



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 07:01 PM UTC

PDB ID : 8TDH / pdb_00008tdh
Title : Structure of trehalose bound Alistipes sp. Glucoside-3-dehydrogenase AL3
Authors : Lazarski, A.C.; Worrall, L.J.; Strynadka, N.C.J.
Deposited on : 2023-07-03
Resolution : 2.95 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

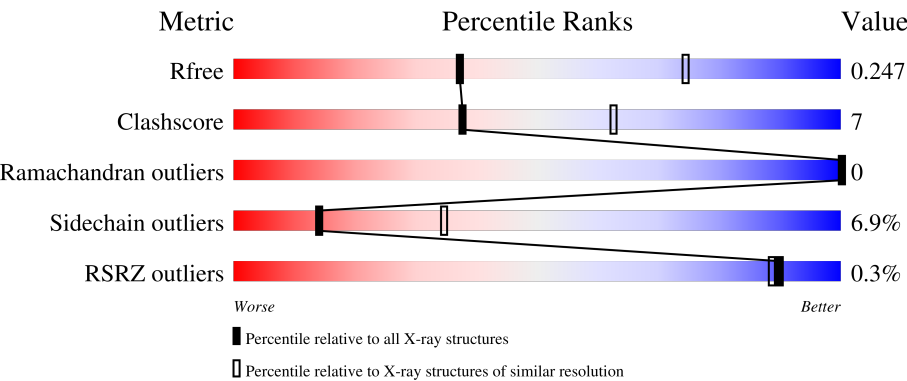
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.95 Å.

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



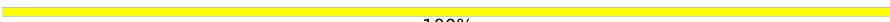
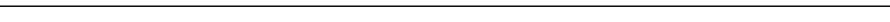
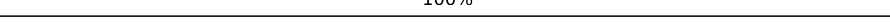
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R _{free}	180053	1130 (2.98-2.94)
Clashscore	190562	1157 (2.98-2.94)
Ramachandran outliers	187476	1101 (2.98-2.94)
Sidechain outliers	187428	1101 (2.98-2.94)
RSRZ outliers	180081	1130 (2.98-2.94)

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	451	76%21%.
1	B	451	% 79%18%.
1	C	451	78%18%.
1	D	451	73%21%6%
2	E	2	100%

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Mol	Chain	Length	Quality of chain
2	G	2	 100%
2	H	2	 100%
2	L	2	 100%
2	P	2	 50% 50%
2	Q	2	 50% 50%
2	T	2	 100%
2	U	2	 100%
2	V	2	 100%
2	W	2	 100%
3	F	2	 50% 50%
3	I	2	 100%
3	J	2	 100%
3	K	2	 100%
3	M	2	 100%
3	N	2	 50% 50%
3	O	2	 100%
3	R	2	 50% 50%
3	S	2	 50% 50%
3	X	2	 50% 50%
3	Y	2	 50% 50%
3	Z	2	 100%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GLC	W	2	-	-	X	-

2 Entry composition

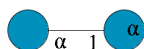
There are 5 unique types of molecules in this entry. The entry contains 15008 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Predicted dehydrogenases and related proteins.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	451	Total	C	N	O	S	0	0	0
			3531	2255	609	646	21			
1	B	451	Total	C	N	O	S	0	0	0
			3559	2271	617	650	21			
1	C	451	Total	C	N	O	S	0	0	0
			3559	2271	617	650	21			
1	D	451	Total	C	N	O	S	0	0	0
			3559	2271	617	650	21			

- Molecule 2 is an oligosaccharide called alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose.



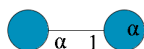
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	E	2	Total	C	O	0	0	0
			23	12	11			
2	G	2	Total	C	O	0	0	0
			23	12	11			
2	H	2	Total	C	O	0	0	0
			23	12	11			
2	L	2	Total	C	O	0	0	0
			23	12	11			
2	P	2	Total	C	O	0	0	0
			23	12	11			
2	Q	2	Total	C	O	0	0	0
			23	12	11			
2	T	2	Total	C	O	0	0	0
			23	12	11			
2	U	2	Total	C	O	0	0	0
			23	12	11			

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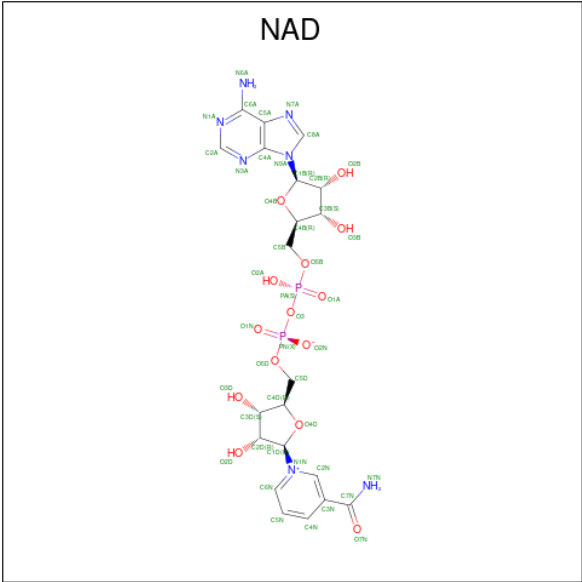
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	V	2	Total	C	O	0	0	0
			23	12	11			
2	W	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 3 is an oligosaccharide called alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	F	2	Total	C	O	0	0	0
			23	12	11			
3	I	2	Total	C	O	0	0	0
			23	12	11			
3	J	2	Total	C	O	0	0	0
			23	12	11			
3	K	2	Total	C	O	0	0	0
			23	12	11			
3	M	2	Total	C	O	0	0	0
			23	12	11			
3	N	2	Total	C	O	0	0	0
			23	12	11			
3	O	2	Total	C	O	0	0	0
			23	12	11			
3	R	2	Total	C	O	0	0	0
			23	12	11			
3	S	2	Total	C	O	0	0	0
			23	12	11			
3	X	2	Total	C	O	0	0	0
			23	12	11			
3	Y	2	Total	C	O	0	0	0
			23	12	11			
3	Z	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 4 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: C₂₁H₂₇N₇O₁₄P₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
4	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
4	C	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
4	D	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

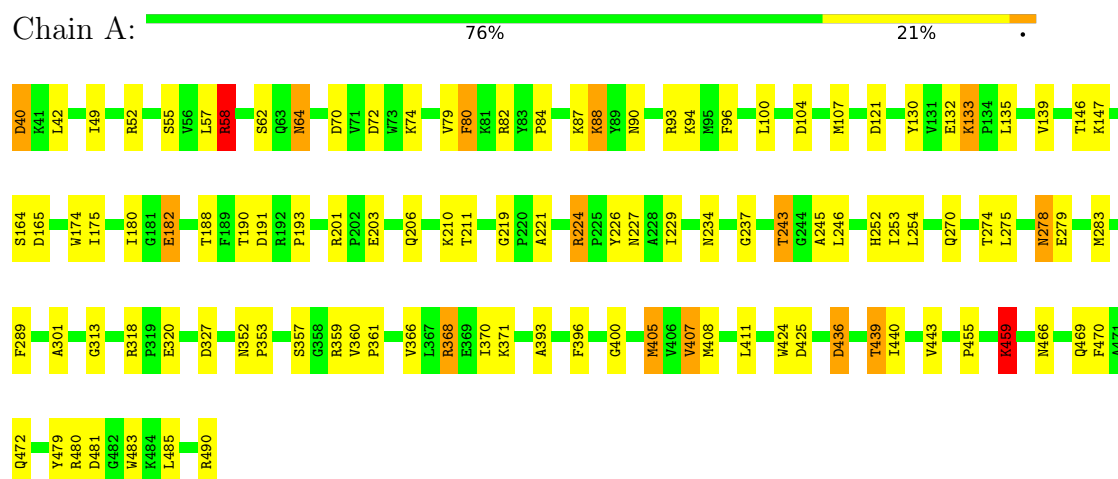
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	41	Total	O	0	0
			41	41		
5	B	30	Total	O	0	0
			30	30		
5	C	25	Total	O	0	0
			25	25		
5	D	22	Total	O	0	0
			22	22		

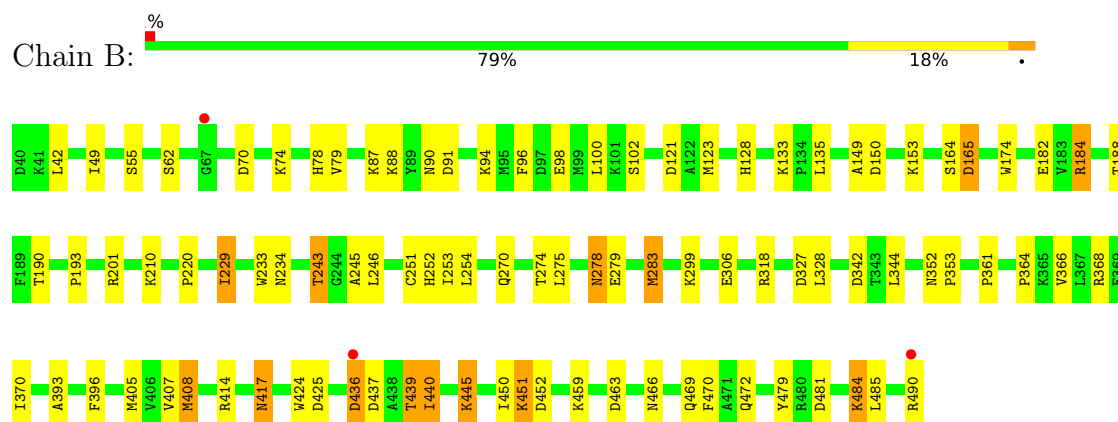
3 Residue-property plots

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.

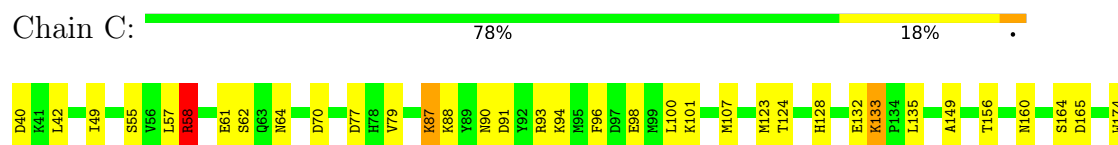
- Molecule 1: Predicted dehydrogenases and related proteins

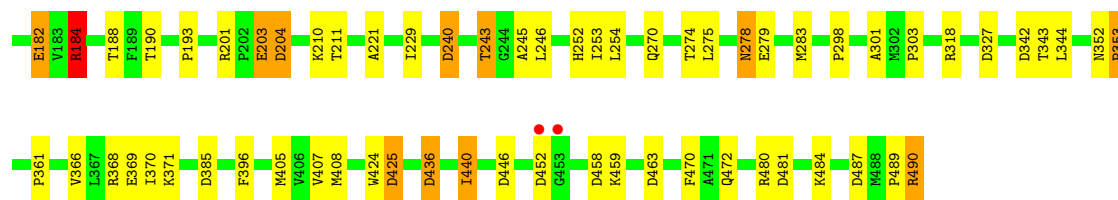


- Molecule 1: Predicted dehydrogenases and related proteins



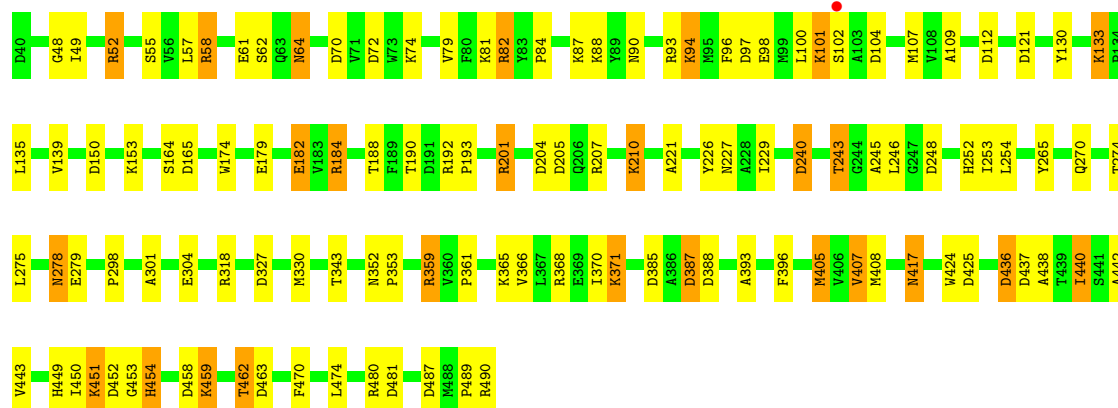
- Molecule 1: Predicted dehydrogenases and related proteins





- Molecule 1: Predicted dehydrogenases and related proteins

Chain D: 73% 21% 6%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain E: 100%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain G: 100%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain H: 100%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain L: 100%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain P:  50% 50%

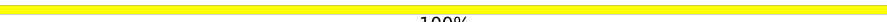


- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain Q:  50% 50%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain T:  100%

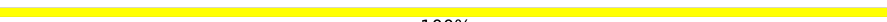


- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain U:  100%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain V:  100%



- Molecule 2: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain W:  100%

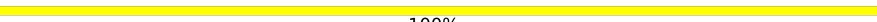


- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain F:  50% 50%



- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain I:  100%

GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain J:  100%GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain K:  100%GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain M:  100%GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain N:  50%  50%GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain O:  100%GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain R:  50%  50%GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain S:  50%  50%GLC1
GLC2

- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain X:  50% 50%



- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain Y:  50% 50%



- Molecule 3: alpha-D-glucopyranose-(1-1)-alpha-D-glucopyranose

Chain Z:  100%



4 Data and refinement statistics

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	186.58Å 57.22Å 224.96Å 90.00° 106.58° 90.00°	Depositor
Resolution (Å)	162.27 – 2.95 162.27 – 2.95	Depositor EDS
% Data completeness (in resolution range)	89.7 (162.27-2.95) 85.6 (162.27-2.95)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.55 (at 2.96Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.195 , 0.247 0.206 , 0.247	Depositor DCC
R_{free} test set	2196 reflections (4.50%)	wwPDB-VP
Wilson B-factor (Å ²)	40.1	Xtriage
Anisotropy	0.088	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 48.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	15008	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.49% 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: NAD, GLC

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	0.86	0/3630	1.40	30/4938 (0.6%)
1	B	0.76	0/3658	1.34	24/4969 (0.5%)
1	C	0.74	0/3658	1.38	33/4969 (0.7%)
1	D	0.70	0/3658	1.33	32/4969 (0.6%)
All	All	0.77	0/14604	1.37	119/19845 (0.6%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	5
1	B	0	2
1	C	0	5
1	D	0	7
All	All	0	19

There are no bond length outliers.

All (119) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	165	ASP	CA-CB-CG	11.62	124.22	112.60
1	D	165	ASP	CA-CB-CG	10.57	123.17	112.60
1	C	283	MET	CG-SD-CE	10.38	123.74	100.90
1	A	64	ASN	CB-CA-C	-9.89	97.18	111.23
1	C	165	ASP	CA-CB-CG	9.81	122.41	112.60
1	B	437	ASP	CA-CB-CG	9.47	122.08	112.60
1	D	487	ASP	CA-CB-CG	9.28	121.88	112.60
1	C	240	ASP	CA-CB-CG	8.84	121.44	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	165	ASP	CA-CB-CG	8.79	121.39	112.60
1	A	490	ARG	N-CA-CB	8.51	124.97	110.50
1	B	436	ASP	CA-CB-CG	8.47	121.07	112.60
1	A	436	ASP	CA-CB-CG	8.06	120.66	112.60
1	C	436	ASP	CA-CB-CG	8.05	120.65	112.60
1	D	64	ASN	CB-CA-C	-7.82	101.03	111.82
1	C	64	ASN	CB-CA-C	-7.81	100.14	111.23
1	D	463	ASP	CA-CB-CG	7.75	120.35	112.60
1	B	87	LYS	CB-CA-C	7.65	121.31	109.84
1	A	243	THR	OG1-CB-CG2	-7.62	94.06	109.30
1	C	87	LYS	CB-CA-C	7.47	120.45	110.06
1	A	203	GLU	N-CA-CB	-7.46	99.42	110.53
1	A	327	ASP	CA-CB-CG	7.40	120.00	112.60
1	C	371	LYS	N-CA-CB	-7.37	98.78	110.19
1	D	88	LYS	CB-CA-C	-7.26	97.23	109.50
1	C	458	ASP	CA-CB-CG	7.10	119.70	112.60
1	C	385	ASP	CB-CA-C	7.04	122.49	109.54
1	D	87	LYS	CB-CA-C	7.00	120.34	109.84
1	A	405	MET	CG-SD-CE	6.99	116.28	100.90
1	C	87	LYS	N-CA-CB	-6.97	97.85	109.28
1	C	77	ASP	CA-CB-CG	6.88	119.48	112.60
1	C	204	ASP	CA-CB-CG	6.85	119.45	112.60
1	A	88	LYS	CB-CA-C	-6.84	97.94	109.50
1	A	87	LYS	CB-CA-C	6.79	120.02	109.84
1	A	58	ARG	CG-CD-NE	-6.72	97.22	112.00
1	C	463	ASP	CA-CB-CG	6.69	119.29	112.60
1	C	88	LYS	CB-CA-C	-6.67	98.23	109.50
1	B	88	LYS	CB-CA-C	-6.64	98.27	109.50
1	B	220	PRO	N-CA-CB	-6.58	96.95	103.20
1	D	327	ASP	CA-CB-CG	6.54	119.14	112.60
1	A	224	ARG	NE-CZ-NH1	-6.54	114.96	121.50
1	D	72	ASP	CA-CB-CG	6.49	119.08	112.60
1	C	327	ASP	CA-CB-CG	6.43	119.03	112.60
1	B	327	ASP	CA-CB-CG	6.42	119.02	112.60
1	A	481	ASP	CA-CB-CG	6.40	119.00	112.60
1	D	304	GLU	CB-CG-CD	6.36	123.41	112.60
1	C	353	PRO	N-CA-CB	-6.36	97.65	103.31
1	C	203	GLU	CA-C-N	6.24	129.70	120.90
1	C	203	GLU	C-N-CA	6.24	129.70	120.90
1	B	463	ASP	CA-CB-CG	6.17	118.77	112.60
1	A	439	THR	CA-CB-OG1	-6.17	100.35	109.60
1	C	87	LYS	CA-CB-CG	6.11	126.32	114.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	182	GLU	CB-CG-CD	6.05	122.89	112.60
1	C	487	ASP	CA-CB-CG	5.99	118.59	112.60
1	A	206	GLN	N-CA-CB	5.97	121.55	110.99
1	C	98	GLU	CB-CG-CD	5.95	122.71	112.60
1	D	458	ASP	CB-CA-C	5.91	121.79	109.68
1	D	343	THR	OG1-CB-CG2	-5.87	97.55	109.30
1	D	210	LYS	CA-CB-CG	5.84	125.79	114.10
1	A	459	LYS	CB-CA-C	-5.84	99.48	110.16
1	D	371	LYS	N-CA-CB	-5.83	101.50	110.42
1	C	342	ASP	CA-CB-CG	5.80	118.40	112.60
1	B	182	GLU	CB-CG-CD	5.79	122.45	112.60
1	D	437	ASP	CA-CB-CG	5.79	118.39	112.60
1	A	121	ASP	CA-CB-CG	5.78	118.38	112.60
1	D	462	THR	CA-CB-OG1	-5.74	100.99	109.60
1	C	472	GLN	N-CA-CB	5.74	118.66	110.06
1	B	243	THR	OG1-CB-CG2	-5.71	97.89	109.30
1	D	130	TYR	CB-CA-C	5.69	119.04	109.48
1	D	243	THR	OG1-CB-CG2	-5.67	97.95	109.30
1	D	385	ASP	CA-CB-CG	5.67	118.27	112.60
1	A	210	LYS	N-CA-C	-5.66	105.87	112.89
1	A	182	GLU	CB-CG-CD	5.65	122.21	112.60
1	B	91	ASP	CA-CB-CG	5.65	118.25	112.60
1	C	458	ASP	CB-CA-C	5.60	121.16	109.68
1	C	446	ASP	CA-CB-CG	5.56	118.16	112.60
1	D	182	GLU	CB-CG-CD	5.54	122.03	112.60
1	A	360	VAL	N-CA-CB	5.53	118.95	111.21
1	D	388	ASP	CA-CB-CG	5.53	118.13	112.60
1	D	52	ARG	NE-CZ-NH1	-5.53	115.97	121.50
1	D	371	LYS	CB-CA-C	5.50	118.64	109.56
1	A	72	ASP	CA-CB-CG	5.49	118.09	112.60
1	A	472	GLN	N-CA-CB	5.44	118.12	110.12
1	C	91	ASP	CA-CB-CG	5.40	118.00	112.60
1	B	121	ASP	CA-CB-CG	5.39	117.99	112.60
1	B	445	LYS	CB-CA-C	5.37	120.31	109.68
1	D	112	ASP	CA-CB-CG	5.37	117.97	112.60
1	B	484	LYS	CB-CA-C	5.35	118.38	110.14
1	B	436	ASP	N-CA-CB	5.34	119.11	110.40
1	C	343	THR	CA-CB-OG1	5.31	117.56	109.60
1	A	289	PHE	CB-CA-C	-5.25	101.13	109.80
1	C	369	GLU	CB-CA-C	5.25	119.47	110.81
1	A	130	TYR	CB-CA-C	5.25	118.30	109.48
1	D	454	HIS	CA-CB-CG	5.22	119.02	113.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	368	ARG	NE-CZ-NH2	5.21	123.89	119.20
1	B	342	ASP	CA-CB-CG	5.21	117.81	112.60
1	C	452	ASP	CA-CB-CG	5.21	117.81	112.60
1	D	104	ASP	N-CA-C	-5.20	106.99	113.55
1	D	452	ASP	CA-CB-CG	5.20	117.80	112.60
1	B	439	THR	OG1-CB-CG2	5.18	119.66	109.30
1	D	52	ARG	CB-CA-C	-5.16	102.22	110.79
1	D	405	MET	CG-SD-CE	5.16	112.25	100.90
1	A	371	LYS	N-CA-CB	-5.13	102.61	110.26
1	D	451	LYS	N-CA-CB	-5.11	102.06	111.36
1	D	94	LYS	CG-CD-CE	5.11	123.05	111.30
1	A	191	ASP	CA-CB-CG	5.11	117.71	112.60
1	B	408	MET	CG-SD-CE	-5.11	89.67	100.90
1	A	52	ARG	CB-CA-C	-5.10	102.32	110.79
1	D	121	ASP	CA-CB-CG	5.09	117.69	112.60
1	B	459	LYS	CB-CA-C	-5.08	100.72	109.86
1	C	156	THR	CA-CB-OG1	5.08	117.21	109.60
1	A	104	ASP	N-CA-C	-5.07	107.16	113.55
1	A	80	PHE	CB-CA-C	-5.07	102.06	110.68
1	B	452	ASP	CA-CB-CG	5.05	117.66	112.60
1	B	472	GLN	N-CA-CB	5.05	117.64	110.06
1	B	98	GLU	CB-CG-CD	5.03	121.16	112.60
1	C	243	THR	OG1-CB-CG2	-5.03	99.24	109.30
1	C	211	THR	CA-CB-OG1	-5.03	102.06	109.60
1	D	201	ARG	CG-CD-NE	5.02	123.04	112.00
1	B	451	LYS	N-CA-CB	-5.01	102.24	111.36
1	B	78	HIS	CB-CG-CD2	5.00	137.71	131.20

There are no chirality outliers.

All (19) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	224	ARG	Sidechain
1	A	368	ARG	Sidechain
1	A	40	ASP	Peptide
1	A	58	ARG	Sidechain
1	A	93	ARG	Sidechain
1	B	184	ARG	Sidechain
1	B	368	ARG	Sidechain
1	C	184	ARG	Sidechain
1	C	368	ARG	Sidechain
1	C	40	ASP	Peptide

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Mol	Chain	Res	Type	Group
1	C	58	ARG	Sidechain
1	C	93	ARG	Sidechain
1	D	184	ARG	Sidechain
1	D	359	ARG	Sidechain
1	D	368	ARG	Sidechain
1	D	52	ARG	Sidechain
1	D	58	ARG	Sidechain
1	D	82	ARG	Sidechain
1	D	93	ARG	Sidechain

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	3531	0	3426	51	0
1	B	3559	0	3488	54	0
1	C	3559	0	3488	38	0
1	D	3559	0	3488	63	0
2	E	23	0	21	1	0
2	G	23	0	21	2	0
2	H	23	0	21	0	0
2	L	23	0	21	0	0
2	P	23	0	21	1	0
2	Q	23	0	21	1	0
2	T	23	0	21	0	0
2	U	23	0	21	4	0
2	V	23	0	21	0	0
2	W	23	0	21	7	0
3	F	23	0	21	3	0
3	I	23	0	21	0	0
3	J	23	0	21	0	0
3	K	23	0	21	0	0
3	M	23	0	21	0	0
3	N	23	0	21	1	0
3	O	23	0	21	0	0
3	R	23	0	21	2	0
3	S	23	0	21	2	0
3	X	23	0	21	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	Y	23	0	21	3	0
3	Z	23	0	21	0	0
4	A	44	0	26	3	0
4	B	44	0	26	3	0
4	C	44	0	26	2	0
4	D	44	0	26	2	0
5	A	41	0	0	5	0
5	B	30	0	0	4	0
5	C	25	0	0	1	0
5	D	22	0	0	3	0
All	All	15008	0	14456	204	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 7.

All (204) 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:184:ARG:HB2	3:Y:1:GLC:H61	1.41	1.02
1:A:283:MET:SD	1:B:283:MET:HE2	2.07	0.95
1:D:462:THR:HG21	2:W:2:GLC:O6	1.67	0.94
2:G:1:GLC:H5	2:G:2:GLC:H1	1.49	0.93
1:D:184:ARG:HB2	3:S:1:GLC:H61	1.58	0.83
1:B:201:ARG:NH1	1:B:279:GLU:OE2	2.14	0.80
1:A:201:ARG:NH1	1:A:279:GLU:OE2	2.15	0.80
1:D:450:ILE:HG23	1:D:453:GLY:O	1.85	0.76
1:D:462:THR:OG1	2:W:2:GLC:H62	1.88	0.74
1:B:184:ARG:HB2	3:Y:1:GLC:C6	2.18	0.73
1:C:254:LEU:HD13	1:C:405:MET:HE2	1.71	0.73
1:D:436:ASP:N	1:D:436:ASP:OD1	2.22	0.72
1:C:70:ASP:OD2	4:C:501:NAD:O3B	2.07	0.71
2:G:1:GLC:C5	2:G:2:GLC:H1	2.20	0.71
1:A:132:GLU:OE2	4:A:501:NAD:H2N	1.92	0.69
1:A:318:ARG:H	1:B:270:GLN:HE22	1.38	0.69
1:B:174:TRP:CE2	1:B:361:PRO:HG2	2.28	0.69
1:B:251:CYS:O	5:B:601:HOH:O	2.10	0.69
1:B:414:ARG:HH22	3:N:2:GLC:H61	1.57	0.68
1:A:174:TRP:CE2	1:A:361:PRO:HG2	2.29	0.67
1:A:283:MET:SD	1:B:283:MET:CE	2.84	0.66
1:C:174:TRP:CE2	1:C:361:PRO:HG2	2.32	0.64
1:D:442:ALA:H	1:D:462:THR:HG22	1.63	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:237:GLY:HA3	5:A:635:HOH:O	1.98	0.64
1:D:150:ASP:O	1:D:153:LYS:HD3	1.98	0.63
1:D:405:MET:N	1:D:405:MET:SD	2.71	0.63
1:D:470:PHE:CE1	1:D:474:LEU:HD21	2.34	0.63
1:D:450:ILE:CG2	1:D:453:GLY:O	2.47	0.62
1:D:179:GLU:OE2	1:D:359:ARG:NH1	2.32	0.62
1:C:184:ARG:HD2	1:C:303:PRO:HG3	1.80	0.62
1:D:188:THR:HG21	1:D:254:LEU:CD2	2.33	0.59
1:D:462:THR:OG1	2:W:2:GLC:C6	2.51	0.58
1:B:408:MET:HE1	1:B:424:TRP:CE2	2.37	0.58
1:C:270:GLN:HE22	1:D:318:ARG:H	1.49	0.58
1:B:70:ASP:OD2	4:B:501:NAD:O3B	2.21	0.58
1:D:425:ASP:OD1	1:D:425:ASP:C	2.47	0.57
1:C:184:ARG:HD2	1:C:303:PRO:CG	2.34	0.57
1:A:425:ASP:OD1	1:A:425:ASP:C	2.48	0.56
1:D:184:ARG:HB2	3:S:1:GLC:C6	2.34	0.56
1:A:270:GLN:HE22	1:B:318:ARG:H	1.53	0.56
1:D:174:TRP:CE2	1:D:361:PRO:HG2	2.40	0.56
1:A:274:THR:O	1:A:275:LEU:C	2.49	0.56
1:B:128:HIS:HE2	3:F:2:GLC:C4	2.19	0.56
1:C:425:ASP:OD1	1:C:425:ASP:C	2.48	0.55
1:B:123:MET:HE1	1:B:149:ALA:HB2	1.87	0.55
1:D:57:LEU:HG	1:D:107:MET:HE2	1.88	0.55
1:A:57:LEU:HG	1:A:107:MET:HE2	1.89	0.55
1:D:265:TYR:HA	1:D:405:MET:HE3	1.87	0.55
1:A:443:VAL:HG21	1:A:459:LYS:HE3	1.88	0.55
1:B:229:ILE:HD12	1:B:234:ASN:ND2	2.21	0.55
1:D:408:MET:HE1	1:D:424:TRP:CE2	2.42	0.55
1:C:408:MET:HE1	1:C:424:TRP:CE2	2.43	0.54
1:B:49:ILE:O	1:B:79:VAL:HG21	2.08	0.54
1:C:133:LYS:HD3	1:C:252:HIS:CE1	2.42	0.54
1:D:96:PHE:O	1:D:100:LEU:HB2	2.08	0.54
1:A:283:MET:CB	1:B:283:MET:HE3	2.37	0.54
1:C:201:ARG:NH1	1:C:279:GLU:OE1	2.40	0.54
1:D:201:ARG:NH1	1:D:279:GLU:OE1	2.41	0.54
1:A:133:LYS:HD3	1:A:252:HIS:CE1	2.43	0.53
1:C:188:THR:HG21	1:C:254:LEU:CD2	2.37	0.53
1:B:188:THR:HG21	1:B:254:LEU:CD2	2.38	0.53
1:C:274:THR:O	1:C:275:LEU:C	2.51	0.53
1:A:408:MET:HE1	1:A:424:TRP:CE2	2.44	0.53
1:A:466:ASN:OD1	1:A:469:GLN:HG3	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:425:ASP:C	1:B:425:ASP:OD1	2.50	0.53
1:A:96:PHE:O	1:A:100:LEU:HB2	2.08	0.53
1:A:175:ILE:HG12	1:A:180:ILE:HD11	1.89	0.53
1:D:440:ILE:HG21	1:D:470:PHE:CD2	2.44	0.53
4:B:501:NAD:H8A	5:B:612:HOH:O	2.08	0.53
2:U:1:GLC:H5	2:U:2:GLC:H1	1.91	0.53
1:B:96:PHE:O	1:B:100:LEU:HB2	2.08	0.52
1:D:438:ALA:O	5:D:601:HOH:O	2.19	0.52
1:A:164:SER:HA	1:A:370:ILE:HD12	1.91	0.52
1:B:133:LYS:HD3	1:B:252:HIS:CE1	2.45	0.52
1:B:274:THR:O	1:B:275:LEU:C	2.53	0.51
1:C:49:ILE:O	1:C:79:VAL:HG21	2.10	0.51
1:C:96:PHE:O	1:C:100:LEU:HB2	2.10	0.51
1:D:442:ALA:H	1:D:462:THR:CG2	2.23	0.51
1:A:188:THR:HG21	1:A:254:LEU:CD2	2.40	0.51
1:B:165:ASP:OD2	5:B:602:HOH:O	2.19	0.51
1:C:489:PRO:O	1:C:490:ARG:HG2	2.11	0.51
1:B:164:SER:HA	1:B:370:ILE:HD12	1.93	0.51
1:A:234:ASN:HB2	1:B:450:ILE:CD1	2.41	0.51
1:C:128:HIS:NE2	2:Q:2:GLC:O3	2.44	0.51
1:B:150:ASP:O	1:B:153:LYS:HD3	2.11	0.50
1:C:135:LEU:HD11	1:C:396:PHE:CE1	2.47	0.50
1:B:306:GLU:OE1	2:U:1:GLC:H2	2.12	0.50
1:B:190:THR:HB	1:B:253:ILE:CD1	2.42	0.50
1:B:135:LEU:HD11	1:B:396:PHE:CE1	2.47	0.49
1:D:274:THR:O	1:D:275:LEU:C	2.54	0.49
1:D:417:ASN:N	1:D:417:ASN:OD1	2.45	0.49
1:B:184:ARG:HD2	3:Y:1:GLC:H61	1.94	0.49
1:D:443:VAL:HG21	1:D:459:LYS:HE3	1.94	0.49
1:B:408:MET:HE1	1:B:424:TRP:CD2	2.48	0.49
1:B:466:ASN:OD1	1:B:469:GLN:HG3	2.12	0.49
1:C:70:ASP:O	1:C:90:ASN:HA	2.13	0.49
1:D:98:GLU:O	1:D:101:LYS:NZ	2.42	0.49
1:A:135:LEU:HD11	1:A:396:PHE:CE1	2.48	0.49
1:D:408:MET:HE1	1:D:424:TRP:CD2	2.48	0.49
1:C:408:MET:HE1	1:C:424:TRP:CD2	2.48	0.48
1:C:278:ASN:H	1:C:278:ASN:HD22	1.61	0.48
1:D:221:ALA:O	1:D:480:ARG:HD3	2.14	0.48
1:A:49:ILE:O	1:A:79:VAL:HG21	2.14	0.48
1:D:133:LYS:HD3	1:D:252:HIS:CE1	2.49	0.48
1:A:190:THR:HB	1:A:253:ILE:CD1	2.43	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:132:GLU:OE2	4:A:501:NAD:C2N	2.62	0.47
1:A:283:MET:HB2	1:B:283:MET:HE3	1.96	0.47
1:D:70:ASP:O	1:D:90:ASN:HA	2.14	0.47
1:D:278:ASN:HD22	1:D:278:ASN:H	1.62	0.47
1:A:94:LYS:HB3	1:A:94:LYS:HE3	1.51	0.47
1:A:370:ILE:HD11	1:A:393:ALA:HB2	1.97	0.47
1:C:123:MET:HE1	1:C:149:ALA:HB2	1.97	0.47
1:D:190:THR:HB	1:D:253:ILE:CD1	2.45	0.47
1:B:352:ASN:N	1:B:353:PRO:CD	2.77	0.47
1:B:370:ILE:HD11	1:B:393:ALA:HB2	1.96	0.47
2:E:1:GLC:O2	2:E:2:GLC:H3	2.14	0.47
1:A:278:ASN:HD22	1:A:278:ASN:H	1.62	0.47
1:A:283:MET:HB2	1:B:283:MET:CE	2.45	0.47
1:A:408:MET:HE1	1:A:424:TRP:CD2	2.49	0.47
1:B:70:ASP:O	1:B:90:ASN:HA	2.15	0.47
1:A:313:GLY:C	5:A:616:HOH:O	2.57	0.46
1:B:128:HIS:NE2	3:F:2:GLC:O4	2.48	0.46
1:D:330:MET:HE2	5:D:614:HOH:O	2.15	0.46
1:C:160:ASN:HB2	5:C:603:HOH:O	2.15	0.46
1:C:164:SER:HA	1:C:370:ILE:HD12	1.97	0.46
1:C:352:ASN:N	1:C:353:PRO:CD	2.78	0.46
1:A:70:ASP:O	1:A:90:ASN:HA	2.14	0.46
1:B:128:HIS:HE2	3:F:2:GLC:HO4	1.62	0.46
1:C:132:GLU:OE2	4:C:501:NAD:H2N	2.15	0.46
1:D:49:ILE:O	1:D:79:VAL:HG21	2.15	0.46
1:D:240:ASP:OD2	2:W:1:GLC:H4	2.16	0.46
1:D:462:THR:HG21	2:W:2:GLC:C6	2.45	0.46
1:D:387:ASP:OD1	1:D:387:ASP:N	2.38	0.45
1:A:352:ASN:N	1:A:353:PRO:CD	2.78	0.45
1:B:440:ILE:HG21	1:B:470:PHE:CD2	2.51	0.45
1:A:193:PRO:HD3	1:A:245:ALA:HB2	1.99	0.45
1:A:82:ARG:C	1:A:84:PRO:HD3	2.41	0.45
1:C:182:GLU:CG	1:C:301:ALA:HB3	2.47	0.45
1:B:417:ASN:N	1:B:417:ASN:OD1	2.49	0.45
1:C:193:PRO:HD3	1:C:245:ALA:HB2	1.98	0.45
1:C:184:ARG:N	2:P:1:GLC:O6	2.45	0.45
1:D:58:ARG:HA	1:D:61:GLU:HG3	1.98	0.44
1:C:190:THR:HB	1:C:253:ILE:CD1	2.47	0.44
1:D:164:SER:HA	1:D:370:ILE:HD12	1.99	0.44
1:D:82:ARG:C	1:D:84:PRO:HD3	2.42	0.44
1:B:370:ILE:CD1	1:B:393:ALA:HB2	2.47	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:490:ARG:HG3	1:B:490:ARG:HH11	1.82	0.44
1:C:182:GLU:HG3	1:C:301:ALA:HB3	1.99	0.44
1:A:219:GLY:HA2	1:A:483:TRP:CH2	2.52	0.44
1:B:479:TYR:CE2	1:B:485:LEU:HG	2.53	0.44
1:D:192:ARG:HE	3:R:1:GLC:HO6	1.59	0.44
4:A:501:NAD:H8A	5:A:625:HOH:O	2.17	0.44
1:C:254:LEU:HD13	1:C:405:MET:CE	2.45	0.44
1:D:135:LEU:HD11	1:D:396:PHE:CE1	2.52	0.44
1:A:440:ILE:HG21	1:A:470:PHE:CD2	2.52	0.43
1:D:462:THR:CG2	2:W:2:GLC:O6	2.53	0.43
1:D:489:PRO:O	1:D:490:ARG:C	2.60	0.43
1:A:408:MET:HE2	1:A:408:MET:HB2	1.88	0.43
1:A:479:TYR:CE2	1:A:485:LEU:HG	2.54	0.43
1:D:248:ASP:OD1	3:R:1:GLC:O4	2.29	0.43
1:A:80:PHE:CD1	1:A:88:LYS:HG2	2.54	0.43
1:A:357:SER:OG	1:A:359:ARG:HG3	2.17	0.43
1:A:411:LEU:HG	5:A:610:HOH:O	2.19	0.43
1:B:328:LEU:HD12	5:B:626:HOH:O	2.17	0.43
1:A:146:THR:OG1	1:A:400:GLY:HA3	2.19	0.43
1:C:221:ALA:O	1:C:480:ARG:HD3	2.19	0.43
1:D:193:PRO:HD3	1:D:245:ALA:HB2	2.00	0.43
1:D:370:ILE:HD11	1:D:393:ALA:HB2	2.01	0.43
1:B:278:ASN:H	1:B:278:ASN:HD22	1.66	0.43
4:D:501:NAD:H2B	5:D:609:HOH:O	2.18	0.43
1:C:408:MET:HB2	1:C:408:MET:HE2	1.81	0.42
1:B:193:PRO:HD3	1:B:245:ALA:HB2	2.01	0.42
1:B:229:ILE:HD12	1:B:234:ASN:HD22	1.83	0.42
1:D:352:ASN:N	1:D:353:PRO:CD	2.82	0.42
1:C:440:ILE:HG21	1:C:470:PHE:CD2	2.55	0.42
1:A:455:PRO:HG3	1:B:233:TRP:CE2	2.55	0.42
1:A:370:ILE:CD1	1:A:393:ALA:HB2	2.49	0.42
1:D:453:GLY:O	1:D:454:HIS:C	2.62	0.42
1:D:139:VAL:HG23	1:D:407:VAL:HG12	2.01	0.42
1:C:57:LEU:HG	1:C:107:MET:HE2	2.02	0.42
1:D:48:GLY:O	1:D:109:ALA:HB3	2.20	0.41
1:D:462:THR:CG2	2:W:2:GLC:C6	2.98	0.41
1:C:58:ARG:HA	1:C:61:GLU:HG3	2.02	0.41
1:D:188:THR:HG21	1:D:254:LEU:HD23	2.02	0.41
1:A:221:ALA:O	1:A:480:ARG:HD3	2.19	0.41
1:B:133:LYS:O	4:B:501:NAD:H1D	2.20	0.41
2:U:1:GLC:H5	2:U:2:GLC:C1	2.49	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:364:PRO:O	1:B:366:VAL:HG23	2.20	0.41
1:A:139:VAL:HG23	1:A:407:VAL:HG12	2.02	0.41
1:A:182:GLU:CG	1:A:301:ALA:HB3	2.50	0.41
2:U:1:GLC:C5	2:U:2:GLC:H1	2.50	0.41
1:A:226:TYR:CG	1:A:227:ASN:N	2.89	0.41
1:C:188:THR:HG21	1:C:254:LEU:HD23	2.02	0.41
1:C:318:ARG:HG3	1:D:270:GLN:HE22	1.85	0.41
1:D:449:HIS:NE2	1:D:451:LYS:HD2	2.36	0.41
1:A:411:LEU:CD2	5:A:610:HOH:O	2.69	0.40
1:B:408:MET:HE2	1:B:408:MET:HB2	1.88	0.40
1:B:490:ARG:HH11	1:B:490:ARG:CG	2.34	0.40
1:D:133:LYS:O	4:D:501:NAD:H1D	2.21	0.40
1:D:442:ALA:N	1:D:462:THR:HG22	2.33	0.40
1:D:318:ARG:HG2	1:D:318:ARG:HH11	1.86	0.40
1:D:182:GLU:CG	1:D:301:ALA:HB3	2.51	0.40
1:D:226:TYR:CG	1:D:227:ASN:N	2.90	0.40
1:B:100:LEU:C	1:B:102:SER:H	2.29	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	449/451 (100%)	427 (95%)	22 (5%)	0	100	100
1	B	449/451 (100%)	430 (96%)	19 (4%)	0	100	100
1	C	449/451 (100%)	429 (96%)	20 (4%)	0	100	100
1	D	449/451 (100%)	433 (96%)	16 (4%)	0	100	100
All	All	1796/1804 (100%)	1719 (96%)	77 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	367/375 (98%)	346 (94%)	21 (6%)	18	42
1	B	375/375 (100%)	352 (94%)	23 (6%)	17	40
1	C	375/375 (100%)	346 (92%)	29 (8%)	12	30
1	D	375/375 (100%)	345 (92%)	30 (8%)	11	28
All	All	1492/1500 (100%)	1389 (93%)	103 (7%)	14	35

All (103) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	ASP
1	A	42	LEU
1	A	55	SER
1	A	58	ARG
1	A	62	SER
1	A	64	ASN
1	A	74	LYS
1	A	133	LYS
1	A	147	LYS
1	A	211	THR
1	A	229	ILE
1	A	243	THR
1	A	246	LEU
1	A	278	ASN
1	A	320	GLU
1	A	366	VAL
1	A	405	MET
1	A	407	VAL
1	A	436	ASP
1	A	439	THR
1	A	459	LYS
1	B	42	LEU
1	B	55	SER
1	B	62	SER

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Mol	Chain	Res	Type
1	B	74	LYS
1	B	94	LYS
1	B	210	LYS
1	B	229	ILE
1	B	243	THR
1	B	246	LEU
1	B	278	ASN
1	B	283	MET
1	B	299	LYS
1	B	344	LEU
1	B	405	MET
1	B	407	VAL
1	B	417	ASN
1	B	436	ASP
1	B	439	THR
1	B	440	ILE
1	B	445	LYS
1	B	451	LYS
1	B	481	ASP
1	B	484	LYS
1	C	42	LEU
1	C	55	SER
1	C	58	ARG
1	C	62	SER
1	C	87	LYS
1	C	94	LYS
1	C	101	LYS
1	C	124	THR
1	C	133	LYS
1	C	184	ARG
1	C	203	GLU
1	C	204	ASP
1	C	210	LYS
1	C	229	ILE
1	C	240	ASP
1	C	243	THR
1	C	246	LEU
1	C	278	ASN
1	C	298	PRO
1	C	344	LEU
1	C	366	VAL
1	C	407	VAL

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Mol	Chain	Res	Type
1	C	425	ASP
1	C	436	ASP
1	C	440	ILE
1	C	459	LYS
1	C	481	ASP
1	C	484	LYS
1	C	490	ARG
1	D	55	SER
1	D	62	SER
1	D	64	ASN
1	D	74	LYS
1	D	81	LYS
1	D	94	LYS
1	D	97	ASP
1	D	101	LYS
1	D	102	SER
1	D	133	LYS
1	D	204	ASP
1	D	205	ASP
1	D	207	ARG
1	D	210	LYS
1	D	229	ILE
1	D	240	ASP
1	D	243	THR
1	D	246	LEU
1	D	278	ASN
1	D	298	PRO
1	D	365	LYS
1	D	366	VAL
1	D	371	LYS
1	D	387	ASP
1	D	407	VAL
1	D	417	ASN
1	D	436	ASP
1	D	440	ILE
1	D	459	LYS
1	D	481	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	43	ASN

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Mol	Chain	Res	Type
1	A	64	ASN
1	A	270	GLN
1	A	278	ASN
1	A	469	GLN
1	A	477	HIS
1	B	43	ASN
1	B	78	HIS
1	B	234	ASN
1	B	252	HIS
1	B	270	GLN
1	B	278	ASN
1	B	477	HIS
1	C	43	ASN
1	C	64	ASN
1	C	234	ASN
1	C	270	GLN
1	C	278	ASN
1	C	469	GLN
1	C	472	GLN
1	C	477	HIS
1	D	43	ASN
1	D	270	GLN
1	D	278	ASN
1	D	469	GLN
1	D	477	HIS

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 ⓘ

44 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	GLC	E	1	2	11,11,12	1.21	1 (9%)	15,15,17	2.96	3 (20%)
2	GLC	E	2	2	12,12,12	0.78	0	17,17,17	1.24	2 (11%)
3	GLC	F	1	3	12,12,12	0.60	0	17,17,17	1.35	3 (17%)
3	GLC	F	2	3	11,11,12	1.30	1 (9%)	15,15,17	2.30	7 (46%)
2	GLC	G	1	2	11,11,12	1.08	1 (9%)	15,15,17	1.45	2 (13%)
2	GLC	G	2	2	12,12,12	1.03	1 (8%)	17,17,17	1.87	4 (23%)
2	GLC	H	1	2	11,11,12	0.93	0	15,15,17	2.57	2 (13%)
2	GLC	H	2	2	12,12,12	0.98	1 (8%)	17,17,17	2.03	5 (29%)
3	GLC	I	1	3	12,12,12	0.61	0	17,17,17	1.25	2 (11%)
3	GLC	I	2	3	11,11,12	0.80	0	15,15,17	2.20	4 (26%)
3	GLC	J	1	3	12,12,12	0.76	0	17,17,17	1.75	3 (17%)
3	GLC	J	2	3	11,11,12	0.61	0	15,15,17	1.73	4 (26%)
3	GLC	K	1	3	12,12,12	0.74	0	17,17,17	1.60	5 (29%)
3	GLC	K	2	3	11,11,12	1.01	1 (9%)	15,15,17	1.52	2 (13%)
2	GLC	L	1	2	11,11,12	0.84	0	15,15,17	1.61	5 (33%)
2	GLC	L	2	2	12,12,12	0.53	0	17,17,17	1.80	3 (17%)
3	GLC	M	1	3	12,12,12	0.96	1 (8%)	17,17,17	1.53	4 (23%)
3	GLC	M	2	3	11,11,12	0.59	0	15,15,17	1.32	2 (13%)
3	GLC	N	1	3	12,12,12	0.88	0	17,17,17	1.64	6 (35%)
3	GLC	N	2	3	11,11,12	0.95	0	15,15,17	3.54	7 (46%)
3	GLC	O	1	3	12,12,12	0.48	0	17,17,17	1.78	4 (23%)
3	GLC	O	2	3	11,11,12	0.66	0	15,15,17	3.28	4 (26%)
2	GLC	P	1	2	11,11,12	0.72	0	15,15,17	1.87	5 (33%)
2	GLC	P	2	2	12,12,12	0.74	0	17,17,17	1.10	1 (5%)
2	GLC	Q	1	2	11,11,12	0.96	1 (9%)	15,15,17	1.78	4 (26%)
2	GLC	Q	2	2	12,12,12	0.45	0	17,17,17	1.23	2 (11%)
3	GLC	R	1	3	12,12,12	0.46	0	17,17,17	1.52	5 (29%)
3	GLC	R	2	3	11,11,12	0.59	0	15,15,17	2.33	6 (40%)
3	GLC	S	1	3	12,12,12	0.54	0	17,17,17	1.43	5 (29%)
3	GLC	S	2	3	11,11,12	0.55	0	15,15,17	1.34	2 (13%)
2	GLC	T	1	2	11,11,12	0.77	0	15,15,17	1.77	4 (26%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GLC	T	2	2	12,12,12	1.45	1 (8%)	17,17,17	2.03	4 (23%)
2	GLC	U	1	2	11,11,12	1.40	2 (18%)	15,15,17	1.95	3 (20%)
2	GLC	U	2	2	12,12,12	0.94	1 (8%)	17,17,17	1.38	1 (5%)
2	GLC	V	1	2	11,11,12	0.92	1 (9%)	15,15,17	1.47	3 (20%)
2	GLC	V	2	2	12,12,12	0.47	0	17,17,17	1.86	5 (29%)
2	GLC	W	1	2	11,11,12	1.42	2 (18%)	15,15,17	2.76	5 (33%)
2	GLC	W	2	2	12,12,12	0.81	0	17,17,17	1.52	4 (23%)
3	GLC	X	1	3	12,12,12	0.38	0	17,17,17	0.89	0
3	GLC	X	2	3	11,11,12	1.09	1 (9%)	15,15,17	1.73	3 (20%)
3	GLC	Y	1	3	12,12,12	0.33	0	17,17,17	1.23	1 (5%)
3	GLC	Y	2	3	11,11,12	0.56	0	15,15,17	1.93	5 (33%)
3	GLC	Z	1	3	12,12,12	0.66	0	17,17,17	1.38	2 (11%)
3	GLC	Z	2	3	11,11,12	0.74	0	15,15,17	2.03	4 (26%)

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	GLC	E	1	2	-	2/2/19/22	0/1/1/1
2	GLC	E	2	2	-	2/2/22/22	0/1/1/1
3	GLC	F	1	3	-	2/2/22/22	0/1/1/1
3	GLC	F	2	3	-	2/2/19/22	0/1/1/1
2	GLC	G	1	2	-	2/2/19/22	0/1/1/1
2	GLC	G	2	2	-	0/2/22/22	0/1/1/1
2	GLC	H	1	2	-	2/2/19/22	0/1/1/1
2	GLC	H	2	2	-	2/2/22/22	0/1/1/1
3	GLC	I	1	3	-	2/2/22/22	0/1/1/1
3	GLC	I	2	3	-	0/2/19/22	0/1/1/1
3	GLC	J	1	3	-	0/2/22/22	0/1/1/1
3	GLC	J	2	3	-	0/2/19/22	0/1/1/1
3	GLC	K	1	3	-	2/2/22/22	0/1/1/1
3	GLC	K	2	3	-	0/2/19/22	0/1/1/1
2	GLC	L	1	2	-	2/2/19/22	0/1/1/1
2	GLC	L	2	2	-	0/2/22/22	0/1/1/1
3	GLC	M	1	3	-	0/2/22/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GLC	M	2	3	-	2/2/19/22	0/1/1/1
3	GLC	N	1	3	-	0/2/22/22	0/1/1/1
3	GLC	N	2	3	-	2/2/19/22	0/1/1/1
3	GLC	O	1	3	-	2/2/22/22	0/1/1/1
3	GLC	O	2	3	-	1/2/19/22	0/1/1/1
2	GLC	P	1	2	-	2/2/19/22	0/1/1/1
2	GLC	P	2	2	-	2/2/22/22	0/1/1/1
2	GLC	Q	1	2	-	2/2/19/22	0/1/1/1
2	GLC	Q	2	2	-	0/2/22/22	0/1/1/1
3	GLC	R	1	3	-	0/2/22/22	0/1/1/1
3	GLC	R	2	3	-	2/2/19/22	0/1/1/1
3	GLC	S	1	3	-	2/2/22/22	0/1/1/1
3	GLC	S	2	3	-	2/2/19/22	0/1/1/1
2	GLC	T	1	2	-	0/2/19/22	0/1/1/1
2	GLC	T	2	2	-	2/2/22/22	0/1/1/1
2	GLC	U	1	2	-	2/2/19/22	0/1/1/1
2	GLC	U	2	2	-	2/2/22/22	0/1/1/1
2	GLC	V	1	2	-	2/2/19/22	0/1/1/1
2	GLC	V	2	2	-	0/2/22/22	0/1/1/1
2	GLC	W	1	2	-	2/2/19/22	0/1/1/1
2	GLC	W	2	2	-	2/2/22/22	0/1/1/1
3	GLC	X	1	3	-	0/2/22/22	0/1/1/1
3	GLC	X	2	3	-	2/2/19/22	0/1/1/1
3	GLC	Y	1	3	-	2/2/22/22	0/1/1/1
3	GLC	Y	2	3	-	1/2/19/22	0/1/1/1
3	GLC	Z	1	3	-	0/2/22/22	0/1/1/1
3	GLC	Z	2	3	-	2/2/19/22	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	T	2	GLC	C4-C5	4.34	1.62	1.53
3	F	2	GLC	C4-C5	3.84	1.61	1.53
2	Q	1	GLC	C1-C2	2.85	1.59	1.52
2	U	1	GLC	C4-C5	2.82	1.59	1.53
3	X	2	GLC	C4-C5	2.69	1.58	1.53
2	G	2	GLC	O1-C1	2.65	1.47	1.39
2	W	1	GLC	C4-C5	2.62	1.58	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	U	2	GLC	C4-C5	2.54	1.58	1.53
2	E	1	GLC	C1-C2	2.51	1.58	1.52
2	G	1	GLC	O5-C1	2.38	1.47	1.43
2	V	1	GLC	C4-C5	2.33	1.58	1.53
2	U	1	GLC	C1-C2	2.32	1.57	1.52
2	H	2	GLC	O1-C1	2.31	1.46	1.39
3	M	1	GLC	O4-C4	-2.22	1.37	1.43
2	W	1	GLC	C4-C3	2.11	1.57	1.52
3	K	2	GLC	C1-C2	2.06	1.57	1.52

All (157) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	O	2	GLC	C1-O5-C5	11.02	126.96	112.19
3	N	2	GLC	C1-O5-C5	9.79	125.31	112.19
2	H	1	GLC	C1-O5-C5	8.46	123.53	112.19
2	E	1	GLC	C1-C2-C3	7.67	120.81	109.64
2	E	1	GLC	C1-O5-C5	-7.09	102.69	112.19
2	W	1	GLC	O2-C2-C3	6.00	122.59	110.15
3	N	2	GLC	C1-C2-C3	5.95	118.30	109.64
2	W	1	GLC	C2-C3-C4	5.90	121.24	110.86
3	Z	2	GLC	C1-O5-C5	5.86	120.04	112.19
2	U	1	GLC	C1-C2-C3	5.23	117.26	109.64
2	L	2	GLC	O2-C2-C3	-5.16	98.21	110.38
3	I	2	GLC	O2-C2-C3	5.10	120.72	110.15
3	R	2	GLC	C1-C2-C3	-4.91	102.50	109.64
2	P	1	GLC	O3-C3-C2	-4.80	100.26	110.05
2	V	2	GLC	O3-C3-C2	-4.60	99.53	110.38
3	F	2	GLC	C1-O5-C5	4.56	118.30	112.19
3	R	2	GLC	O2-C2-C3	4.51	119.50	110.15
3	I	2	GLC	O3-C3-C2	4.51	119.25	110.05
2	H	2	GLC	C4-C3-C2	-4.47	102.98	110.83
3	J	1	GLC	C1-C2-C3	4.39	119.31	110.36
3	X	2	GLC	C1-O5-C5	4.35	118.02	112.19
3	O	1	GLC	O5-C1-C2	4.32	117.89	110.30
3	F	2	GLC	C3-C4-C5	4.14	117.74	110.23
2	V	2	GLC	C1-O5-C5	3.99	121.37	113.65
2	V	1	GLC	C1-O5-C5	3.97	117.51	112.19
2	T	2	GLC	C1-O5-C5	3.97	121.33	113.65
2	T	1	GLC	O5-C1-C2	-3.95	101.36	110.79
2	H	2	GLC	O2-C2-C3	3.91	119.59	110.38
2	T	2	GLC	C1-C2-C3	3.90	118.31	110.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	2	GLC	O3-C3-C2	3.88	119.52	110.38
2	T	1	GLC	O2-C2-C3	3.85	118.13	110.15
3	Y	2	GLC	C1-O5-C5	3.83	117.32	112.19
3	K	2	GLC	C1-O5-C5	3.82	117.31	112.19
3	Y	1	GLC	O3-C3-C2	-3.77	101.48	110.38
2	G	2	GLC	C1-O5-C5	-3.77	106.36	113.65
3	J	2	GLC	C1-C2-C3	3.74	115.09	109.64
2	H	1	GLC	O2-C2-C3	3.68	117.77	110.15
2	G	1	GLC	O5-C5-C6	3.66	114.79	107.66
2	E	1	GLC	O2-C2-C3	-3.61	102.67	110.15
3	F	2	GLC	O4-C4-C3	-3.59	101.92	110.38
3	O	1	GLC	C1-C2-C3	3.56	117.61	110.36
2	U	2	GLC	O5-C1-C2	-3.55	104.06	110.30
2	Q	1	GLC	O3-C3-C2	3.53	117.25	110.05
2	G	2	GLC	O5-C1-C2	-3.52	104.12	110.30
3	O	2	GLC	C1-C2-C3	-3.51	104.54	109.64
3	Y	2	GLC	C2-C3-C4	-3.50	104.71	110.86
3	J	1	GLC	O5-C1-C2	3.45	116.36	110.30
3	R	2	GLC	O5-C1-C2	-3.43	102.60	110.79
2	W	2	GLC	C1-O5-C5	-3.42	107.03	113.65
2	W	1	GLC	O3-C3-C2	-3.42	103.08	110.05
3	N	2	GLC	O5-C5-C4	3.40	119.10	110.83
3	Z	1	GLC	C4-C3-C2	3.40	116.79	110.83
2	T	2	GLC	O5-C1-C2	3.38	116.24	110.30
3	N	2	GLC	O5-C5-C6	-3.37	101.10	107.66
3	O	2	GLC	O2-C2-C3	3.37	117.13	110.15
3	M	2	GLC	O5-C1-C2	-3.36	102.77	110.79
2	W	1	GLC	O5-C1-C2	-3.30	102.91	110.79
2	W	1	GLC	O2-C2-C1	-3.28	101.70	109.22
2	L	2	GLC	O5-C1-C2	3.23	115.97	110.30
3	X	2	GLC	O5-C1-C2	3.23	118.49	110.79
3	K	1	GLC	O3-C3-C2	-3.19	102.87	110.38
2	Q	1	GLC	C1-C2-C3	3.13	114.21	109.64
3	N	2	GLC	O2-C2-C1	-3.11	102.11	109.22
3	F	2	GLC	O2-C2-C3	-3.10	103.72	110.15
2	U	1	GLC	C2-C3-C4	3.05	116.23	110.86
3	O	2	GLC	C2-C3-C4	-3.05	105.50	110.86
2	T	2	GLC	O5-C5-C4	3.03	115.17	109.70
3	I	2	GLC	O3-C3-C4	-2.99	103.33	110.38
3	S	1	GLC	C1-C2-C3	2.97	116.42	110.36
3	F	1	GLC	C4-C3-C2	2.95	116.02	110.83
3	F	1	GLC	O2-C2-C1	-2.95	102.44	109.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	M	1	GLC	O4-C4-C3	-2.95	103.42	110.38
2	L	1	GLC	O5-C1-C2	-2.95	103.76	110.79
2	G	2	GLC	C4-C3-C2	2.93	115.98	110.83
2	Q	2	GLC	C1-O5-C5	2.91	119.29	113.65
3	J	2	GLC	O4-C4-C3	-2.91	103.51	110.38
3	O	1	GLC	O2-C2-C3	-2.89	103.57	110.38
3	I	1	GLC	C4-C3-C2	-2.87	105.79	110.83
2	G	1	GLC	C1-O5-C5	2.86	116.03	112.19
2	G	2	GLC	O2-C2-C3	2.86	117.11	110.38
3	O	1	GLC	O1-C1-O5	-2.83	102.00	110.41
3	N	2	GLC	C2-C3-C4	2.83	115.83	110.86
3	Y	2	GLC	O5-C5-C6	2.80	113.11	107.66
3	N	1	GLC	C1-O5-C5	-2.79	108.25	113.65
3	R	2	GLC	C1-O5-C5	-2.74	108.51	112.19
3	J	2	GLC	O5-C1-C2	-2.74	104.25	110.79
2	U	1	GLC	C3-C4-C5	2.69	115.11	110.23
2	T	1	GLC	O2-C2-C1	-2.69	103.07	109.22
2	L	1	GLC	C1-O5-C5	2.69	115.78	112.19
2	W	2	GLC	C1-C2-C3	2.68	115.83	110.36
3	K	1	GLC	O5-C1-C2	2.68	115.00	110.30
3	R	1	GLC	O5-C1-C2	2.66	114.97	110.30
3	K	1	GLC	O2-C2-C1	2.62	115.30	109.25
2	V	1	GLC	O2-C2-C3	2.61	115.56	110.15
3	X	2	GLC	C3-C4-C5	2.60	114.94	110.23
2	E	2	GLC	C1-O5-C5	2.56	118.61	113.65
3	N	1	GLC	O5-C5-C4	-2.53	105.14	109.70
3	N	1	GLC	O3-C3-C2	-2.52	104.44	110.38
3	S	2	GLC	C2-C3-C4	-2.51	106.45	110.86
2	P	2	GLC	O2-C2-C3	2.51	116.29	110.38
2	P	1	GLC	C2-C3-C4	2.51	115.27	110.86
3	R	1	GLC	C1-C2-C3	2.50	115.46	110.36
3	N	1	GLC	O1-C1-C2	2.50	116.23	108.98
2	V	2	GLC	C4-C3-C2	2.46	115.16	110.83
3	Y	2	GLC	O3-C3-C2	2.45	115.06	110.05
2	Q	1	GLC	C1-O5-C5	-2.45	108.90	112.19
2	H	2	GLC	C1-O5-C5	2.42	118.33	113.65
2	H	2	GLC	O1-C1-C2	2.41	115.99	108.98
2	P	1	GLC	O5-C1-C2	2.40	116.52	110.79
3	N	1	GLC	O1-C1-O5	-2.39	103.32	110.41
3	Z	1	GLC	O3-C3-C2	-2.38	104.76	110.38
3	Z	2	GLC	O4-C4-C5	-2.38	103.47	109.32
3	F	2	GLC	O5-C5-C4	2.38	116.61	110.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	M	1	GLC	O3-C3-C2	2.36	115.93	110.38
2	W	2	GLC	O1-C1-C2	2.35	115.80	108.98
3	S	1	GLC	O1-C1-O5	2.34	117.37	110.41
2	L	2	GLC	C1-C2-C3	2.34	115.12	110.36
3	M	1	GLC	O2-C2-C3	-2.29	104.98	110.38
3	K	1	GLC	C1-O5-C5	2.28	118.07	113.65
3	M	1	GLC	O2-C2-C1	2.27	114.50	109.25
3	Z	2	GLC	O3-C3-C2	-2.27	105.42	110.05
3	R	1	GLC	O3-C3-C2	2.26	115.71	110.38
3	J	1	GLC	O2-C2-C1	-2.25	104.06	109.25
2	P	1	GLC	O2-C2-C3	-2.24	105.51	110.15
3	S	1	GLC	O1-C1-C2	-2.24	102.48	108.98
3	I	1	GLC	O2-C2-C1	2.24	114.41	109.25
3	F	2	GLC	C1-C2-C3	2.21	112.86	109.64
2	L	1	GLC	C1-C2-C3	2.20	112.85	109.64
2	Q	1	GLC	O3-C3-C4	-2.19	105.22	110.38
2	E	2	GLC	O2-C2-C3	2.18	115.52	110.38
3	J	2	GLC	C2-C3-C4	2.18	114.69	110.86
3	S	1	GLC	O2-C2-C3	-2.18	105.25	110.38
2	L	1	GLC	C6-C5-C4	-2.17	107.70	113.02
3	R	2	GLC	O2-C2-C1	2.16	114.17	109.22
3	K	2	GLC	O2-C2-C3	2.16	114.62	110.15
3	N	2	GLC	O3-C3-C4	-2.14	105.32	110.38
2	V	2	GLC	O5-C1-C2	2.13	114.04	110.30
2	T	1	GLC	C1-O5-C5	2.12	115.02	112.19
3	I	2	GLC	O5-C5-C6	-2.11	103.55	107.66
3	S	2	GLC	C1-O5-C5	2.09	114.99	112.19
2	W	2	GLC	C3-C4-C5	-2.07	106.47	110.23
3	R	2	GLC	C2-C3-C4	-2.07	107.23	110.86
2	Q	2	GLC	O1-C1-C2	-2.07	102.99	108.98
3	S	1	GLC	O3-C3-C2	-2.06	105.51	110.38
2	P	1	GLC	C1-C2-C3	2.04	112.62	109.64
3	K	1	GLC	C3-C4-C5	2.04	113.93	110.23
2	V	2	GLC	C3-C4-C5	2.04	113.92	110.23
3	N	1	GLC	O2-C2-C1	2.03	113.94	109.25
2	L	1	GLC	O3-C3-C4	-2.03	105.59	110.38
3	R	1	GLC	O2-C2-C1	-2.02	104.58	109.25
3	R	1	GLC	O6-C6-C5	2.02	118.21	111.33
3	F	2	GLC	O5-C5-C6	-2.02	103.73	107.66
3	Z	2	GLC	O3-C3-C4	2.02	115.13	110.38
2	V	1	GLC	O5-C1-C2	-2.02	105.98	110.79
3	M	2	GLC	C1-O5-C5	2.02	114.89	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	Y	2	GLC	C3-C4-C5	-2.01	106.59	110.23
3	F	1	GLC	O2-C2-C3	2.01	115.11	110.38

There are no chirality outliers.

All (58) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	W	2	GLC	O5-C5-C6-O6
2	E	2	GLC	O5-C5-C6-O6
3	O	1	GLC	O5-C5-C6-O6
2	G	1	GLC	O5-C5-C6-O6
2	Q	1	GLC	C4-C5-C6-O6
3	F	2	GLC	C4-C5-C6-O6
3	M	2	GLC	O5-C5-C6-O6
3	S	1	GLC	O5-C5-C6-O6
2	H	2	GLC	O5-C5-C6-O6
3	F	1	GLC	O5-C5-C6-O6
3	N	2	GLC	O5-C5-C6-O6
3	Y	1	GLC	O5-C5-C6-O6
2	L	1	GLC	C4-C5-C6-O6
2	E	1	GLC	C4-C5-C6-O6
2	U	1	GLC	C4-C5-C6-O6
3	M	2	GLC	C4-C5-C6-O6
2	U	1	GLC	O5-C5-C6-O6
2	G	1	GLC	C4-C5-C6-O6
3	F	2	GLC	O5-C5-C6-O6
2	E	2	GLC	C4-C5-C6-O6
2	H	2	GLC	C4-C5-C6-O6
2	W	2	GLC	C4-C5-C6-O6
2	Q	1	GLC	O5-C5-C6-O6
3	O	1	GLC	C4-C5-C6-O6
2	W	1	GLC	C4-C5-C6-O6
3	N	2	GLC	C4-C5-C6-O6
3	Y	1	GLC	C4-C5-C6-O6
3	S	2	GLC	O5-C5-C6-O6
3	R	2	GLC	C4-C5-C6-O6
2	P	2	GLC	O5-C5-C6-O6
3	R	2	GLC	O5-C5-C6-O6
2	E	1	GLC	O5-C5-C6-O6
3	I	1	GLC	O5-C5-C6-O6
3	F	1	GLC	C4-C5-C6-O6
3	S	1	GLC	C4-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
2	T	2	GLC	O5-C5-C6-O6
2	L	1	GLC	O5-C5-C6-O6
2	W	1	GLC	O5-C5-C6-O6
2	H	1	GLC	O5-C5-C6-O6
3	I	1	GLC	C4-C5-C6-O6
3	X	2	GLC	O5-C5-C6-O6
2	V	1	GLC	C4-C5-C6-O6
2	U	2	GLC	C4-C5-C6-O6
3	S	2	GLC	C4-C5-C6-O6
2	V	1	GLC	O5-C5-C6-O6
2	P	2	GLC	C4-C5-C6-O6
3	Z	2	GLC	C4-C5-C6-O6
3	K	1	GLC	O5-C5-C6-O6
3	O	2	GLC	C4-C5-C6-O6
3	Z	2	GLC	O5-C5-C6-O6
2	P	1	GLC	C4-C5-C6-O6
2	U	2	GLC	O5-C5-C6-O6
2	H	1	GLC	C4-C5-C6-O6
3	Y	2	GLC	O5-C5-C6-O6
3	X	2	GLC	C4-C5-C6-O6
2	T	2	GLC	C4-C5-C6-O6
2	P	1	GLC	O5-C5-C6-O6
3	K	1	GLC	C4-C5-C6-O6

There are no ring outliers.

15 monomers are involved in 27 short contacts:

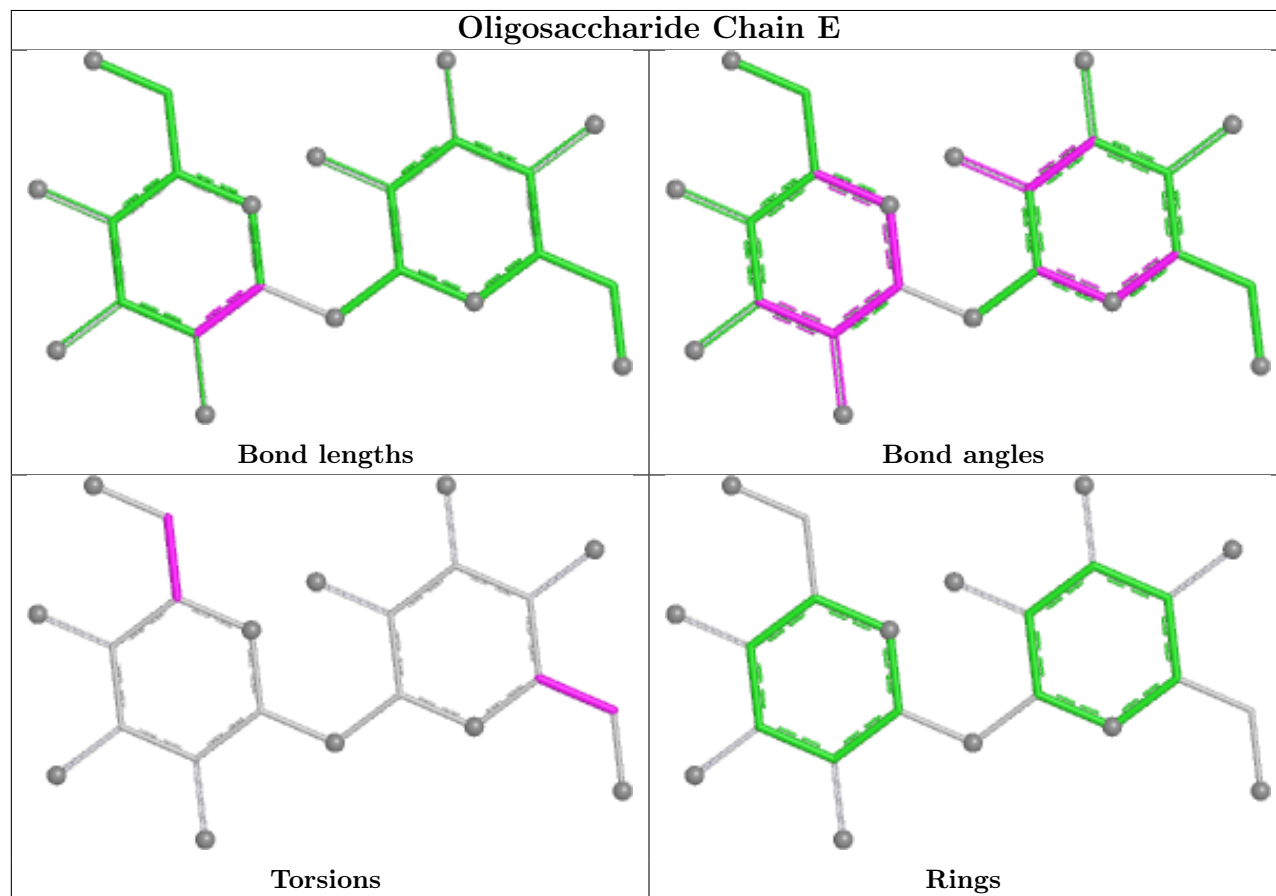
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	2	GLC	2	0
2	U	2	GLC	3	0
3	N	2	GLC	1	0
3	F	2	GLC	3	0
2	W	1	GLC	1	0
3	S	1	GLC	2	0
3	Y	1	GLC	3	0
2	W	2	GLC	6	0
2	E	2	GLC	1	0
2	E	1	GLC	1	0
2	U	1	GLC	4	0
2	G	1	GLC	2	0
3	R	1	GLC	2	0
2	P	1	GLC	1	0

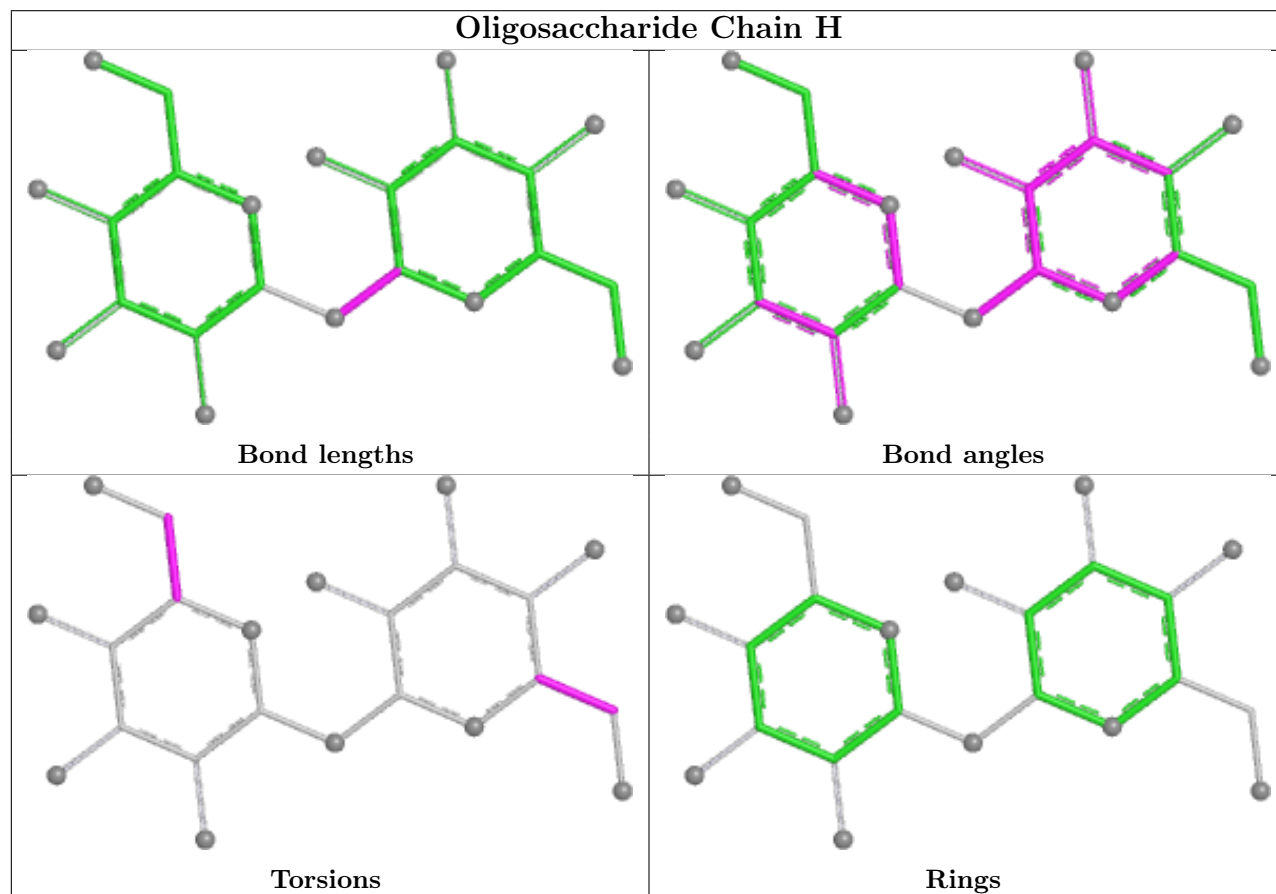
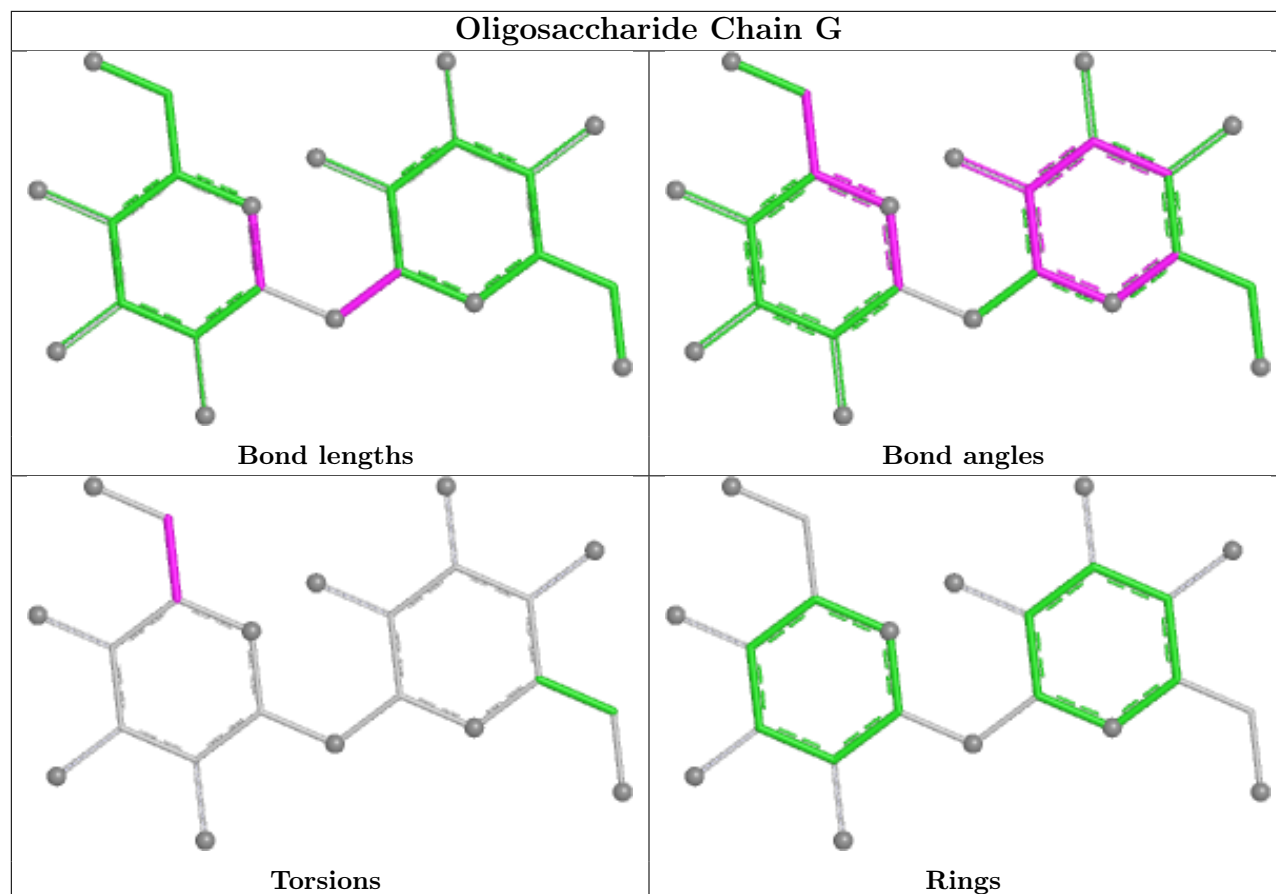
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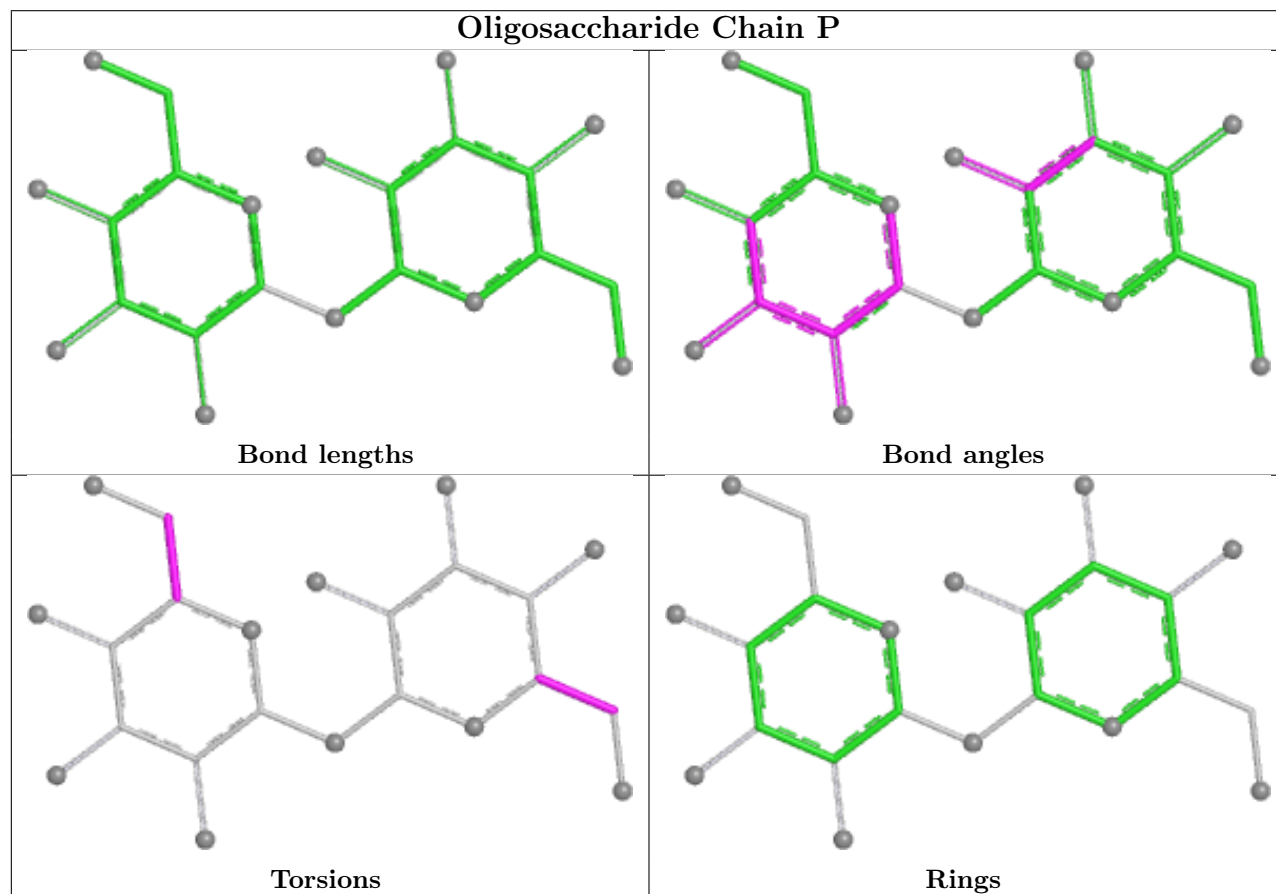
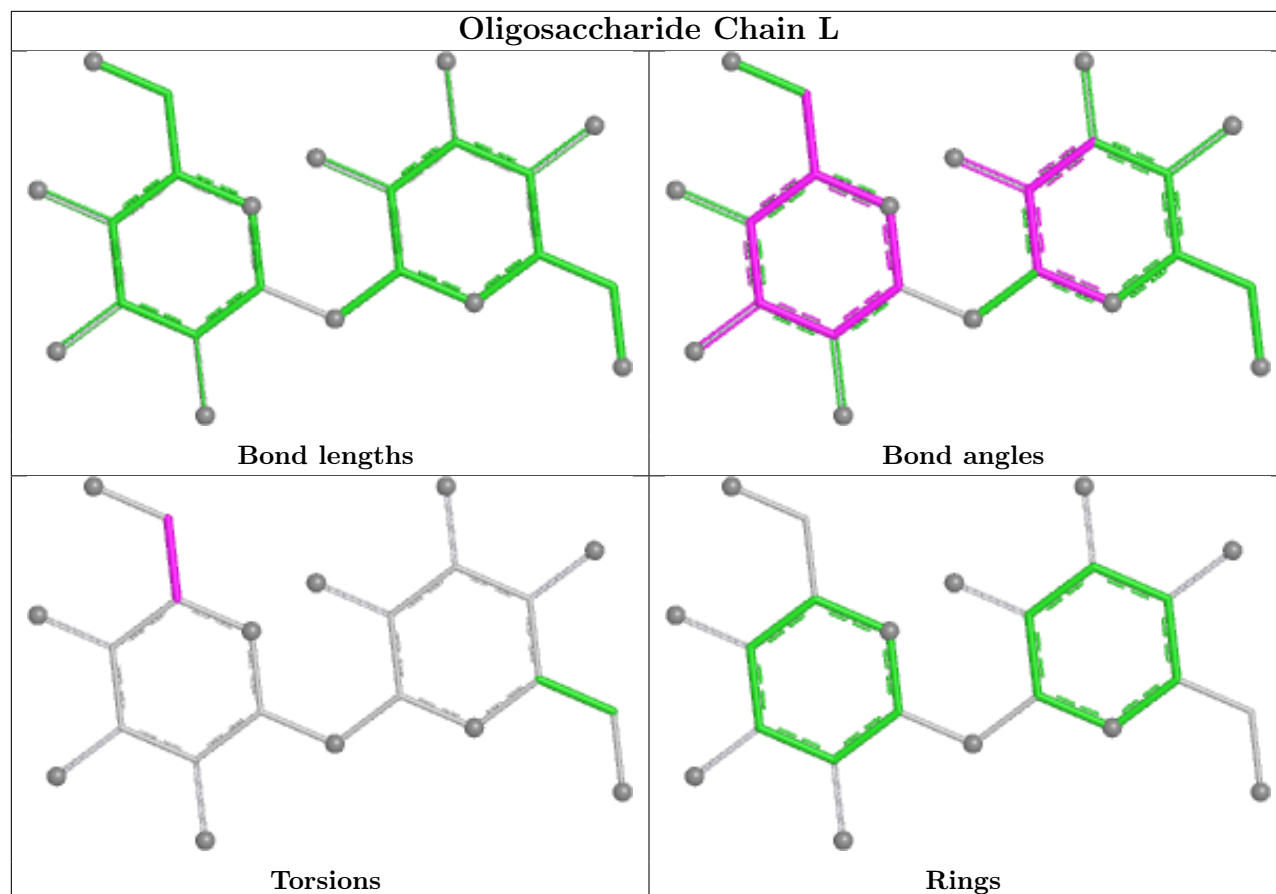
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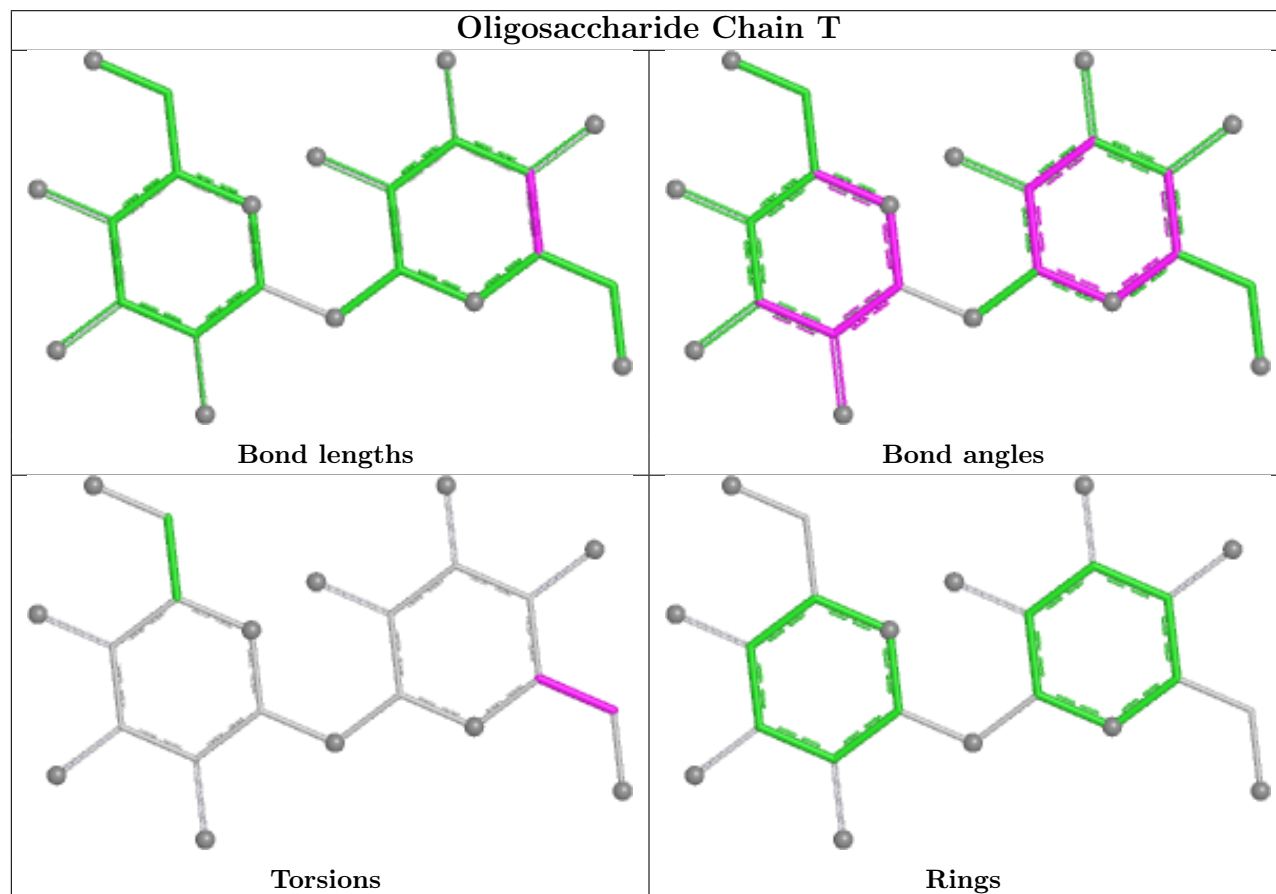
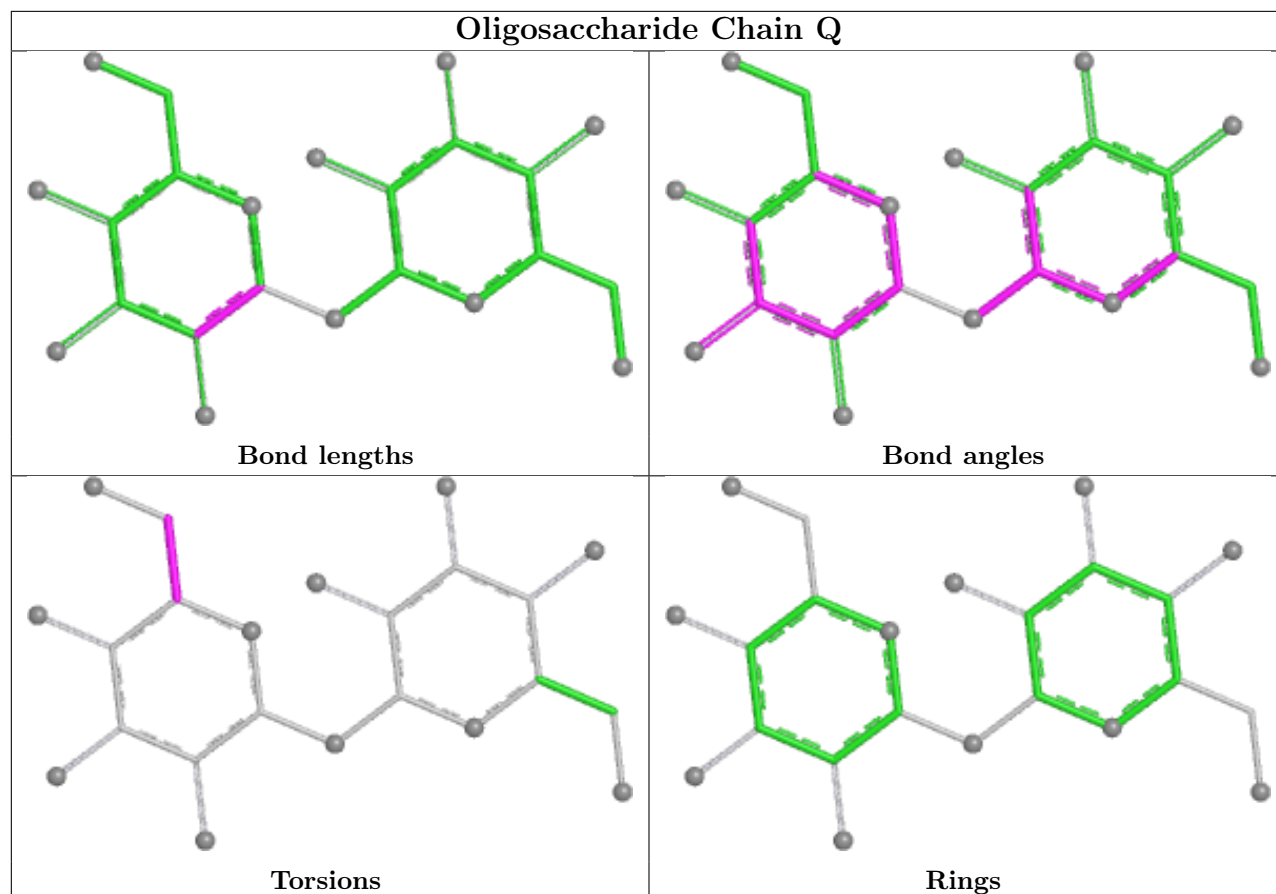
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	Q	2	GLC	1	0

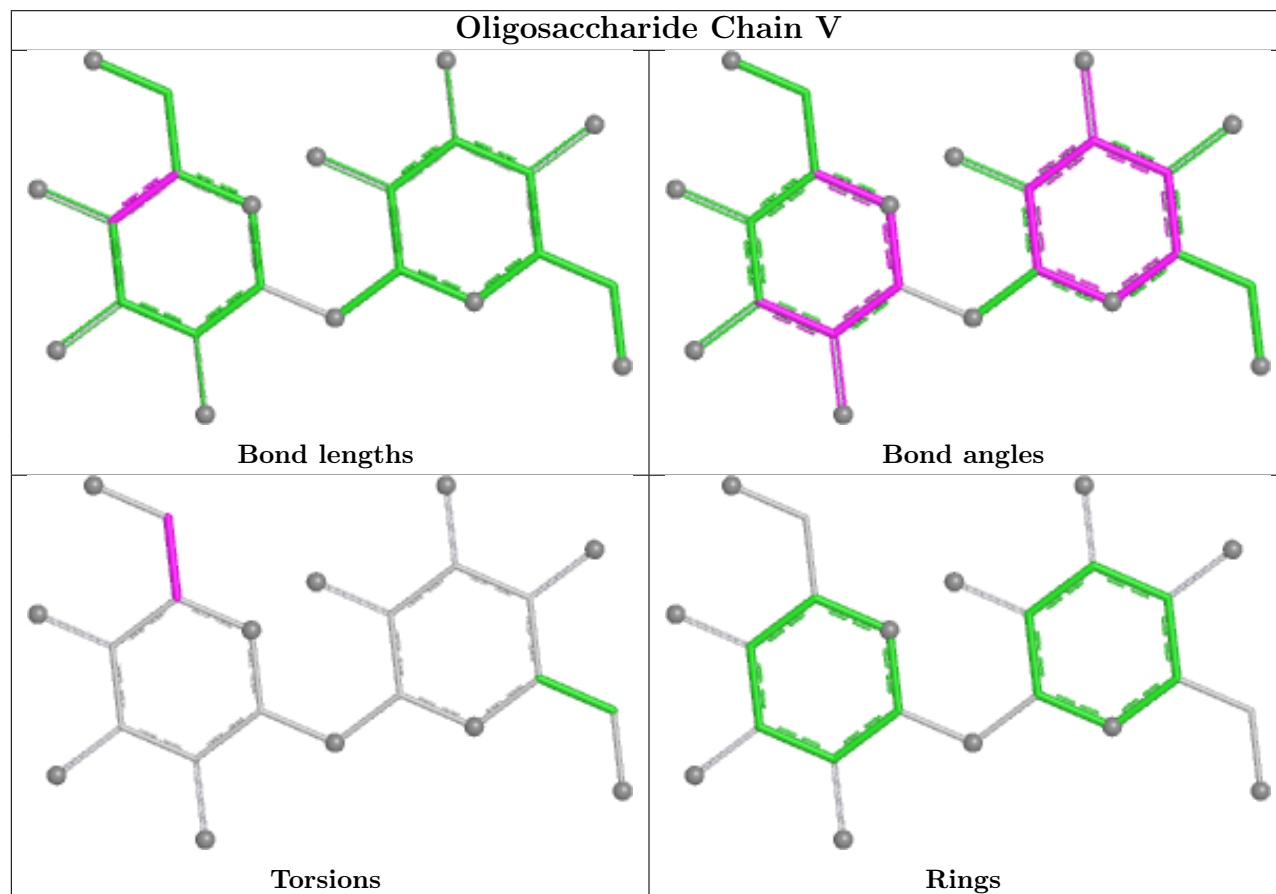
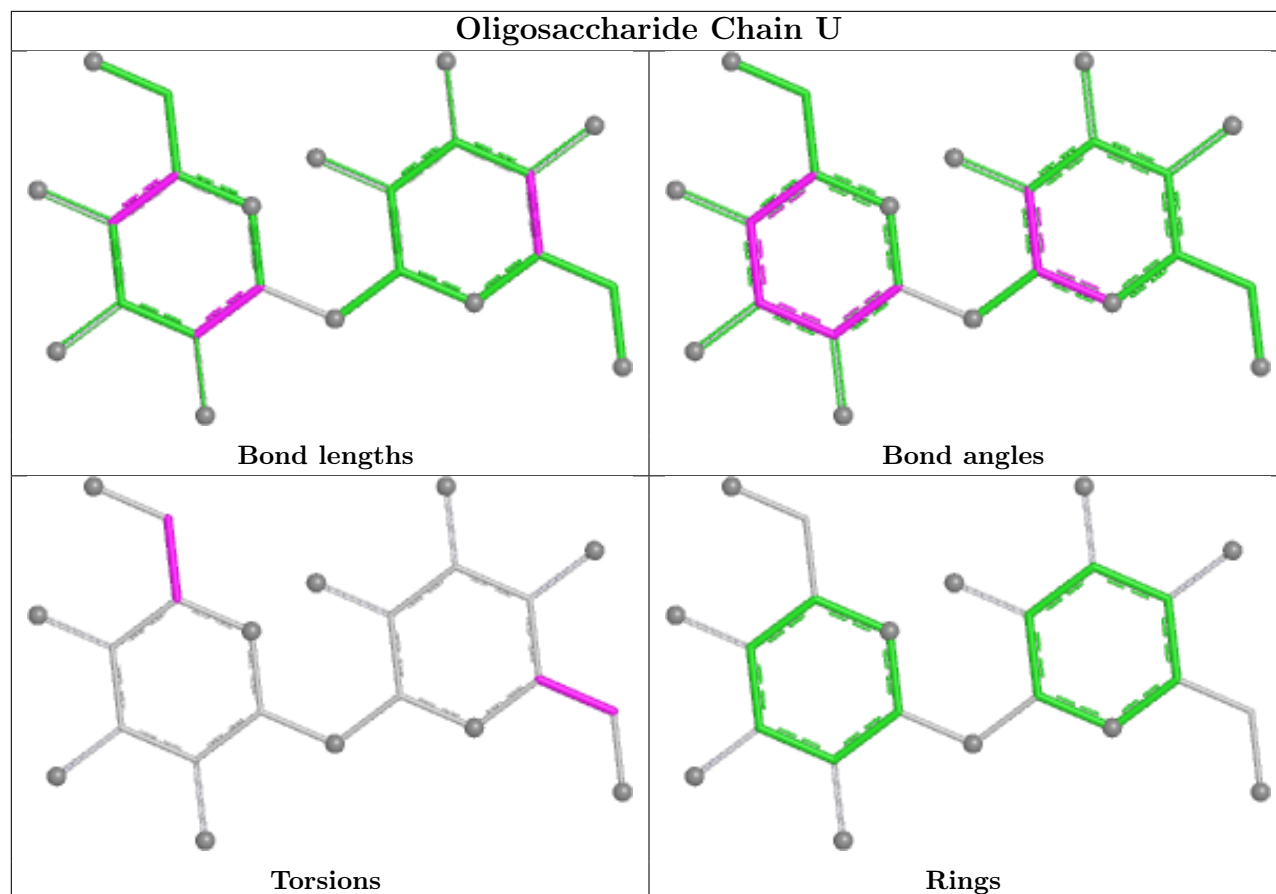
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

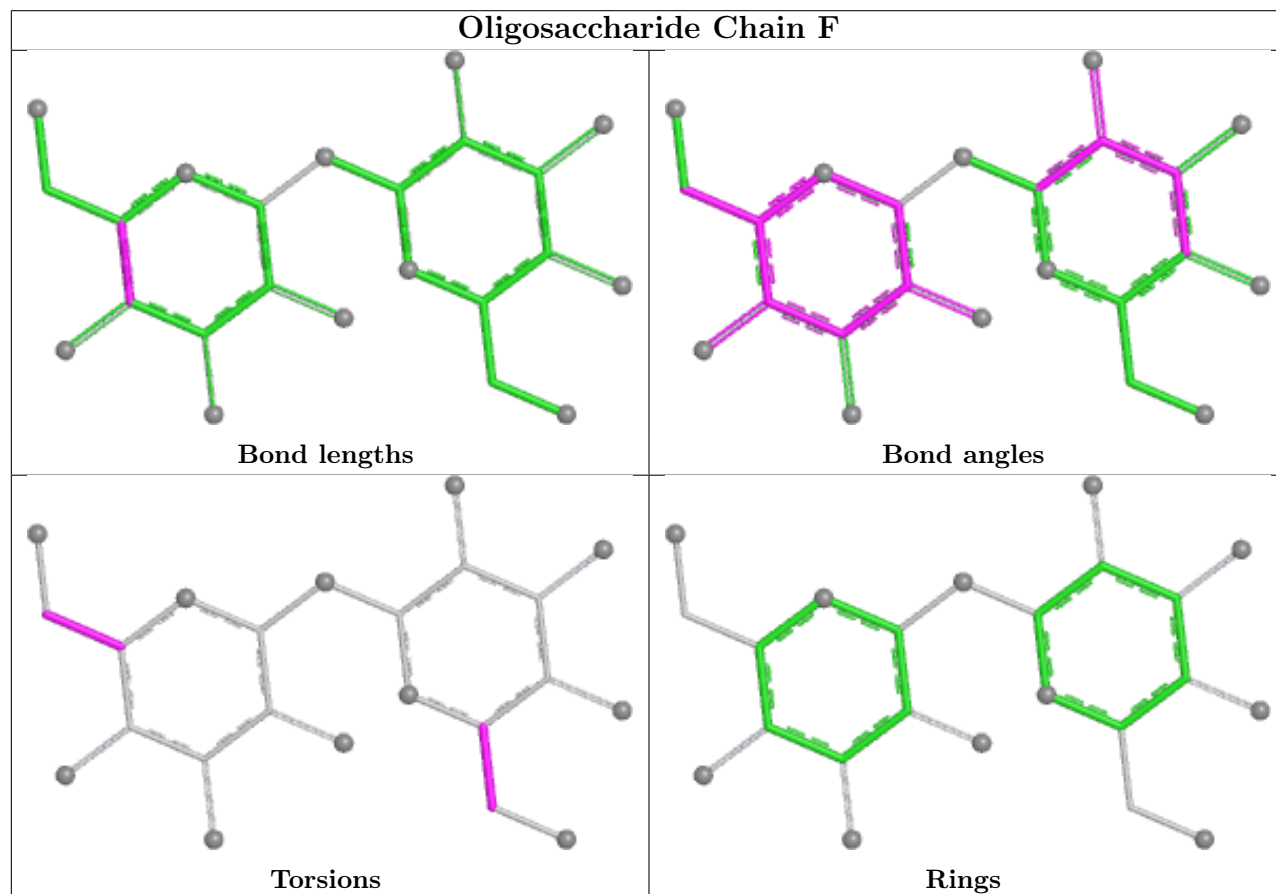
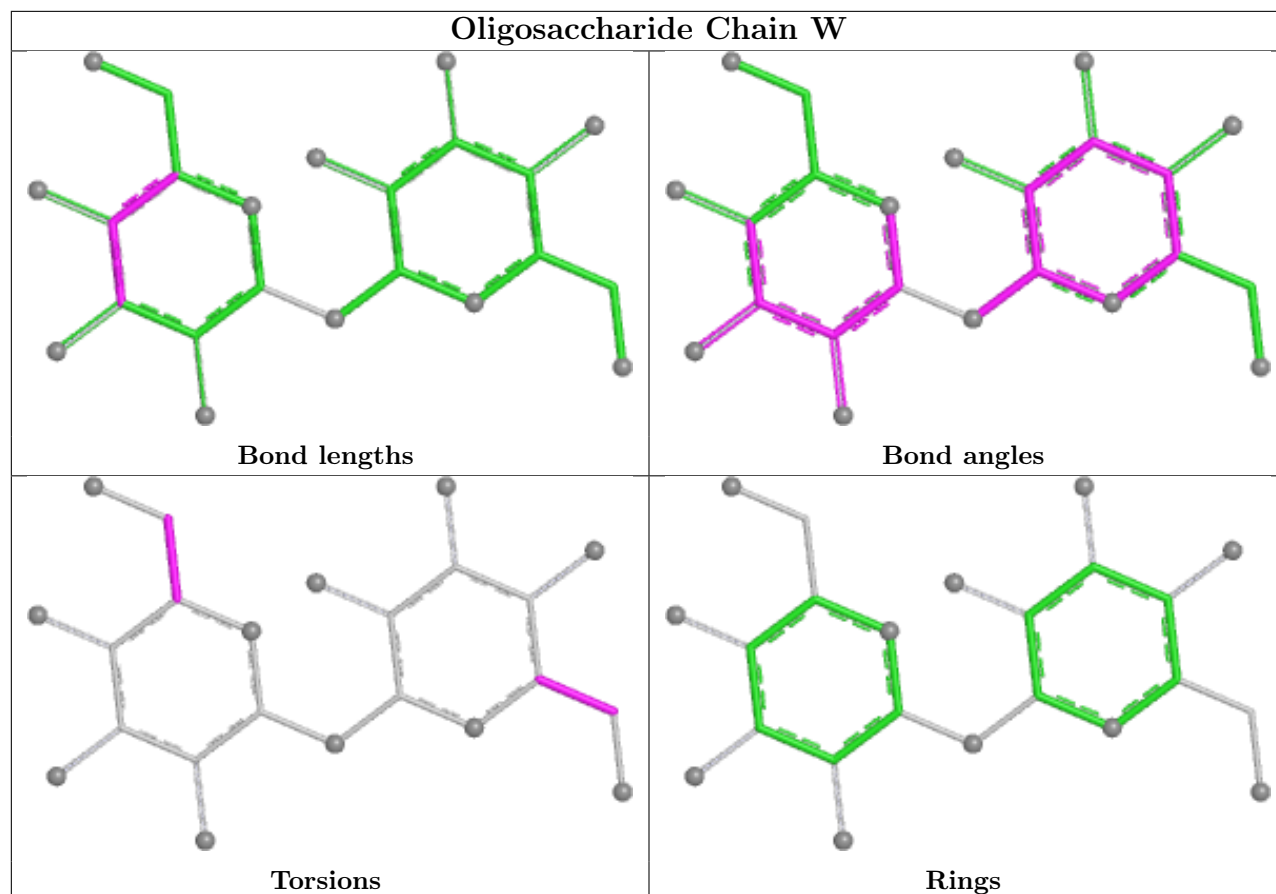


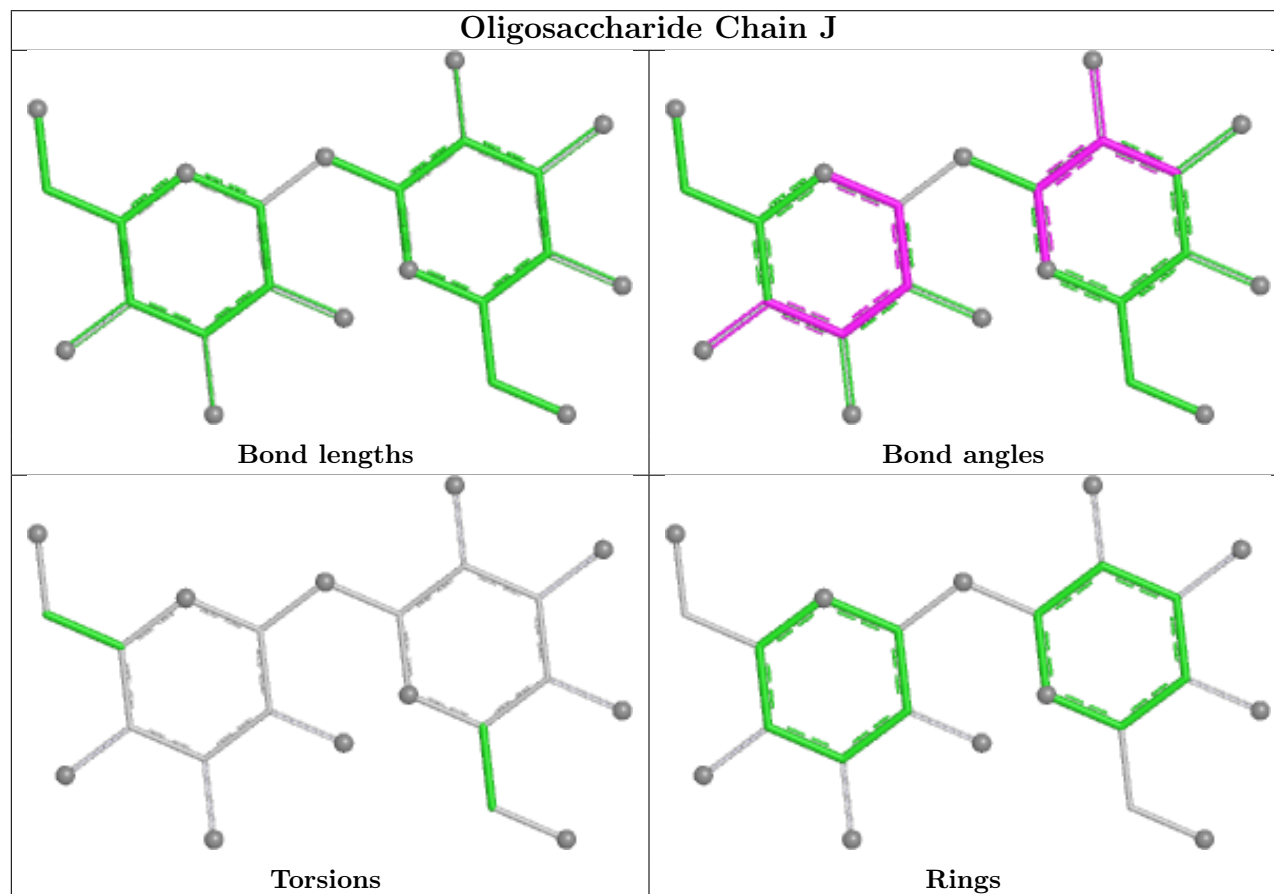
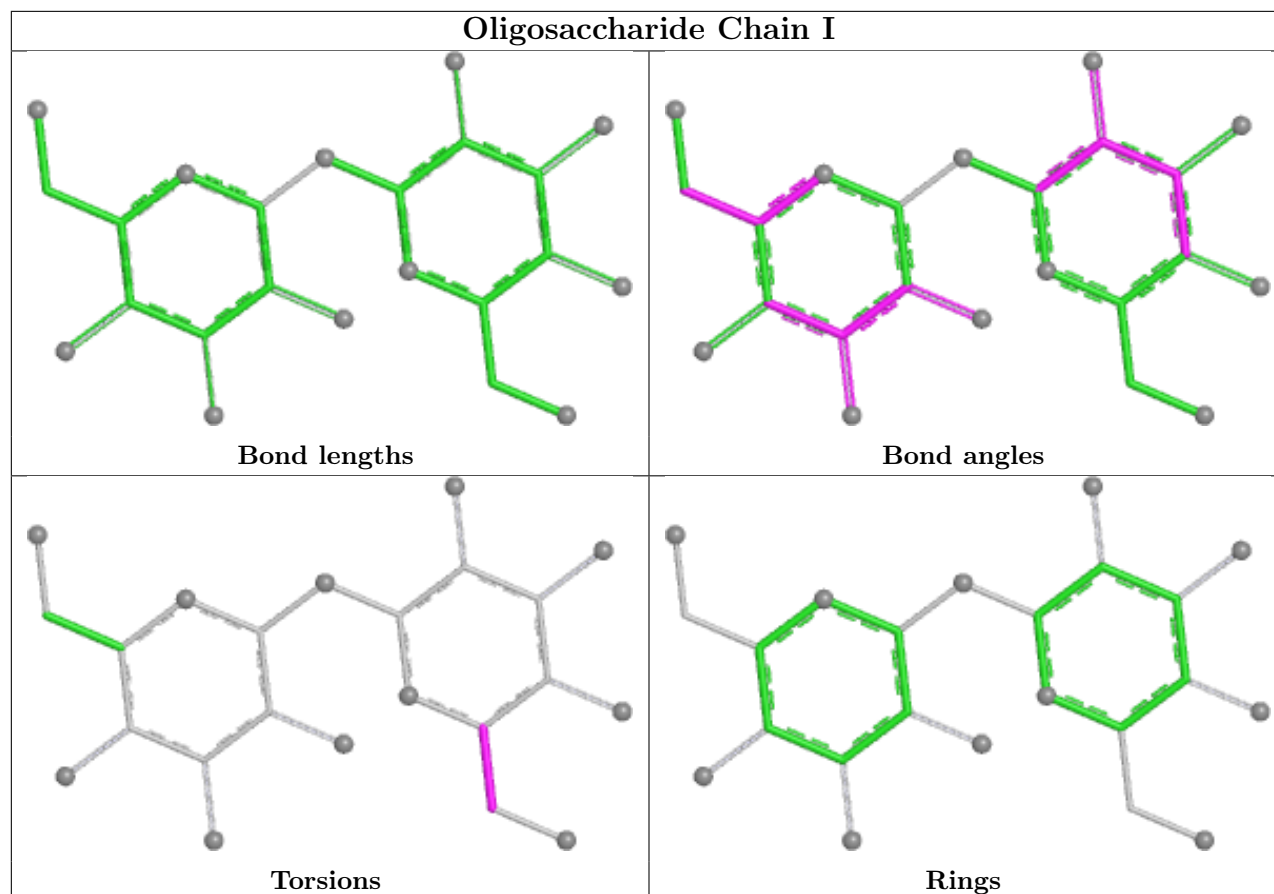


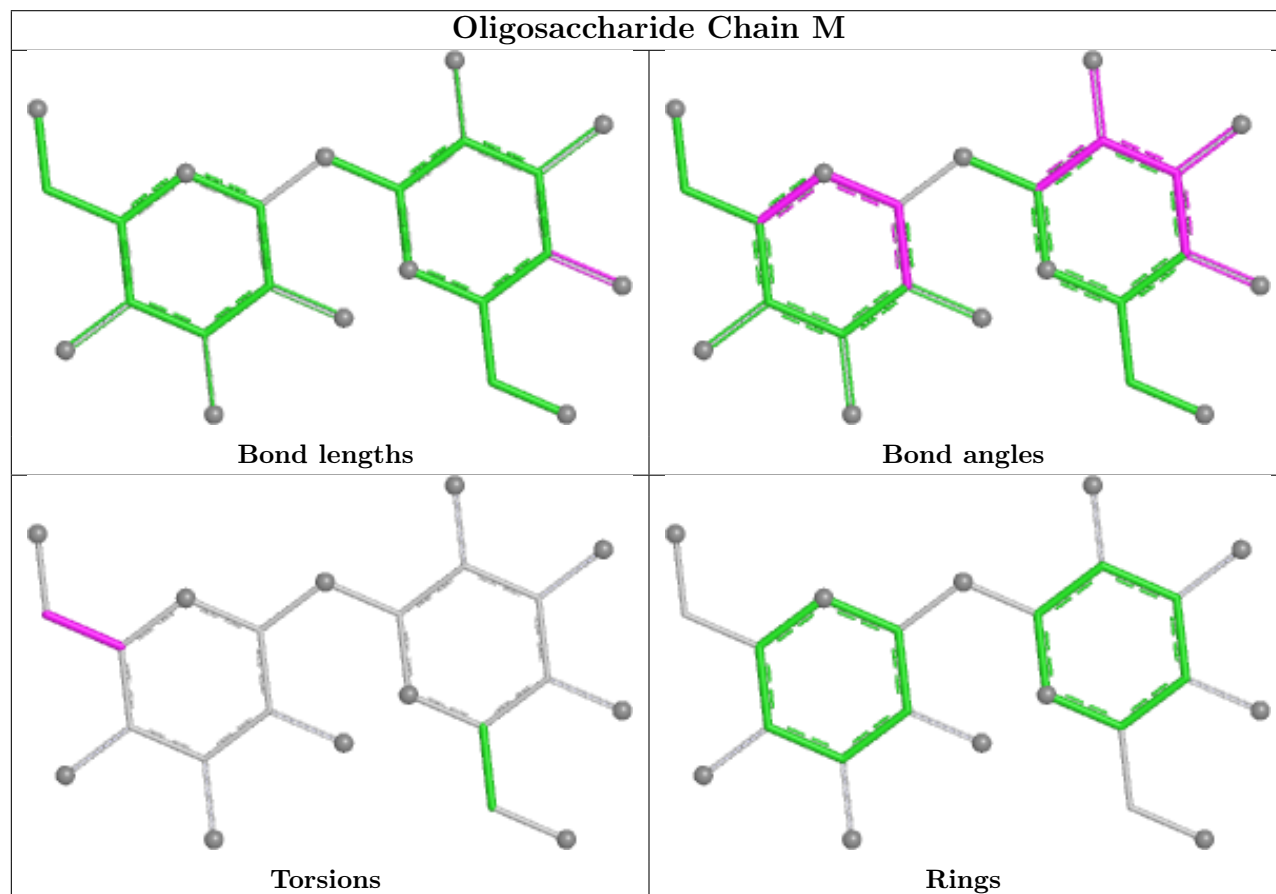
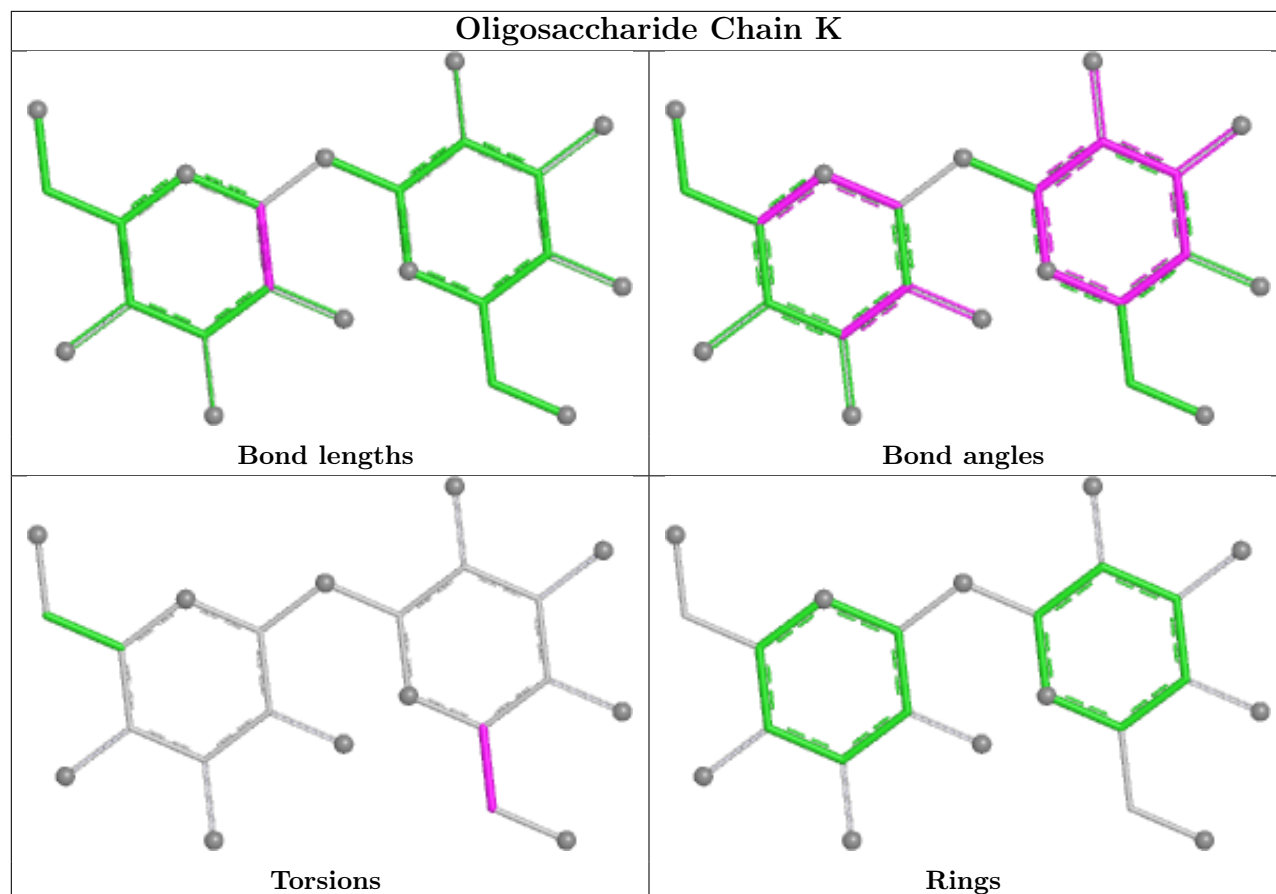


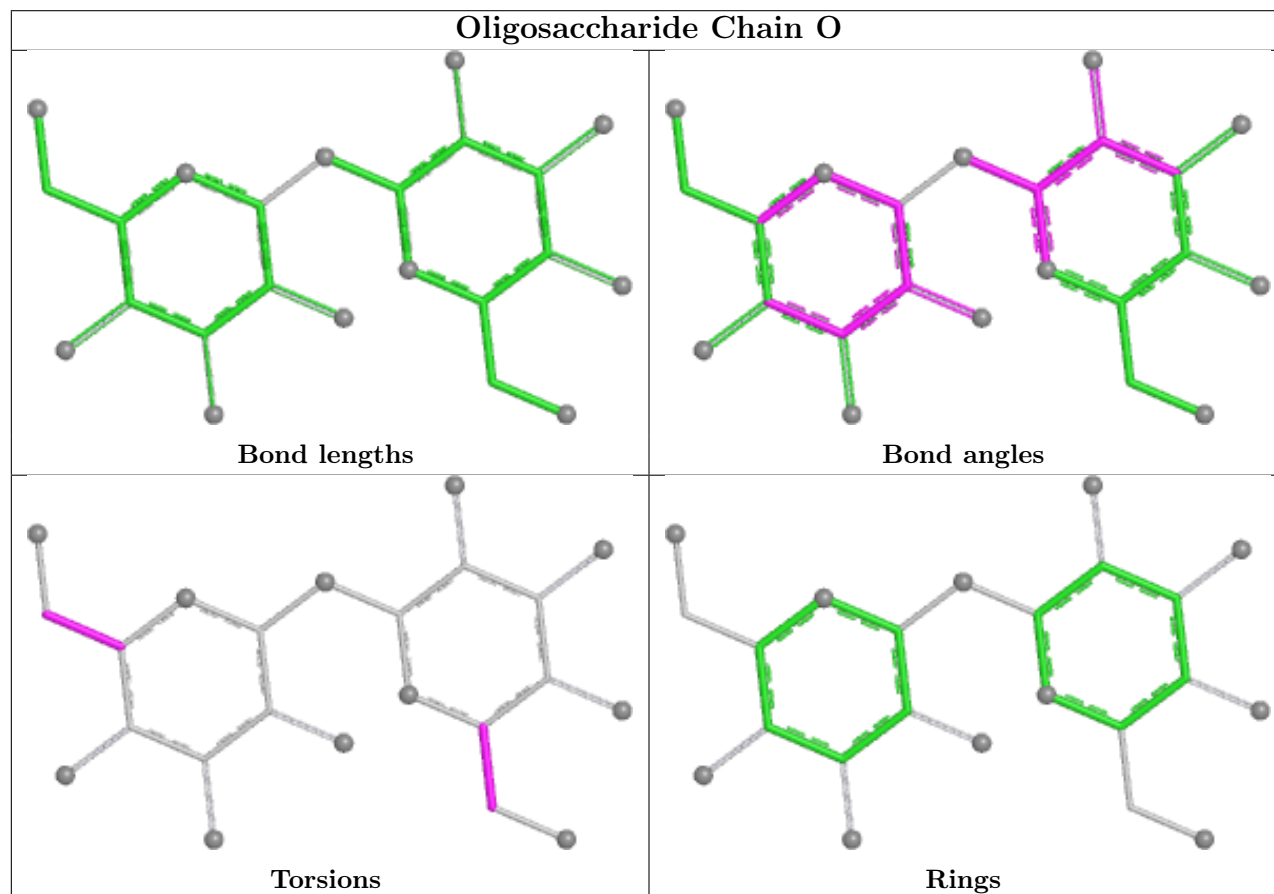
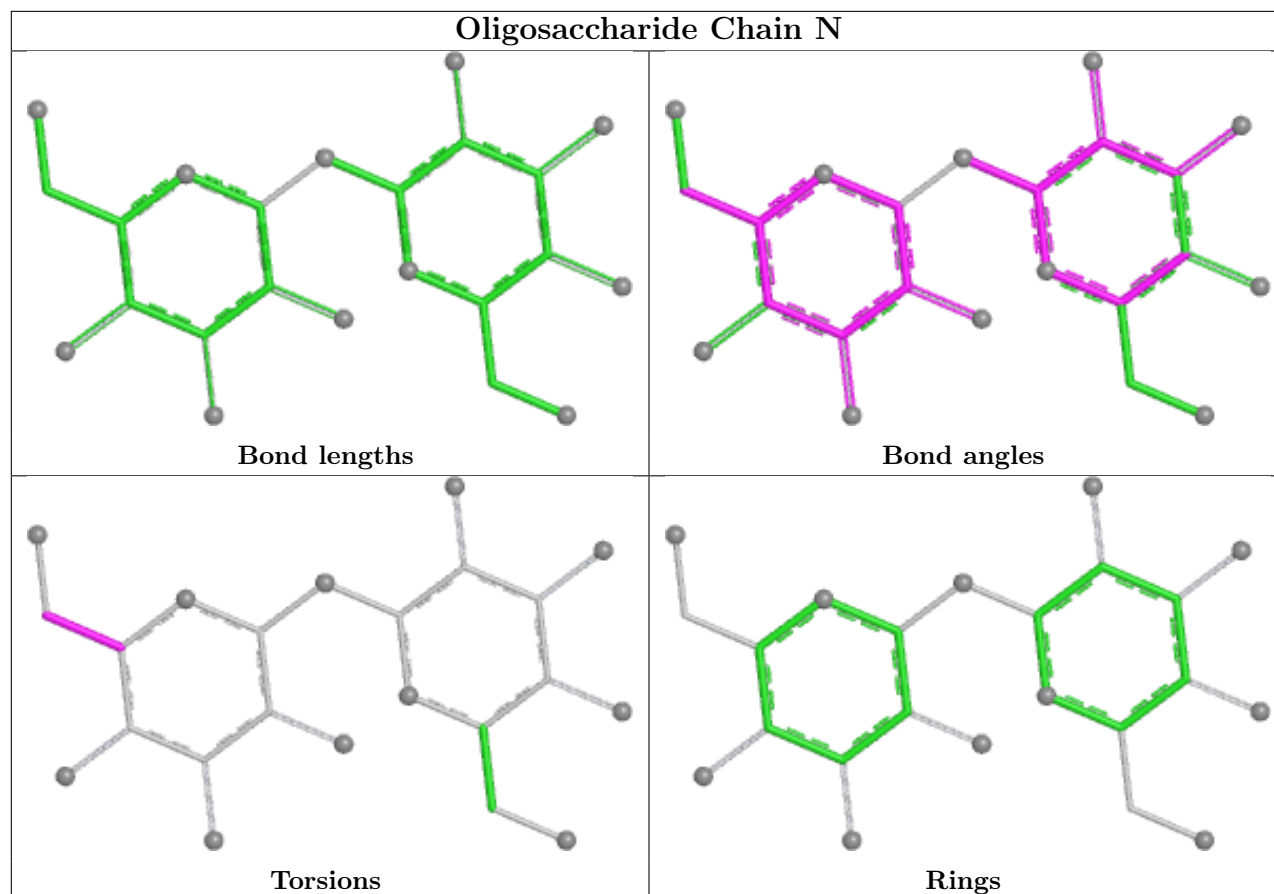


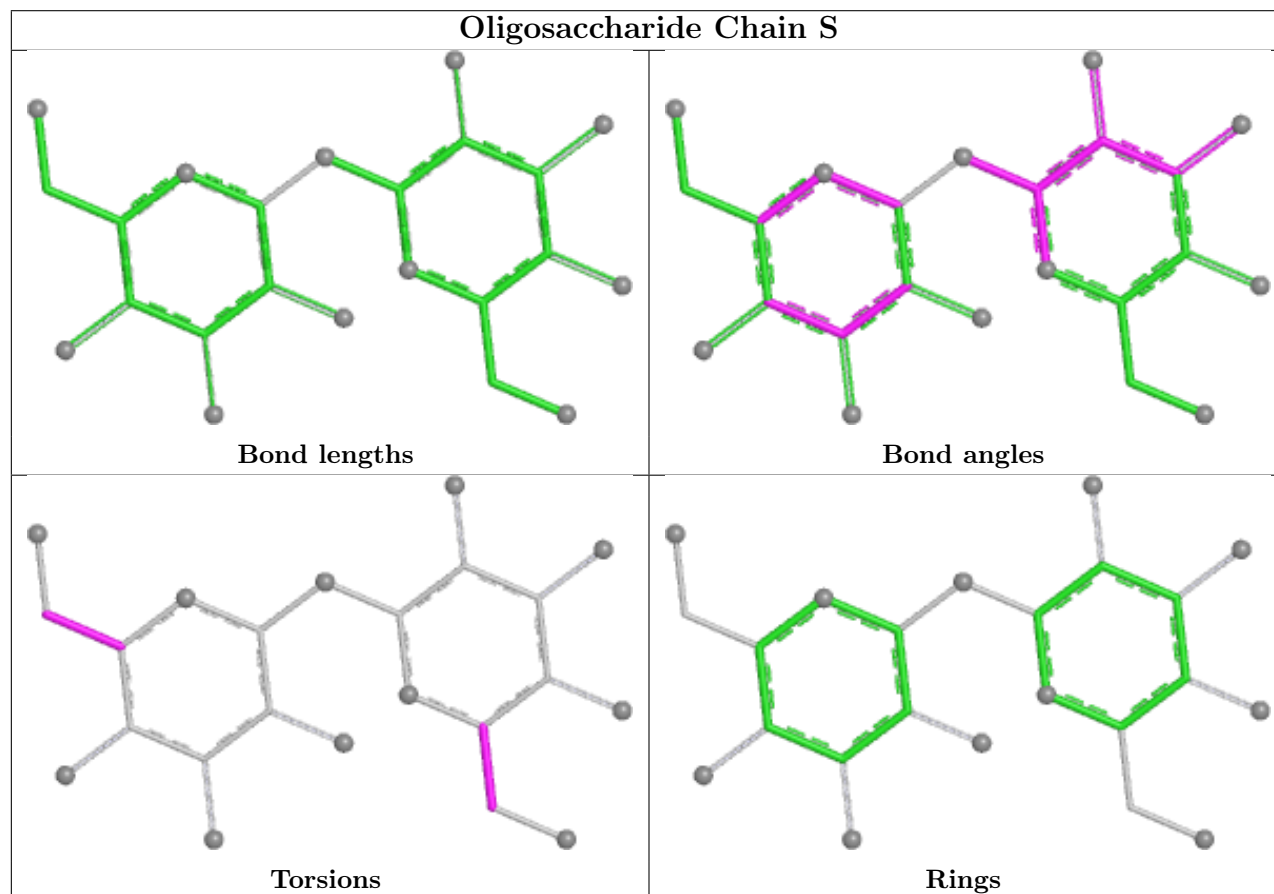
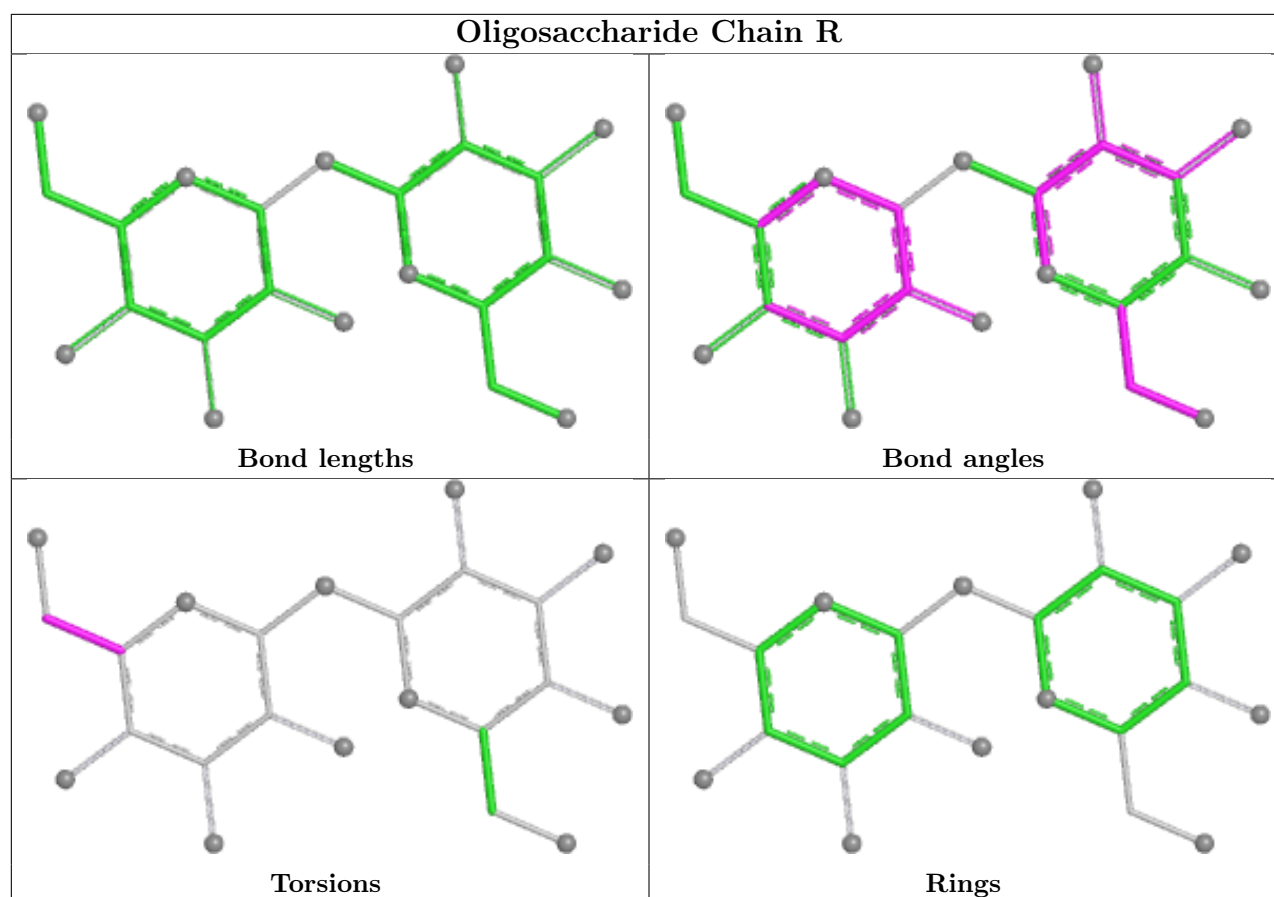


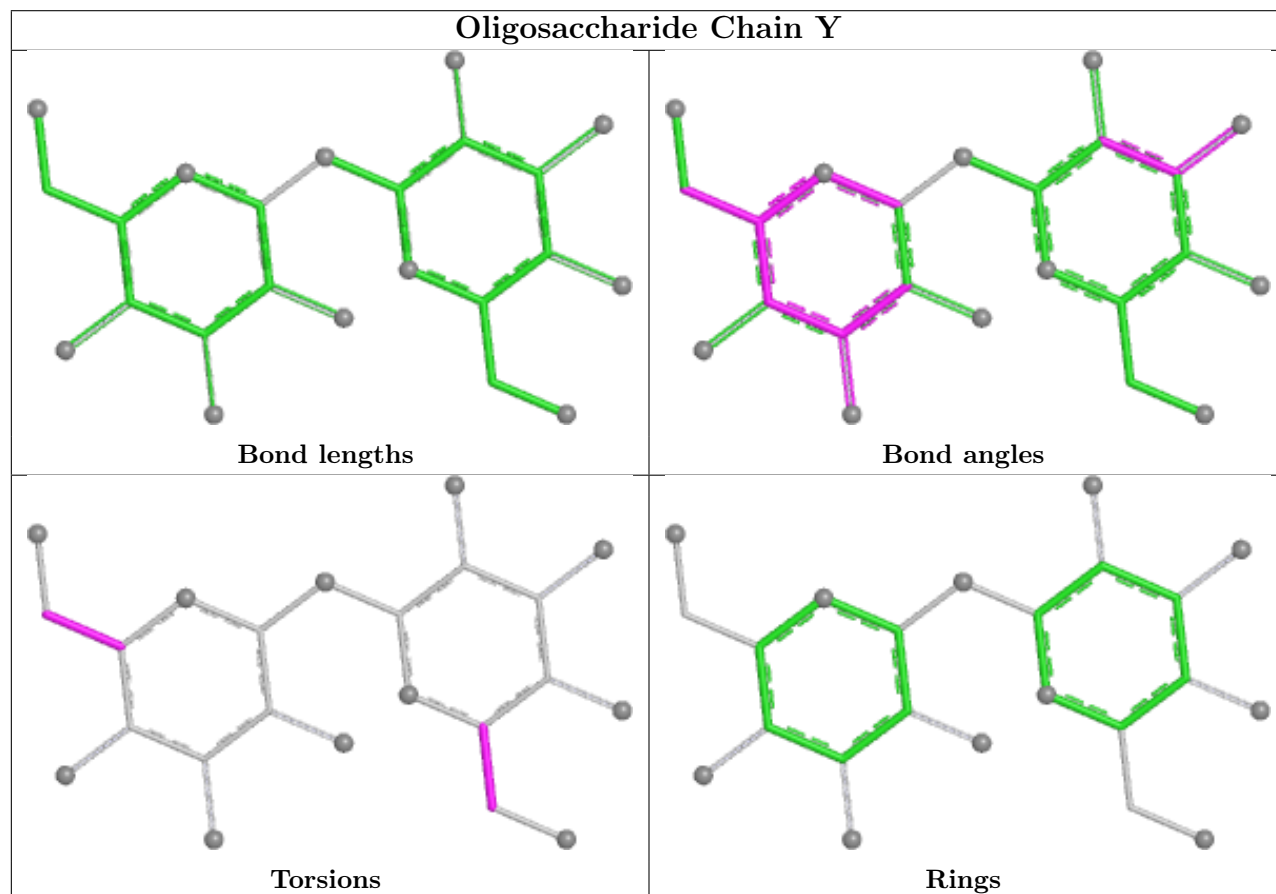
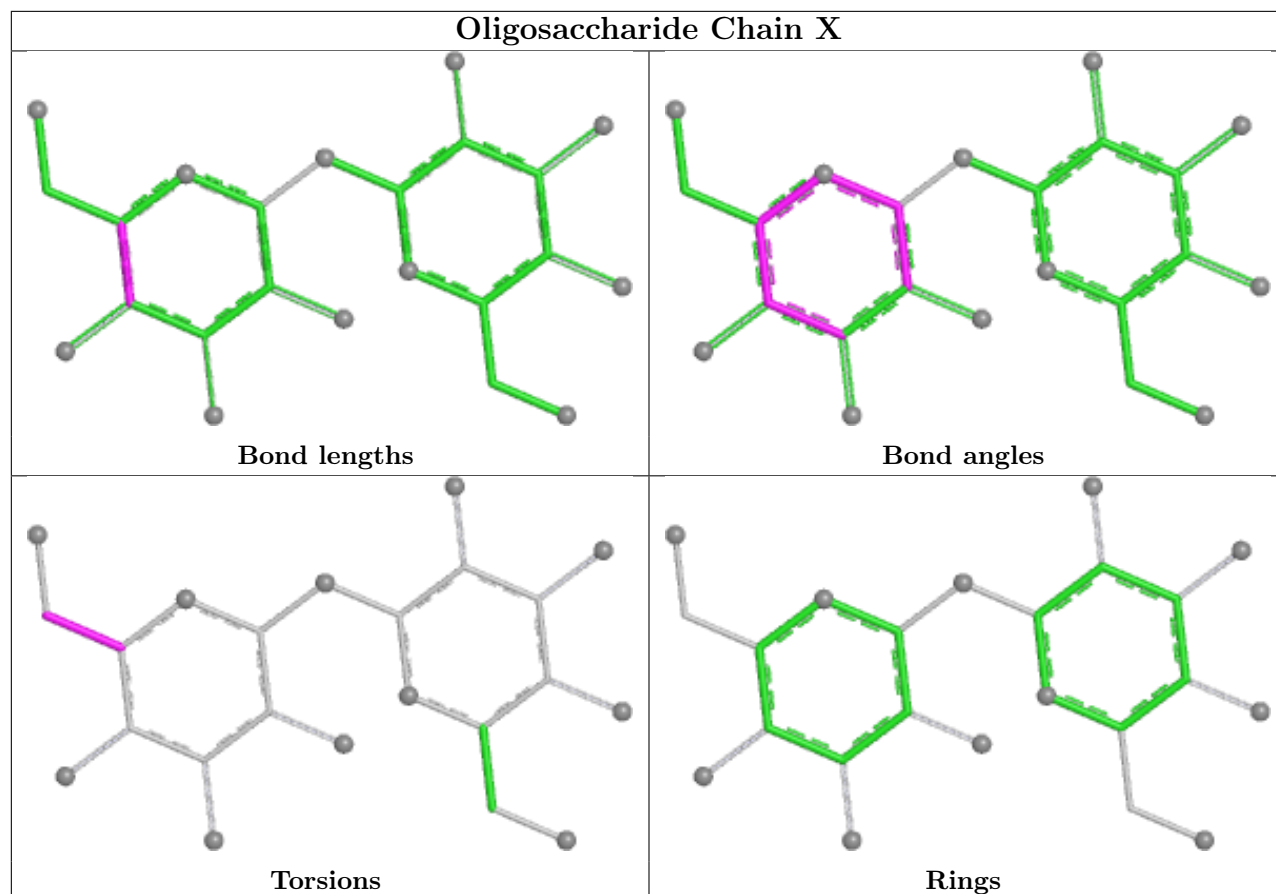


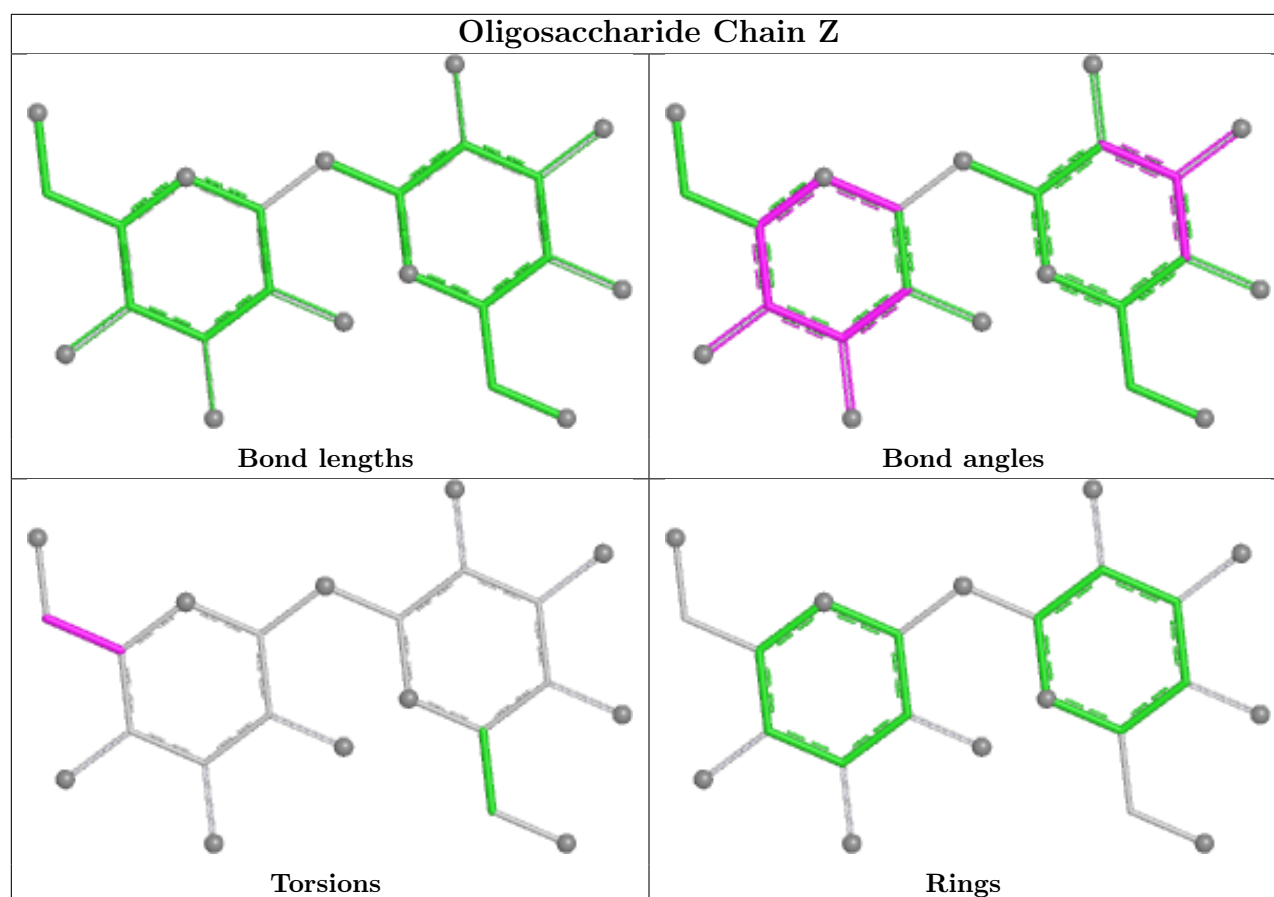












5.6 Ligand geometry [i](#)

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	$\# Z > 2$
4	NAD	D	501	-	46,48,48	0.75	3 (6%)	64,73,73	1.06	5 (7%)
4	NAD	A	501	-	46,48,48	0.81	1 (2%)	64,73,73	1.09	5 (7%)
4	NAD	B	501	-	46,48,48	0.96	2 (4%)	64,73,73	1.09	6 (9%)
4	NAD	C	501	-	46,48,48	1.06	3 (6%)	64,73,73	1.22	5 (7%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the

Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.
'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAD	D	501	-	-	6/30/62/62	0/5/5/5
4	NAD	A	501	-	-	5/30/62/62	0/5/5/5
4	NAD	B	501	-	-	4/30/62/62	0/5/5/5
4	NAD	C	501	-	-	7/30/62/62	0/5/5/5

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	501	NAD	PA-O3	4.23	1.64	1.59
4	B	501	NAD	C2N-N1N	3.95	1.39	1.35
4	A	501	NAD	C2N-N1N	3.70	1.39	1.35
4	B	501	NAD	O4D-C1D	3.46	1.45	1.40
4	C	501	NAD	O4D-C1D	3.24	1.45	1.40
4	D	501	NAD	C2N-N1N	2.79	1.38	1.35
4	C	501	NAD	C2N-N1N	2.62	1.37	1.35
4	D	501	NAD	PA-O3	2.35	1.62	1.59
4	D	501	NAD	O4D-C1D	2.07	1.43	1.40

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	501	NAD	O2B-C2B-C1B	4.00	123.86	110.10
4	C	501	NAD	C2N-C3N-C4N	3.53	122.36	118.26
4	A	501	NAD	O2B-C2B-C1B	3.42	121.88	110.10
4	C	501	NAD	C6N-N1N-C2N	-3.39	119.00	121.88
4	B	501	NAD	C2N-C3N-C4N	3.08	121.84	118.26
4	D	501	NAD	C6N-N1N-C2N	-3.07	119.27	121.88
4	C	501	NAD	C4N-C3N-C7N	-2.95	113.02	121.06
4	B	501	NAD	O3D-C3D-C4D	-2.87	102.85	111.08
4	D	501	NAD	O2N-PN-O3	-2.72	99.93	107.27
4	D	501	NAD	O2N-PN-O1N	2.71	125.06	112.44
4	D	501	NAD	O3-PA-O1A	-2.52	103.14	110.70
4	B	501	NAD	O2N-PN-O1N	2.45	123.84	112.44
4	A	501	NAD	O3-PA-O1A	-2.33	103.71	110.70
4	B	501	NAD	C6N-N1N-C2N	-2.30	119.92	121.88
4	D	501	NAD	C2N-C3N-C4N	2.22	120.84	118.26
4	A	501	NAD	C6N-N1N-C2N	-2.20	120.01	121.88
4	B	501	NAD	O2A-PA-O1A	2.18	122.57	112.44
4	A	501	NAD	C2N-C3N-C7N	2.16	125.70	119.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	501	NAD	O2D-C2D-C3D	2.13	118.64	111.82
4	A	501	NAD	O2A-PA-O1A	2.08	122.14	112.44
4	C	501	NAD	O3B-C3B-C2B	2.02	118.28	111.82

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	501	NAD	O4D-C1D-N1N-C2N
4	A	501	NAD	O4D-C1D-N1N-C6N
4	A	501	NAD	C2D-C1D-N1N-C2N
4	A	501	NAD	C2D-C1D-N1N-C6N
4	B	501	NAD	O4D-C1D-N1N-C6N
4	C	501	NAD	O4D-C1D-N1N-C2N
4	C	501	NAD	O4D-C1D-N1N-C6N
4	C	501	NAD	C2D-C1D-N1N-C2N
4	D	501	NAD	C5D-O5D-PN-O2N
4	D	501	NAD	O4D-C1D-N1N-C6N
4	D	501	NAD	PN-O3-PA-O5B
4	C	501	NAD	O4B-C4B-C5B-O5B
4	C	501	NAD	C3B-C4B-C5B-O5B
4	D	501	NAD	C4N-C3N-C7N-N7N
4	C	501	NAD	PN-O3-PA-O1A
4	B	501	NAD	C4N-C3N-C7N-N7N
4	B	501	NAD	O4D-C1D-N1N-C2N
4	D	501	NAD	O4D-C1D-N1N-C2N
4	C	501	NAD	PN-O3-PA-O2A
4	D	501	NAD	O4B-C4B-C5B-O5B
4	B	501	NAD	O4B-C4B-C5B-O5B
4	A	501	NAD	O4B-C4B-C5B-O5B

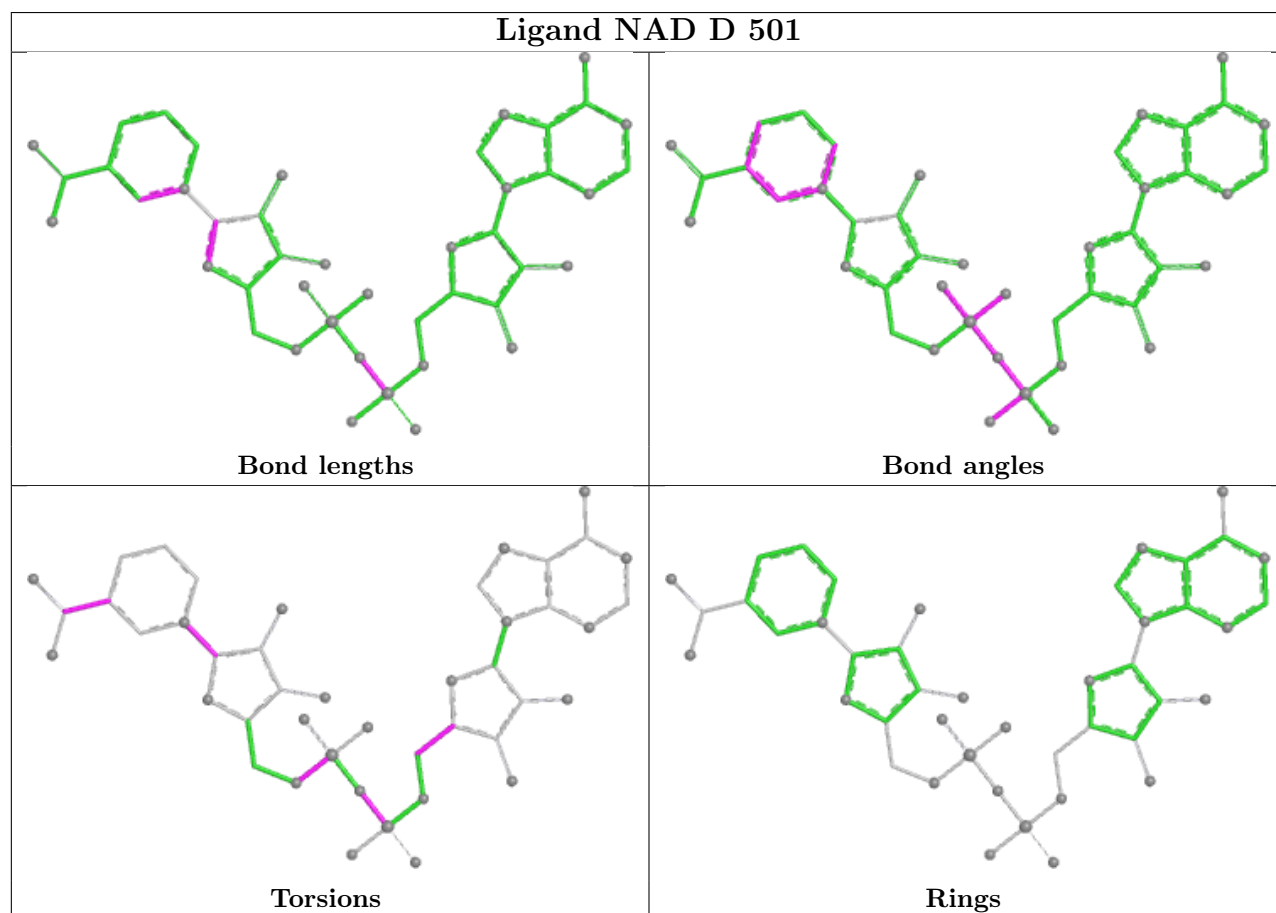
There are no ring outliers.

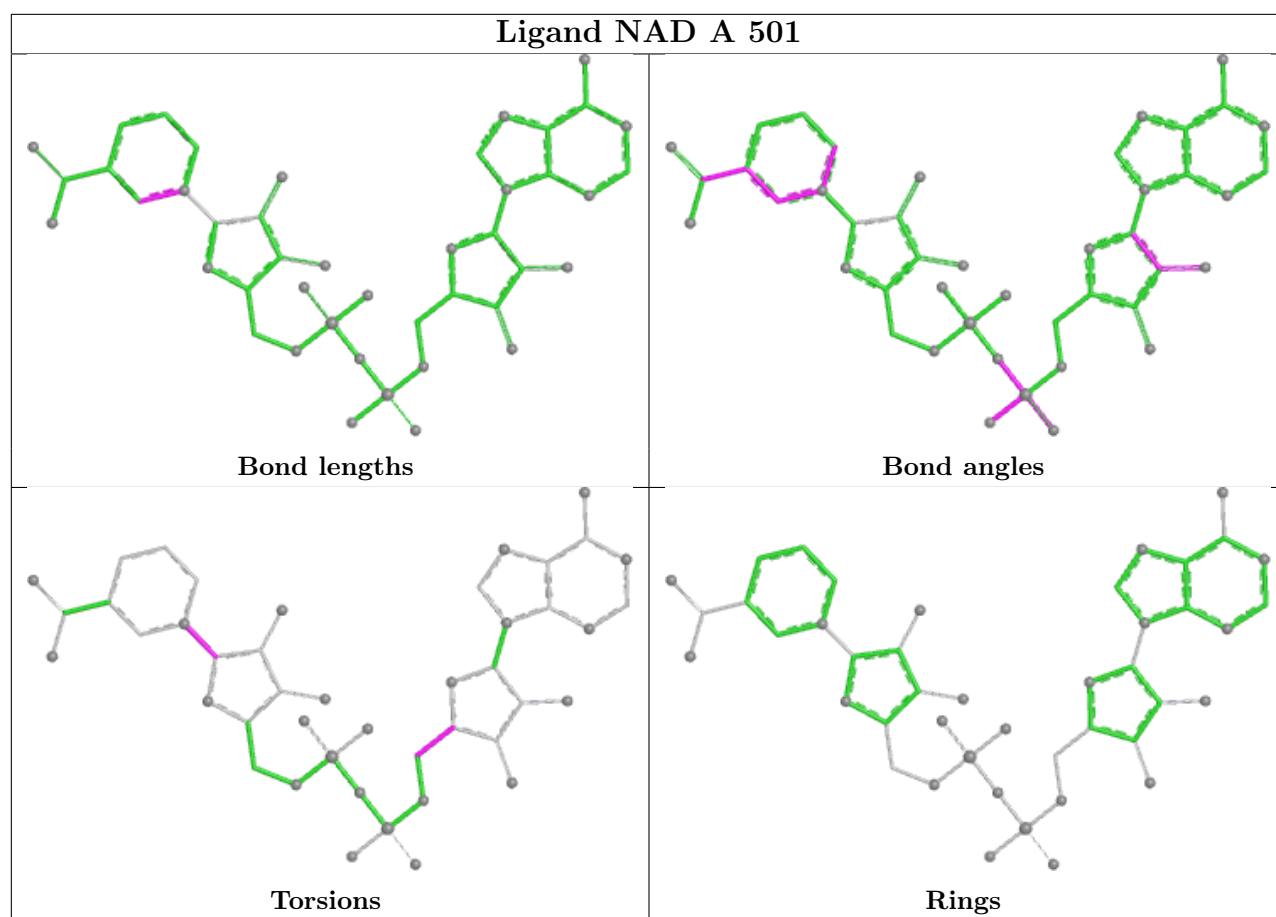
4 monomers are involved in 10 short contacts:

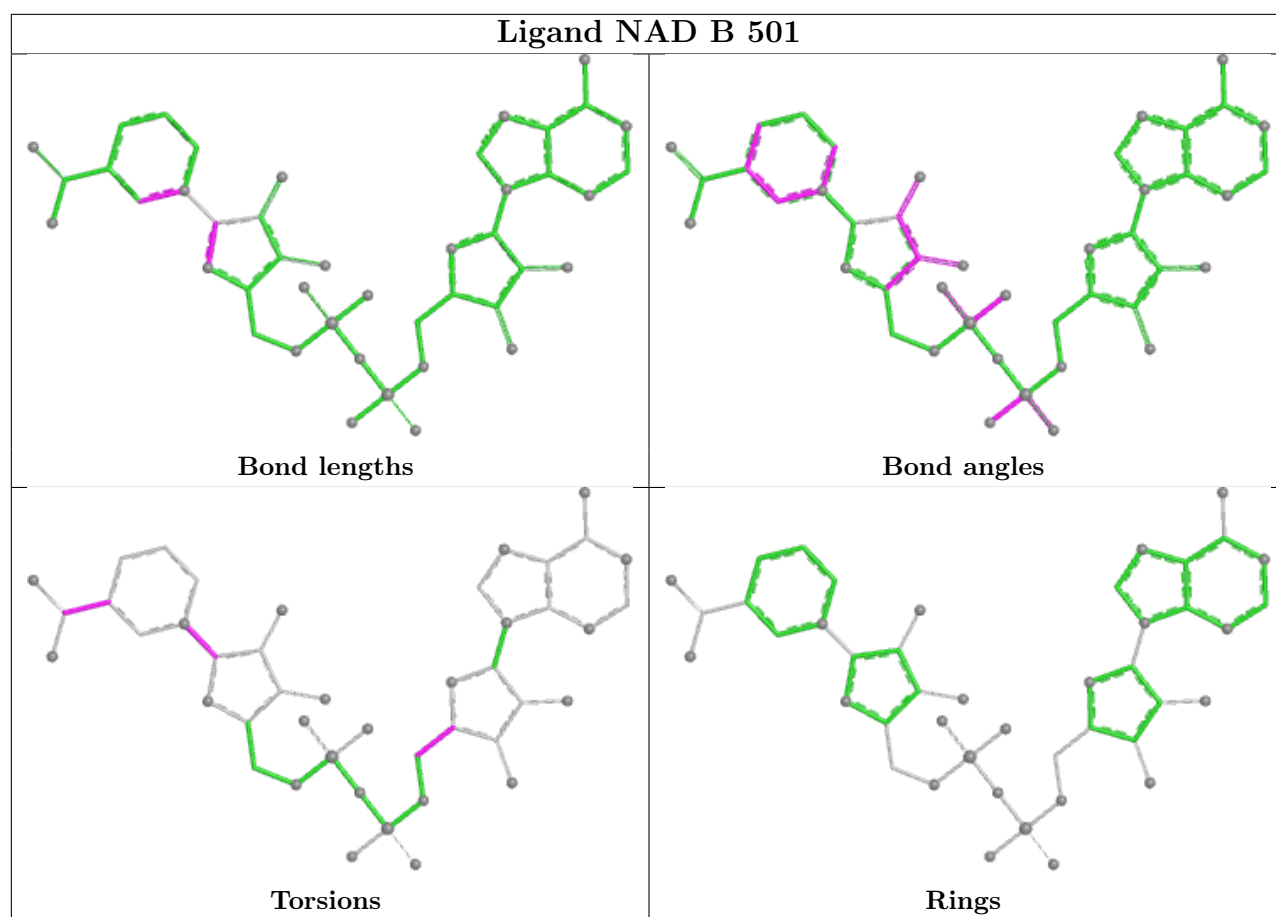
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	501	NAD	2	0
4	A	501	NAD	3	0
4	B	501	NAD	3	0
4	C	501	NAD	2	0

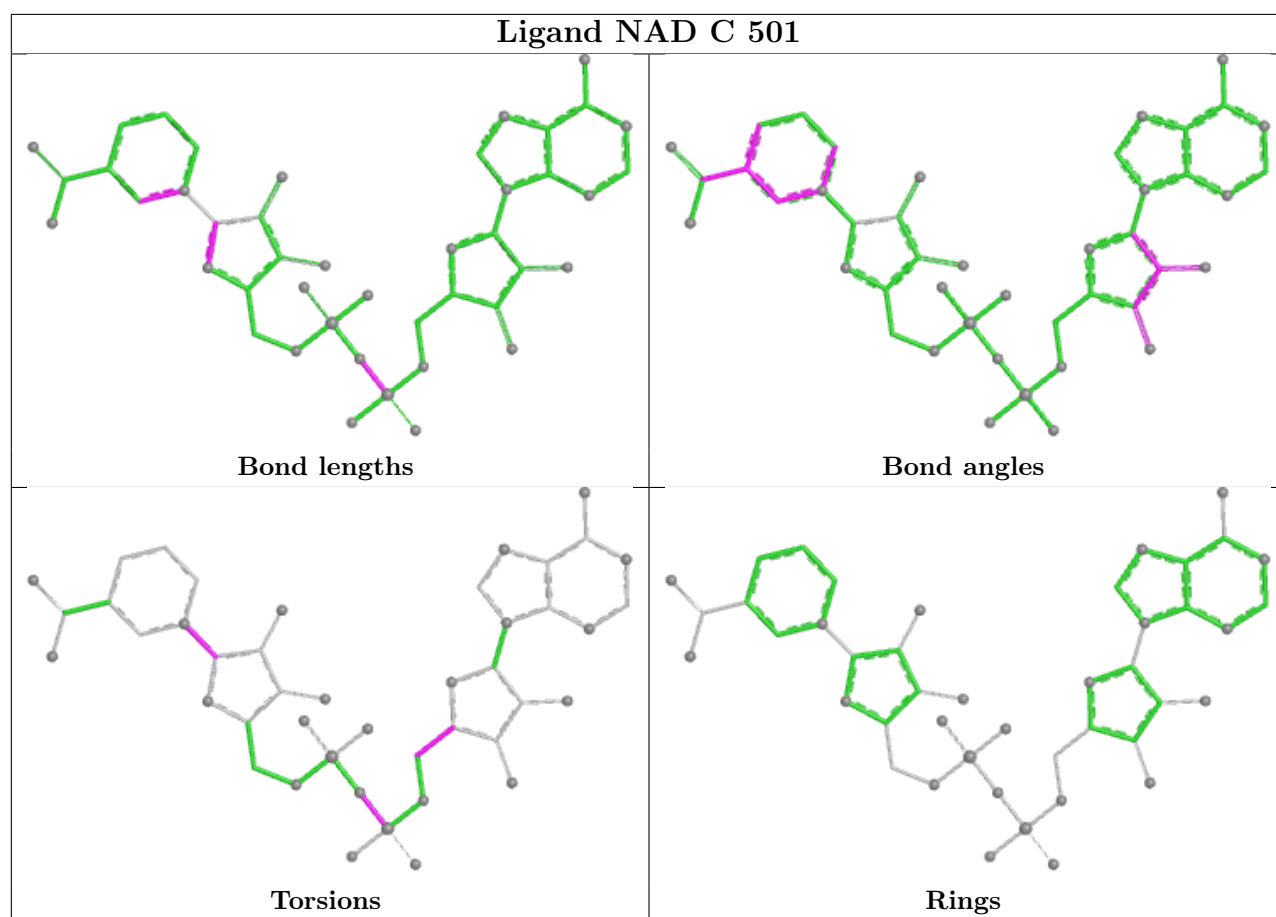
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	451/451 (100%)	-0.25	0 100 100	20, 27, 39, 48	0
1	B	451/451 (100%)	0.04	3 (0%) 84 80	25, 37, 54, 76	0
1	C	451/451 (100%)	0.02	2 (0%) 88 86	28, 44, 67, 92	0
1	D	451/451 (100%)	0.24	1 (0%) 91 90	32, 51, 73, 94	0
All	All	1804/1804 (100%)	0.01	6 (0%) 90 88	20, 40, 66, 94	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	67	GLY	3.2
1	C	452	ASP	3.1
1	C	453	GLY	2.7
1	B	436	ASP	2.5
1	D	102	SER	2.4
1	B	490	ARG	2.2

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(Å ²)	Q<0.9
2	GLC	H	1	11/12	0.67	0.12	84,87,89,90	0

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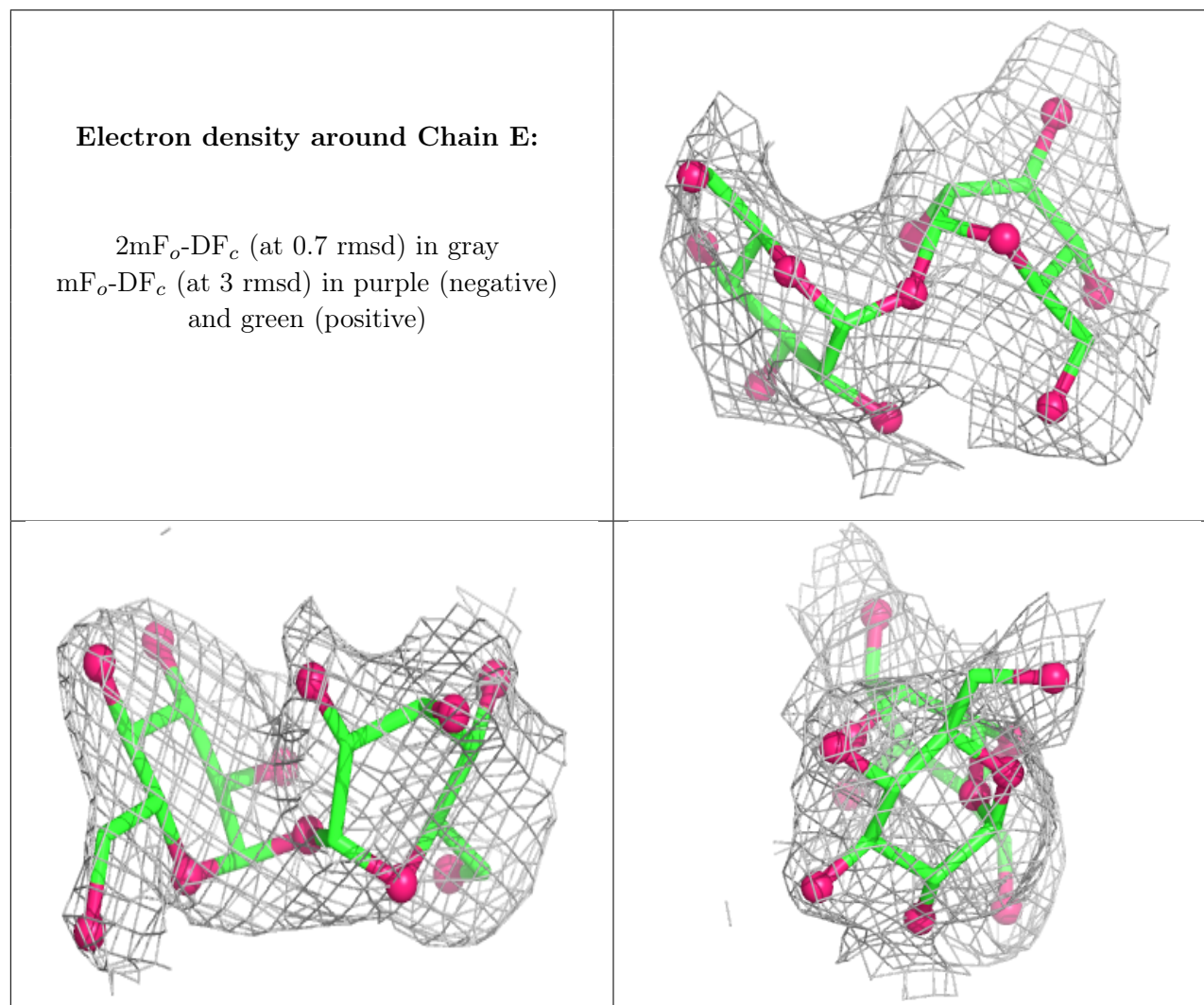
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	GLC	X	2	11/12	0.77	0.13	45,73,89,93	0
2	GLC	G	1	11/12	0.80	0.10	68,69,70,70	0
2	GLC	W	1	11/12	0.81	0.12	39,55,61,65	0
2	GLC	H	2	12/12	0.84	0.12	71,76,78,80	0
3	GLC	F	1	12/12	0.84	0.10	54,58,63,63	0
2	GLC	U	1	11/12	0.84	0.12	46,53,63,68	0
3	GLC	Z	2	11/12	0.84	0.10	45,60,72,88	0
3	GLC	F	2	11/12	0.85	0.11	53,56,58,58	0
3	GLC	R	2	11/12	0.85	0.10	38,46,48,49	0
2	GLC	G	2	12/12	0.85	0.13	63,68,69,69	0
2	GLC	U	2	12/12	0.85	0.14	46,68,78,78	0
2	GLC	W	2	12/12	0.86	0.10	47,65,70,71	0
3	GLC	O	2	11/12	0.87	0.09	43,49,53,59	0
2	GLC	E	1	11/12	0.87	0.11	48,52,55,60	0
2	GLC	E	2	12/12	0.88	0.10	43,53,57,59	0
2	GLC	T	2	12/12	0.88	0.10	47,57,73,73	0
3	GLC	I	2	11/12	0.89	0.09	34,42,46,48	0
3	GLC	M	2	11/12	0.89	0.09	35,40,42,46	0
2	GLC	Q	1	11/12	0.89	0.10	35,40,48,50	0
2	GLC	T	1	11/12	0.90	0.09	39,59,71,83	0
3	GLC	N	2	11/12	0.90	0.11	28,36,45,49	0
3	GLC	N	1	12/12	0.91	0.08	26,31,38,43	0
3	GLC	Z	1	12/12	0.91	0.10	40,50,62,82	0
2	GLC	V	1	11/12	0.91	0.09	48,53,63,63	0
3	GLC	X	1	12/12	0.92	0.09	50,58,66,75	0
3	GLC	J	2	11/12	0.92	0.08	32,36,45,47	0
2	GLC	V	2	12/12	0.92	0.08	36,41,46,50	0
2	GLC	L	1	11/12	0.92	0.08	32,33,44,48	0
3	GLC	K	2	11/12	0.93	0.09	29,35,38,38	0
3	GLC	S	2	11/12	0.93	0.08	28,40,47,48	0
3	GLC	K	1	12/12	0.94	0.08	19,23,35,48	0
3	GLC	Y	2	11/12	0.94	0.07	32,35,46,48	0
2	GLC	L	2	12/12	0.94	0.07	26,35,42,45	0
3	GLC	I	1	12/12	0.94	0.07	23,28,33,39	0
2	GLC	Q	2	12/12	0.95	0.07	36,42,51,52	0
3	GLC	Y	1	12/12	0.95	0.06	23,26,27,31	0
2	GLC	P	2	12/12	0.95	0.07	31,46,49,51	0
3	GLC	M	1	12/12	0.95	0.09	20,22,31,34	0
3	GLC	O	1	12/12	0.95	0.07	30,34,44,47	0
3	GLC	J	1	12/12	0.96	0.06	22,28,34,35	0
3	GLC	S	1	12/12	0.96	0.06	30,32,38,38	0
3	GLC	R	1	12/12	0.96	0.06	26,36,42,47	0

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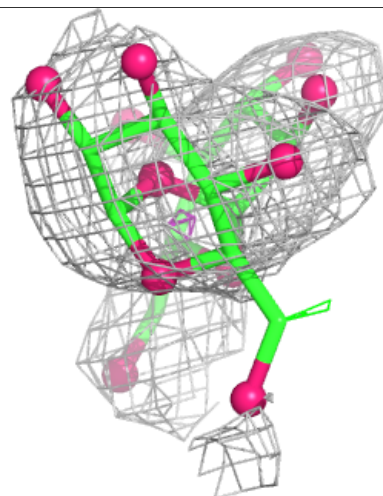
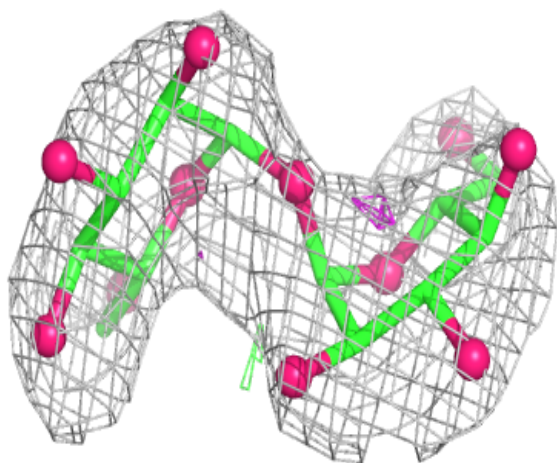
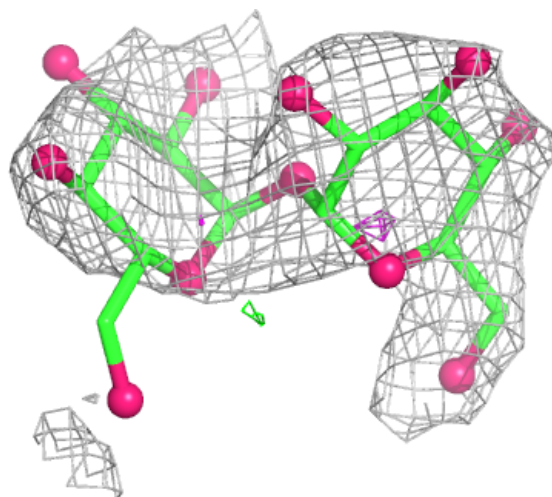
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	GLC	P	1	11/12	0.97	0.06	22,26,28,29	0

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.



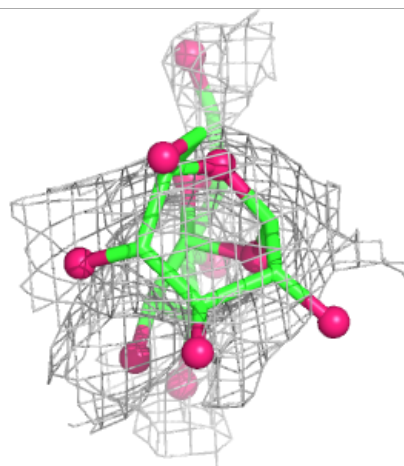
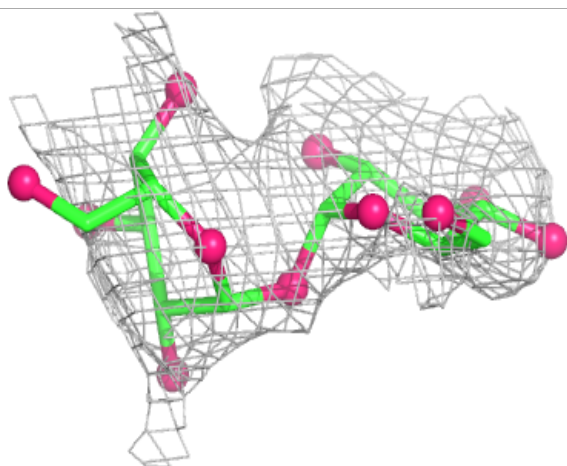
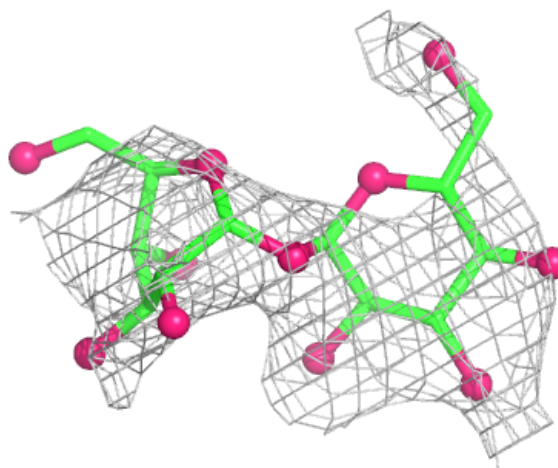
Electron density around Chain G:

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



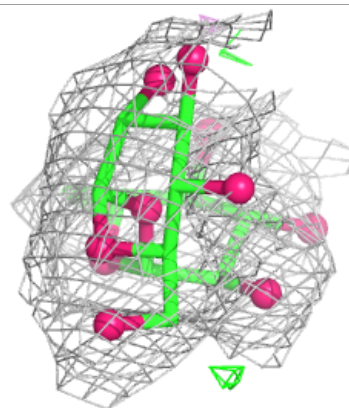
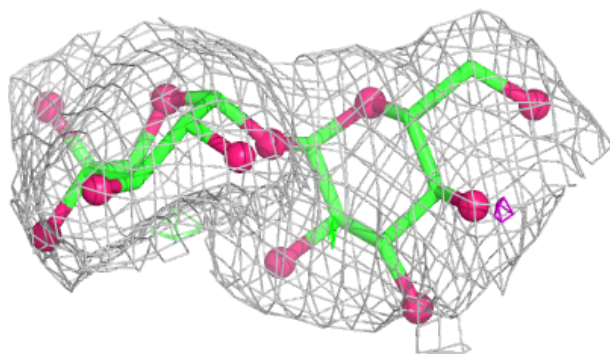
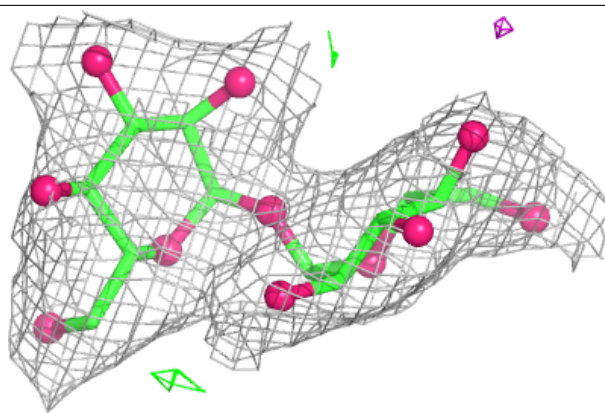
Electron density around Chain H:

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



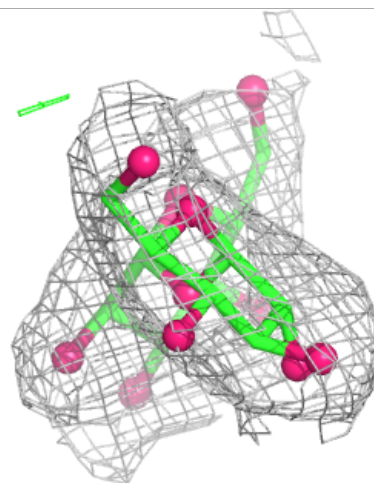
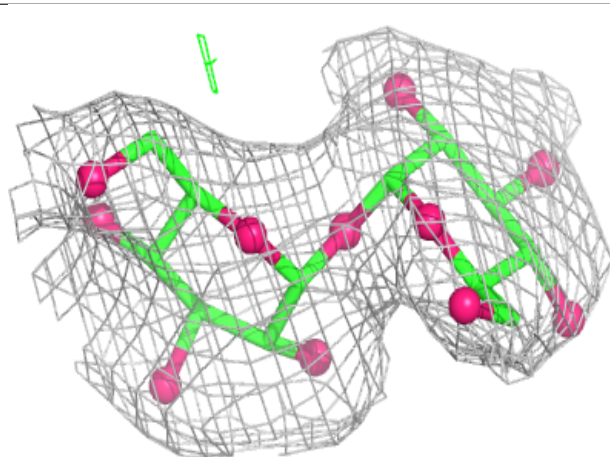
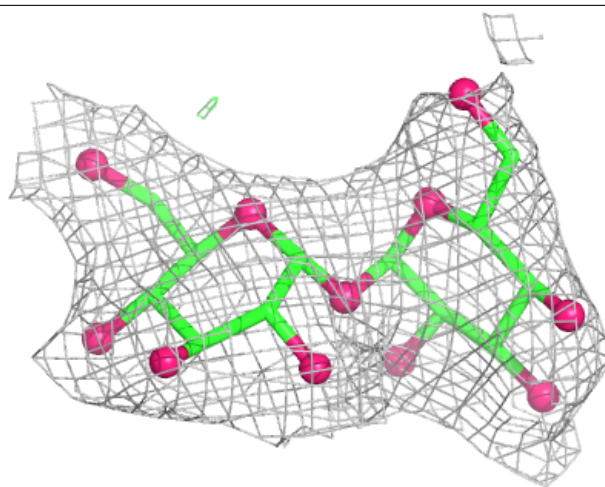
Electron density around Chain L:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



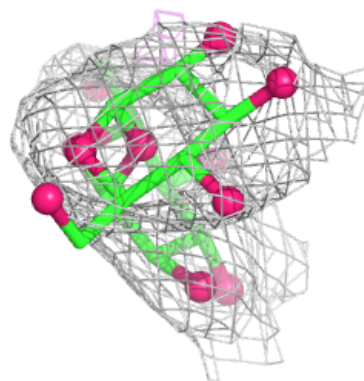
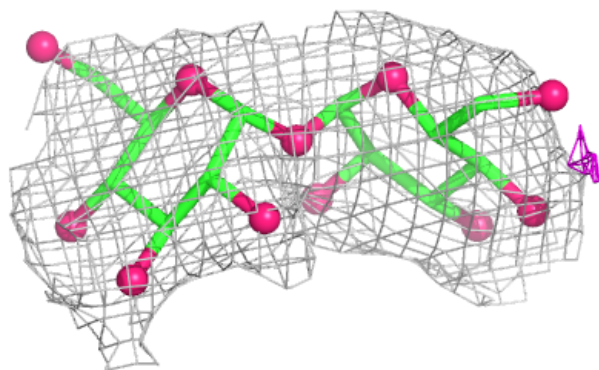
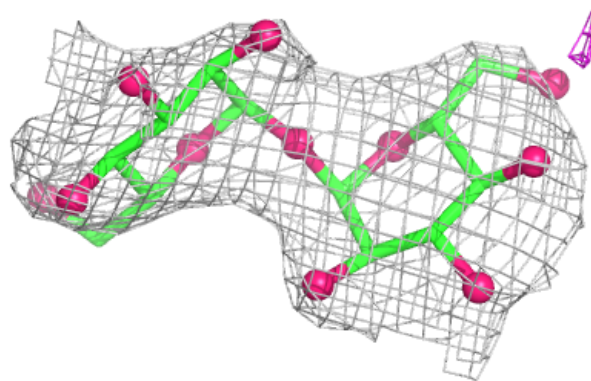
Electron density around Chain P:

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and green (positive)



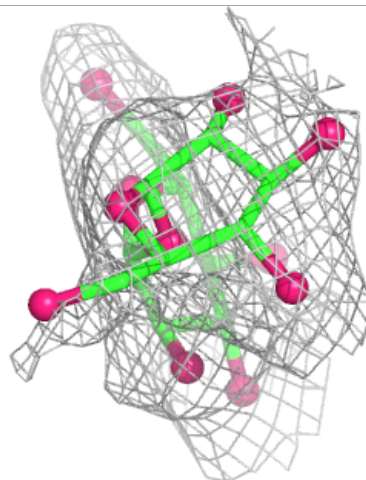
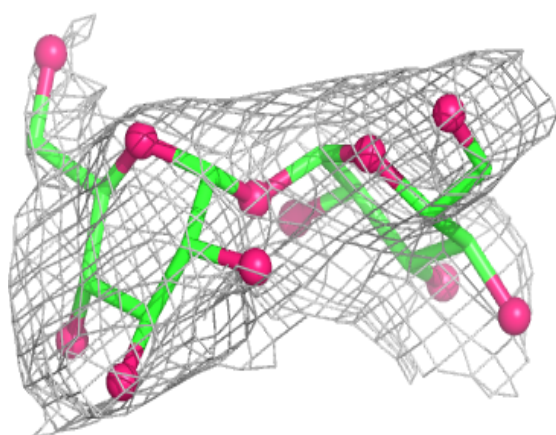
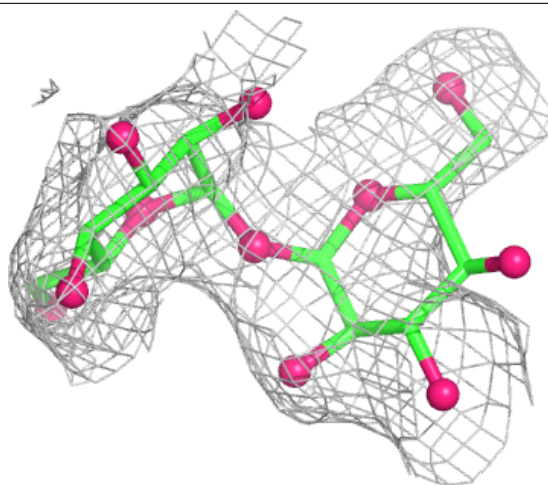
Electron density around Chain Q:

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



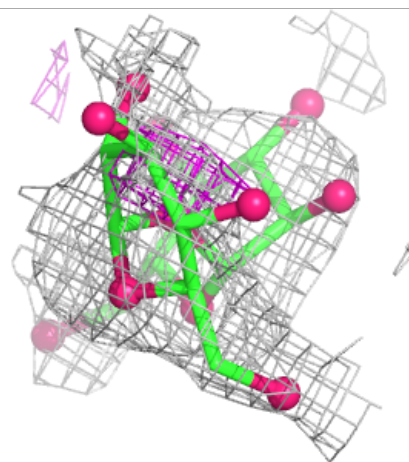
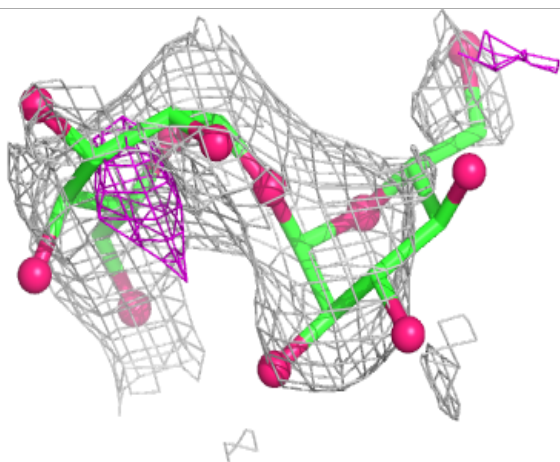
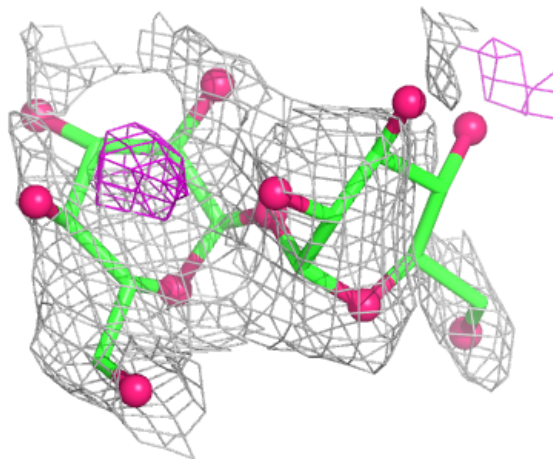
Electron density around Chain T:

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



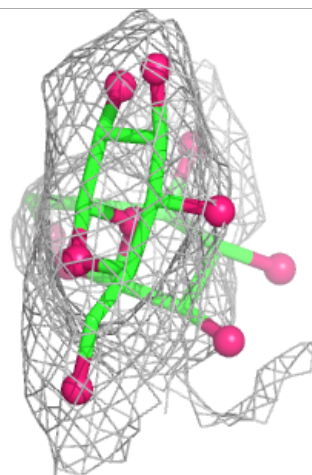
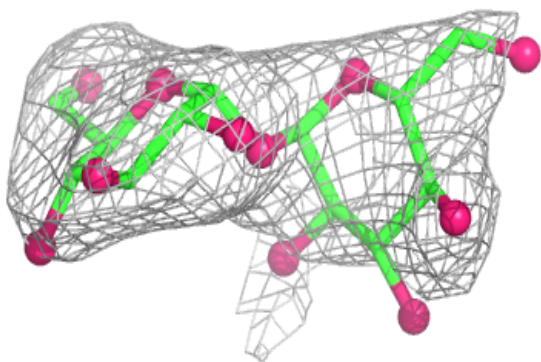
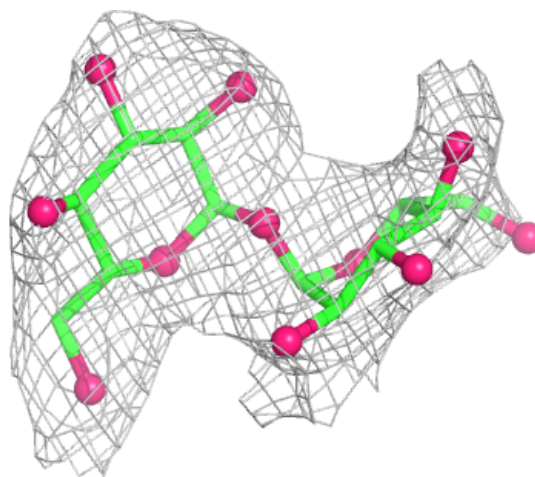
Electron density around Chain U:

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



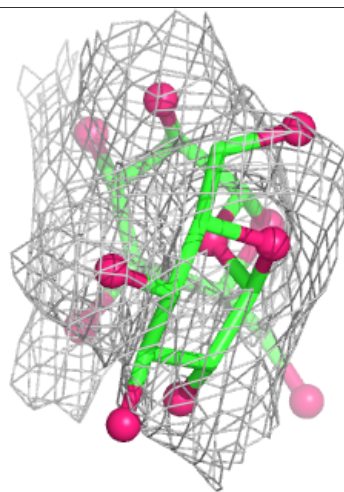
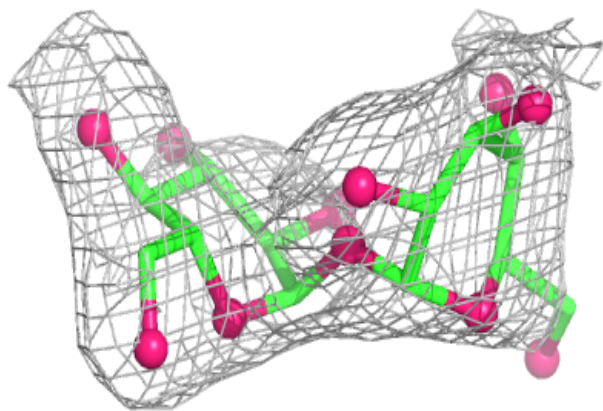
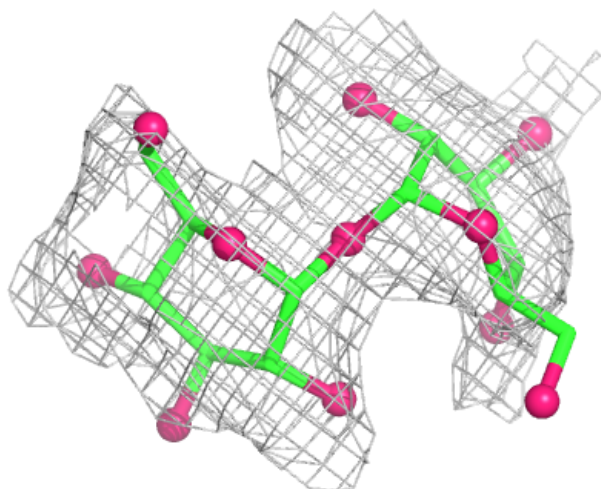
Electron density around Chain V:

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



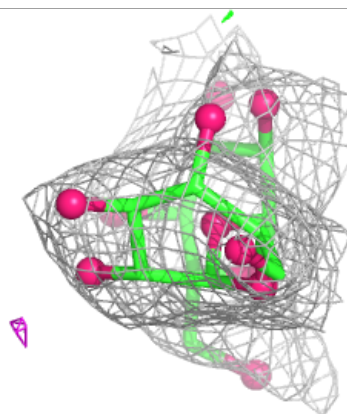
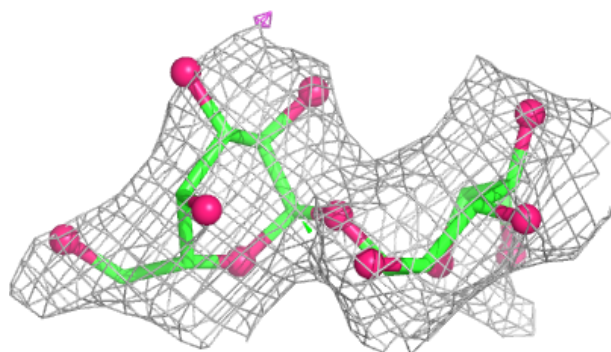
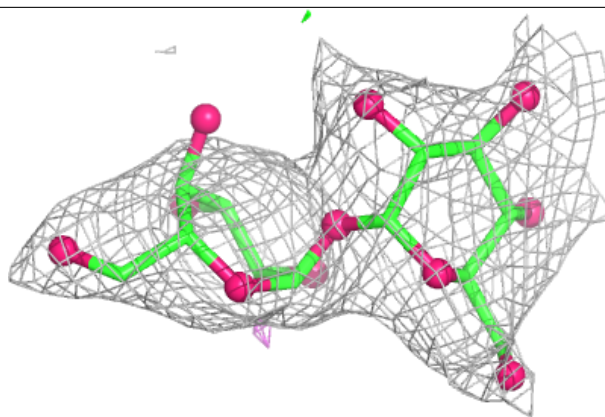
Electron density around Chain W:

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

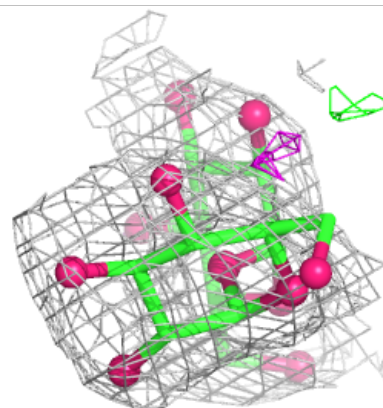
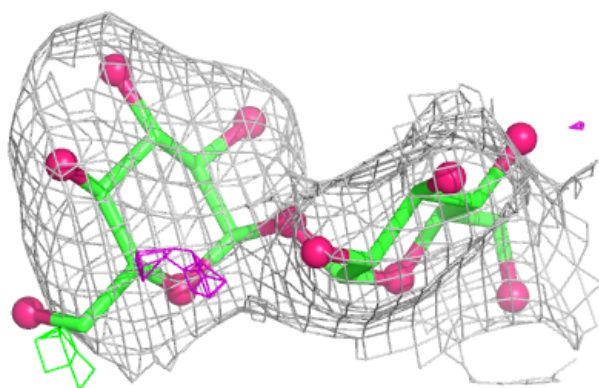
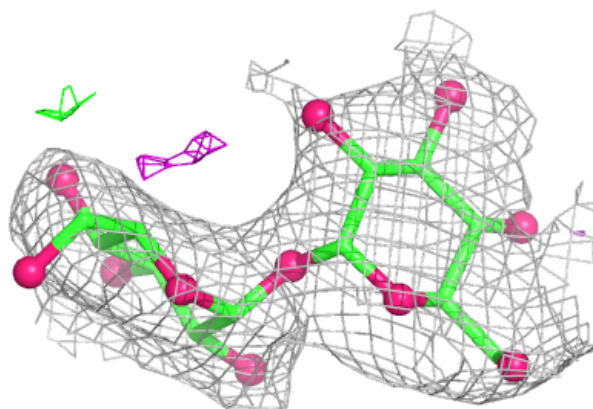


Electron density around Chain F:

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and green (positive)

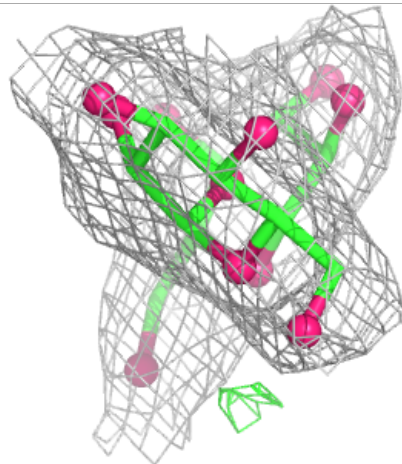
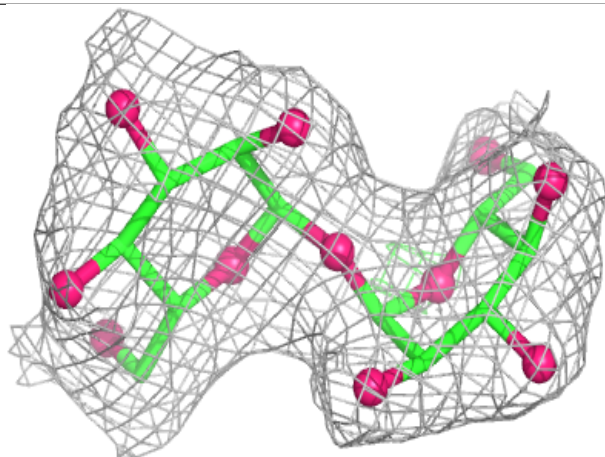
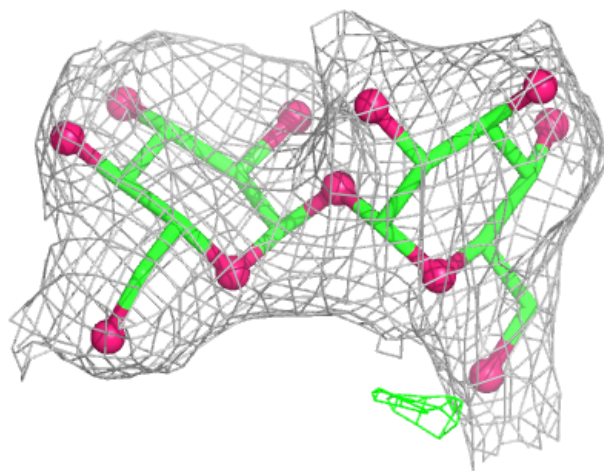
**Electron density around Chain I:**

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



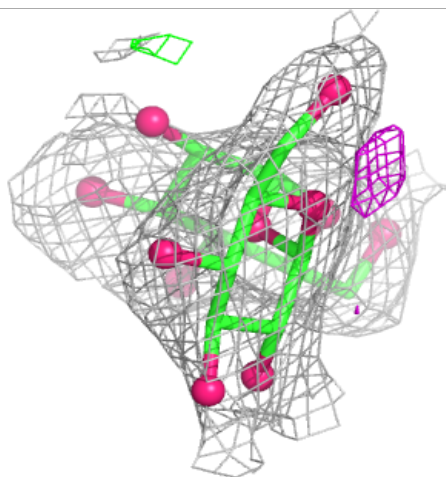
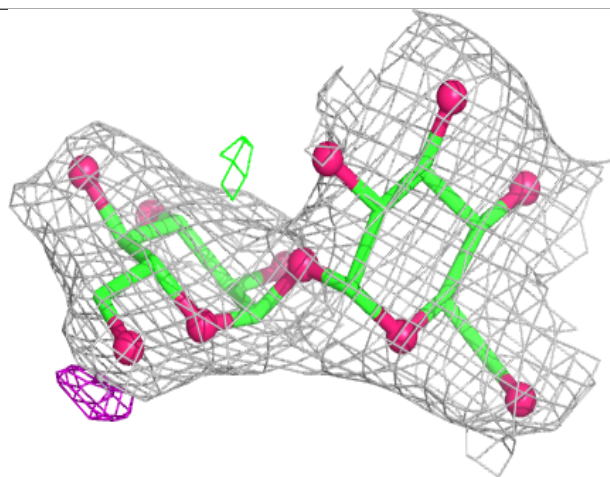
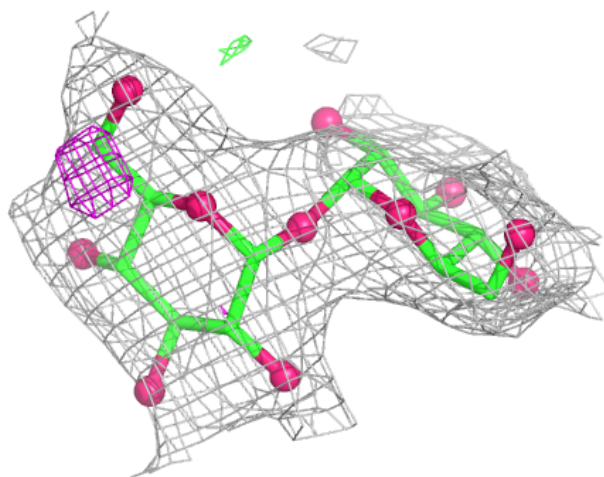
Electron density around Chain J:

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



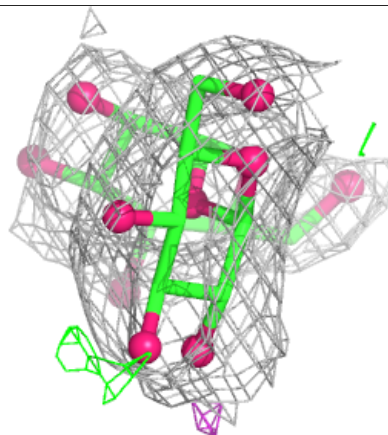
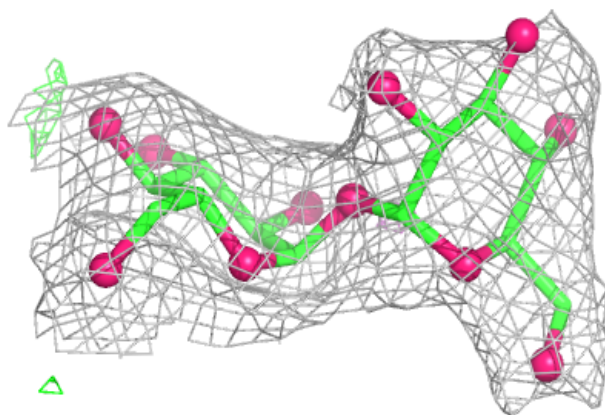
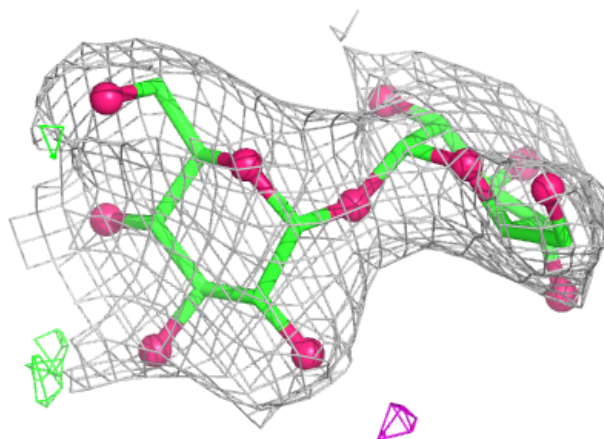
Electron density around Chain K:

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



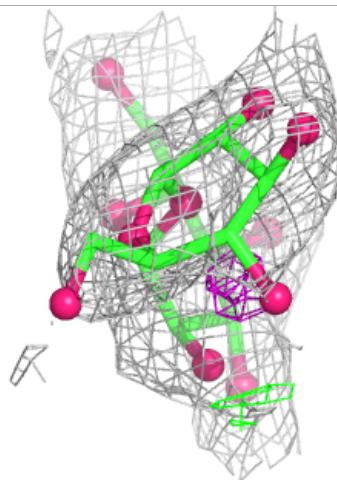
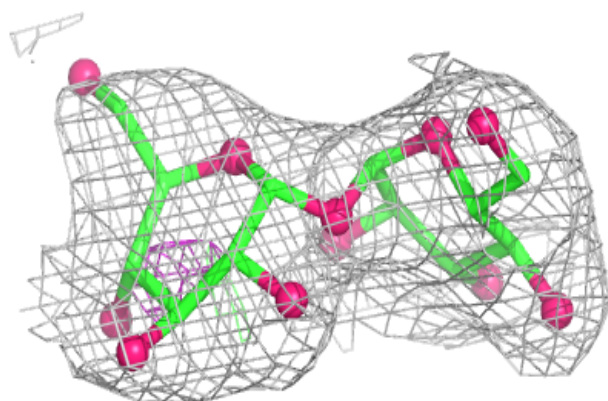
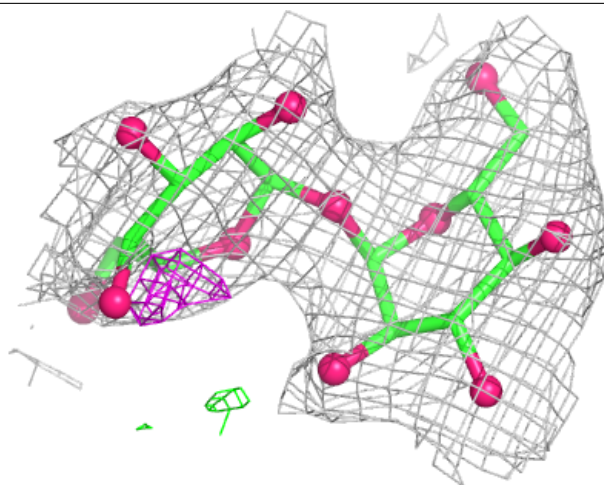
Electron density around Chain M:

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



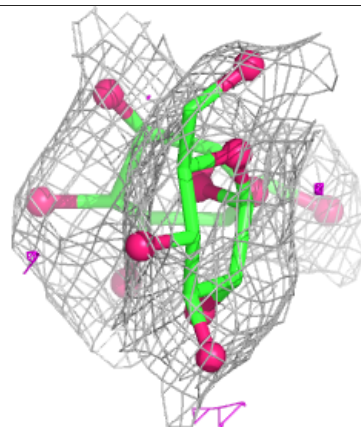
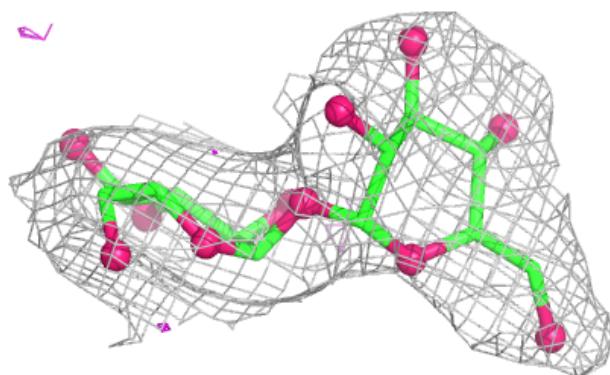
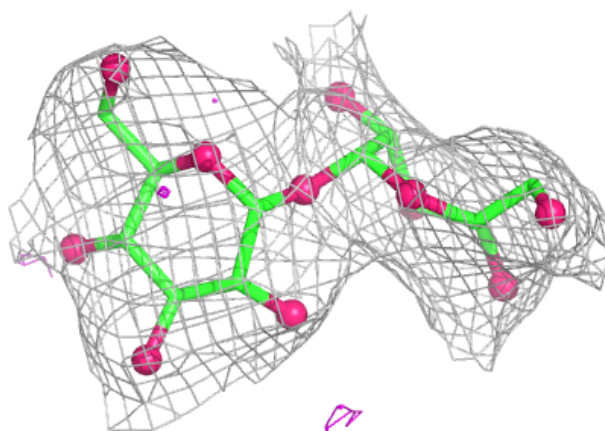
Electron density around Chain N:

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



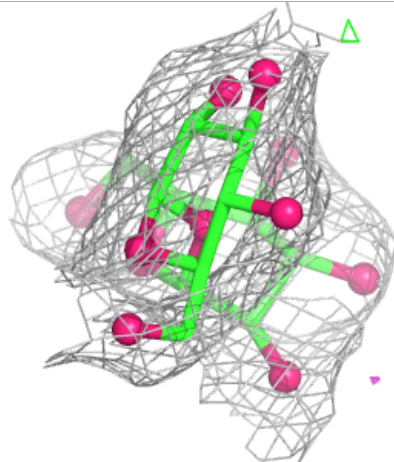
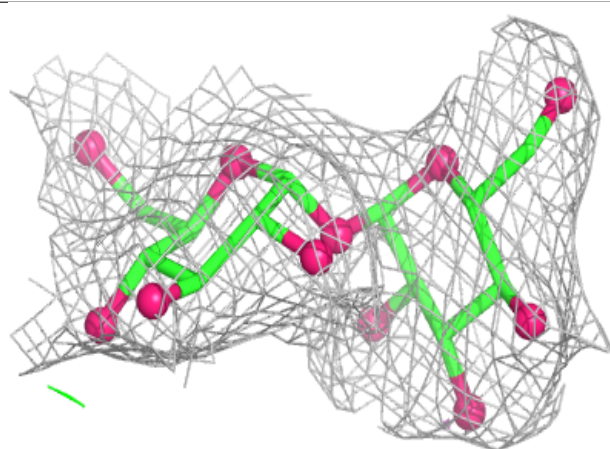
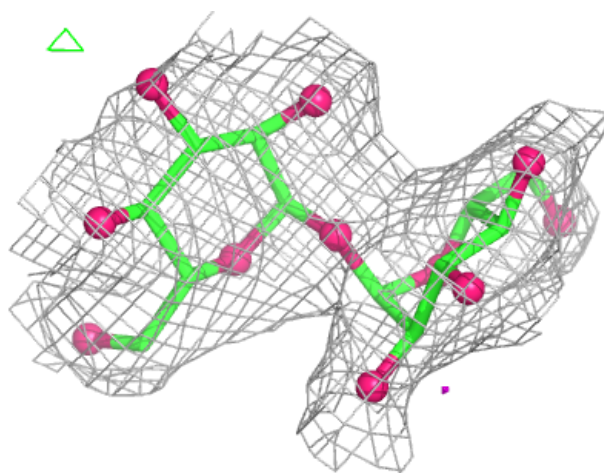
Electron density around Chain O:

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



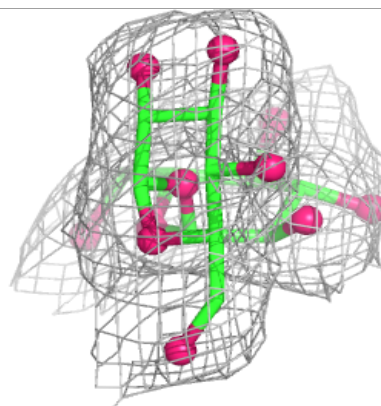
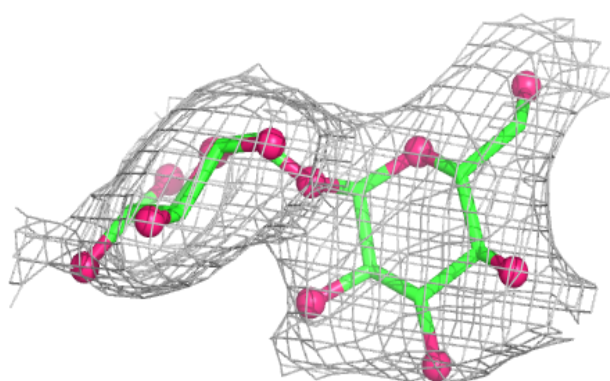
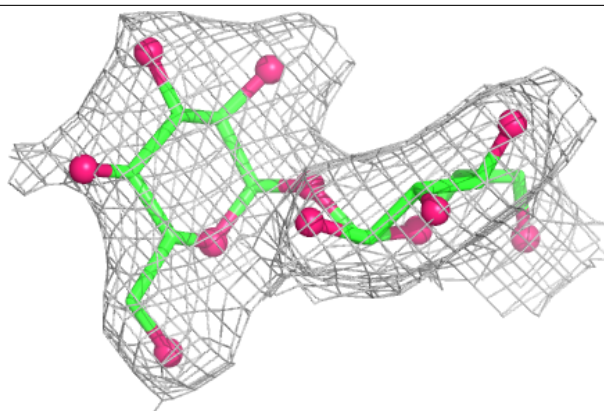
Electron density around Chain R:

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

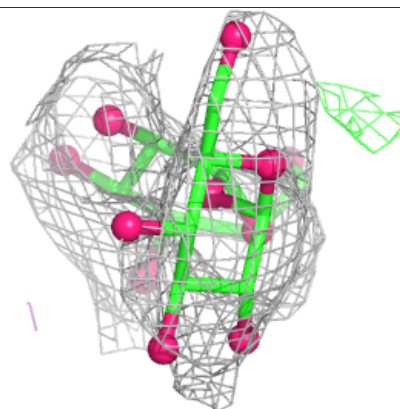
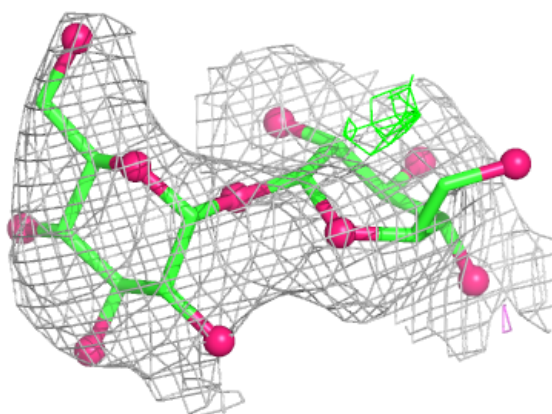


Electron density around Chain S:

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

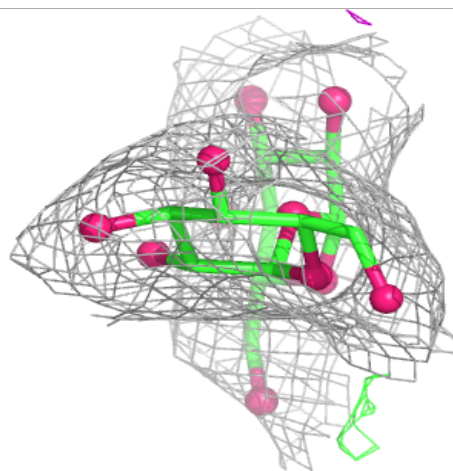
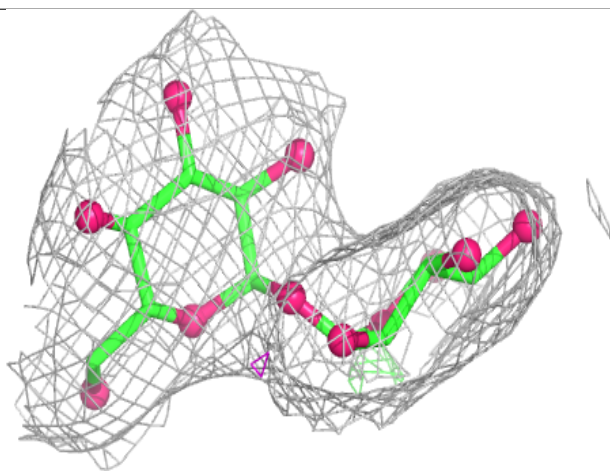
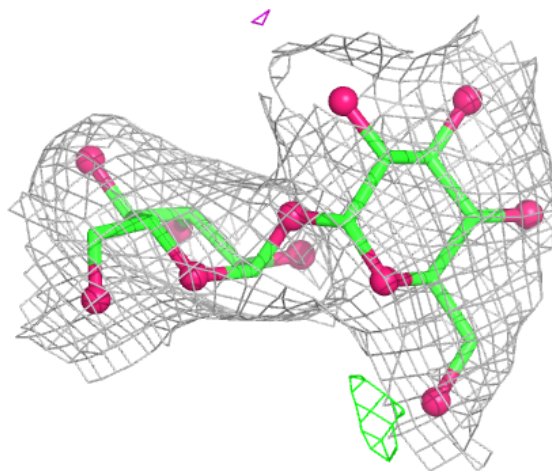
**Electron density around Chain X:**

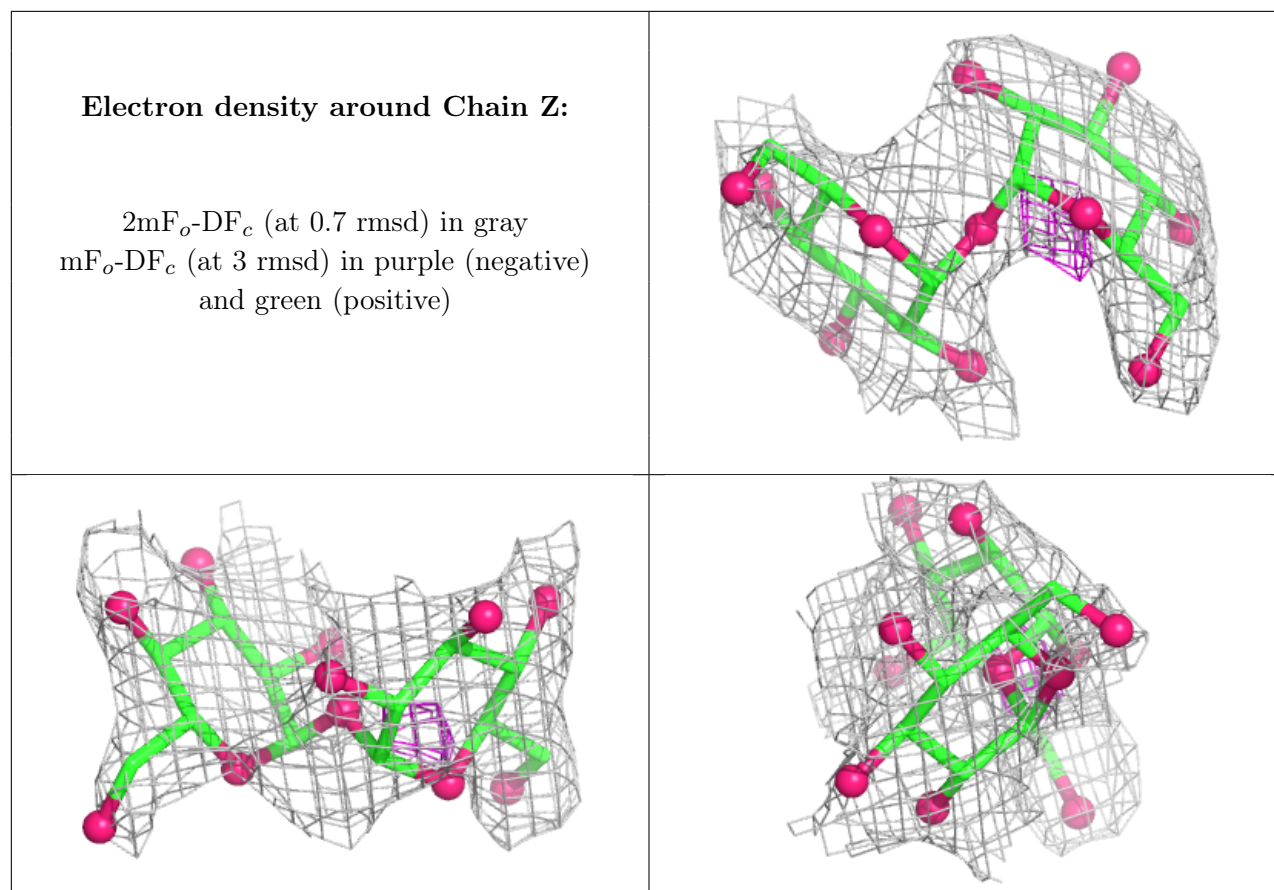
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain Y:

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





6.4 Ligands [i](#)

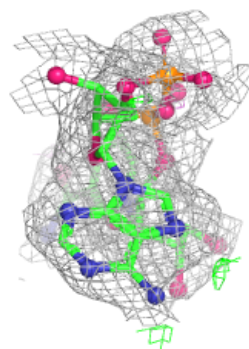
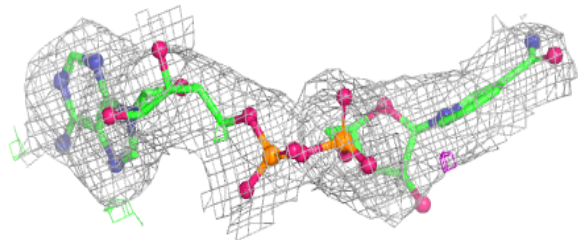
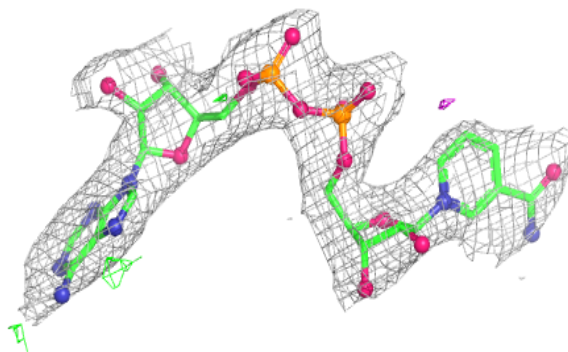
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAD	C	501	44/44	0.96	0.08	37,43,48,50	0
4	NAD	D	501	44/44	0.96	0.08	41,44,52,52	0
4	NAD	B	501	44/44	0.97	0.07	26,29,33,34	0
4	NAD	A	501	44/44	0.98	0.06	19,21,23,23	0

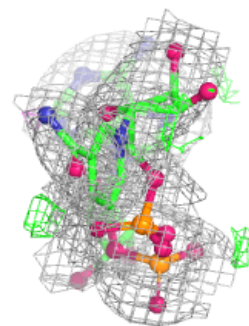
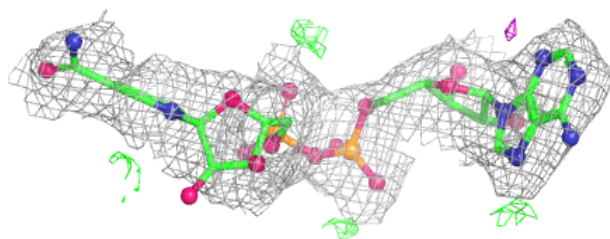
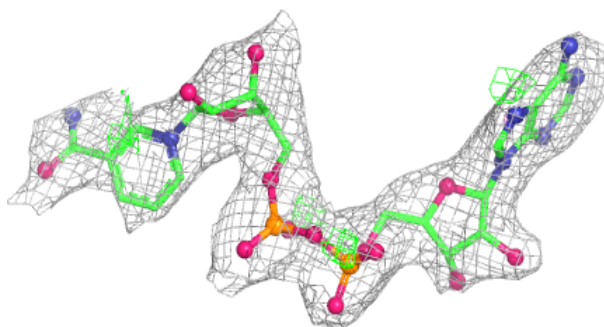
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NAD C 501:

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

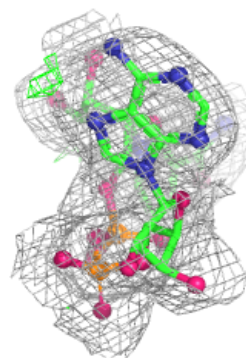
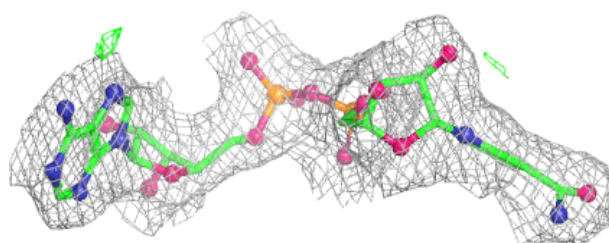
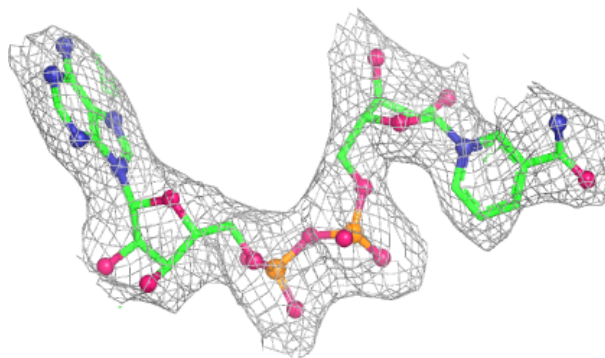
**Electron density around NAD D 501:**

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

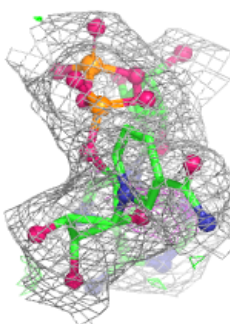
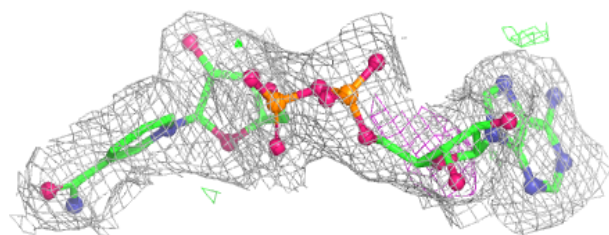
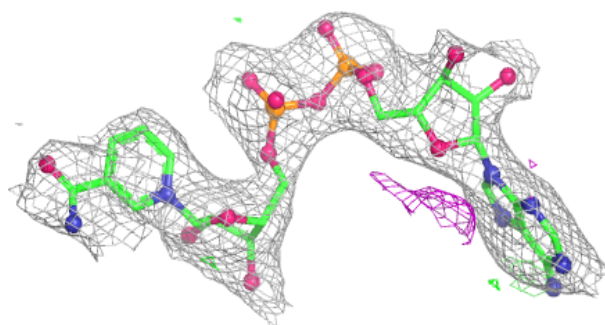


Electron density around NAD B 501:

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

**Electron density around NAD 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)



6.5 Other polymers [i](#)

There are no such residues in this entry.