



wwPDB X-ray Structure Validation Summary Report

Dec 16, 2023 – 09:51 AM EST

PDB ID : 2ONC
Title : Crystal structure of human DPP-4
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Deposited on : 2007-01-23
Resolution : 2.55 Å(reported)

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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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

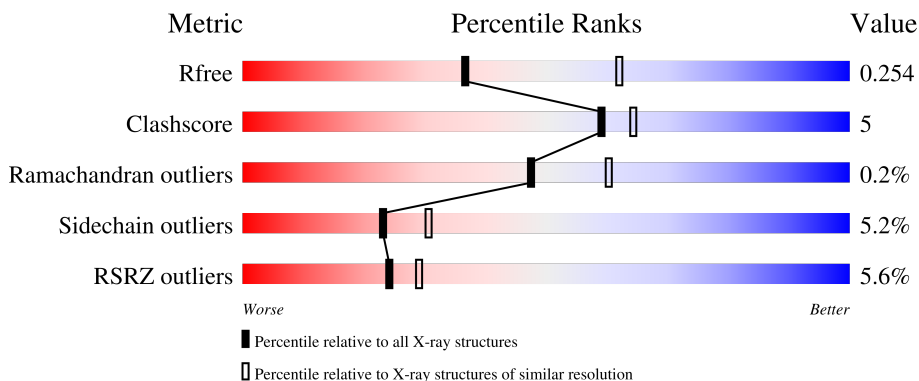
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

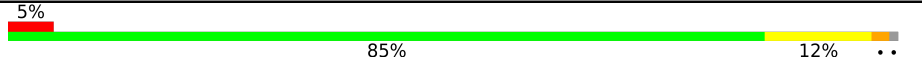



The reported resolution of this entry is 2.55 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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	731	
1	B	731	
1	C	731	
1	D	731	

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Mol	Chain	Length	Quality of chain
2	E	2	 50% 50%
2	F	2	 50% 50%
2	G	2	 50% 50%
2	H	2	 100%
2	I	2	 100%

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 25016 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 Dipeptidyl peptidase 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	724	5925	3807	973	1119	26	0	1	0
1	B	728	5958	3826	981	1125	26	0	1	0
1	C	723	5918	3802	972	1118	26	0	1	0
1	D	722	5907	3795	969	1117	26	0	0	0

There are 20 discrepancies between the modelled and reference sequences:

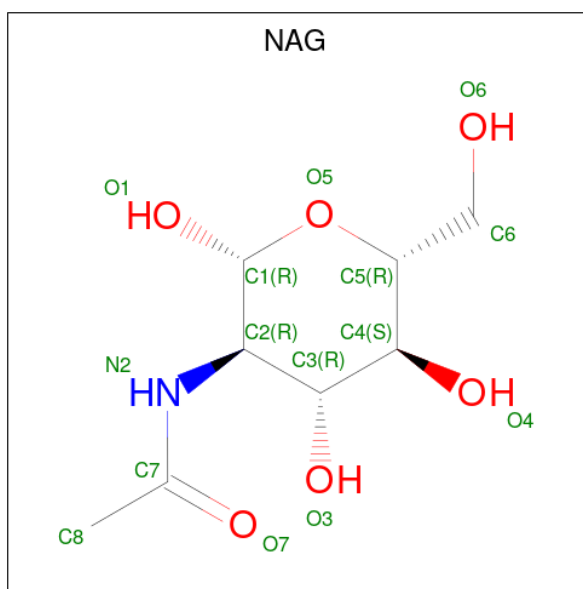
Chain	Residue	Modelled	Actual	Comment	Reference
A	36	HIS	-	expression tag	UNP P27487
A	37	HIS	-	expression tag	UNP P27487
A	38	ALA	-	expression tag	UNP P27487
A	39	SER	-	expression tag	UNP P27487
A	40	ALA	-	expression tag	UNP P27487
B	36	HIS	-	expression tag	UNP P27487
B	37	HIS	-	expression tag	UNP P27487
B	38	ALA	-	expression tag	UNP P27487
B	39	SER	-	expression tag	UNP P27487
B	40	ALA	-	expression tag	UNP P27487
C	36	HIS	-	expression tag	UNP P27487
C	37	HIS	-	expression tag	UNP P27487
C	38	ALA	-	expression tag	UNP P27487
C	39	SER	-	expression tag	UNP P27487
C	40	ALA	-	expression tag	UNP P27487
D	36	HIS	-	expression tag	UNP P27487
D	37	HIS	-	expression tag	UNP P27487
D	38	ALA	-	expression tag	UNP P27487
D	39	SER	-	expression tag	UNP P27487
D	40	ALA	-	expression tag	UNP P27487

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	E	2	28	16	2	10	0	0	0
2	F	2	28	16	2	10	0	0	0
2	G	2	28	16	2	10	0	0	0
2	H	2	28	16	2	10	0	0	0
2	I	2	28	16	2	10	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



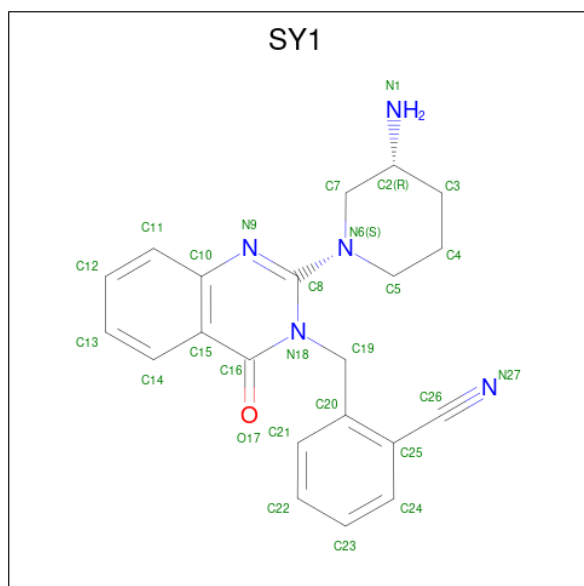
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	14	8	1	5	0	0
3	A	1	14	8	1	5	0	0
3	A	1	14	8	1	5	0	0

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

- Molecule 4 is 2-({2-[(3R)-3-AMINOPIPERIDIN-1-YL]-4-OXOQUINAZOLIN-3(4H)-YL}M ETHYL)BENZONITRILE (three-letter code: SY1) (formula: C₂₁H₂₁N₅O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			27	21	5	1		
4	A	1	Total	C	N	O	0	0
			27	21	5	1		
4	B	1	Total	C	N	O	0	0
			27	21	5	1		
4	B	1	Total	C	N	O	0	0
			27	21	5	1		
4	C	1	Total	C	N	O	0	0
			27	21	5	1		
4	C	1	Total	C	N	O	0	0
			27	21	5	1		
4	D	1	Total	C	N	O	0	0
			27	21	5	1		
4	D	1	Total	C	N	O	0	0
			27	21	5	1		

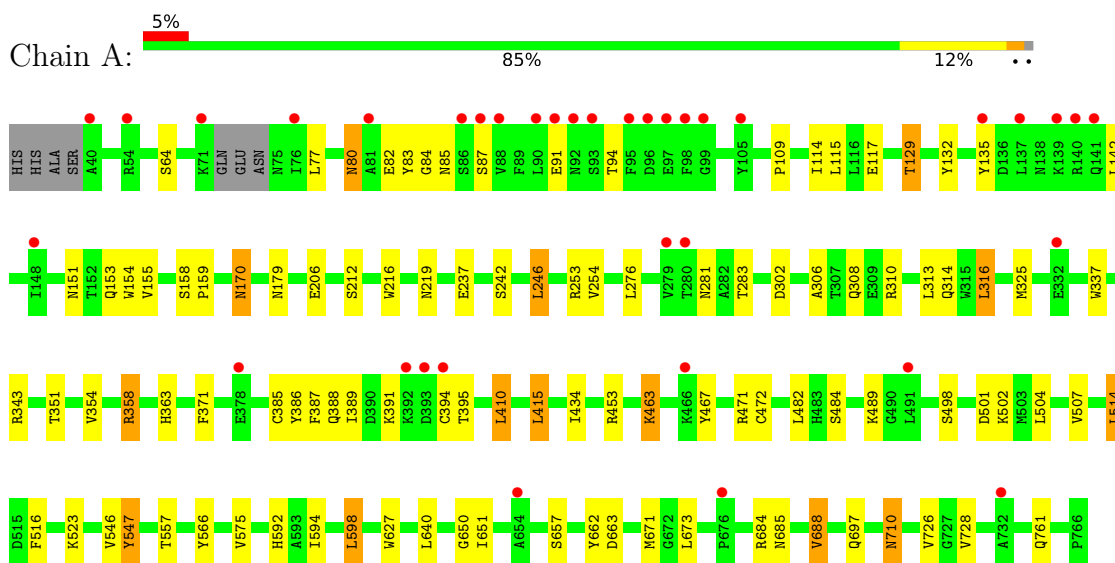
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	227	Total	O	0	0
			227	227		
5	B	213	Total	O	0	0
			213	213		
5	C	219	Total	O	0	0
			219	219		
5	D	97	Total	O	0	0
			97	97		

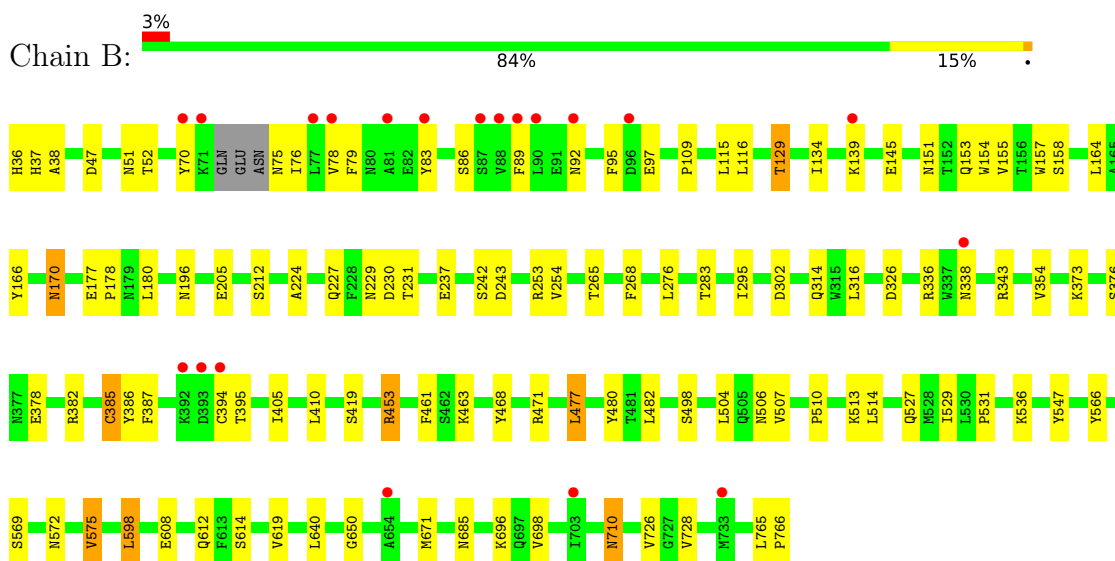
3 Residue-property plots [i](#)

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.

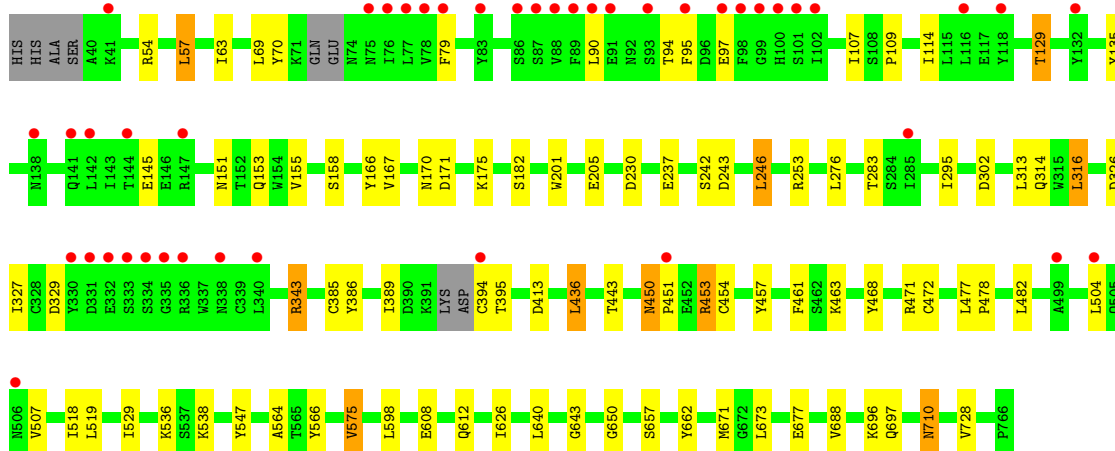
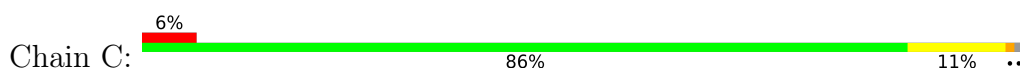
- Molecule 1: Dipeptidyl peptidase 4



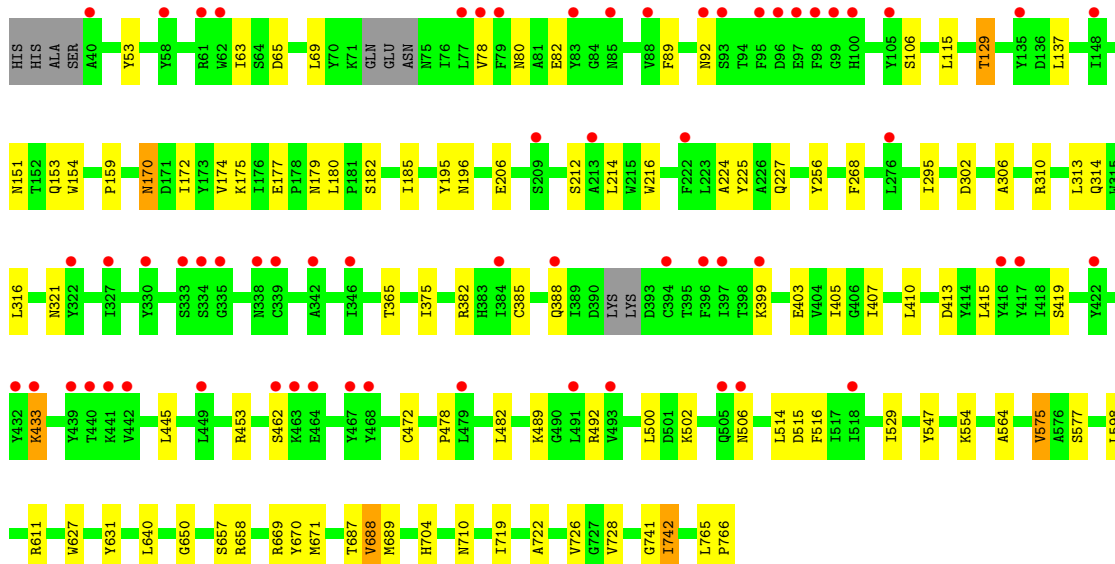
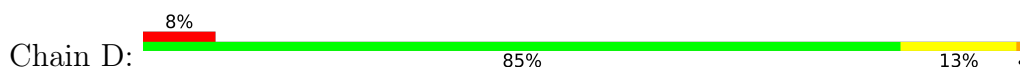
- Molecule 1: Dipeptidyl peptidase 4



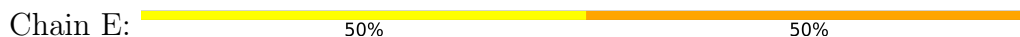
- Molecule 1: Dipeptidyl peptidase 4



- Molecule 1: Dipeptidyl peptidase 4



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



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



MAG1
MAG2


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

Chain G:  50% 50%MAG1
MAG2

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

Chain H:  100%MAG1
MAG2

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

Chain I:  100%MAG1
MAG2

4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	122.36Å 123.70Å 145.36Å 90.00° 114.89° 90.00°	Depositor
Resolution (Å)	50.00 – 2.55 38.65 – 2.55	Depositor EDS
% Data completeness (in resolution range)	92.8 (50.00-2.55) 92.8 (38.65-2.55)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.61 (at 2.54Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.195 , 0.254 0.195 , 0.254	Depositor DCC
R_{free} test set	5942 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	46.8	Xtrriage
Anisotropy	0.526	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 49.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.012 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	25016	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.26% 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, SY1

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	0.44	0/6096	0.59	2/8291 (0.0%)
1	B	0.42	0/6135	0.58	0/8344
1	C	0.43	0/6092	0.59	2/8285 (0.0%)
1	D	0.40	0/6077	0.55	0/8266
All	All	0.42	0/24400	0.58	4/33186 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	316	LEU	CA-CB-CG	5.45	127.84	115.30
1	C	57	LEU	CA-CB-CG	5.37	127.66	115.30
1	A	316	LEU	CA-CB-CG	5.09	127.00	115.30
1	A	142	LEU	CA-CB-CG	5.03	126.88	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	5925	0	5639	53	0
1	B	5958	0	5670	58	0
1	C	5918	0	5635	43	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	5907	0	5621	46	0
2	E	28	0	25	1	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	0	0
2	I	28	0	25	0	0
3	A	56	0	52	0	0
3	B	56	0	52	0	0
3	C	56	0	52	0	0
3	D	28	0	26	0	0
4	A	54	0	42	6	0
4	B	54	0	42	6	0
4	C	54	0	42	6	0
4	D	54	0	42	5	0
5	A	227	0	0	5	0
5	B	213	0	0	5	0
5	C	219	0	0	0	0
5	D	97	0	0	2	0
All	All	25016	0	23040	220	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 5.

The worst 5 of 220 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:153:GLN:HE22	1:B:170:ASN:H	1.07	1.00
1:C:153:GLN:HE22	1:C:170:ASN:H	1.13	0.95
1:A:153:GLN:HE22	1:A:170:ASN:H	1.20	0.89
4:B:800:SY1:H52	4:B:800:SY1:H191	1.57	0.87
1:D:153:GLN:HE22	1:D:170:ASN:H	1.25	0.81

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	720/731 (98%)	681 (95%)	37 (5%)	2 (0%)	41	51
1	B	725/731 (99%)	686 (95%)	37 (5%)	2 (0%)	41	51
1	C	718/731 (98%)	678 (94%)	39 (5%)	1 (0%)	51	65
1	D	716/731 (98%)	671 (94%)	44 (6%)	1 (0%)	51	65
All	All	2879/2924 (98%)	2716 (94%)	157 (6%)	6 (0%)	47	60

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	85	ASN
1	A	87	SER
1	B	463	LYS
1	B	83	TYR
1	C	536	LYS

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	648/654 (99%)	611 (94%)	37 (6%)	20	27
1	B	652/654 (100%)	616 (94%)	36 (6%)	21	29
1	C	648/654 (99%)	614 (95%)	34 (5%)	23	30
1	D	646/654 (99%)	618 (96%)	28 (4%)	29	39
All	All	2594/2616 (99%)	2459 (95%)	135 (5%)	23	30

5 of 135 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	365	THR
1	D	399	LYS
1	D	575	VAL

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Mol	Chain	Res	Type
1	B	316	LEU
1	B	295	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 58 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	592	HIS
1	D	592	HIS
1	C	344	GLN
1	D	572	ASN
1	D	383	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](#)

10 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAG	E	1	2	14,14,15	0.65	0	17,19,21	1.66	3 (17%)
2	NAG	E	2	2	14,14,15	0.51	0	17,19,21	0.95	1 (5%)
2	NAG	F	1	2,1	14,14,15	0.67	0	17,19,21	0.79	0
2	NAG	F	2	2	14,14,15	0.48	0	17,19,21	1.05	1 (5%)
2	NAG	G	1	2,1	14,14,15	0.52	0	17,19,21	0.68	0
2	NAG	G	2	2	14,14,15	0.55	0	17,19,21	0.99	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	H	1	2,1	14,14,15	0.57	0	17,19,21	1.49	3 (17%)
2	NAG	H	2	2	14,14,15	0.49	0	17,19,21	0.82	1 (5%)
2	NAG	I	1	2,1	14,14,15	0.46	0	17,19,21	1.03	2 (11%)
2	NAG	I	2	2	14,14,15	0.50	0	17,19,21	1.10	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	NAG	E	1	2	-	4/6/23/26	0/1/1/1
2	NAG	E	2	2	-	1/6/23/26	0/1/1/1
2	NAG	F	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	F	2	2	-	1/6/23/26	0/1/1/1
2	NAG	G	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	G	2	2	-	0/6/23/26	0/1/1/1
2	NAG	H	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	H	2	2	-	2/6/23/26	0/1/1/1
2	NAG	I	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	I	2	2	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	1	NAG	O5-C1-C2	-3.58	105.64	111.29
2	E	1	NAG	C3-C4-C5	3.58	116.62	110.24
2	E	1	NAG	C4-C3-C2	3.36	115.95	111.02
2	F	2	NAG	C1-O5-C5	3.24	116.58	112.19
2	I	2	NAG	C1-O5-C5	3.16	116.47	112.19

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	1	NAG	C8-C7-N2-C2
2	E	1	NAG	O7-C7-N2-C2
2	F	1	NAG	C8-C7-N2-C2

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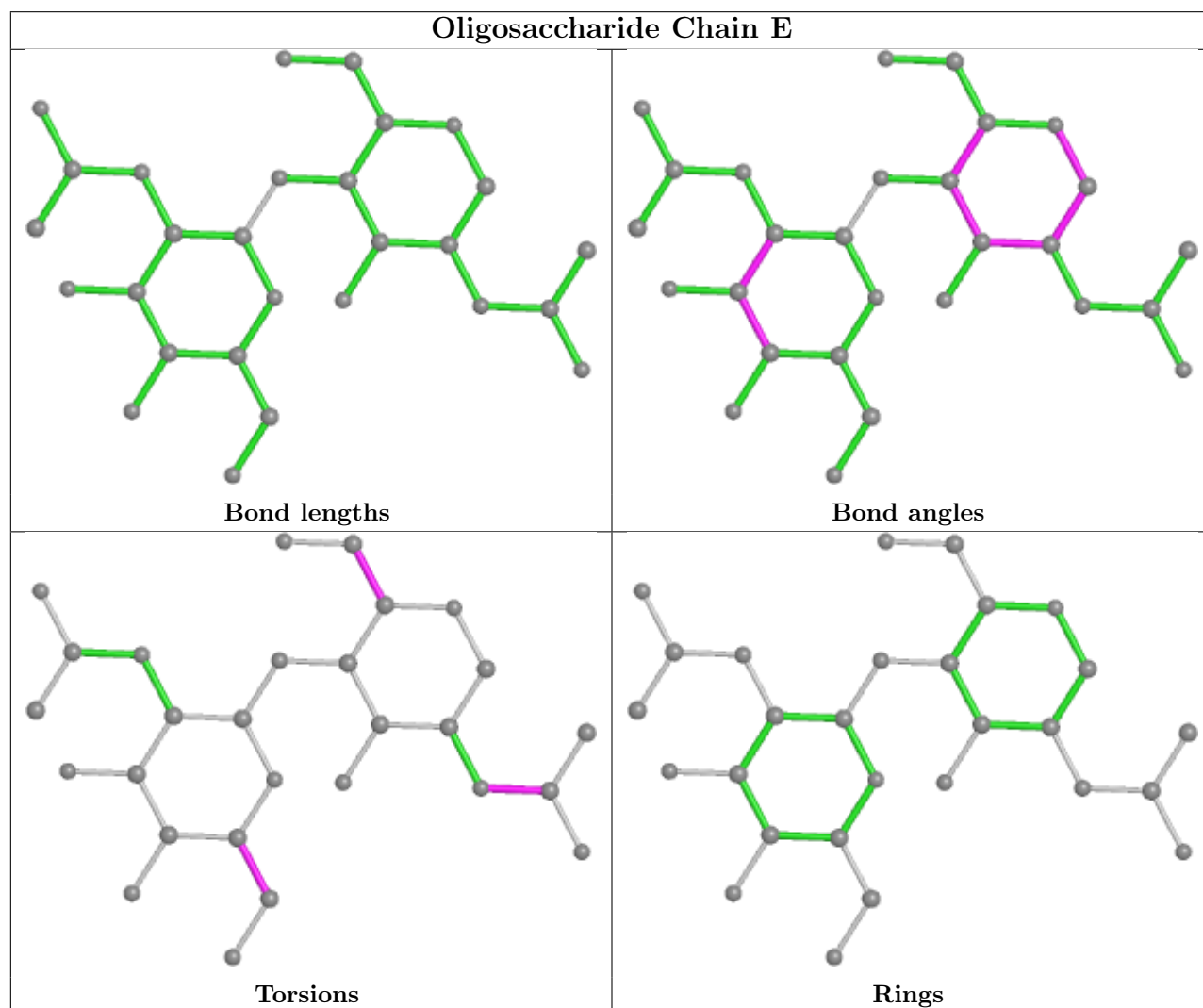
Mol	Chain	Res	Type	Atoms
2	F	1	NAG	O7-C7-N2-C2
2	G	1	NAG	C8-C7-N2-C2

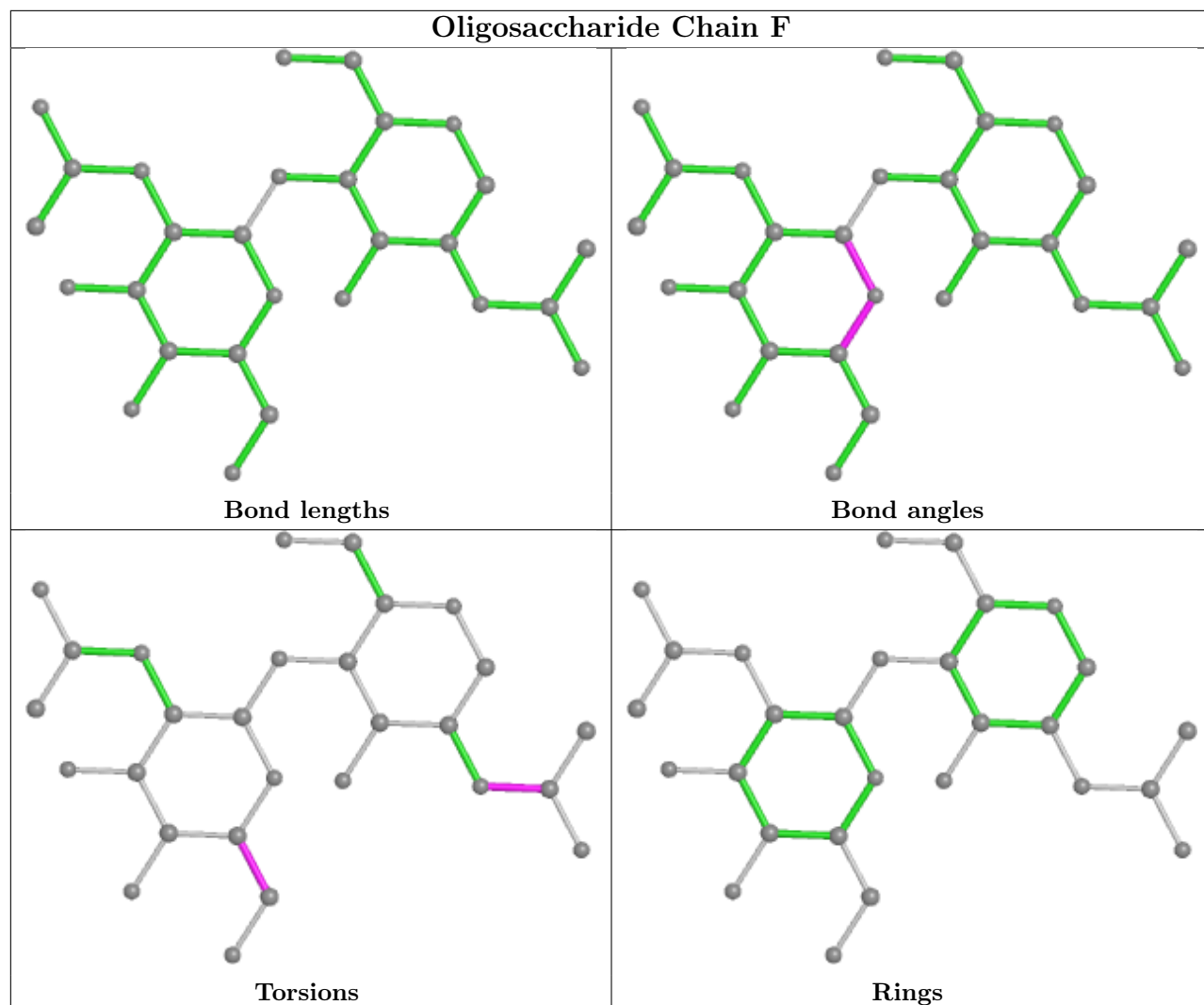
There are no ring outliers.

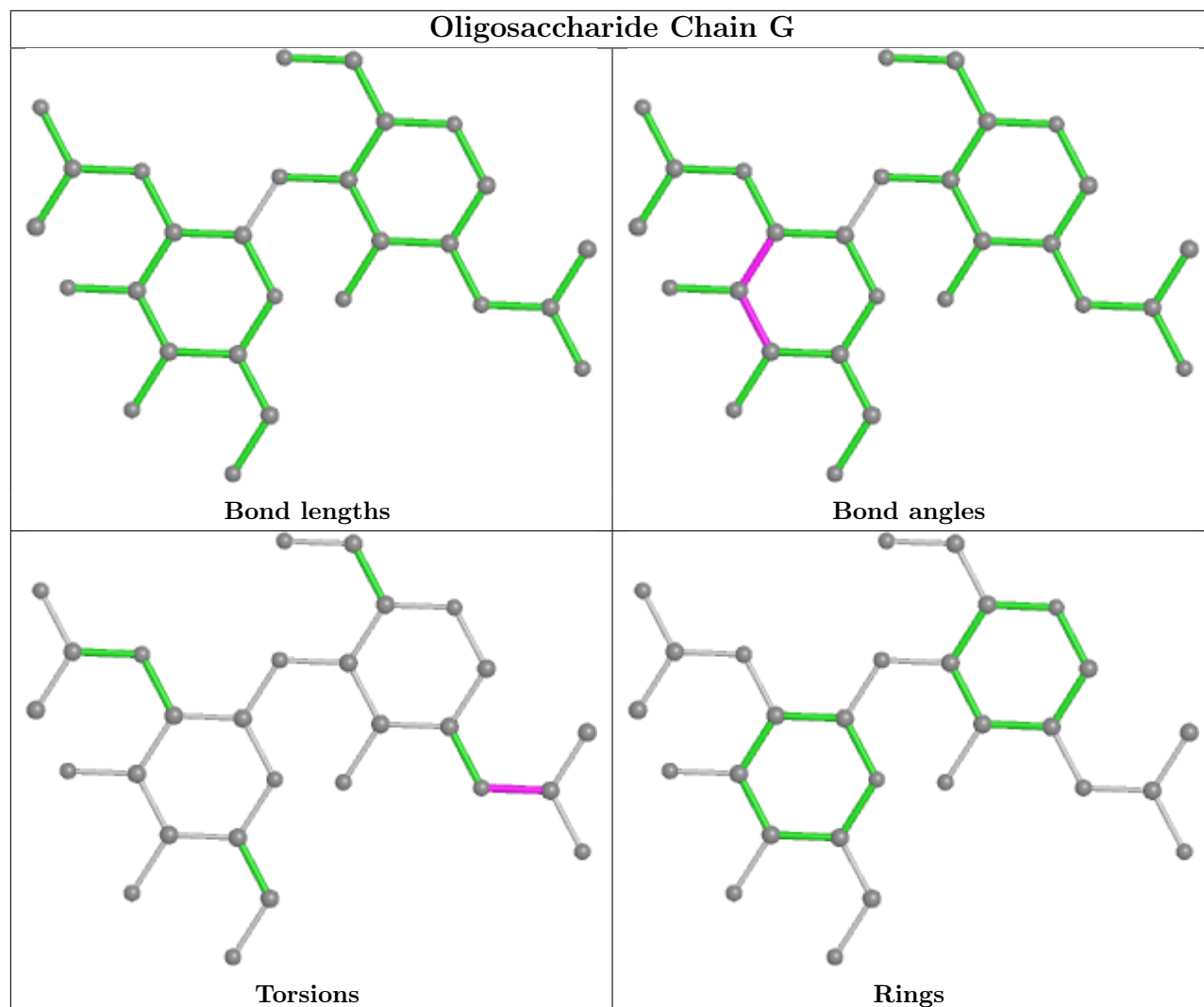
1 monomer is involved in 1 short contact:

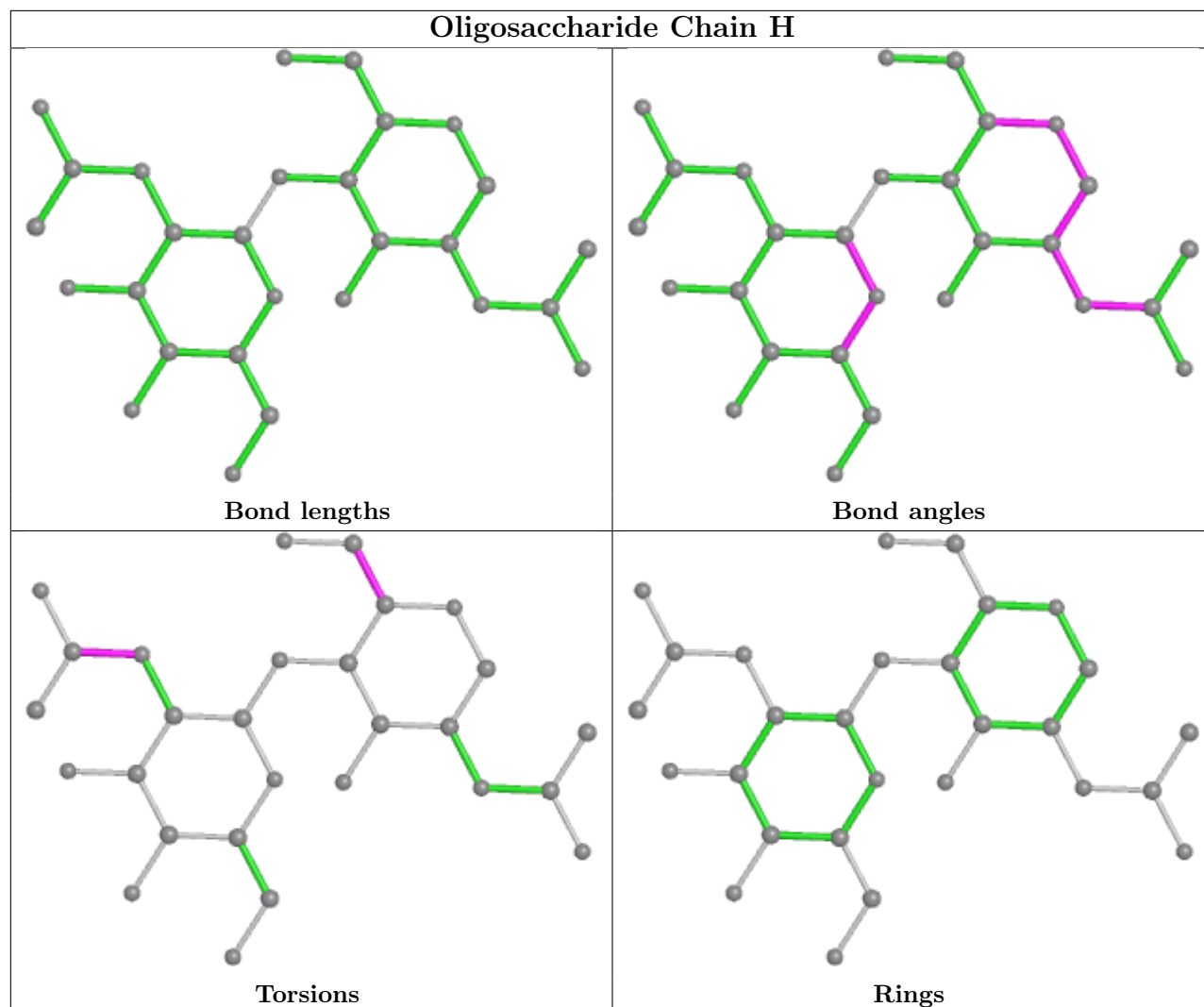
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	1	NAG	1	0

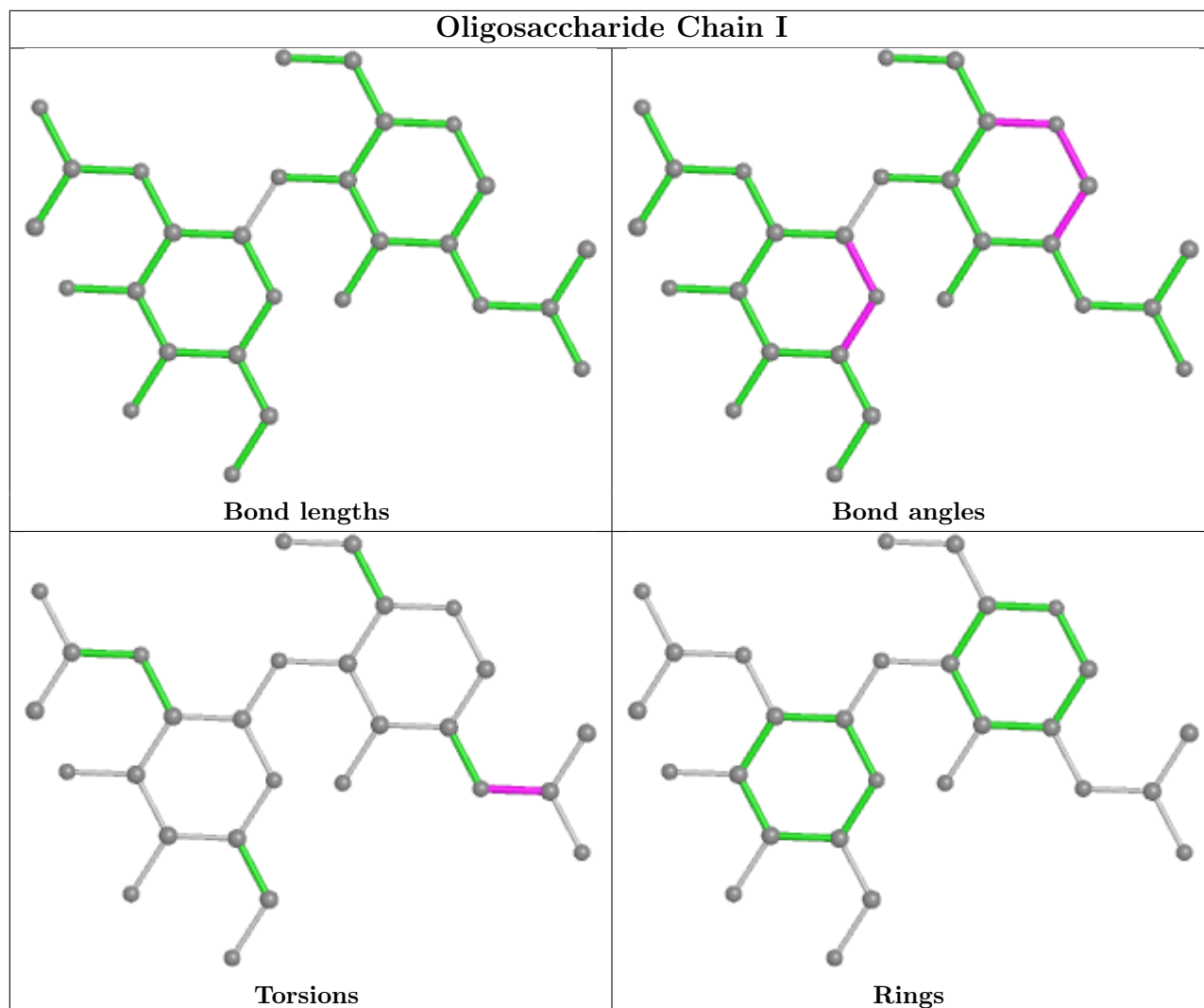
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.











5.6 Ligand geometry [i](#)

22 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	SY1	C	800	-	30,30,30	1.91	5 (16%)	29,42,42	1.95	9 (31%)
3	NAG	C	807	1	14,14,15	0.61	0	17,19,21	1.23	1 (5%)
3	NAG	D	802	1	14,14,15	0.62	0	17,19,21	1.04	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	D	805	1	14,14,15	0.50	0	17,19,21	1.02	2 (11%)
4	SY1	B	800	-	30,30,30	1.95	5 (16%)	29,42,42	1.93	8 (27%)
4	SY1	D	800	-	30,30,30	1.92	4 (13%)	29,42,42	1.89	8 (27%)
3	NAG	A	807	1	14,14,15	0.58	0	17,19,21	1.10	1 (5%)
3	NAG	A	804	1	14,14,15	0.53	0	17,19,21	0.92	1 (5%)
3	NAG	B	802	1	14,14,15	0.61	0	17,19,21	1.07	1 (5%)
3	NAG	C	803	1	14,14,15	0.51	0	17,19,21	1.04	1 (5%)
3	NAG	A	802	1	14,14,15	0.60	0	17,19,21	1.06	2 (11%)
3	NAG	C	802	1	14,14,15	0.61	0	17,19,21	0.98	1 (5%)
3	NAG	B	807	1	14,14,15	0.49	0	17,19,21	1.13	2 (11%)
4	SY1	B	801	-	30,30,30	1.97	5 (16%)	29,42,42	1.50	6 (20%)
4	SY1	A	801	-	30,30,30	1.98	5 (16%)	29,42,42	1.80	8 (27%)
4	SY1	C	801	-	30,30,30	2.38	5 (16%)	29,42,42	2.52	9 (31%)
3	NAG	B	803	1	14,14,15	0.57	0	17,19,21	1.11	1 (5%)
4	SY1	D	801	-	30,30,30	2.05	6 (20%)	29,42,42	2.08	8 (27%)
3	NAG	A	803	1	14,14,15	0.60	0	17,19,21	1.07	2 (11%)
4	SY1	A	800	-	30,30,30	1.92	5 (16%)	29,42,42	2.15	10 (34%)
3	NAG	B	804	1	14,14,15	0.52	0	17,19,21	0.94	1 (5%)
3	NAG	C	806	1	14,14,15	0.59	0	17,19,21	1.04	2 (11%)

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	SY1	C	800	-	-	2/8/20/20	0/4/4/4
3	NAG	C	807	1	-	2/6/23/26	0/1/1/1
3	NAG	D	802	1	-	0/6/23/26	0/1/1/1
3	NAG	D	805	1	-	4/6/23/26	0/1/1/1
4	SY1	B	800	-	-	2/8/20/20	0/4/4/4
4	SY1	D	800	-	-	2/8/20/20	0/4/4/4
3	NAG	A	807	1	-	0/6/23/26	0/1/1/1
3	NAG	A	804	1	-	2/6/23/26	0/1/1/1
3	NAG	B	802	1	-	2/6/23/26	0/1/1/1
3	NAG	C	803	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	802	1	-	1/6/23/26	0/1/1/1
3	NAG	C	802	1	-	0/6/23/26	0/1/1/1
3	NAG	B	807	1	-	4/6/23/26	0/1/1/1
4	SY1	B	801	-	-	3/8/20/20	0/4/4/4
4	SY1	A	801	-	-	1/8/20/20	0/4/4/4
4	SY1	C	801	-	-	6/8/20/20	0/4/4/4
3	NAG	B	803	1	-	1/6/23/26	0/1/1/1
4	SY1	D	801	-	-	1/8/20/20	0/4/4/4
3	NAG	A	803	1	-	1/6/23/26	0/1/1/1
4	SY1	A	800	-	-	2/8/20/20	0/4/4/4
3	NAG	B	804	1	-	0/6/23/26	0/1/1/1
3	NAG	C	806	1	-	0/6/23/26	0/1/1/1

The worst 5 of 40 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	801	SY1	C26-N27	8.40	1.29	1.14
4	C	800	SY1	C26-C25	-7.69	1.28	1.43
4	B	801	SY1	C26-C25	-7.52	1.28	1.43
4	D	800	SY1	C26-C25	-7.50	1.29	1.43
4	A	800	SY1	C26-C25	-7.46	1.29	1.43

The worst 5 of 85 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	801	SY1	C25-C26-N27	-10.58	159.03	177.72
4	D	801	SY1	C25-C26-N27	-7.77	164.00	177.72
4	A	800	SY1	C7-C2-N1	-5.96	99.27	111.60
4	A	801	SY1	C25-C26-N27	-5.34	168.30	177.72
4	B	800	SY1	C7-C2-N1	-4.86	101.55	111.60

There are no chirality outliers.

5 of 38 torsion outliers are listed below:

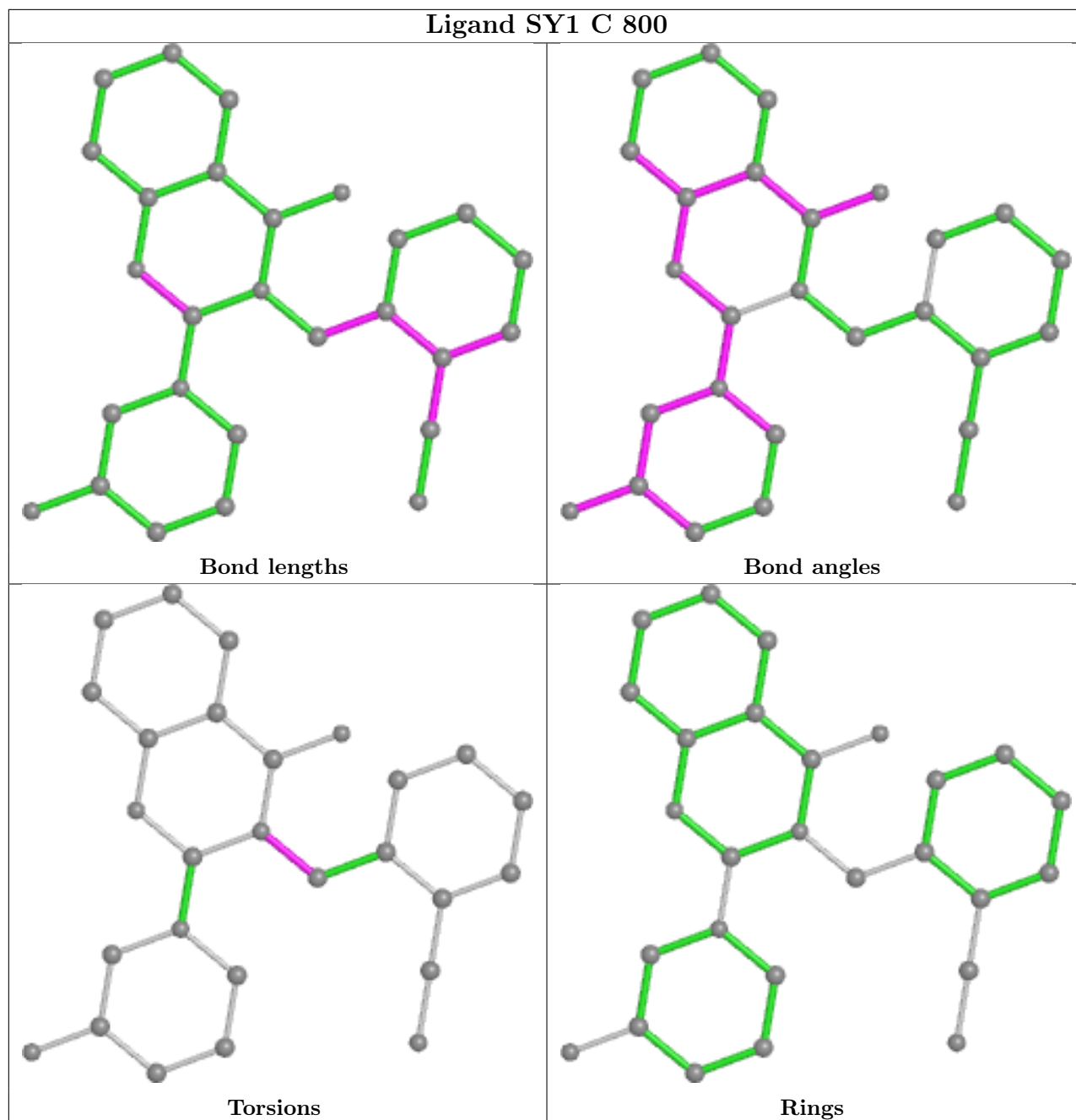
Mol	Chain	Res	Type	Atoms
3	B	802	NAG	C8-C7-N2-C2
3	B	802	NAG	O7-C7-N2-C2
3	B	807	NAG	C8-C7-N2-C2
3	B	807	NAG	O7-C7-N2-C2
3	D	805	NAG	C8-C7-N2-C2

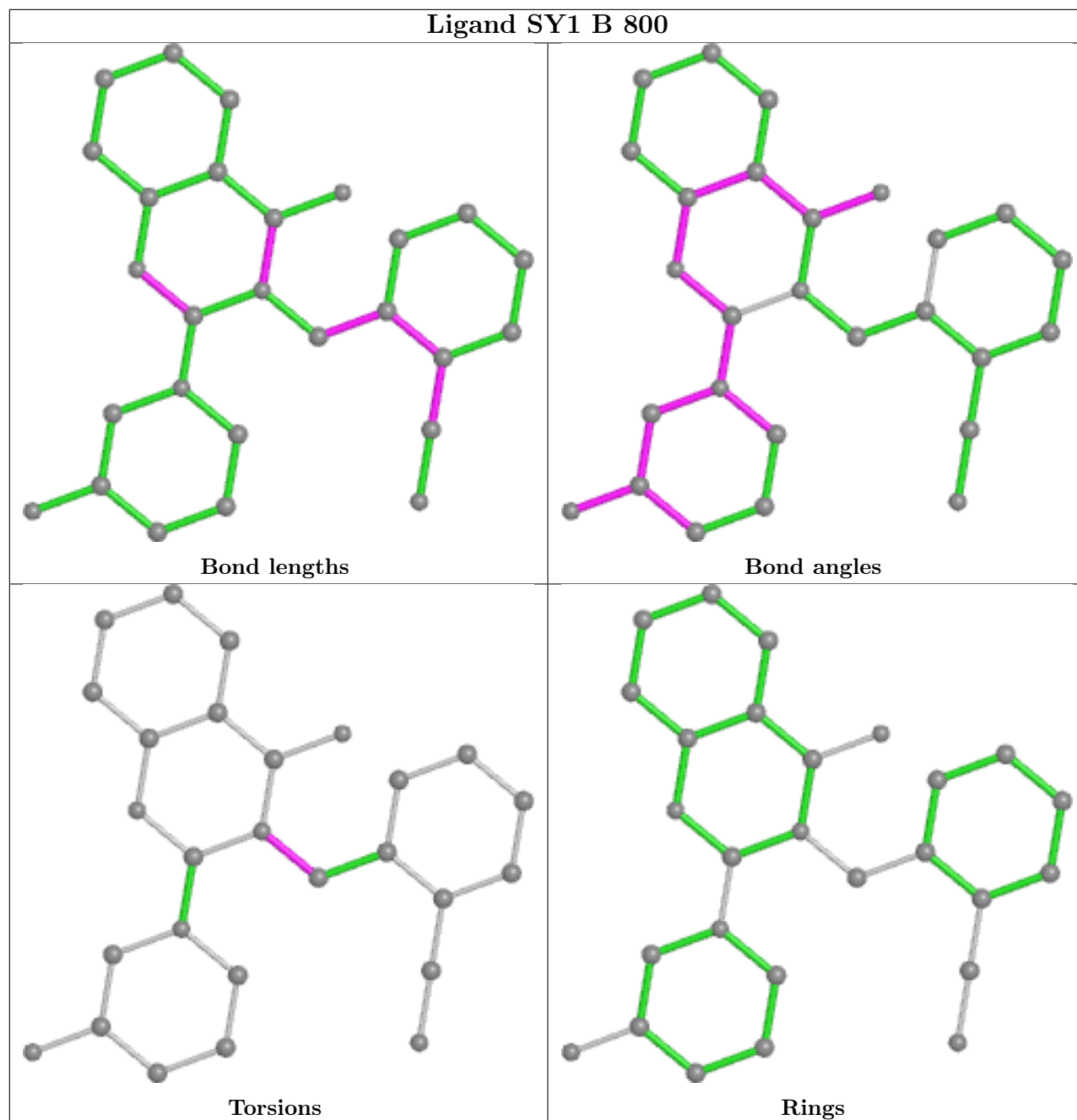
There are no ring outliers.

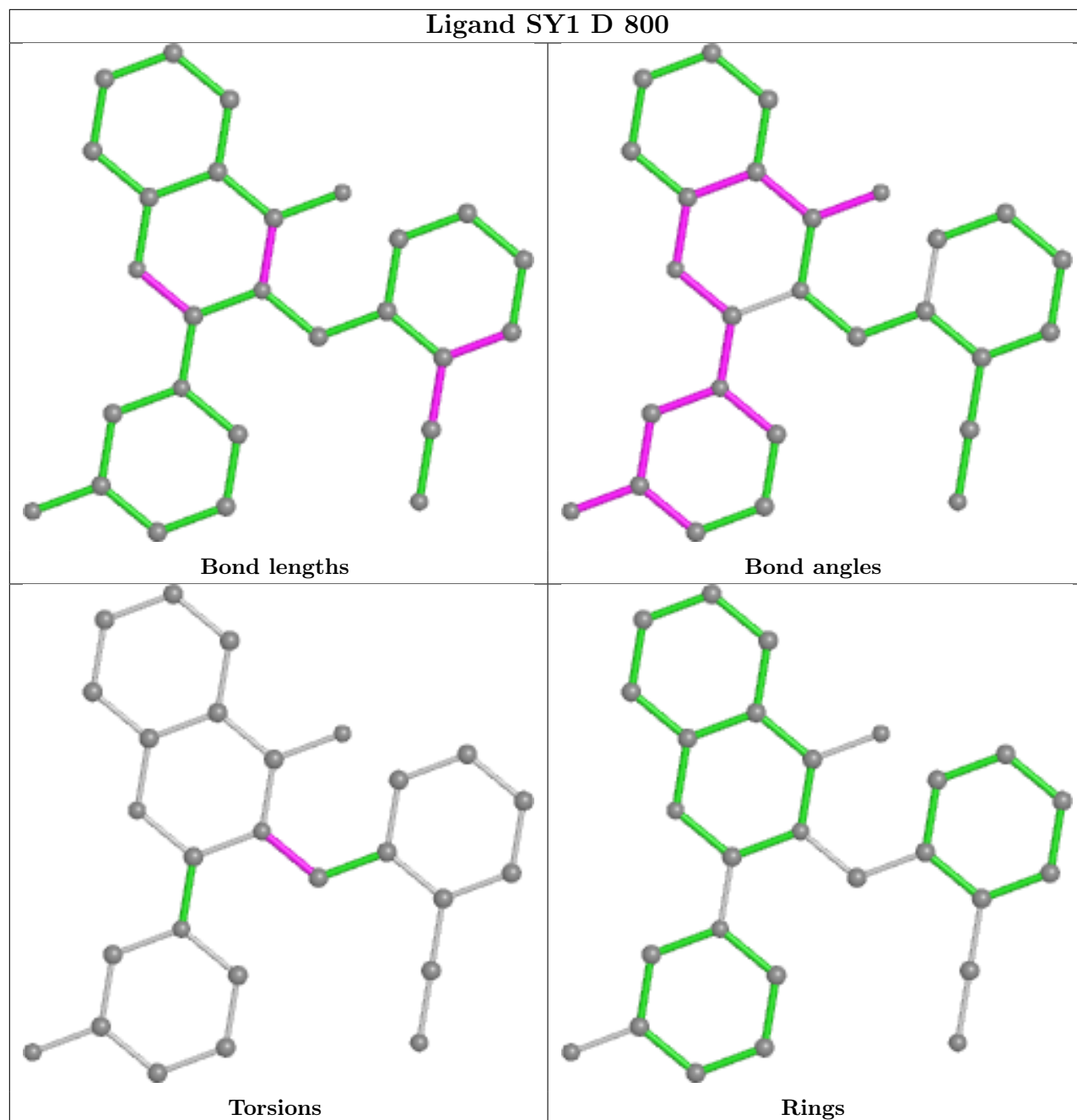
5 monomers are involved in 23 short contacts:

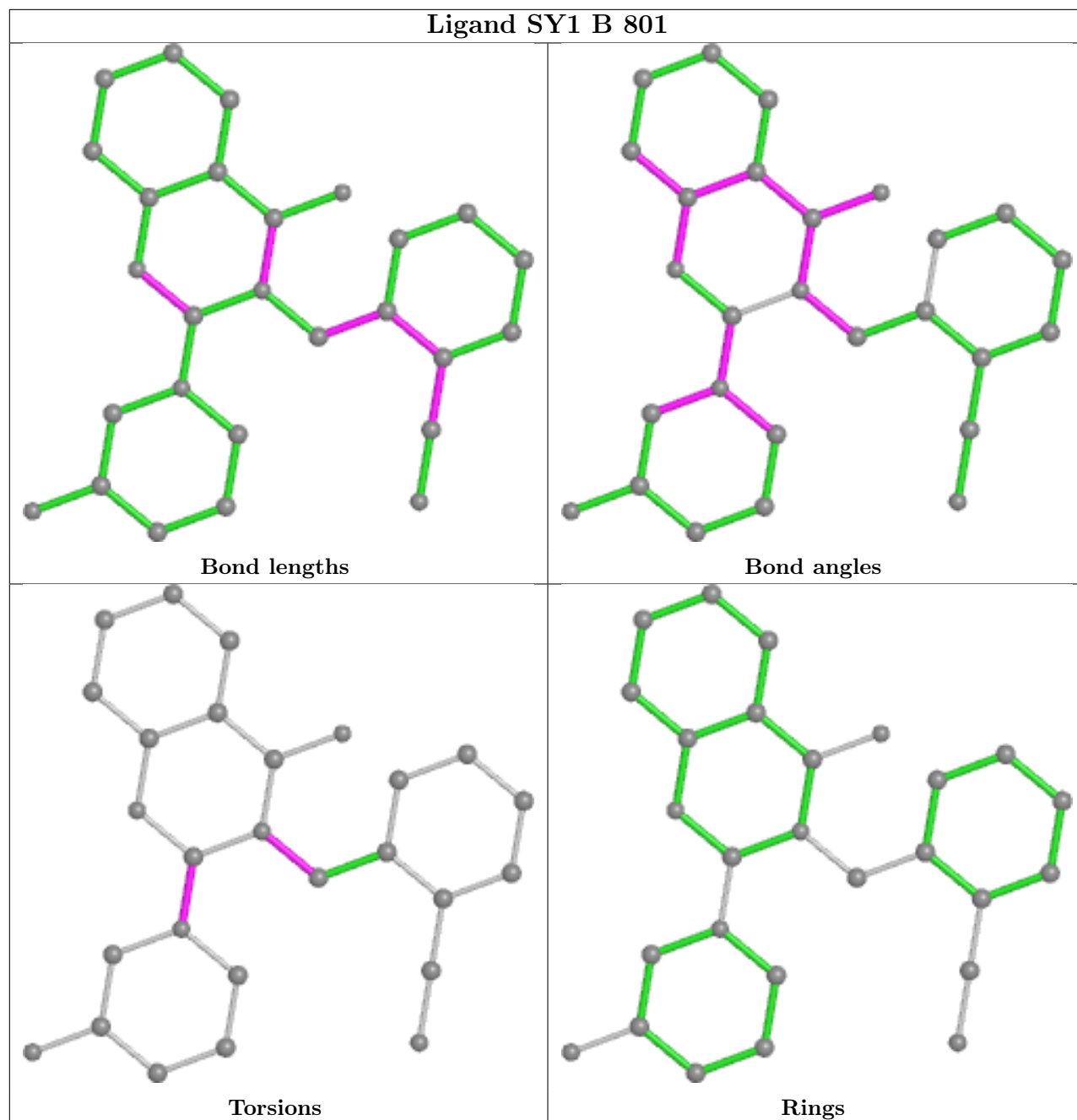
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	800	SY1	6	0
4	B	800	SY1	6	0
4	D	800	SY1	5	0
4	A	801	SY1	2	0
4	A	800	SY1	4	0

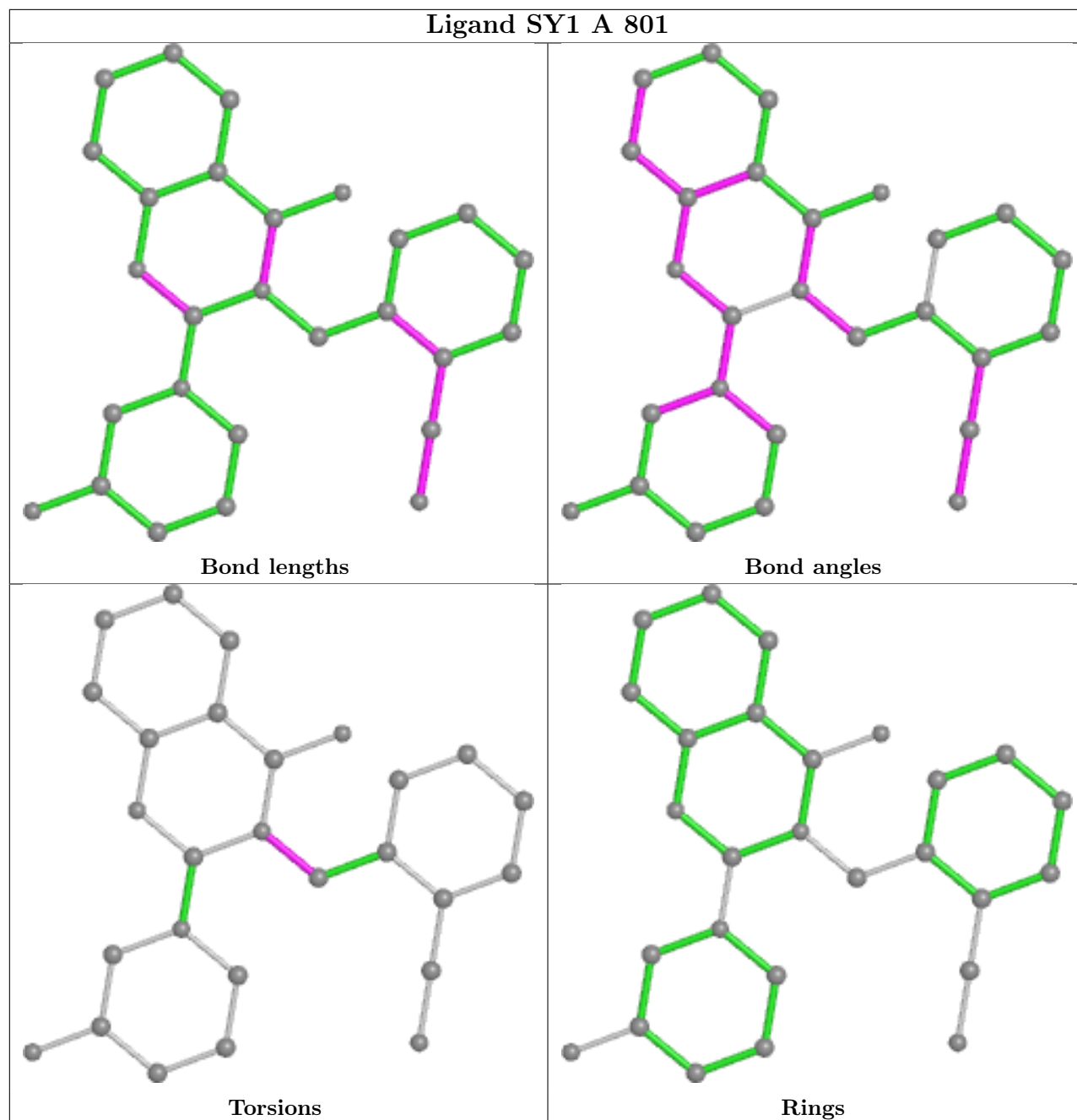
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

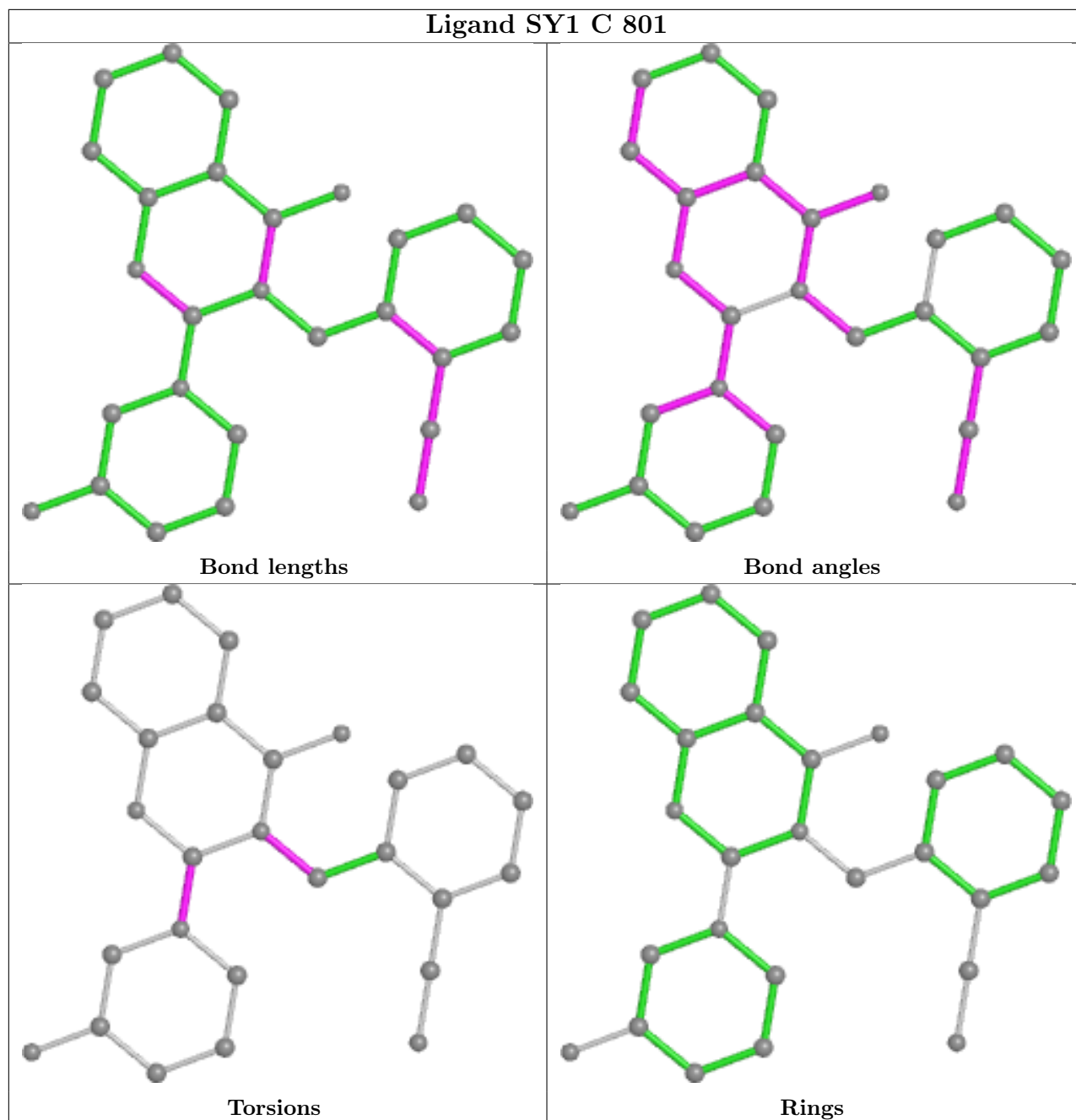


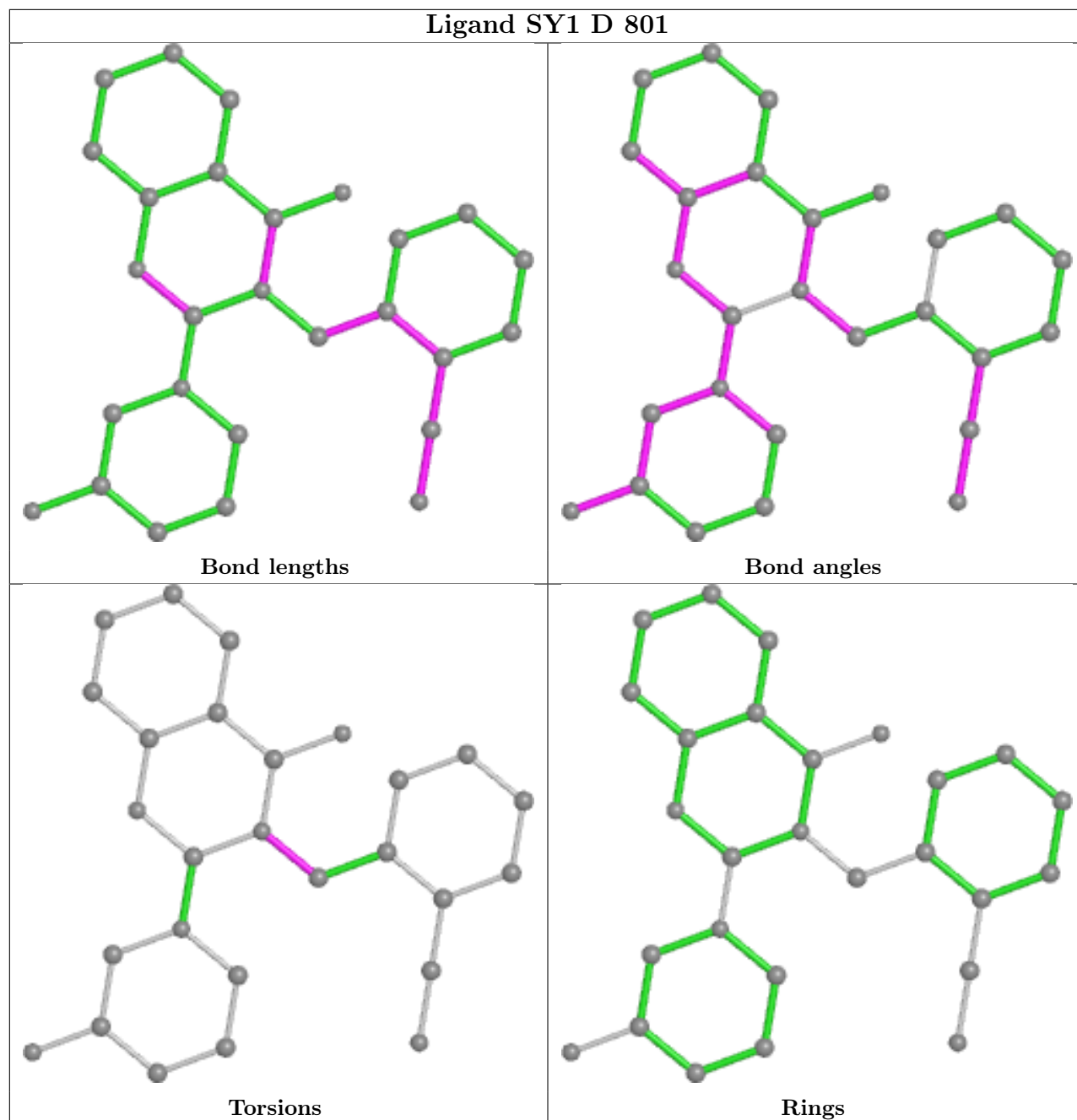


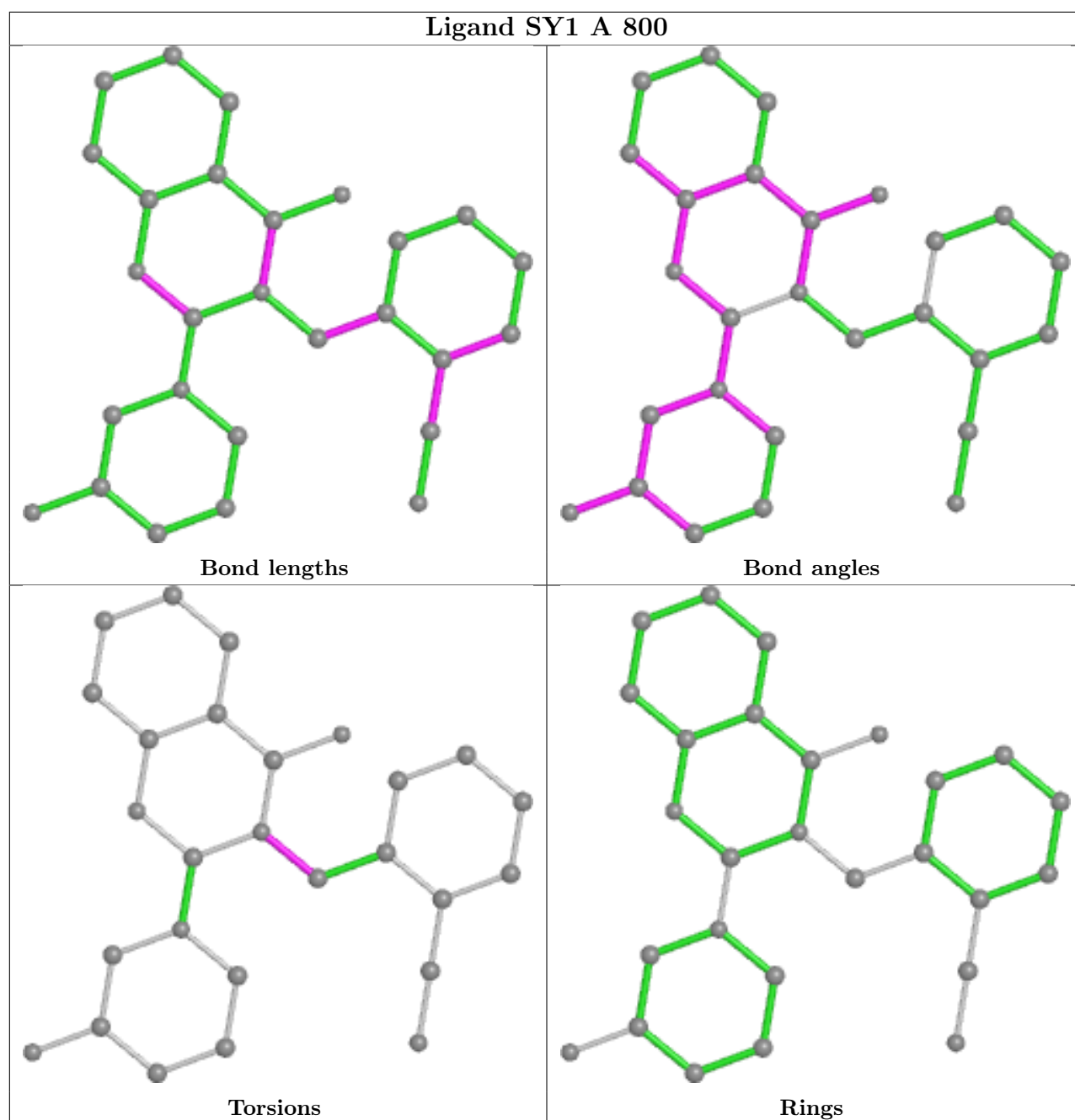












5.7 Other polymers [i](#)

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	724/731 (99%)	0.22	36 (4%) 28 34	28, 45, 76, 113	1 (0%)
1	B	728/731 (99%)	0.10	20 (2%) 54 61	32, 49, 74, 102	0
1	C	723/731 (98%)	0.20	44 (6%) 21 25	31, 49, 77, 94	0
1	D	722/731 (98%)	0.47	62 (8%) 10 12	35, 62, 91, 133	0
All	All	2897/2924 (99%)	0.25	162 (5%) 24 29	28, 51, 83, 133	1 (0%)

The worst 5 of 162 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	392	LYS	6.3
1	D	83	TYR	6.2
1	A	88	VAL	6.0
1	D	77	LEU	5.7
1	C	88	VAL	5.2

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.

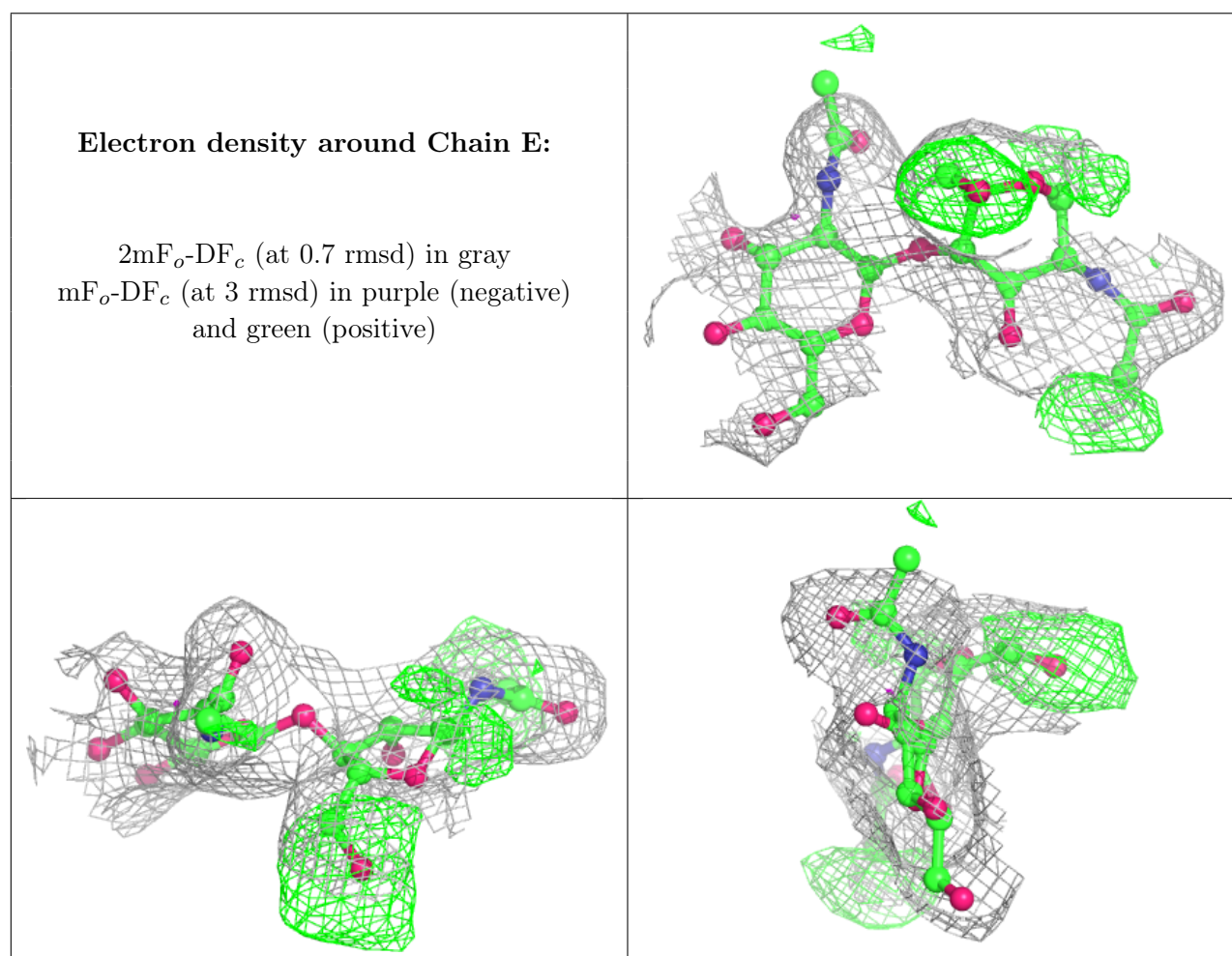
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	E	1	14/15	0.52	0.19	97,99,101,101	0
2	NAG	E	2	14/15	0.79	0.22	101,102,103,103	0

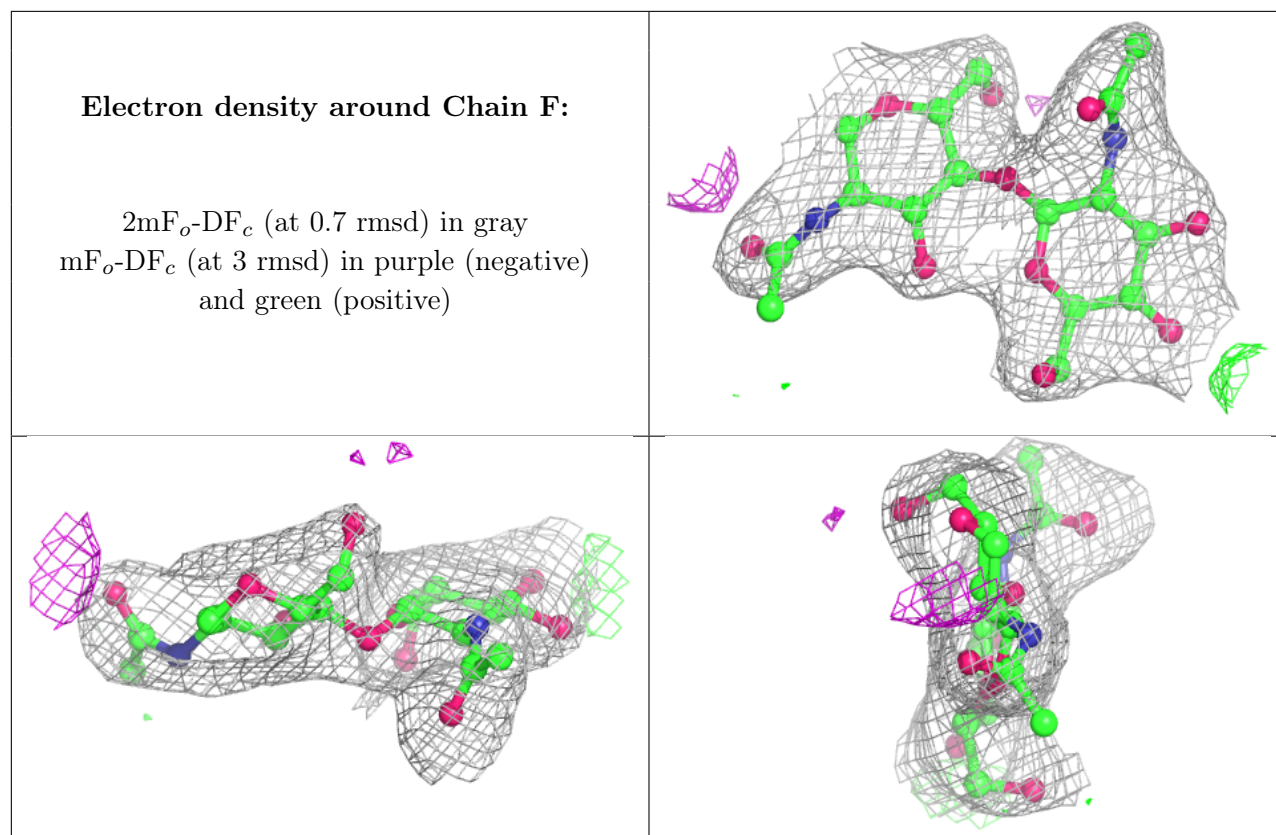
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	NAG	H	2	14/15	0.84	0.32	74,77,80,80	0
2	NAG	G	2	14/15	0.86	0.26	80,82,83,83	0
2	NAG	I	2	14/15	0.86	0.21	74,75,76,76	0
2	NAG	F	2	14/15	0.91	0.15	67,68,69,69	0
2	NAG	G	1	14/15	0.92	0.16	68,70,73,77	0
2	NAG	I	1	14/15	0.93	0.14	67,69,70,72	0
2	NAG	H	1	14/15	0.94	0.14	62,65,68,72	0
2	NAG	F	1	14/15	0.95	0.16	57,61,63,65	0

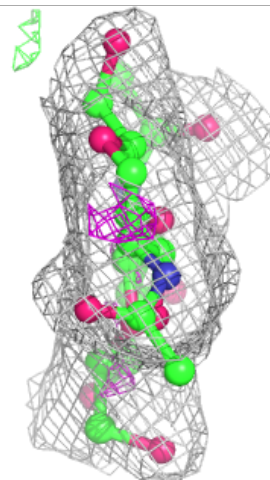
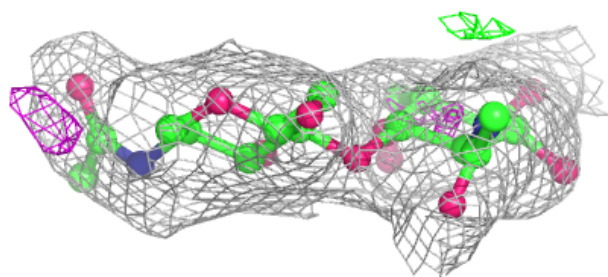
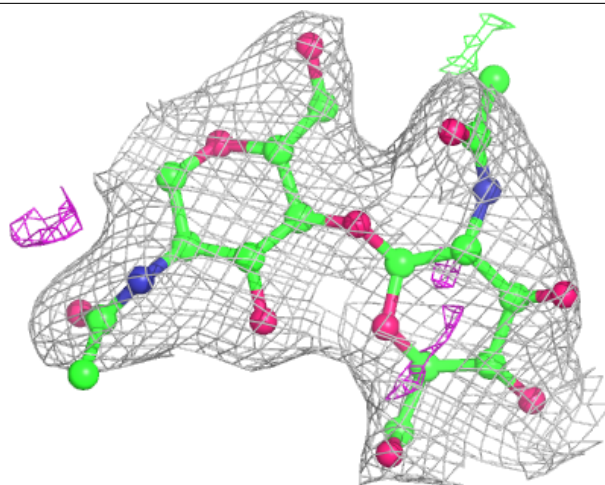
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

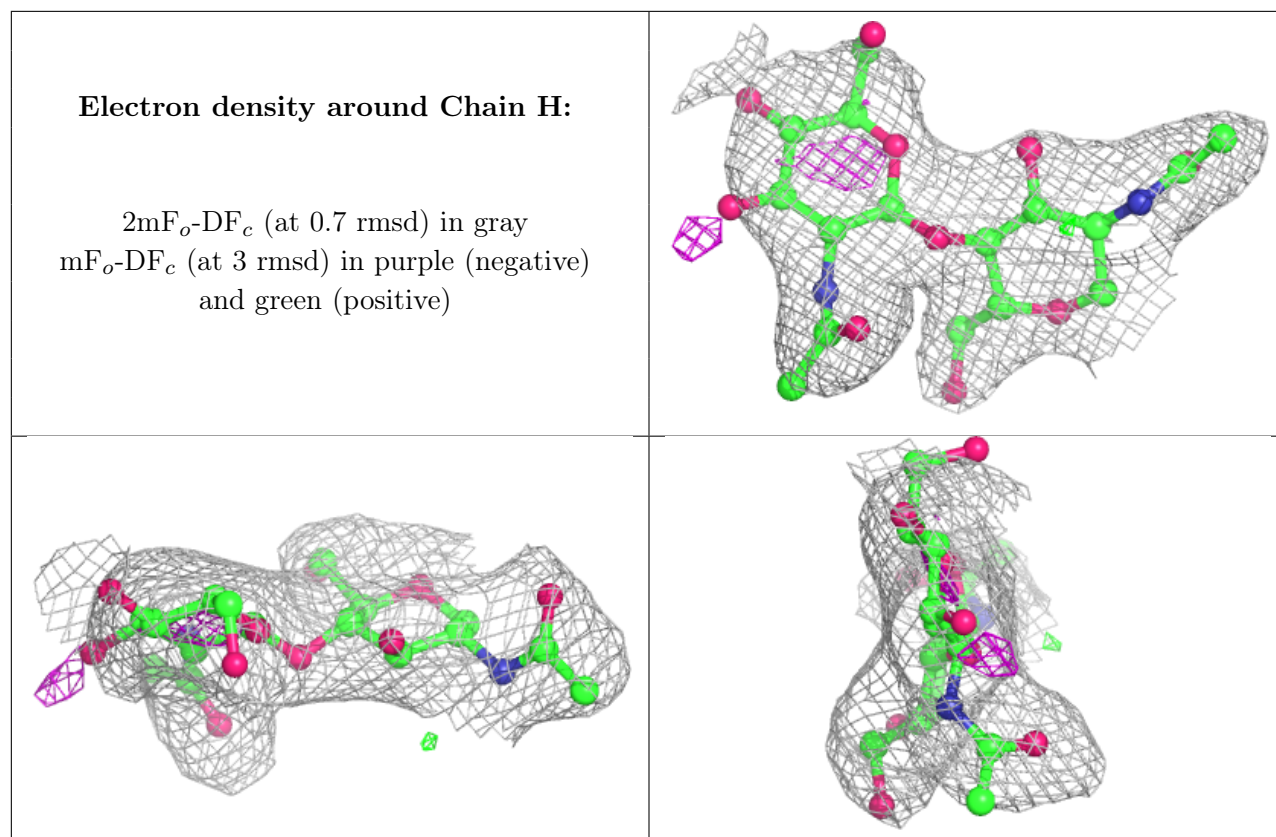


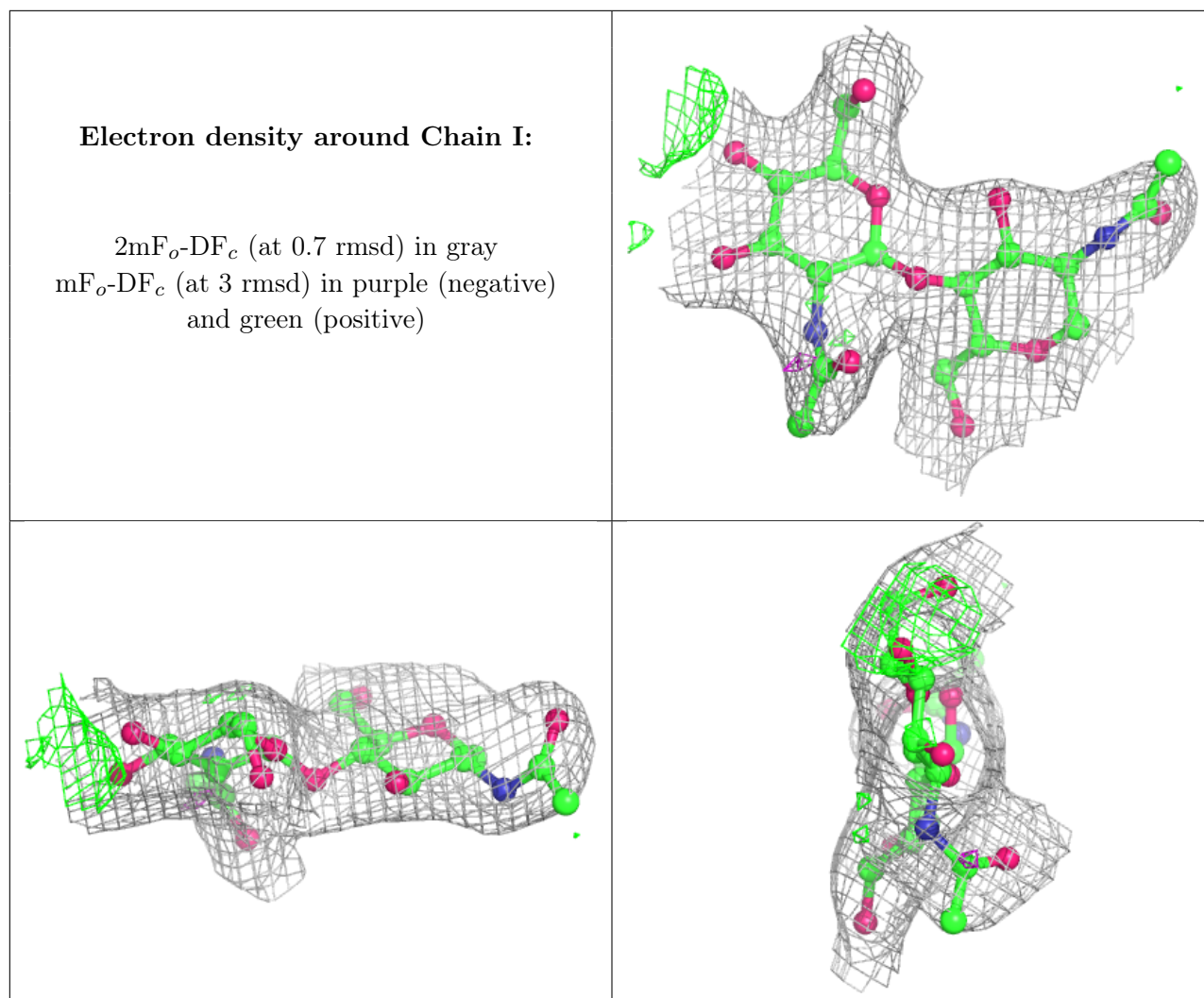


Electron density around Chain G:

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







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
3	NAG	A	802	14/15	0.68	0.19	105,105,106,106	0
3	NAG	B	802	14/15	0.78	0.13	98,100,100,100	0
3	NAG	A	803	14/15	0.79	0.31	72,75,77,78	0
3	NAG	B	807	14/15	0.79	0.14	75,77,78,79	0
3	NAG	C	806	14/15	0.80	0.16	82,84,86,86	0
3	NAG	C	802	14/15	0.81	0.29	72,73,74,75	0
3	NAG	B	804	14/15	0.82	0.28	72,74,76,77	0
3	NAG	C	803	14/15	0.83	0.29	69,71,74,75	0
3	NAG	D	802	14/15	0.83	0.24	78,80,81,81	0

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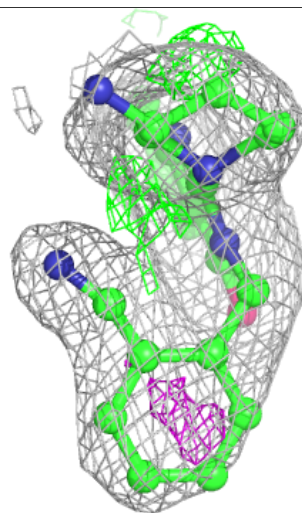
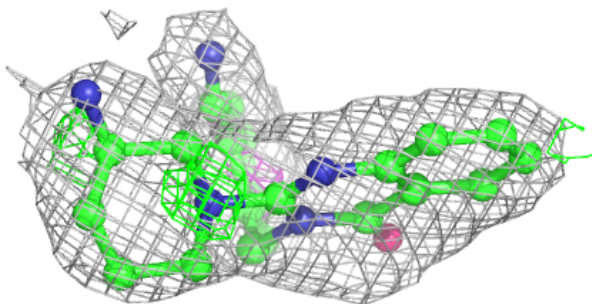
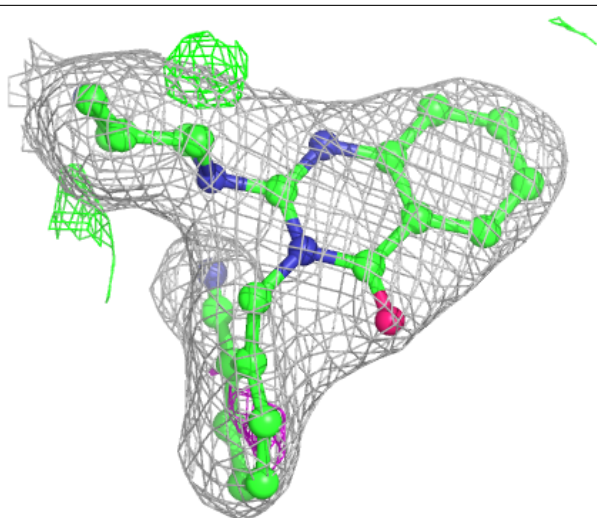
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	NAG	C	807	14/15	0.88	0.36	70,74,75,76	0
3	NAG	A	804	14/15	0.88	0.30	70,72,76,77	0
3	NAG	D	805	14/15	0.88	0.17	80,81,82,83	0
3	NAG	A	807	14/15	0.90	0.40	60,64,66,66	0
4	SY1	C	801	27/27	0.90	0.17	62,63,64,64	0
3	NAG	B	803	14/15	0.93	0.17	62,64,66,67	0
4	SY1	A	801	27/27	0.94	0.15	47,50,53,53	0
4	SY1	B	801	27/27	0.95	0.15	48,49,51,52	0
4	SY1	D	801	27/27	0.95	0.20	56,58,62,65	0
4	SY1	D	800	27/27	0.96	0.20	43,46,47,47	0
4	SY1	B	800	27/27	0.96	0.19	38,40,44,45	0
4	SY1	C	800	27/27	0.97	0.17	33,37,41,41	0
4	SY1	A	800	27/27	0.97	0.23	36,41,42,43	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.

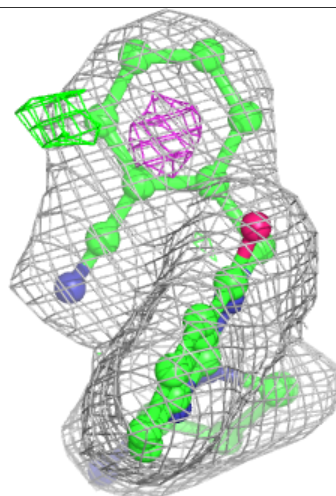
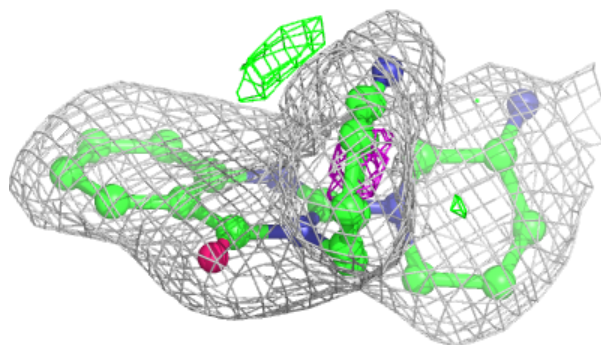
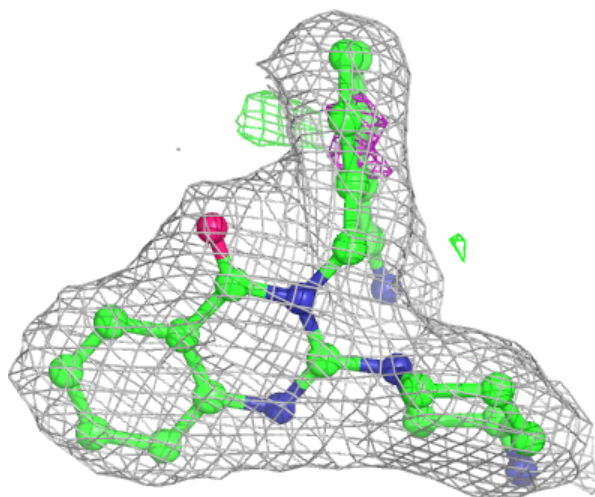
Electron density around SY1 C 801:

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



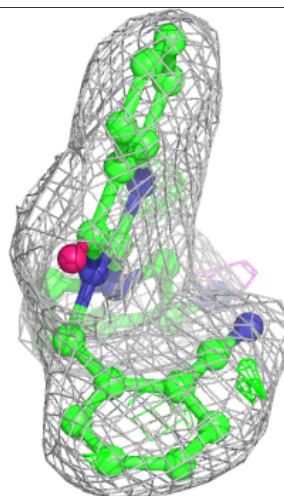
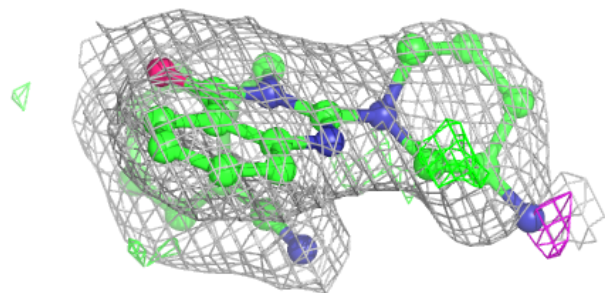
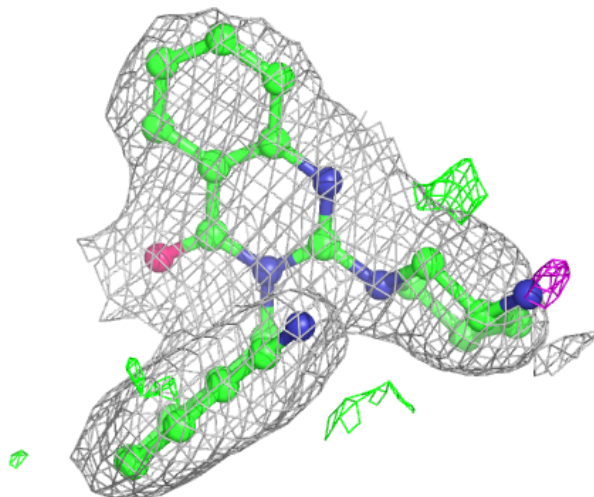
Electron density around SY1 A 801:

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



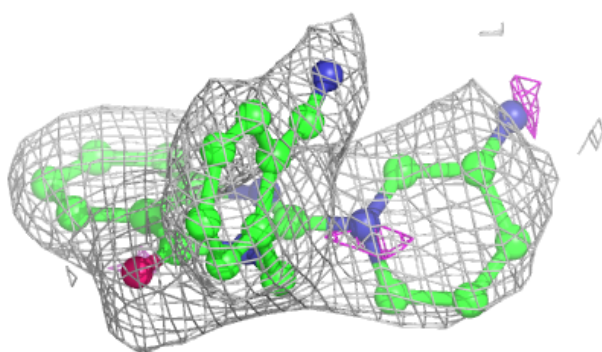
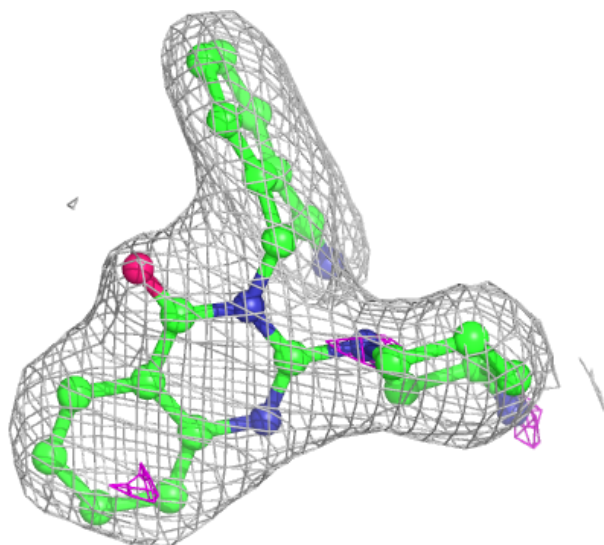
Electron density around SY1 B 801:

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



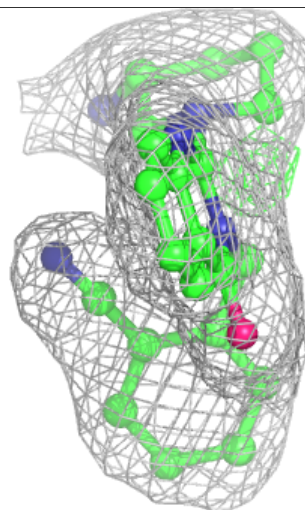
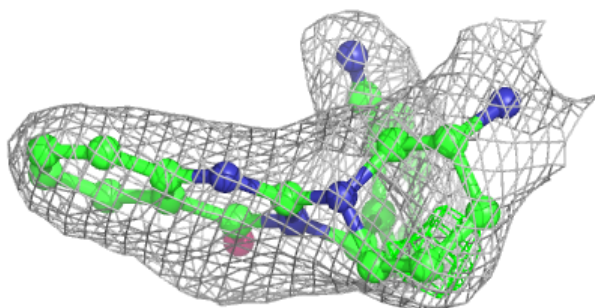
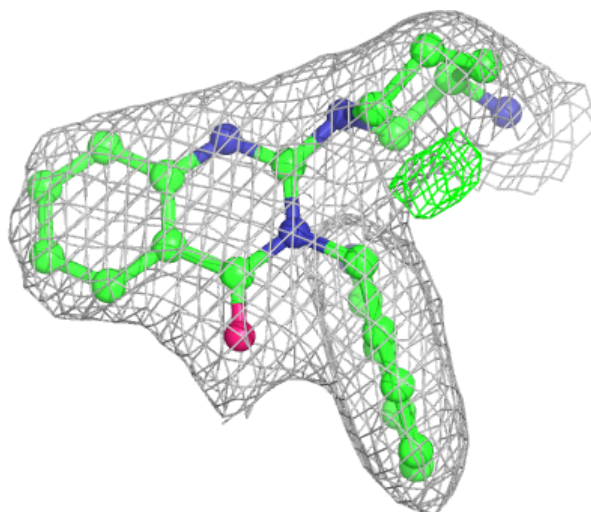
Electron density around SY1 D 801:

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



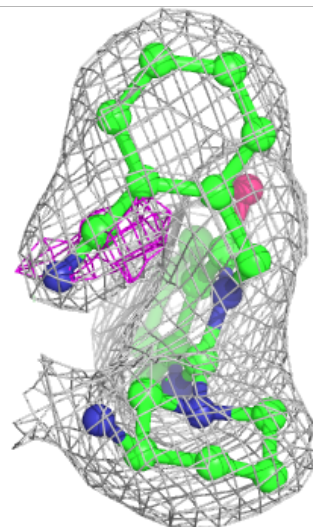
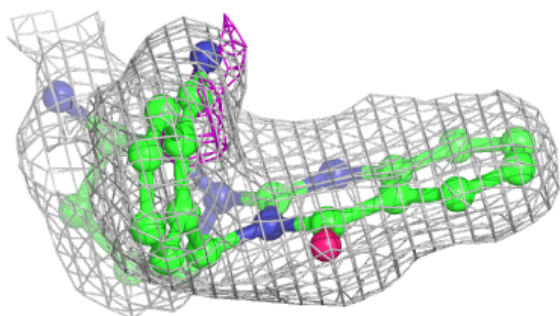
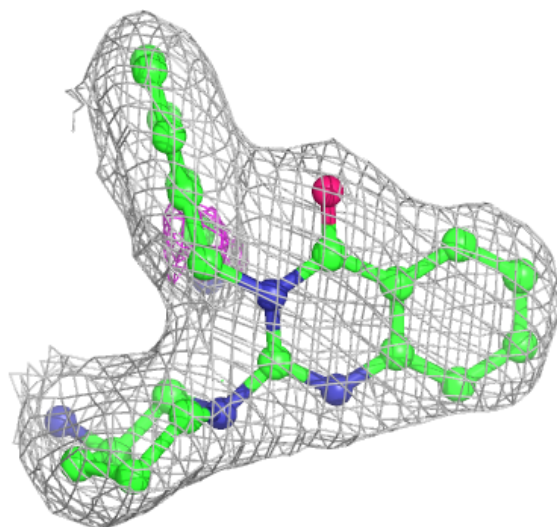
Electron density around SY1 D 800:

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



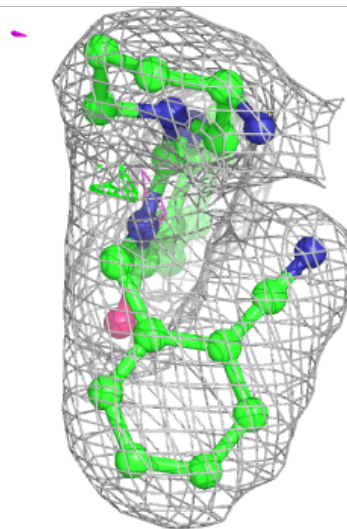
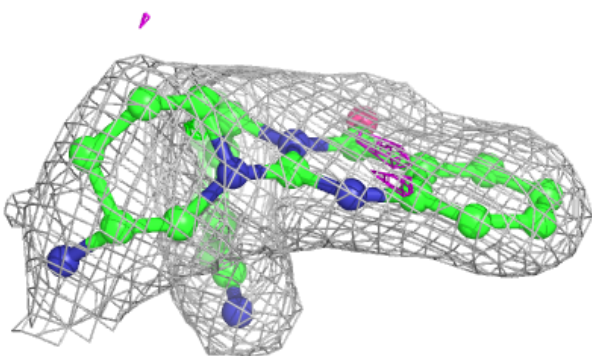
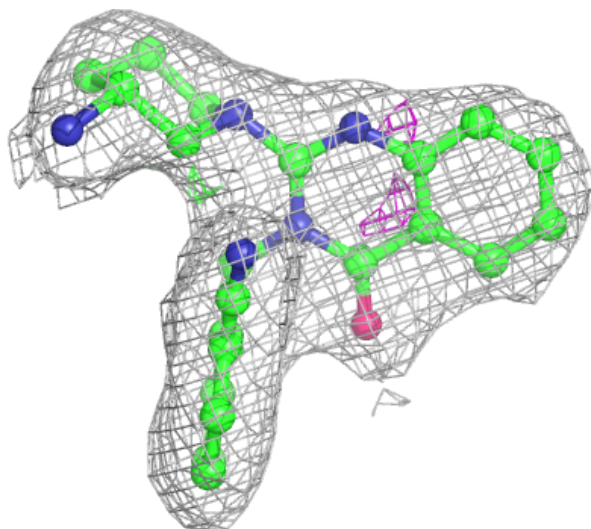
Electron density around SY1 B 800:

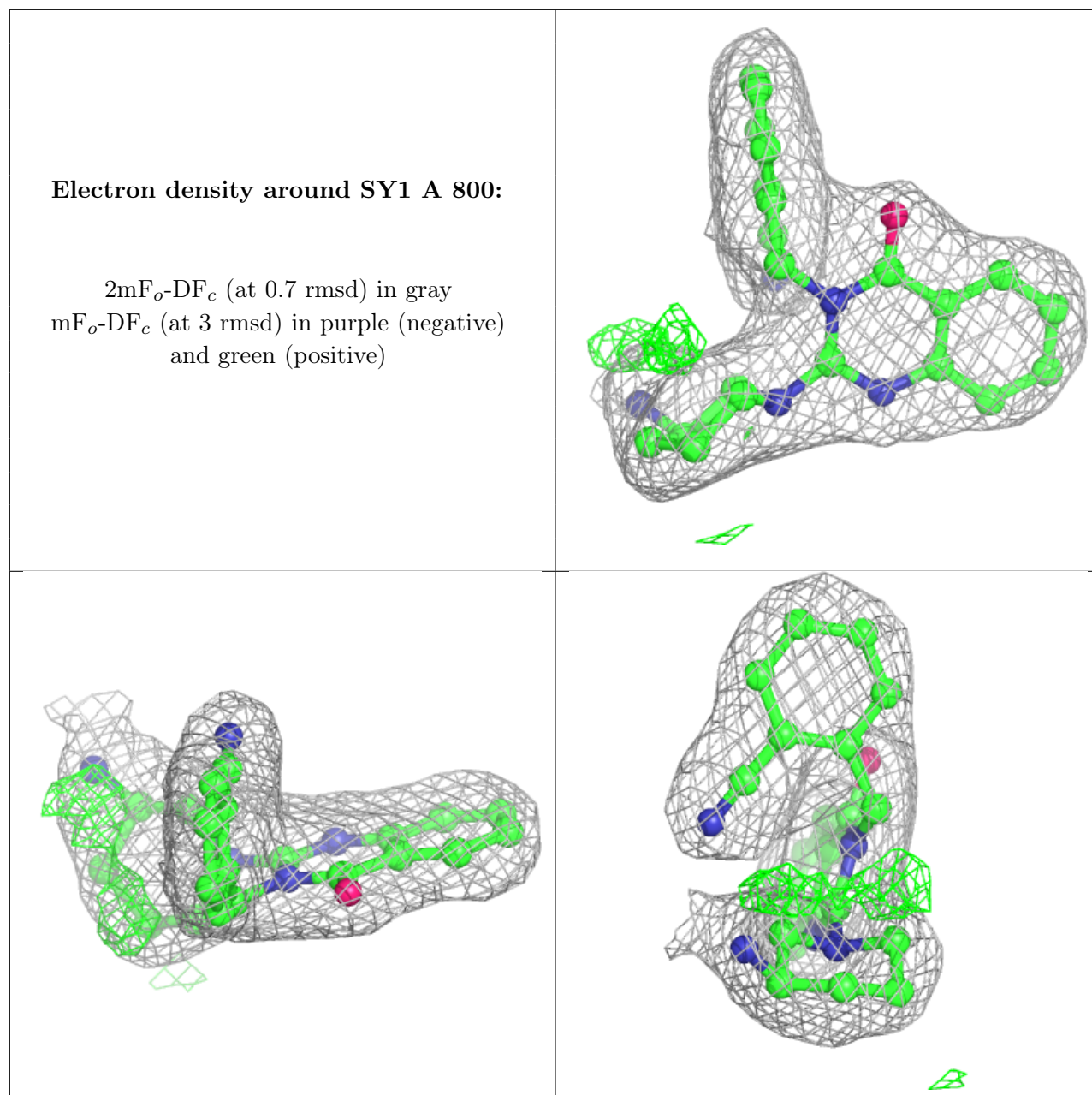
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around SY1 C 800:

$2mF_o-DF_c$ (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.