Full wwPDB X-ray Structure Validation Report ⓘ

Aug 21, 2020 – 08:25 AM BST

PDB ID	:	4DNS
Title	:	Crystal structure of Bermuda grass isoallergen BG60 provides insight into the various cross-allergenicity of the pollen group 4 allergens
Authors	:	Huang, T.H.; Peng, H.J.; Su, S.N.; Liaw, S.H.
Deposited on	:	2012-02-08
Resolution	:	2.15 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 following versions of software and data (see references ⓘ) were used in the production of this report:

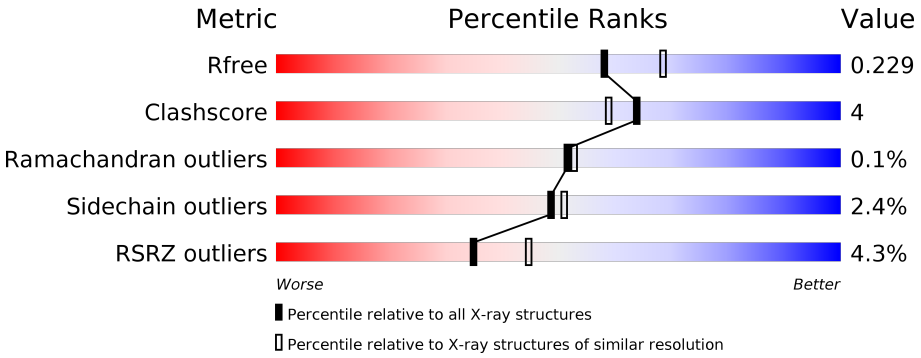
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.13.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.13.1

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 2.15 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	1479 (2.16-2.16)
Clashscore	141614	1585 (2.16-2.16)
Ramachandran outliers	138981	1560 (2.16-2.16)
Sidechain outliers	138945	1559 (2.16-2.16)
RSRZ outliers	127900	1456 (2.16-2.16)

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 on 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 <=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	497	4%, 90%, 7%
1	B	497	4%, 87%, 10%
2	C	2	100%
2	D	2	50%, 50%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	NAG	A	504	-	-	-	X
4	NAG	B	504	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8048 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.

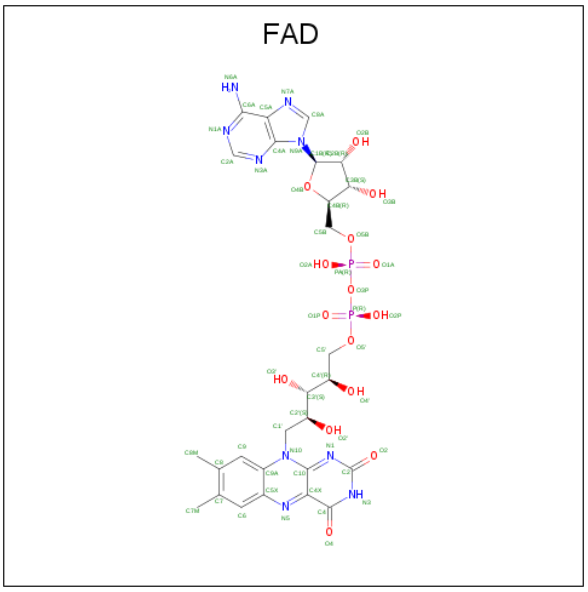
- Molecule 1 is a protein called FAD-linked oxidoreductase BG60.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	486	Total	C	N	O	S	0	0	0
			3778	2433	646	678	21			
1	B	485	Total	C	N	O	S	0	0	0
			3770	2429	645	675	21			

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

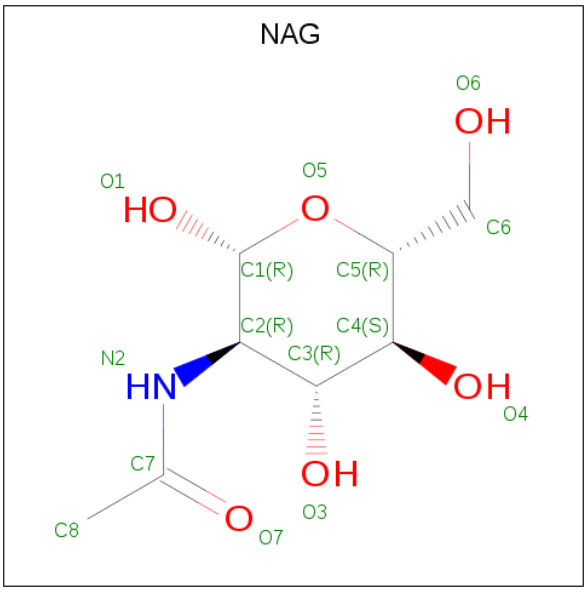
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	D	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
3	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- 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	N	O	0	0
			14	8	1	5		

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

- Molecule 5 is water.

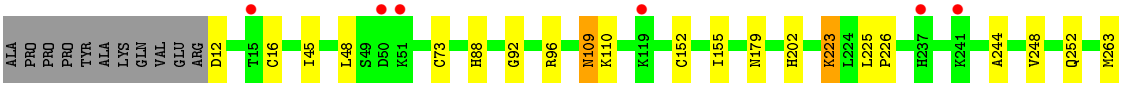
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	158	Total	O	0	0
			158	158		
5	B	152	Total	O	0	0
			152	152		

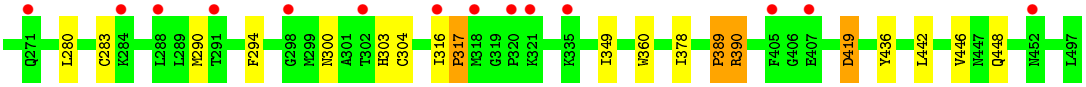
3 Residue-property plots

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: FAD-linked oxidoreductase BG60

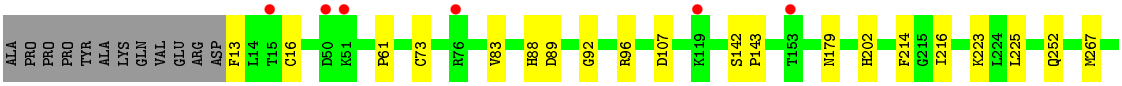
Chain A:

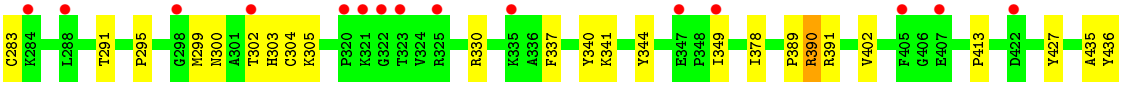


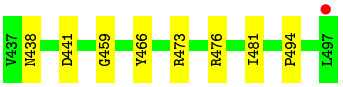


• Molecule 1: FAD-linked oxidoreductase BG60

Chain B:

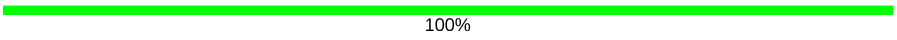






• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:



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

Chain D:


NAG1
NAG2

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	86.04Å 86.04Å 309.43Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.15 39.34 – 2.15	Depositor EDS
% Data completeness (in resolution range)	(Not available) (50.00-2.15) 96.2 (39.34-2.15)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.08	Depositor
$< I/\sigma(I) >$ [1]	6.25 (at 2.16Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.180 , 0.220 0.197 , 0.229	Depositor DCC
R_{free} test set	6381 reflections (10.12%)	wwPDB-VP
Wilson B-factor (Å^2)	24.4	Xtriage
Anisotropy	0.017	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 53.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	8048	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: NAG, FAD

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	0.68	0/3879	0.77	0/5262
1	B	0.69	0/3871	0.77	0/5251
All	All	0.68	0/7750	0.77	0/10513

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

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	3778	0	3783	26	0
1	B	3770	0	3779	35	0
2	C	28	0	25	0	0
2	D	28	0	25	0	0
3	A	53	0	29	1	0
3	B	53	0	29	2	0
4	A	14	0	13	0	0
4	B	14	0	13	0	0
5	A	158	0	0	4	0
5	B	152	0	0	4	0
All	All	8048	0	7696	60	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 4.

All (60) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:390:ARG:HH11	1:B:390:ARG:HG2	1.29	0.97
1:A:283:CYS:HG	1:A:304:CYS:HG	1.21	0.88
1:A:316:ILE:HD11	5:A:665:HOH:O	1.76	0.85
1:B:283:CYS:HG	1:B:304:CYS:HG	1.09	0.83
1:B:16:CYS:HG	1:B:73:CYS:HG	0.84	0.82
1:A:16:CYS:HG	1:A:73:CYS:HG	0.75	0.75
1:A:252:GLN:HE22	1:A:349:ILE:H	1.36	0.73
1:B:390:ARG:HH11	1:B:390:ARG:CG	2.01	0.70
1:B:390:ARG:NH2	1:B:435:ALA:O	2.25	0.69
1:B:252:GLN:HE22	1:B:349:ILE:H	1.42	0.66
1:A:316:ILE:CD1	5:A:665:HOH:O	2.37	0.66
1:A:390:ARG:HB2	1:A:390:ARG:HH11	1.60	0.65
1:A:92:GLY:O	1:A:96:ARG:HG2	2.01	0.61
1:B:214:PHE:HD1	1:B:481:ILE:HD11	1.67	0.59
1:B:179:ASN:ND2	1:B:225:LEU:HD11	2.17	0.58
1:A:45:ILE:HG23	1:A:48:LEU:HD12	1.87	0.56
1:B:291:THR:O	1:B:295:PRO:HG3	2.07	0.54
1:B:349:ILE:HD12	1:B:427:TYR:HB3	1.90	0.54
1:A:179:ASN:ND2	1:A:225:LEU:HD11	2.23	0.53
1:A:226:PRO:HD3	5:B:623:HOH:O	2.07	0.53
1:A:442:LEU:HD22	1:A:446:VAL:HG12	1.91	0.53
1:B:252:GLN:NE2	1:B:349:ILE:H	2.06	0.52
1:B:390:ARG:CG	1:B:390:ARG:NH1	2.66	0.52
1:B:283:CYS:HG	1:B:304:CYS:CB	2.21	0.51
1:B:300:ASN:H	1:B:303:HIS:HD2	1.58	0.50
1:A:252:GLN:NE2	1:A:349:ILE:H	2.07	0.50
1:B:89:ASP:HB2	3:B:501:FAD:H52A	1.92	0.50
1:A:300:ASN:H	1:A:303:HIS:HD2	1.58	0.50
1:A:316:ILE:HB	1:A:317:PRO:HD3	1.93	0.50
1:A:390:ARG:HB2	1:A:390:ARG:NH1	2.27	0.49
1:B:92:GLY:O	1:B:96:ARG:HG2	2.14	0.48
1:B:330:ARG:NH1	5:B:678:HOH:O	2.46	0.48
1:A:390:ARG:NH2	5:A:613:HOH:O	2.46	0.47
1:A:390:ARG:NH2	1:A:436:TYR:HA	2.29	0.47
1:A:448:GLN:NE2	5:A:655:HOH:O	2.49	0.46
1:B:83:VAL:HG21	1:B:216:ILE:HG23	1.98	0.45
1:B:252:GLN:HE22	1:B:349:ILE:HG12	1.82	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:402:VAL:HG11	1:B:413:PRO:HB3	1.98	0.45
1:B:344:TYR:CZ	1:B:390:ARG:HG3	2.51	0.45
1:A:389:PRO:HG2	1:A:390:ARG:HD3	1.98	0.44
1:B:390:ARG:HG2	1:B:390:ARG:NH1	2.09	0.44
1:A:152:CYS:HB2	1:A:155:ILE:HD11	1.99	0.44
1:B:473:ARG:HG3	1:B:476:ARG:NH2	2.32	0.44
1:B:13:PHE:N	5:B:661:HOH:O	2.50	0.43
1:B:88:HIS:CE1	3:B:501:FAD:HM71	2.54	0.43
1:A:88:HIS:CE1	3:A:501:FAD:HM71	2.54	0.43
1:A:360:TRP:HZ3	1:A:419:ASP:HB3	1.84	0.42
1:B:390:ARG:NH2	1:B:466:TYR:O	2.52	0.42
1:B:202:HIS:HD2	5:B:619:HOH:O	2.02	0.42
1:B:459:GLY:HA3	1:B:494:PRO:HG3	2.01	0.42
1:B:300:ASN:OD1	1:B:302:THR:HG22	2.19	0.42
1:A:109:ASN:HD21	1:A:110:LYS:NZ	2.19	0.41
1:B:378:ILE:O	1:B:391:ARG:HD2	2.20	0.41
1:A:390:ARG:N	1:A:390:ARG:HD3	2.36	0.41
1:A:223:LYS:HE2	1:B:223:LYS:HZ1	1.85	0.41
1:A:244:ALA:O	1:A:248:VAL:HG23	2.20	0.41
1:B:142:SER:HA	1:B:143:PRO:HD3	1.90	0.41
1:B:436:TYR:CE2	1:B:438:ASN:HB2	2.55	0.41
1:B:341:LYS:HG2	1:B:441:ASP:OD2	2.21	0.41
1:B:61:PRO:HD2	1:B:107:ASP:O	2.22	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	484/497 (97%)	466 (96%)	17 (4%)	1 (0%)	47 46
1	B	483/497 (97%)	467 (97%)	16 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	967/994 (97%)	933 (96%)	33 (3%)	1 (0%)	51 53

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	317	PRO

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	397/406 (98%)	385 (97%)	12 (3%)	41 40
1	B	396/406 (98%)	389 (98%)	7 (2%)	59 63
All	All	793/812 (98%)	774 (98%)	19 (2%)	49 51

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	12	ASP
1	A	109	ASN
1	A	202	HIS
1	A	223	LYS
1	A	263	MET
1	A	280	LEU
1	A	290	MET
1	A	294	PHE
1	A	378	ILE
1	A	389	PRO
1	A	390	ARG
1	A	419	ASP
1	B	267	MET
1	B	299	MET
1	B	305	LYS
1	B	337	PHE
1	B	340	TYR

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Mol	Chain	Res	Type
1	B	389	PRO
1	B	390	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	25	GLN
1	A	68	GLN
1	A	109	ASN
1	A	179	ASN
1	A	202	HIS
1	A	252	GLN
1	A	303	HIS
1	A	438	ASN
1	B	68	GLN
1	B	179	ASN
1	B	202	HIS
1	B	252	GLN
1	B	303	HIS
1	B	438	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

4 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	$\#\|Z\|>2$
2	NAG	C	1	1,2	14,14,15	0.57	0	17,19,21	0.72	0
2	NAG	C	2	2	14,14,15	0.59	0	17,19,21	0.59	0
2	NAG	D	1	1,2	14,14,15	0.60	0	17,19,21	0.87	2 (11%)
2	NAG	D	2	2	14,14,15	0.63	0	17,19,21	0.63	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
2	NAG	C	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	2/6/23/26	0/1/1/1
2	NAG	D	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	D	2	2	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	1	NAG	O5-C1-C2	-2.11	107.96	111.29
2	D	1	NAG	C2-N2-C7	-2.06	119.97	122.90

There are no chirality outliers.

All (3) torsion outliers are listed below:

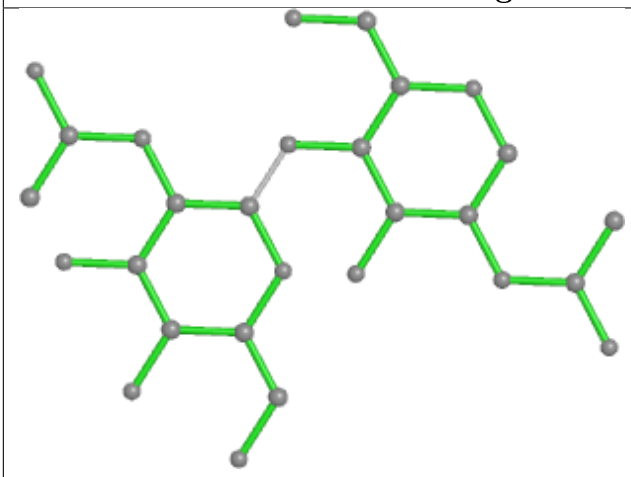
Mol	Chain	Res	Type	Atoms
2	C	2	NAG	C8-C7-N2-C2
2	C	2	NAG	O7-C7-N2-C2
2	D	1	NAG	C4-C5-C6-O6

There are no ring outliers.

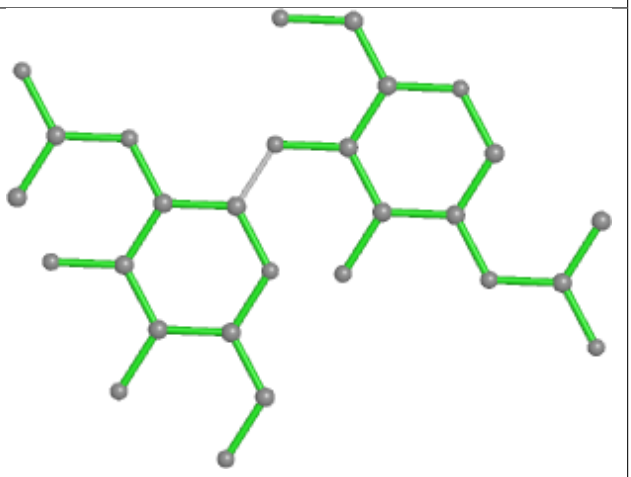
No monomer is involved in short contacts.

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

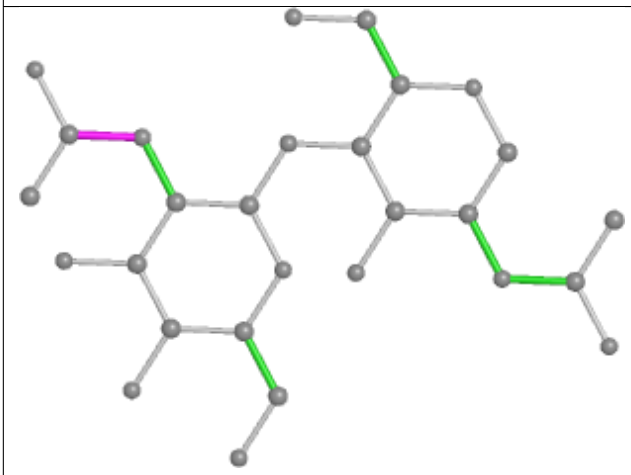
Oligosaccharide Chain C



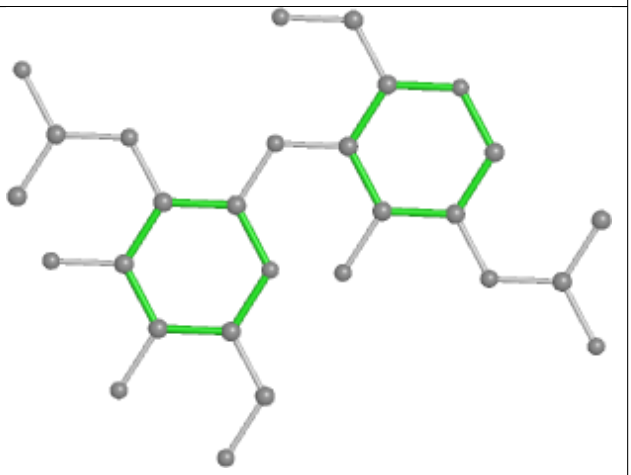
Bond lengths



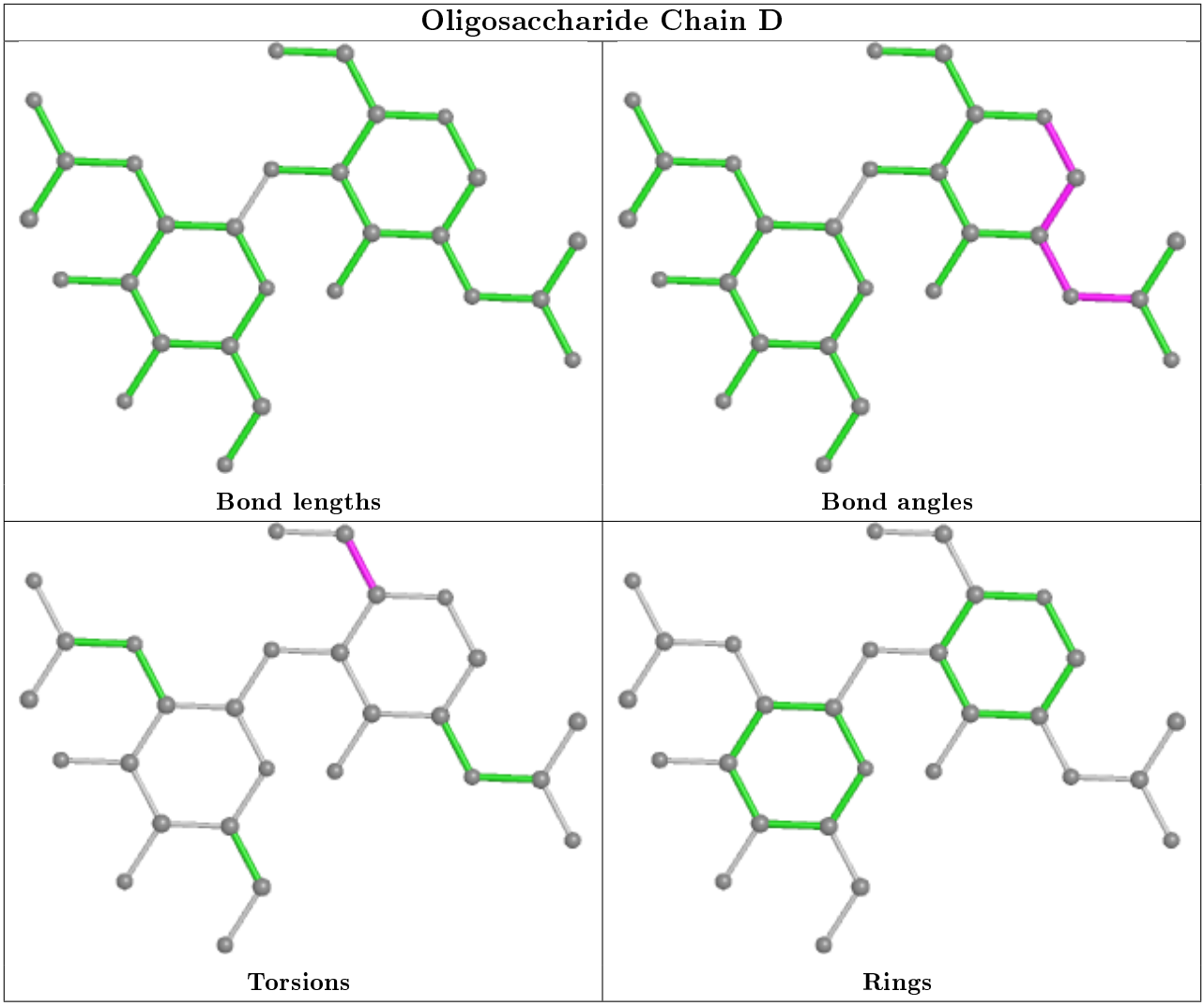
Bond angles



Torsions



Rings



5.6 Ligand geometry (i)

4 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	$\#\|Z\| > 2$
3	FAD	B	501	1	51,58,58	2.57	15 (29%)	60,89,89	2.09	9 (15%)
3	FAD	A	501	1	51,58,58	2.39	16 (31%)	60,89,89	2.06	8 (13%)
4	NAG	B	504	1	14,14,15	0.84	0	17,19,21	0.56	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
4	NAG	A	504	1	14,14,15	0.75	0	17,19,21	0.74	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
3	FAD	B	501	1	-	10/30/50/50	0/6/6/6
3	FAD	A	501	1	-	8/30/50/50	0/6/6/6
4	NAG	B	504	1	-	5/6/23/26	0/1/1/1
4	NAG	A	504	1	-	5/6/23/26	0/1/1/1

All (31) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	501	FAD	C9A-N10	7.65	1.48	1.38
3	B	501	FAD	C4X-C10	7.12	1.45	1.38
3	A	501	FAD	C9A-N10	6.84	1.47	1.38
3	A	501	FAD	C4X-C10	6.34	1.45	1.38
3	A	501	FAD	C4A-N3A	5.40	1.43	1.35
3	B	501	FAD	C4A-N3A	5.29	1.42	1.35
3	B	501	FAD	C10-N1	5.25	1.40	1.33
3	B	501	FAD	C4X-N5	5.07	1.40	1.33
3	A	501	FAD	C4X-N5	4.36	1.39	1.33
3	B	501	FAD	C4-N3	4.24	1.40	1.33
3	A	501	FAD	C4'-C3'	4.23	1.61	1.53
3	B	501	FAD	C4'-C3'	4.21	1.61	1.53
3	A	501	FAD	C10-N1	4.16	1.38	1.33
3	B	501	FAD	C1'-N10	3.99	1.52	1.48
3	A	501	FAD	C4-N3	3.96	1.39	1.33
3	B	501	FAD	C9A-C5X	3.75	1.50	1.42
3	A	501	FAD	C9A-C5X	3.60	1.49	1.42
3	A	501	FAD	C1'-N10	3.50	1.51	1.48
3	A	501	FAD	C8-C7	3.38	1.49	1.40
3	B	501	FAD	C8-C7	3.23	1.48	1.40
3	B	501	FAD	C2A-N3A	2.76	1.36	1.32
3	B	501	FAD	C5X-N5	2.73	1.39	1.35
3	B	501	FAD	C7M-C7	2.66	1.56	1.51
3	A	501	FAD	C5X-N5	2.58	1.39	1.35
3	B	501	FAD	C9-C8	2.55	1.44	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	501	FAD	C9-C8	2.53	1.44	1.37
3	A	501	FAD	C2A-N3A	2.48	1.36	1.32
3	A	501	FAD	C7M-C7	2.41	1.55	1.51
3	A	501	FAD	C5'-C4'	-2.35	1.48	1.51
3	B	501	FAD	C5'-C4'	-2.16	1.48	1.51
3	A	501	FAD	C5A-C4A	-2.00	1.35	1.40

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	501	FAD	C4-N3-C2	11.42	124.78	115.14
3	A	501	FAD	C4-N3-C2	10.98	124.42	115.14
3	B	501	FAD	C4X-C4-N3	-5.66	115.69	123.43
3	A	501	FAD	C4X-C4-N3	-5.64	115.72	123.43
3	A	501	FAD	C1'-N10-C9A	3.40	120.97	118.29
3	A	501	FAD	C9A-N10-C10	-3.26	117.64	121.91
3	B	501	FAD	C9A-N10-C10	-3.22	117.69	121.91
3	B	501	FAD	C1'-N10-C9A	2.93	120.60	118.29
3	A	501	FAD	O3'-C3'-C4'	2.78	115.52	108.81
3	B	501	FAD	O3'-C3'-C4'	2.69	115.30	108.81
3	B	501	FAD	C4X-N5-C5X	2.67	119.44	116.77
3	A	501	FAD	C4X-N5-C5X	2.42	119.19	116.77
3	B	501	FAD	C1'-N10-C10	2.34	120.50	118.41
3	A	501	FAD	C1'-N10-C10	2.27	120.44	118.41
3	B	501	FAD	O3B-C3B-C4B	2.11	117.15	111.05
3	B	501	FAD	P-O3P-PA	2.05	139.87	132.83
3	A	501	FAD	O4B-C4B-C3B	-2.02	101.11	105.11

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	501	FAD	N10-C1'-C2'-O2'
3	B	501	FAD	N10-C1'-C2'-C3'
3	B	501	FAD	C3'-C4'-C5'-O5'
3	A	501	FAD	N10-C1'-C2'-O2'
4	B	504	NAG	C8-C7-N2-C2
4	B	504	NAG	O7-C7-N2-C2
4	A	504	NAG	C8-C7-N2-C2
4	A	504	NAG	O7-C7-N2-C2
4	B	504	NAG	O5-C5-C6-O6
4	A	504	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
4	A	504	NAG	C4-C5-C6-O6
4	B	504	NAG	C4-C5-C6-O6
3	A	501	FAD	O3'-C3'-C4'-C5'
3	A	501	FAD	O3'-C3'-C4'-O4'
3	B	501	FAD	O4'-C4'-C5'-O5'
3	A	501	FAD	O4'-C4'-C5'-O5'
3	B	501	FAD	O3'-C3'-C4'-C5'
3	B	501	FAD	O3'-C3'-C4'-O4'
3	A	501	FAD	C2'-C3'-C4'-O4'
3	A	501	FAD	C3'-C4'-C5'-O5'
3	A	501	FAD	C2'-C3'-C4'-C5'
4	B	504	NAG	C3-C2-N2-C7
3	B	501	FAD	C2'-C3'-C4'-C5'
3	B	501	FAD	PA-O3P-P-O1P
3	A	501	FAD	N10-C1'-C2'-C3'
4	A	504	NAG	C1-C2-N2-C7
3	B	501	FAD	C2'-C3'-C4'-O4'
3	B	501	FAD	PA-O3P-P-O2P

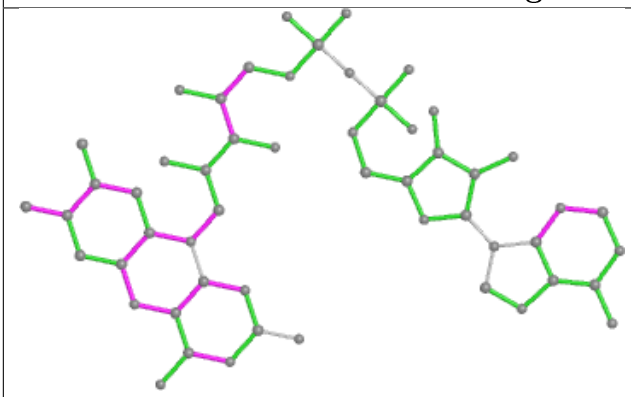
There are no ring outliers.

2 monomers are involved in 3 short contacts:

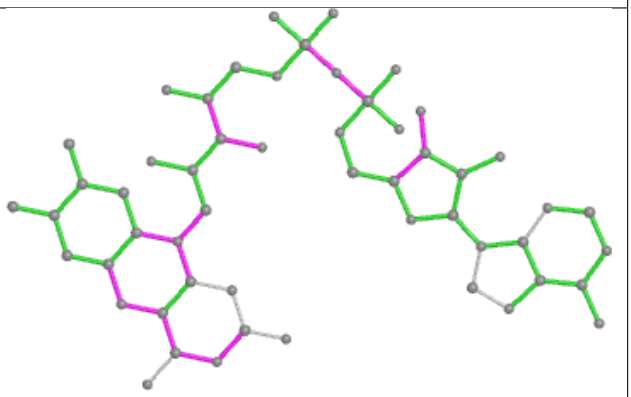
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	501	FAD	2	0
3	A	501	FAD	1	0

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 then 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.

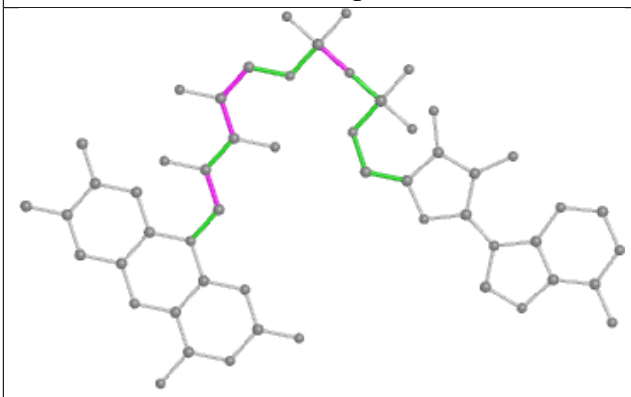
Ligand FAD B 501



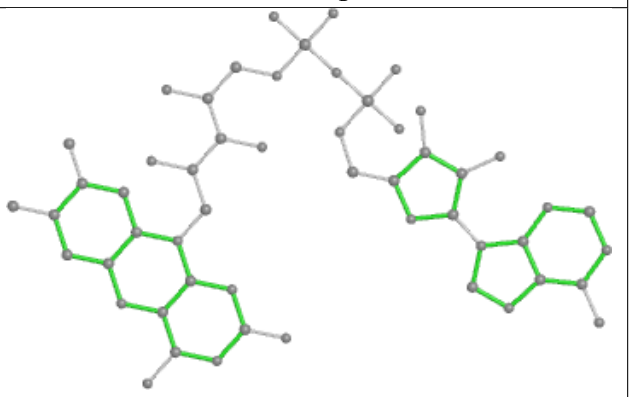
Bond lengths



Bond angles

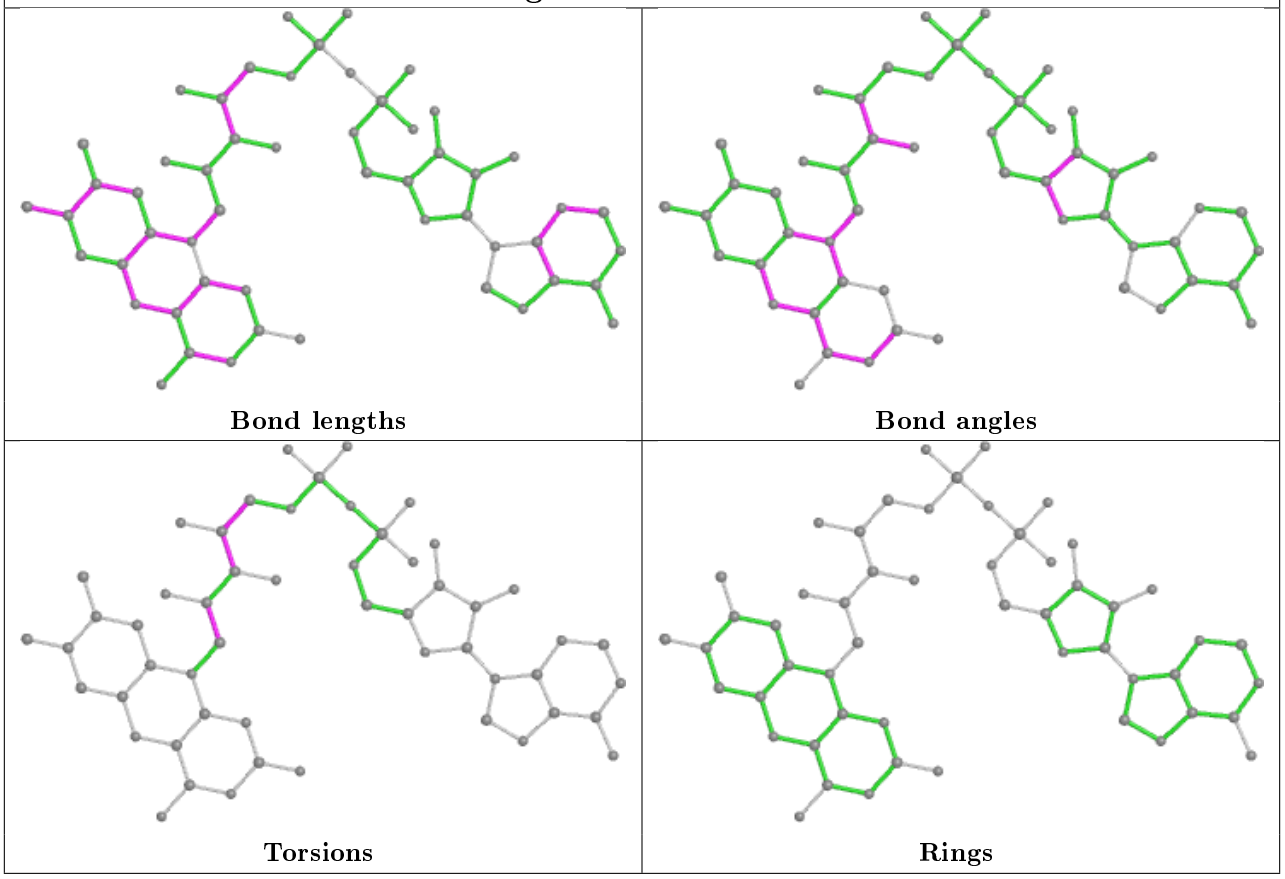


Torsions



Rings

Ligand FAD A 501



5.7 Other polymers

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^{th} 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	486/497 (97%)	0.11	20 (4%)	37	46	10, 21, 39, 50	0
1	B	485/497 (97%)	0.15	22 (4%)	33	42	10, 23, 41, 49	0
All	All	971/994 (97%)	0.13	42 (4%)	35	45	10, 22, 40, 50	0

All (42) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	405	PHE	8.1
1	A	50	ASP	5.3
1	B	405	PHE	4.7
1	A	288	LEU	4.7
1	B	325	ARG	4.6
1	A	51	LYS	4.0
1	A	321	LYS	3.9
1	B	288	LEU	3.6
1	B	322	GLY	3.6
1	B	15	THR	3.5
1	A	119	LYS	3.5
1	A	407	GLU	3.5
1	B	298	GLY	3.5
1	B	76	ARG	3.1
1	A	335	LYS	3.0
1	B	153	THR	3.0
1	B	320	PRO	3.0
1	B	321	LYS	2.9
1	A	15	THR	2.6
1	B	407	GLU	2.6
1	B	51	LYS	2.6
1	A	271	GLN	2.6
1	A	237	HIS	2.5
1	B	119	LYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	497	LEU	2.5
1	A	318	MET	2.5
1	B	50	ASP	2.5
1	A	298	GLY	2.5
1	B	284	LYS	2.5
1	A	452	ASN	2.4
1	B	302	THR	2.4
1	A	316	ILE	2.4
1	B	323	THR	2.3
1	B	422	ASP	2.2
1	B	347	GLU	2.2
1	A	302	THR	2.2
1	A	284	LYS	2.2
1	A	241	LYS	2.2
1	B	335	LYS	2.2
1	B	349	ILE	2.2
1	A	320	PRO	2.1
1	A	291	THR	2.1

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)

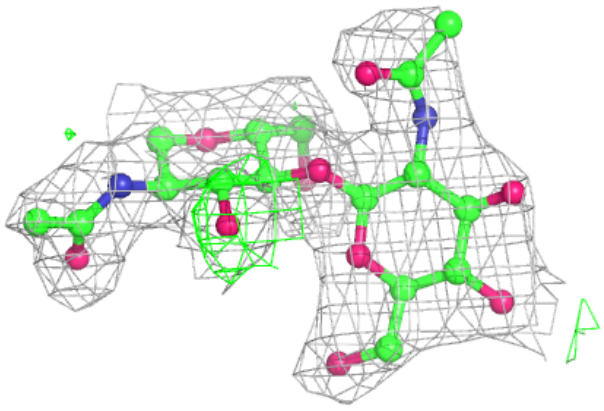
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

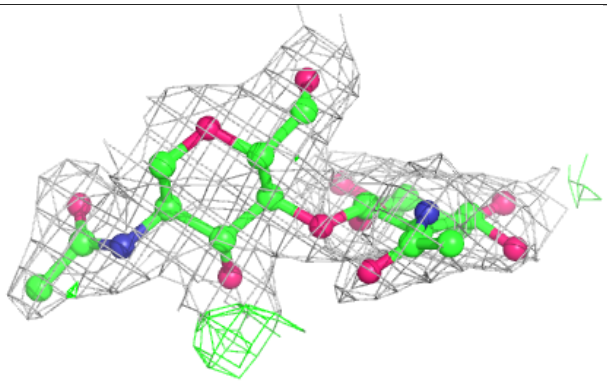
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NAG	D	2	14/15	0.89	0.16	34,38,40,42	0
2	NAG	D	1	14/15	0.89	0.12	24,26,31,38	0
2	NAG	C	2	14/15	0.90	0.18	33,37,40,40	0
2	NAG	C	1	14/15	0.93	0.09	17,21,24,28	0

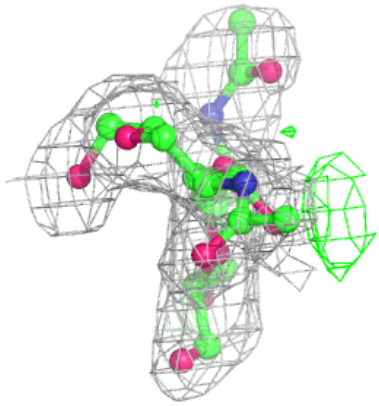
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain C:

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

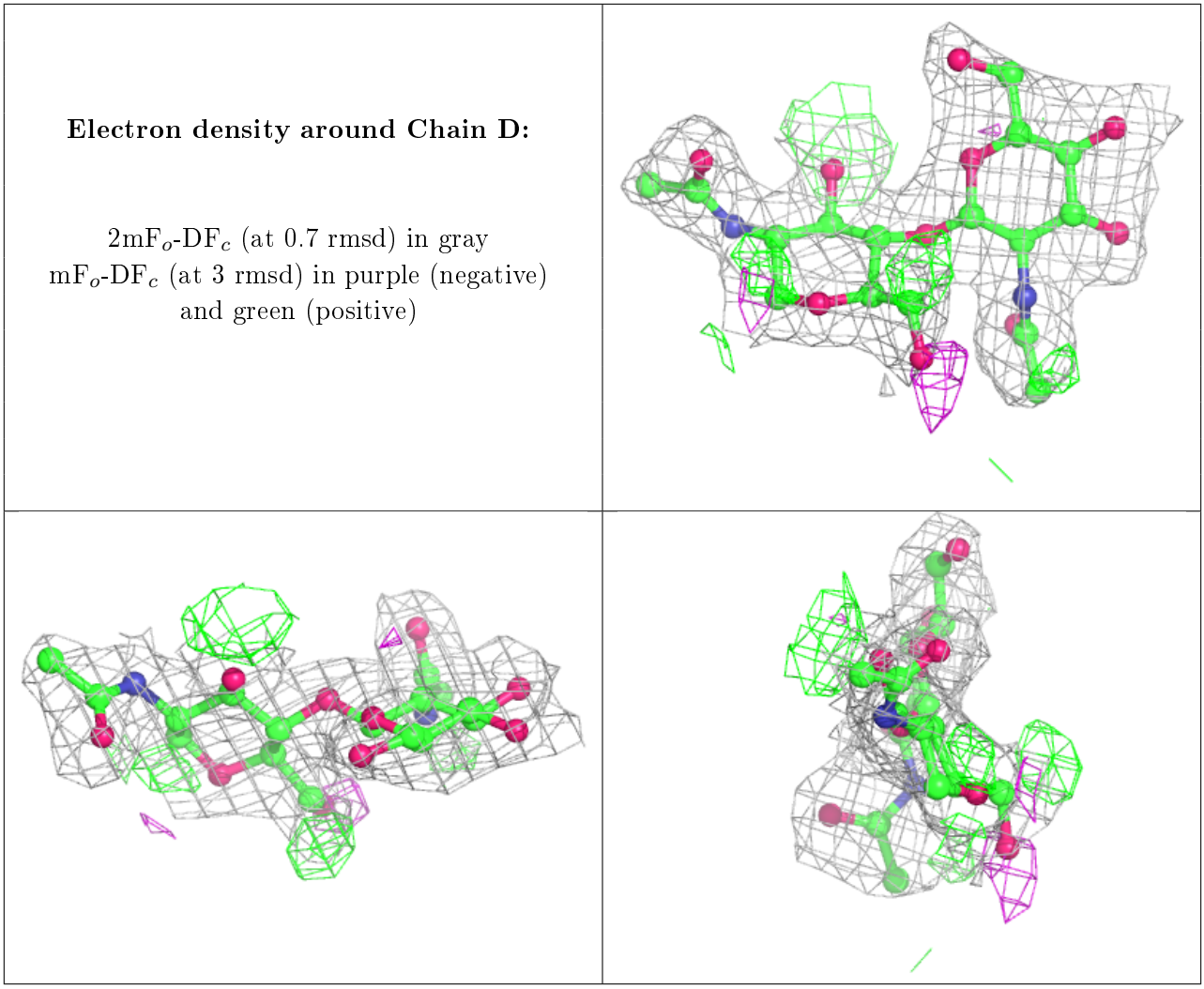






Electron density around Chain D:

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



6.4 Ligands

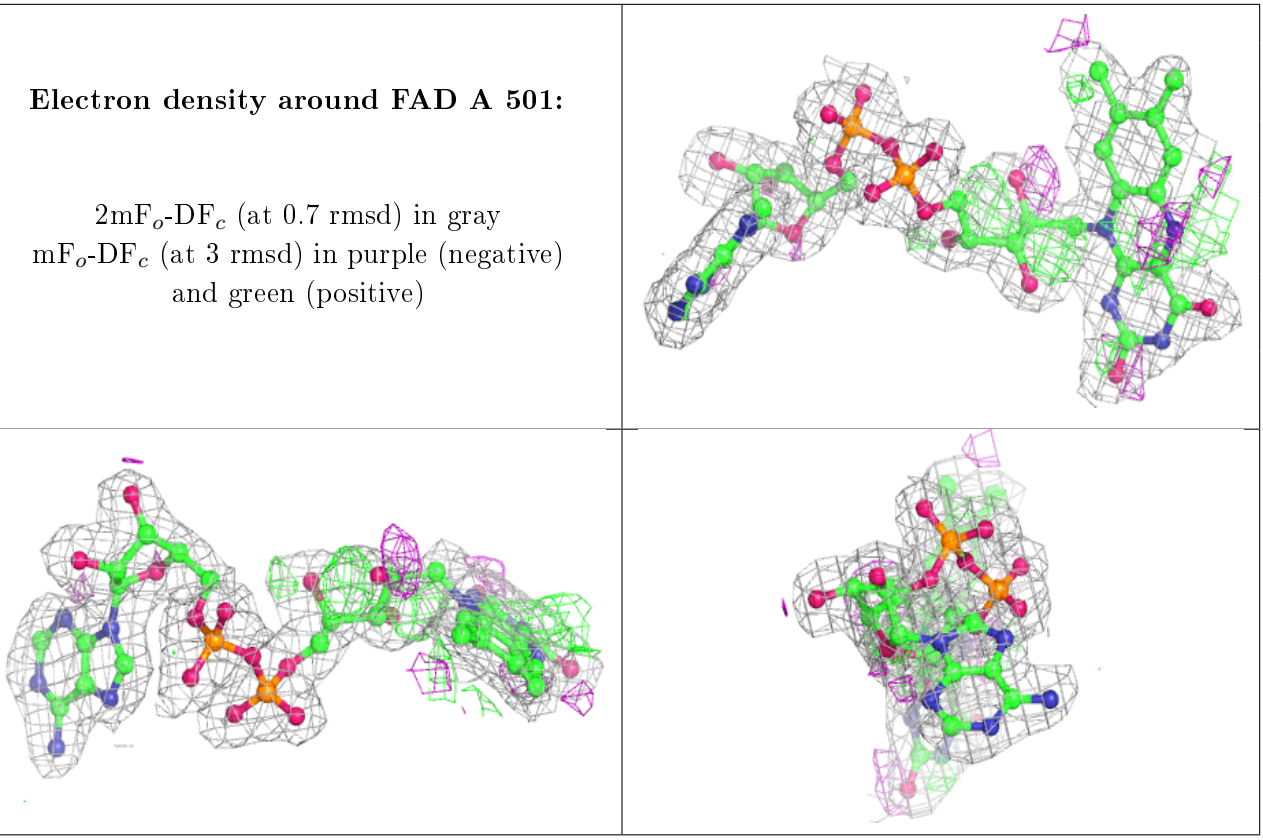
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	504	14/15	0.69	0.41	48,50,52,52	0
4	NAG	A	504	14/15	0.75	0.52	48,50,54,55	0
3	FAD	A	501	53/53	0.94	0.16	8,13,19,21	0
3	FAD	B	501	53/53	0.95	0.15	8,14,22,23	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.

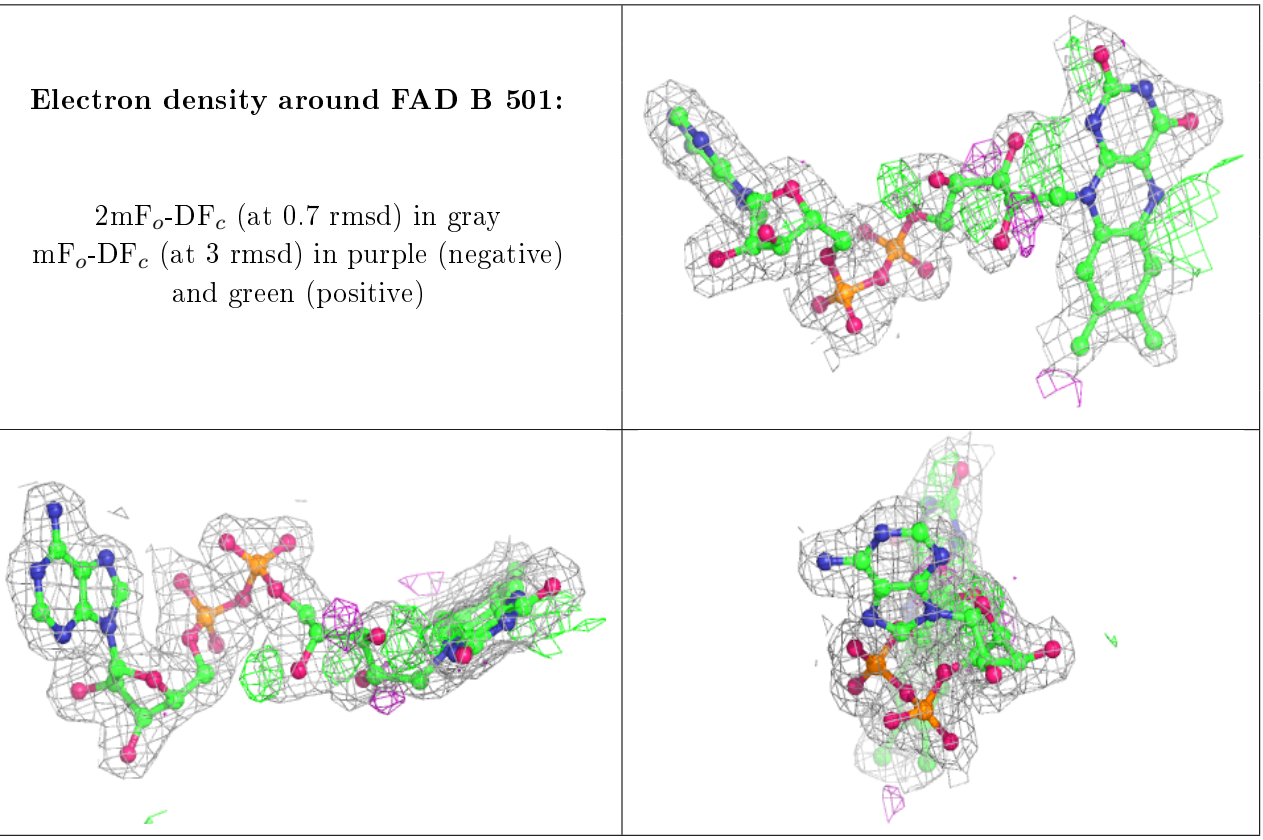
Electron density around FAD A 501:

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



Electron density around FAD B 501:

$2mF_o$-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.