2	B	170	ARG	NE-CZ-NH2	-5.71	117.44	120.30
1	E	28	THR	CA-CB-OG1	-5.70	97.03	109.00
1	C	201	ARG	NE-CZ-NH2	-5.63	117.48	120.30
1	E	127	TRP	CG-CD1-NE1	-5.63	104.47	110.10
1	C	82	GLU	N-CA-CB	-5.62	100.49	110.60
1	C	248	ASN	N-CA-CB	-5.57	100.58	110.60
2	B	90	ASP	CB-CG-OD1	5.56	123.30	118.30
1	A	37	THR	CA-CB-CG2	5.56	120.18	112.40
1	E	73	ASP	CB-CG-OD1	5.55	123.30	118.30
2	F	21	TRP	CG-CD1-NE1	-5.55	104.55	110.10
1	A	150	ARG	NE-CZ-NH1	5.54	123.07	120.30
1	A	127	TRP	CG-CD1-NE1	-5.51	104.59	110.10
1	C	37	THR	CA-CB-CG2	5.51	120.11	112.40
1	A	324	PRO	O-C-N	5.51	131.51	122.70
1	E	271	ASP	CB-CG-OD1	5.45	123.20	118.30
1	A	104	ASP	CB-CG-OD1	5.43	123.19	118.30
2	D	11	GLU	CA-CB-CG	-5.42	101.47	113.40
1	C	104	ASP	CB-CG-OD1	5.41	123.17	118.30
2	D	132	GLU	CA-CB-CG	-5.40	101.52	113.40
2	F	132	GLU	CA-CB-CG	-5.40	101.52	113.40
1	A	321	ARG	CB-CG-CD	-5.40	97.57	111.60
2	D	164	ASP	CB-CG-OD1	5.39	123.15	118.30
1	E	180	TRP	CB-CG-CD1	-5.38	120.01	127.00
2	D	21	TRP	CG-CD1-NE1	-5.37	104.73	110.10
1	C	28	THR	CA-CB-OG1	-5.36	97.74	109.00
1	E	37	THR	CA-CB-CG2	5.31	119.83	112.40
1	A	201	ARG	NE-CZ-NH2	-5.29	117.66	120.30
2	D	14	TRP	CG-CD1-NE1	-5.28	104.82	110.10
1	A	153	TRP	CG-CD1-NE1	-5.26	104.84	110.10
1	E	321	ARG	CB-CG-CD	-5.26	97.92	111.60
2	F	162	TYR	CB-CG-CD1	-5.25	117.85	121.00
1	E	201	ARG	NE-CZ-NH2	-5.24	117.68	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	321	ARG	CG-CD-NE	5.19	122.70	111.80
2	B	132	GLU	CA-CB-CG	-5.19	101.99	113.40
1	A	109	ARG	NE-CZ-NH1	-5.18	117.71	120.30
1	C	127	TRP	CG-CD1-NE1	-5.18	104.92	110.10
2	D	124	ARG	CG-CD-NE	-5.17	100.95	111.80
1	A	248	ASN	N-CA-CB	-5.16	101.32	110.60
1	A	157	SER	CA-CB-OG	-5.14	97.33	111.20
2	B	21	TRP	CG-CD1-NE1	-5.13	104.97	110.10
1	A	22	ASN	CA-C-N	5.12	126.45	116.20
1	A	82	GLU	CA-CB-CG	5.12	124.66	113.40
1	E	22	ASN	CA-C-N	5.12	126.44	116.20
1	C	271	ASP	CB-CG-OD1	5.11	122.90	118.30
1	A	326	LYS	CA-CB-CG	5.10	124.62	113.40
1	A	68	ASP	CB-CG-OD1	5.10	122.89	118.30
1	C	153	TRP	CG-CD2-CE3	5.08	138.47	133.90
1	A	37	THR	CA-CB-OG1	-5.07	98.36	109.00
1	E	153	TRP	CG-CD1-NE1	-5.06	105.04	110.10
2	F	25	ARG	NE-CZ-NH2	-5.06	117.77	120.30
1	E	107	SER	CA-CB-OG	-5.04	97.58	111.20
1	C	309	VAL	N-CA-CB	-5.04	100.41	111.50
1	A	222	TRP	CG-CD1-NE1	-5.02	105.08	110.10
1	A	180	TRP	CG-CD2-CE3	5.01	138.41	133.90
1	C	321	ARG	CB-CG-CD	-5.00	98.59	111.60
1	A	153	TRP	CG-CD2-CE3	5.00	138.40	133.90

There are no chirality outliers.

There are no planarity outliers.

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	2532	588	2473	40	0
1	C	2532	588	2473	35	0
1	E	2532	588	2473	37	0
2	B	1421	331	1345	22	0
2	D	1421	331	1345	19	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	1421	331	1345	19	0
3	G	39	37	34	1	0
3	H	39	37	34	2	0
3	I	39	37	34	1	0
4	A	42	42	39	0	0
4	B	14	14	13	0	0
4	C	42	42	39	0	0
4	D	14	14	13	0	0
4	E	42	42	39	0	0
4	F	14	14	13	0	0
5	A	25	16	22	0	0
5	C	25	16	22	0	0
5	E	25	16	22	0	0
6	A	11	22	0	0	0
6	B	12	24	0	1	0
6	C	10	20	0	0	0
6	D	14	28	0	1	0
6	E	12	24	0	0	0
6	F	13	26	0	1	0
All	All	12291	3228	11778	142	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (142) 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:83:TYR:O	2:B:87:THR:HG23	1.82	0.79
2:D:83:TYR:O	2:D:87:THR:HG23	1.84	0.78
2:F:83:TYR:O	2:F:87:THR:HG23	1.83	0.77
1:E:321:ARG:HG2	1:E:321:ARG:HH11	1.54	0.72
1:A:325:GLU:HB3	2:B:15:GLU:HG3	1.74	0.70
1:A:321:ARG:HG2	1:A:321:ARG:HH11	1.57	0.69
1:C:321:ARG:HH11	1:C:321:ARG:HG2	1.56	0.69
2:B:132:GLU:HG2	2:B:134:GLY:H	1.59	0.68
1:C:216:ASN:HB3	1:E:212:THR:HG21	1.77	0.67
2:F:132:GLU:HG2	2:F:134:GLY:H	1.60	0.65
2:D:132:GLU:HG2	2:D:134:GLY:H	1.61	0.65
2:D:28:ASN:HB2	2:D:144:CYS:O	1.99	0.63
2:B:164:ASP:HB3	2:F:175:GLY:HA3	1.81	0.62
2:B:58:LYS:HE2	2:B:59:THR:O	2.00	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:58:LYS:HE2	2:F:59:THR:O	2.00	0.61
2:D:58:LYS:HE2	2:D:59:THR:O	2.01	0.61
1:E:79:PHE:O	1:E:82:GLU:HB2	1.99	0.61
1:A:325:GLU:HB2	2:B:13:GLY:O	2.04	0.58
2:B:175:GLY:HA3	2:D:164:ASP:HB3	1.86	0.57
1:E:325:GLU:HG3	2:F:15:GLU:HG3	1.86	0.57
2:B:25:ARG:HG2	2:B:34:GLN:HG3	1.86	0.57
1:C:283:THR:HG22	1:C:285:ASN:H	1.70	0.56
1:E:283:THR:HG22	1:E:285:ASN:H	1.69	0.56
1:E:311:GLN:NE2	2:F:97:GLU:HB2	2.20	0.56
1:A:283:THR:HG22	1:A:285:ASN:H	1.71	0.54
1:E:222:TRP:CE2	1:E:225:GLY:HA2	2.43	0.54
6:B:413:HOH:O	2:F:87:THR:HG22	2.08	0.53
1:C:167:THR:HB	3:H:1:NAG:H62	1.90	0.53
1:C:311:GLN:NE2	2:D:97:GLU:HB2	2.23	0.53
2:D:173:ILE:HG22	2:D:174:LYS:HG2	1.91	0.53
2:B:173:ILE:HG22	2:B:174:LYS:HG2	1.90	0.53
1:E:15:LEU:HD22	2:F:119:PHE:HA	1.91	0.53
2:F:173:ILE:HG22	2:F:174:LYS:HG2	1.90	0.53
1:A:222:TRP:CE2	1:A:225:GLY:HA2	2.45	0.52
2:B:141:TYR:O	2:B:166:ALA:HA	2.09	0.52
2:D:141:TYR:O	2:D:166:ALA:HA	2.10	0.52
1:E:167:THR:HB	3:I:1:NAG:H62	1.92	0.52
1:A:167:THR:HB	3:G:1:NAG:H62	1.91	0.51
1:E:86:LEU:HD11	1:E:268:MET:HB2	1.92	0.51
1:A:75:HIS:HE1	1:A:94:PHE:O	1.93	0.51
1:C:75:HIS:HE1	1:C:94:PHE:O	1.93	0.51
1:A:15:LEU:HD22	2:B:119:PHE:HA	1.93	0.51
1:A:86:LEU:HD11	1:A:268:MET:HB2	1.91	0.51
2:F:141:TYR:O	2:F:166:ALA:HA	2.11	0.51
1:C:222:TRP:CE2	1:C:225:GLY:HA2	2.45	0.51
1:A:311:GLN:NE2	2:B:97:GLU:HB2	2.25	0.50
2:D:87:THR:HG22	6:F:403:HOH:O	2.11	0.50
1:C:86:LEU:HD11	1:C:268:MET:HB2	1.92	0.50
1:C:52:CYS:HB3	1:C:277:CYS:O	2.12	0.49
1:E:75:HIS:HE1	1:E:94:PHE:O	1.95	0.49
1:E:326:LYS:HD2	1:E:327:GLN:H	1.76	0.49
1:E:323:VAL:HG21	2:F:7:ALA:HB2	1.95	0.49
1:E:284:PRO:HG2	1:E:298:ASN:ND2	2.28	0.48
1:A:53:ASN:OD1	1:A:276:THR:HA	2.14	0.48
1:A:323:VAL:HG21	2:B:7:ALA:HB2	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:140:LYS:HG3	1:C:144:GLY:O	2.13	0.48
2:D:175:GLY:HA3	2:F:164:ASP:HB3	1.95	0.48
1:A:221:PRO:HA	3:H:2:NAG:O7	2.13	0.48
1:E:28:THR:HG23	2:F:105:GLN:OE1	2.13	0.47
1:C:28:THR:HG23	2:D:105:GLN:OE1	2.13	0.47
1:A:284:PRO:HG2	1:A:298:ASN:ND2	2.29	0.47
1:E:52:CYS:HB3	1:E:277:CYS:O	2.15	0.47
1:A:140:LYS:HG3	1:A:144:GLY:O	2.13	0.47
1:C:15:LEU:HD22	2:D:119:PHE:HA	1.96	0.47
1:C:8:ASN:HB2	2:D:169:ASN:HD21	1.80	0.47
1:E:55:PRO:HD3	1:E:278:ILE:HD12	1.97	0.47
1:A:55:PRO:HD3	1:A:278:ILE:HD12	1.97	0.46
1:E:56:HIS:ND1	1:E:264:LYS:NZ	2.63	0.46
1:E:89:GLU:OE1	1:E:109:ARG:NH1	2.48	0.46
1:E:309:VAL:HG22	2:F:93:SER:HA	1.98	0.46
1:C:284:PRO:HG2	1:C:298:ASN:ND2	2.30	0.46
1:A:309:VAL:HG22	2:B:93:SER:HA	1.97	0.46
2:B:72:GLU:CD	1:C:238:LYS:HZ2	2.19	0.46
2:B:87:THR:HG22	6:D:402:HOH:O	2.15	0.46
1:C:28:THR:HG22	1:C:31:ASP:H	1.80	0.46
1:C:55:PRO:HD3	1:C:278:ILE:HD12	1.97	0.46
1:C:56:HIS:ND1	1:C:264:LYS:NZ	2.63	0.46
1:C:323:VAL:HG21	2:D:7:ALA:HB2	1.96	0.46
1:E:140:LYS:HG3	1:E:144:GLY:O	2.15	0.46
1:A:28:THR:HG23	2:B:105:GLN:OE1	2.16	0.45
2:B:127:ARG:NH1	2:F:131:GLU:OE1	2.49	0.45
1:A:52:CYS:HB3	1:A:277:CYS:O	2.16	0.45
1:A:133:ASN:OD1	1:A:255:ARG:NH2	2.49	0.45
2:B:25:ARG:HA	2:B:34:GLN:HA	1.99	0.45
1:A:56:HIS:ND1	1:A:264:LYS:NZ	2.64	0.44
1:C:180:TRP:HH2	1:C:213:ILE:HD13	1.81	0.44
1:C:309:VAL:HG22	2:D:93:SER:HA	1.99	0.44
2:D:126:LEU:HD21	2:D:152:ILE:HD13	2.00	0.44
1:C:133:ASN:OD1	1:C:255:ARG:NH2	2.50	0.44
1:E:259:LYS:HB2	1:E:259:LYS:NZ	2.33	0.44
2:F:126:LEU:HD21	2:F:152:ILE:HD13	1.99	0.44
2:B:51:LYS:HB2	1:E:30:THR:HG22	2.00	0.44
2:B:131:GLU:OE1	2:D:127:ARG:NH1	2.51	0.44
1:A:89:GLU:OE1	1:A:109:ARG:NH1	2.51	0.43
1:C:175:ASP:OD1	1:C:239:PRO:HD3	2.18	0.43
1:E:175:ASP:OD1	1:E:239:PRO:HD3	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:180:TRP:HH2	1:E:213:ILE:HD13	1.83	0.43
1:A:180:TRP:HH2	1:A:213:ILE:HD13	1.83	0.43
1:A:259:LYS:HB2	1:A:259:LYS:NZ	2.34	0.43
1:E:133:ASN:OD1	1:E:255:ARG:NH2	2.51	0.43
1:A:28:THR:HG22	1:A:31:ASP:H	1.83	0.43
1:A:212:THR:HG21	1:E:216:ASN:HB3	2.00	0.43
1:A:230:ILE:HG21	1:A:230:ILE:HD13	1.79	0.43
1:C:313:THR:OG1	1:C:315:LYS:NZ	2.51	0.43
1:E:28:THR:HG22	1:E:31:ASP:H	1.83	0.43
1:A:84:TRP:CE2	1:A:116:GLY:HA2	2.54	0.43
1:A:326:LYS:HE2	1:A:328:THR:OG1	2.19	0.42
1:C:89:GLU:OE1	1:C:109:ARG:NH1	2.52	0.42
1:A:164:LEU:O	1:A:246:ASN:HA	2.19	0.42
1:A:109:ARG:HH11	1:A:109:ARG:HD2	1.67	0.42
1:E:54:ASN:O	1:E:278:ILE:HA	2.19	0.42
1:A:57:ARG:NH2	1:A:82:GLU:OE1	2.53	0.42
2:B:164:ASP:OD2	2:F:174:LYS:NZ	2.52	0.42
1:E:313:THR:OG1	1:E:315:LYS:NZ	2.53	0.42
1:A:54:ASN:O	1:A:278:ILE:HA	2.20	0.42
2:D:25:ARG:CG	2:D:34:GLN:HG3	2.50	0.42
1:E:283:THR:HG22	1:E:285:ASN:N	2.35	0.42
1:C:57:ARG:NH2	1:C:82:GLU:OE1	2.52	0.42
1:E:109:ARG:HH11	1:E:109:ARG:HD2	1.71	0.42
2:F:123:ARG:HH11	2:F:123:ARG:HD3	1.73	0.42
1:A:156:LYS:HD2	1:A:158:GLY:O	2.20	0.41
1:C:182:ILE:HD11	1:C:215:PRO:HD3	2.02	0.41
1:C:123:GLU:OE1	1:C:168:MET:HG2	2.21	0.41
1:A:175:ASP:OD1	1:A:239:PRO:HD3	2.21	0.41
1:C:77:ASP:O	1:C:80:GLN:HG3	2.21	0.41
1:A:75:HIS:CE1	1:A:94:PHE:O	2.73	0.41
1:A:313:THR:OG1	1:A:315:LYS:NZ	2.54	0.41
1:C:121:ILE:O	1:C:256:GLY:HA3	2.21	0.41
1:C:283:THR:HG22	1:C:285:ASN:N	2.35	0.41
2:D:54:ARG:O	2:D:57:GLU:HB3	2.20	0.41
1:A:216:ASN:HB3	1:C:212:THR:HG21	2.01	0.40
1:C:54:ASN:O	1:C:278:ILE:HA	2.21	0.40
1:C:84:TRP:CE2	1:C:116:GLY:HA2	2.56	0.40
1:E:326:LYS:HD2	1:E:327:GLN:N	2.36	0.40
1:E:326:LYS:HB3	1:E:326:LYS:HE3	1.84	0.40
1:A:156:LYS:O	1:A:156:LYS:HG3	2.22	0.40
1:A:283:THR:HG22	1:A:285:ASN:N	2.36	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:327:GLN:HG2	1:C:328:THR:N	2.37	0.40
1:E:75:HIS:CE1	1:E:94:PHE:O	2.74	0.40
1:E:182:ILE:HD11	1:E:215:PRO:HD3	2.02	0.40
1:E:283:THR:HB	1:E:286:GLY:O	2.20	0.40
2:F:27:GLN:HG3	2:F:32:THR:CG2	2.52	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	326/328 (99%)	305 (94%)	16 (5%)	5 (2%)	10	26
1	C	326/328 (99%)	309 (95%)	13 (4%)	4 (1%)	13	32
1	E	326/328 (99%)	310 (95%)	14 (4%)	2 (1%)	25	50
2	B	173/175 (99%)	160 (92%)	9 (5%)	4 (2%)	6	16
2	D	173/175 (99%)	162 (94%)	7 (4%)	4 (2%)	6	16
2	F	173/175 (99%)	161 (93%)	8 (5%)	4 (2%)	6	16
All	All	1497/1509 (99%)	1407 (94%)	67 (4%)	23 (2%)	10	26

All (23) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3	LEU
1	A	326	LYS
2	B	58	LYS
2	B	173	ILE
1	C	327	GLN
2	D	58	LYS
2	D	173	ILE

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Mol	Chain	Res	Type
2	F	58	LYS
2	F	173	ILE
1	A	2	ASP
2	B	172	GLN
2	D	172	GLN
2	F	172	GLN
1	A	62	ILE
2	B	174	LYS
1	C	62	ILE
2	D	174	LYS
1	E	62	ILE
2	F	174	LYS
1	A	22	ASN
1	C	22	ASN
1	C	4	PRO
1	E	22	ASN

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	289/289 (100%)	263 (91%)	26 (9%)	9	22
1	C	289/289 (100%)	266 (92%)	23 (8%)	12	27
1	E	289/289 (100%)	261 (90%)	28 (10%)	8	19
2	B	149/149 (100%)	145 (97%)	4 (3%)	44	74
2	D	149/149 (100%)	145 (97%)	4 (3%)	44	74
2	F	149/149 (100%)	143 (96%)	6 (4%)	31	60
All	All	1314/1314 (100%)	1223 (93%)	91 (7%)	15	35

All (91) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	GLN
1	A	18	HIS

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Mol	Chain	Res	Type
1	A	28	THR
1	A	34	ILE
1	A	37	THR
1	A	82	GLU
1	A	103	PRO
1	A	109	ARG
1	A	150	ARG
1	A	157	SER
1	A	160	THR
1	A	197	GLN
1	A	199	SER
1	A	205	SER
1	A	210	GLN
1	A	228	SER
1	A	248	ASN
1	A	259	LYS
1	A	265	SER
1	A	277	CYS
1	A	278	ILE
1	A	280	GLU
1	A	309	VAL
1	A	318	THR
1	A	321	ARG
1	A	326	LYS
2	B	128	GLU
2	B	145	ASP
2	B	160	ASP
2	B	170	ARG
1	C	8	ASN
1	C	18	HIS
1	C	28	THR
1	C	34	ILE
1	C	37	THR
1	C	103	PRO
1	C	150	ARG
1	C	159	SER
1	C	160	THR
1	C	197	GLN
1	C	199	SER
1	C	205	SER
1	C	210	GLN
1	C	228	SER

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Mol	Chain	Res	Type
1	C	248	ASN
1	C	259	LYS
1	C	265	SER
1	C	277	CYS
1	C	278	ILE
1	C	280	GLU
1	C	309	VAL
1	C	318	THR
1	C	321	ARG
2	D	128	GLU
2	D	150	GLU
2	D	160	ASP
2	D	170	ARG
1	E	2	ASP
1	E	8	ASN
1	E	18	HIS
1	E	28	THR
1	E	34	ILE
1	E	37	THR
1	E	82	GLU
1	E	103	PRO
1	E	109	ARG
1	E	150	ARG
1	E	159	SER
1	E	160	THR
1	E	189	GLN
1	E	197	GLN
1	E	199	SER
1	E	205	SER
1	E	210	GLN
1	E	228	SER
1	E	248	ASN
1	E	259	LYS
1	E	265	SER
1	E	277	CYS
1	E	278	ILE
1	E	280	GLU
1	E	309	VAL
1	E	321	ARG
1	E	326	LYS
1	E	328	THR
2	F	29	SER

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Mol	Chain	Res	Type
2	F	127	ARG
2	F	128	GLU
2	F	150	GLU
2	F	160	ASP
2	F	170	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	ASN
1	A	132	GLN
1	A	171	ASN
2	B	28	ASN
2	B	146	ASN
1	C	132	GLN
1	C	171	ASN
1	C	327	GLN
2	D	169	ASN
1	E	132	GLN
1	E	171	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](#)

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
3	NAG	G	1	3,1	14,14,15	0.45	0	17,19,21	0.81	0
3	NAG	G	2	3	14,14,15	0.65	0	17,19,21	1.27	1 (5%)
3	BMA	G	3	3	11,11,12	0.69	0	15,15,17	1.15	2 (13%)
3	NAG	H	1	3,1	14,14,15	0.60	0	17,19,21	0.78	0
3	NAG	H	2	3	14,14,15	0.47	0	17,19,21	1.19	1 (5%)
3	BMA	H	3	3	11,11,12	0.62	0	15,15,17	1.30	3 (20%)
3	NAG	I	1	3,1	14,14,15	0.54	0	17,19,21	0.78	0
3	NAG	I	2	3	14,14,15	0.50	0	17,19,21	1.09	1 (5%)
3	BMA	I	3	3	11,11,12	0.78	0	15,15,17	0.99	1 (6%)

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

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	3	BMA	C1-O5-C5	2.72	115.87	112.19
3	G	2	NAG	C4-C3-C2	-2.67	107.10	111.02
3	H	3	BMA	O5-C1-C2	-2.61	106.74	110.77
3	I	2	NAG	C4-C3-C2	-2.32	107.62	111.02
3	I	3	BMA	O5-C5-C6	2.30	110.80	107.20
3	H	2	NAG	C4-C3-C2	-2.25	107.72	111.02
3	G	3	BMA	C1-C2-C3	-2.19	106.97	109.67
3	H	3	BMA	C6-C5-C4	-2.16	107.95	113.00
3	G	3	BMA	C1-O5-C5	2.09	115.03	112.19

There are no chirality outliers.

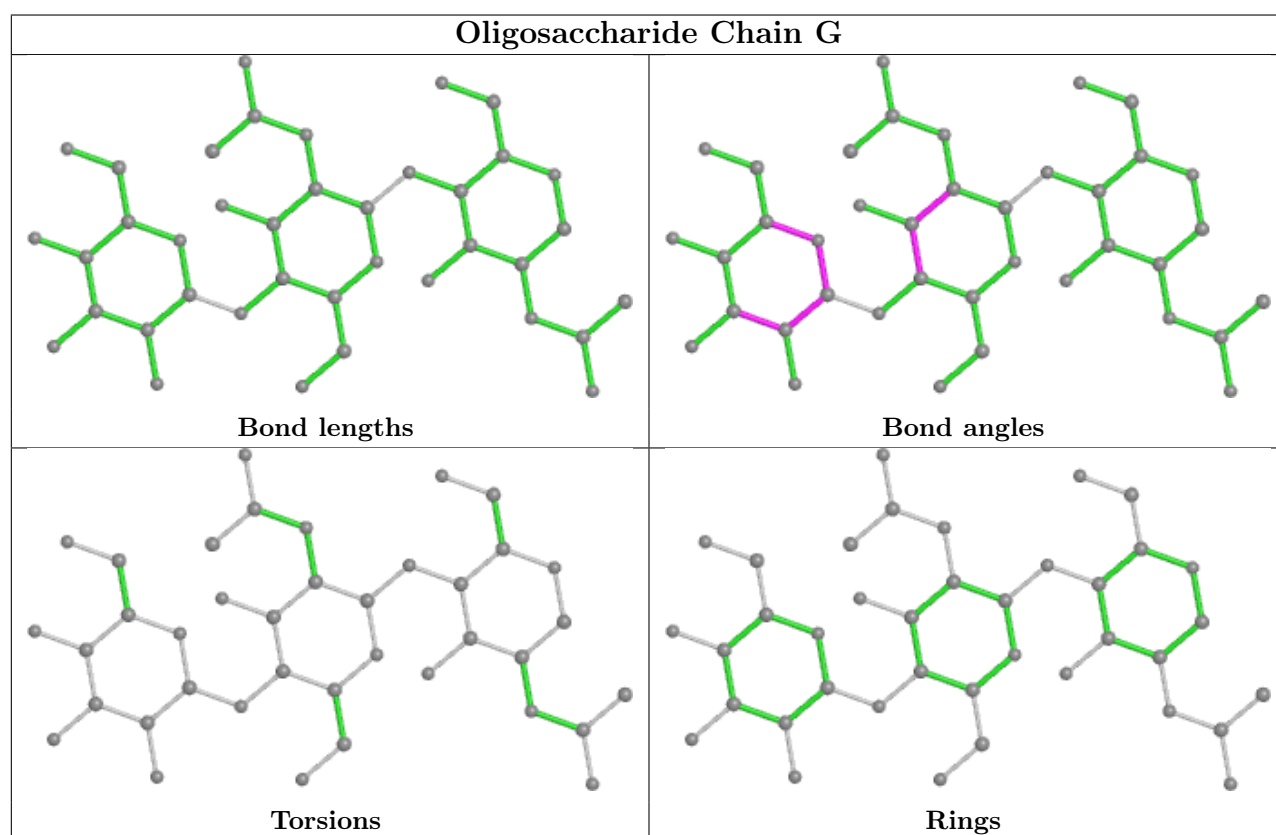
There are no torsion outliers.

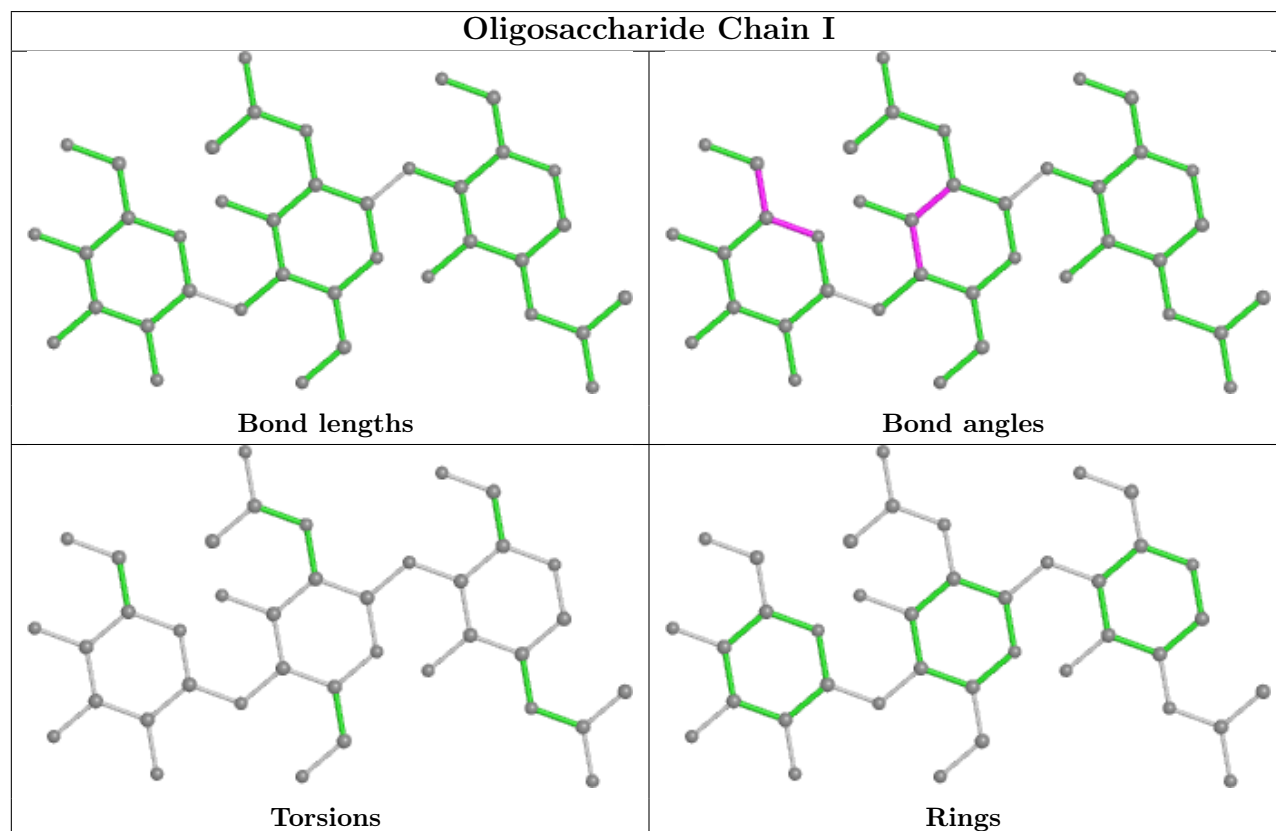
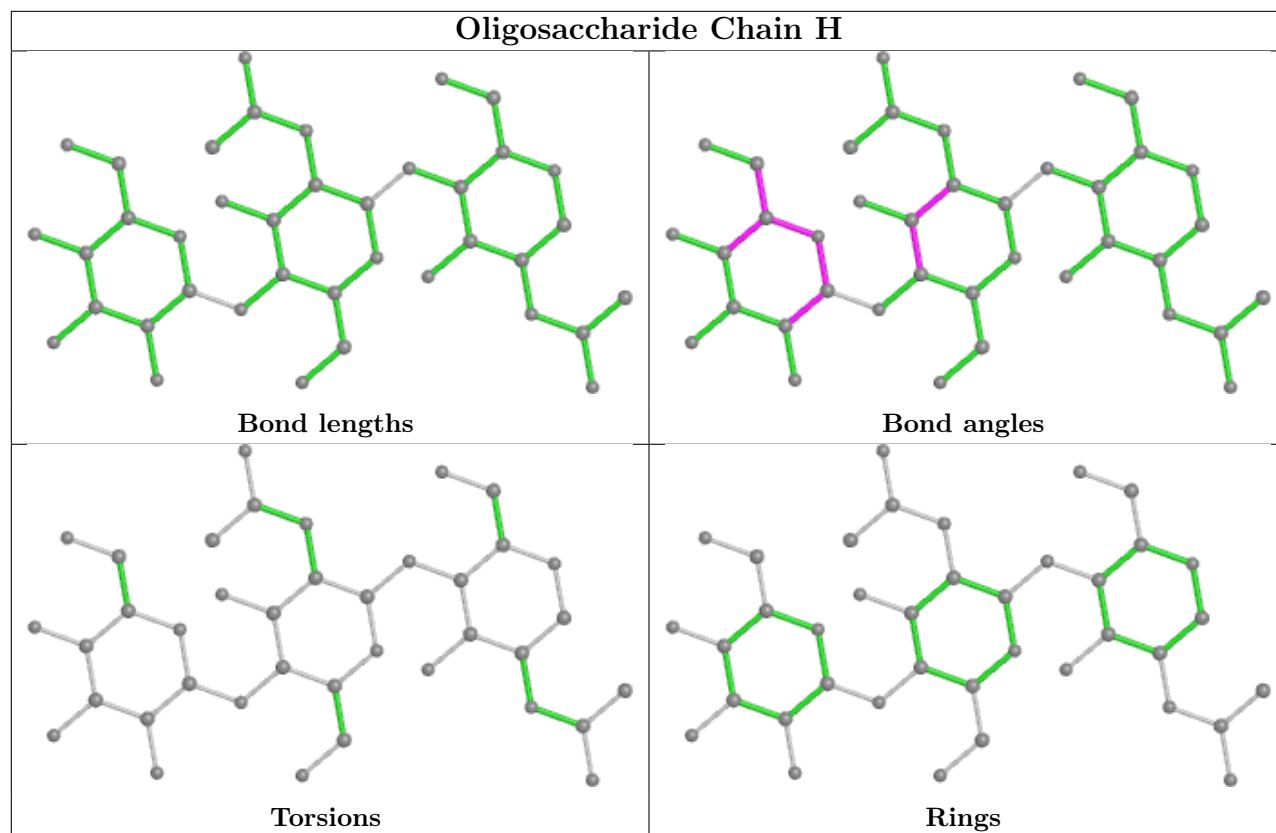
There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	G	1	NAG	1	0
3	H	1	NAG	1	0
3	I	1	NAG	1	0
3	H	2	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

15 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$
4	NAG	E	334	1	14,14,15	0.84	0	17,19,21	1.42	3 (17%)
4	NAG	C	348	1	14,14,15	0.67	0	17,19,21	1.63	4 (23%)
4	NAG	A	348	1	14,14,15	0.79	0	17,19,21	1.57	3 (17%)
4	NAG	D	401	2	14,14,15	0.83	1 (7%)	17,19,21	1.25	1 (5%)
4	NAG	B	401	2	14,14,15	0.75	1 (7%)	17,19,21	1.32	1 (5%)
4	NAG	E	348	1	14,14,15	0.75	0	17,19,21	1.54	3 (17%)
4	NAG	C	334	1	14,14,15	0.83	0	17,19,21	1.48	3 (17%)
4	NAG	E	329	1	14,14,15	0.70	0	17,19,21	0.90	1 (5%)
5	ANA	A	349	-	25,25,25	1.04	2 (8%)	30,36,36	1.45	3 (10%)
4	NAG	F	401	2	14,14,15	0.85	1 (7%)	17,19,21	1.28	1 (5%)
5	ANA	C	349	-	25,25,25	1.07	1 (4%)	30,36,36	1.46	3 (10%)
5	ANA	E	349	-	25,25,25	1.02	2 (8%)	30,36,36	1.42	3 (10%)
4	NAG	A	329	1	14,14,15	0.72	0	17,19,21	0.90	1 (5%)
4	NAG	C	329	1	14,14,15	0.71	0	17,19,21	0.89	1 (5%)
4	NAG	A	334	1	14,14,15	0.68	0	17,19,21	1.48	3 (17%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	E	334	1	-	0/6/23/26	0/1/1/1
4	NAG	C	348	1	-	2/6/23/26	0/1/1/1
4	NAG	A	348	1	-	2/6/23/26	0/1/1/1
4	NAG	D	401	2	-	0/6/23/26	0/1/1/1
4	NAG	B	401	2	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	E	348	1	-	2/6/23/26	0/1/1/1
4	NAG	C	334	1	-	0/6/23/26	0/1/1/1
4	NAG	E	329	1	-	0/6/23/26	0/1/1/1
5	ANA	A	349	-	-	7/27/45/45	0/1/1/1
4	NAG	F	401	2	-	0/6/23/26	0/1/1/1
5	ANA	C	349	-	-	7/27/45/45	0/1/1/1
5	ANA	E	349	-	-	7/27/45/45	0/1/1/1
4	NAG	A	329	1	-	0/6/23/26	0/1/1/1
4	NAG	C	329	1	-	0/6/23/26	0/1/1/1
4	NAG	A	334	1	-	0/6/23/26	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	349	ANA	O4-CA4	3.90	1.44	1.35
5	A	349	ANA	O4-CA4	3.62	1.43	1.35
5	E	349	ANA	O4-CA4	3.53	1.43	1.35
4	F	401	NAG	C4-C5	2.38	1.58	1.53
4	D	401	NAG	C4-C5	2.27	1.57	1.53
4	B	401	NAG	C4-C5	2.09	1.57	1.53
5	E	349	ANA	O1B-C1	-2.05	1.22	1.30
5	A	349	ANA	O1B-C1	-2.01	1.22	1.30

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	349	ANA	O4-CA4-CM4	4.73	119.78	111.09
5	A	349	ANA	O4-CA4-CM4	4.67	119.68	111.09
5	E	349	ANA	O4-CA4-CM4	4.53	119.42	111.09
4	A	348	NAG	C1-O5-C5	4.30	118.02	112.19
4	C	348	NAG	C1-O5-C5	4.10	117.75	112.19
4	E	348	NAG	C1-O5-C5	3.78	117.31	112.19
4	F	401	NAG	C1-O5-C5	3.51	116.95	112.19
4	B	401	NAG	C1-O5-C5	3.51	116.94	112.19
5	C	349	ANA	O4-C4-C3	3.33	115.92	108.48
4	D	401	NAG	C1-O5-C5	3.25	116.59	112.19
5	E	349	ANA	O4-C4-C3	3.15	115.53	108.48
5	A	349	ANA	O4-C4-C3	3.03	115.25	108.48
4	E	348	NAG	C3-C4-C5	-3.01	104.88	110.24
4	A	348	NAG	C3-C4-C5	-2.94	105.00	110.24
4	E	334	NAG	C1-O5-C5	2.88	116.10	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	334	NAG	C1-O5-C5	2.85	116.06	112.19
4	C	334	NAG	C1-O5-C5	2.83	116.03	112.19
4	C	348	NAG	C3-C4-C5	-2.78	105.29	110.24
4	E	329	NAG	C1-O5-C5	2.64	115.77	112.19
4	A	334	NAG	C8-C7-N2	2.50	120.33	116.10
4	A	329	NAG	C1-O5-C5	2.48	115.55	112.19
4	A	348	NAG	O4-C4-C5	2.41	115.28	109.30
4	E	348	NAG	O4-C4-C5	2.37	115.19	109.30
4	C	334	NAG	C8-C7-N2	2.32	120.03	116.10
4	C	348	NAG	O4-C4-C5	2.30	115.02	109.30
4	C	329	NAG	C1-O5-C5	2.23	115.22	112.19
4	A	334	NAG	C1-C2-N2	2.21	114.27	110.49
4	E	334	NAG	C1-C2-N2	2.18	114.21	110.49
5	C	349	ANA	C4-C5-N5	-2.18	105.90	110.62
4	E	334	NAG	C8-C7-N2	2.12	119.69	116.10
5	E	349	ANA	C4-C5-N5	-2.11	106.04	110.62
4	C	348	NAG	C8-C7-N2	2.10	119.65	116.10
4	C	334	NAG	C1-C2-N2	2.03	113.96	110.49
5	A	349	ANA	C2-O6-C6	2.02	118.91	114.20

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	349	ANA	O1B-C1-C2-O2
5	A	349	ANA	O1B-C1-C2-O6
5	C	349	ANA	O1B-C1-C2-O2
5	C	349	ANA	O1B-C1-C2-O6
5	E	349	ANA	O1B-C1-C2-O2
5	E	349	ANA	O1B-C1-C2-O6
5	A	349	ANA	CM4-CA4-O4-C4
5	C	349	ANA	CM4-CA4-O4-C4
5	E	349	ANA	CM4-CA4-O4-C4
5	A	349	ANA	OA4-CA4-O4-C4
5	C	349	ANA	OA4-CA4-O4-C4
5	E	349	ANA	OA4-CA4-O4-C4
4	C	348	NAG	O5-C5-C6-O6
4	A	348	NAG	O5-C5-C6-O6
4	E	348	NAG	O5-C5-C6-O6
4	C	348	NAG	C4-C5-C6-O6
4	E	348	NAG	C4-C5-C6-O6
4	A	348	NAG	C4-C5-C6-O6

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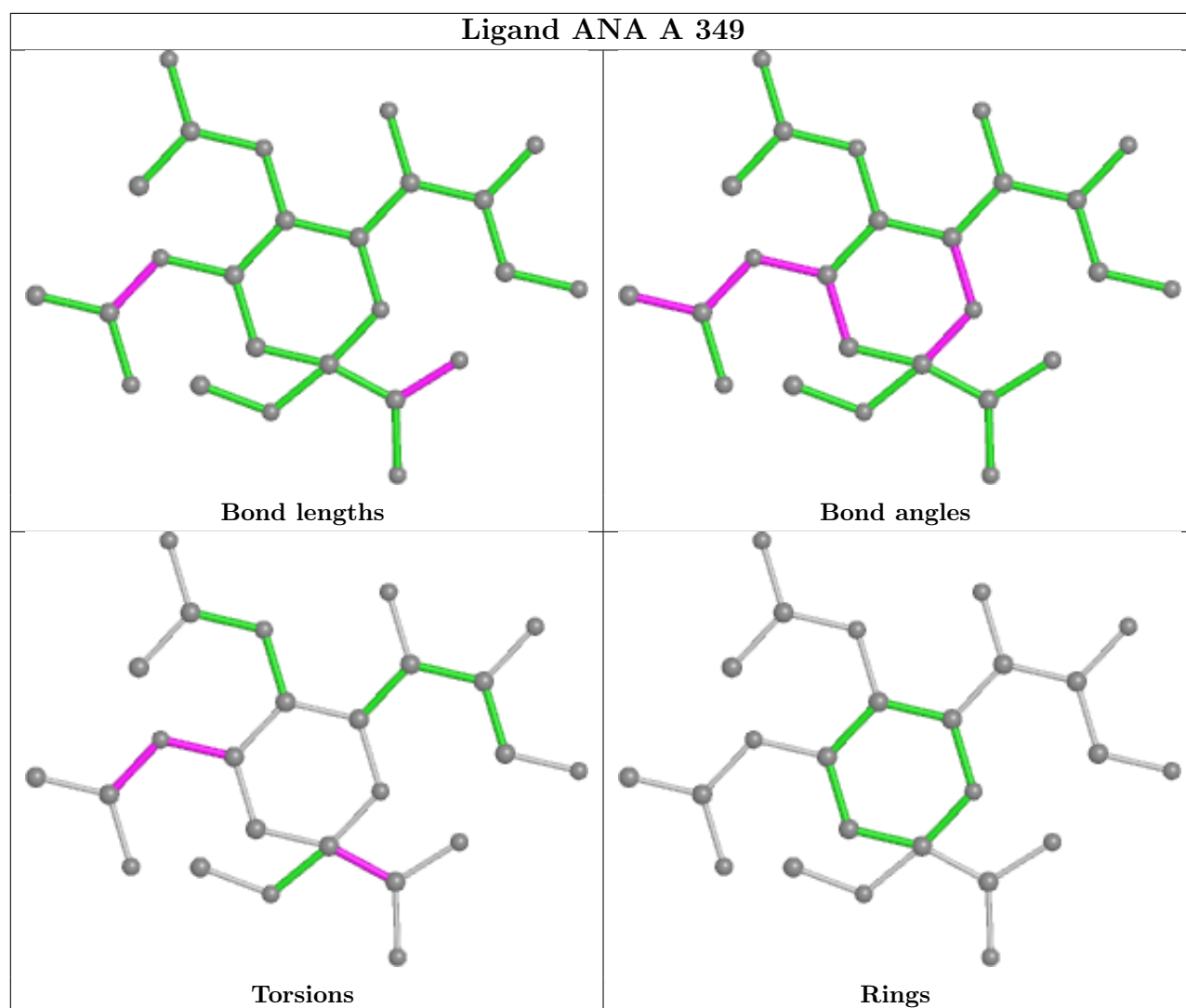
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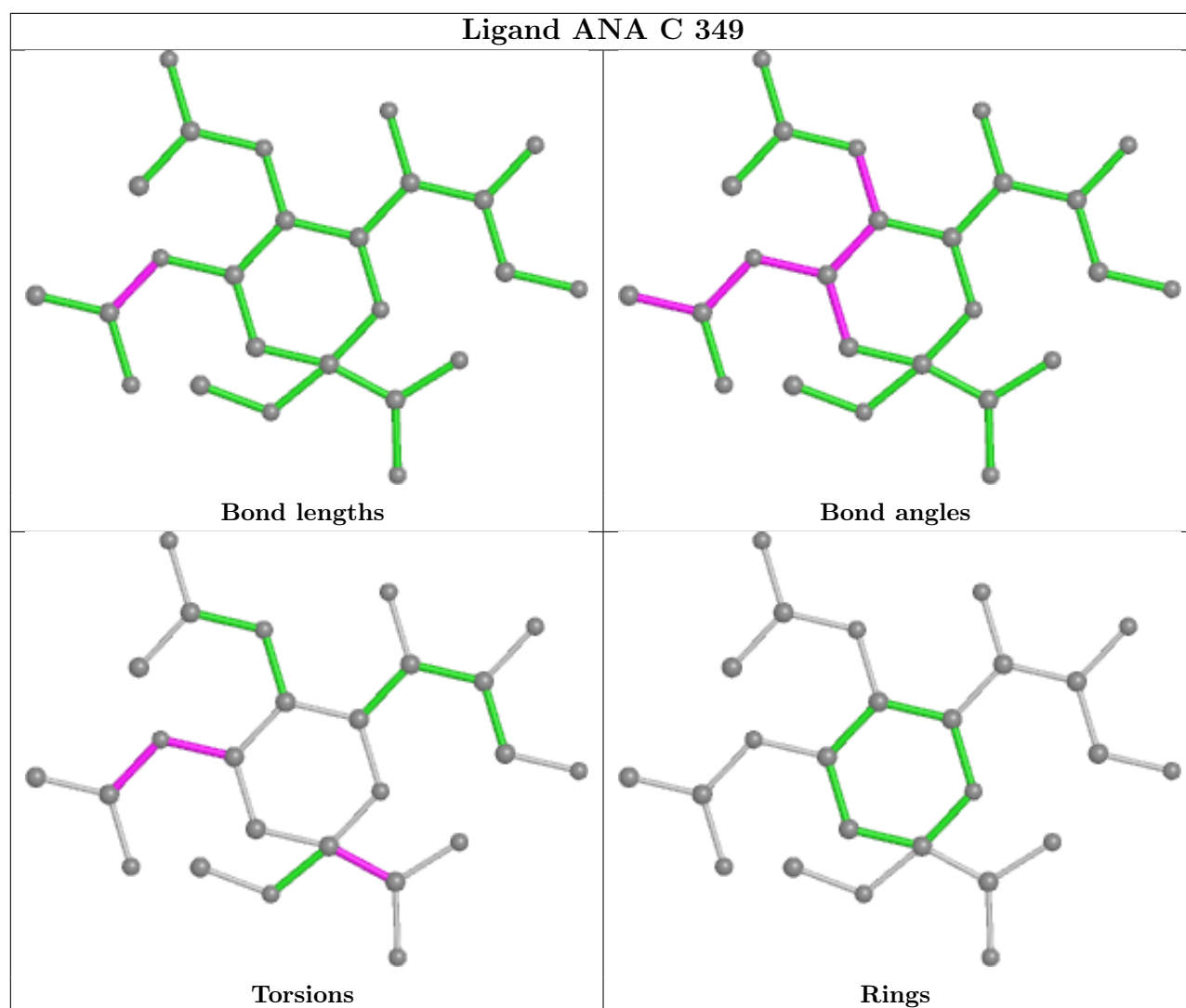
Mol	Chain	Res	Type	Atoms
5	C	349	ANA	C3-C4-O4-CA4
5	E	349	ANA	C3-C4-O4-CA4
5	A	349	ANA	C3-C4-O4-CA4
5	A	349	ANA	O1A-C1-C2-O2
5	C	349	ANA	O1A-C1-C2-O2
5	E	349	ANA	O1A-C1-C2-O2
5	A	349	ANA	C5-C4-O4-CA4
5	C	349	ANA	C5-C4-O4-CA4
5	E	349	ANA	C5-C4-O4-CA4

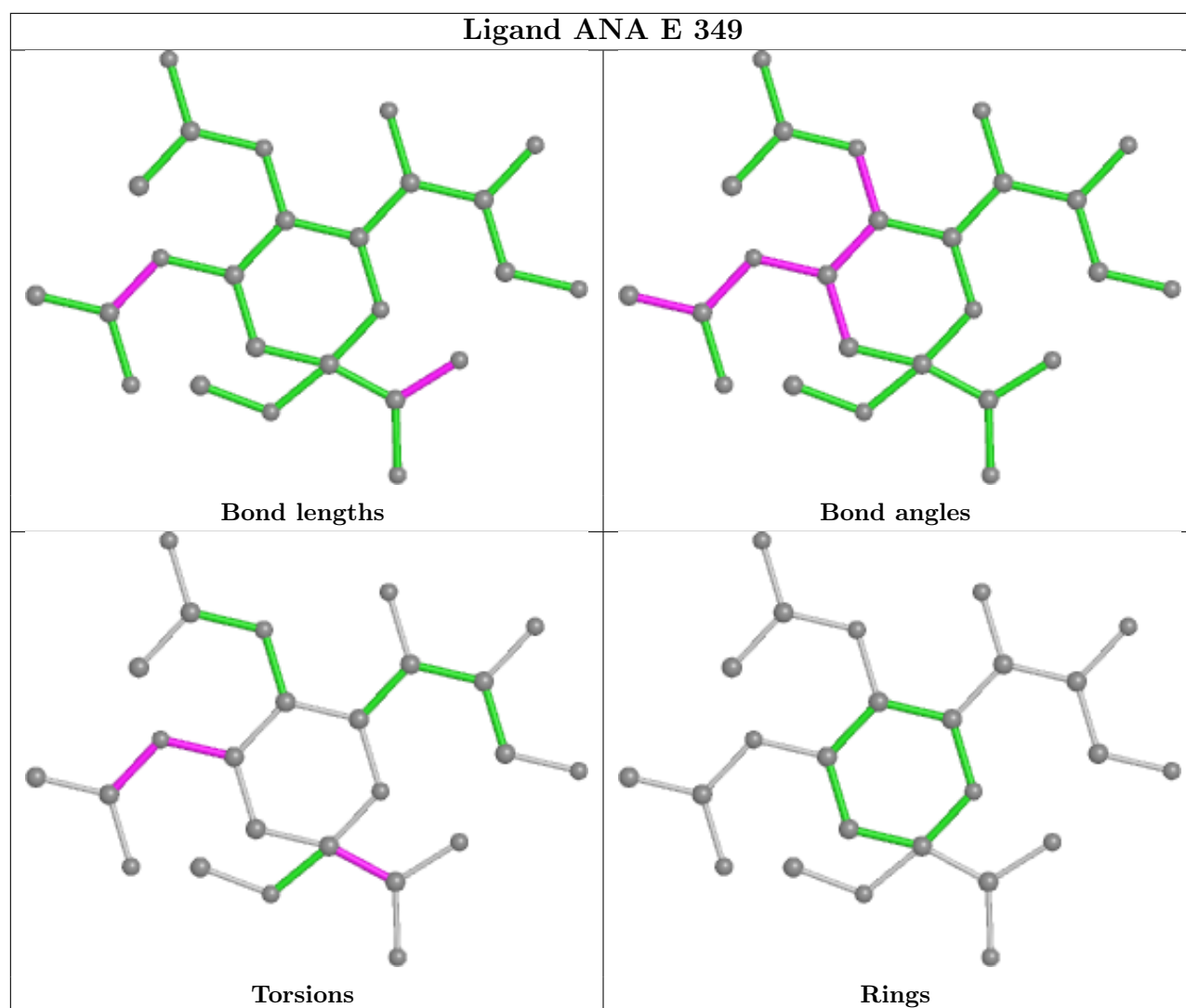
There are no ring outliers.

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 all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







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	328/328 (100%)	-0.43	11 (3%) 45 45	6, 26, 53, 150	0
1	C	328/328 (100%)	-0.38	10 (3%) 50 51	7, 26, 52, 152	0
1	E	328/328 (100%)	-0.42	11 (3%) 45 45	6, 26, 51, 148	0
2	B	175/175 (100%)	-0.56	5 (2%) 51 52	3, 21, 53, 105	0
2	D	175/175 (100%)	-0.54	5 (2%) 51 52	3, 20, 53, 105	0
2	F	175/175 (100%)	-0.64	6 (3%) 45 45	3, 20, 53, 105	0
All	All	1509/1509 (100%)	-0.47	48 (3%) 47 48	3, 24, 53, 152	0

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	3	LEU	8.3
1	C	3	LEU	8.2
1	C	6	ASN	8.0
1	A	4	PRO	7.5
2	B	175	GLY	7.3
1	A	8	ASN	7.2
1	E	6	ASN	7.2
1	A	2	ASP	7.1
1	E	3	LEU	7.0
1	C	7	ASP	7.0
2	D	175	GLY	6.9
1	E	1	GLN	6.8
1	A	328	THR	6.3
1	A	7	ASP	6.2
1	C	4	PRO	6.1
1	A	5	GLY	6.0
1	A	6	ASN	5.9
1	A	1	GLN	5.5
2	D	173	ILE	5.5

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Mol	Chain	Res	Type	RSRZ
1	E	4	PRO	5.4
1	C	328	THR	5.3
2	F	175	GLY	5.2
1	E	7	ASP	5.1
1	C	8	ASN	5.1
1	E	5	GLY	4.9
1	A	327	GLN	4.8
1	C	2	ASP	4.4
2	D	174	LYS	4.4
1	C	1	GLN	4.1
1	E	328	THR	4.1
2	D	58	LYS	4.0
1	E	2	ASP	3.9
1	A	326	LYS	3.8
2	F	173	ILE	3.8
1	C	5	GLY	3.7
2	B	173	ILE	3.6
2	B	174	LYS	3.4
1	E	8	ASN	3.3
2	F	58	LYS	2.9
1	E	327	GLN	2.7
2	B	57	GLU	2.5
1	E	9	SER	2.5
2	F	174	LYS	2.3
2	D	57	GLU	2.2
1	C	208	ARG	2.2
2	B	58	LYS	2.2
2	F	172	GLN	2.2
2	F	57	GLU	2.1

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

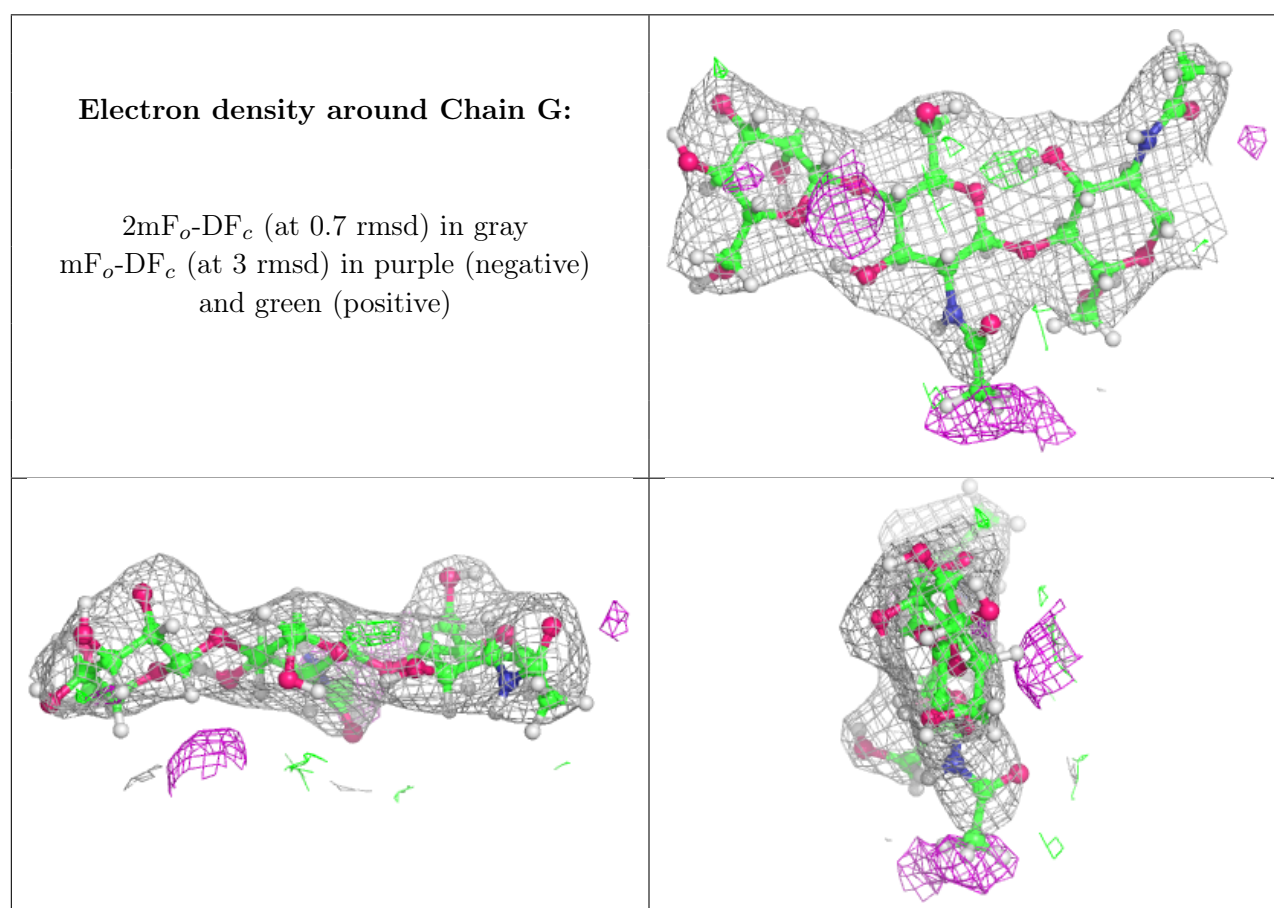
There are no non-standard protein/DNA/RNA residues in this entry.

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.

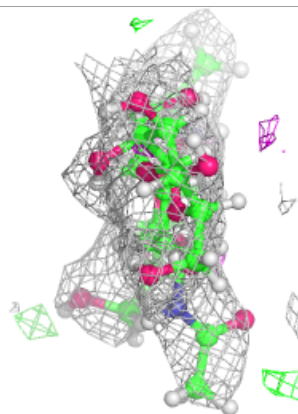
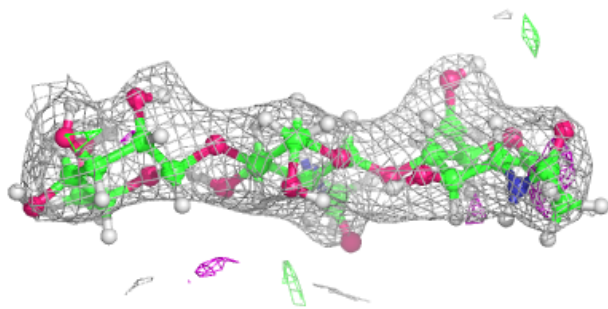
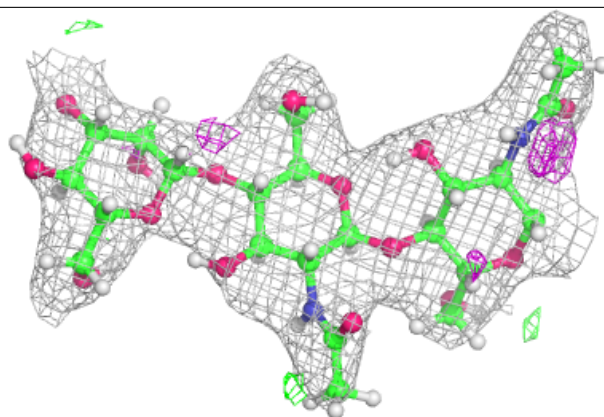
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	BMA	I	3	11/12	0.78	0.37	0,0,70,70	0
3	BMA	G	3	11/12	0.89	0.28	0,0,69,71	0
3	BMA	H	3	11/12	0.90	0.33	0,0,69,69	0
3	NAG	H	1	14/15	0.90	0.21	0,0,48,51	0
3	NAG	I	2	14/15	0.91	0.18	0,0,60,62	0
3	NAG	G	1	14/15	0.93	0.17	0,0,47,51	0
3	NAG	I	1	14/15	0.93	0.13	0,0,47,51	0
3	NAG	G	2	14/15	0.93	0.17	0,0,60,62	0
3	NAG	H	2	14/15	0.93	0.17	0,0,60,62	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.

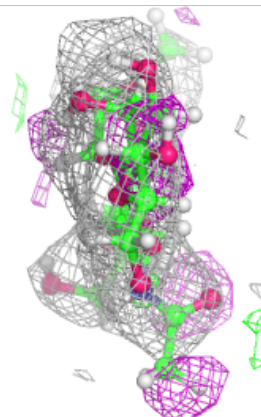
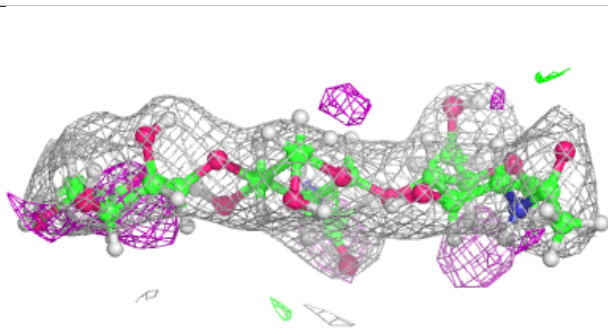
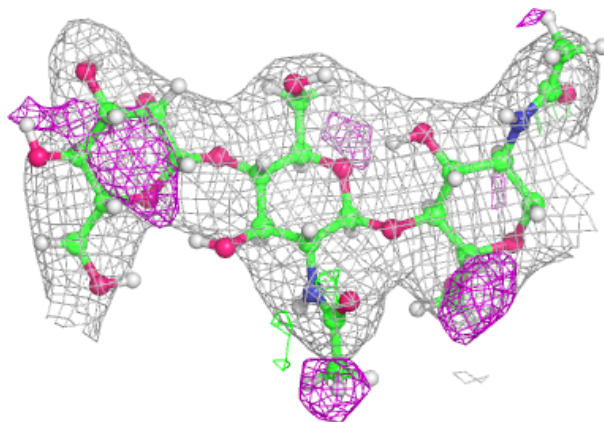


Electron density around Chain H:

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

**Electron density around Chain I:**

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



6.4 Ligands

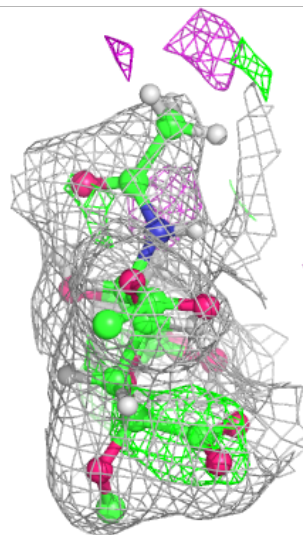
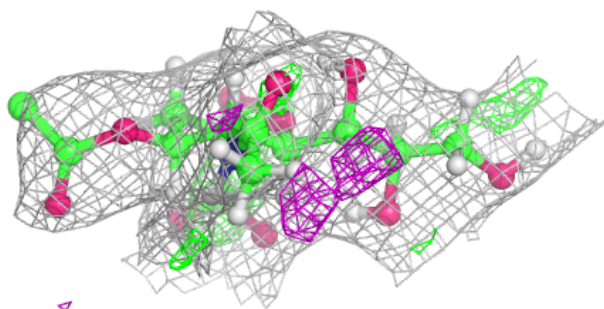
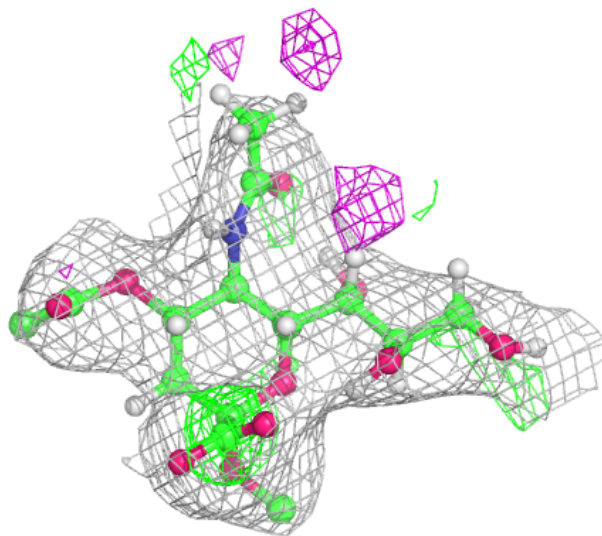
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	B	401	14/15	0.80	0.37	0,0,65,65	0
4	NAG	D	401	14/15	0.86	0.35	0,0,64,65	0
4	NAG	C	348	14/15	0.87	0.27	0,0,44,46	0
4	NAG	F	401	14/15	0.87	0.26	0,0,64,65	0
4	NAG	C	334	14/15	0.90	0.23	0,0,46,48	0
4	NAG	E	329	14/15	0.91	0.31	0,0,49,50	0
4	NAG	A	334	14/15	0.93	0.17	0,0,45,48	0
4	NAG	E	348	14/15	0.93	0.23	0,0,44,45	0
4	NAG	A	348	14/15	0.93	0.19	0,0,44,45	0
4	NAG	E	334	14/15	0.94	0.15	0,0,46,48	0
4	NAG	A	329	14/15	0.94	0.25	0,0,49,50	0
4	NAG	C	329	14/15	0.94	0.28	0,0,49,50	0
5	ANA	E	349	25/25	0.94	0.16	0,34,39,41	0
5	ANA	C	349	25/25	0.95	0.14	0,34,39,42	0
5	ANA	A	349	25/25	0.95	0.13	0,34,39,40	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

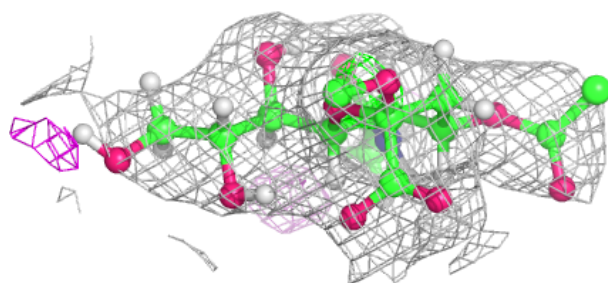
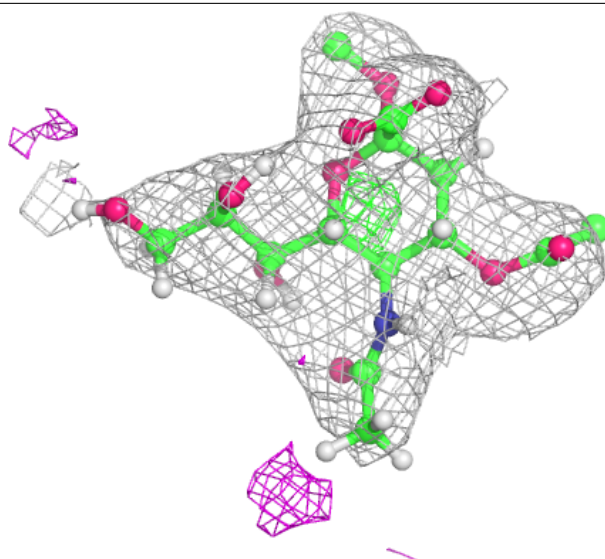
Electron density around ANA E 349:

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



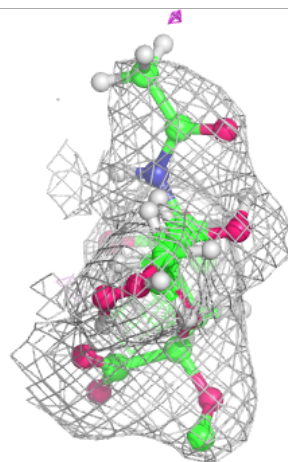
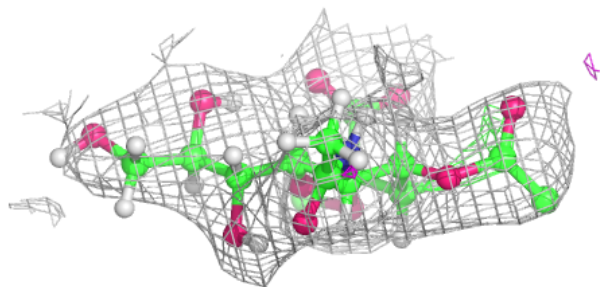
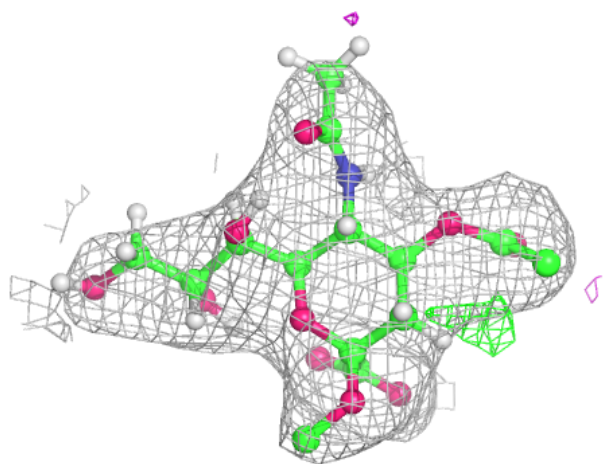
Electron density around ANA C 349:

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



Electron density around ANA A 349:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.