



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 26, 2024 – 09:02 AM EDT

PDB ID : 5HDB  
Title : Integrin alphaIIbeta3 in complex with Ro-435054  
Authors : Lin, F.Y.  
Deposited on : 2016-01-05  
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](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 : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

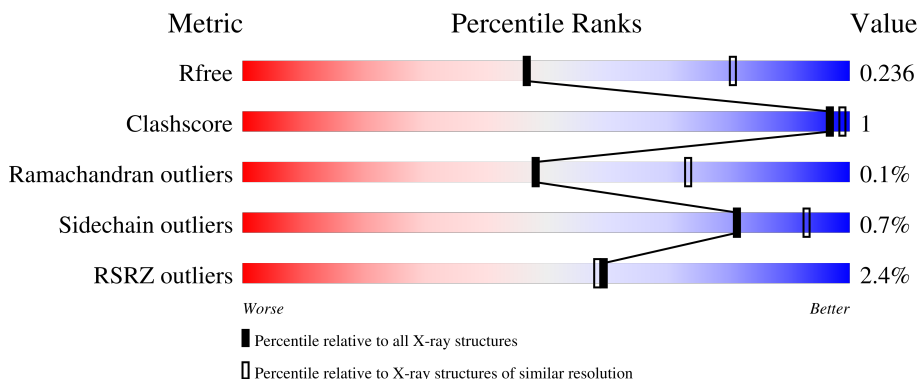
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

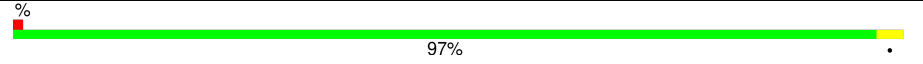
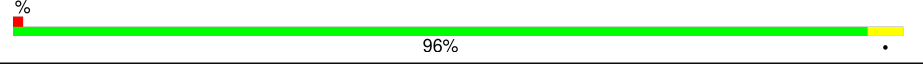
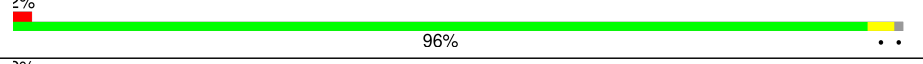
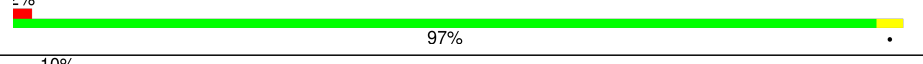
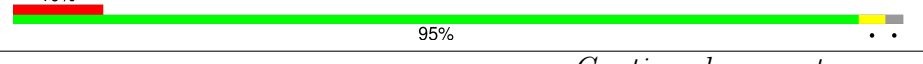
The reported resolution of this entry is 2.70 Å.

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))
$R_{free}$	164625	3333 (2.70-2.70)
Clashscore	180529	3684 (2.70-2.70)
Ramachandran outliers	177936	3633 (2.70-2.70)
Sidechain outliers	177891	3633 (2.70-2.70)
RSRZ outliers	164620	3333 (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  $\geq 3$ , 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	454	 97%
1	C	454	 96%
2	B	471	 96%
2	D	471	 97%
3	E	219	 95%

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Mol	Chain	Length	Quality of chain
3	H	219	 97%
4	F	214	 7% 100%
4	L	214	 97%
5	G	5	 40% 60%
6	I	2	 100%
6	K	2	 100%
7	J	4	 75% 25%

## 2 Entry composition

There are 15 unique types of molecules in this entry. The entry contains 42246 atoms, of which 20351 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 Integrin alpha-IIb.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	454	6908	2242	3381	610	667	8	0	9	0
1	C	453	6840	2224	3338	604	666	8	0	6	0

- Molecule 2 is a protein called Integrin beta-3.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	B	466	7184	2260	3556	619	715	34	24	8	0
2	D	471	7182	2260	3551	620	716	35	28	2	0

- Molecule 3 is a protein called Monoclonal antibody 10E5 heavy chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
3	E	214	3221	1035	1590	264	326	6	0	0	0
3	H	216	3242	1041	1600	266	329	6	0	0	0

- Molecule 4 is a protein called Monoclonal antibody 10E5 light chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
4	F	214	3190	1019	1553	268	341	9	0	0	0
4	L	214	3190	1019	1553	268	341	9	0	0	0

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[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
			Total	C	H	N	O			
5	G	5	113	34	52	2	25	0	0	0

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



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	H	N	O			
6	I	2	53	16	25	2	10	0	0	0
6	K	2	53	16	25	2	10	0	0	0

- Molecule 7 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	H	N	O			
7	J	4	93	28	43	2	20	0	0	0

- Molecule 8 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	O	S	0	0
			5	4	1		
8	A	1	Total	O	S	0	0
			5	4	1		
8	A	1	Total	O	S	0	0
			5	4	1		
8	C	1	Total	O	S	0	0
			5	4	1		
8	C	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		

- Molecule 9 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	H			O
9	A	1	14	3	8	3	0	0

- Molecule 10 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
10	A	4	4	4	0	0
10	B	1	1	1	0	0
10	C	4	4	4	0	0
10	D	2	2	2	0	0

- Molecule 11 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

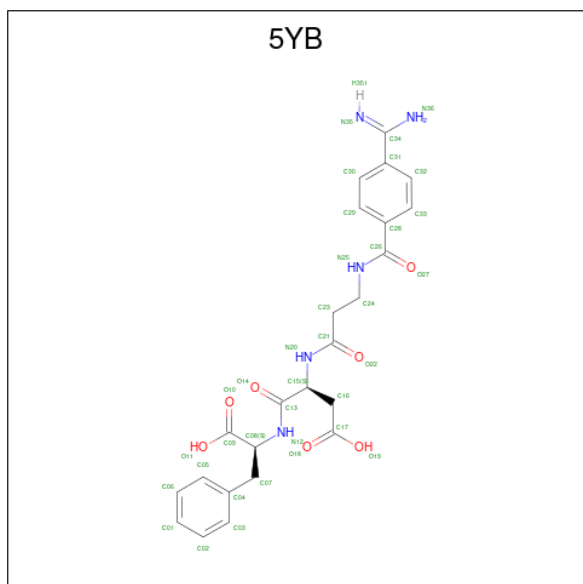
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
11	B	1	1	1	0	0
11	D	1	1	1	0	0

- Molecule 12 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	H	N			O
12	B	1	27	8	13	1	5	0	0
12	D	1	27	8	13	1	5	0	0

- Molecule 13 is N-(4-carbamimidoylbenzoyl)-beta-alanyl-L-alpha-aspartyl-L-phenylalanine (three-letter code: 5YB) (formula: C<sub>24</sub>H<sub>27</sub>N<sub>5</sub>O<sub>7</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	H	N			O
13	B	1	61	24	25	5	7	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
13	D	1	61	24	25	5	7	0	0

- Molecule 14 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	C	2	Total	Cl	0	0
			2	2		

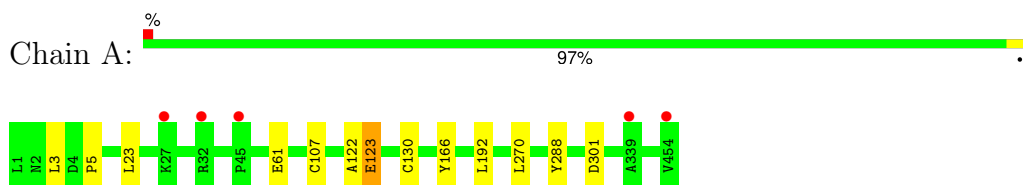
- Molecule 15 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	A	303	Total	O	0	0
			303	303		
15	B	175	Total	O	0	0
			175	175		
15	C	80	Total	O	0	0
			80	80		
15	D	96	Total	O	0	0
			96	96		
15	E	10	Total	O	0	0
			10	10		
15	F	13	Total	O	0	0
			13	13		
15	H	24	Total	O	0	0
			24	24		
15	L	41	Total	O	0	0
			41	41		

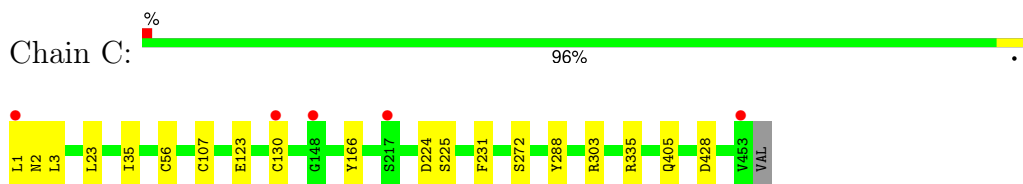
### 3 Residue-property plots [i](#)

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.

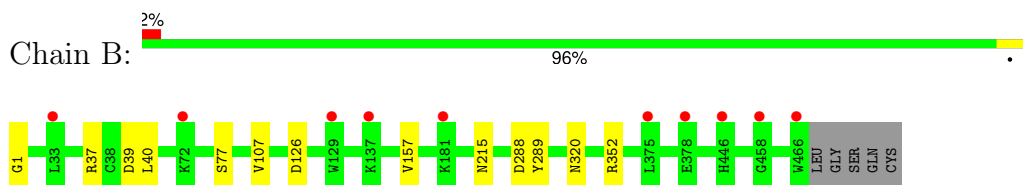
- Molecule 1: Integrin alpha-IIb



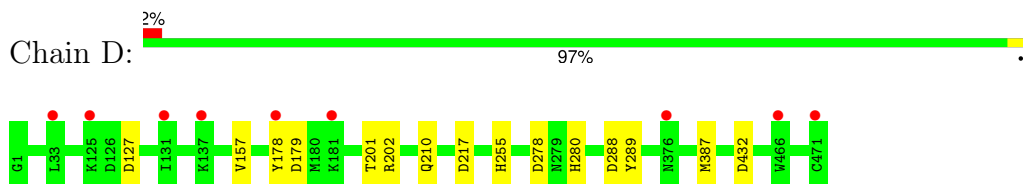
- Molecule 1: Integrin alpha-IIb



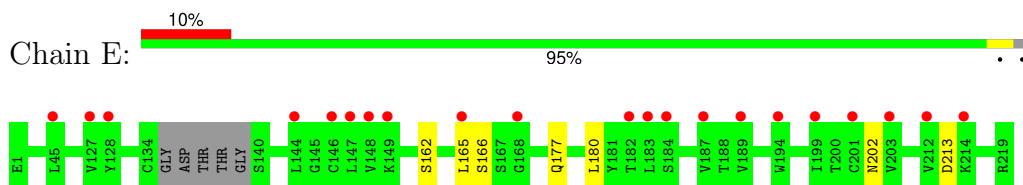
- Molecule 2: Integrin beta-3



- Molecule 2: Integrin beta-3



- Molecule 3: Monoclonal antibody 10E5 heavy chain



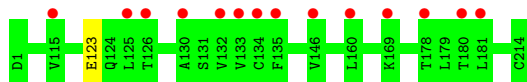
- Molecule 3: Monoclonal antibody 10E5 heavy chain

Chain H:  97%



- Molecule 4: Monoclonal antibody 10E5 light chain

Chain F:  7% 100%



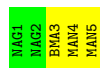
- Molecule 4: Monoclonal antibody 10E5 light chain

Chain L:  97%



- Molecule 5: alpha-D-mannopyranose-(1-3)-[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 G:  40% 60%



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

Chain I:  100%



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

Chain K:  100%



- Molecule 7: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J:  75% 25%

MAG1  
MAG2  
BMA3  
MAY4

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	259.35Å 144.44Å 104.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.01 – 2.70 49.01 – 2.70	Depositor EDS
% Data completeness (in resolution range)	98.1 (49.01-2.70) 85.7 (49.01-2.70)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.46 (at 2.69Å)	Xtrriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, $R_{free}$	0.212 , 0.237 0.213 , 0.236	Depositor DCC
$R_{free}$ test set	2000 reflections (1.90%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	49.1	Xtrriage
Anisotropy	0.280	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 61.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	42246	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	101.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.13% 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: 5YB, MAN, NAG, BMA, SO4, CL, CA, GOL, MG

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	0.27	0/3651	0.44	0/4975
1	C	0.25	0/3618	0.43	0/4930
2	B	0.24	0/3726	0.42	0/5051
2	D	0.24	0/3710	0.41	0/5029
3	E	0.24	0/1673	0.43	0/2290
3	H	0.24	0/1684	0.43	0/2305
4	F	0.24	0/1673	0.41	0/2269
4	L	0.24	0/1673	0.43	0/2269
All	All	0.25	0/21408	0.43	0/29118

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3527	3381	3365	5	0
1	C	3502	3338	3320	8	0
2	B	3628	3556	3525	6	0
2	D	3631	3551	3539	8	0
3	E	1631	1590	1590	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	H	1642	1600	1600	2	0
4	F	1637	1553	1553	1	0
4	L	1637	1553	1553	3	0
5	G	61	52	52	0	0
6	I	28	25	25	1	0
6	K	28	25	25	0	0
7	J	50	43	43	0	0
8	A	15	0	0	0	0
8	C	10	0	0	0	0
8	L	5	0	0	0	0
9	A	6	8	8	0	0
10	A	4	0	0	0	0
10	B	1	0	0	0	0
10	C	4	0	0	0	0
10	D	2	0	0	0	0
11	B	1	0	0	0	0
11	D	1	0	0	0	0
12	B	14	13	13	0	0
12	D	14	13	13	0	0
13	B	36	25	24	1	0
13	D	36	25	24	1	0
14	C	2	0	0	0	0
15	A	303	0	0	1	1
15	B	175	0	0	3	0
15	C	80	0	0	1	1
15	D	96	0	0	4	0
15	E	10	0	0	0	0
15	F	13	0	0	0	0
15	H	24	0	0	0	0
15	L	41	0	0	0	0
All	All	21895	20351	20272	38	1

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 1.

All (38) 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:D:387:MET:O	15:D:2101:HOH:O	2.01	0.79
2:B:126[B]:ASP:OD1	15:B:2101:HOH:O	2.07	0.70
2:D:280:HIS:O	15:D:2102:HOH:O	2.16	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:428:ASP:OD2	15:C:601:HOH:O	2.16	0.61
1:A:301:ASP:OD2	15:A:601:HOH:O	2.17	0.60
2:B:1:GLY:O	15:B:2102:HOH:O	2.17	0.55
1:C:1:LEU:N	1:C:2:ASN:HA	2.25	0.51
1:C:224:ASP:OD1	1:C:225:SER:N	2.40	0.49
2:D:288:ASP:OD1	2:D:289:TYR:N	2.41	0.49
2:B:320:ASN:OD1	15:B:2103:HOH:O	2.20	0.48
2:D:178:TYR:CG	2:D:179:ASP:N	2.81	0.48
4:L:211:ARG:O	4:L:213:GLU:N	2.43	0.47
1:A:122:ALA:O	1:A:123:GLU:HB2	2.15	0.47
6:I:1:NAG:O4	6:I:2:NAG:H83	2.15	0.46
4:L:4:MET:HE1	4:L:90:GLN:HB3	1.97	0.46
2:B:288:ASP:OD1	2:B:289:TYR:N	2.44	0.46
1:C:231:PHE:CE1	13:D:501:5YB:H321	2.51	0.45
2:D:210:GLN:OE1	15:D:2103:HOH:O	2.21	0.45
2:B:107:VAL:O	2:B:352:ARG:NH2	2.46	0.45
2:D:201:THR:OG1	15:D:2104:HOH:O	2.21	0.45
4:L:186:TYR:O	4:L:192:TYR:OH	2.34	0.44
1:C:3:LEU:O	1:C:405:GLN:NE2	2.41	0.44
1:A:192:LEU:HD11	13:B:2011:5YB:H321	1.99	0.43
2:B:39:ASP:OD1	2:B:40:LEU:N	2.51	0.43
1:C:35:ILE:O	1:C:56:CYS:N	2.51	0.43
3:H:213:ASP:OD1	3:H:213:ASP:N	2.52	0.43
3:E:162:SER:N	3:E:202:ASN:OD1	2.52	0.43
3:E:165:LEU:HD12	3:E:166:SER:N	2.34	0.42
3:E:177:GLN:N	3:E:180:LEU:O	2.48	0.42
2:D:217:ASP:OD2	2:D:255:HIS:NE2	2.45	0.42
4:F:123:GLU:OE1	4:F:123:GLU:N	2.48	0.42
1:C:303:ARG:NH1	1:C:335:ARG:HD3	2.35	0.41
1:A:107:CYS:HA	1:A:130:CYS:HA	2.02	0.41
1:C:107:CYS:HA	1:C:130:CYS:HA	2.03	0.41
2:D:278:ASP:OD2	2:D:280:HIS:HB2	2.21	0.41
3:E:213:ASP:OD1	3:E:213:ASP:N	2.55	0.40
3:H:162:SER:N	3:H:202:ASN:OD1	2.48	0.40
1:A:3:LEU:O	1:A:5:PRO:HD3	2.21	0.40

All (1) 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)
15:A:882:HOH:O	15:C:678:HOH:O[1_554]	1.96	0.24



## 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	461/454 (102%)	441 (96%)	19 (4%)	1 (0%)	44	68
1	C	457/454 (101%)	433 (95%)	23 (5%)	1 (0%)	44	68
2	B	472/471 (100%)	451 (96%)	20 (4%)	1 (0%)	44	68
2	D	471/471 (100%)	453 (96%)	17 (4%)	1 (0%)	44	68
3	E	210/219 (96%)	199 (95%)	11 (5%)	0	100	100
3	H	212/219 (97%)	200 (94%)	12 (6%)	0	100	100
4	F	212/214 (99%)	199 (94%)	13 (6%)	0	100	100
4	L	212/214 (99%)	204 (96%)	8 (4%)	0	100	100
All	All	2707/2716 (100%)	2580 (95%)	123 (4%)	4 (0%)	48	73

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	123	GLU
1	C	123	GLU
2	D	157	VAL
2	B	157	VAL

### 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	370/362 (102%)	365 (99%)	5 (1%)	62	84

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	366/362 (101%)	362 (99%)	4 (1%)	70	87
2	B	420/416 (101%)	417 (99%)	3 (1%)	81	93
2	D	418/416 (100%)	415 (99%)	3 (1%)	81	93
3	E	186/189 (98%)	186 (100%)	0	100	100
3	H	187/189 (99%)	187 (100%)	0	100	100
4	F	188/188 (100%)	188 (100%)	0	100	100
4	L	188/188 (100%)	188 (100%)	0	100	100
All	All	2323/2310 (101%)	2308 (99%)	15 (1%)	81	94

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	23	LEU
1	A	61	GLU
1	A	166	TYR
1	A	270	LEU
1	A	288	TYR
2	B	37	ARG
2	B	77	SER
2	B	215	ASN
1	C	23	LEU
1	C	166	TYR
1	C	272	SER
1	C	288	TYR
2	D	127	ASP
2	D	202	ARG
2	D	432	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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

13 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	NAG	G	1	5,2	14,14,15	0.40	0	17,19,21	0.50	0
5	NAG	G	2	5	14,14,15	0.23	0	17,19,21	0.49	0
5	BMA	G	3	5	11,11,12	0.79	0	15,15,17	0.88	1 (6%)
5	MAN	G	4	5	11,11,12	0.62	0	15,15,17	0.91	1 (6%)
5	MAN	G	5	5	11,11,12	0.63	0	15,15,17	1.10	2 (13%)
6	NAG	I	1	6,2	14,14,15	0.32	0	17,19,21	0.43	0
6	NAG	I	2	6	14,14,15	0.26	0	17,19,21	0.58	0
7	NAG	J	1	2,7	14,14,15	0.40	0	17,19,21	0.62	0
7	NAG	J	2	7	14,14,15	0.32	0	17,19,21	0.40	0
7	BMA	J	3	7	11,11,12	0.62	0	15,15,17	0.74	0
7	MAN	J	4	7	11,11,12	0.71	0	15,15,17	1.06	2 (13%)
6	NAG	K	1	6,2	14,14,15	0.34	0	17,19,21	0.41	0
6	NAG	K	2	6	14,14,15	0.12	0	17,19,21	0.49	0

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

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

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	MAN	J	4	7	-	0/2/19/22	0/1/1/1
6	NAG	K	1	6,2	-	2/6/23/26	0/1/1/1
6	NAG	K	2	6	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	G	5	MAN	C1-O5-C5	3.23	116.51	112.19
7	J	4	MAN	C1-O5-C5	3.06	116.29	112.19
7	J	4	MAN	O2-C2-C3	-2.18	105.64	110.15
5	G	4	MAN	O2-C2-C3	-2.13	105.74	110.15
5	G	5	MAN	O2-C2-C3	-2.11	105.77	110.15
5	G	3	BMA	C3-C4-C5	2.02	113.90	110.23

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	I	1	NAG	O5-C5-C6-O6
6	I	1	NAG	C4-C5-C6-O6
6	I	2	NAG	C8-C7-N2-C2
6	I	2	NAG	O7-C7-N2-C2
6	K	2	NAG	C8-C7-N2-C2
6	K	2	NAG	O7-C7-N2-C2
6	K	1	NAG	O5-C5-C6-O6
6	K	1	NAG	C4-C5-C6-O6
5	G	5	MAN	O5-C5-C6-O6
5	G	2	NAG	C4-C5-C6-O6
5	G	2	NAG	O5-C5-C6-O6
6	I	2	NAG	C1-C2-N2-C7

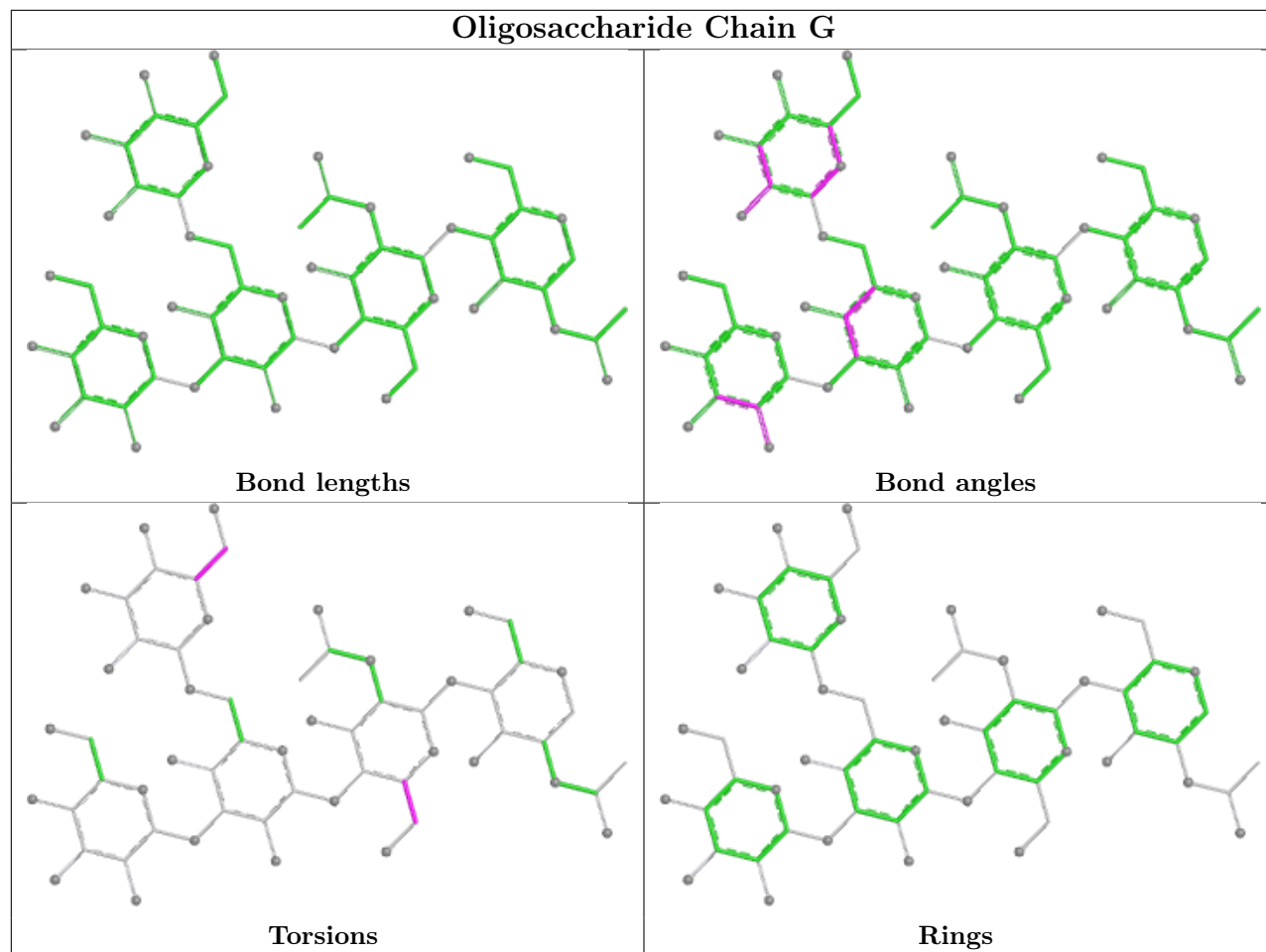
There are no ring outliers.

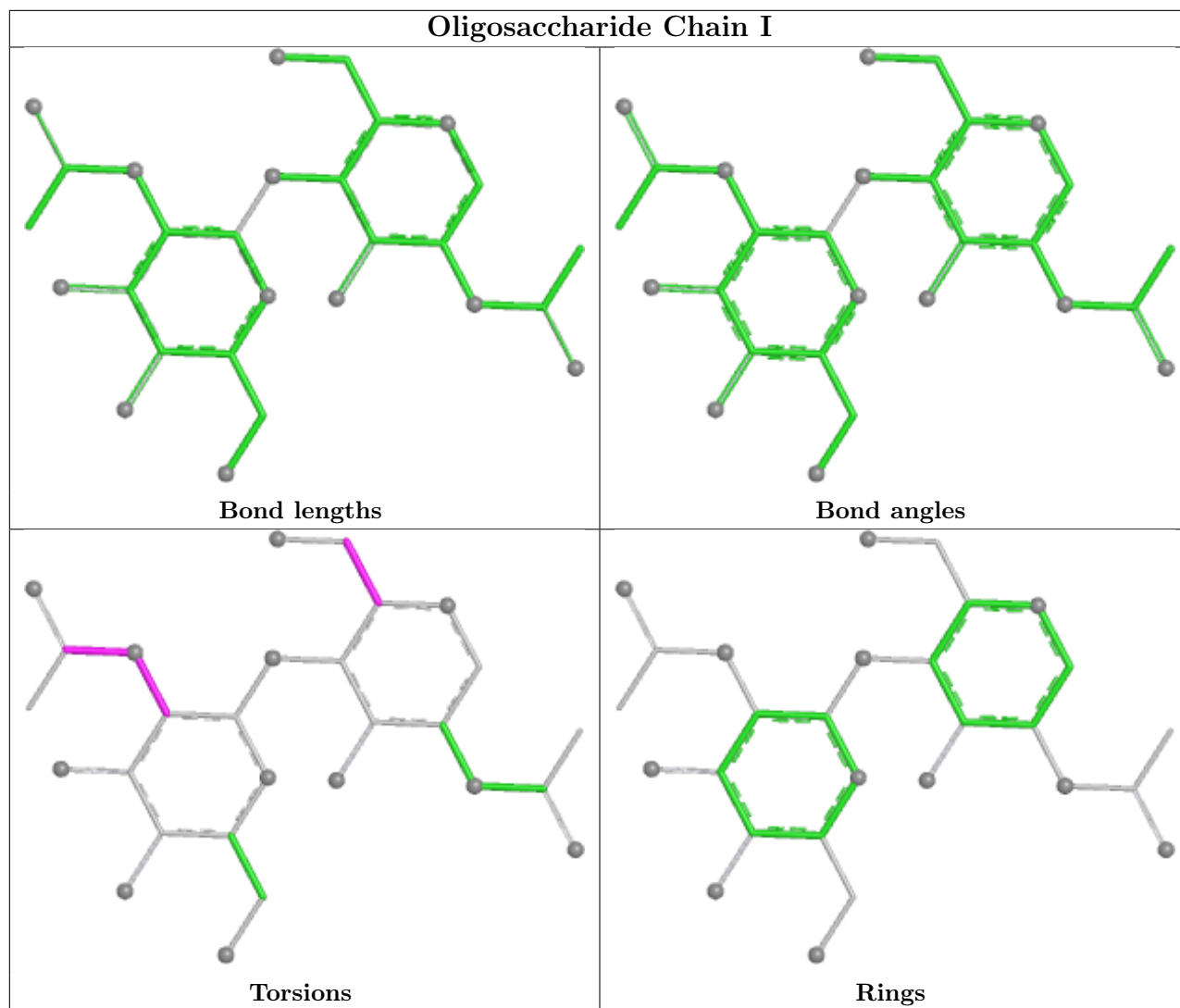
2 monomers are involved in 1 short contact:

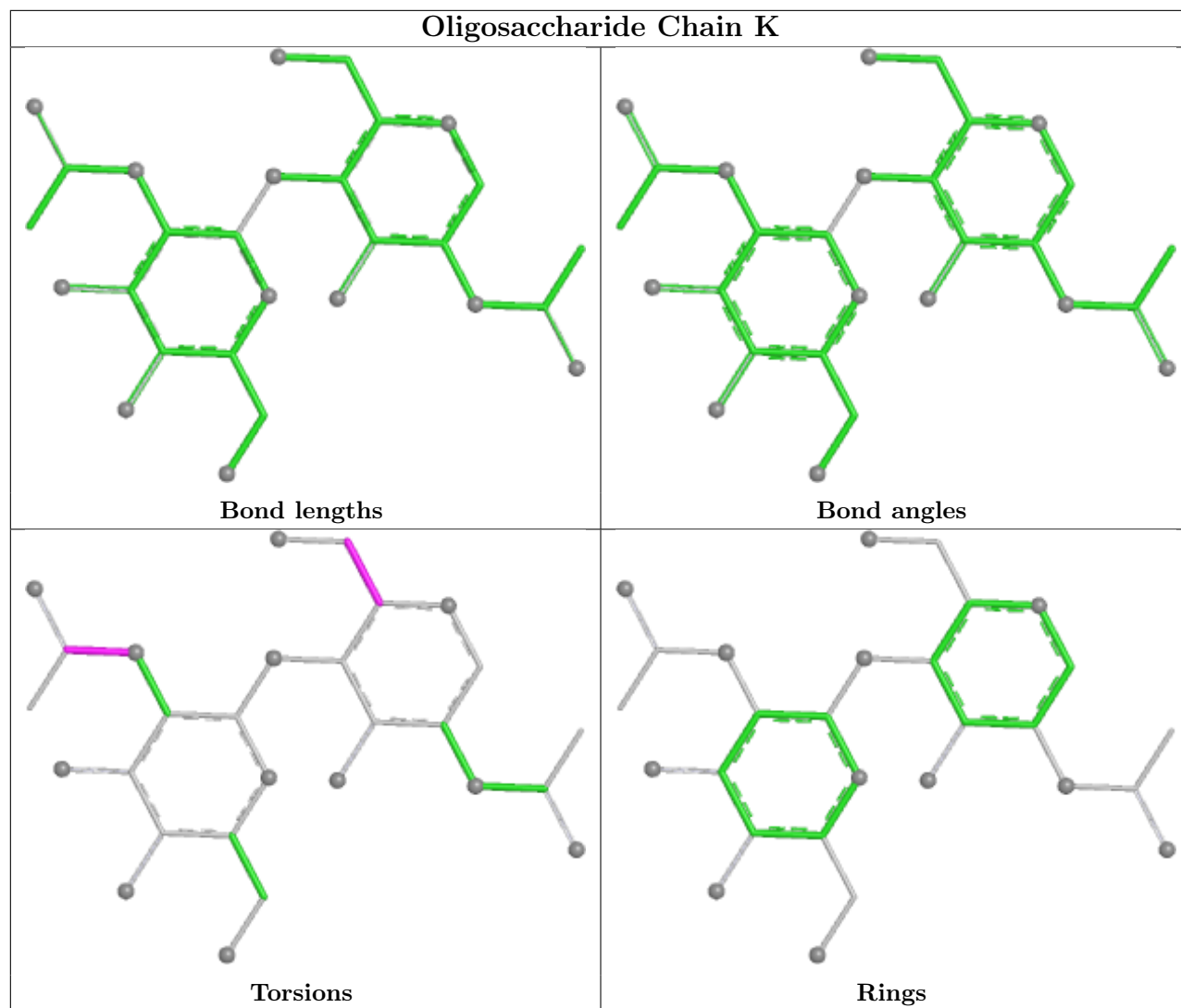
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	I	1	NAG	1	0
6	I	2	NAG	1	0

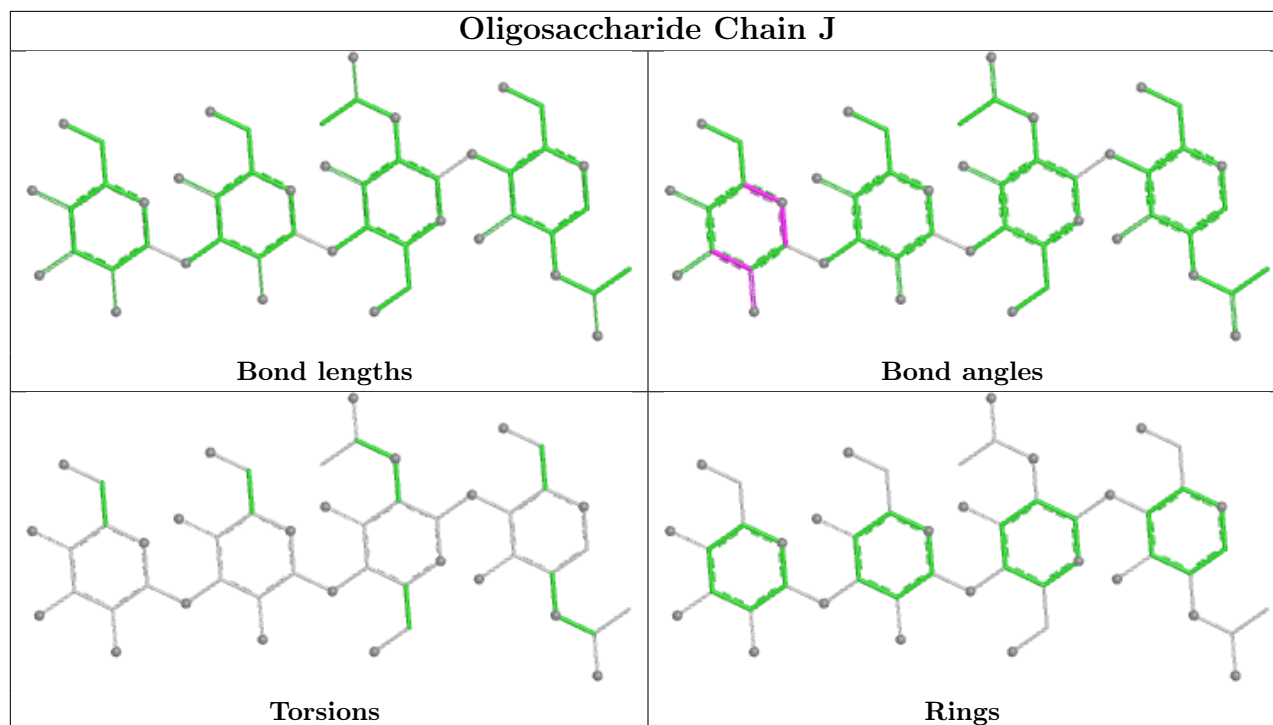
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for oligosaccharide.









## 5.6 Ligand geometry [i](#)

Of 26 ligands modelled in this entry, 15 are monoatomic - leaving 11 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
9	GOL	A	504	-	5,5,5	0.38	0	5,5,5	0.27	0
8	SO4	A	502	-	4,4,4	0.26	0	6,6,6	0.06	0
13	5YB	D	501	11	37,37,37	2.36	8 (21%)	45,49,49	1.15	2 (4%)
12	NAG	B	2003	2	14,14,15	0.30	0	17,19,21	0.44	0
13	5YB	B	2011	11	37,37,37	2.33	8 (21%)	45,49,49	1.15	2 (4%)
8	SO4	A	503	-	4,4,4	0.22	0	6,6,6	0.18	0
8	SO4	L	301	-	4,4,4	0.26	0	6,6,6	0.11	0
8	SO4	C	501	-	4,4,4	0.24	0	6,6,6	0.13	0
8	SO4	A	501	-	4,4,4	0.27	0	6,6,6	0.08	0
12	NAG	D	505	2	14,14,15	0.44	0	17,19,21	0.55	0
8	SO4	C	502	-	4,4,4	0.25	0	6,6,6	0.11	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
13	5YB	D	501	11	-	6/38/38/38	0/2/2/2
12	NAG	B	2003	2	-	0/6/23/26	0/1/1/1
13	5YB	B	2011	11	-	5/38/38/38	0/2/2/2
9	GOL	A	504	-	-	2/4/4/4	-
12	NAG	D	505	2	-	0/6/23/26	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	B	2011	5YB	C13-N12	7.65	1.50	1.34
13	D	501	5YB	C13-N12	7.64	1.50	1.34
13	D	501	5YB	C21-N20	6.18	1.47	1.34
13	B	2011	5YB	C21-N20	6.01	1.46	1.34
13	D	501	5YB	C26-N25	5.18	1.45	1.33
13	B	2011	5YB	C26-N25	5.05	1.44	1.33
13	D	501	5YB	C23-C21	4.46	1.60	1.51
13	B	2011	5YB	C23-C21	4.44	1.60	1.51
13	D	501	5YB	C34-N36	3.56	1.43	1.33
13	B	2011	5YB	C34-N36	3.54	1.43	1.33
13	D	501	5YB	C31-C34	3.05	1.53	1.47
13	B	2011	5YB	C07-C04	2.81	1.58	1.51
13	B	2011	5YB	C31-C34	2.79	1.52	1.47
13	D	501	5YB	C07-C04	2.77	1.57	1.51
13	B	2011	5YB	O22-C21	-2.12	1.19	1.23
13	D	501	5YB	O22-C21	-2.11	1.19	1.23

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
13	B	2011	5YB	C23-C21-N20	2.89	120.95	115.86
13	D	501	5YB	C23-C21-N20	2.72	120.66	115.86
13	D	501	5YB	C28-C26-N25	2.40	122.12	117.12
13	B	2011	5YB	O22-C21-N20	-2.17	119.28	122.95

There are no chirality outliers.

All (13) torsion outliers are listed below:

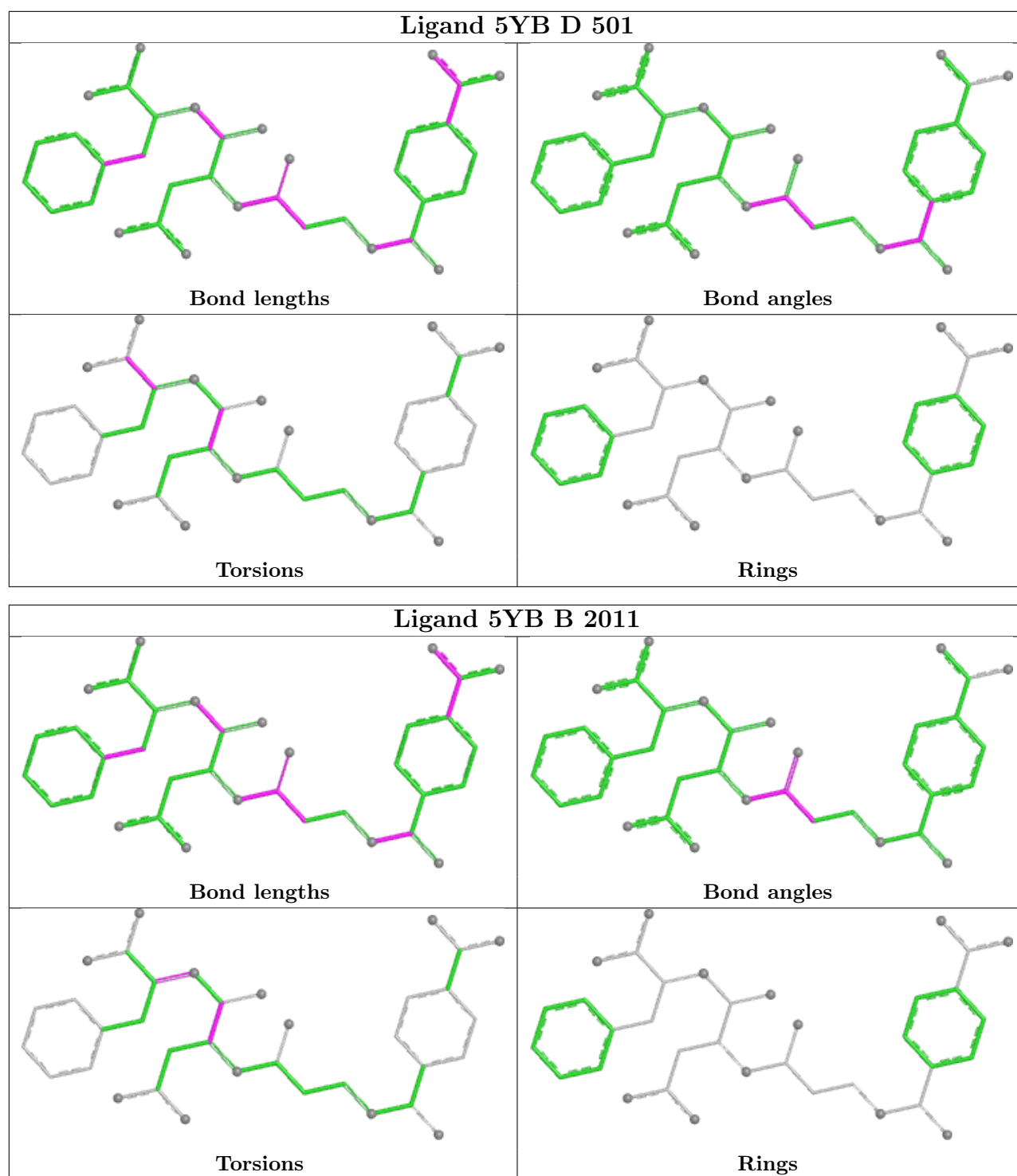
Mol	Chain	Res	Type	Atoms
9	A	504	GOL	O1-C1-C2-C3
9	A	504	GOL	O1-C1-C2-O2
13	B	2011	5YB	C09-C08-N12-C13
13	B	2011	5YB	O14-C13-C15-N20
13	B	2011	5YB	N12-C13-C15-N20
13	D	501	5YB	C07-C08-C09-O11
13	D	501	5YB	C07-C08-C09-O10
13	D	501	5YB	O14-C13-C15-N20
13	D	501	5YB	N12-C13-C15-N20
13	D	501	5YB	O14-C13-C15-C16
13	D	501	5YB	N12-C13-C15-C16
13	B	2011	5YB	C07-C08-N12-C13
13	B	2011	5YB	O14-C13-C15-C16

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
13	D	501	5YB	1	0
13	B	2011	5YB	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

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, 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	454/454 (100%)	-0.43	5 (1%) 77 77	26, 53, 85, 141	7 (1%)
1	C	453/454 (99%)	0.01	5 (1%) 77 77	34, 77, 115, 162	4 (0%)
2	B	466/471 (98%)	0.15	10 (2%) 63 63	30, 89, 186, 223	6 (1%)
2	D	471/471 (100%)	0.36	9 (1%) 66 65	41, 105, 161, 240	2 (0%)
3	E	214/219 (97%)	0.94	21 (9%) 14 14	88, 159, 230, 266	0
3	H	216/219 (98%)	0.40	1 (0%) 87 86	61, 118, 180, 235	0
4	F	214/214 (100%)	0.75	14 (6%) 26 24	96, 150, 228, 255	0
4	L	214/214 (100%)	0.21	0 100 100	68, 105, 139, 213	0
All	All	2702/2716 (99%)	0.20	65 (2%) 59 58	26, 95, 191, 266	19 (0%)

All (65) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	137[A]	LYS	8.8
3	E	183	LEU	4.3
4	F	180	THR	4.3
3	E	147	LEU	4.2
4	F	178	THR	4.2
4	F	135	PHE	4.0
3	E	212	VAL	3.8
3	E	165	LEU	3.6
2	D	376	ASN	3.2
1	A	454	VAL	3.2
2	B	466	TRP	3.1
2	D	466	TRP	3.1
2	D	471	CYS	3.0
3	E	184	SER	3.0
1	A	32[A]	ARG	2.9
1	C	453	VAL	2.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	D	137	LYS	2.9
3	E	149	LYS	2.8
1	A	45	PRO	2.8
3	E	128	TYR	2.8
4	F	130	ALA	2.7
3	E	189	VAL	2.7
1	C	217	SER	2.7
3	E	168	GLY	2.7
2	D	178	TYR	2.6
2	B	129	TRP	2.6
4	F	126	THR	2.6
3	E	144	LEU	2.5
4	F	181	LEU	2.5
2	B	458	GLY	2.5
3	H	133	VAL	2.5
4	F	146	VAL	2.5
3	E	148	VAL	2.5
1	A	339	ALA	2.5
2	B	181	LYS	2.4
2	B	446	HIS	2.4
3	E	146	CYS	2.4
2	B	33	LEU	2.3
4	F	132	VAL	2.3
2	D	125	LYS	2.3
4	F	169	LYS	2.3
3	E	194	TRP	2.3
2	B	378	GLU	2.3
1	C	148	GLY	2.3
4	F	125	LEU	2.3
2	B	375	LEU	2.2
2	D	131	ILE	2.2
3	E	201	CYS	2.2
2	D	181	LYS	2.1
3	E	187	VAL	2.1
4	F	160	LEU	2.1
3	E	214	LYS	2.1
3	E	127	VAL	2.1
1	C	1	LEU	2.1
4	F	134	CYS	2.1
1	A	27	LYS	2.1
3	E	182	THR	2.1
3	E	199	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
4	F	133	VAL	2.1
1	C	130	CYS	2.0
3	E	203	VAL	2.0
2	D	33	LEU	2.0
2	B	72	LYS	2.0
3	E	45	LEU	2.0
4	F	115	VAL	2.0

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

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

## 6.3 Carbohydrates [i](#)

SUGAR-RSR INFOmissingINFO

## 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.

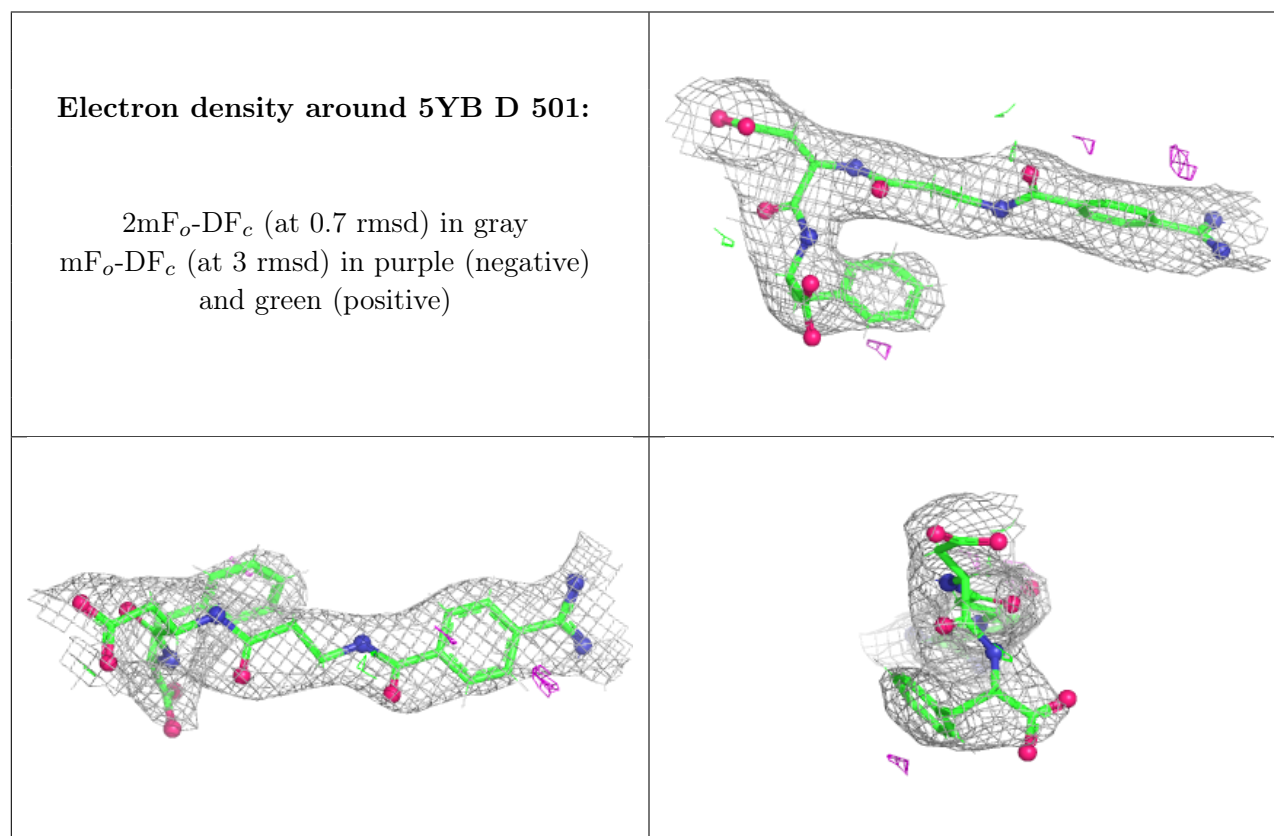
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
8	SO4	C	502	5/5	0.62	0.17	188,191,193,193	0
10	CA	D	503	1/1	0.64	0.27	210,210,210,210	0
12	NAG	D	505	14/15	0.67	0.15	104,142,170,170	0
8	SO4	L	301	5/5	0.70	0.21	176,178,179,181	0
9	GOL	A	504	6/6	0.81	0.18	86,104,123,124	0
12	NAG	B	2003	14/15	0.82	0.12	111,144,173,174	0
8	SO4	C	501	5/5	0.83	0.35	176,179,182,182	0
8	SO4	A	502	5/5	0.87	0.24	134,139,148,154	0
8	SO4	A	503	5/5	0.91	0.14	97,111,113,122	0
8	SO4	A	501	5/5	0.91	0.28	169,171,181,184	0
14	CL	C	504	1/1	0.91	0.14	100,100,100,100	0
13	5YB	D	501	36/36	0.93	0.12	45,85,116,122	0
13	5YB	B	2011	36/36	0.93	0.14	34,77,107,118	0
14	CL	C	503	1/1	0.95	0.07	81,81,81,81	0
10	CA	C	505	1/1	0.97	0.09	174,174,174,174	0
10	CA	A	506	1/1	0.98	0.10	68,68,68,68	0

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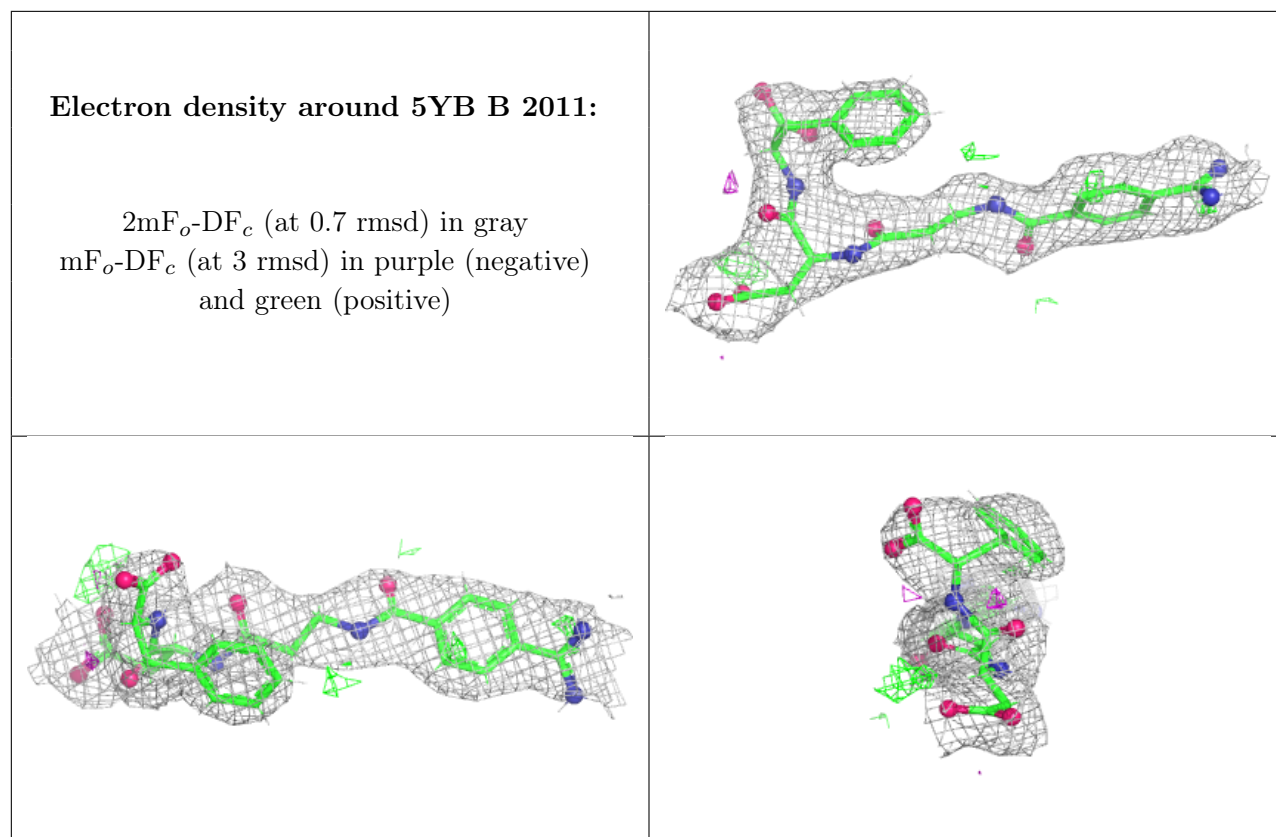
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
10	CA	A	507	1/1	0.98	0.16	79,79,79,79	0
11	MG	B	2001	1/1	0.99	0.05	31,31,31,31	0
11	MG	D	502	1/1	0.99	0.02	47,47,47,47	0
10	CA	A	505	1/1	0.99	0.03	62,62,62,62	0
10	CA	C	506	1/1	0.99	0.06	67,67,67,67	0
10	CA	C	507	1/1	0.99	0.03	56,56,56,56	0
10	CA	C	508	1/1	0.99	0.03	62,62,62,62	0
10	CA	B	2002	1/1	0.99	0.06	31,31,31,31	0
10	CA	D	504	1/1	0.99	0.03	50,50,50,50	0
10	CA	A	508	1/1	1.00	0.02	38,38,38,38	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.