



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 14, 2024 – 01:17 pm GMT

PDB ID : 6TKV  
Title : Crystal structure of the human FUT8 in complex with GDP and a biantennary complex N-glycan  
Authors : Garcia-Garcia, A.; Ceballos-Laita, L.; Serna, L.; Artschwager, R.; Reichardt, N.C.; Corzana, F.; Hurtado-Guerrero, R.  
Deposited on : 2019-11-29  
Resolution : 1.95 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<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>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

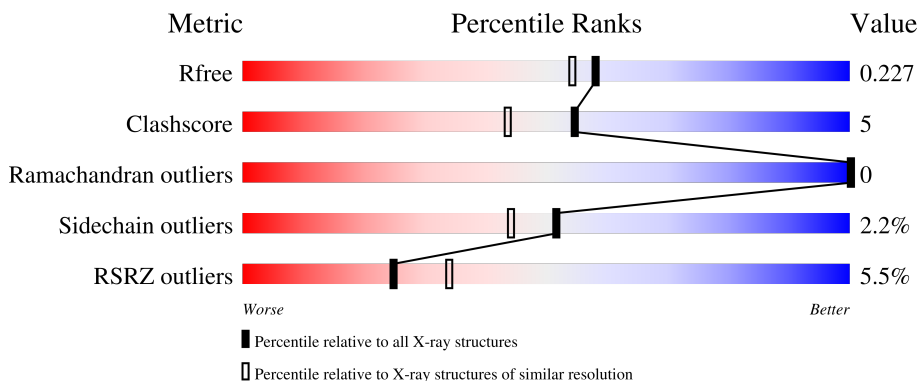
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.95 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))
$R_{free}$	130704	2580 (1.96-1.96)
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)
RSRZ outliers	127900	2539 (1.96-1.96)

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  $\geq 3$ , 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	468	
2	B	453	
3	C	7	
3	D	7	

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:

<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
5	GOL	B	604	-	-	X	-

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8353 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 Alpha-(1,6)-fucosyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	468	3810	2425	670	700	15	0	1	0

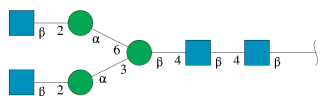
- Molecule 2 is a protein called Alpha-(1,6)-fucosyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	453	3701	2359	649	679	14	0	2	0

There are 15 discrepancies between the modelled and reference sequences:

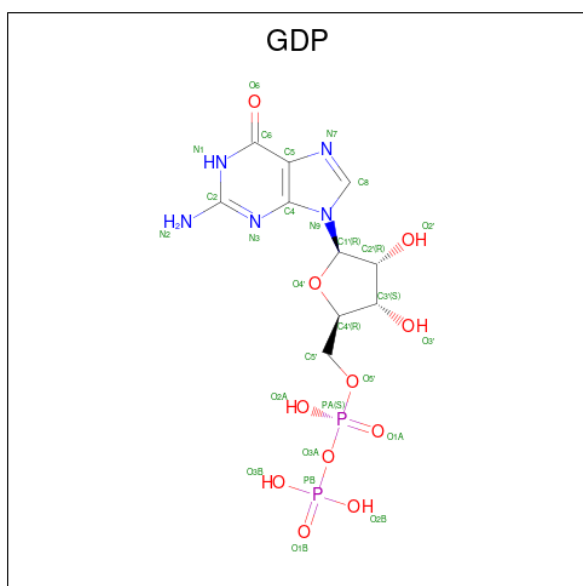
Chain	Residue	Modelled	Actual	Comment	Reference
B	?	-	ASN	deletion	UNP Q9BYC5
B	?	-	SER	deletion	UNP Q9BYC5
B	?	-	ILE	deletion	UNP Q9BYC5
B	?	-	SER	deletion	UNP Q9BYC5
B	?	-	TRP	deletion	UNP Q9BYC5
B	?	-	SER	deletion	UNP Q9BYC5
B	?	-	ALA	deletion	UNP Q9BYC5
B	?	-	GLY	deletion	UNP Q9BYC5
B	?	-	LEU	deletion	UNP Q9BYC5
B	?	-	HIS	deletion	UNP Q9BYC5
B	?	-	ASN	deletion	UNP Q9BYC5
B	?	-	ARG	deletion	UNP Q9BYC5
B	?	-	TYR	deletion	UNP Q9BYC5
B	?	-	THR	deletion	UNP Q9BYC5
B	?	-	GLU	deletion	UNP Q9BYC5

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]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	C	7	Total	C	N	O	0	0	0
			90	50	4	36			
3	D	7	Total	C	N	O	0	0	0
			90	50	4	36			

- Molecule 4 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula:  $C_{10}H_{15}N_5O_{11}P_2$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			28	10	5	11	2		
4	B	1	Total	C	N	O	P	0	0
			28	10	5	11	2		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		

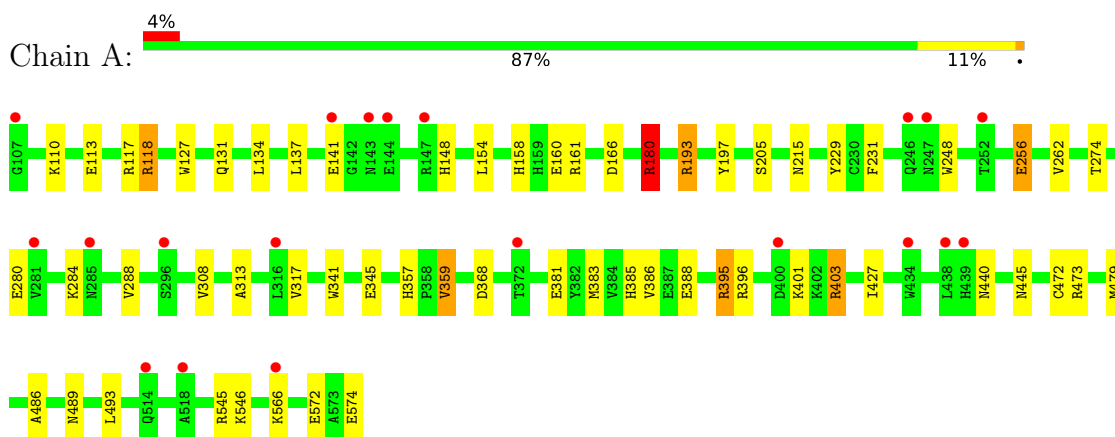
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	243	Total	O	0	0
			243	243		
6	B	261	Total	O	0	0
			261	261		

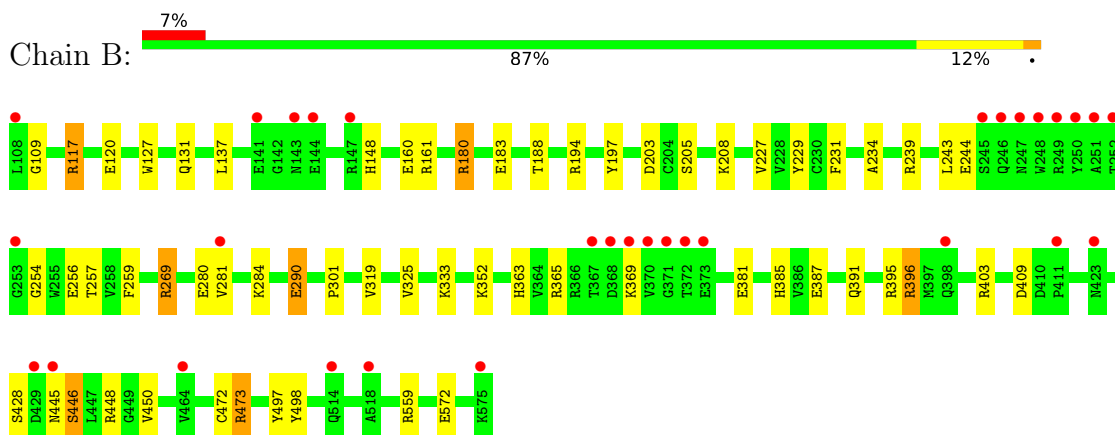
### 3 Residue-property plots [i](#)

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

- Molecule 1: Alpha-(1,6)-fucosyltransferase



- Molecule 2: Alpha-(1,6)-fucosyltransferase



- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose





- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  71% 29%

MAG1  
MAG2  
BMA3  
MAN4  
MAG5  
MAN6  
MAG7

## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	208.04Å 68.59Å 173.92Å 90.00° 149.90° 90.00°	Depositor
Resolution (Å)	20.00 – 1.95 20.00 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.1 (20.00-1.95) 99.3 (20.00-1.95)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.62 (at 1.96Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.185 , 0.219 0.194 , 0.227	Depositor DCC
$R_{free}$ test set	3478 reflections (3.93%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	31.0	Xtrriage
Anisotropy	0.539	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.42 , 59.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	8353	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.07% of the height of the origin peak. No significant pseudotranslation is detected.*

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

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 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: GDP, BMA, NAG, GOL, MAN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z  > 5$	RMSZ	# $ Z  > 5$
1	A	0.88	7/3913 (0.2%)	1.28	26/5304 (0.5%)
2	B	0.89	6/3799 (0.2%)	1.25	26/5148 (0.5%)
All	All	0.88	13/7712 (0.2%)	1.27	52/10452 (0.5%)

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	B	0	2
All	All	0	3

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	388	GLU	CD-OE1	7.37	1.33	1.25
2	B	473	ARG	CD-NE	-6.70	1.35	1.46
2	B	120	GLU	CD-OE1	6.46	1.32	1.25
1	A	256	GLU	CD-OE1	6.30	1.32	1.25
1	A	160	GLU	CD-OE1	6.20	1.32	1.25
2	B	160	GLU	CD-OE1	6.14	1.32	1.25
1	A	205	SER	CB-OG	-6.09	1.34	1.42
1	A	113	GLU	CD-OE2	6.06	1.32	1.25
1	A	395	ARG	CD-NE	-5.66	1.36	1.46
2	B	180	ARG	CD-NE	-5.51	1.37	1.46
2	B	109	GLY	C-O	5.33	1.32	1.23
1	A	280	GLU	CD-OE2	5.29	1.31	1.25
2	B	290	GLU	CD-OE2	-5.16	1.20	1.25

All (52) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	473	ARG	NE-CZ-NH2	-28.16	106.22	120.30
1	A	180	ARG	NE-CZ-NH2	-27.12	106.74	120.30
2	B	180	ARG	NE-CZ-NH2	-23.95	108.33	120.30
1	A	117	ARG	NE-CZ-NH2	-21.57	109.52	120.30
2	B	180	ARG	NE-CZ-NH1	19.66	130.13	120.30
1	A	395	ARG	NE-CZ-NH2	-19.25	110.68	120.30
1	A	473	ARG	NE-CZ-NH2	-18.79	110.90	120.30
2	B	473	ARG	NE-CZ-NH1	17.77	129.19	120.30
1	A	180	ARG	NE-CZ-NH1	16.04	128.32	120.30
2	B	161	ARG	NE-CZ-NH2	-15.16	112.72	120.30
1	A	473	ARG	NE-CZ-NH1	15.13	127.87	120.30
2	B	117	ARG	NE-CZ-NH2	-13.84	113.38	120.30
2	B	395	ARG	NE-CZ-NH2	-13.07	113.76	120.30
1	A	117	ARG	NE-CZ-NH1	12.97	126.78	120.30
1	A	395	ARG	NE-CZ-NH1	12.05	126.32	120.30
2	B	473	ARG	CD-NE-CZ	11.61	139.86	123.60
2	B	161	ARG	NE-CZ-NH1	10.11	125.35	120.30
1	A	473	ARG	CG-CD-NE	-10.02	90.77	111.80
1	A	403	ARG	NE-CZ-NH2	-9.94	115.33	120.30
1	A	180	ARG	CD-NE-CZ	9.88	137.43	123.60
1	A	193	ARG	NE-CZ-NH2	-9.57	115.52	120.30
1	A	161	ARG	NE-CZ-NH2	-9.46	115.57	120.30
1	A	473	ARG	CD-NE-CZ	9.44	136.82	123.60
2	B	180	ARG	CD-NE-CZ	8.92	136.09	123.60
2	B	117	ARG	NE-CZ-NH1	8.89	124.75	120.30
1	A	161	ARG	NE-CZ-NH1	8.53	124.57	120.30
2	B	396	ARG	NE-CZ-NH2	-8.27	116.16	120.30
1	A	193	ARG	NE-CZ-NH1	8.16	124.38	120.30
2	B	403	ARG	NE-CZ-NH2	-8.03	116.29	120.30
1	A	395	ARG	CG-CD-NE	-7.55	95.95	111.80
1	A	118	ARG	NE-CZ-NH2	-7.43	116.59	120.30
2	B	269	ARG	NE-CZ-NH1	-7.15	116.72	120.30
2	B	161	ARG	CG-CD-NE	-7.04	97.01	111.80
2	B	473	ARG	CG-CD-NE	-7.04	97.01	111.80
2	B	395	ARG	NE-CZ-NH1	6.99	123.80	120.30
2	B	396	ARG	NE-CZ-NH1	6.91	123.75	120.30
1	A	359	VAL	CB-CA-C	-6.76	98.55	111.40
1	A	180	ARG	CG-CD-NE	-6.69	97.75	111.80
1	A	395	ARG	CD-NE-CZ	6.54	132.76	123.60
2	B	161	ARG	CD-NE-CZ	6.33	132.46	123.60
1	A	161	ARG	CG-CD-NE	-6.28	98.62	111.80
2	B	180	ARG	CG-CD-NE	-6.19	98.81	111.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	403	ARG	CG-CD-NE	-6.09	99.02	111.80
2	B	194	ARG	NE-CZ-NH2	-6.01	117.29	120.30
2	B	472	CYS	CA-CB-SG	-5.50	104.10	114.00
1	A	472	CYS	CA-CB-SG	-5.38	104.32	114.00
2	B	403	ARG	NE-CZ-NH1	5.37	122.98	120.30
2	B	395	ARG	CG-CD-NE	-5.36	100.54	111.80
2	B	117	ARG	CD-NE-CZ	5.19	130.86	123.60
1	A	396	ARG	NE-CZ-NH1	5.17	122.88	120.30
1	A	117	ARG	CD-NE-CZ	5.16	130.82	123.60
1	A	118	ARG	NE-CZ-NH1	5.10	122.85	120.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	180	ARG	Sidechain
2	B	180	ARG	Sidechain
2	B	428	SER	Peptide

## 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3810	0	3723	37	1
2	B	3701	0	3628	39	0
3	C	90	0	76	2	0
3	D	90	0	76	1	0
4	A	28	0	12	0	0
4	B	28	0	12	2	0
5	A	24	0	32	6	0
5	B	78	0	104	9	0
6	A	243	0	0	9	1
6	B	261	0	0	7	1
All	All	8353	0	7663	81	2

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 5.

All (81) 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:385:HIS:HE2	5:B:604:GOL:H32	1.39	0.86
2:B:244:GLU:OE2	2:B:269:ARG:HD2	1.86	0.75
1:A:110:LYS:HB3	5:A:603:GOL:H2	1.73	0.70
2:B:365:ARG:NH1	2:B:409:ASP:OD2	2.27	0.68
1:A:403:ARG:HD2	1:A:427:ILE:HD11	1.77	0.67
1:A:180:ARG:HD3	6:A:723:HOH:O	1.96	0.66
2:B:254:GLY:O	2:B:257:THR:HB	1.96	0.66
2:B:208:LYS:HE3	5:B:606:GOL:O2	1.96	0.65
2:B:385:HIS:NE2	5:B:604:GOL:H32	2.11	0.64
1:A:368:ASP:OD2	5:A:602:GOL:H11	1.97	0.63
2:B:197:TYR:OH	2:B:572:GLU:HG3	2.00	0.62
1:A:118:ARG:HD2	1:A:166:ASP:OD2	2.01	0.60
2:B:183:GLU:HG3	2:B:319:VAL:HG21	1.84	0.59
2:B:290:GLU:HB3	5:B:613:GOL:H2	1.84	0.59
2:B:365:ARG:HG2	2:B:369:LYS:HD3	1.85	0.58
2:B:559:ARG:HH21	5:B:610:GOL:C1	2.16	0.58
1:A:180:ARG:CD	6:A:723:HOH:O	2.51	0.58
1:A:546:LYS:NZ	6:A:703:HOH:O	2.36	0.57
1:A:383:MET:HE2	1:A:383:MET:HA	1.87	0.57
1:A:357:HIS:HE1	6:A:765:HOH:O	1.88	0.56
2:B:448:ARG:NH1	6:B:701:HOH:O	2.38	0.56
3:C:2:NAG:O3	3:C:7:NAG:H81	2.06	0.56
2:B:188:THR:HG21	2:B:333:LYS:HE2	1.88	0.55
1:A:383:MET:CE	1:A:386:VAL:HG21	2.37	0.54
1:A:381:GLU:HG2	1:A:493:LEU:HD13	1.90	0.54
2:B:137:LEU:CD2	2:B:148:HIS:HD2	2.19	0.54
2:B:365:ARG:HG3	2:B:369:LYS:CB	2.38	0.53
2:B:137:LEU:CD2	2:B:148:HIS:CD2	2.92	0.53
1:A:137:LEU:CD2	1:A:148:HIS:CD2	2.92	0.52
1:A:197:TYR:OH	1:A:572:GLU:HG3	2.09	0.52
2:B:473:ARG:HD2	6:B:763:HOH:O	2.09	0.52
2:B:137:LEU:HD21	2:B:148:HIS:HD2	1.75	0.52
1:A:137:LEU:HD21	1:A:148:HIS:HD2	1.74	0.51
2:B:363:HIS:CD2	4:B:601:GDP:O6	2.64	0.51
2:B:559:ARG:HH21	5:B:610:GOL:H12	1.75	0.51
2:B:281:VAL:HG12	6:B:713:HOH:O	2.10	0.51
1:A:368:ASP:OD2	5:A:602:GOL:C1	2.59	0.51
2:B:446:SER:O	2:B:450:VAL:HG23	2.11	0.50
1:A:383:MET:HE1	1:A:386:VAL:HG21	1.93	0.50
1:A:313:ALA:O	1:A:317:VAL:HG12	2.10	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:2:NAG:O3	3:D:7:NAG:H81	2.12	0.49
1:A:127:TRP:NE1	1:A:131:GLN:OE1	2.45	0.49
1:A:341:TRP:HZ3	1:A:345:GLU:OE1	1.95	0.49
2:B:396:ARG:HD3	6:B:766:HOH:O	2.12	0.48
2:B:127:TRP:NE1	2:B:131:GLN:OE1	2.46	0.48
1:A:148:HIS:CE1	5:A:605:GOL:O2	2.67	0.48
1:A:215:ASN:OD1	6:A:701:HOH:O	2.20	0.48
2:B:473:ARG:HD3	2:B:498:TYR:O	2.13	0.48
1:A:274:THR:HG23	1:A:288:VAL:HG22	1.96	0.47
1:A:110:LYS:CB	5:A:603:GOL:H2	2.42	0.47
1:A:137:LEU:CD2	1:A:148:HIS:HD2	2.26	0.47
2:B:280[A]:GLU:HG3	6:B:870:HOH:O	2.14	0.47
2:B:385:HIS:HE2	5:B:604:GOL:C3	2.17	0.47
1:A:395:ARG:HD3	6:A:881:HOH:O	2.16	0.46
1:A:479[A]:MET:HE3	1:A:486:ALA:HB1	1.98	0.46
1:A:479[A]:MET:CE	1:A:489:ASN:HB2	2.46	0.46
2:B:281:VAL:CG1	6:B:713:HOH:O	2.64	0.45
1:A:137:LEU:HD21	1:A:148:HIS:CD2	2.51	0.45
2:B:381:GLU:OE2	5:B:604:GOL:H31	2.16	0.45
1:A:193:ARG:HD2	1:A:574:GLU:OE2	2.17	0.45
1:A:440:ASN:HD21	1:A:445:ASN:HD22	1.65	0.45
1:A:127:TRP:CE2	1:A:131:GLN:OE1	2.70	0.45
1:A:385:HIS:HD2	6:A:923:HOH:O	1.99	0.44
2:B:365:ARG:HG3	2:B:369:LYS:HB2	1.99	0.44
1:A:256:GLU:H	1:A:256:GLU:CD	2.20	0.44
2:B:117:ARG:NH1	6:B:708:HOH:O	2.45	0.44
2:B:203:ASP:OD1	2:B:205:SER:HB2	2.17	0.44
1:A:215:ASN:OD1	1:A:248:TRP:HA	2.18	0.43
1:A:158:HIS:HD2	6:A:809:HOH:O	2.01	0.43
2:B:325:VAL:HG22	2:B:497:TYR:CD2	2.53	0.43
5:A:604:GOL:H32	6:A:877:HOH:O	2.18	0.42
1:A:479[A]:MET:HE1	1:A:489:ASN:HB2	2.00	0.42
1:A:572:GLU:H	1:A:572:GLU:CD	2.24	0.41
2:B:559:ARG:NE	5:B:610:GOL:O1	2.49	0.41
3:C:6:MAN:H2	3:C:7:NAG:N2	2.35	0.41
2:B:234:ALA:HB1	2:B:239:ARG:O	2.20	0.41
2:B:387:GLU:O	2:B:391:GLN:HG2	2.21	0.40
2:B:137:LEU:HD23	2:B:148:HIS:CD2	2.56	0.40
2:B:227:VAL:HG13	2:B:243:LEU:HD11	2.03	0.40
2:B:256:GLU:HA	2:B:259:PHE:O	2.21	0.40
4:B:601:GDP:O5'	4:B:601:GDP:O3B	2.39	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:545:ARG:O	1:A:545:ARG:O[2_656]	1.91	0.29
6:A:881:HOH:O	6:B:757:HOH:O[2_555]	2.18	0.02

## 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	467/468 (100%)	456 (98%)	11 (2%)	0	100	100
2	B	451/453 (100%)	437 (97%)	14 (3%)	0	100	100
All	All	918/921 (100%)	893 (97%)	25 (3%)	0	100	100

There are no Ramachandran outliers to report.

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	411/410 (100%)	400 (97%)	11 (3%)	44	34
2	B	400/398 (100%)	393 (98%)	7 (2%)	59	53
All	All	811/808 (100%)	793 (98%)	18 (2%)	52	44

All (18) residues with a non-rotameric sidechain are listed below:



Mol	Chain	Res	Type
1	A	134	LEU
1	A	141	GLU
1	A	154	LEU
1	A	229	TYR
1	A	231	PHE
1	A	262	VAL
1	A	284	LYS
1	A	308	VAL
1	A	359	VAL
1	A	401	LYS
1	A	566	LYS
2	B	229	TYR
2	B	231	PHE
2	B	284	LYS
2	B	301	PRO
2	B	352	LYS
2	B	445	ASN
2	B	446	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	148	HIS
1	A	158	HIS
1	A	357	HIS
1	A	391	GLN
1	A	430	ASN
1	A	439	HIS
1	A	445	ASN
2	B	148	HIS

### 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

14 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	C	1	3	15,15,15	1.05	0	21,21,21	1.91	5 (23%)
3	NAG	C	2	3	14,14,15	2.24	3 (21%)	17,19,21	2.56	9 (52%)
3	BMA	C	3	3	11,11,12	2.27	3 (27%)	15,15,17	1.30	1 (6%)
3	MAN	C	4	3	11,11,12	2.03	3 (27%)	15,15,17	1.29	2 (13%)
3	NAG	C	5	3	14,14,15	0.87	0	17,19,21	1.33	2 (11%)
3	MAN	C	6	3	11,11,12	2.72	7 (63%)	15,15,17	1.34	3 (20%)
3	NAG	C	7	3	14,14,15	2.65	4 (28%)	17,19,21	2.31	7 (41%)
3	NAG	D	1	3	15,15,15	1.88	3 (20%)	21,21,21	4.47	9 (42%)
3	NAG	D	2	3	14,14,15	1.74	4 (28%)	17,19,21	1.42	3 (17%)
3	BMA	D	3	3	11,11,12	2.51	4 (36%)	15,15,17	1.81	4 (26%)
3	MAN	D	4	3	11,11,12	2.13	3 (27%)	15,15,17	1.33	2 (13%)
3	NAG	D	5	3	14,14,15	1.78	2 (14%)	17,19,21	1.30	2 (11%)
3	MAN	D	6	3	11,11,12	2.17	3 (27%)	15,15,17	1.59	4 (26%)
3	NAG	D	7	3	14,14,15	1.71	3 (21%)	17,19,21	1.77	6 (35%)

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	C	1	3	-	0/6/26/26	0/1/1/1
3	NAG	C	2	3	-	2/6/23/26	0/1/1/1
3	BMA	C	3	3	-	0/2/19/22	0/1/1/1
3	MAN	C	4	3	-	0/2/19/22	0/1/1/1
3	NAG	C	5	3	-	0/6/23/26	0/1/1/1
3	MAN	C	6	3	-	0/2/19/22	0/1/1/1
3	NAG	C	7	3	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	D	1	3	-	1/6/26/26	0/1/1/1
3	NAG	D	2	3	-	0/6/23/26	0/1/1/1
3	BMA	D	3	3	-	0/2/19/22	0/1/1/1
3	MAN	D	4	3	-	0/2/19/22	0/1/1/1
3	NAG	D	5	3	-	0/6/23/26	0/1/1/1
3	MAN	D	6	3	-	0/2/19/22	0/1/1/1
3	NAG	D	7	3	-	2/6/23/26	0/1/1/1

All (42) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	7	NAG	O5-C1	7.75	1.56	1.43
3	C	2	NAG	C1-C2	-6.36	1.42	1.52
3	C	3	BMA	O5-C5	5.86	1.55	1.43
3	D	5	NAG	C1-C2	5.24	1.60	1.52
3	D	4	MAN	O3-C3	-5.11	1.30	1.43
3	C	4	MAN	C2-C3	5.08	1.60	1.52
3	D	3	BMA	O5-C5	4.98	1.53	1.43
3	D	1	NAG	O1-C1	-4.51	1.25	1.39
3	D	7	NAG	C1-C2	4.41	1.58	1.52
3	C	6	MAN	O5-C5	4.40	1.52	1.43
3	C	6	MAN	O5-C1	4.10	1.50	1.43
3	D	3	BMA	O4-C4	4.06	1.52	1.43
3	D	1	NAG	O5-C5	3.88	1.53	1.44
3	D	3	BMA	O5-C1	-3.85	1.37	1.43
3	C	6	MAN	C4-C3	3.85	1.62	1.52
3	D	6	MAN	O5-C5	3.59	1.50	1.43
3	D	2	NAG	O3-C3	3.42	1.51	1.43
3	D	6	MAN	C4-C5	3.36	1.60	1.53
3	C	6	MAN	O2-C2	3.27	1.50	1.43
3	D	6	MAN	O5-C1	3.09	1.48	1.43
3	C	7	NAG	C1-C2	2.99	1.56	1.52
3	C	3	BMA	O3-C3	2.98	1.50	1.43
3	C	3	BMA	C2-C3	2.97	1.56	1.52
3	C	2	NAG	O3-C3	-2.96	1.36	1.43
3	D	2	NAG	C8-C7	2.92	1.56	1.50
3	C	7	NAG	C3-C2	2.85	1.58	1.52
3	D	7	NAG	C4-C3	2.79	1.59	1.52
3	D	5	NAG	C2-N2	2.69	1.50	1.46
3	D	4	MAN	O5-C5	2.69	1.48	1.43
3	C	6	MAN	O4-C4	2.61	1.49	1.43
3	C	4	MAN	O2-C2	-2.52	1.38	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	7	NAG	C4-C3	2.47	1.58	1.52
3	C	2	NAG	O7-C7	2.45	1.28	1.23
3	D	4	MAN	O2-C2	2.44	1.48	1.43
3	C	4	MAN	O3-C3	-2.40	1.37	1.43
3	D	3	BMA	C2-C3	-2.34	1.49	1.52
3	D	1	NAG	C8-C7	2.32	1.55	1.50
3	D	7	NAG	C8-C7	2.26	1.55	1.50
3	C	6	MAN	O6-C6	2.18	1.51	1.42
3	D	2	NAG	C3-C2	2.17	1.57	1.52
3	D	2	NAG	C1-C2	2.10	1.55	1.52
3	C	6	MAN	C4-C5	2.07	1.57	1.53

All (59) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	1	NAG	C1-C2-C3	-12.39	93.65	110.54
3	D	1	NAG	C1-O5-C5	-11.07	92.78	113.66
3	D	1	NAG	O5-C1-C2	8.09	117.65	109.52
3	C	7	NAG	C1-O5-C5	5.58	119.75	112.19
3	C	2	NAG	O7-C7-N2	5.57	132.20	121.95
3	C	1	NAG	C1-C2-C3	-5.39	103.19	110.54
3	D	1	NAG	O6-C6-C5	-4.51	95.83	111.29
3	C	2	NAG	O6-C6-C5	-3.75	98.41	111.29
3	C	7	NAG	O5-C5-C6	3.74	113.07	107.20
3	C	2	NAG	C6-C5-C4	-3.70	104.34	113.00
3	D	5	NAG	O3-C3-C2	-3.65	101.92	109.47
3	C	1	NAG	O1-C1-O5	-3.61	99.54	110.38
3	C	2	NAG	C8-C7-N2	-3.57	110.06	116.10
3	C	3	BMA	O5-C5-C6	3.54	112.76	107.20
3	C	7	NAG	C4-C3-C2	3.48	116.12	111.02
3	D	3	BMA	C1-C2-C3	3.39	113.83	109.67
3	D	1	NAG	C1-C2-N2	3.35	114.61	110.73
3	D	1	NAG	O1-C1-C2	3.34	116.16	109.22
3	C	1	NAG	C1-C2-N2	-3.32	106.88	110.73
3	D	7	NAG	C6-C5-C4	3.28	120.69	113.00
3	D	1	NAG	O1-C1-O5	3.12	119.74	110.38
3	D	6	MAN	O2-C2-C1	-3.11	102.79	109.15
3	C	5	NAG	C1-C2-N2	-3.00	105.36	110.49
3	D	7	NAG	O5-C5-C4	-2.98	103.58	110.83
3	D	1	NAG	C3-C4-C5	2.91	115.44	110.24
3	C	1	NAG	C1-O5-C5	-2.89	108.22	113.66
3	D	3	BMA	C3-C4-C5	-2.87	105.12	110.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	3	BMA	C1-O5-C5	-2.86	108.32	112.19
3	C	6	MAN	O3-C3-C2	-2.78	104.66	109.99
3	D	6	MAN	C1-C2-C3	2.76	113.06	109.67
3	D	4	MAN	C1-O5-C5	-2.75	108.47	112.19
3	C	7	NAG	C6-C5-C4	-2.71	106.67	113.00
3	C	2	NAG	O5-C5-C6	-2.70	102.98	107.20
3	C	2	NAG	C4-C3-C2	-2.65	107.13	111.02
3	C	2	NAG	O3-C3-C4	-2.63	104.28	110.35
3	D	2	NAG	C1-C2-N2	-2.51	106.21	110.49
3	D	7	NAG	C3-C4-C5	-2.50	105.78	110.24
3	C	4	MAN	C1-O5-C5	2.49	115.56	112.19
3	D	7	NAG	C2-N2-C7	2.48	126.43	122.90
3	C	4	MAN	O2-C2-C3	-2.46	105.22	110.14
3	C	7	NAG	C2-N2-C7	2.43	126.36	122.90
3	D	7	NAG	O4-C4-C5	2.41	115.28	109.30
3	C	2	NAG	O7-C7-C8	-2.32	117.74	122.06
3	C	6	MAN	O5-C5-C6	2.28	110.78	107.20
3	D	7	NAG	O5-C5-C6	-2.28	103.63	107.20
3	D	6	MAN	O5-C1-C2	2.27	114.27	110.77
3	D	4	MAN	C2-C3-C4	-2.25	107.01	110.89
3	D	5	NAG	O4-C4-C3	-2.23	105.20	110.35
3	C	7	NAG	O3-C3-C2	-2.21	104.88	109.47
3	C	2	NAG	O3-C3-C2	-2.20	104.92	109.47
3	C	1	NAG	O6-C6-C5	-2.20	103.75	111.29
3	D	6	MAN	O6-C6-C5	-2.17	103.83	111.29
3	D	3	BMA	C2-C3-C4	2.08	114.49	110.89
3	C	5	NAG	C1-O5-C5	-2.06	109.40	112.19
3	D	2	NAG	O7-C7-N2	2.05	125.72	121.95
3	D	1	NAG	C2-N2-C7	-2.05	118.19	123.18
3	D	2	NAG	C8-C7-N2	-2.04	112.65	116.10
3	C	6	MAN	C2-C3-C4	2.03	114.41	110.89
3	C	7	NAG	C3-C4-C5	2.01	113.83	110.24

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	2	NAG	O5-C5-C6-O6
3	D	7	NAG	C4-C5-C6-O6
3	C	2	NAG	C4-C5-C6-O6
3	C	7	NAG	C4-C5-C6-O6
3	C	7	NAG	O5-C5-C6-O6

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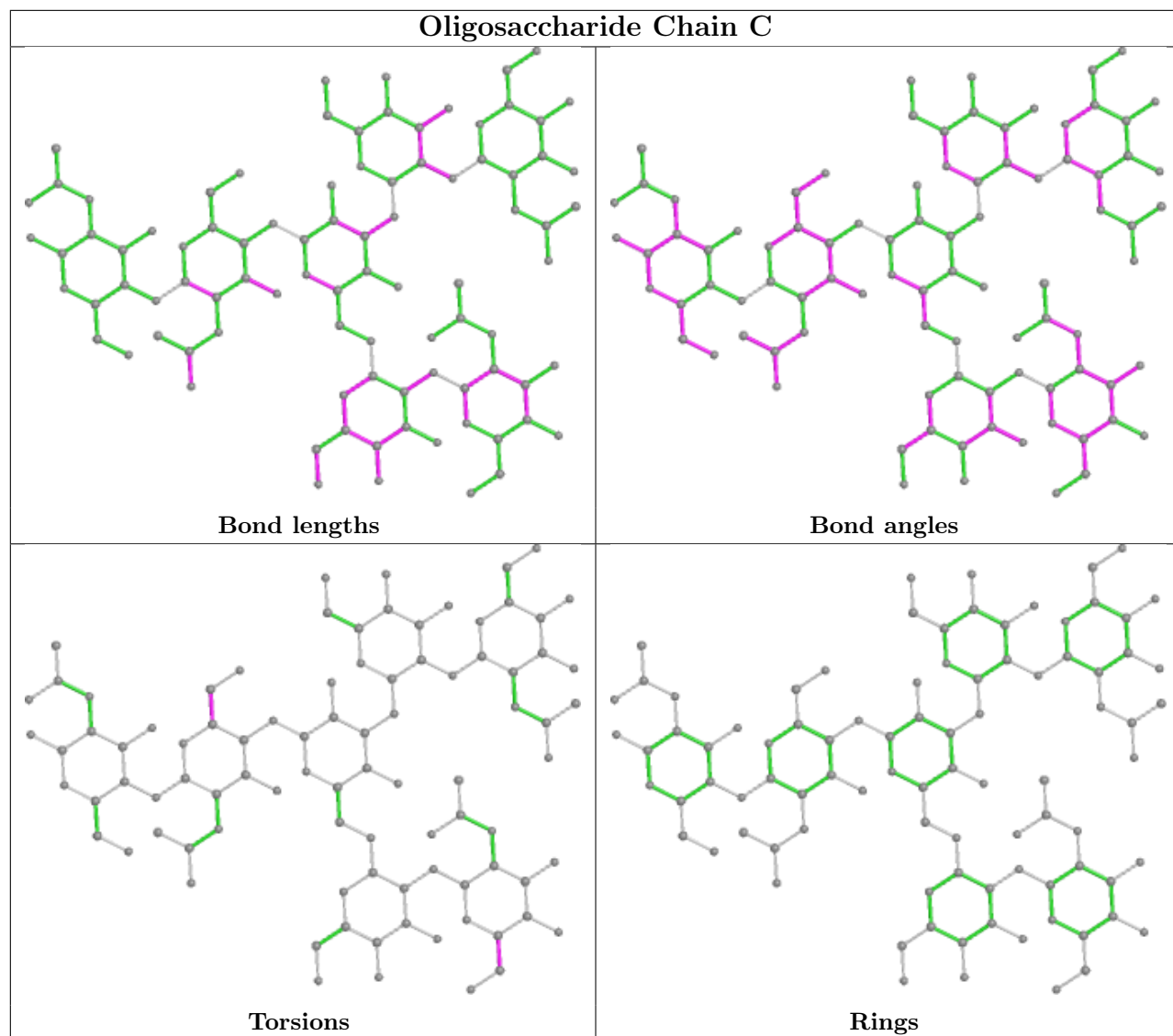
Mol	Chain	Res	Type	Atoms
3	D	7	NAG	O5-C5-C6-O6
3	D	1	NAG	C4-C5-C6-O6

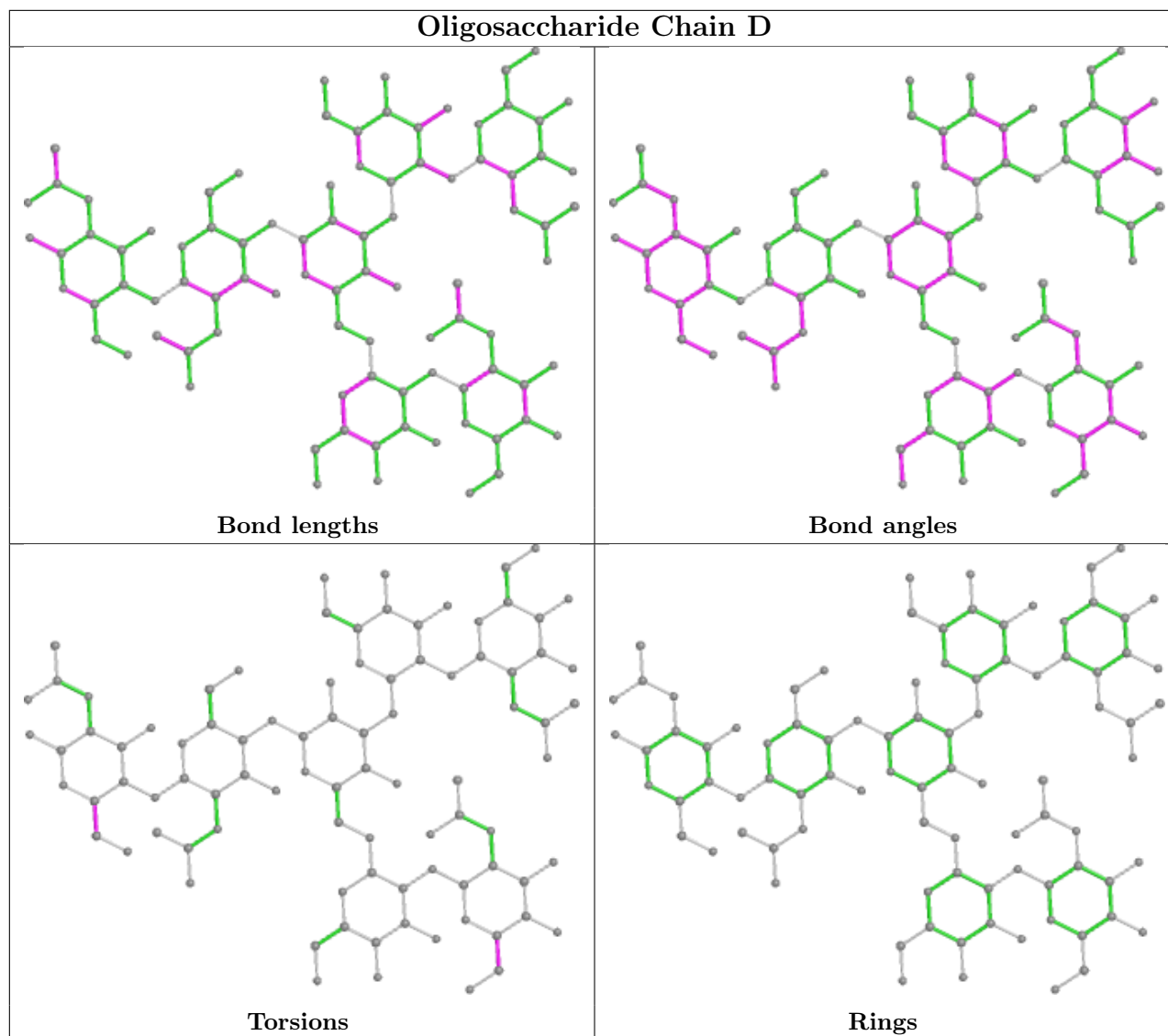
There are no ring outliers.

5 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	7	NAG	2	0
3	D	7	NAG	1	0
3	C	2	NAG	1	0
3	C	6	MAN	1	0
3	D	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 [i](#)

19 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	GOL	B	602	-	5,5,5	0.15	0	5,5,5	0.37	0
5	GOL	B	612	-	5,5,5	0.15	0	5,5,5	0.62	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GOL	B	613	-	5,5,5	0.11	0	5,5,5	0.41	0
4	GDP	B	601	-	24,30,30	1.59	3 (12%)	30,47,47	1.59	6 (20%)
5	GOL	B	605	-	5,5,5	0.10	0	5,5,5	0.29	0
5	GOL	A	603	-	5,5,5	0.17	0	5,5,5	0.49	0
5	GOL	B	604	-	5,5,5	0.17	0	5,5,5	0.40	0
5	GOL	B	609	-	5,5,5	0.10	0	5,5,5	0.25	0
5	GOL	B	611	-	5,5,5	0.17	0	5,5,5	0.38	0
5	GOL	B	614	-	5,5,5	0.19	0	5,5,5	0.40	0
5	GOL	A	602	-	5,5,5	0.12	0	5,5,5	0.20	0
5	GOL	B	610	-	5,5,5	0.17	0	5,5,5	0.37	0
4	GDP	A	601	-	24,30,30	1.26	2 (8%)	30,47,47	1.56	6 (20%)
5	GOL	B	607	-	5,5,5	0.17	0	5,5,5	0.43	0
5	GOL	A	604	-	5,5,5	0.14	0	5,5,5	0.14	0
5	GOL	A	605	-	5,5,5	0.22	0	5,5,5	0.46	0
5	GOL	B	606	-	5,5,5	0.16	0	5,5,5	0.38	0
5	GOL	B	603	-	5,5,5	0.10	0	5,5,5	0.34	0
5	GOL	B	608	-	5,5,5	0.20	0	5,5,5	0.51	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	GOL	B	602	-	-	1/4/4/4	-
5	GOL	B	612	-	-	3/4/4/4	-
5	GOL	B	613	-	-	4/4/4/4	-
4	GDP	B	601	-	-	7/12/32/32	0/3/3/3
5	GOL	B	605	-	-	2/4/4/4	-
5	GOL	A	603	-	-	2/4/4/4	-
5	GOL	B	604	-	-	0/4/4/4	-
5	GOL	B	609	-	-	2/4/4/4	-
5	GOL	B	611	-	-	3/4/4/4	-
5	GOL	B	614	-	-	4/4/4/4	-
5	GOL	A	602	-	-	2/4/4/4	-
5	GOL	B	610	-	-	2/4/4/4	-
4	GDP	A	601	-	-	4/12/32/32	0/3/3/3
5	GOL	B	607	-	-	4/4/4/4	-
5	GOL	A	604	-	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GOL	A	605	-	-	4/4/4/4	-
5	GOL	B	606	-	-	4/4/4/4	-
5	GOL	B	603	-	-	3/4/4/4	-
5	GOL	B	608	-	-	2/4/4/4	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	601	GDP	C6-N1	-5.51	1.29	1.37
4	A	601	GDP	O6-C6	2.92	1.29	1.23
4	B	601	GDP	C2-N1	-2.61	1.31	1.37
4	A	601	GDP	C2-N1	-2.12	1.32	1.37
4	B	601	GDP	C8-N7	2.07	1.38	1.35

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	601	GDP	O6-C6-N1	-4.38	115.48	120.65
4	A	601	GDP	O6-C6-N1	4.08	125.47	120.65
4	A	601	GDP	O6-C6-C5	-3.71	117.12	124.37
4	B	601	GDP	C5-C6-N1	3.61	120.33	113.95
4	B	601	GDP	O2B-PB-O1B	2.85	121.83	110.68
4	A	601	GDP	O3B-PB-O2B	2.74	118.10	107.64
4	A	601	GDP	O2'-C2'-C3'	-2.51	103.70	111.82
4	B	601	GDP	O4'-C1'-C2'	-2.46	103.34	106.93
4	B	601	GDP	O3A-PB-O1B	-2.44	97.68	111.19
4	A	601	GDP	O3A-PB-O1B	-2.40	97.87	111.19
4	A	601	GDP	O3B-PB-O3A	2.24	112.15	104.64
4	B	601	GDP	C8-N7-C5	2.05	106.91	102.99

There are no chirality outliers.

All (53) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	601	GDP	PB-O3A-PA-O5'
4	B	601	GDP	PA-O3A-PB-O3B
5	A	602	GOL	O1-C1-C2-C3
5	A	603	GOL	O1-C1-C2-O2
5	A	603	GOL	O1-C1-C2-C3
5	A	605	GOL	O1-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
5	B	605	GOL	O1-C1-C2-O2
5	B	605	GOL	O1-C1-C2-C3
5	B	606	GOL	O1-C1-C2-C3
5	B	606	GOL	C1-C2-C3-O3
5	B	606	GOL	O2-C2-C3-O3
5	B	607	GOL	O1-C1-C2-O2
5	B	607	GOL	O1-C1-C2-C3
5	B	608	GOL	O1-C1-C2-O2
5	B	608	GOL	O1-C1-C2-C3
5	B	609	GOL	O2-C2-C3-O3
5	B	610	GOL	O1-C1-C2-C3
5	B	613	GOL	C1-C2-C3-O3
5	B	613	GOL	O2-C2-C3-O3
5	B	614	GOL	C1-C2-C3-O3
4	B	601	GDP	O4'-C4'-C5'-O5'
4	B	601	GDP	C3'-C4'-C5'-O5'
5	B	611	GOL	O1-C1-C2-O2
5	B	614	GOL	O2-C2-C3-O3
5	A	605	GOL	C1-C2-C3-O3
5	B	603	GOL	O1-C1-C2-C3
5	B	607	GOL	C1-C2-C3-O3
5	B	609	GOL	C1-C2-C3-O3
5	B	611	GOL	O1-C1-C2-C3
5	B	612	GOL	O1-C1-C2-C3
5	B	612	GOL	C1-C2-C3-O3
5	B	613	GOL	O1-C1-C2-C3
5	A	602	GOL	O1-C1-C2-O2
5	B	606	GOL	O1-C1-C2-O2
5	B	612	GOL	O2-C2-C3-O3
5	B	610	GOL	O1-C1-C2-O2
5	B	613	GOL	O1-C1-C2-O2
4	B	601	GDP	PB-O3A-PA-O5'
4	A	601	GDP	PA-O3A-PB-O1B
5	A	605	GOL	O1-C1-C2-O2
5	A	605	GOL	O2-C2-C3-O3
5	B	607	GOL	O2-C2-C3-O3
5	B	611	GOL	O2-C2-C3-O3
5	B	614	GOL	O1-C1-C2-O2
4	B	601	GDP	PB-O3A-PA-O1A
5	B	602	GOL	O1-C1-C2-C3
4	B	601	GDP	C4'-C5'-O5'-PA
4	A	601	GDP	C4'-C5'-O5'-PA

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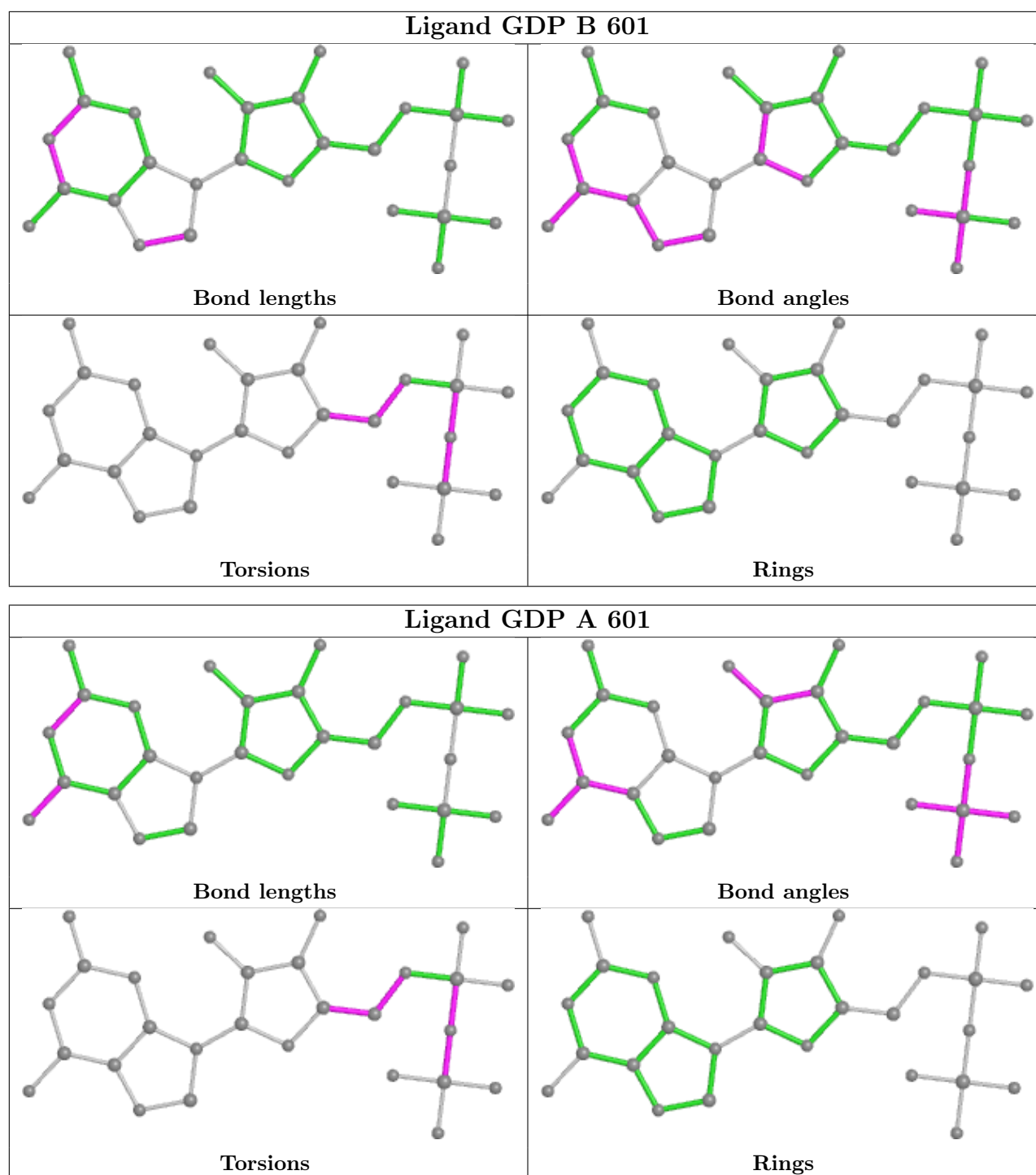
Mol	Chain	Res	Type	Atoms
5	B	603	GOL	O1-C1-C2-O2
4	A	601	GDP	O4'-C4'-C5'-O5'
5	B	603	GOL	C1-C2-C3-O3
4	B	601	GDP	PA-O3A-PB-O1B
5	B	614	GOL	O1-C1-C2-C3

There are no ring outliers.

9 monomers are involved in 17 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	613	GOL	1	0
4	B	601	GDP	2	0
5	A	603	GOL	2	0
5	B	604	GOL	4	0
5	A	602	GOL	2	0
5	B	610	GOL	3	0
5	A	604	GOL	1	0
5	A	605	GOL	1	0
5	B	606	GOL	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 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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	B	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	B	429:ASP	C	445:ASN	N	11.79

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	468/468 (100%)	0.15	20 (4%) 35 45	25, 37, 55, 69	0
2	B	453/453 (100%)	0.23	31 (6%) 17 25	24, 33, 62, 97	0
All	All	921/921 (100%)	0.19	51 (5%) 25 34	24, 35, 59, 97	0

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	370	VAL	9.4
2	B	445	ASN	6.9
2	B	372	THR	6.0
2	B	252	THR	5.9
2	B	246	GLN	5.8
2	B	371	GLY	5.6
1	A	439	HIS	5.3
2	B	367	THR	5.0
2	B	108	LEU	4.8
1	A	434	TRP	4.6
1	A	143	ASN	4.6
2	B	429	ASP	4.5
1	A	518	ALA	4.2
2	B	368	ASP	4.0
2	B	411	PRO	3.9
2	B	369	LYS	3.8
1	A	372	THR	3.7
2	B	253	GLY	3.6
2	B	398	GLN	3.5
1	A	285	ASN	3.5
2	B	250	TYR	3.4
1	A	246	GLN	3.4
1	A	107	GLY	3.3
2	B	373	GLU	3.3

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Mol	Chain	Res	Type	RSRZ
2	B	245	SER	3.3
2	B	147	ARG	3.2
2	B	247	ASN	3.2
2	B	143	ASN	3.1
1	A	247	ASN	3.0
1	A	281	VAL	3.0
2	B	249	ARG	2.9
2	B	281	VAL	2.8
1	A	252	THR	2.8
2	B	141	GLU	2.8
2	B	423	ASN	2.8
1	A	141	GLU	2.7
1	A	400	ASP	2.6
1	A	514	GLN	2.5
2	B	514	GLN	2.5
1	A	147	ARG	2.4
2	B	144	GLU	2.3
2	B	251	ALA	2.3
1	A	144	GLU	2.2
1	A	566	LYS	2.2
1	A	296	SER	2.2
2	B	464	VAL	2.2
1	A	316	LEU	2.2
1	A	438	LEU	2.2
2	B	518	ALA	2.1
2	B	248	TRP	2.1
2	B	575	LYS	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, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	NAG	C	7	14/15	0.70	0.31	67,73,78,79	0

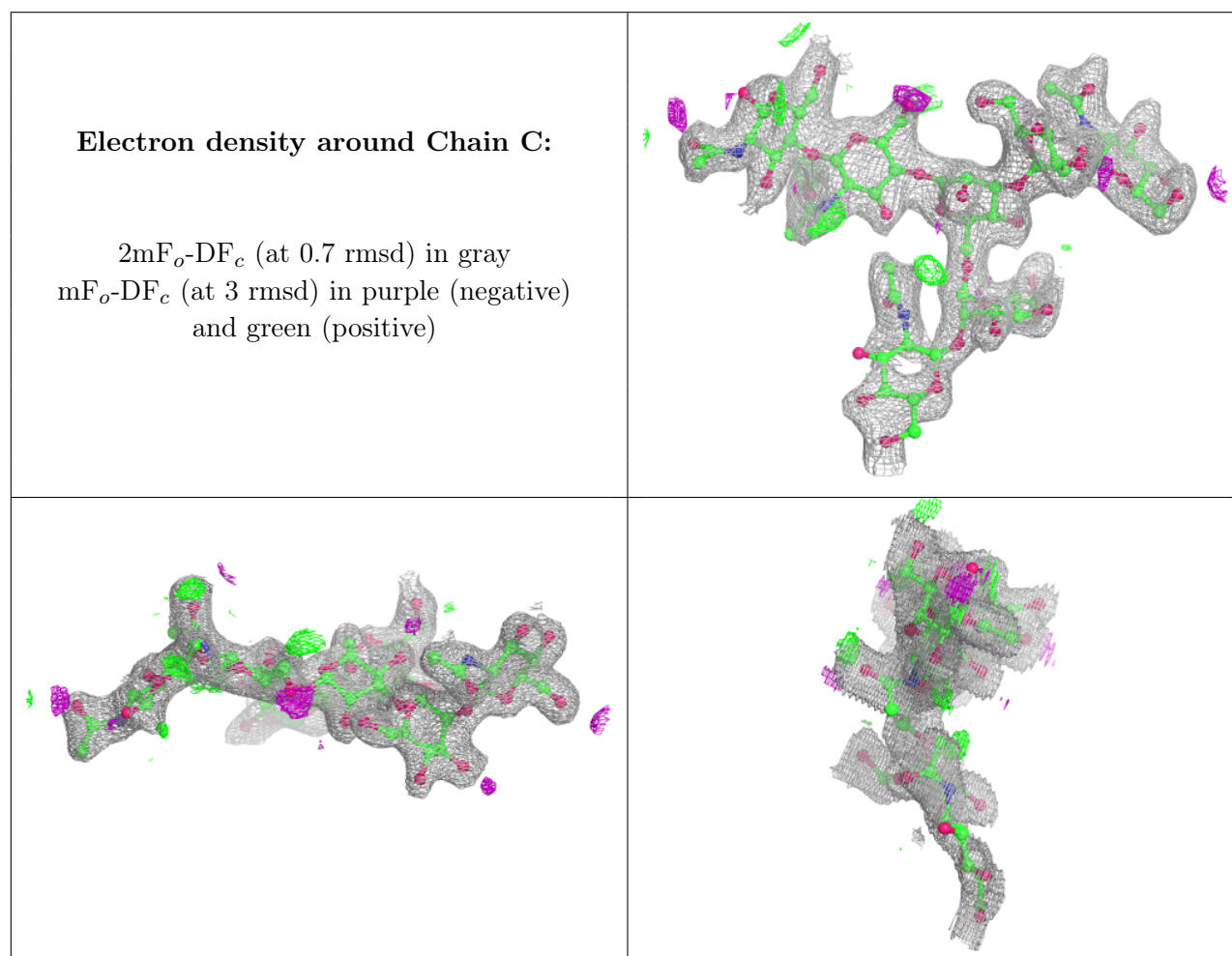
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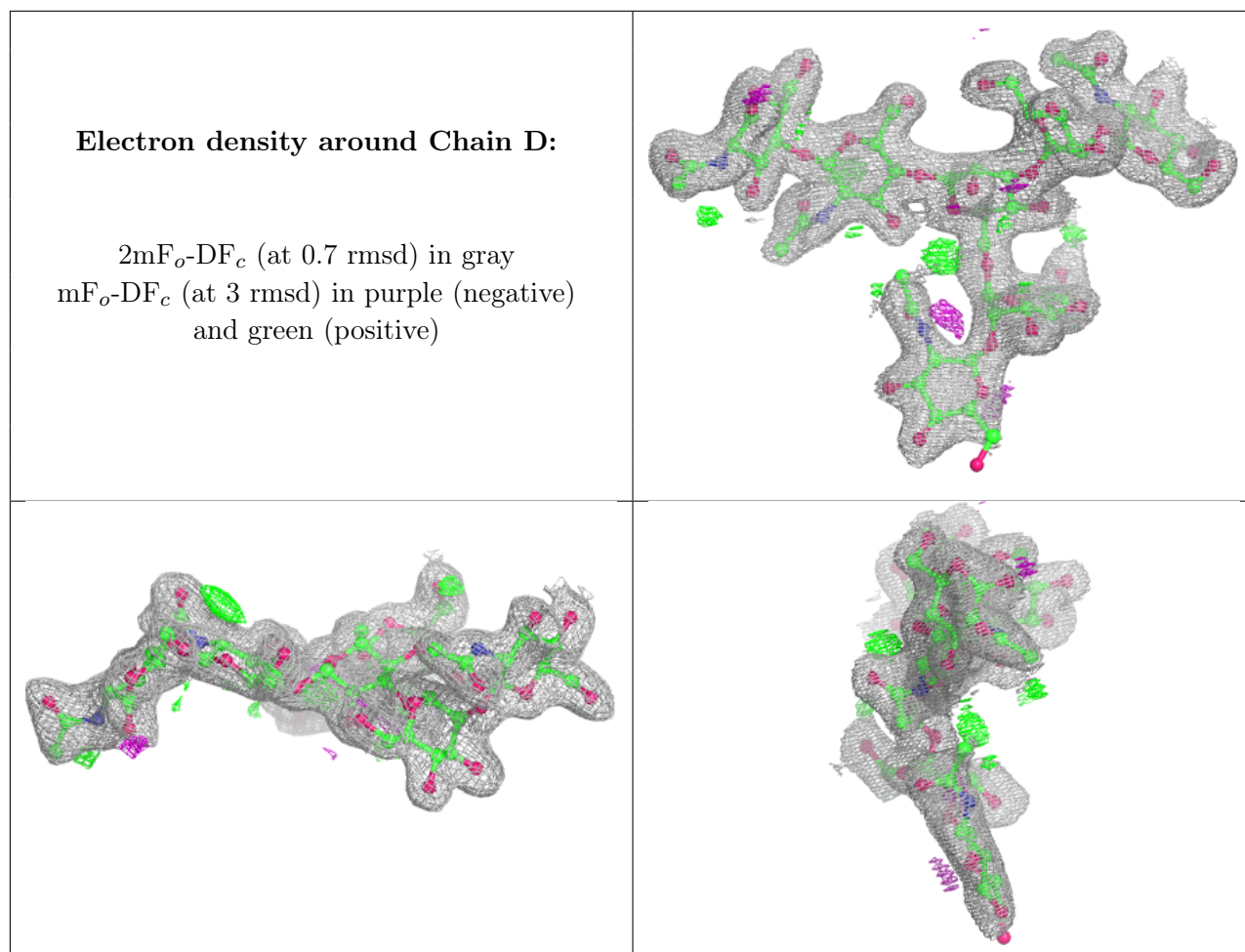


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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	MAN	C	6	11/12	0.78	0.19	47,50,55,62	0
3	NAG	D	7	14/15	0.79	0.31	52,57,61,69	0
3	MAN	D	6	11/12	0.84	0.14	38,41,43,45	0
3	NAG	C	1	15/15	0.88	0.17	44,47,49,57	0
3	NAG	C	2	14/15	0.89	0.12	44,48,51,55	0
3	BMA	D	3	11/12	0.90	0.08	32,33,34,36	0
3	NAG	D	1	15/15	0.92	0.12	37,42,45,47	0
3	MAN	D	4	11/12	0.93	0.16	33,35,37,38	0
3	NAG	C	5	14/15	0.94	0.10	35,36,38,42	0
3	MAN	C	4	11/12	0.95	0.15	39,41,44,45	0
3	NAG	D	2	14/15	0.95	0.08	34,36,38,41	0
3	BMA	C	3	11/12	0.95	0.08	39,40,41,46	0
3	NAG	D	5	14/15	0.96	0.07	29,30,33,34	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.





## 6.4 Ligands [i](#)

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

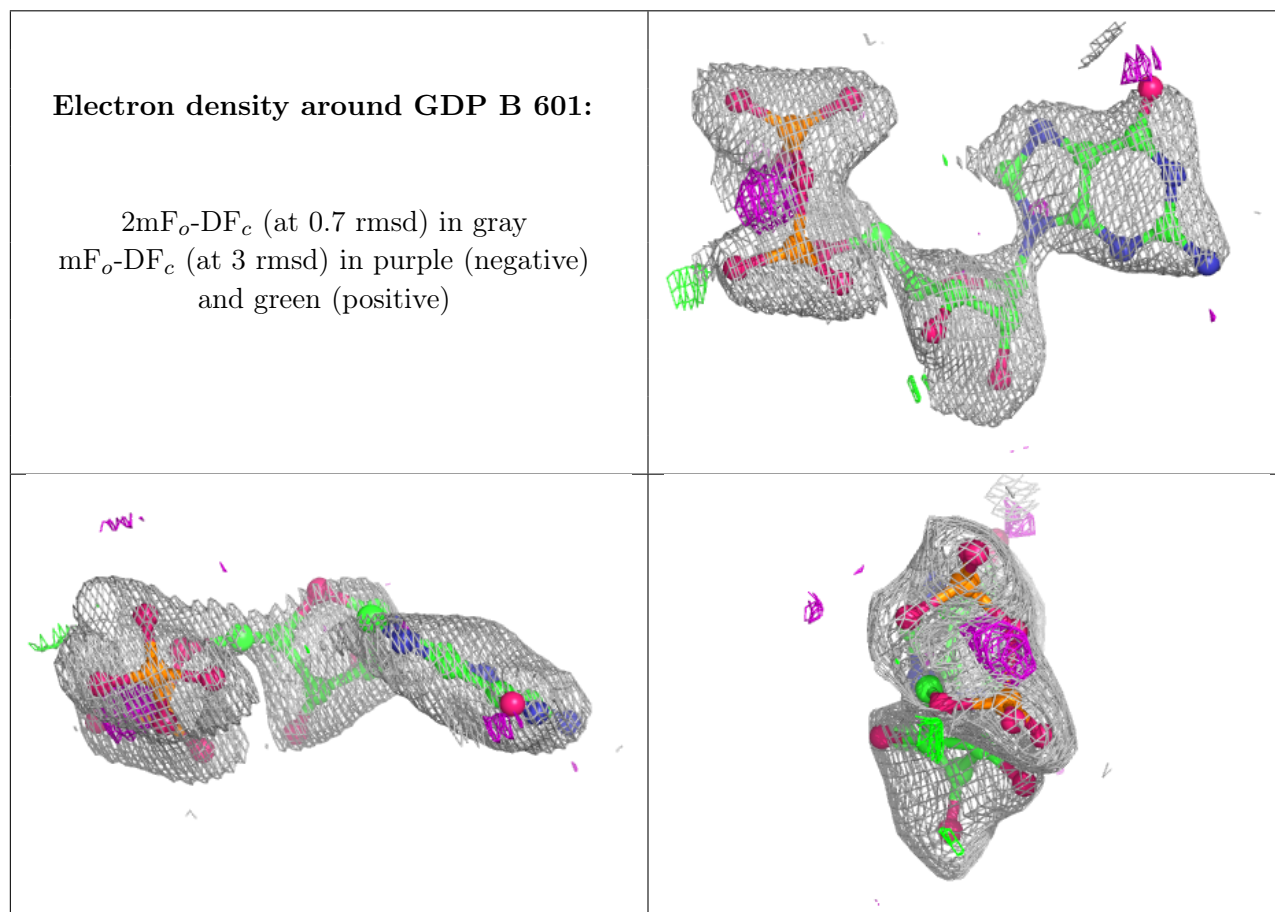
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
5	GOL	A	605	6/6	0.72	0.21	57,66,71,73	0
5	GOL	B	608	6/6	0.76	0.25	63,67,70,72	0
5	GOL	A	603	6/6	0.81	0.32	45,56,58,63	0
5	GOL	B	606	6/6	0.82	0.15	54,56,58,60	0
5	GOL	B	602	6/6	0.82	0.17	67,71,72,74	0
5	GOL	B	607	6/6	0.84	0.19	53,62,65,65	0
4	GDP	B	601	28/28	0.85	0.20	49,62,67,68	0
5	GOL	B	610	6/6	0.85	0.38	58,66,72,80	0
5	GOL	B	611	6/6	0.85	0.16	58,63,66,66	0
5	GOL	B	604	6/6	0.86	0.24	60,64,65,69	0
5	GOL	B	609	6/6	0.87	0.16	67,69,73,77	0

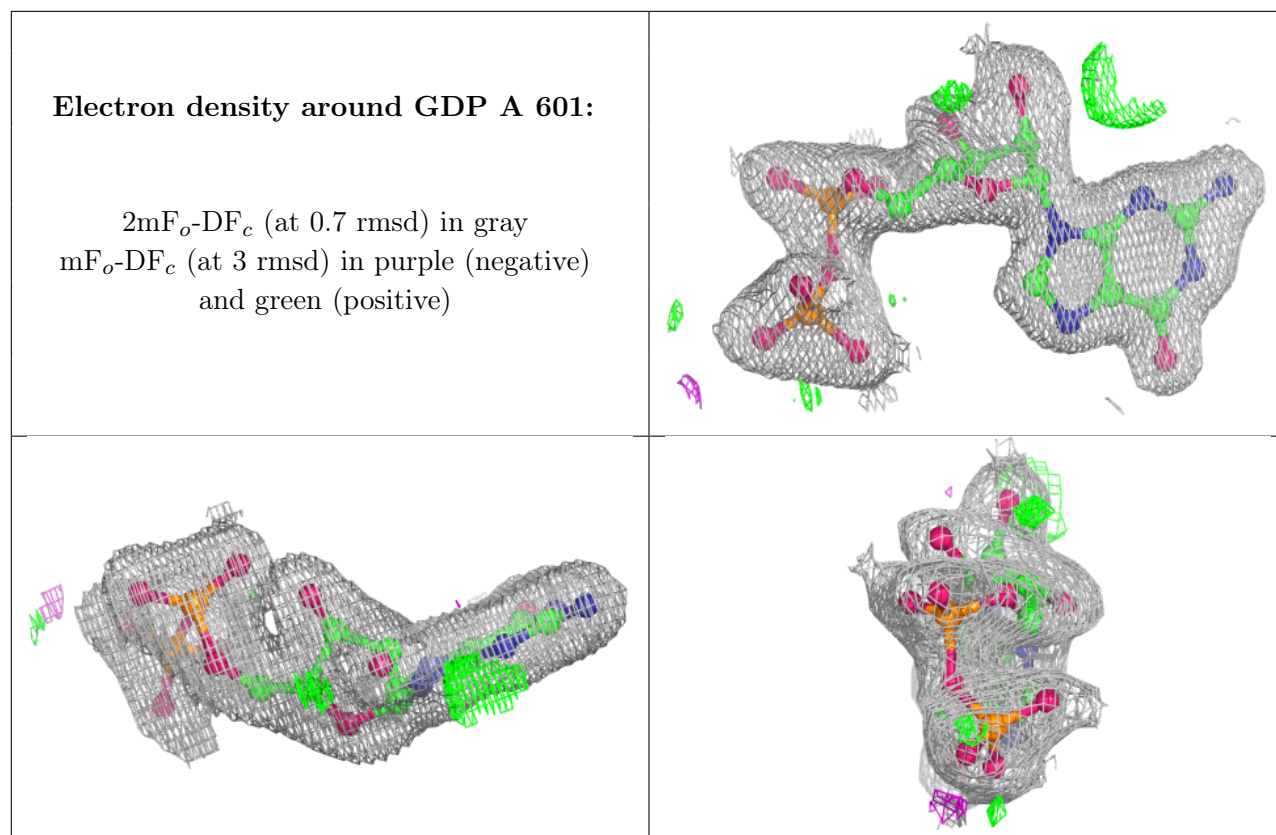
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	GOL	B	612	6/6	0.87	0.14	57,60,65,69	0
5	GOL	A	602	6/6	0.89	0.18	52,59,61,61	0
5	GOL	A	604	6/6	0.91	0.13	54,60,64,67	0
5	GOL	B	614	6/6	0.91	0.22	59,61,61,62	0
5	GOL	B	613	6/6	0.92	0.14	60,62,63,64	0
5	GOL	B	605	6/6	0.93	0.23	56,63,66,67	0
5	GOL	B	603	6/6	0.94	0.16	47,51,52,56	0
4	GDP	A	601	28/28	0.97	0.12	30,32,35,37	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.





## 6.5 Other polymers [i](#)

There are no such residues in this entry.