



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:19 PM UTC

PDB ID : 2AEC / pdb_00002aec
Title : Crystal Structure of Human M340H-Beta1,4-Galactosyltransferase-I (M340H-B4GAL-T1) in Complex with GlcNAc-beta1,2-Man-alpha1,6-Man-beta-O
R
Authors : Ramasamy, V.; Ramakrishnan, B.; Boeggeman, E.; Ratner, D.M.; Seeberger, P.H.; Qasba, P.K.
Deposited on : 2005-07-22
Resolution : 2.00 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtrriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

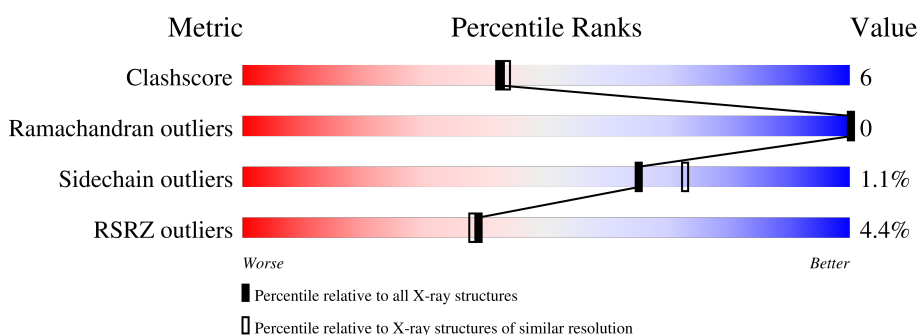
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	287	
1	B	287	
1	C	287	
2	D	3	
2	E	3	
2	F	3	

2 Entry composition i

There are 9 unique types of molecules in this entry. The entry contains 7464 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 Beta-1,4-galactosyltransferase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	272	2212	1417	385	399	11	0	0	0
1	B	272	2212	1417	385	399	11	0	0	0
1	C	272	2212	1417	385	399	11	0	0	0

There are 51 discrepancies between the modelled and reference sequences:

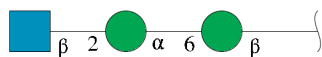
Chain	Residue	Modelled	Actual	Comment	Reference
A	112	ALA	-	SEE REMARK 999	UNP P15291
A	113	SER	-	SEE REMARK 999	UNP P15291
A	114	MET	-	SEE REMARK 999	UNP P15291
A	115	THR	-	SEE REMARK 999	UNP P15291
A	116	GLY	-	SEE REMARK 999	UNP P15291
A	117	GLY	-	SEE REMARK 999	UNP P15291
A	118	GLN	-	SEE REMARK 999	UNP P15291
A	119	GLN	-	SEE REMARK 999	UNP P15291
A	120	MET	-	SEE REMARK 999	UNP P15291
A	121	GLY	-	SEE REMARK 999	UNP P15291
A	122	ARG	-	SEE REMARK 999	UNP P15291
A	123	GLY	-	SEE REMARK 999	UNP P15291
A	124	SER	-	SEE REMARK 999	UNP P15291
A	125	ALA	-	SEE REMARK 999	UNP P15291
A	337	THR	ARG	engineered mutation	UNP P15291
A	338	THR	CYS	engineered mutation	UNP P15291
A	340	HIS	MET	engineered mutation	UNP P15291
B	112	ALA	-	SEE REMARK 999	UNP P15291
B	113	SER	-	SEE REMARK 999	UNP P15291
B	114	MET	-	SEE REMARK 999	UNP P15291
B	115	THR	-	SEE REMARK 999	UNP P15291
B	116	GLY	-	SEE REMARK 999	UNP P15291
B	117	GLY	-	SEE REMARK 999	UNP P15291

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Chain	Residue	Modelled	Actual	Comment	Reference
B	118	GLN	-	SEE REMARK 999	UNP P15291
B	119	GLN	-	SEE REMARK 999	UNP P15291
B	120	MET	-	SEE REMARK 999	UNP P15291
B	121	GLY	-	SEE REMARK 999	UNP P15291
B	122	ARG	-	SEE REMARK 999	UNP P15291
B	123	GLY	-	SEE REMARK 999	UNP P15291
B	124	SER	-	SEE REMARK 999	UNP P15291
B	125	ALA	-	SEE REMARK 999	UNP P15291
B	337	THR	ARG	engineered mutation	UNP P15291
B	338	THR	CYS	engineered mutation	UNP P15291
B	340	HIS	MET	engineered mutation	UNP P15291
C	112	ALA	-	SEE REMARK 999	UNP P15291
C	113	SER	-	SEE REMARK 999	UNP P15291
C	114	MET	-	SEE REMARK 999	UNP P15291
C	115	THR	-	SEE REMARK 999	UNP P15291
C	116	GLY	-	SEE REMARK 999	UNP P15291
C	117	GLY	-	SEE REMARK 999	UNP P15291
C	118	GLN	-	SEE REMARK 999	UNP P15291
C	119	GLN	-	SEE REMARK 999	UNP P15291
C	120	MET	-	SEE REMARK 999	UNP P15291
C	121	GLY	-	SEE REMARK 999	UNP P15291
C	122	ARG	-	SEE REMARK 999	UNP P15291
C	123	GLY	-	SEE REMARK 999	UNP P15291
C	124	SER	-	SEE REMARK 999	UNP P15291
C	125	ALA	-	SEE REMARK 999	UNP P15291
C	337	THR	ARG	engineered mutation	UNP P15291
C	338	THR	CYS	engineered mutation	UNP P15291
C	340	HIS	MET	engineered mutation	UNP P15291

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



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
2	D	3	Total	C	N	O	0	0	0
			37	20	1	16			
2	E	3	Total	C	N	O	0	0	0
			37	20	1	16			

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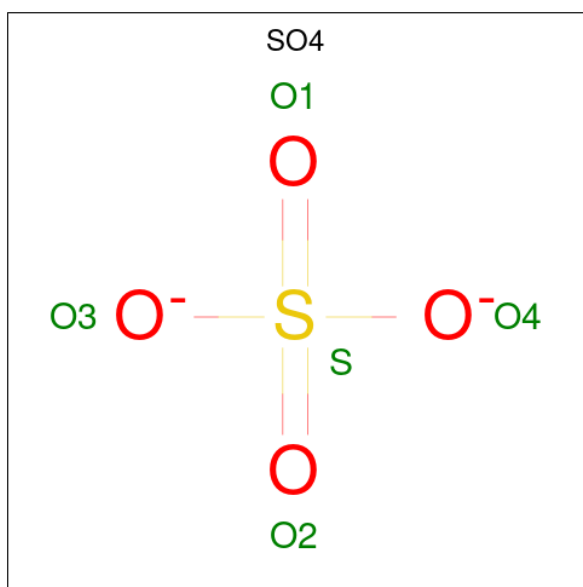
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	F	3	37	20	1	16	0	0	0

- Molecule 3 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mn		
3	A	1	1	1	0	0
3	B	1	1	1	0	0
3	C	1	1	1	0	0

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



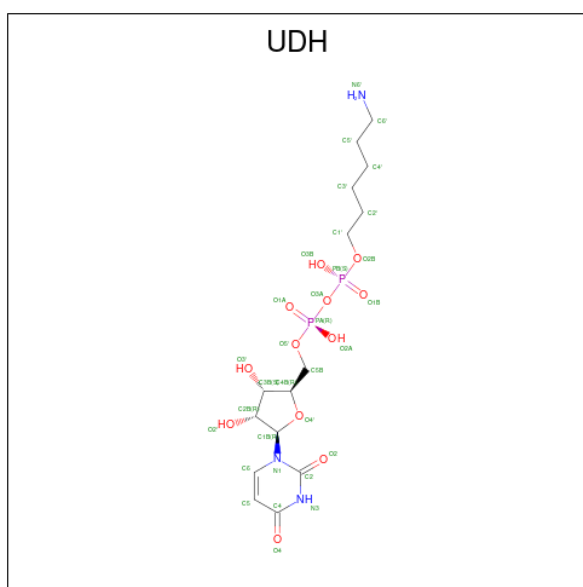
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	B	1	5	4	1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	B	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	C	1	5	4	1	0	0
4	C	1	5	4	1	0	0
4	C	1	5	4	1	0	0
4	C	1	5	4	1	0	0

- Molecule 5 is 6-AMINOHEXYL-URIDINE-C1,5'-DIPHOSPHATE (CCD ID: UDH) (formula: C₁₅H₂₇N₃O₁₂P₂).



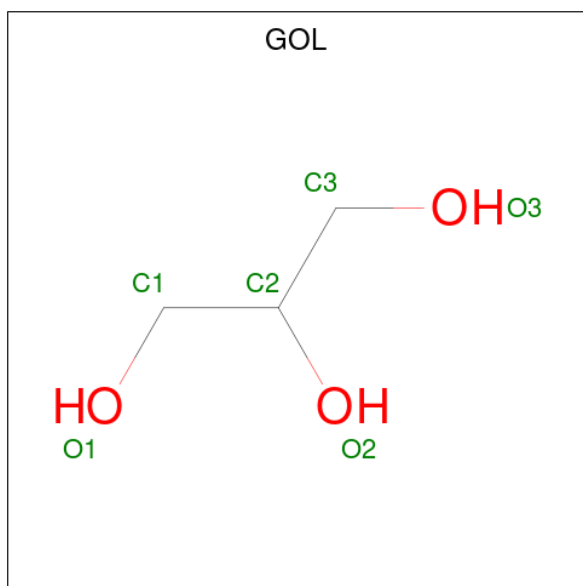
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
5	A	1	32	15	3	12	2	0	0
5	B	1	32	15	3	12	2	0	0

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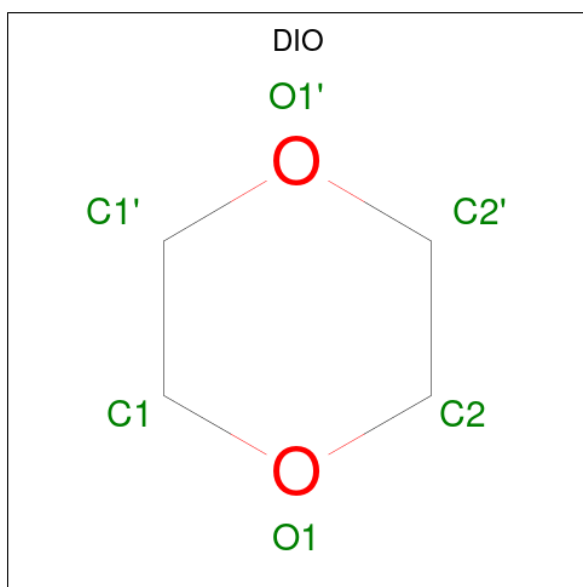
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
5	C	1	32	15	3	12	2	0	0

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



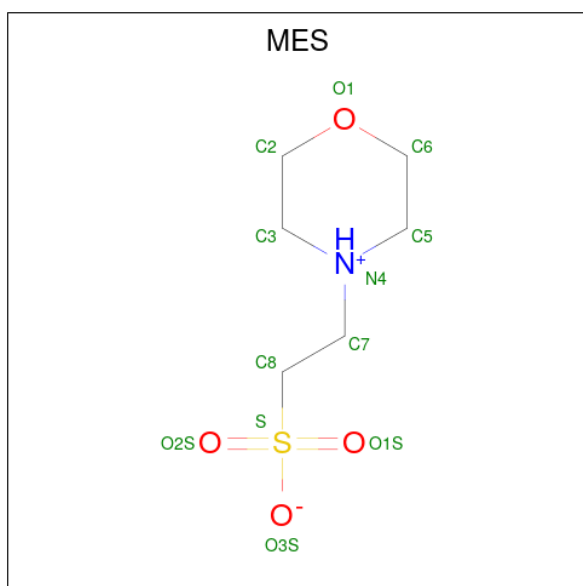
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	6	3	3	0	0
6	A	1	6	3	3	0	0
6	B	1	6	3	3	0	0
6	B	1	6	3	3	0	0
6	B	1	6	3	3	0	0
6	B	1	6	3	3	0	0
6	C	1	6	3	3	0	0

- Molecule 7 is 1,4-DIETHYLENE DIOXIDE (CCD ID: DIO) (formula: C₄H₈O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	C	1	Total	C	O	0	0
			6	4	2		

- Molecule 8 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
8	C	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

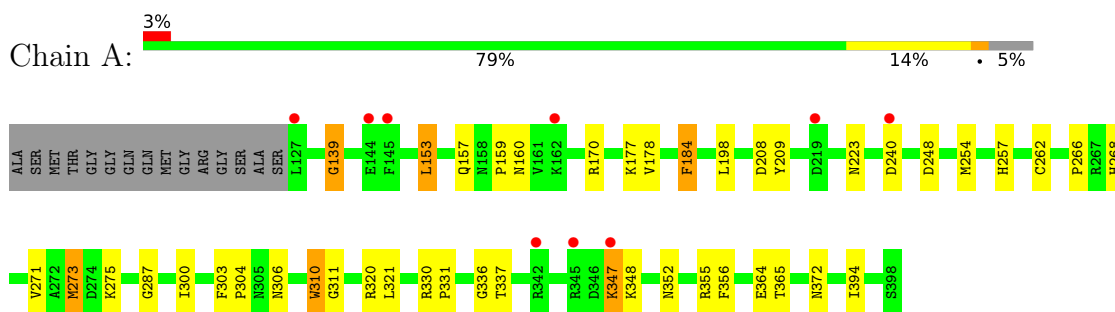
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	171	Total 171	O 171	0	0
9	B	181	Total 181	O 181	0	0
9	C	136	Total 136	O 136	0	0

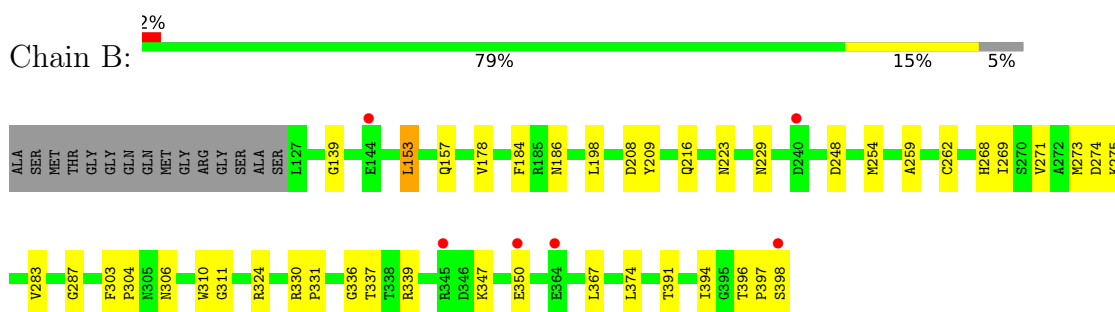
3 Residue-property plots [i](#)

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.

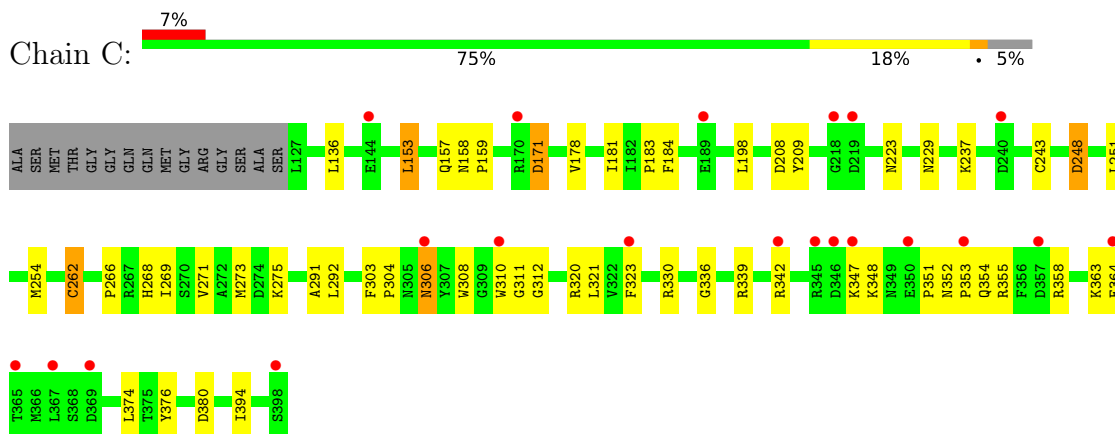
- Molecule 1: Beta-1,4-galactosyltransferase 1



- Molecule 1: Beta-1,4-galactosyltransferase 1



- Molecule 1: Beta-1,4-galactosyltransferase 1




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

Chain D:  67% 33%


BM11
MAN2
MAG3

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

Chain E:  100%

BM11
MAN2
MAG3

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

Chain F:  100%

BM11
MAN2
MAG3

4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	107.23Å 194.99Å 143.74Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 2.00 40.00 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.2 (40.00-2.00) 99.3 (40.00-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.05 (at 2.00Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.208 , 0.239 0.199 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	25.3	Xtrriage
Anisotropy	0.775	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 44.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.000 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.013 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7464	wwPDB-VP
Average B, all atoms (Å ²)	31.0	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.*

¹Intensities estimated from amplitudes.

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

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, SO4, UDH, GOL, MN, BMA, MES, DIO, 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	0.52	1/2274 (0.0%)	1.03	15/3089 (0.5%)
1	B	0.55	0/2274	1.03	17/3089 (0.6%)
1	C	0.48	0/2274	1.01	16/3089 (0.5%)
All	All	0.52	1/6822 (0.0%)	1.02	48/9267 (0.5%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	273	MET	SD-CE	-5.91	1.64	1.79

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	311	GLY	N-CA-C	10.29	124.93	112.48
1	C	311	GLY	N-CA-C	9.41	124.78	112.18
1	B	311	GLY	N-CA-C	9.29	124.63	112.18
1	B	178	VAL	N-CA-C	8.92	120.66	108.17
1	A	178	VAL	N-CA-C	8.11	119.52	108.17
1	A	184	PHE	N-CA-C	7.12	120.01	108.76
1	B	184	PHE	N-CA-C	7.10	119.97	108.76
1	C	269	ILE	N-CA-C	6.86	117.83	111.45
1	C	178	VAL	N-CA-C	6.68	117.46	108.11
1	C	209	TYR	N-CA-C	6.66	119.54	109.41
1	A	209	TYR	N-CA-C	6.65	119.51	109.41
1	C	306	ASN	N-CA-C	6.63	120.28	112.72
1	B	209	TYR	N-CA-C	6.36	119.08	109.41
1	B	269	ILE	N-CA-C	6.23	117.58	111.67
1	C	171	ASP	N-CA-C	6.02	120.63	113.28
1	B	208	ASP	N-CA-C	-5.94	96.70	107.75
1	A	306	ASN	N-CA-C	5.90	120.04	112.26

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	198	LEU	N-CA-C	5.89	117.78	111.36
1	C	208	ASP	N-CA-C	-5.83	96.90	107.75
1	C	158	ASN	CA-C-N	5.80	125.67	119.28
1	C	158	ASN	C-N-CA	5.80	125.67	119.28
1	C	183	PRO	N-CA-C	-5.79	102.10	111.19
1	C	184	PHE	N-CA-C	5.77	118.06	108.99
1	B	259	ALA	N-CA-C	5.74	118.51	109.96
1	C	262	CYS	N-CA-C	5.64	118.86	110.52
1	B	347	LYS	N-CA-C	-5.63	102.95	110.55
1	A	331	PRO	N-CA-C	-5.60	102.78	111.13
1	A	262	CYS	N-CA-C	5.52	118.69	110.52
1	B	283	VAL	N-CA-C	5.50	119.81	111.89
1	A	310	TRP	N-CA-C	5.48	118.39	110.28
1	B	331	PRO	N-CA-C	-5.48	102.97	111.13
1	C	248	ASP	N-CA-C	-5.47	103.31	110.53
1	C	312	GLY	N-CA-C	5.43	126.05	113.18
1	B	248	ASP	N-CA-C	-5.40	103.40	110.53
1	A	208	ASP	N-CA-C	-5.40	97.10	107.57
1	B	139	GLY	CA-C-N	5.36	125.62	119.83
1	B	139	GLY	C-N-CA	5.36	125.62	119.83
1	B	262	CYS	N-CA-C	5.36	118.45	110.52
1	A	198	LEU	N-CA-C	5.35	117.19	111.36
1	C	198	LEU	N-CA-C	5.30	117.14	111.36
1	C	181	ILE	N-CA-C	5.29	115.47	107.80
1	A	365	THR	N-CA-C	5.27	117.94	111.82
1	A	248	ASP	N-CA-C	-5.27	103.07	110.50
1	A	139	GLY	CA-C-N	5.19	125.20	119.90
1	A	139	GLY	C-N-CA	5.19	125.20	119.90
1	B	310	TRP	N-CA-C	5.06	117.77	110.28
1	A	347	LYS	N-CA-C	-5.03	103.75	110.55
1	B	306	ASN	N-CA-C	5.03	118.26	112.57

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	2212	0	2157	29	0
1	B	2212	0	2157	23	0
1	C	2212	0	2157	36	0
2	D	37	0	33	1	0
2	E	37	0	33	0	0
2	F	37	0	33	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	20	0	0	0	0
4	B	30	0	0	0	0
4	C	20	0	0	0	0
5	A	32	0	25	0	0
5	B	32	0	25	0	0
5	C	32	0	25	1	0
6	A	12	0	16	3	0
6	B	24	0	32	3	0
6	C	6	0	8	1	0
7	C	6	0	8	2	0
8	C	12	0	13	3	0
9	A	171	0	0	0	0
9	B	181	0	0	1	0
9	C	136	0	0	0	0
All	All	7464	0	6722	86	0

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

All (86) 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:C:273:MET:HE1	1:C:275:LYS:HE2	1.50	0.94
1:C:268:HIS:HD2	1:C:330:ARG:HE	1.09	0.92
1:A:273:MET:HE1	1:A:275:LYS:HE2	1.51	0.91
1:A:153:LEU:HD22	1:A:157:GLN:HE21	1.36	0.88
1:B:324:ARG:HH11	1:B:367:LEU:HD21	1.41	0.85
1:B:398:SER:H	6:B:419:GOL:H12	1.42	0.84
1:B:268:HIS:HD2	1:B:330:ARG:HE	1.26	0.80
1:A:268:HIS:HD2	1:A:330:ARG:HE	1.28	0.79
1:A:273:MET:CE	1:A:275:LYS:HE2	2.13	0.78
1:C:273:MET:CE	1:C:275:LYS:HE2	2.15	0.77
1:C:268:HIS:CD2	1:C:330:ARG:HE	1.99	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:273:MET:HE1	1:B:275:LYS:HE2	1.72	0.72
1:C:308:TRP:HE1	7:C:435:DIO:H12	1.54	0.71
1:B:153:LEU:O	1:B:157:GLN:HG3	1.92	0.69
1:A:254:MET:SD	1:A:337:THR:HG22	2.31	0.69
1:B:273:MET:CE	1:B:275:LYS:HE2	2.25	0.67
1:B:324:ARG:NH1	1:B:367:LEU:HD21	2.09	0.66
1:C:376:TYR:O	8:C:436:MES:H71	1.96	0.66
1:C:306:ASN:HB3	7:C:435:DIO:H1'1	1.78	0.66
1:A:177:LYS:HE2	1:A:240:ASP:O	1.97	0.65
6:B:414:GOL:H31	9:B:494:HOH:O	1.97	0.64
1:A:268:HIS:CD2	1:A:330:ARG:HE	2.13	0.63
1:A:153:LEU:HD22	1:A:157:GLN:NE2	2.13	0.62
1:C:352:ASN:OD1	1:C:354:GLN:HG2	2.01	0.61
1:C:153:LEU:O	1:C:157:GLN:HG3	2.00	0.60
1:A:153:LEU:CD2	1:A:157:GLN:HE21	2.12	0.59
1:A:157:GLN:C	1:A:159:PRO:HD3	2.29	0.57
1:C:268:HIS:HB3	1:C:330:ARG:HG2	1.85	0.57
1:B:254:MET:SD	1:B:337:THR:HG22	2.44	0.57
1:C:157:GLN:C	1:C:159:PRO:HD3	2.31	0.56
1:A:268:HIS:HB3	1:A:330:ARG:HG2	1.87	0.56
1:B:268:HIS:HB3	1:B:330:ARG:HG2	1.88	0.56
1:A:268:HIS:HE1	1:A:287:GLY:O	1.90	0.55
1:C:266:PRO:HG2	1:C:321:LEU:HD22	1.88	0.53
1:C:254:MET:SD	1:C:339:ARG:HG3	2.48	0.53
1:A:254:MET:SD	1:A:337:THR:CG2	2.96	0.52
1:C:271:VAL:HG22	1:C:336:GLY:HA3	1.91	0.51
1:B:268:HIS:HE1	1:B:287:GLY:O	1.95	0.50
1:B:271:VAL:HG22	1:B:336:GLY:HA3	1.94	0.49
1:A:139:GLY:HA2	1:A:257:HIS:HD2	1.78	0.49
1:C:304:PRO:HB3	1:C:320:ARG:HH21	1.78	0.49
1:B:254:MET:HE1	1:C:136:LEU:HD22	1.95	0.48
1:B:268:HIS:CD2	1:B:330:ARG:HE	2.17	0.48
1:C:273:MET:HE2	1:C:275:LYS:HG2	1.96	0.48
1:A:352:ASN:O	1:A:355:ARG:HG2	2.13	0.48
1:A:372:ASN:O	1:B:391:THR:HG21	2.14	0.47
1:A:303:PHE:HB3	1:A:304:PRO:HD2	1.97	0.47
1:C:223:ASN:HB3	1:C:394:ILE:CD1	2.44	0.47
1:B:303:PHE:HB3	1:B:304:PRO:HD2	1.96	0.47
1:C:308:TRP:O	1:C:352:ASN:HB2	2.14	0.47
1:A:160:ASN:ND2	1:A:170:ARG:HH21	2.13	0.47
1:B:396:THR:HB	1:B:397:PRO:HD2	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:351:PRO:O	1:C:353:PRO:HD3	2.15	0.46
1:A:310:TRP:CE2	6:A:417:GOL:H12	2.51	0.46
1:C:237:LYS:NZ	8:C:436:MES:H61	2.31	0.46
1:B:186:ASN:ND2	6:B:416:GOL:O1	2.46	0.46
1:B:229:ASN:HB3	1:B:374:LEU:HD22	1.98	0.46
1:C:347:LYS:O	1:C:348:LYS:HB2	2.15	0.46
1:A:310:TRP:NE1	6:A:417:GOL:H12	2.31	0.45
1:A:139:GLY:HA2	1:A:257:HIS:CD2	2.51	0.45
1:B:216:GLN:OE1	1:B:394:ILE:HD11	2.17	0.44
1:A:356:PHE:HE2	2:D:2:MAN:H61	1.81	0.44
1:C:266:PRO:CG	1:C:321:LEU:HD22	2.48	0.44
1:C:251:LEU:HD21	1:C:273:MET:HE3	1.99	0.44
1:C:229:ASN:HB3	1:C:374:LEU:HD22	2.00	0.43
1:C:352:ASN:O	1:C:355:ARG:HG2	2.18	0.43
1:A:347:LYS:O	1:A:348:LYS:HB2	2.18	0.43
1:C:291:ALA:C	1:C:292:LEU:HD12	2.44	0.43
1:B:223:ASN:HB3	1:B:394:ILE:HD12	2.01	0.43
1:B:274:ASP:O	1:C:171:ASP:HB3	2.19	0.42
1:B:254:MET:SD	1:B:339:ARG:HG3	2.59	0.42
1:A:300:ILE:HB	1:A:320:ARG:HB3	2.01	0.42
1:C:248:ASP:HB3	5:C:403:UDH:O3'	2.20	0.42
1:C:303:PHE:HB3	1:C:304:PRO:HD2	2.02	0.41
1:C:271:VAL:CG2	1:C:336:GLY:HA3	2.49	0.41
1:C:243:CYS:SG	1:C:262:CYS:N	2.94	0.41
1:B:268:HIS:HD2	1:B:330:ARG:NE	2.06	0.41
1:A:223:ASN:HB3	1:A:394:ILE:CD1	2.51	0.41
1:C:310:TRP:CE2	6:C:418:GOL:H12	2.55	0.41
1:A:271:VAL:HG22	1:A:336:GLY:HA3	2.03	0.40
1:C:323:PHE:CE1	1:C:363:LYS:HB2	2.56	0.40
1:A:266:PRO:HG2	1:A:321:LEU:HD22	2.03	0.40
1:A:310:TRP:CD1	6:A:417:GOL:H12	2.57	0.40
1:C:237:LYS:HZ3	8:C:436:MES:H61	1.86	0.40
1:A:184:PHE:CD2	1:A:184:PHE:C	3.00	0.40
1:C:354:GLN:OE1	1:C:358:ARG:NH2	2.43	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	270/287 (94%)	263 (97%)	7 (3%)	0	100	100
1	B	270/287 (94%)	264 (98%)	6 (2%)	0	100	100
1	C	270/287 (94%)	263 (97%)	7 (3%)	0	100	100
All	All	810/861 (94%)	790 (98%)	20 (2%)	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	243/252 (96%)	241 (99%)	2 (1%)	73	80
1	B	243/252 (96%)	241 (99%)	2 (1%)	73	80
1	C	243/252 (96%)	239 (98%)	4 (2%)	55	62
All	All	729/756 (96%)	721 (99%)	8 (1%)	65	73

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	153	LEU
1	A	364	GLU
1	B	153	LEU
1	B	350	GLU
1	C	153	LEU

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Mol	Chain	Res	Type
1	C	342	ARG
1	C	364	GLU
1	C	380	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	157	GLN
1	A	160	ASN
1	A	186	ASN
1	A	206	GLN
1	A	215	ASN
1	A	268	HIS
1	A	377	GLN
1	B	186	ASN
1	B	215	ASN
1	B	268	HIS
1	C	215	ASN
1	C	268	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](#)

9 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	BMA	D	1	2	12,12,12	1.67	5 (41%)	17,17,17	0.68	0
2	MAN	D	2	2	11,11,12	2.30	4 (36%)	15,15,17	2.25	4 (26%)
2	NAG	D	3	2	14,14,15	1.73	5 (35%)	17,19,21	0.96	1 (5%)
2	BMA	E	1	2	12,12,12	1.75	5 (41%)	17,17,17	0.69	0
2	MAN	E	2	2	11,11,12	2.31	4 (36%)	15,15,17	2.11	4 (26%)
2	NAG	E	3	2	14,14,15	1.69	4 (28%)	17,19,21	0.96	1 (5%)
2	BMA	F	1	2	12,12,12	1.63	5 (41%)	17,17,17	0.69	0
2	MAN	F	2	2	11,11,12	2.47	4 (36%)	15,15,17	2.25	4 (26%)
2	NAG	F	3	2	14,14,15	2.05	6 (42%)	17,19,21	1.04	1 (5%)

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	BMA	D	1	2	-	1/2/22/22	0/1/1/1
2	MAN	D	2	2	-	2/2/19/22	0/1/1/1
2	NAG	D	3	2	-	0/6/23/26	0/1/1/1
2	BMA	E	1	2	-	2/2/22/22	0/1/1/1
2	MAN	E	2	2	-	1/2/19/22	0/1/1/1
2	NAG	E	3	2	-	0/6/23/26	0/1/1/1
2	BMA	F	1	2	-	2/2/22/22	0/1/1/1
2	MAN	F	2	2	-	2/2/19/22	0/1/1/1
2	NAG	F	3	2	-	0/6/23/26	0/1/1/1

All (42) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	2	MAN	O5-C1	5.08	1.52	1.43
2	E	2	MAN	O5-C1	4.45	1.51	1.43
2	D	2	MAN	O5-C1	4.44	1.51	1.43
2	E	2	MAN	O5-C5	4.35	1.51	1.43
2	F	2	MAN	O5-C5	4.21	1.51	1.43
2	D	2	MAN	O5-C5	3.83	1.50	1.43
2	F	2	MAN	C2-C3	3.80	1.58	1.52
2	F	3	NAG	O5-C5	3.76	1.50	1.43
2	D	2	MAN	C2-C3	3.71	1.58	1.52
2	F	3	NAG	O5-C1	3.60	1.49	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	2	MAN	C2-C3	3.56	1.57	1.52
2	F	3	NAG	C2-N2	3.37	1.51	1.46
2	E	3	NAG	O5-C5	3.26	1.49	1.43
2	D	3	NAG	O5-C5	3.18	1.49	1.43
2	D	3	NAG	C2-N2	3.12	1.51	1.46
2	E	3	NAG	O5-C1	2.99	1.48	1.43
2	D	1	BMA	O5-C1	2.99	1.50	1.42
2	E	1	BMA	C3-C2	2.97	1.60	1.52
2	E	1	BMA	O5-C1	2.94	1.50	1.42
2	F	1	BMA	C3-C2	2.80	1.59	1.52
2	E	3	NAG	C2-N2	2.72	1.50	1.46
2	D	1	BMA	C3-C2	2.71	1.59	1.52
2	D	3	NAG	O5-C1	2.69	1.48	1.43
2	F	1	BMA	O5-C1	2.67	1.49	1.42
2	F	3	NAG	C3-C2	2.65	1.58	1.52
2	F	3	NAG	C1-C2	2.62	1.55	1.52
2	D	2	MAN	C4-C5	2.62	1.58	1.53
2	E	1	BMA	O5-C5	2.61	1.50	1.44
2	D	1	BMA	C1-C2	2.54	1.58	1.52
2	E	1	BMA	C1-C2	2.44	1.57	1.52
2	F	1	BMA	C1-C2	2.35	1.57	1.52
2	F	2	MAN	C4-C5	2.35	1.58	1.53
2	F	1	BMA	O5-C5	2.29	1.50	1.44
2	D	1	BMA	O5-C5	2.29	1.50	1.44
2	E	2	MAN	C4-C5	2.23	1.57	1.53
2	D	3	NAG	C4-C3	2.18	1.58	1.52
2	F	3	NAG	C4-C3	2.13	1.57	1.52
2	F	1	BMA	C4-C3	2.10	1.57	1.52
2	E	3	NAG	C3-C2	2.05	1.56	1.52
2	D	3	NAG	C1-C2	2.05	1.55	1.52
2	E	1	BMA	C4-C3	2.03	1.57	1.52
2	D	1	BMA	C4-C3	2.03	1.57	1.52

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2	MAN	C1-O5-C5	5.23	119.19	112.19
2	F	2	MAN	C1-O5-C5	5.08	119.00	112.19
2	D	2	MAN	O2-C2-C3	-4.82	100.17	110.15
2	F	2	MAN	O2-C2-C3	-4.81	100.19	110.15
2	E	2	MAN	C1-O5-C5	4.73	118.52	112.19
2	E	2	MAN	O2-C2-C3	-4.27	101.31	110.15

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	2	MAN	C1-C2-C3	3.68	115.01	109.64
2	F	2	MAN	C1-C2-C3	3.52	114.76	109.64
2	D	2	MAN	C1-C2-C3	3.23	114.34	109.64
2	E	3	NAG	C4-C3-C2	-2.89	106.78	111.02
2	F	2	MAN	O2-C2-C1	2.86	115.77	109.22
2	D	3	NAG	C4-C3-C2	-2.83	106.87	111.02
2	D	2	MAN	O2-C2-C1	2.71	115.42	109.22
2	F	3	NAG	C4-C3-C2	-2.66	107.12	111.02
2	E	2	MAN	O2-C2-C1	2.51	114.97	109.22

There are no chirality outliers.

All (10) torsion outliers are listed below:

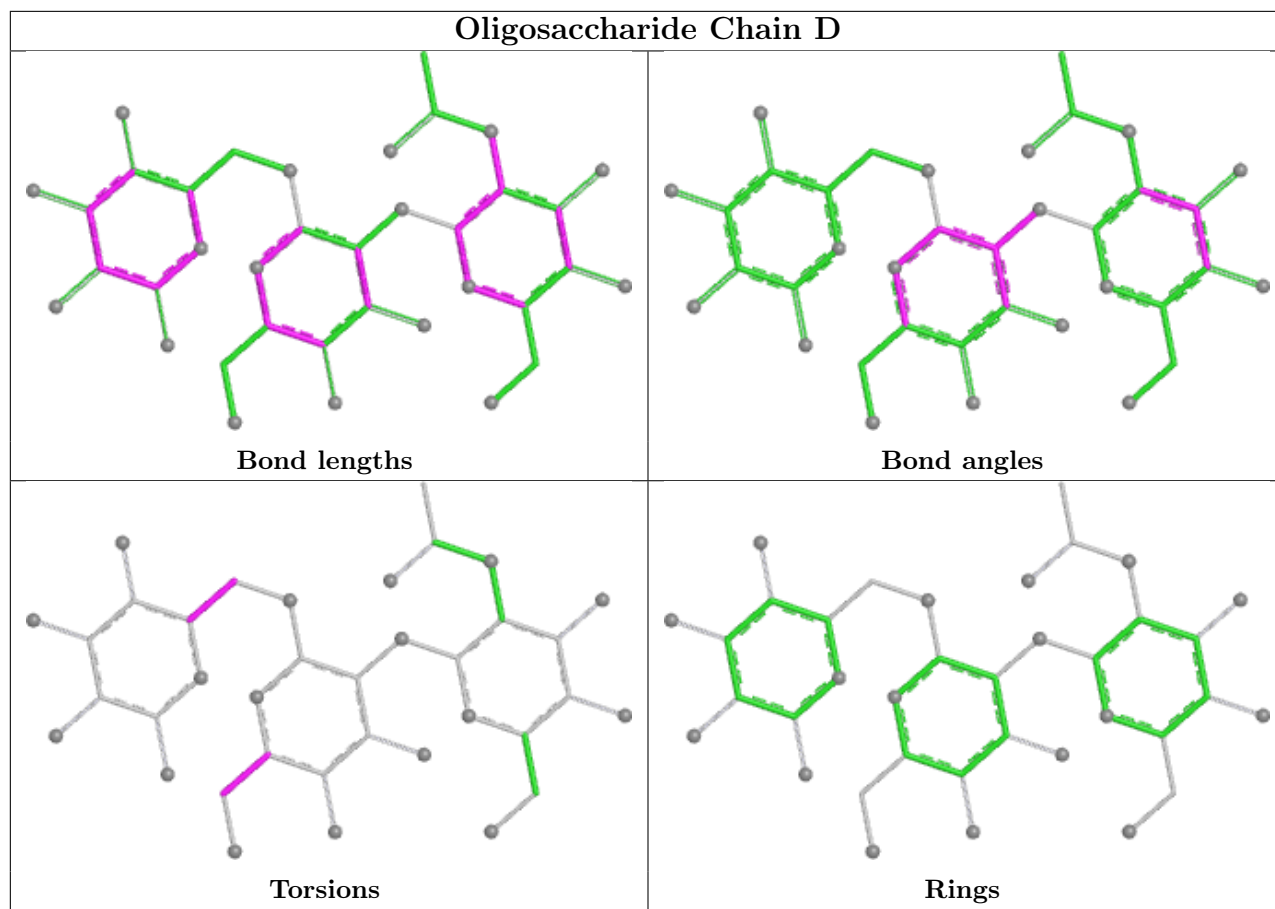
Mol	Chain	Res	Type	Atoms
2	D	2	MAN	O5-C5-C6-O6
2	E	1	BMA	O5-C5-C6-O6
2	D	2	MAN	C4-C5-C6-O6
2	F	1	BMA	O5-C5-C6-O6
2	F	2	MAN	C4-C5-C6-O6
2	E	1	BMA	C4-C5-C6-O6
2	D	1	BMA	O5-C5-C6-O6
2	F	2	MAN	O5-C5-C6-O6
2	E	2	MAN	O5-C5-C6-O6
2	F	1	BMA	C4-C5-C6-O6

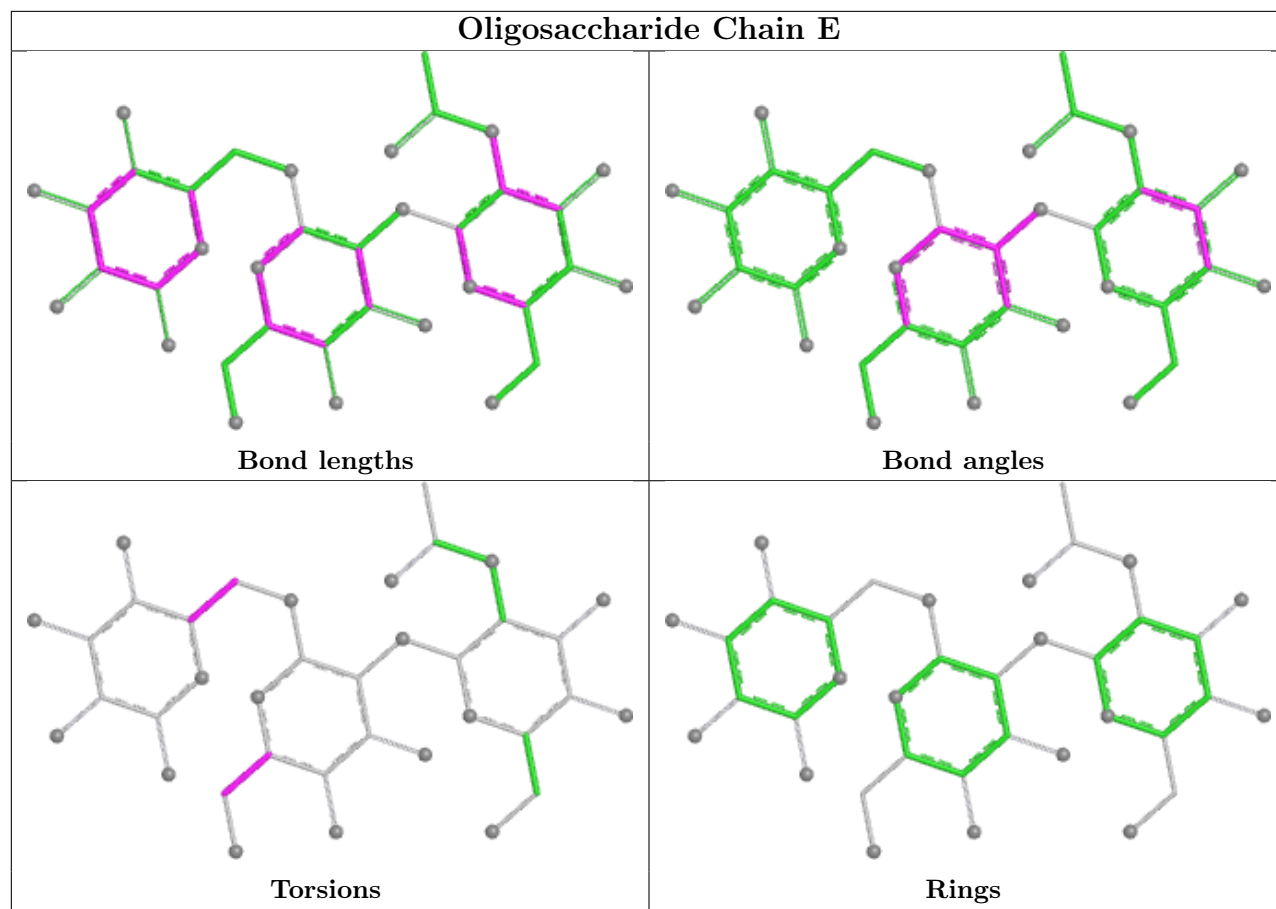
There are no ring outliers.

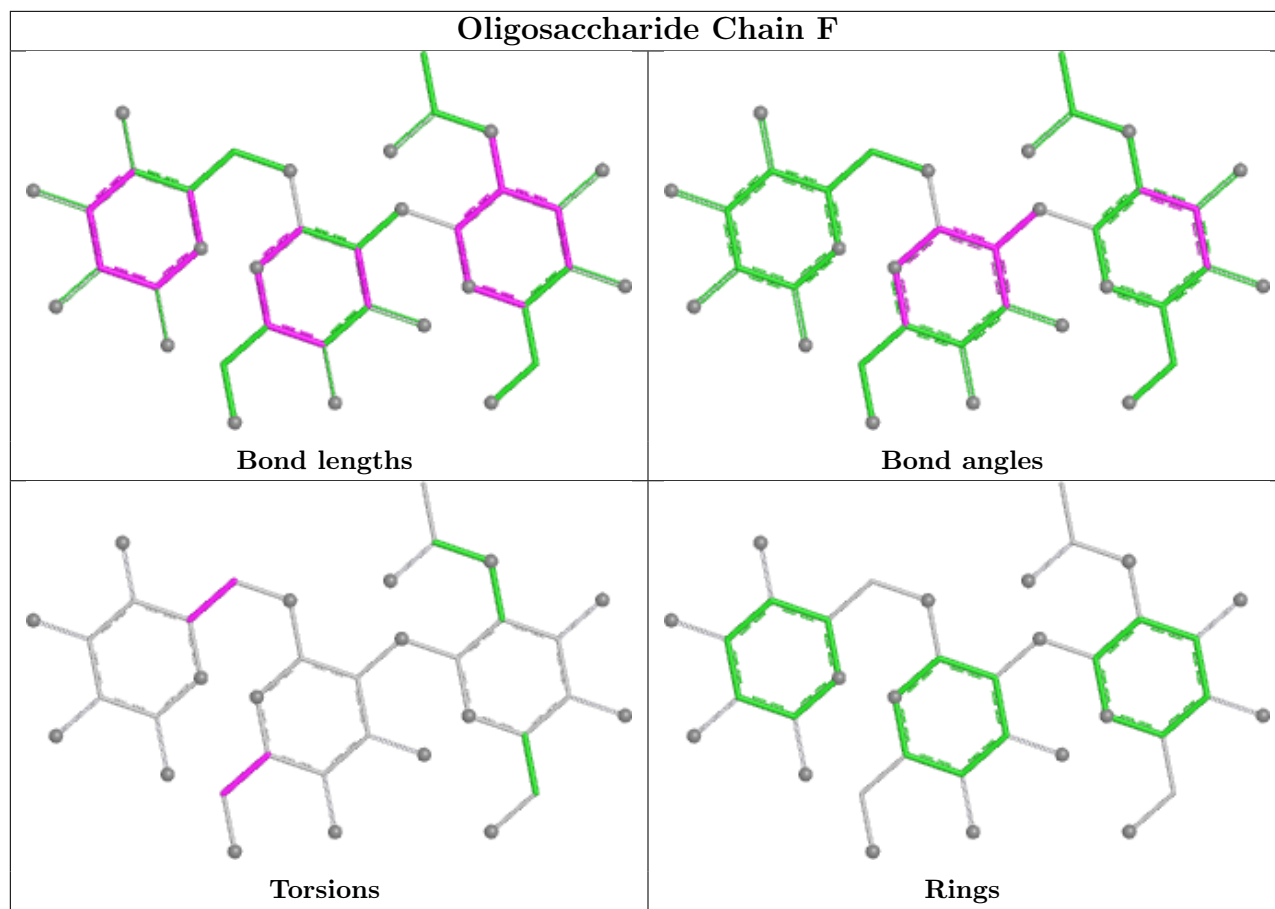
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	2	MAN	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 29 ligands modelled in this entry, 3 are monoatomic - leaving 26 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$
4	SO4	A	432	-	4,4,4	1.87	2 (50%)	6,6,6	0.82	0
4	SO4	B	427	-	4,4,4	1.80	2 (50%)	6,6,6	0.87	0
4	SO4	C	426	-	4,4,4	1.85	2 (50%)	6,6,6	0.83	0
4	SO4	C	434	-	4,4,4	1.92	2 (50%)	6,6,6	0.81	0
6	GOL	B	414	-	5,5,5	0.47	0	5,5,5	0.77	0
4	SO4	C	430	-	4,4,4	1.89	2 (50%)	6,6,6	0.83	0
6	GOL	B	416	-	5,5,5	0.58	0	5,5,5	0.50	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	UDH	A	399	3	33,33,33	1.66	5 (15%)	44,47,47	1.47	9 (20%)
6	GOL	A	417	-	5,5,5	0.20	0	5,5,5	0.68	0
4	SO4	A	423	-	4,4,4	1.87	2 (50%)	6,6,6	0.83	0
7	DIO	C	435	-	6,6,6	0.97	0	6,6,6	0.73	0
4	SO4	B	424	-	4,4,4	1.83	2 (50%)	6,6,6	0.84	0
4	SO4	A	422	-	4,4,4	1.80	2 (50%)	6,6,6	0.84	0
6	GOL	A	420	-	5,5,5	0.38	0	5,5,5	0.60	0
6	GOL	B	419	-	5,5,5	0.41	0	5,5,5	0.56	0
5	UDH	B	401	3	33,33,33	1.72	4 (12%)	44,47,47	1.47	8 (18%)
4	SO4	B	428	-	4,4,4	1.81	2 (50%)	6,6,6	0.78	0
4	SO4	B	425	-	4,4,4	1.88	2 (50%)	6,6,6	0.83	0
8	MES	C	436	-	12,12,12	1.50	3 (25%)	15,16,16	0.65	0
6	GOL	C	418	-	5,5,5	0.37	0	5,5,5	0.69	0
4	SO4	B	431	-	4,4,4	1.83	2 (50%)	6,6,6	0.84	0
4	SO4	B	433	-	4,4,4	1.89	2 (50%)	6,6,6	0.82	0
6	GOL	B	415	-	5,5,5	0.34	0	5,5,5	0.72	0
5	UDH	C	403	3	33,33,33	1.49	5 (15%)	44,47,47	1.45	7 (15%)
4	SO4	A	421	-	4,4,4	1.81	1 (25%)	6,6,6	0.87	0
4	SO4	C	429	-	4,4,4	1.82	2 (50%)	6,6,6	0.84	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
6	GOL	B	419	-	-	2/4/4/4	-
8	MES	C	436	-	-	0/6/14/14	0/1/1/1
6	GOL	C	418	-	-	0/4/4/4	-
7	DIO	C	435	-	-	-	0/1/1/1
6	GOL	B	414	-	-	1/4/4/4	-
5	UDH	B	401	3	-	4/25/41/41	0/2/2/2
5	UDH	C	403	3	-	2/25/41/41	0/2/2/2
6	GOL	B	416	-	-	0/4/4/4	-
6	GOL	B	415	-	-	4/4/4/4	-
5	UDH	A	399	3	-	4/25/41/41	0/2/2/2
6	GOL	A	417	-	-	3/4/4/4	-
6	GOL	A	420	-	-	2/4/4/4	-

All (44) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	399	UDH	PA-O3A	7.36	1.67	1.59
5	B	401	UDH	PA-O3A	7.32	1.67	1.59
5	C	403	UDH	PA-O3A	5.29	1.65	1.59
4	C	434	SO4	O1-S	3.19	1.63	1.44
4	B	433	SO4	O1-S	3.15	1.63	1.44
4	C	430	SO4	O1-S	3.11	1.63	1.44
4	A	423	SO4	O1-S	3.10	1.63	1.44
4	B	425	SO4	O1-S	3.10	1.63	1.44
4	C	426	SO4	O1-S	3.07	1.63	1.44
4	A	432	SO4	O1-S	3.07	1.63	1.44
4	B	424	SO4	O1-S	3.04	1.62	1.44
5	B	401	UDH	PB-O1B	2.99	1.61	1.50
4	A	421	SO4	O1-S	2.99	1.62	1.44
4	B	431	SO4	O1-S	2.98	1.62	1.44
4	B	428	SO4	O1-S	2.96	1.62	1.44
4	B	427	SO4	O1-S	2.95	1.62	1.44
4	A	422	SO4	O1-S	2.95	1.62	1.44
4	C	429	SO4	O1-S	2.95	1.62	1.44
8	C	436	MES	C3-N4	2.72	1.54	1.46
5	C	403	UDH	PB-O2B	-2.54	1.49	1.59
8	C	436	MES	C5-N4	2.43	1.53	1.46
5	B	401	UDH	C2-N1	2.42	1.42	1.38
5	B	401	UDH	PB-O2B	-2.36	1.50	1.59
5	C	403	UDH	PB-O1B	2.36	1.59	1.50
5	C	403	UDH	PB-O3A	-2.32	1.57	1.59
5	A	399	UDH	PB-O1B	2.21	1.58	1.50
5	A	399	UDH	PB-O2B	-2.17	1.50	1.59
5	A	399	UDH	C2-N1	2.15	1.41	1.38
8	C	436	MES	C7-N4	2.13	1.52	1.47
4	C	434	SO4	O3-S	-2.10	1.30	1.48
4	B	425	SO4	O3-S	-2.09	1.31	1.48
5	A	399	UDH	C6-N1	2.08	1.43	1.38
4	C	430	SO4	O3-S	-2.08	1.31	1.48
4	A	432	SO4	O3-S	-2.08	1.31	1.48
4	B	431	SO4	O3-S	-2.08	1.31	1.48
4	C	429	SO4	O3-S	-2.07	1.31	1.48
4	B	433	SO4	O3-S	-2.04	1.31	1.48
4	B	428	SO4	O3-S	-2.04	1.31	1.48
4	B	424	SO4	O3-S	-2.02	1.31	1.48
4	A	423	SO4	O3-S	-2.02	1.31	1.48
4	C	426	SO4	O3-S	-2.02	1.31	1.48
5	C	403	UDH	C6-N1	2.01	1.42	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	427	SO4	O3-S	-2.01	1.31	1.48
4	A	422	SO4	O3-S	-2.01	1.31	1.48

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	401	UDH	O3A-PB-O1B	-3.70	99.57	110.70
5	C	403	UDH	O3A-PB-O1B	-3.49	100.20	110.70
5	A	399	UDH	O4'-C4B-C3B	-3.48	98.24	105.15
5	A	399	UDH	O3A-PB-O1B	-3.47	100.27	110.70
5	B	401	UDH	O4'-C4B-C3B	-3.41	98.39	105.15
5	C	403	UDH	O4'-C4B-C3B	-3.12	98.96	105.15
5	C	403	UDH	O3B-PB-O1B	3.10	126.84	112.44
5	B	401	UDH	O2-C2-N1	-2.95	118.95	122.80
5	A	399	UDH	O3B-PB-O1B	2.93	126.09	112.44
5	B	401	UDH	O3B-PB-O1B	2.69	124.97	112.44
5	C	403	UDH	O2-C2-N1	-2.58	119.44	122.80
5	A	399	UDH	O2-C2-N1	-2.46	119.59	122.80
5	C	403	UDH	C5'-C4'-C3'	-2.39	102.29	114.37
5	A	399	UDH	C2B-C1B-N1	2.37	119.86	113.25
5	C	403	UDH	C2B-C1B-N1	2.28	119.61	113.25
5	B	401	UDH	O2-C2-N3	2.27	125.67	121.49
5	B	401	UDH	C3'-C2'-C1'	-2.25	103.68	113.47
5	A	399	UDH	O2-C2-N3	2.24	125.62	121.49
5	C	403	UDH	O2-C2-N3	2.23	125.60	121.49
5	A	399	UDH	C3'-C2'-C1'	-2.23	103.76	113.47
5	A	399	UDH	C5'-C4'-C3'	-2.17	103.39	114.37
5	B	401	UDH	C5'-C4'-C3'	-2.16	103.43	114.37
5	A	399	UDH	C4'-C3'-C2'	-2.05	104.01	114.37
5	B	401	UDH	C4'-C3'-C2'	-2.02	104.14	114.37

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	415	GOL	O1-C1-C2-C3
6	B	415	GOL	O1-C1-C2-O2
6	A	417	GOL	C1-C2-C3-O3
6	A	420	GOL	O1-C1-C2-C3
6	B	414	GOL	O1-C1-C2-C3
6	B	415	GOL	C1-C2-C3-O3
6	B	419	GOL	C1-C2-C3-O3

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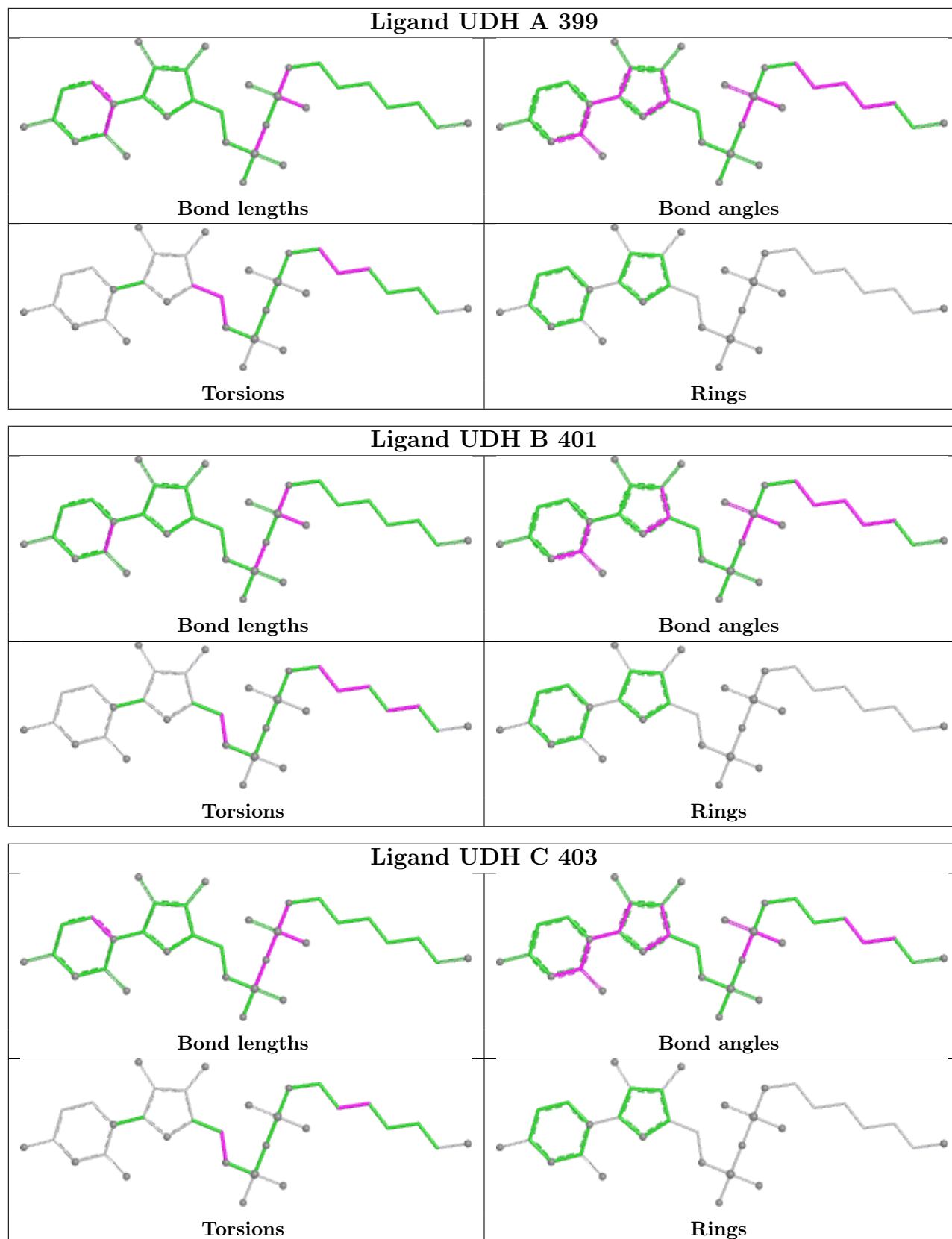
Mol	Chain	Res	Type	Atoms
6	B	419	GOL	O2-C2-C3-O3
5	B	401	UDH	C3'-C4'-C5'-C6'
5	B	401	UDH	C1'-C2'-C3'-C4'
5	A	399	UDH	C1'-C2'-C3'-C4'
6	A	417	GOL	O2-C2-C3-O3
6	B	415	GOL	O2-C2-C3-O3
5	C	403	UDH	C1'-C2'-C3'-C4'
6	A	420	GOL	O1-C1-C2-O2
5	B	401	UDH	O2B-C1'-C2'-C3'
5	A	399	UDH	C4B-C5B-O5'-PA
5	B	401	UDH	C4B-C5B-O5'-PA
6	A	417	GOL	O1-C1-C2-C3
5	A	399	UDH	O2B-C1'-C2'-C3'
5	A	399	UDH	O4'-C4B-C5B-O5'
5	C	403	UDH	C4B-C5B-O5'-PA

There are no ring outliers.

8 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	414	GOL	1	0
6	B	416	GOL	1	0
6	A	417	GOL	3	0
7	C	435	DIO	2	0
6	B	419	GOL	1	0
8	C	436	MES	3	0
6	C	418	GOL	1	0
5	C	403	UDH	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](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	272/287 (94%)	0.16	9 (3%) 49 48	18, 27, 44, 55	0
1	B	272/287 (94%)	-0.07	6 (2%) 62 61	16, 24, 39, 50	0
1	C	272/287 (94%)	0.66	21 (7%) 19 18	22, 33, 52, 61	0
All	All	816/861 (94%)	0.25	36 (4%) 39 38	16, 28, 47, 61	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	398	SER	4.0
1	C	342	ARG	3.7
1	C	398	SER	3.1
1	A	219	ASP	3.0
1	C	357	ASP	2.9
1	A	144	GLU	2.8
1	C	347	LYS	2.8
1	C	367	LEU	2.8
1	A	342	ARG	2.7
1	C	219	ASP	2.6
1	C	369	ASP	2.6
1	C	364	GLU	2.6
1	C	365	THR	2.6
1	C	323	PHE	2.5
1	A	345	ARG	2.5
1	B	350	GLU	2.4
1	A	347	LYS	2.4
1	C	189	GLU	2.4
1	B	144	GLU	2.4
1	A	162	LYS	2.4
1	C	144	GLU	2.3
1	B	240	ASP	2.3
1	C	346	ASP	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	306	ASN	2.3
1	C	170	ARG	2.3
1	C	218	GLY	2.3
1	A	127	LEU	2.3
1	B	345	ARG	2.2
1	C	353	PRO	2.1
1	C	310	TRP	2.1
1	C	240	ASP	2.1
1	B	364	GLU	2.0
1	A	240	ASP	2.0
1	C	345	ARG	2.0
1	A	145	PHE	2.0
1	C	350	GLU	2.0

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

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

6.3 Carbohydrates [i](#)

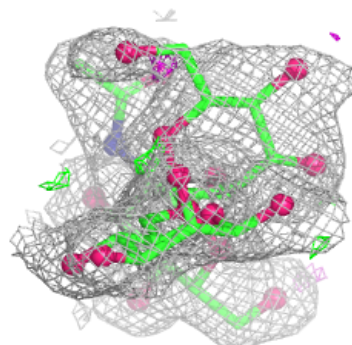
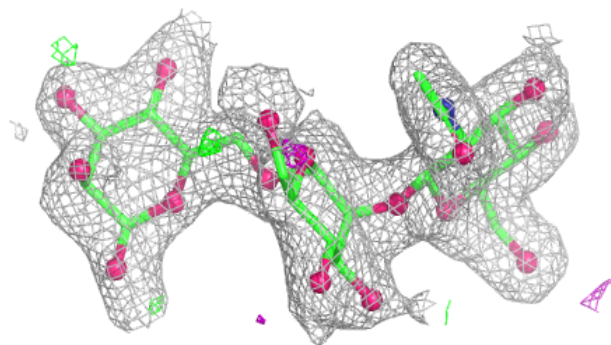
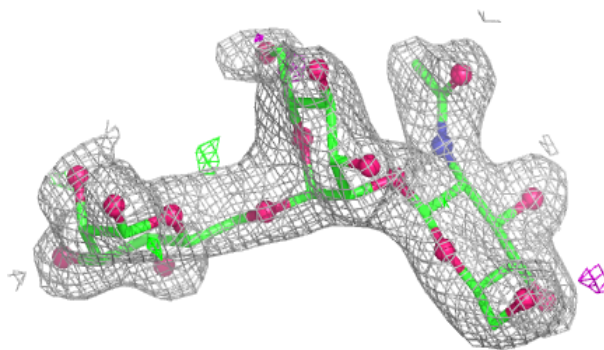
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	BMA	F	1	12/12	0.80	0.16	58,60,61,62	0
2	BMA	D	1	12/12	0.84	0.13	41,46,48,49	0
2	BMA	E	1	12/12	0.85	0.12	40,43,45,47	0
2	MAN	F	2	11/12	0.85	0.14	56,60,62,64	0
2	MAN	D	2	11/12	0.87	0.13	40,47,51,53	0
2	MAN	E	2	11/12	0.87	0.12	36,45,47,50	0
2	NAG	F	3	14/15	0.90	0.13	48,50,52,53	0
2	NAG	E	3	14/15	0.95	0.07	26,29,30,31	0
2	NAG	D	3	14/15	0.95	0.08	30,34,36,37	0

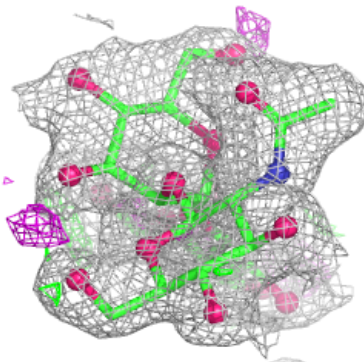
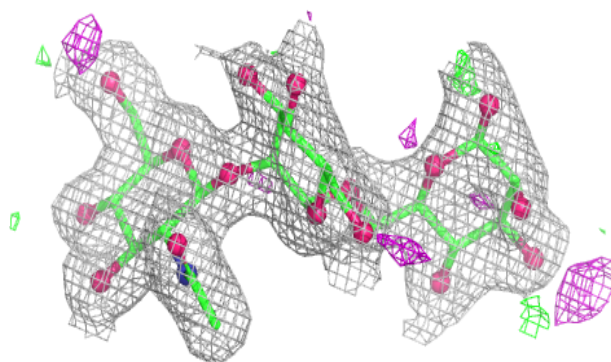
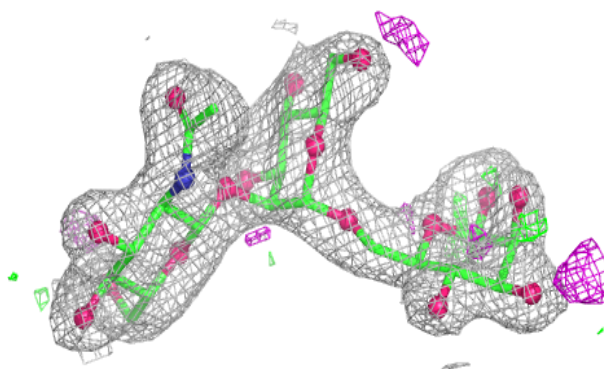
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

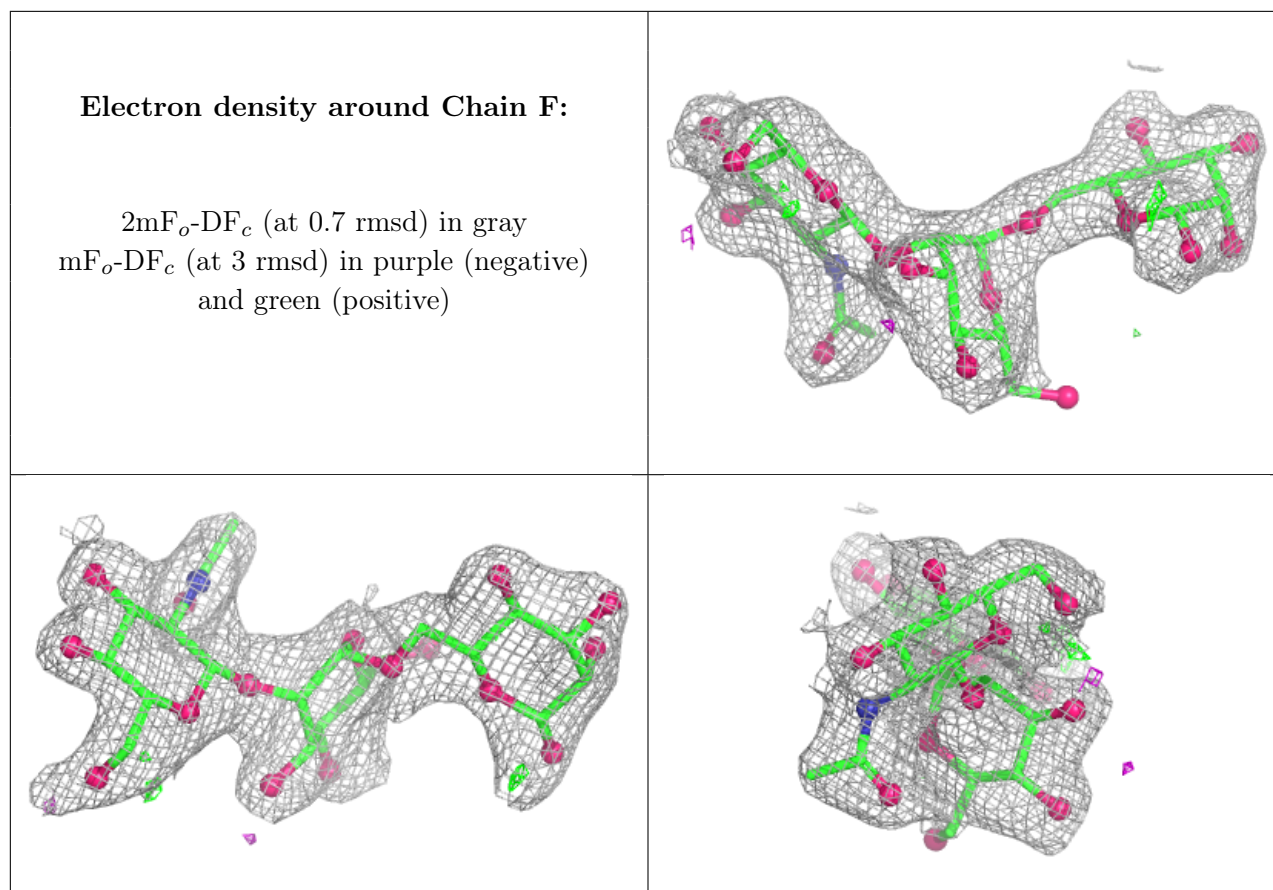
Electron density around Chain D:

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

**Electron density around Chain E:**

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





6.4 Ligands i

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
8	MES	C	436	12/12	0.61	0.31	79,82,89,90	0
4	SO4	C	434	5/5	0.65	0.16	107,107,107,108	0
4	SO4	C	430	5/5	0.67	0.16	100,100,101,101	0
7	DIO	C	435	6/6	0.68	0.30	66,66,67,67	0
4	SO4	A	423	5/5	0.69	0.19	86,87,87,88	0
4	SO4	B	433	5/5	0.72	0.17	86,87,87,88	0
6	GOL	A	420	6/6	0.76	0.17	49,55,55,55	0
4	SO4	B	424	5/5	0.77	0.17	75,75,76,76	0
6	GOL	B	415	6/6	0.77	0.21	44,48,49,52	0
4	SO4	B	425	5/5	0.80	0.14	98,98,98,99	0
4	SO4	A	432	5/5	0.82	0.12	96,96,96,96	0
4	SO4	B	431	5/5	0.83	0.15	87,88,88,88	0
4	SO4	B	428	5/5	0.83	0.17	58,62,62,62	0

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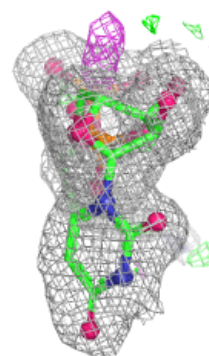
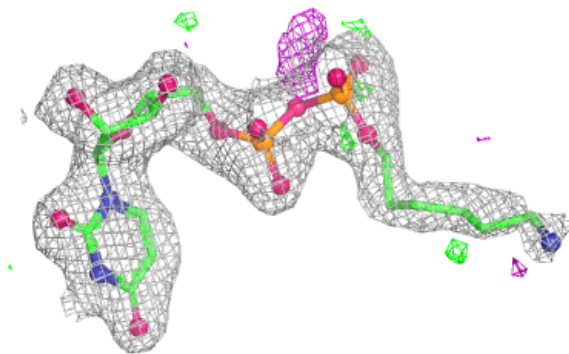
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	SO4	A	422	5/5	0.84	0.15	64,66,67,67	0
6	GOL	B	419	6/6	0.84	0.18	47,49,50,54	0
4	SO4	B	427	5/5	0.86	0.17	76,76,77,78	0
4	SO4	C	429	5/5	0.87	0.15	81,81,81,82	0
6	GOL	B	414	6/6	0.88	0.14	28,34,36,38	0
4	SO4	A	421	5/5	0.89	0.12	74,74,74,74	0
6	GOL	C	418	6/6	0.90	0.15	45,45,47,47	0
6	GOL	A	417	6/6	0.91	0.12	32,36,37,40	0
4	SO4	C	426	5/5	0.91	0.17	51,54,54,54	0
5	UDH	C	403	32/32	0.95	0.10	31,36,54,57	0
6	GOL	B	416	6/6	0.96	0.07	20,24,25,26	0
5	UDH	A	399	32/32	0.97	0.07	23,28,51,54	0
5	UDH	B	401	32/32	0.98	0.07	17,21,54,59	0
3	MN	A	400	1/1	0.99	0.02	29,29,29,29	0
3	MN	C	404	1/1	0.99	0.04	34,34,34,34	0
3	MN	B	402	1/1	1.00	0.01	22,22,22,22	0

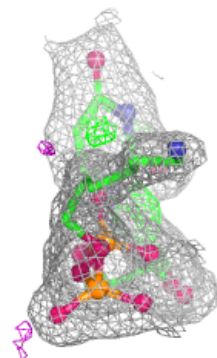
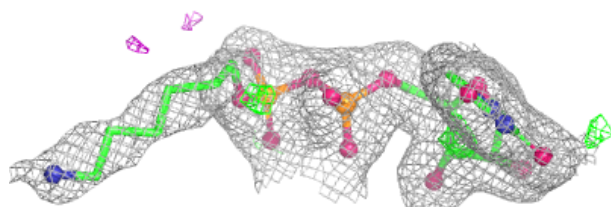
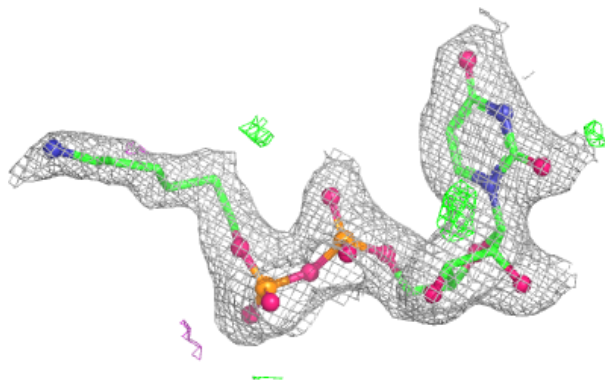
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

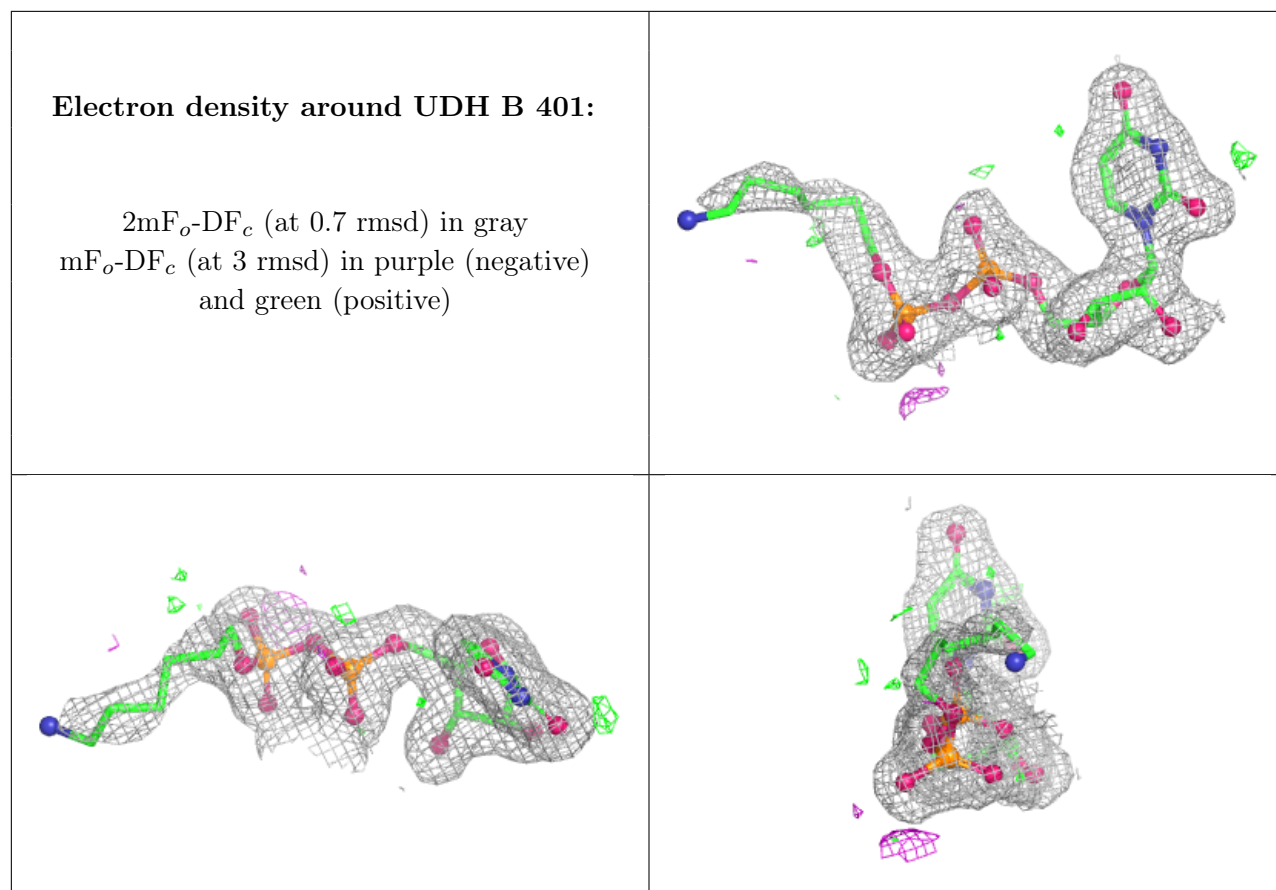
Electron density around UDH C 403:

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

**Electron density around UDH A 399:**

$2mF_o-DF_c$ (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.