



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 15, 2024 – 06:56 pm GMT

PDB ID : 6S2G  
Title : Structure Of D80A-Fructofuranosidase From Xanthophyllomyces Dendrorhous Complexed With Fructose And Epigallocatechin Gallate (Egcg)  
Authors : Ramirez-Escudero, M.; Sanz-Aparicio, J.  
Deposited on : 2019-06-20  
Resolution : 2.03 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

---

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (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

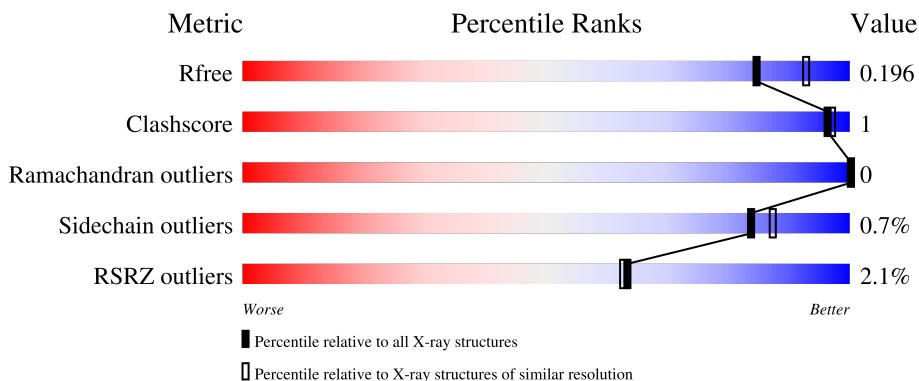
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.03 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	10434 (2.04-2.00)
Clashscore	141614	11643 (2.04-2.00)
Ramachandran outliers	138981	11493 (2.04-2.00)
Sidechain outliers	138945	11492 (2.04-2.00)
RSRZ outliers	127900	10220 (2.04-2.00)

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

Mol	Chain	Length	Quality of chain
1	A	665	 91% 6% 3%
1	B	665	 91% 6% 3%
2	C	3	 67% 33%
2	E	3	 100%
3	D	9	 22% 67% 11%

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
4	F	10	

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
3	MAN	D	6	-	-	-	X
4	MAN	F	6	-	-	-	X
6	KDH	A	1006	-	-	-	X
6	KDH	B	1005	-	-	-	X
6	KDH	B	1006	-	-	-	X
8	NAG	A	1215	-	-	-	X
8	NAG	B	1215	-	-	-	X
8	NAG	B	1242	-	-	-	X

## 2 Entry composition i

There are 9 unique types of molecules in this entry. The entry contains 11707 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

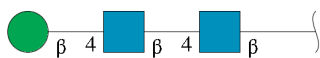
- Molecule 1 is a protein called Beta-fructofuranosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	624	Total	C	N	O	S	0	1	0
			4805	3063	784	951	7			
1	B	624	Total	C	N	O	S	0	1	0
			4805	3063	784	951	7			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2	VAL	ILE	conflict	UNP J7HDY4
A	80	ALA	ASP	engineered mutation	UNP J7HDY4
A	663	ALA	SER	conflict	UNP J7HDY4
A	665	TYR	ARG	conflict	UNP J7HDY4
B	2	VAL	ILE	conflict	UNP J7HDY4
B	80	ALA	ASP	engineered mutation	UNP J7HDY4
B	663	ALA	SER	conflict	UNP J7HDY4
B	665	TYR	ARG	conflict	UNP J7HDY4

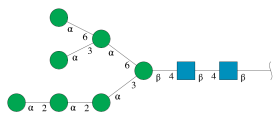
- Molecule 2 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	3	Total	C	N	O	0	0	0
			39	22	2	15			
2	E	3	Total	C	N	O	0	0	0
			39	22	2	15			

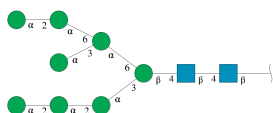
- Molecule 3 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyr

anose-(1-6)]alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



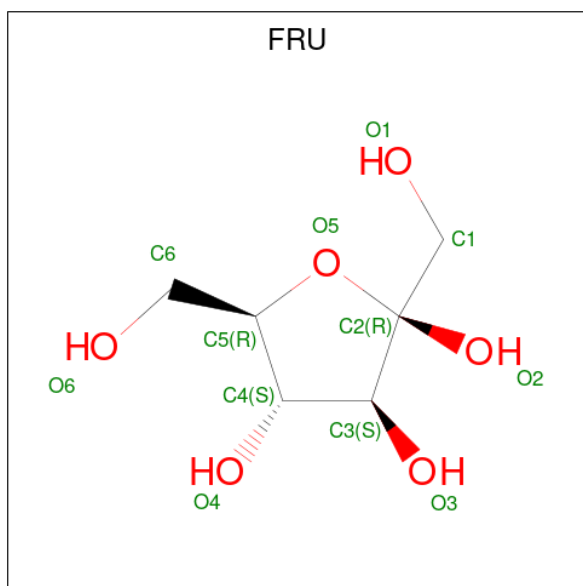
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
			Total	C	N				O
3	D	9	104	58	2	44	0	0	0

- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]-[alpha-D-mannopyranose-(1-3)]alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



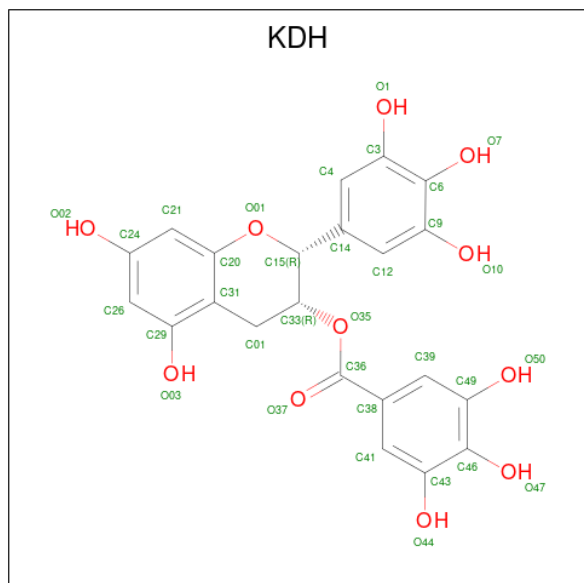
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
			Total	C	N				O
4	F	10	116	64	2	50	0	0	0

- Molecule 5 is beta-D-fructofuranose (three-letter code: FRU) (formula: C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			12	6	6		
5	B	1	Total	C	O	0	0
			12	6	6		

- Molecule 6 is (2R,3R)-5,7-dihydroxy-2-(3,4,5-trihydroxyphenyl)-3,4-dihydro-2H-chromen-3-yl 3,4,5-trihydroxybenzoate (three-letter code: KDH) (formula: C<sub>22</sub>H<sub>18</sub>O<sub>11</sub>) (labeled as "Ligand of Interest" by depositor).



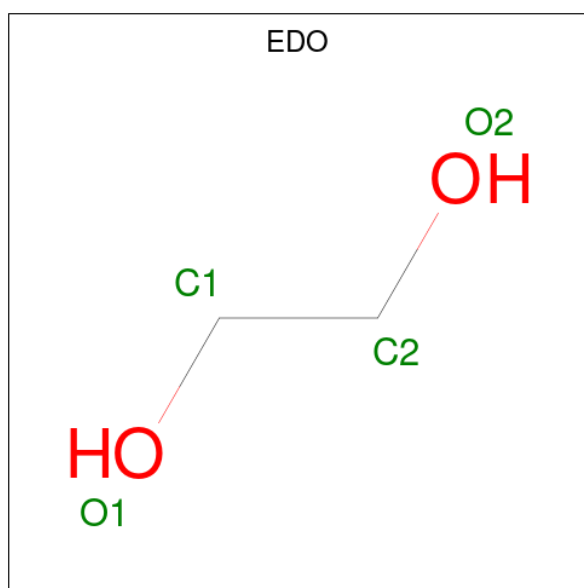
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			33	22	11		
6	A	1	Total	C	O	0	0
			33	22	11		
6	A	1	Total	C	O	0	0
			33	22	11		
6	A	1	Total	C	O	0	0
			33	22	11		
6	A	1	Total	C	O	0	0
			33	22	11		
6	A	1	Total	C	O	9	0
			33	22	11		
6	A	1	Total	C	O	0	0
			33	22	11		
6	A	1	Total	C	O	0	0
			33	22	11		
6	B	1	Total	C	O	0	0
			33	22	11		

*Continued on next page...*

Continued from previous page...

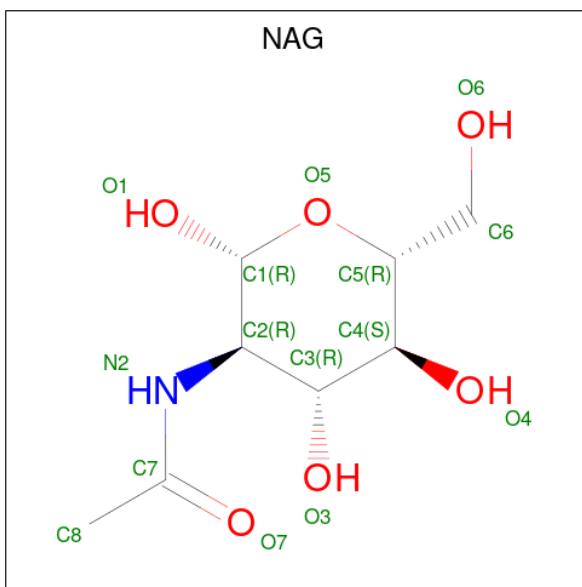
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O	0	0
			33	22	11		
6	B	1	Total	C	O	0	0
			33	22	11		
6	B	1	Total	C	O	0	0
			33	22	11		
6	B	1	Total	C	O	0	0
			33	22	11		

- Molecule 7 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

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



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

*Continued on next page...*



*Continued from previous page...*

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

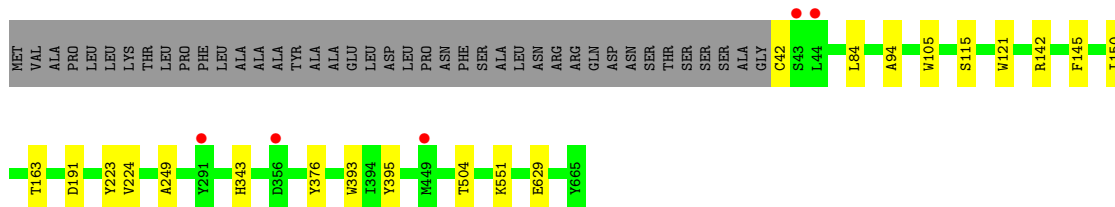
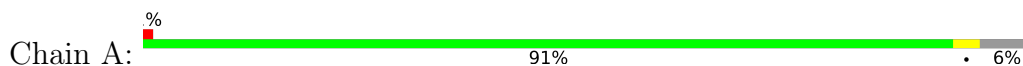
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	542	Total	O	0	0
			542	542		
9	B	413	Total	O	0	0
			413	413		

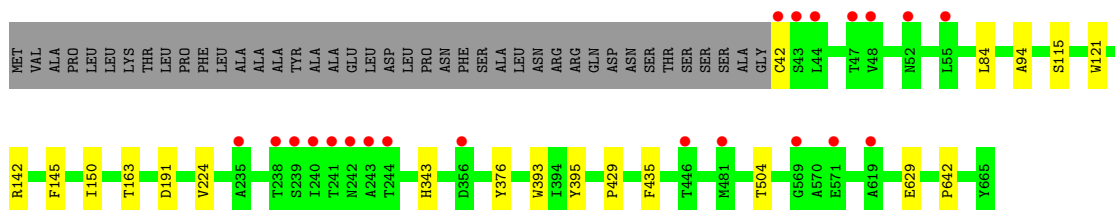
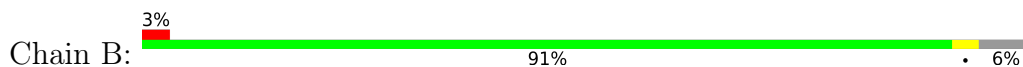
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Beta-fructofuranosidase



- Molecule 1: Beta-fructofuranosidase



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




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



- Molecule 3: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-

(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  22% 67% 11%



● Molecule 4: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:  30% 60% 10%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	74.85Å 205.97Å 145.17Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	118.66 – 2.03 47.78 – 2.03	Depositor EDS
% Data completeness (in resolution range)	100.0 (118.66-2.03) 100.0 (47.78-2.03)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.50 (at 2.03Å)	Xtrriage
Refinement program	REFMAC 5.8.0135	Depositor
R, $R_{free}$	0.166 , 0.188 0.176 , 0.196	Depositor DCC
$R_{free}$ test set	7349 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.5	Xtrriage
Anisotropy	0.765	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 50.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	11707	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.40% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

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

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: KDH, BMA, NAG, EDO, FRU, MAN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.45	0/4940	0.65	0/6754
1	B	0.42	0/4940	0.64	0/6754
All	All	0.44	0/9880	0.65	0/13508

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4805	0	4503	9	0
1	B	4805	0	4504	10	0
2	C	39	0	34	1	0
2	E	39	0	34	0	0
3	D	104	0	85	0	1
4	F	116	0	97	0	1
5	A	12	0	12	0	0
5	B	12	0	12	0	0
6	A	264	0	88	1	0
6	B	198	0	66	1	0
7	A	4	0	6	0	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	B	4	0	6	0	0
8	A	182	0	169	0	0
8	B	168	0	156	2	0
9	A	542	0	0	1	0
9	B	413	0	0	0	0
All	All	11707	0	9772	20	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 1.

All (20) 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:642:PRO:HG3	6:B:1008:KDH:H01	1.83	0.61
1:A:150:ILE:HG12	1:A:224:VAL:HG11	1.86	0.57
1:B:150:ILE:HG12	1:B:224:VAL:HG11	1.86	0.57
1:B:84:LEU:HD23	1:B:94:ALA:HA	1.89	0.54
1:A:84:LEU:HD23	1:A:94:ALA:HA	1.91	0.52
1:B:429:PRO:HB3	8:B:1444:NAG:H62	1.93	0.49
1:B:435:PHE:CZ	8:B:1444:NAG:H5	2.50	0.47
1:B:343:HIS:HB3	1:B:376:TYR:CD1	2.51	0.45
9:A:2381:HOH:O	2:C:2:NAG:H83	2.16	0.45
1:B:393:TRP:CZ2	1:B:395:TYR:HB3	2.53	0.43
1:A:343:HIS:HB3	1:A:376:TYR:CD1	2.53	0.43
1:B:145:PHE:HB2	1:B:163:THR:HB	2.02	0.42
1:A:393:TRP:CZ2	1:A:395:TYR:HB3	2.54	0.42
1:B:504:THR:HG22	1:B:629:GLU:HB2	2.01	0.41
1:A:145:PHE:HB2	1:A:163:THR:HB	2.03	0.41
1:B:115:SER:HB2	1:B:121:TRP:CD2	2.54	0.41
1:A:105:TRP:CE3	6:A:1002:KDH:H15	2.55	0.41
1:A:504:THR:HG22	1:A:629:GLU:HB2	2.02	0.41
1:A:223:TYR:O	1:A:249:ALA:HA	2.21	0.40
1:A:115:SER:HB2	1:A:121:TRP:CD2	2.57	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:8:MAN:O4	4:F:8:MAN:O4[2_555]	1.28	0.92
3:D:9:MAN:O4	3:D:9:MAN:O4[2_555]	1.84	0.36

## 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	623/665 (94%)	598 (96%)	25 (4%)	0	100	100
1	B	623/665 (94%)	598 (96%)	25 (4%)	0	100	100
All	All	1246/1330 (94%)	1196 (96%)	50 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	498/529 (94%)	494 (99%)	4 (1%)	81	85
1	B	498/529 (94%)	495 (99%)	3 (1%)	86	89
All	All	996/1058 (94%)	989 (99%)	7 (1%)	84	87

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	CYS
1	A	142	ARG
1	A	191	ASP
1	A	551	LYS
1	B	42	CYS
1	B	142	ARG
1	B	191	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	268	HIS
1	A	335	GLN
1	A	342	ASN
1	A	458	GLN
1	B	268	HIS
1	B	335	GLN
1	B	342	ASN
1	B	370	GLN
1	B	458	GLN

### 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](#)

25 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
2	NAG	C	1	1,2	14,14,15	0.60	0	17,19,21	1.17	1 (5%)
2	NAG	C	2	2	14,14,15	0.85	1 (7%)	17,19,21	1.56	5 (29%)
2	BMA	C	3	2	11,11,12	0.64	0	15,15,17	1.94	6 (40%)
3	NAG	D	1	3,1	14,14,15	1.11	1 (7%)	17,19,21	1.11	1 (5%)
3	NAG	D	2	3	14,14,15	0.33	0	17,19,21	0.94	1 (5%)
3	BMA	D	3	3	11,11,12	0.41	0	15,15,17	1.89	2 (13%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	MAN	D	4	3	10,10,12	1.17	2 (20%)	14,14,17	1.85	4 (28%)
3	MAN	D	5	3	11,11,12	0.42	0	15,15,17	1.75	2 (13%)
3	MAN	D	6	3	11,11,12	0.39	0	15,15,17	0.81	0
3	MAN	D	7	3	11,11,12	0.45	0	15,15,17	1.68	2 (13%)
3	MAN	D	8	3	11,11,12	0.67	0	15,15,17	0.68	0
3	MAN	D	9	3	11,11,12	0.67	0	15,15,17	1.42	3 (20%)
2	NAG	E	1	1,2	14,14,15	0.45	0	17,19,21	0.96	1 (5%)
2	NAG	E	2	2	14,14,15	0.62	0	17,19,21	0.90	1 (5%)
2	BMA	E	3	2	11,11,12	0.54	0	15,15,17	2.21	5 (33%)
4	NAG	F	1	4,1	14,14,15	0.86	1 (7%)	17,19,21	0.93	0
4	MAN	F	10	4	11,11,12	0.36	0	15,15,17	0.92	0
4	NAG	F	2	4	14,14,15	0.45	0	17,19,21	0.95	0
4	BMA	F	3	4	11,11,12	0.37	0	15,15,17	1.34	3 (20%)
4	MAN	F	4	4	11,11,12	1.27	2 (18%)	15,15,17	1.54	3 (20%)
4	MAN	F	5	4	11,11,12	0.47	0	15,15,17	0.93	0
4	MAN	F	6	4	11,11,12	0.53	0	15,15,17	1.46	3 (20%)
4	MAN	F	7	4	11,11,12	1.23	2 (18%)	15,15,17	1.62	4 (26%)
4	MAN	F	8	4	11,11,12	0.61	0	15,15,17	1.26	3 (20%)
4	MAN	F	9	4	11,11,12	0.64	0	15,15,17	1.15	2 (13%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	2/6/23/26	0/1/1/1
2	BMA	C	3	2	-	2/2/19/22	0/1/1/1
3	NAG	D	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	D	2	3	-	0/6/23/26	0/1/1/1
3	BMA	D	3	3	-	0/2/19/22	0/1/1/1
3	MAN	D	4	3	-	-	1/1/1/1
3	MAN	D	5	3	-	1/2/19/22	0/1/1/1
3	MAN	D	6	3	-	0/2/19/22	0/1/1/1
3	MAN	D	7	3	-	2/2/19/22	0/1/1/1
3	MAN	D	8	3	-	0/2/19/22	0/1/1/1
3	MAN	D	9	3	-	0/2/19/22	0/1/1/1
2	NAG	E	1	1,2	-	2/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1
2	BMA	E	3	2	-	0/2/19/22	0/1/1/1
4	NAG	F	1	4,1	-	0/6/23/26	0/1/1/1
4	MAN	F	10	4	-	0/2/19/22	0/1/1/1
4	NAG	F	2	4	-	0/6/23/26	0/1/1/1
4	BMA	F	3	4	-	2/2/19/22	0/1/1/1
4	MAN	F	4	4	-	1/2/19/22	0/1/1/1
4	MAN	F	5	4	-	2/2/19/22	0/1/1/1
4	MAN	F	6	4	-	0/2/19/22	0/1/1/1
4	MAN	F	7	4	-	2/2/19/22	0/1/1/1
4	MAN	F	8	4	-	0/2/19/22	0/1/1/1
4	MAN	F	9	4	-	0/2/19/22	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	1	NAG	C1-C2	4.02	1.58	1.52
4	F	1	NAG	C1-C2	2.85	1.56	1.52
4	F	4	MAN	O5-C1	-2.78	1.39	1.43
4	F	7	MAN	O5-C1	-2.58	1.39	1.43
3	D	4	MAN	O5-C1	-2.45	1.39	1.43
2	C	2	NAG	O5-C1	-2.25	1.40	1.43
4	F	4	MAN	C2-C3	-2.23	1.49	1.52
3	D	4	MAN	O2-C2	-2.08	1.38	1.43
4	F	7	MAN	O2-C2	-2.03	1.39	1.43

All (52) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	5	MAN	C1-O5-C5	5.20	119.24	112.19
3	D	3	BMA	O3-C3-C4	-4.77	99.32	110.35
3	D	7	MAN	O6-C6-C5	-4.40	96.19	111.29
2	E	3	BMA	C3-C4-C5	4.28	117.88	110.24
3	D	3	BMA	O3-C3-C2	4.28	118.19	109.99
3	D	4	MAN	C1-O5-C5	4.13	122.15	112.78
2	E	3	BMA	C1-O5-C5	4.09	117.74	112.19
4	F	6	MAN	C1-C2-C3	3.93	114.50	109.67
2	C	3	BMA	C6-C5-C4	-3.71	104.31	113.00
2	C	2	NAG	C8-C7-N2	3.48	121.99	116.10
2	E	3	BMA	O3-C3-C4	-3.36	102.57	110.35
3	D	9	MAN	O2-C2-C3	-3.24	103.64	110.14

Continued on next page...

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	3	BMA	O5-C5-C6	3.17	112.17	107.20
4	F	3	BMA	O3-C3-C4	-3.13	103.12	110.35
4	F	4	MAN	C1-O5-C5	3.07	116.36	112.19
4	F	7	MAN	O5-C1-C2	3.06	115.50	110.77
4	F	3	BMA	C6-C5-C4	-2.94	106.12	113.00
4	F	4	MAN	C6-C5-C4	-2.90	106.20	113.00
2	E	3	BMA	C2-C3-C4	2.90	115.91	110.89
3	D	4	MAN	O5-C5-C4	2.86	114.66	109.52
4	F	7	MAN	O5-C5-C6	2.83	111.64	107.20
2	C	2	NAG	C2-N2-C7	2.70	126.75	122.90
2	C	3	BMA	C1-C2-C3	2.65	112.93	109.67
4	F	4	MAN	O3-C3-C2	-2.64	104.93	109.99
4	F	9	MAN	O5-C5-C6	2.64	111.34	107.20
3	D	9	MAN	C1-O5-C5	2.64	115.77	112.19
3	D	7	MAN	O5-C5-C6	2.61	111.29	107.20
4	F	8	MAN	O2-C2-C3	-2.58	104.97	110.14
4	F	7	MAN	O2-C2-C1	-2.55	103.92	109.15
3	D	4	MAN	O2-C2-C1	-2.53	103.97	109.15
3	D	4	MAN	C1-C2-C3	2.49	112.73	109.67
2	C	3	BMA	C1-O5-C5	2.48	115.56	112.19
4	F	8	MAN	O2-C2-C1	-2.47	104.11	109.15
4	F	6	MAN	O5-C5-C6	2.43	111.01	107.20
4	F	7	MAN	O3-C3-C2	2.41	114.61	109.99
4	F	9	MAN	C1-O5-C5	2.39	115.43	112.19
3	D	9	MAN	C1-C2-C3	2.39	112.60	109.67
2	C	2	NAG	C1-C2-N2	-2.38	106.42	110.49
2	E	2	NAG	C1-O5-C5	2.33	115.34	112.19
2	C	3	BMA	C2-C3-C4	-2.28	106.94	110.89
2	C	1	NAG	C1-O5-C5	2.27	115.27	112.19
2	C	3	BMA	O4-C4-C5	-2.24	103.74	109.30
2	C	2	NAG	O7-C7-C8	-2.18	118.00	122.06
3	D	5	MAN	C6-C5-C4	-2.12	108.04	113.00
3	D	1	NAG	O5-C1-C2	-2.11	107.95	111.29
4	F	3	BMA	O5-C5-C6	2.11	110.51	107.20
4	F	6	MAN	O5-C5-C4	-2.06	105.81	110.83
4	F	8	MAN	C1-O5-C5	2.06	114.98	112.19
2	E	3	BMA	C6-C5-C4	-2.03	108.24	113.00
3	D	2	NAG	O5-C5-C6	2.03	110.39	107.20
2	E	1	NAG	O4-C4-C5	2.03	114.34	109.30
2	C	2	NAG	C4-C3-C2	-2.02	108.06	111.02

There are no chirality outliers.

All (16) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	F	7	MAN	O5-C5-C6-O6
4	F	7	MAN	C4-C5-C6-O6
2	C	2	NAG	C8-C7-N2-C2
2	C	2	NAG	O7-C7-N2-C2
2	C	3	BMA	O5-C5-C6-O6
4	F	5	MAN	C4-C5-C6-O6
4	F	5	MAN	O5-C5-C6-O6
4	F	3	BMA	C4-C5-C6-O6
4	F	3	BMA	O5-C5-C6-O6
3	D	5	MAN	O5-C5-C6-O6
3	D	7	MAN	C4-C5-C6-O6
2	E	1	NAG	C4-C5-C6-O6
2	C	3	BMA	C4-C5-C6-O6
2	E	1	NAG	O5-C5-C6-O6
3	D	7	MAN	O5-C5-C6-O6
4	F	4	MAN	C4-C5-C6-O6

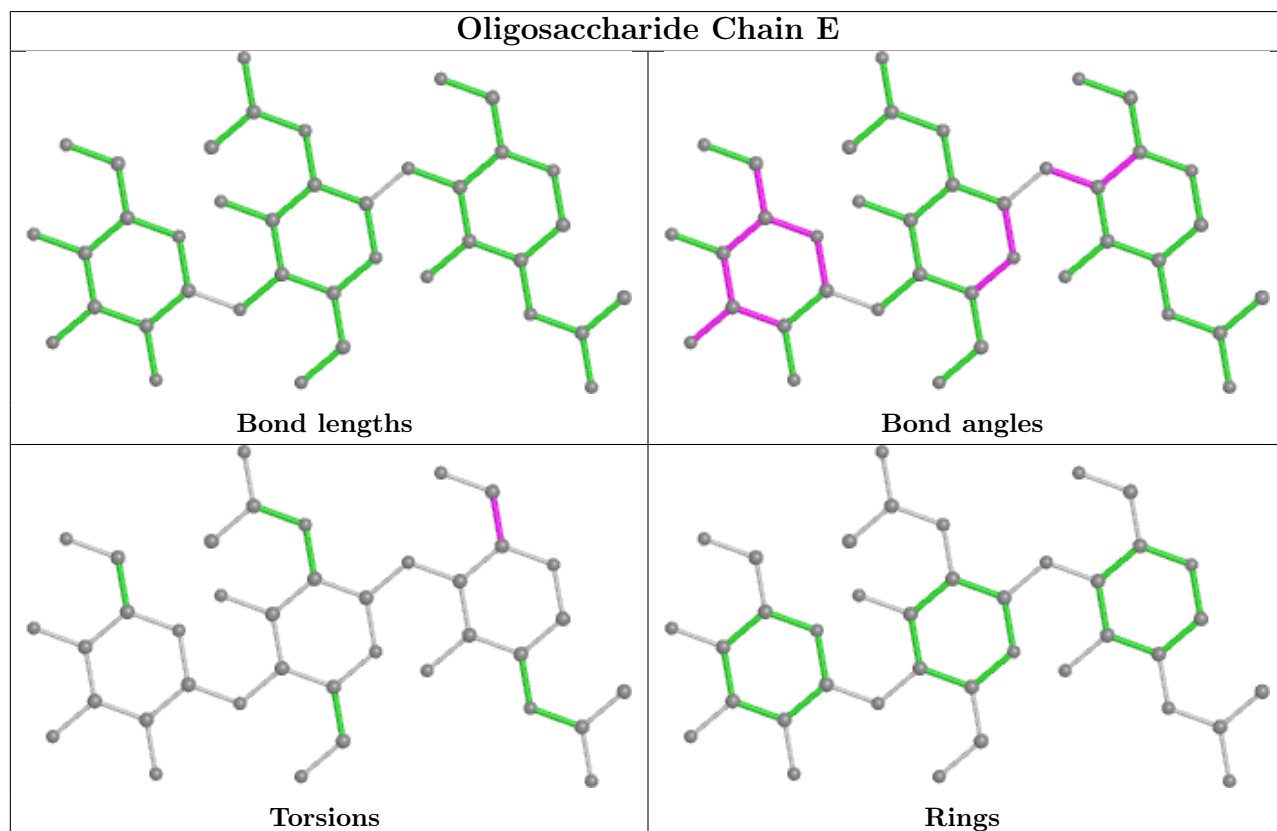
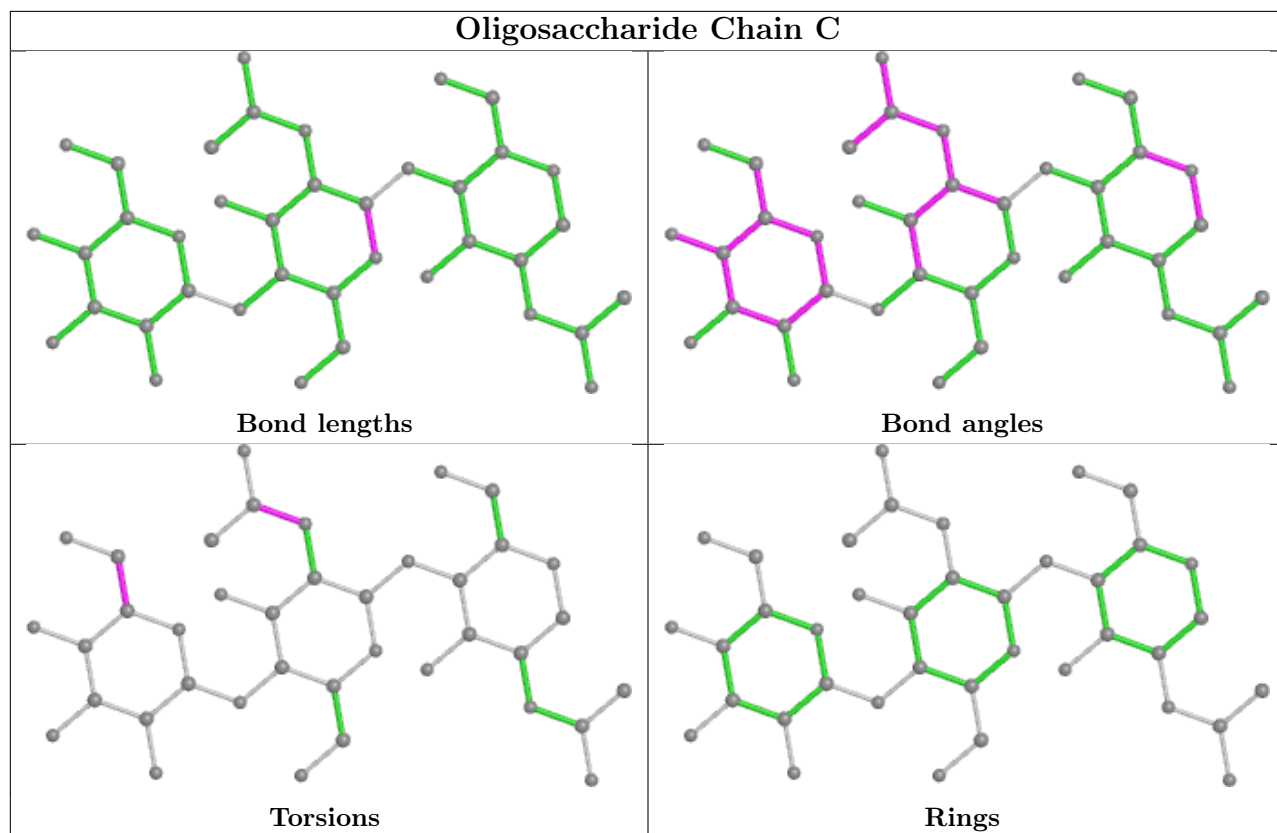
All (1) ring outliers are listed below:

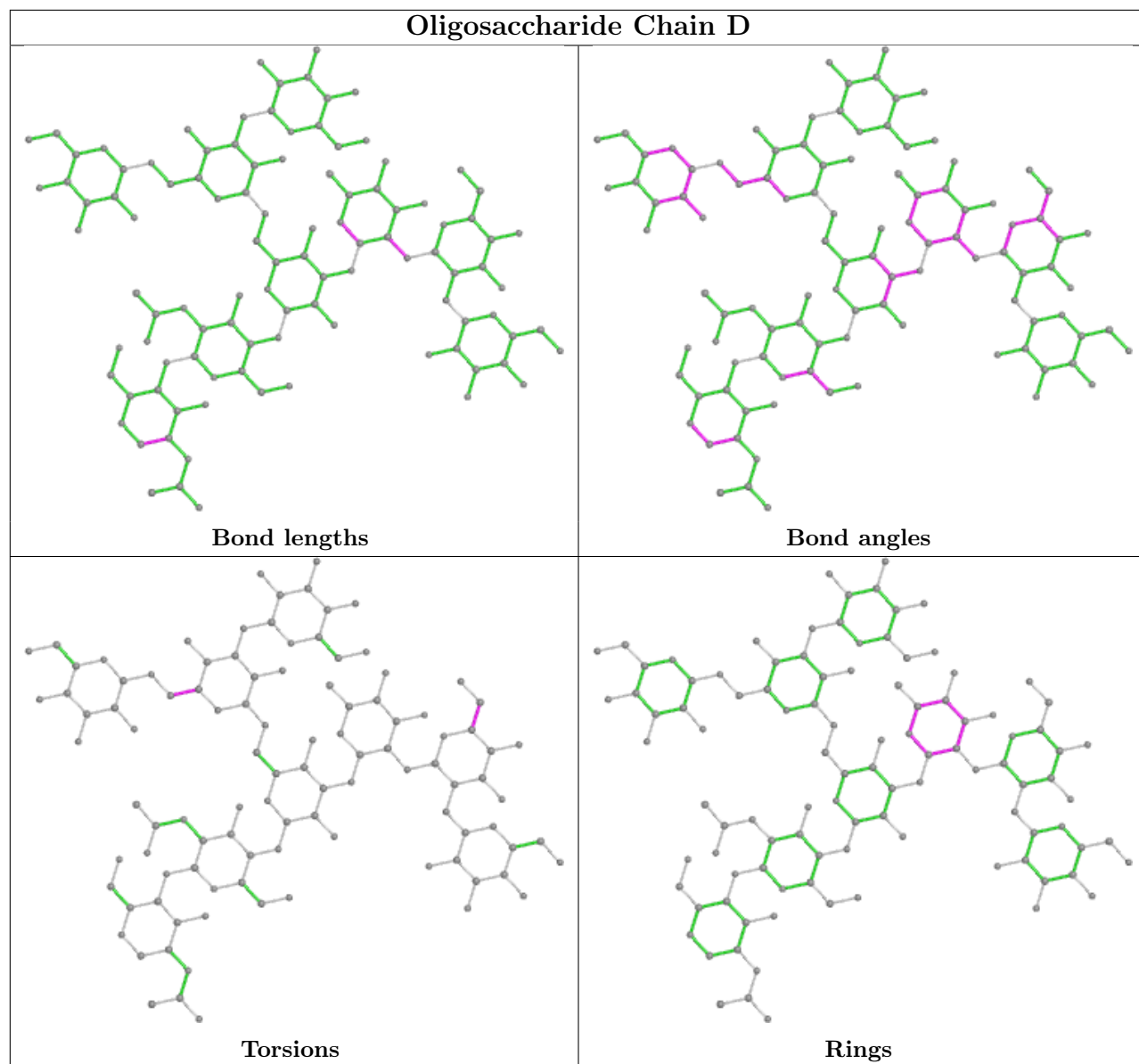
Mol	Chain	Res	Type	Atoms
3	D	4	MAN	C1-C2-C3-C4-C5-O5

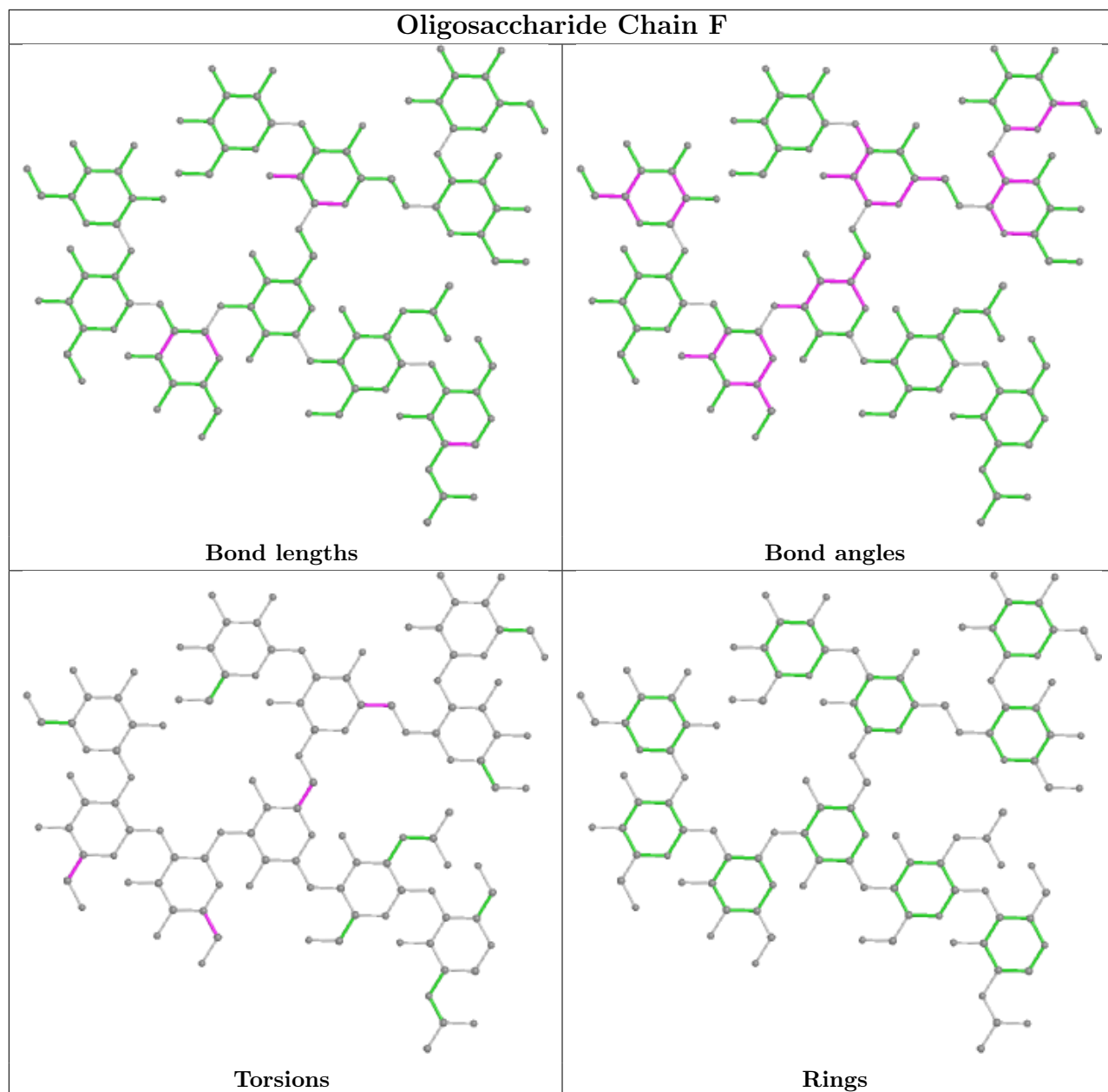
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	2	NAG	1	0
3	D	9	MAN	0	1
4	F	8	MAN	0	1

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](#)

43 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
6	KDH	B	1006	-	36,36,36	3.18	7 (19%)	54,54,54	1.43	7 (12%)
6	KDH	B	1004	-	36,36,36	3.11	7 (19%)	54,54,54	1.45	9 (16%)
8	NAG	A	1052	1	14,14,15	0.25	0	17,19,21	1.50	3 (17%)
8	NAG	A	1242	1	14,14,15	0.33	0	17,19,21	1.10	2 (11%)
5	FRU	B	1001	-	11,12,12	0.65	0	10,18,18	1.05	0
8	NAG	B	1357	1	14,14,15	0.33	0	17,19,21	0.66	0
6	KDH	A	1005	-	36,36,36	3.04	7 (19%)	54,54,54	1.36	8 (14%)
6	KDH	B	1008	-	36,36,36	2.48	8 (22%)	54,54,54	1.60	12 (22%)
8	NAG	A	1444	1	14,14,15	0.41	0	17,19,21	0.88	1 (5%)
8	NAG	A	1606	1	14,14,15	0.54	0	17,19,21	1.74	4 (23%)
6	KDH	A	1009	-	36,36,36	3.05	8 (22%)	54,54,54	1.74	11 (20%)
8	NAG	B	1539	1	14,14,15	0.55	0	17,19,21	1.30	1 (5%)
8	NAG	B	1483	1	14,14,15	0.33	0	17,19,21	1.17	2 (11%)
6	KDH	A	1003	-	36,36,36	2.93	7 (19%)	54,54,54	1.42	7 (12%)
8	NAG	A	1471	1	14,14,15	0.33	0	17,19,21	1.44	3 (17%)
8	NAG	B	1319	-	14,14,15	0.30	0	17,19,21	0.64	0
8	NAG	B	1215	1	14,14,15	0.39	0	17,19,21	1.45	1 (5%)
8	NAG	B	1242	1	14,14,15	0.31	0	17,19,21	1.54	3 (17%)
5	FRU	A	1001	-	11,12,12	0.71	0	10,18,18	0.99	1 (10%)
6	KDH	A	1002	-	36,36,36	3.23	7 (19%)	54,54,54	1.52	10 (18%)
8	NAG	B	1444	1	14,14,15	0.43	0	17,19,21	1.36	1 (5%)
8	NAG	B	1576	1	14,14,15	0.42	0	17,19,21	1.12	0
7	EDO	A	1011	-	3,3,3	0.53	0	2,2,2	0.13	0
8	NAG	B	1644	1	14,14,15	0.38	0	17,19,21	0.94	1 (5%)
8	NAG	A	1215	1	14,14,15	0.61	0	17,19,21	2.44	4 (23%)
8	NAG	B	1555	1	14,14,15	0.42	0	17,19,21	1.19	2 (11%)
8	NAG	B	1471	1	14,14,15	0.36	0	17,19,21	0.88	0
6	KDH	A	1007	-	36,36,36	2.56	8 (22%)	54,54,54	1.88	15 (27%)
6	KDH	B	1003	-	36,36,36	2.89	8 (22%)	54,54,54	1.37	9 (16%)
8	NAG	A	1236	1	14,14,15	0.38	0	17,19,21	0.96	0
8	NAG	A	1644	1	14,14,15	0.47	0	17,19,21	0.91	1 (5%)
6	KDH	A	1006	-	36,36,36	3.16	7 (19%)	54,54,54	1.40	7 (12%)
6	KDH	A	1004	-	36,36,36	3.08	7 (19%)	54,54,54	1.45	10 (18%)
6	KDH	B	1002	-	36,36,36	3.28	7 (19%)	54,54,54	1.55	9 (16%)
8	NAG	A	1357	1	14,14,15	0.42	0	17,19,21	1.44	2 (11%)
8	NAG	A	1555	1	14,14,15	0.34	0	17,19,21	2.33	7 (41%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	KDH	A	1008	-	36,36,36	3.25	7 (19%)	54,54,54	1.44	9 (16%)
7	EDO	B	1011	-	3,3,3	0.48	0	2,2,2	0.36	0
8	NAG	A	1576	1	14,14,15	0.27	0	17,19,21	1.11	1 (5%)
8	NAG	B	1052	1	14,14,15	0.30	0	17,19,21	0.75	0
8	NAG	A	1539	1	14,14,15	0.60	0	17,19,21	1.51	2 (11%)
8	NAG	A	1483	1	14,14,15	0.32	0	17,19,21	1.24	3 (17%)
6	KDH	B	1005	-	36,36,36	3.07	7 (19%)	54,54,54	1.48	9 (16%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	KDH	B	1006	-	-	1/12/24/24	0/4/4/4
6	KDH	B	1004	-	-	2/12/24/24	0/4/4/4
8	NAG	A	1052	1	-	2/6/23/26	0/1/1/1
8	NAG	A	1242	1	-	0/6/23/26	0/1/1/1
5	FRU	B	1001	-	-	1/5/24/24	0/1/1/1
8	NAG	B	1357	1	-	0/6/23/26	0/1/1/1
6	KDH	A	1005	-	-	0/12/24/24	0/4/4/4
6	KDH	B	1008	-	-	4/12/24/24	0/4/4/4
8	NAG	A	1444	1	-	0/6/23/26	0/1/1/1
8	NAG	A	1606	1	-	5/6/23/26	0/1/1/1
6	KDH	A	1009	-	-	3/12/24/24	0/4/4/4
8	NAG	B	1539	1	-	2/6/23/26	0/1/1/1
8	NAG	B	1483	1	-	2/6/23/26	0/1/1/1
6	KDH	A	1003	-	-	4/12/24/24	0/4/4/4
8	NAG	A	1471	1	-	2/6/23/26	0/1/1/1
8	NAG	B	1319	-	-	5/6/23/26	0/1/1/1
8	NAG	B	1215	1	-	0/6/23/26	0/1/1/1
8	NAG	B	1242	1	-	2/6/23/26	0/1/1/1
5	FRU	A	1001	-	-	1/5/24/24	0/1/1/1
6	KDH	A	1002	-	-	4/12/24/24	0/4/4/4
8	NAG	B	1444	1	-	2/6/23/26	0/1/1/1
8	NAG	B	1576	1	-	2/6/23/26	0/1/1/1
7	EDO	A	1011	-	-	0/1/1/1	-
8	NAG	B	1644	1	-	0/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	NAG	A	1215	1	-	4/6/23/26	0/1/1/1
8	NAG	B	1555	1	-	0/6/23/26	0/1/1/1
8	NAG	B	1471	1	-	0/6/23/26	0/1/1/1
6	KDH	A	1007	-	-	0/12/24/24	0/4/4/4
6	KDH	B	1003	-	-	4/12/24/24	0/4/4/4
8	NAG	A	1236	1	-	0/6/23/26	0/1/1/1
8	NAG	A	1644	1	-	0/6/23/26	0/1/1/1
6	KDH	A	1006	-	-	4/12/24/24	0/4/4/4
6	KDH	A	1004	-	-	4/12/24/24	0/4/4/4
6	KDH	B	1002	-	-	4/12/24/24	0/4/4/4
8	NAG	A	1357	1	-	2/6/23/26	0/1/1/1
8	NAG	A	1555	1	-	2/6/23/26	0/1/1/1
6	KDH	A	1008	-	-	4/12/24/24	0/4/4/4
7	EDO	B	1011	-	-	1/1/1/1	-
8	NAG	A	1576	1	-	2/6/23/26	0/1/1/1
8	NAG	B	1052	1	-	0/6/23/26	0/1/1/1
8	NAG	A	1539	1	-	2/6/23/26	0/1/1/1
8	NAG	A	1483	1	-	0/6/23/26	0/1/1/1
6	KDH	B	1005	-	-	0/12/24/24	0/4/4/4

All (102) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	1002	KDH	C9-C6	8.45	1.50	1.40
6	B	1002	KDH	C49-C46	8.43	1.50	1.40
6	A	1008	KDH	C9-C6	8.41	1.50	1.40
6	A	1002	KDH	C43-C46	8.34	1.50	1.40
6	A	1006	KDH	C49-C46	8.14	1.49	1.40
6	A	1003	KDH	C49-C46	8.12	1.49	1.40
6	A	1008	KDH	C49-C46	8.07	1.49	1.40
6	B	1002	KDH	C3-C6	8.06	1.49	1.40
6	A	1004	KDH	C43-C46	8.04	1.49	1.40
6	B	1002	KDH	C9-C6	8.00	1.49	1.40
6	A	1004	KDH	C49-C46	7.99	1.49	1.40
6	B	1006	KDH	C43-C46	7.96	1.49	1.40
6	B	1004	KDH	C49-C46	7.95	1.49	1.40
6	A	1002	KDH	C49-C46	7.95	1.49	1.40
6	A	1005	KDH	C9-C6	7.88	1.49	1.40
6	B	1004	KDH	C43-C46	7.84	1.49	1.40
6	A	1002	KDH	C3-C6	7.80	1.49	1.40

Continued on next page...

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	1006	KDH	C49-C46	7.77	1.49	1.40
6	B	1004	KDH	C9-C6	7.74	1.49	1.40
6	B	1005	KDH	C9-C6	7.70	1.49	1.40
6	B	1006	KDH	C3-C6	7.69	1.49	1.40
6	A	1008	KDH	C3-C6	7.69	1.49	1.40
6	A	1004	KDH	C9-C6	7.67	1.49	1.40
6	B	1002	KDH	C43-C46	7.63	1.49	1.40
6	A	1006	KDH	C43-C46	7.61	1.49	1.40
6	B	1004	KDH	C3-C6	7.60	1.49	1.40
6	B	1003	KDH	C49-C46	7.54	1.49	1.40
6	A	1009	KDH	C3-C6	7.53	1.49	1.40
6	A	1006	KDH	C9-C6	7.51	1.49	1.40
6	A	1009	KDH	C9-C6	7.50	1.49	1.40
6	B	1005	KDH	C43-C46	7.48	1.49	1.40
6	A	1005	KDH	C49-C46	7.48	1.49	1.40
6	B	1005	KDH	C49-C46	7.47	1.49	1.40
6	A	1003	KDH	C43-C46	7.43	1.48	1.40
6	A	1005	KDH	C3-C6	7.41	1.48	1.40
6	B	1005	KDH	C3-C6	7.38	1.48	1.40
6	A	1009	KDH	C43-C46	7.37	1.48	1.40
6	A	1006	KDH	C20-C31	7.31	1.50	1.40
6	B	1006	KDH	C20-C31	7.31	1.50	1.40
6	B	1006	KDH	C9-C6	7.31	1.48	1.40
6	A	1008	KDH	C43-C46	7.28	1.48	1.40
6	B	1003	KDH	C43-C46	7.23	1.48	1.40
6	A	1004	KDH	C3-C6	7.15	1.48	1.40
6	A	1005	KDH	C43-C46	7.15	1.48	1.40
6	A	1006	KDH	C3-C6	7.02	1.48	1.40
6	A	1008	KDH	C20-C31	6.90	1.49	1.40
6	A	1007	KDH	C3-C6	6.87	1.48	1.40
6	B	1002	KDH	C20-C31	6.86	1.49	1.40
6	B	1003	KDH	C3-C6	6.73	1.48	1.40
6	A	1003	KDH	C9-C6	6.70	1.48	1.40
6	B	1003	KDH	C9-C6	6.65	1.48	1.40
6	B	1005	KDH	C20-C31	6.65	1.49	1.40
6	A	1009	KDH	C49-C46	6.59	1.47	1.40
6	A	1005	KDH	C20-C31	6.50	1.49	1.40
6	A	1009	KDH	C20-C31	6.47	1.49	1.40
6	A	1002	KDH	C20-C31	6.40	1.49	1.40
6	A	1003	KDH	C3-C6	6.39	1.47	1.40
6	B	1003	KDH	C20-C31	6.36	1.49	1.40
6	A	1003	KDH	C20-C31	6.33	1.49	1.40

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	1008	KDH	C49-C46	6.33	1.47	1.40
6	B	1008	KDH	C9-C6	6.21	1.47	1.40
6	B	1002	KDH	O35-C36	6.20	1.47	1.34
6	A	1008	KDH	O35-C36	6.20	1.47	1.34
6	B	1004	KDH	C20-C31	6.11	1.48	1.40
6	A	1004	KDH	C20-C31	6.08	1.48	1.40
6	B	1008	KDH	C3-C6	6.01	1.47	1.40
6	A	1009	KDH	O35-C36	5.99	1.46	1.34
6	A	1006	KDH	O35-C36	5.99	1.46	1.34
6	A	1007	KDH	C9-C6	5.92	1.47	1.40
6	B	1006	KDH	O35-C36	5.86	1.46	1.34
6	A	1007	KDH	C20-C31	5.86	1.48	1.40
6	B	1005	KDH	O35-C36	5.80	1.46	1.34
6	A	1007	KDH	C49-C46	5.77	1.46	1.40
6	B	1004	KDH	O35-C36	5.75	1.46	1.34
6	A	1004	KDH	O35-C36	5.71	1.46	1.34
6	A	1002	KDH	O35-C36	5.67	1.46	1.34
6	A	1005	KDH	O35-C36	5.54	1.45	1.34
6	A	1007	KDH	C43-C46	5.41	1.46	1.40
6	B	1008	KDH	C43-C46	5.21	1.46	1.40
6	B	1008	KDH	C20-C31	5.20	1.47	1.40
6	B	1003	KDH	O35-C36	5.08	1.44	1.34
6	A	1003	KDH	O35-C36	5.03	1.44	1.34
6	A	1009	KDH	C29-C31	5.01	1.50	1.40
6	A	1008	KDH	C29-C31	4.93	1.49	1.40
6	A	1006	KDH	C29-C31	4.72	1.49	1.40
6	B	1002	KDH	C29-C31	4.66	1.49	1.40
6	A	1003	KDH	C29-C31	4.62	1.49	1.40
6	B	1006	KDH	C29-C31	4.56	1.49	1.40
6	A	1002	KDH	C29-C31	4.53	1.49	1.40
6	A	1004	KDH	C29-C31	4.52	1.49	1.40
6	B	1008	KDH	O35-C36	4.48	1.43	1.34
6	B	1005	KDH	C29-C31	4.47	1.48	1.40
6	B	1004	KDH	C29-C31	4.27	1.48	1.40
6	A	1007	KDH	O35-C36	4.26	1.43	1.34
6	B	1003	KDH	C29-C31	4.13	1.48	1.40
6	A	1005	KDH	C29-C31	3.91	1.47	1.40
6	A	1007	KDH	C29-C31	3.64	1.47	1.40
6	B	1008	KDH	C29-C31	3.62	1.47	1.40
6	A	1007	KDH	O35-C33	-3.61	1.40	1.46
6	B	1008	KDH	O35-C33	-2.23	1.42	1.46
6	B	1003	KDH	O35-C33	-2.19	1.42	1.46

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	1009	KDH	C01-C33	2.06	1.56	1.51

All (177) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	1215	NAG	C1-O5-C5	8.27	123.40	112.19
8	A	1555	NAG	C1-O5-C5	6.65	121.20	112.19
8	B	1215	NAG	C1-O5-C5	5.31	119.39	112.19
6	A	1007	KDH	O01-C15-C14	5.16	119.09	107.47
8	A	1539	NAG	C1-O5-C5	5.06	119.05	112.19
6	A	1009	KDH	C33-O35-C36	4.99	126.05	117.38
6	A	1009	KDH	O35-C36-C38	4.97	119.95	111.92
6	B	1002	KDH	O35-C36-C38	4.87	119.79	111.92
6	A	1007	KDH	O01-C20-C21	4.67	123.74	116.38
6	B	1004	KDH	O35-C36-C38	4.50	119.19	111.92
8	A	1606	NAG	C2-N2-C7	4.48	129.28	122.90
8	B	1539	NAG	C1-O5-C5	4.47	118.25	112.19
6	B	1005	KDH	O35-C36-C38	4.36	118.96	111.92
6	B	1008	KDH	O01-C20-C21	4.09	122.83	116.38
6	A	1004	KDH	O35-C36-C38	4.09	118.52	111.92
6	A	1003	KDH	O35-C36-C38	4.04	118.44	111.92
6	A	1006	KDH	O35-C36-C38	3.89	118.19	111.92
8	B	1444	NAG	C1-O5-C5	3.88	117.45	112.19
6	A	1007	KDH	C14-C15-C33	-3.86	104.00	113.68
6	A	1009	KDH	O35-C33-C01	3.80	121.17	109.16
6	A	1002	KDH	O35-C36-C38	3.80	118.06	111.92
6	A	1007	KDH	C39-C49-C46	-3.79	117.86	120.47
6	A	1007	KDH	C41-C38-C39	3.67	124.06	119.63
8	A	1215	NAG	O5-C1-C2	3.64	117.04	111.29
6	A	1008	KDH	O01-C20-C21	3.64	122.11	116.38
6	B	1003	KDH	O35-C36-C38	3.58	117.70	111.92
6	A	1007	KDH	C21-C20-C31	-3.53	117.95	122.17
6	B	1006	KDH	O35-C36-C38	3.53	117.62	111.92
6	A	1008	KDH	C33-O35-C36	3.51	123.48	117.38
6	B	1004	KDH	O01-C20-C21	3.51	121.91	116.38
8	A	1606	NAG	C8-C7-N2	3.50	122.02	116.10
6	B	1008	KDH	O01-C15-C14	3.49	115.33	107.47
6	A	1005	KDH	C41-C43-C46	-3.45	118.09	120.47
6	B	1005	KDH	C49-C46-C43	-3.44	117.32	119.51
6	A	1004	KDH	O01-C20-C21	3.43	121.78	116.38
6	A	1002	KDH	O01-C20-C21	3.43	121.78	116.38
6	B	1008	KDH	C9-C6-C3	-3.38	117.36	119.51

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	1003	KDH	O01-C20-C21	3.36	121.67	116.38
6	A	1003	KDH	C49-C46-C43	-3.36	117.37	119.51
6	B	1006	KDH	C9-C6-C3	-3.36	117.38	119.51
6	A	1002	KDH	C41-C43-C46	-3.35	118.16	120.47
6	B	1006	KDH	O01-C20-C21	3.28	121.55	116.38
6	B	1005	KDH	O01-C20-C21	3.24	121.47	116.38
6	A	1005	KDH	O01-C20-C21	3.20	121.41	116.38
6	B	1003	KDH	C9-C6-C3	-3.17	117.49	119.51
6	B	1002	KDH	O01-C20-C21	3.16	121.35	116.38
6	A	1006	KDH	C49-C46-C43	-3.15	117.50	119.51
8	B	1242	NAG	C8-C7-N2	3.14	121.41	116.10
8	A	1052	NAG	O5-C1-C2	-3.14	106.34	111.29
6	A	1009	KDH	O01-C20-C21	3.12	121.30	116.38
6	A	1005	KDH	O35-C36-C38	3.11	116.94	111.92
6	B	1008	KDH	C39-C49-C46	-3.08	118.35	120.47
8	A	1052	NAG	C8-C7-N2	3.08	121.31	116.10
6	A	1009	KDH	C29-C26-C24	3.06	122.46	119.70
8	A	1471	NAG	C8-C7-N2	3.05	121.25	116.10
8	A	1555	NAG	O5-C1-C2	-3.04	106.49	111.29
6	B	1008	KDH	C29-C26-C24	3.04	122.45	119.70
6	B	1006	KDH	C49-C46-C43	-3.03	117.58	119.51
6	A	1008	KDH	C49-C46-C43	-3.01	117.59	119.51
8	A	1555	NAG	C3-C4-C5	3.01	115.62	110.24
6	A	1006	KDH	O01-C20-C21	3.01	121.12	116.38
6	A	1003	KDH	O01-C20-C21	2.98	121.07	116.38
8	B	1555	NAG	C1-O5-C5	2.94	116.18	112.19
6	A	1007	KDH	C4-C3-C6	-2.92	118.45	120.47
6	A	1002	KDH	C9-C6-C3	-2.92	117.65	119.51
6	B	1002	KDH	C49-C46-C43	-2.92	117.65	119.51
6	A	1009	KDH	O35-C36-O37	-2.91	118.78	123.53
6	B	1004	KDH	C9-C6-C3	-2.88	117.68	119.51
8	B	1242	NAG	O5-C1-C2	-2.87	106.75	111.29
6	B	1002	KDH	C9-C6-C3	-2.86	117.69	119.51
6	A	1004	KDH	C41-C38-C39	2.83	123.04	119.63
6	A	1005	KDH	C9-C6-C3	-2.82	117.72	119.51
8	A	1357	NAG	C8-C7-N2	2.82	120.87	116.10
8	B	1242	NAG	C1-O5-C5	2.80	115.98	112.19
6	A	1004	KDH	C9-C6-C3	-2.80	117.73	119.51
8	B	1483	NAG	C4-C3-C2	2.78	115.09	111.02
6	A	1008	KDH	C4-C14-C12	2.78	122.04	118.08
6	A	1009	KDH	C9-C6-C3	-2.77	117.75	119.51
6	B	1002	KDH	O35-C36-O37	-2.70	119.12	123.53

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	1002	KDH	C4-C14-C12	2.70	121.92	118.08
6	A	1007	KDH	C41-C43-C46	-2.67	118.63	120.47
6	B	1002	KDH	O01-C15-C14	2.64	113.43	107.47
8	A	1555	NAG	C8-C7-N2	2.64	120.57	116.10
6	B	1005	KDH	C9-C6-C3	-2.63	117.83	119.51
8	A	1357	NAG	C2-N2-C7	2.63	126.65	122.90
6	A	1008	KDH	O01-C20-C31	-2.60	117.53	122.26
6	B	1004	KDH	C4-C14-C12	2.55	121.71	118.08
6	A	1009	KDH	C26-C29-C31	-2.55	118.06	121.73
6	A	1006	KDH	C9-C6-C3	-2.54	117.89	119.51
8	A	1555	NAG	O5-C5-C4	2.54	117.01	110.83
6	A	1009	KDH	O01-C20-C31	-2.51	117.69	122.26
6	B	1002	KDH	C4-C3-C6	-2.50	118.74	120.47
6	B	1006	KDH	C21-C20-C31	-2.50	119.18	122.17
6	A	1002	KDH	C21-C20-C31	-2.49	119.19	122.17
8	A	1539	NAG	C1-C2-N2	2.49	114.74	110.49
6	A	1004	KDH	C12-C9-C6	-2.48	118.76	120.47
6	A	1004	KDH	C4-C14-C12	2.47	121.60	118.08
6	B	1008	KDH	C01-C33-C15	2.47	115.37	110.22
6	A	1007	KDH	C4-C14-C12	2.47	121.59	118.08
6	A	1007	KDH	O35-C36-C38	2.46	115.89	111.92
6	A	1008	KDH	C29-C26-C24	2.44	121.91	119.70
8	B	1644	NAG	C1-C2-N2	-2.44	106.32	110.49
6	B	1008	KDH	O01-C20-C31	-2.44	117.82	122.26
8	A	1215	NAG	C2-N2-C7	2.43	126.37	122.90
6	A	1004	KDH	C39-C49-C46	-2.43	118.79	120.47
6	B	1005	KDH	C21-C20-C31	-2.43	119.27	122.17
6	A	1004	KDH	C41-C43-C46	-2.42	118.80	120.47
6	B	1004	KDH	C49-C46-C43	-2.42	117.97	119.51
6	B	1002	KDH	C21-C20-C31	-2.42	119.28	122.17
8	A	1215	NAG	C4-C3-C2	-2.41	107.48	111.02
6	A	1007	KDH	C12-C9-C6	-2.41	118.81	120.47
6	A	1003	KDH	C9-C6-C3	-2.41	117.98	119.51
8	A	1555	NAG	C6-C5-C4	-2.41	107.37	113.00
6	B	1008	KDH	C26-C29-C31	-2.39	118.29	121.73
6	A	1008	KDH	C12-C9-C6	-2.39	118.82	120.47
6	B	1005	KDH	O01-C15-C14	2.38	112.84	107.47
6	B	1008	KDH	C21-C20-C31	-2.37	119.33	122.17
6	A	1002	KDH	C4-C3-C6	-2.37	118.84	120.47
6	A	1007	KDH	C12-C14-C15	-2.37	114.83	119.83
6	A	1002	KDH	O35-C36-O37	-2.36	119.69	123.53
6	A	1005	KDH	C41-C38-C39	2.36	122.47	119.63

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	1008	KDH	C9-C6-C3	-2.35	118.01	119.51
6	B	1004	KDH	C21-C20-C31	-2.32	119.40	122.17
8	A	1052	NAG	C4-C3-C2	-2.30	107.64	111.02
6	B	1004	KDH	C39-C49-C46	-2.27	118.90	120.47
8	A	1483	NAG	C1-O5-C5	2.27	115.26	112.19
6	A	1004	KDH	C21-C20-C31	-2.26	119.47	122.17
6	A	1005	KDH	C4-C3-C6	-2.25	118.92	120.47
6	A	1007	KDH	C26-C29-C31	-2.25	118.49	121.73
6	A	1009	KDH	C39-C49-C46	-2.25	118.92	120.47
6	B	1003	KDH	C39-C49-C46	-2.23	118.93	120.47
6	A	1006	KDH	C21-C20-C31	-2.22	119.52	122.17
6	A	1009	KDH	C49-C46-C43	-2.21	118.11	119.51
8	A	1471	NAG	C2-N2-C7	2.20	126.04	122.90
6	B	1005	KDH	C4-C3-C6	-2.20	118.95	120.47
8	A	1606	NAG	C4-C3-C2	-2.20	107.79	111.02
8	A	1444	NAG	C1-O5-C5	2.20	115.17	112.19
6	A	1003	KDH	O35-C36-O37	-2.20	119.95	123.53
8	A	1606	NAG	O7-C7-C8	-2.19	117.98	122.06
8	B	1483	NAG	O5-C5-C6	2.19	110.64	107.20
6	A	1005	KDH	C4-C14-C12	2.18	121.19	118.08
8	A	1242	NAG	O5-C1-C2	-2.18	107.85	111.29
6	A	1007	KDH	O01-C20-C31	-2.18	118.30	122.26
6	B	1008	KDH	C4-C14-C12	2.17	121.18	118.08
6	A	1006	KDH	C4-C3-C6	-2.16	118.98	120.47
8	A	1644	NAG	O5-C5-C6	2.16	110.60	107.20
8	A	1576	NAG	C4-C3-C2	2.16	114.18	111.02
6	A	1003	KDH	C21-C20-C31	-2.15	119.60	122.17
6	B	1003	KDH	C41-C38-C39	2.14	122.22	119.63
6	B	1006	KDH	O01-C15-C14	2.14	112.28	107.47
6	B	1005	KDH	C26-C29-C31	-2.13	118.66	121.73
6	B	1008	KDH	C4-C3-C6	-2.13	119.00	120.47
6	A	1005	KDH	C21-C20-C31	-2.10	119.66	122.17
8	A	1483	NAG	C1-C2-N2	-2.10	106.89	110.49
8	A	1471	NAG	O5-C1-C2	-2.10	107.97	111.29
6	B	1006	KDH	C26-C29-C31	-2.09	118.72	121.73
6	B	1005	KDH	C4-C14-C12	2.09	121.06	118.08
6	B	1004	KDH	C41-C43-C46	-2.09	119.03	120.47
6	B	1008	KDH	O03-C29-C31	2.08	122.15	117.56
6	B	1003	KDH	C4-C14-C15	-2.08	115.45	119.83
8	B	1555	NAG	C4-C3-C2	2.08	114.06	111.02
6	A	1008	KDH	C41-C43-C46	-2.07	119.04	120.47
6	A	1002	KDH	C33-O35-C36	2.07	120.98	117.38

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	1006	KDH	C26-C29-C31	-2.07	118.76	121.73
6	B	1002	KDH	C39-C49-C46	-2.06	119.05	120.47
8	A	1242	NAG	C1-O5-C5	2.06	114.98	112.19
6	A	1002	KDH	C38-C41-C43	2.06	121.84	120.09
6	B	1004	KDH	C26-C29-C31	-2.06	118.77	121.73
6	A	1004	KDH	C49-C46-C43	-2.05	118.21	119.51
6	B	1003	KDH	C41-C43-C46	-2.04	119.06	120.47
6	A	1007	KDH	C26-C24-C21	2.03	123.24	120.43
6	B	1003	KDH	O01-C20-C31	-2.03	118.56	122.26
8	A	1483	NAG	C4-C3-C2	2.03	113.99	111.02
8	A	1555	NAG	C2-N2-C7	2.02	125.79	122.90
6	B	1003	KDH	C21-C20-C31	-2.02	119.76	122.17
6	A	1003	KDH	C4-C14-C15	-2.01	115.59	119.83
5	A	1001	FRU	O2-C2-O5	-2.00	105.64	109.50

There are no chirality outliers.

All (77) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	1002	KDH	C01-C33-O35-C36
6	A	1009	KDH	C01-C33-O35-C36
6	A	1009	KDH	C38-C36-O35-C33
6	A	1009	KDH	O37-C36-O35-C33
6	B	1008	KDH	C01-C33-O35-C36
8	B	1319	NAG	C8-C7-N2-C2
8	B	1319	NAG	O7-C7-N2-C2
6	A	1002	KDH	C38-C36-O35-C33
6	A	1004	KDH	O35-C36-C38-C41
6	A	1006	KDH	O35-C36-C38-C39
6	A	1008	KDH	O35-C36-C38-C39
6	A	1004	KDH	O35-C36-C38-C39
6	A	1006	KDH	O35-C36-C38-C41
6	A	1008	KDH	O35-C36-C38-C41
6	B	1002	KDH	C01-C33-O35-C36
6	A	1004	KDH	O37-C36-C38-C39
8	B	1539	NAG	O5-C5-C6-O6
8	B	1539	NAG	C4-C5-C6-O6
6	A	1004	KDH	O37-C36-C38-C41
8	B	1444	NAG	O5-C5-C6-O6
6	A	1002	KDH	O37-C36-O35-C33
6	B	1002	KDH	C38-C36-O35-C33
6	B	1004	KDH	C38-C36-O35-C33

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms
6	A	1006	KDH	O37-C36-C38-C39
6	A	1006	KDH	O37-C36-C38-C41
8	A	1215	NAG	O5-C5-C6-O6
8	A	1215	NAG	C4-C5-C6-O6
6	B	1008	KDH	C38-C36-O35-C33
8	A	1052	NAG	C8-C7-N2-C2
8	A	1052	NAG	O7-C7-N2-C2
8	A	1357	NAG	C8-C7-N2-C2
8	A	1357	NAG	O7-C7-N2-C2
8	A	1471	NAG	C8-C7-N2-C2
8	A	1471	NAG	O7-C7-N2-C2
8	A	1555	NAG	C8-C7-N2-C2
8	A	1555	NAG	O7-C7-N2-C2
8	A	1606	NAG	C8-C7-N2-C2
8	A	1606	NAG	O7-C7-N2-C2
8	B	1242	NAG	C8-C7-N2-C2
8	B	1242	NAG	O7-C7-N2-C2
8	A	1606	NAG	O5-C5-C6-O6
8	A	1576	NAG	C4-C5-C6-O6
6	A	1008	KDH	O37-C36-C38-C39
8	B	1483	NAG	O5-C5-C6-O6
8	B	1444	NAG	C4-C5-C6-O6
8	A	1606	NAG	C4-C5-C6-O6
6	B	1004	KDH	O37-C36-O35-C33
6	B	1002	KDH	O37-C36-O35-C33
8	B	1483	NAG	C4-C5-C6-O6
8	A	1539	NAG	C4-C5-C6-O6
6	A	1008	KDH	O37-C36-C38-C41
8	A	1576	NAG	O5-C5-C6-O6
8	B	1319	NAG	O5-C5-C6-O6
7	B	1011	EDO	O1-C1-C2-O2
6	A	1003	KDH	C12-C14-C15-C33
6	A	1003	KDH	C4-C14-C15-C33
6	B	1003	KDH	C12-C14-C15-C33
6	B	1003	KDH	C4-C14-C15-C33
6	B	1002	KDH	C15-C33-O35-C36
8	A	1539	NAG	O5-C5-C6-O6
6	B	1008	KDH	O37-C36-O35-C33
8	B	1319	NAG	C3-C2-N2-C7
8	B	1319	NAG	C1-C2-N2-C7
6	A	1002	KDH	C15-C33-O35-C36
8	B	1576	NAG	C4-C5-C6-O6

*Continued on next page...*

*Continued from previous page...*

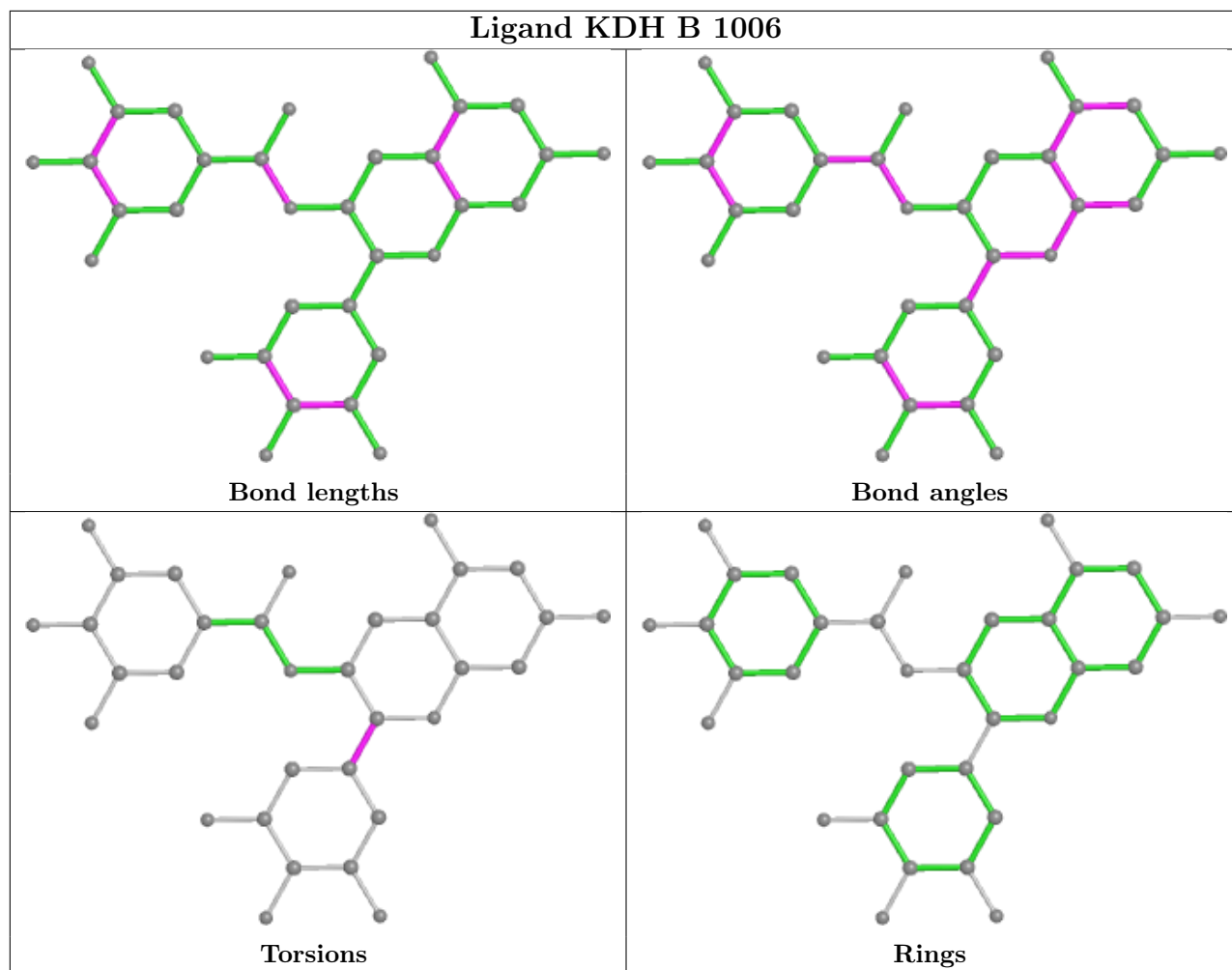
Mol	Chain	Res	Type	Atoms
6	B	1008	KDH	C15-C33-O35-C36
8	B	1576	NAG	O5-C5-C6-O6
8	A	1606	NAG	C3-C2-N2-C7
8	A	1215	NAG	C1-C2-N2-C7
6	A	1003	KDH	C12-C14-C15-O01
6	A	1003	KDH	C4-C14-C15-O01
6	B	1003	KDH	C12-C14-C15-O01
5	A	1001	FRU	O1-C1-C2-C3
5	B	1001	FRU	O1-C1-C2-C3
8	A	1215	NAG	C3-C2-N2-C7
6	B	1003	KDH	C4-C14-C15-O01
6	B	1006	KDH	C4-C14-C15-O01

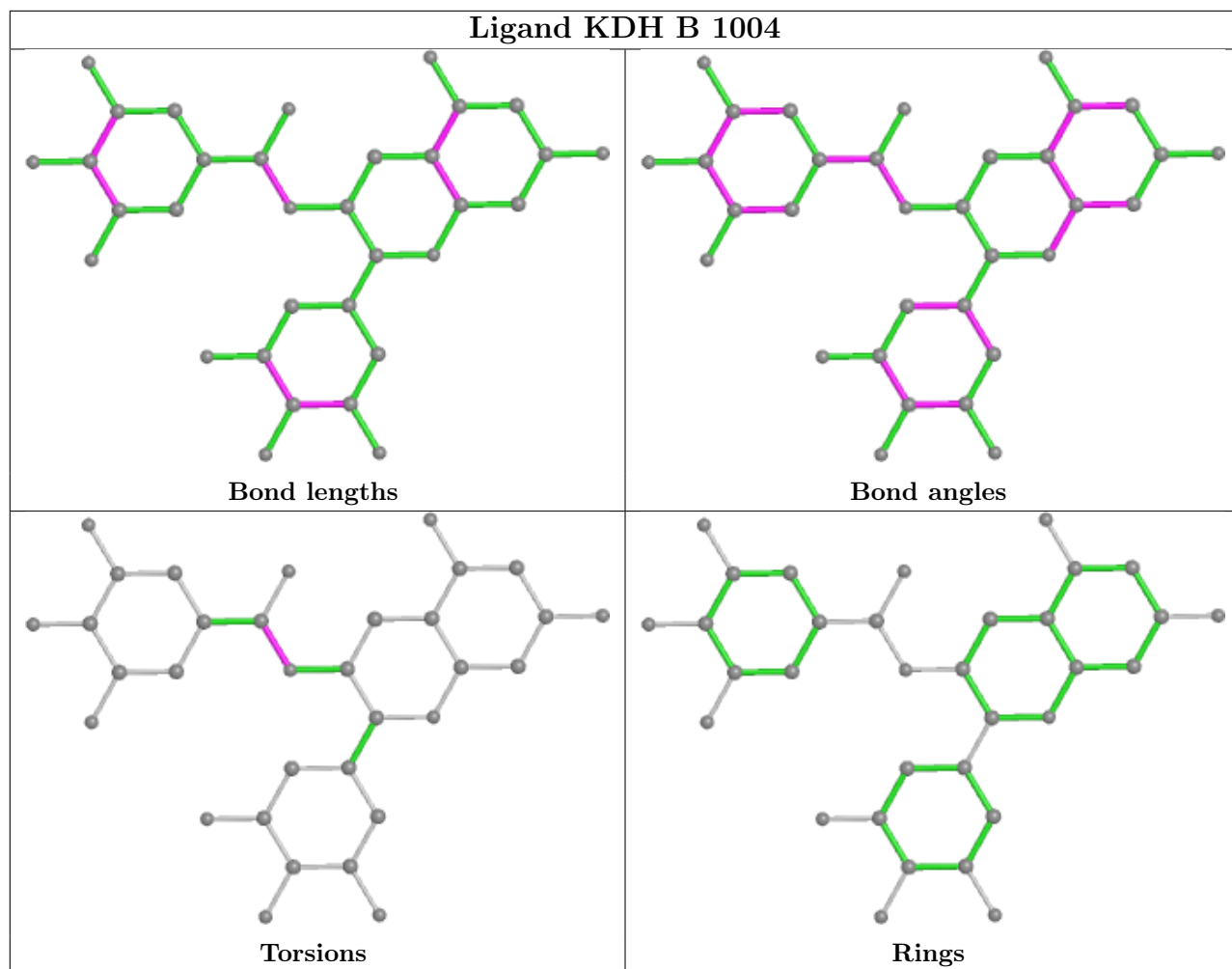
There are no ring outliers.

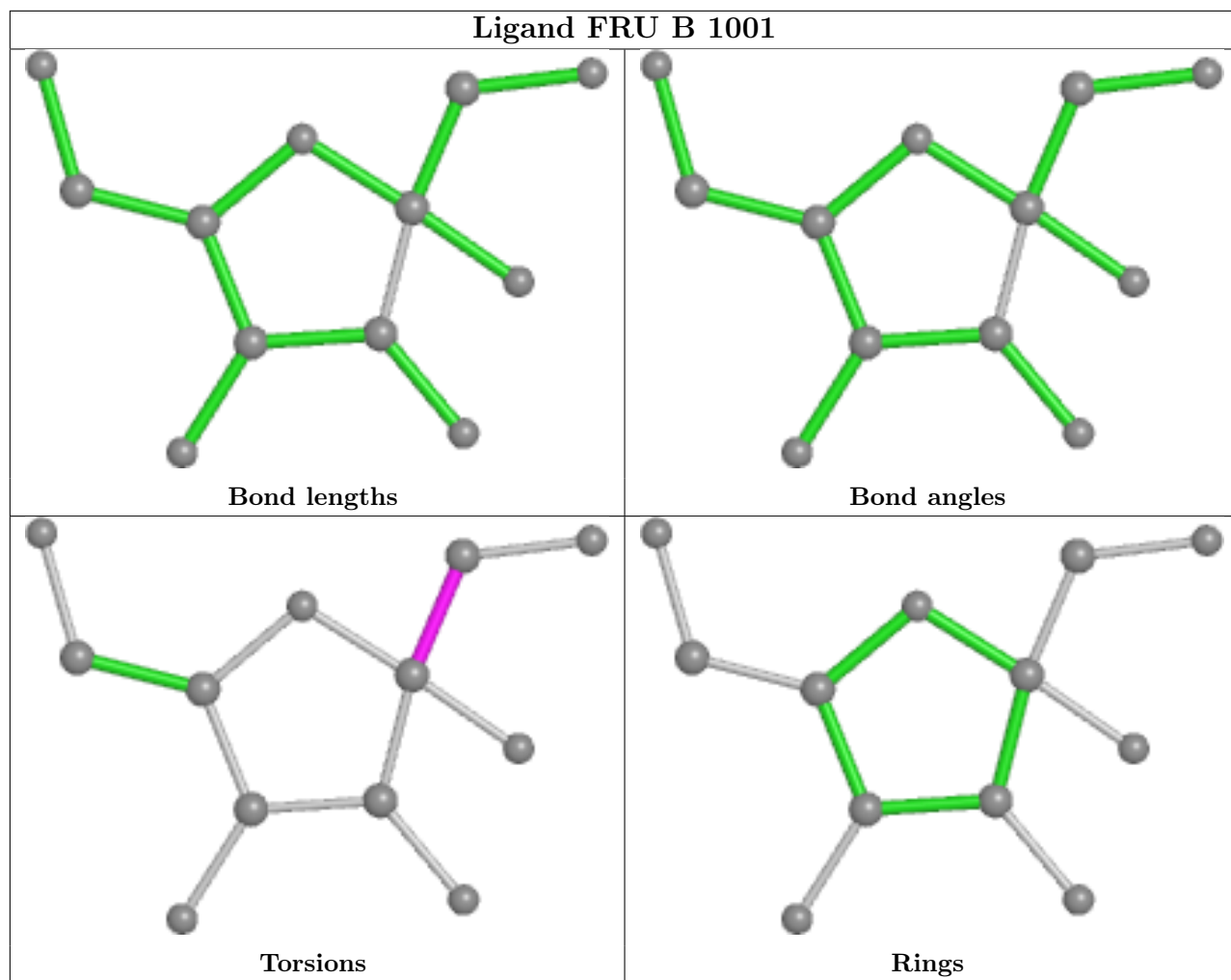
3 monomers are involved in 4 short contacts:

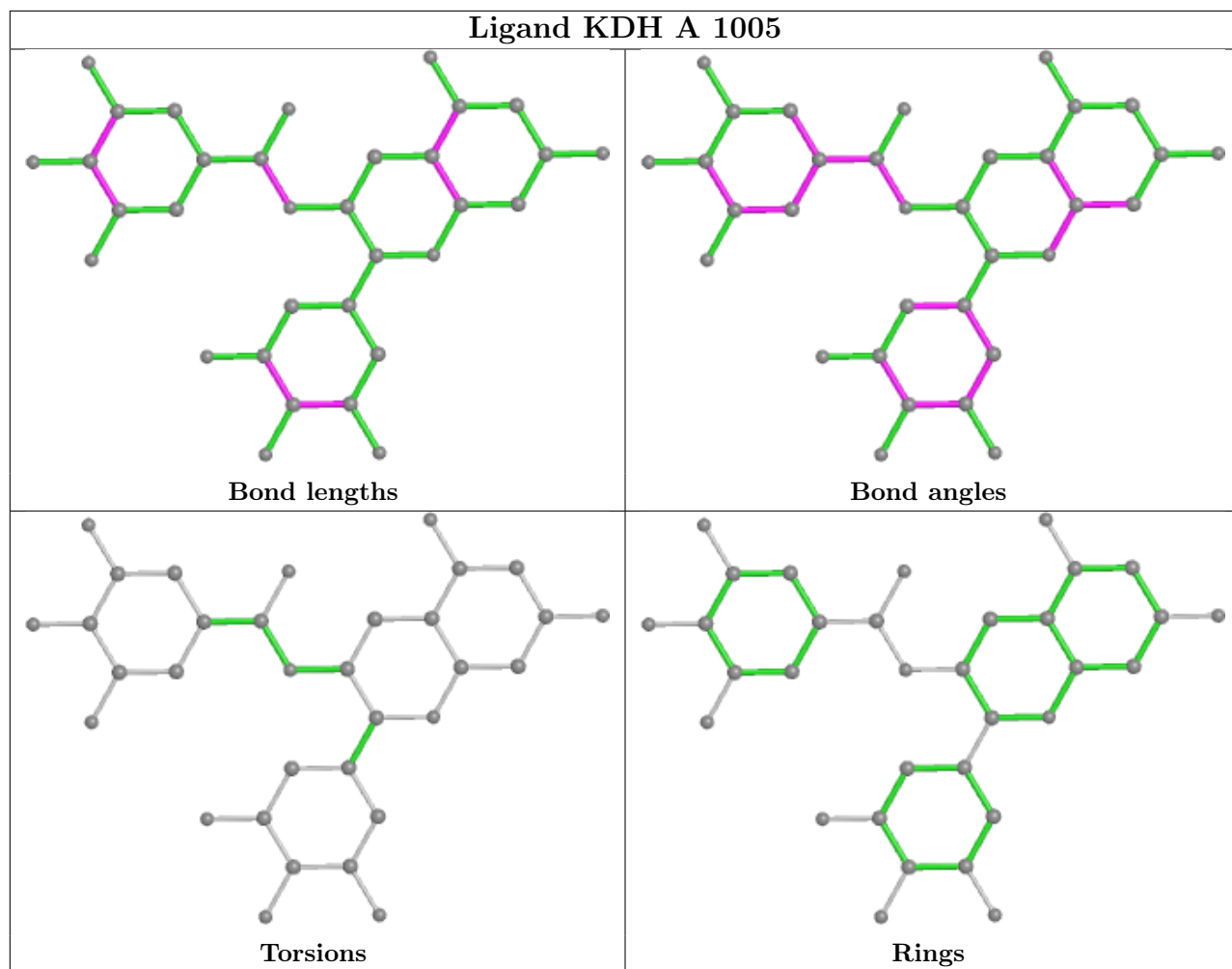
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	1008	KDH	1	0
6	A	1002	KDH	1	0
8	B	1444	NAG	2	0

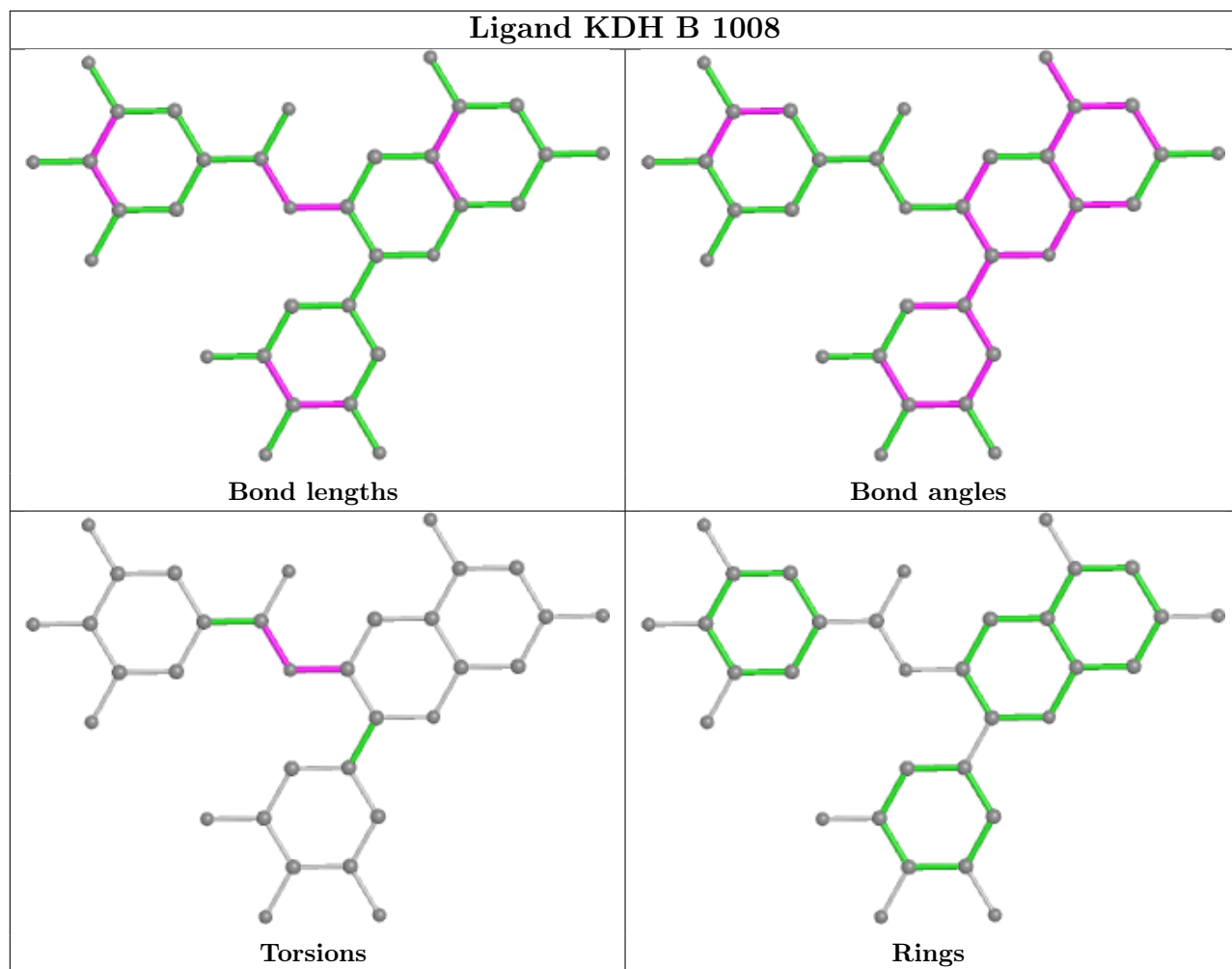
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



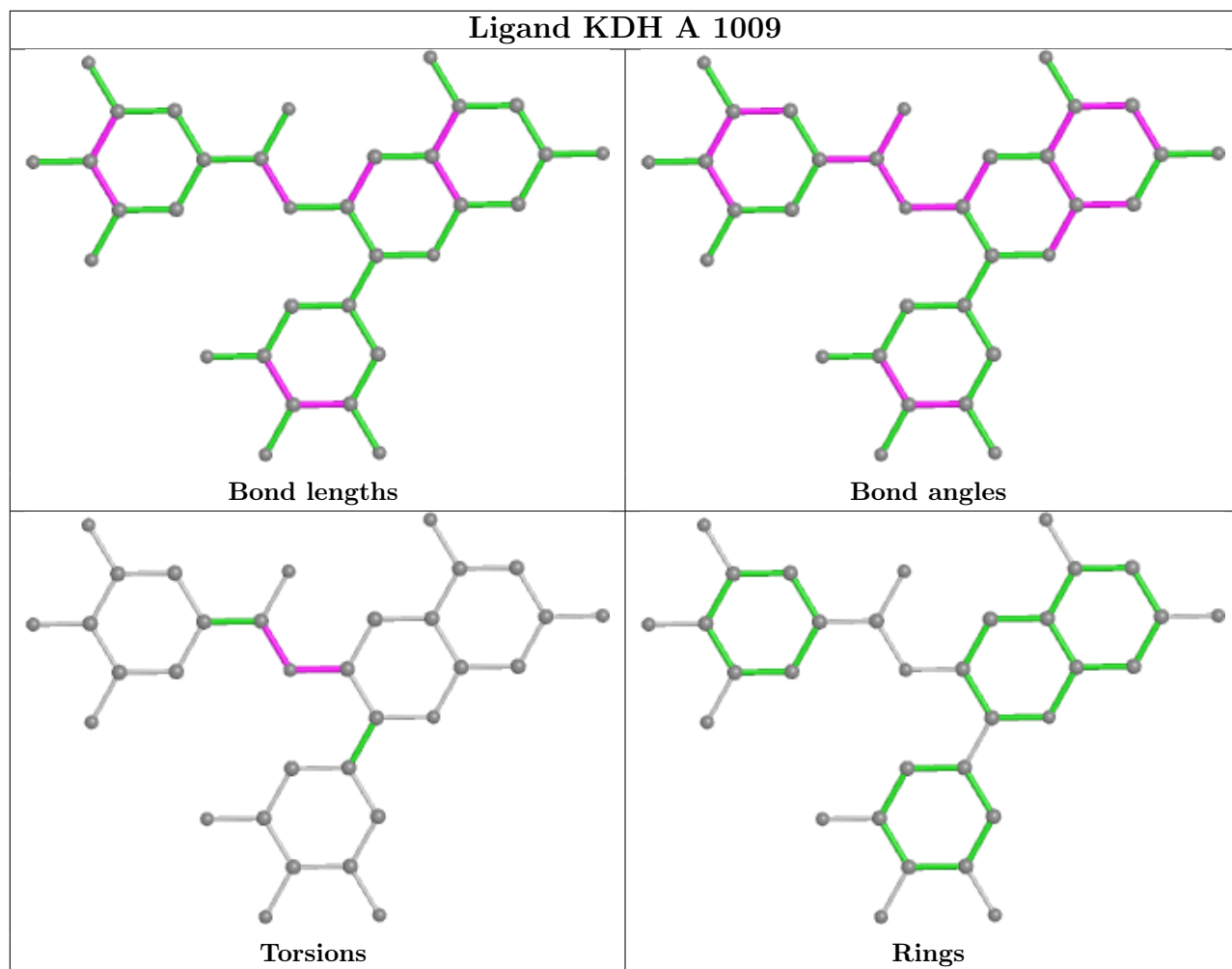


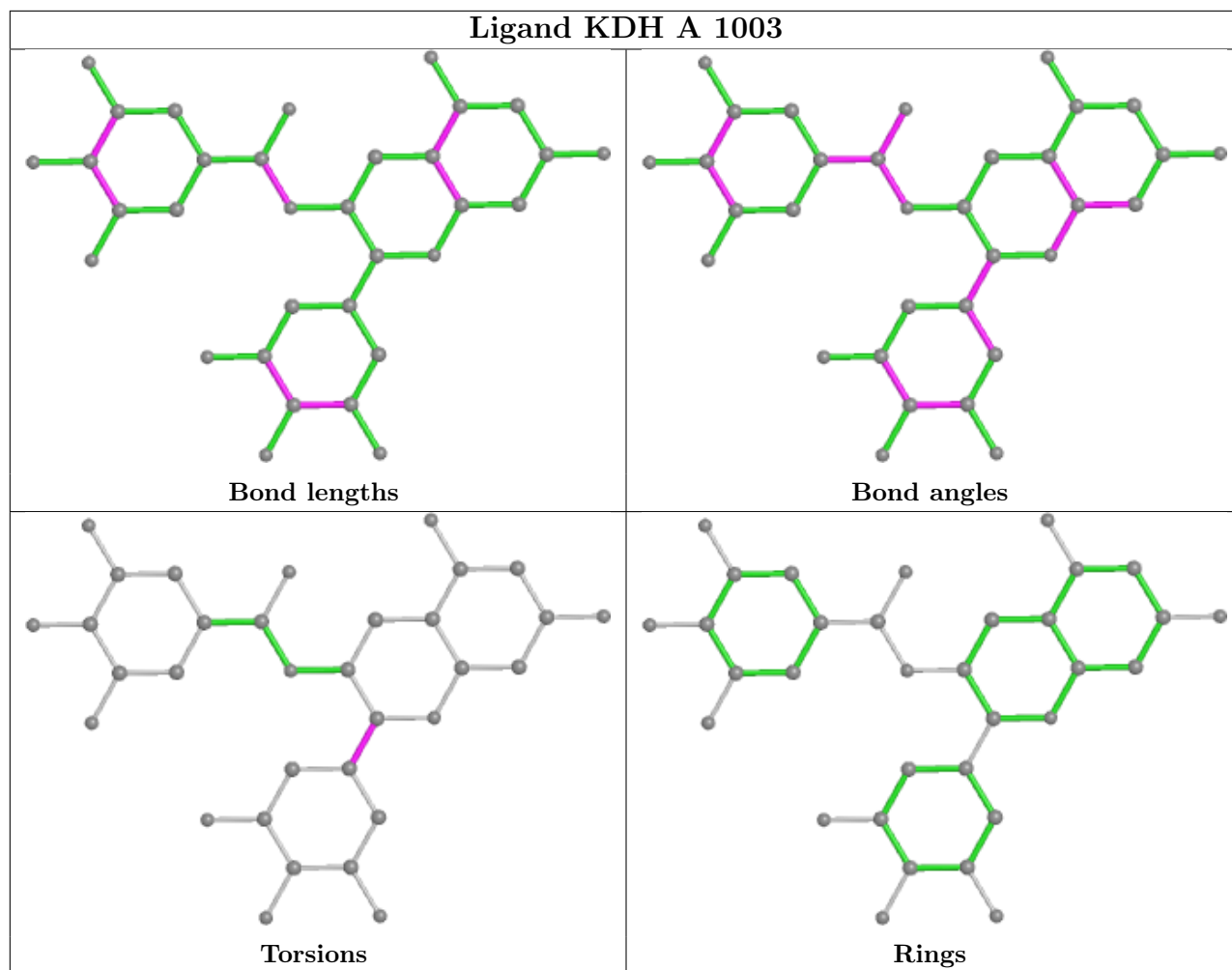


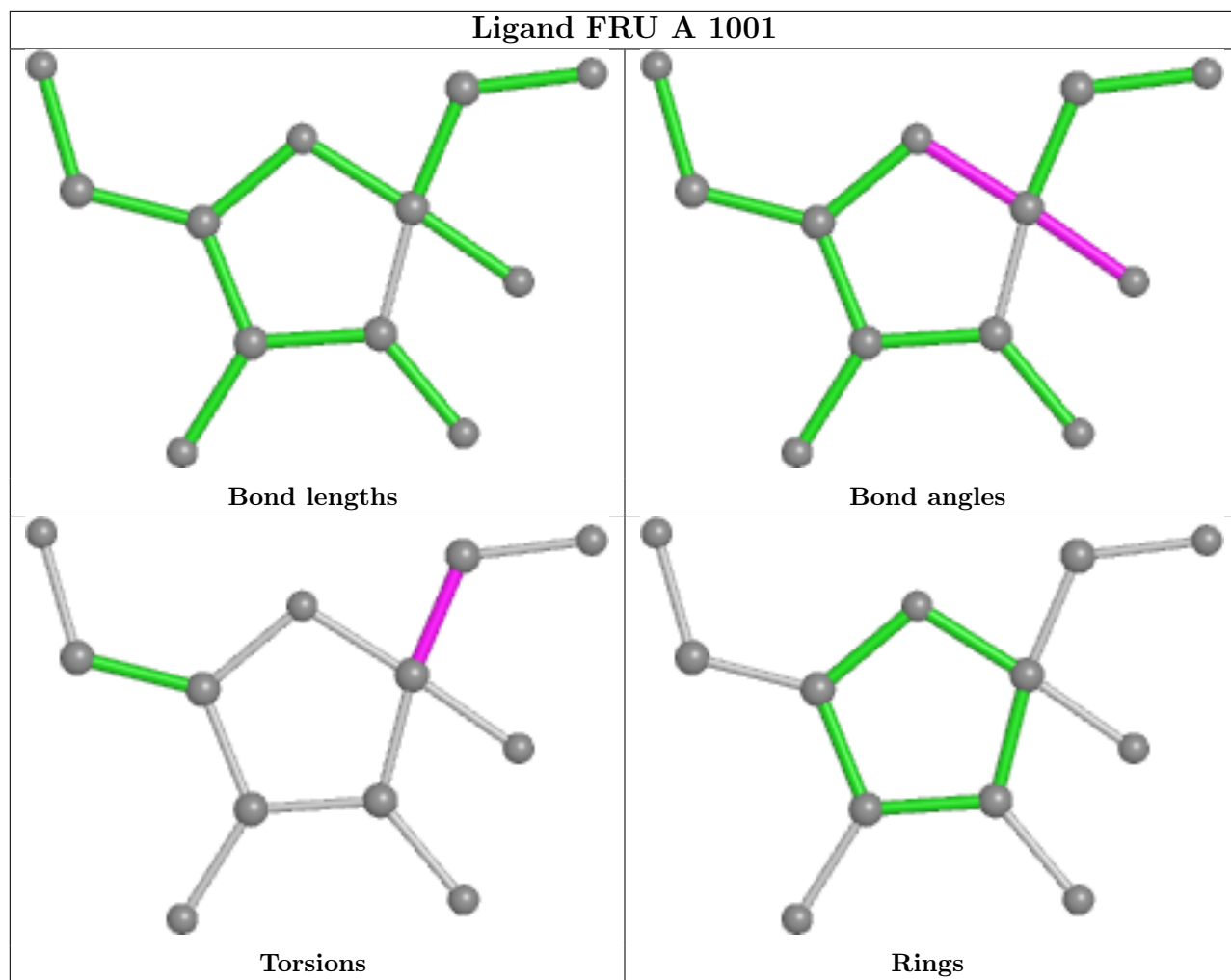


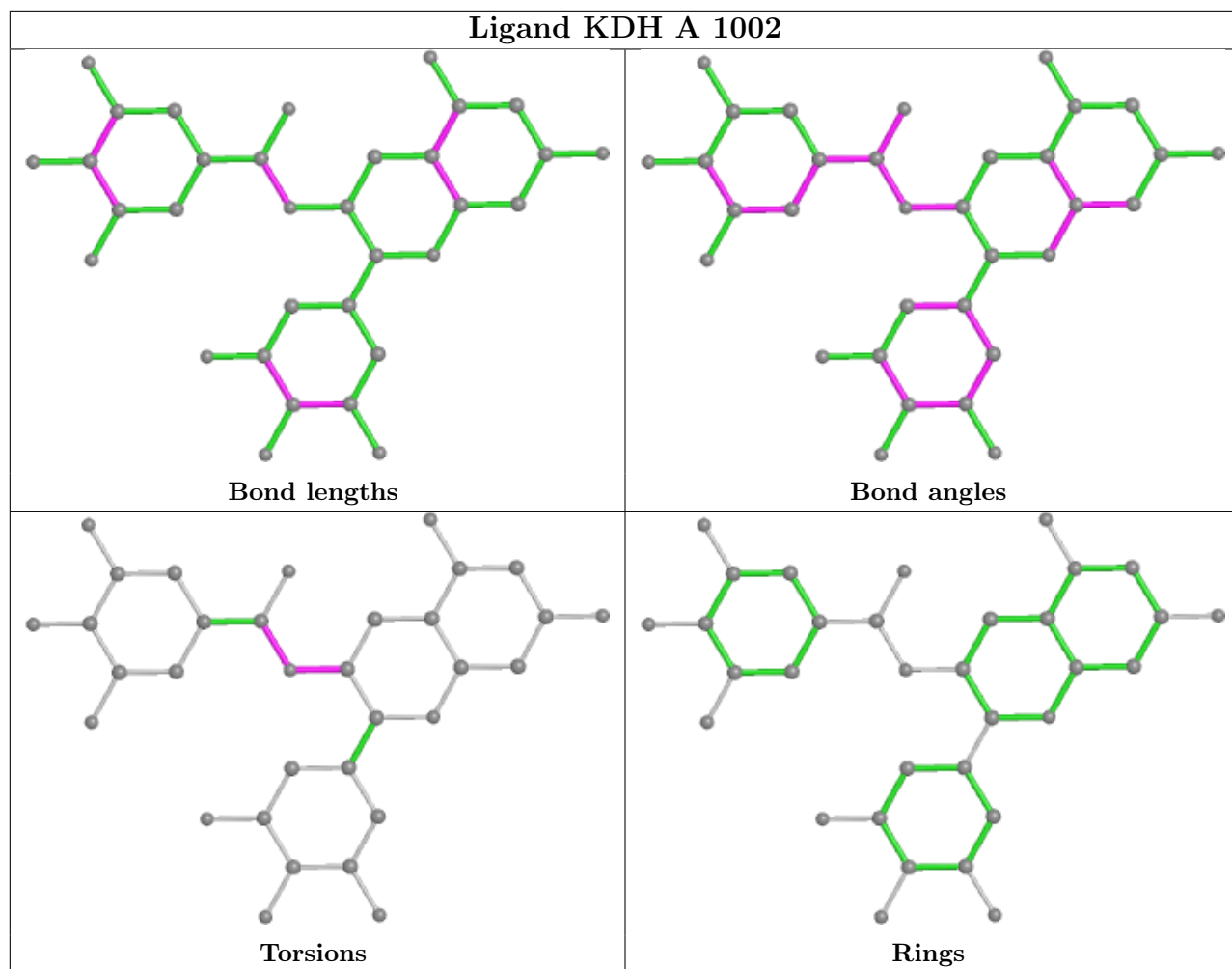


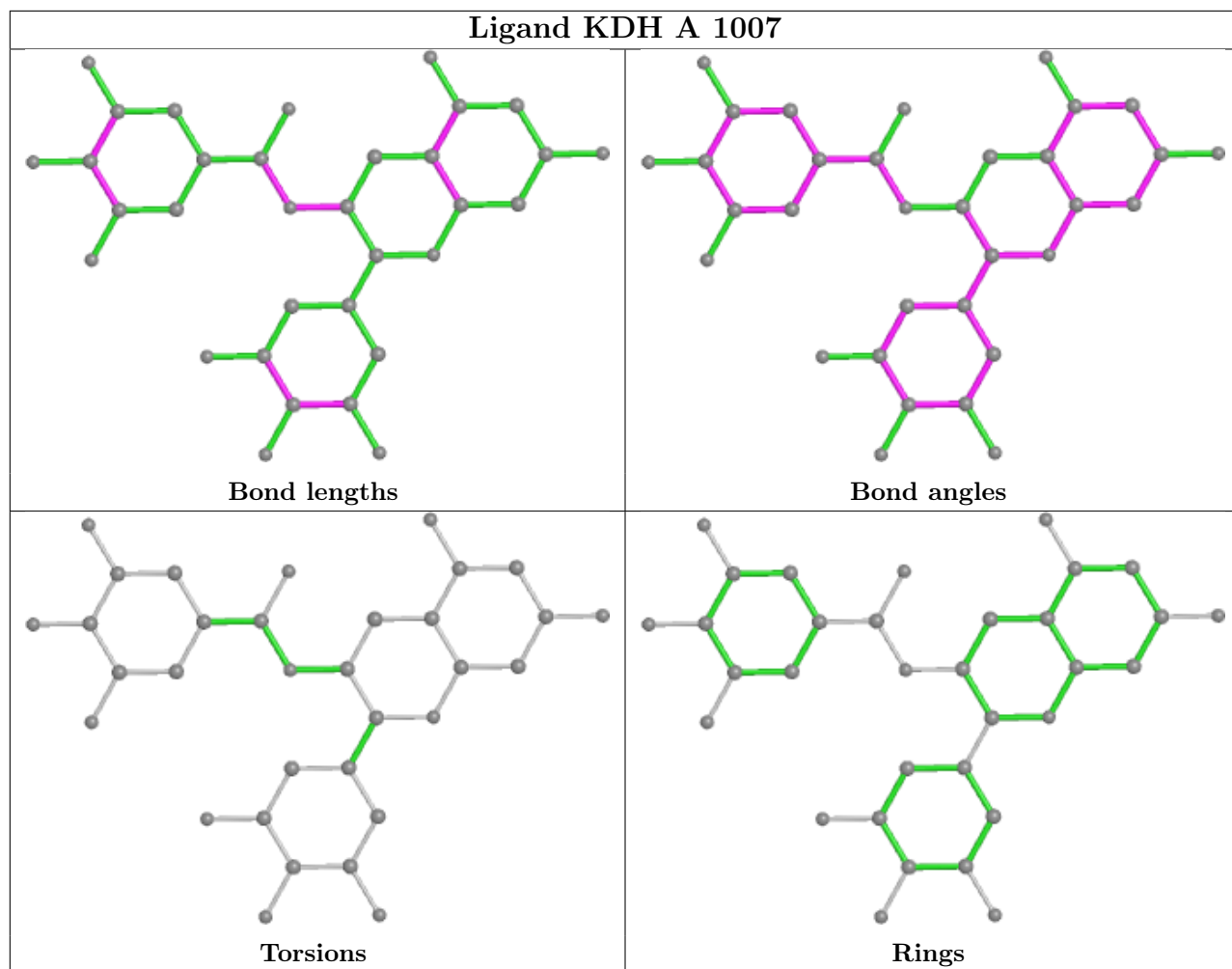


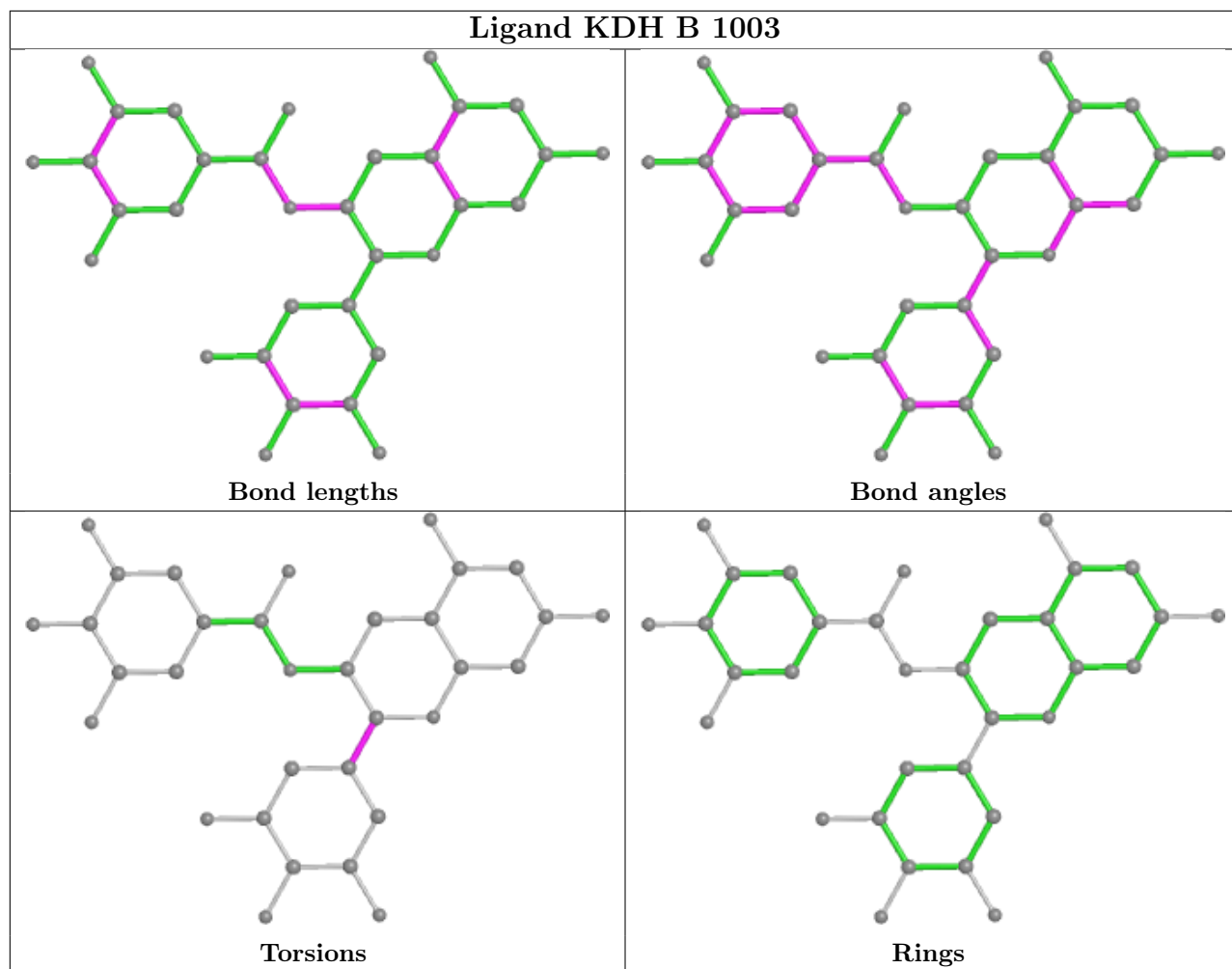


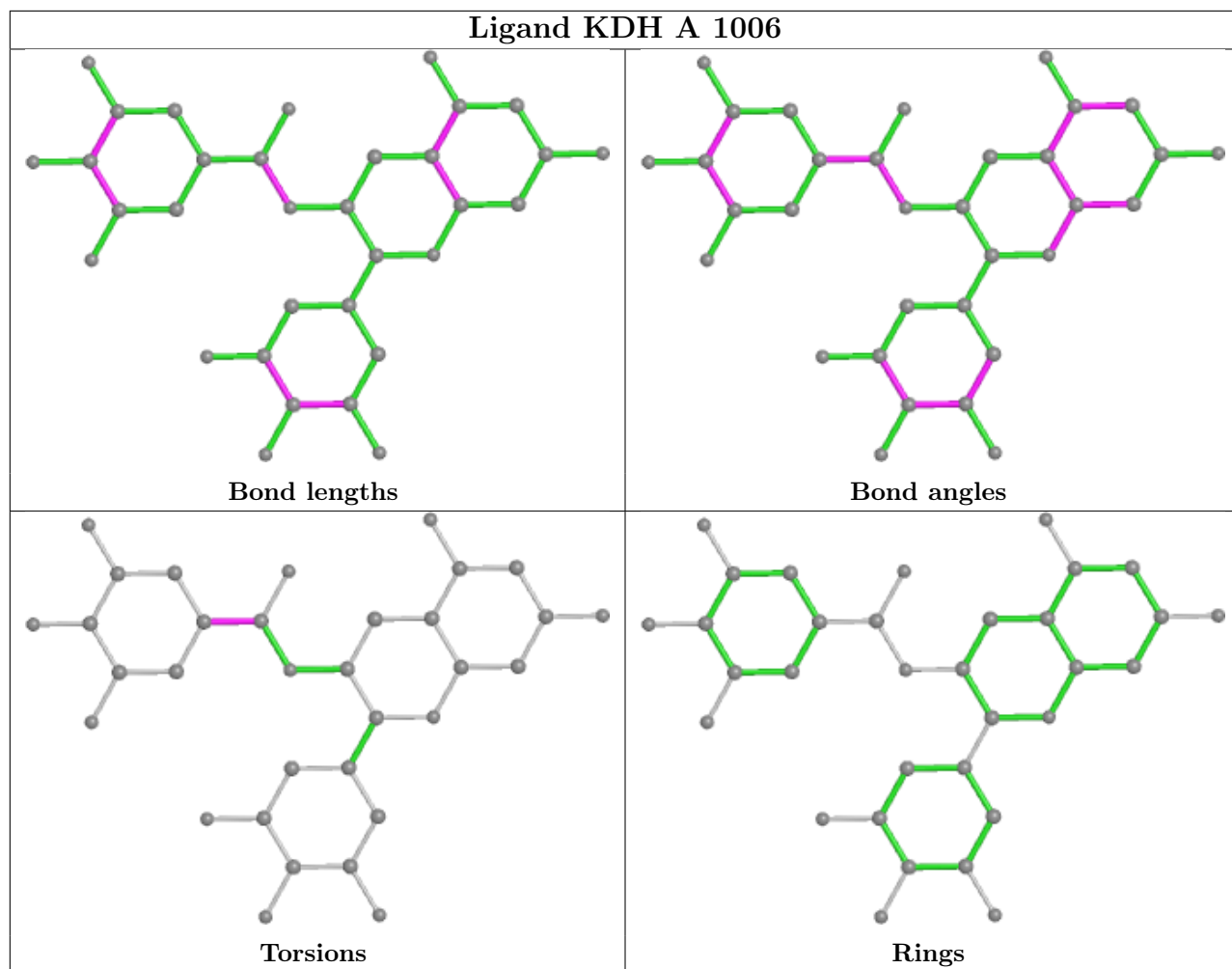


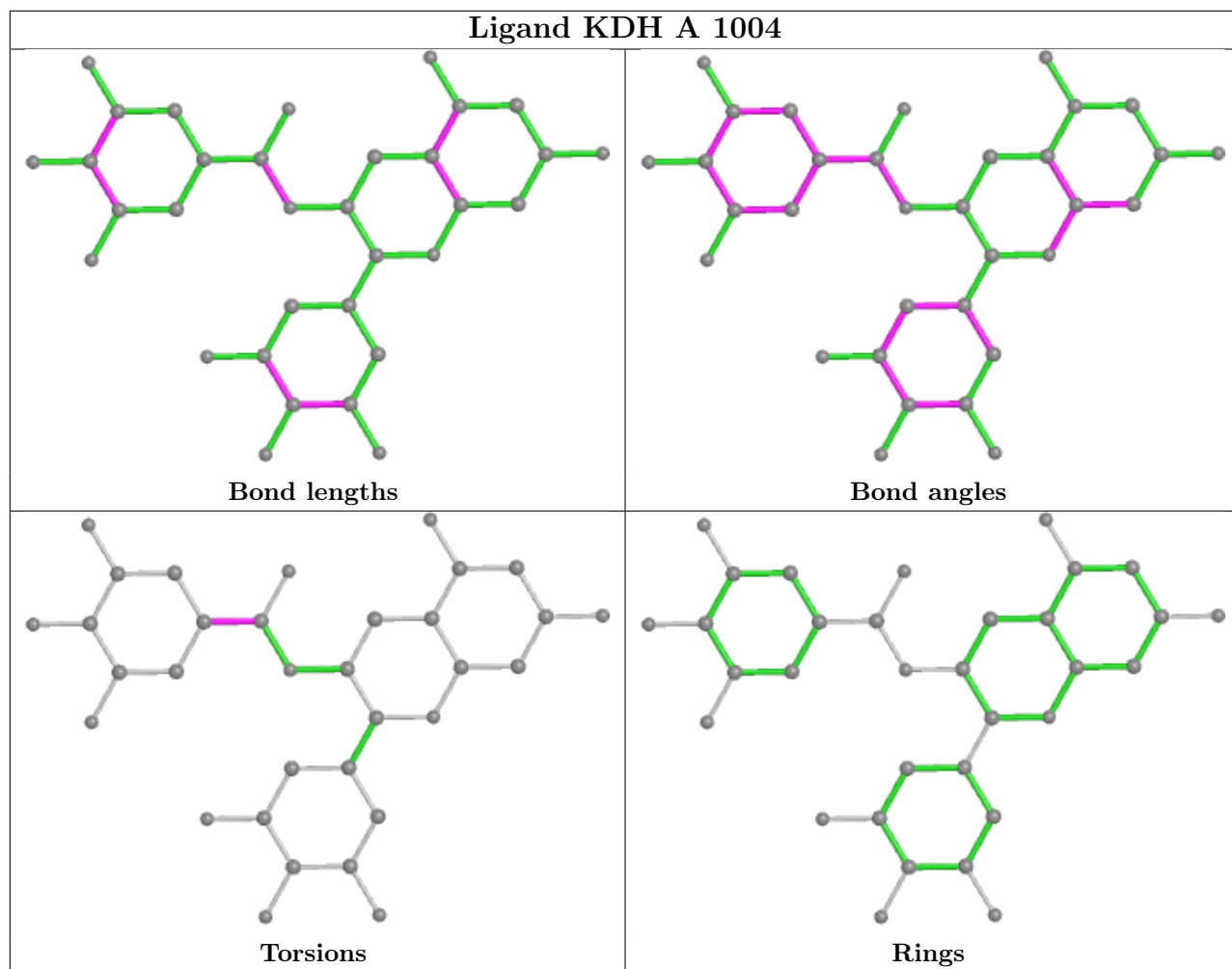




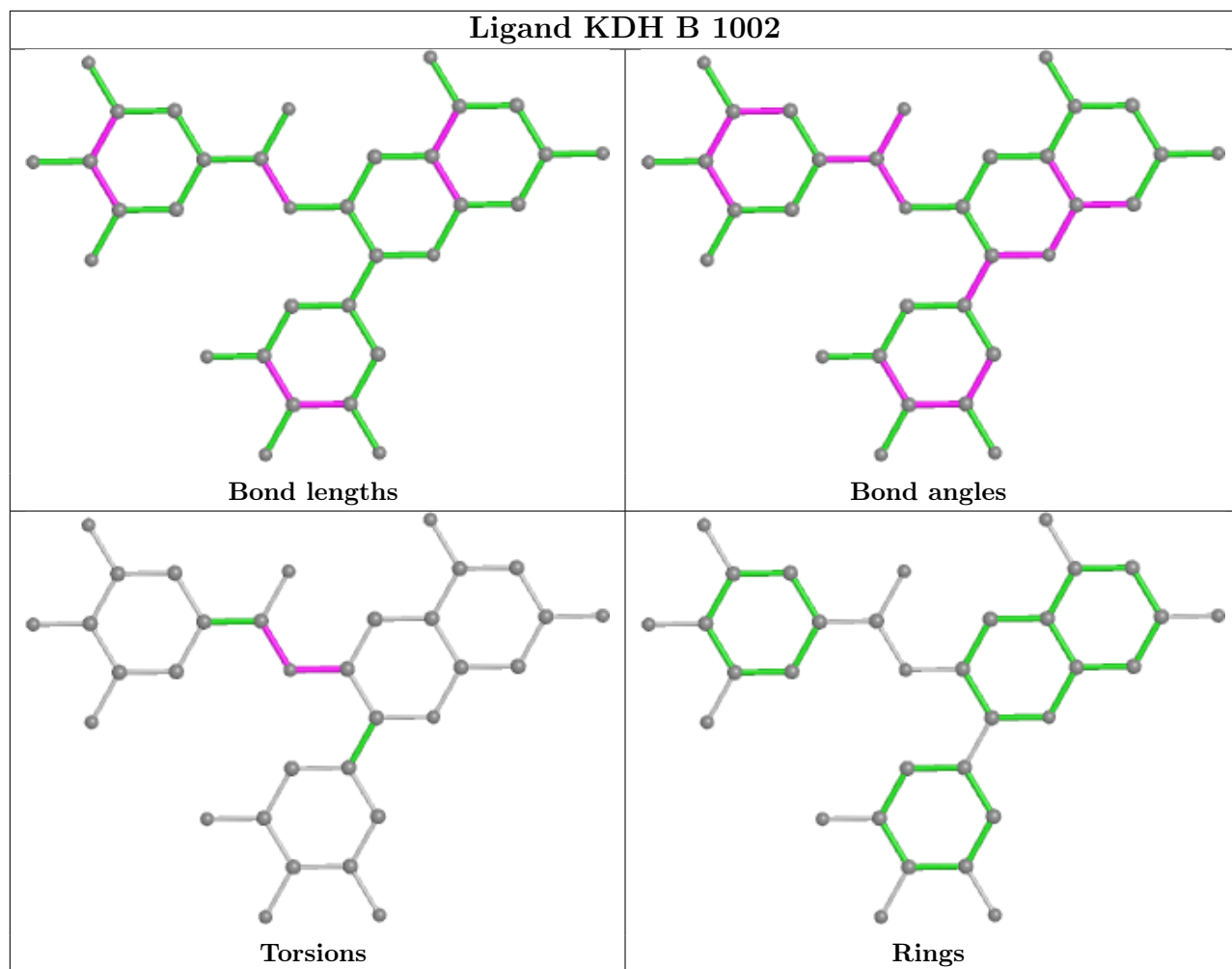


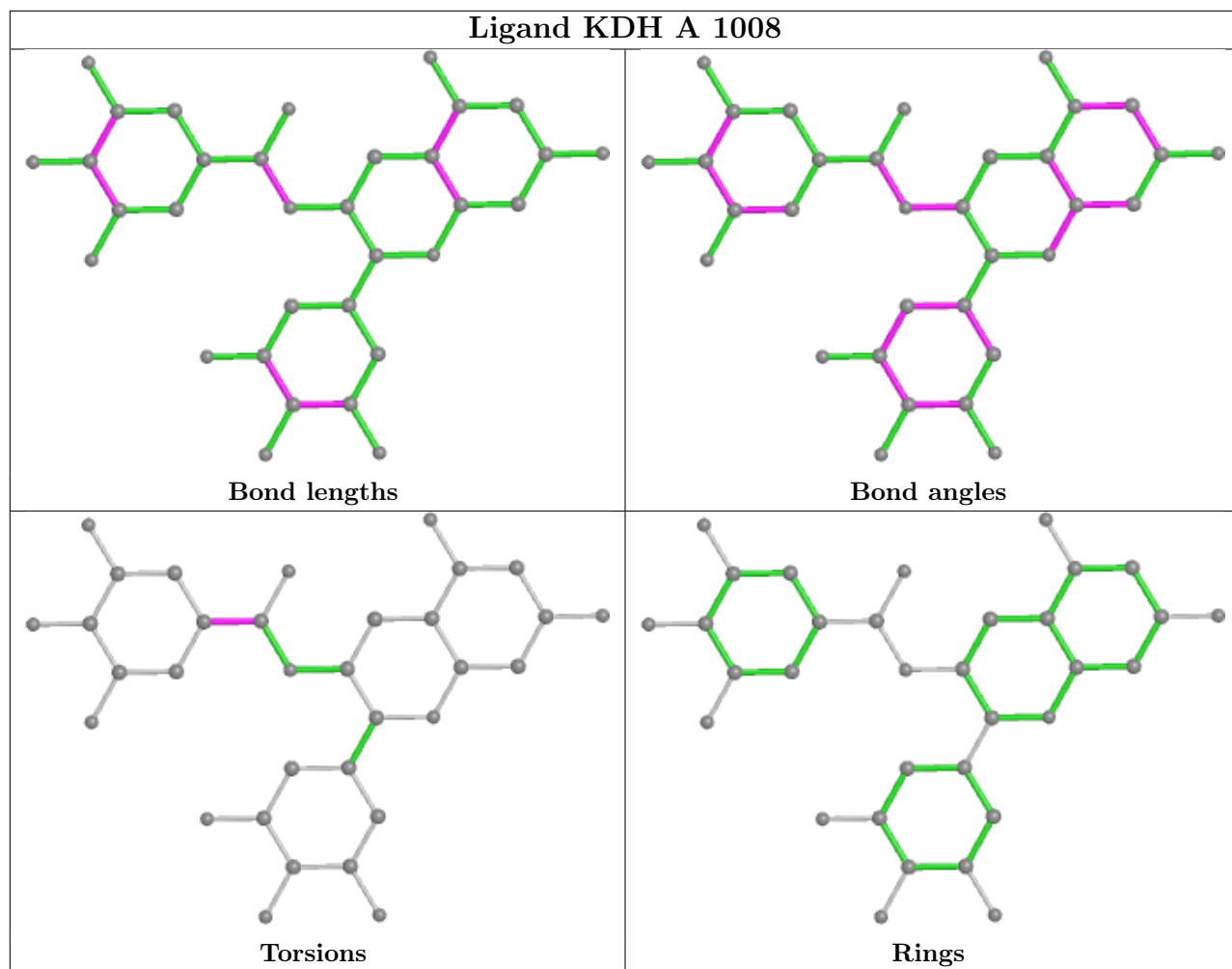


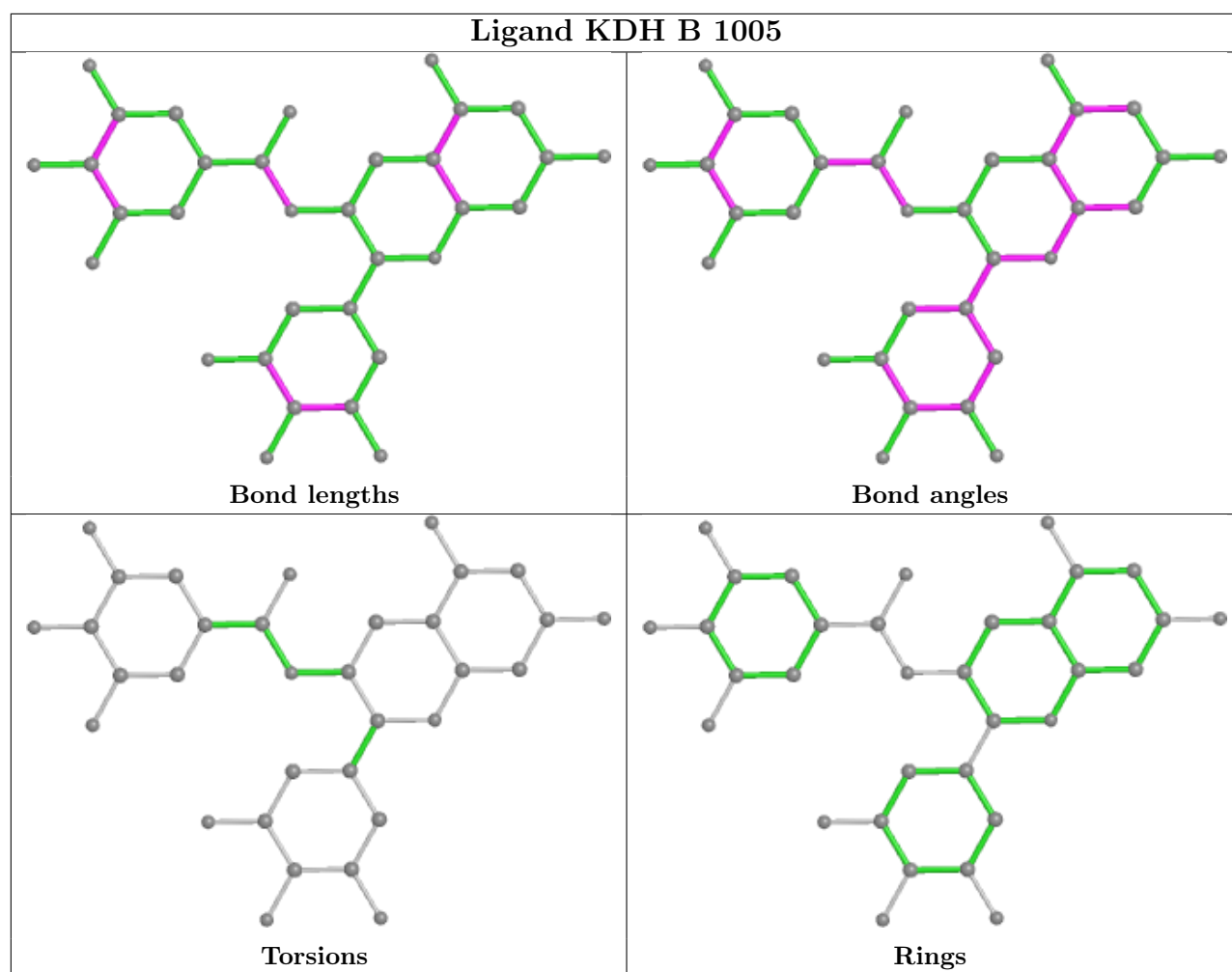












## 5.7 Other polymers [i](#)

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

### 6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	624/665 (93%)	-0.13	5 (0%) 86 85	16, 26, 40, 59	0
1	B	624/665 (93%)	0.14	21 (3%) 45 45	20, 35, 55, 70	0
All	All	1248/1330 (93%)	0.00	26 (2%) 63 63	16, 30, 51, 70	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	42	CYS	3.7
1	B	44	LEU	3.6
1	B	240	ILE	3.6
1	A	449	MET	3.0
1	B	55	LEU	3.0
1	B	571	GLU	3.0
1	A	44	LEU	3.0
1	B	356	ASP	2.8
1	B	238	THR	2.7
1	B	619	ALA	2.7
1	B	43	SER	2.7
1	B	446	THR	2.5
1	B	244	THR	2.5
1	B	242	ASN	2.4
1	B	569	GLY	2.4
1	B	241	THR	2.3
1	B	52	ASN	2.3
1	A	43	SER	2.3
1	A	356	ASP	2.2
1	B	47	THR	2.2
1	A	291	TYR	2.1
1	B	48	VAL	2.1
1	B	235	ALA	2.0
1	B	481	MET	2.0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	B	243	ALA	2.0
1	B	239	SER	2.0

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

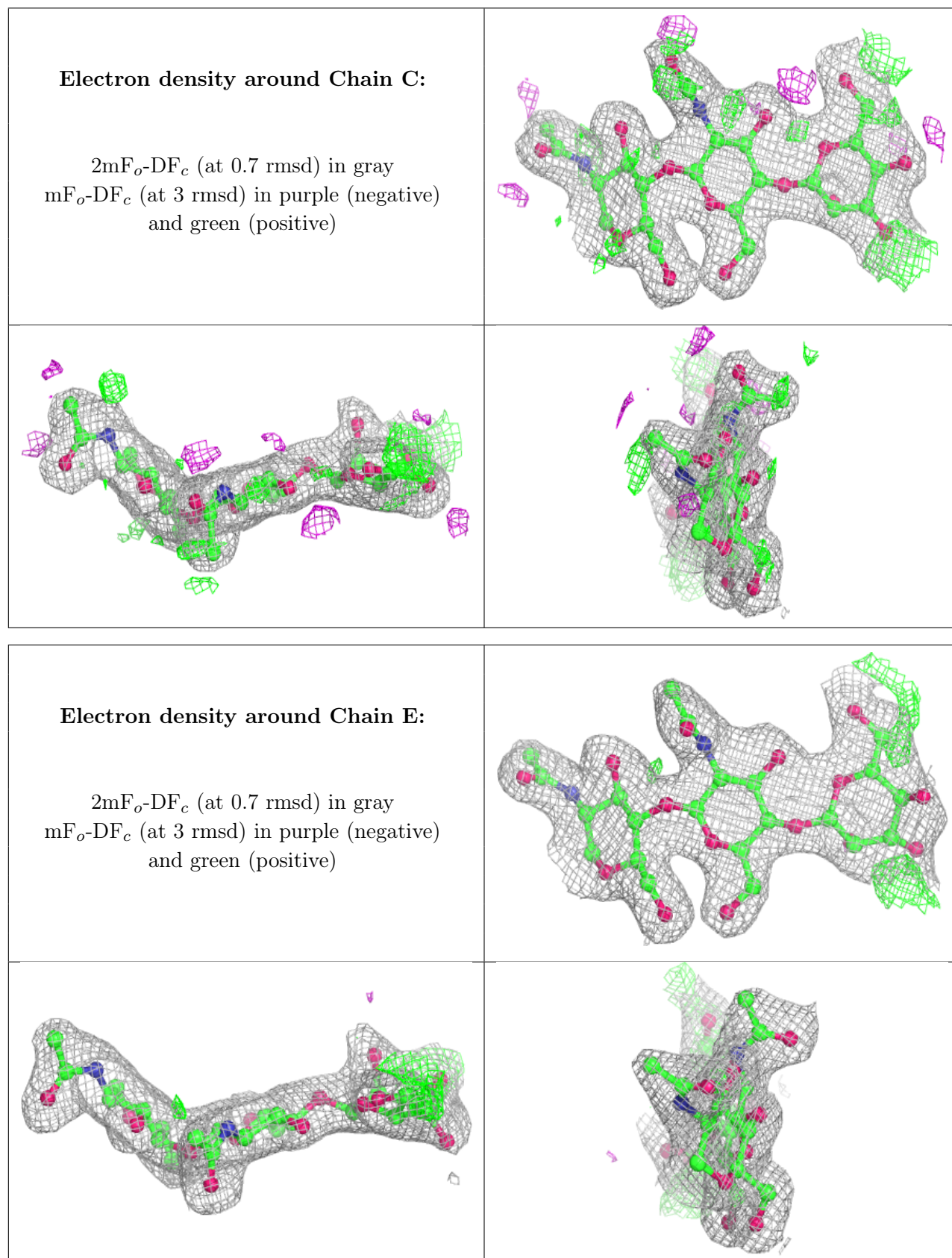
There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

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

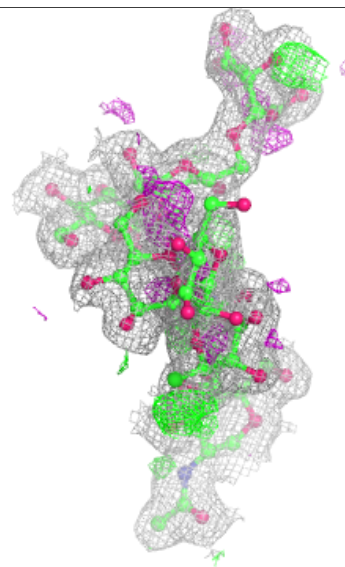
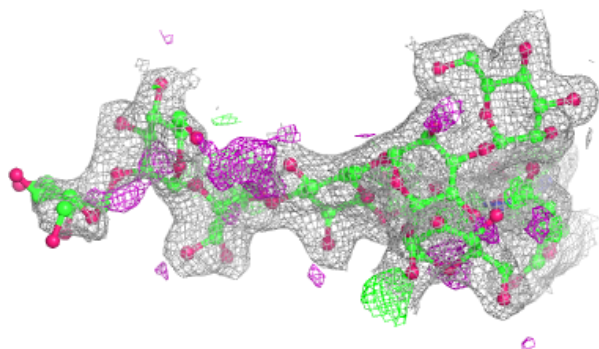
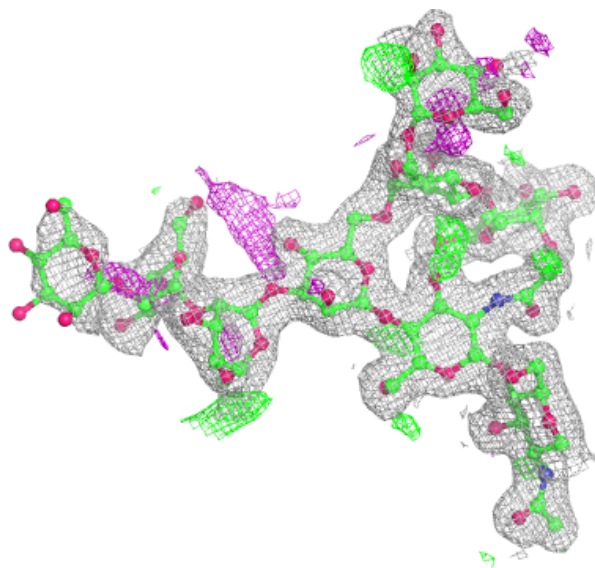
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	MAN	D	9	11/12	0.63	0.25	59,62,66,73	0
4	MAN	F	9	11/12	0.67	0.23	71,77,80,80	0
4	MAN	F	8	11/12	0.70	0.22	63,67,73,77	0
4	MAN	F	6	11/12	0.71	0.62	89,93,96,97	0
3	MAN	D	6	11/12	0.76	0.55	87,89,93,94	0
2	BMA	C	3	11/12	0.78	0.16	44,50,54,62	0
3	MAN	D	5	11/12	0.80	0.26	59,63,70,78	0
2	BMA	E	3	11/12	0.81	0.21	58,62,68,76	0
4	MAN	F	5	11/12	0.85	0.31	66,68,72,80	0
3	MAN	D	4	10/12	0.89	0.17	47,54,56,59	0
4	MAN	F	4	11/12	0.91	0.15	49,56,59,59	0
4	BMA	F	3	11/12	0.94	0.09	31,34,40,43	0
4	MAN	F	7	11/12	0.94	0.10	28,32,42,53	0
3	BMA	D	3	11/12	0.96	0.10	27,30,31,38	0
2	NAG	E	1	14/15	0.96	0.12	30,34,38,40	0
2	NAG	E	2	14/15	0.96	0.15	36,40,44,51	0
2	NAG	C	2	14/15	0.96	0.14	28,31,38,42	0
3	MAN	D	7	11/12	0.97	0.10	23,27,39,51	0
3	NAG	D	1	14/15	0.97	0.10	18,19,21,21	0
4	NAG	F	1	14/15	0.97	0.10	23,24,26,26	0
3	NAG	D	2	14/15	0.97	0.09	21,23,24,25	0
2	NAG	C	1	14/15	0.97	0.10	25,27,33,34	0
4	NAG	F	2	14/15	0.98	0.09	26,28,29,30	0
3	MAN	D	8	11/12	0.98	0.10	19,20,21,21	0
4	MAN	F	10	11/12	0.98	0.12	23,24,25,26	0

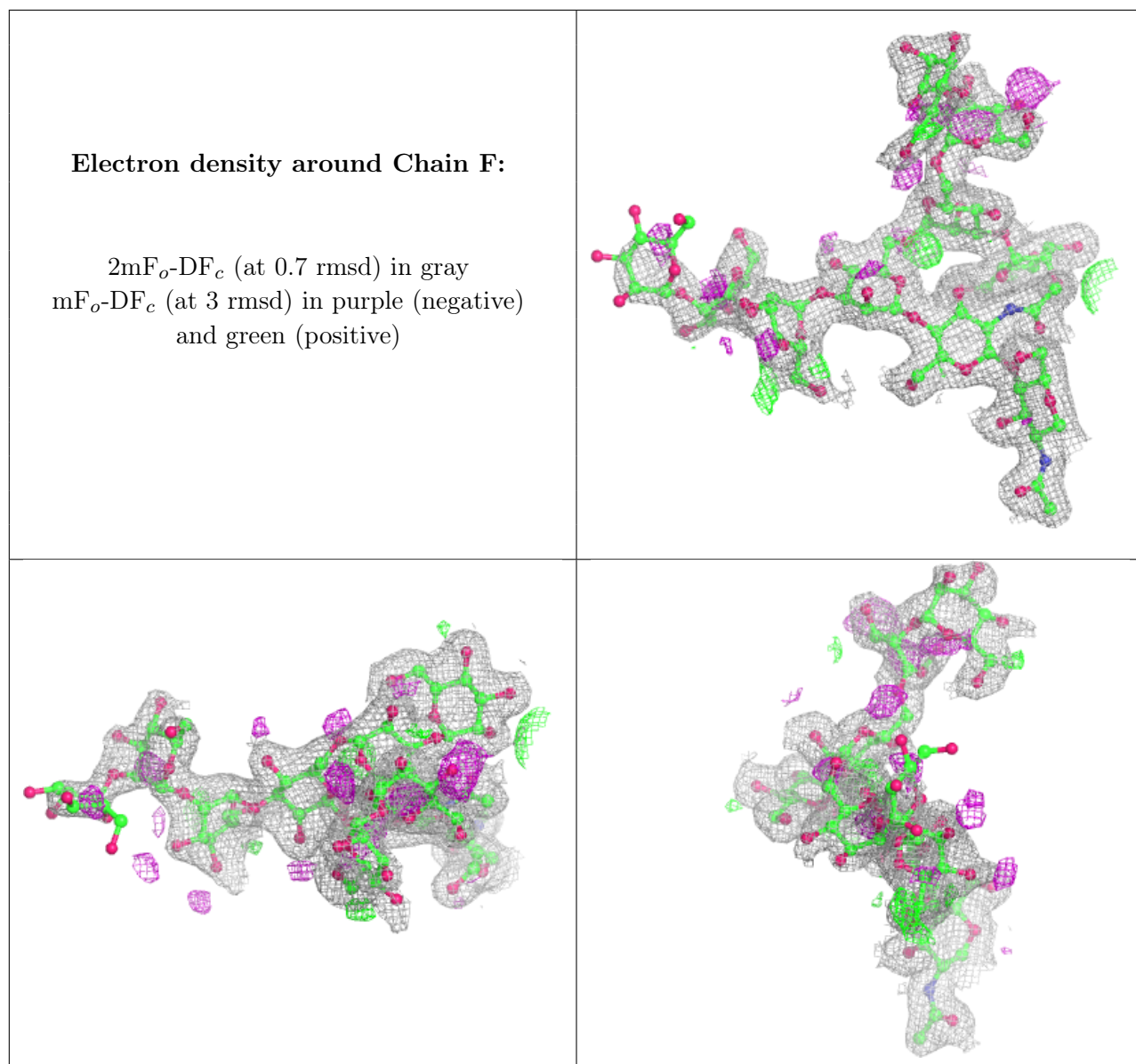
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



**Electron density around Chain D:**

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





## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	KDH	A	1009	33/33	0.60	0.32	52,82,107,108	0
7	EDO	A	1011	4/4	0.67	0.30	68,71,72,72	0
6	KDH	B	1008	33/33	0.68	0.32	63,85,100,101	0
6	KDH	A	1008	33/33	0.69	0.30	41,74,81,84	0
6	KDH	A	1007	33/33	0.69	0.38	68,81,114,118	9

*Continued on next page...*



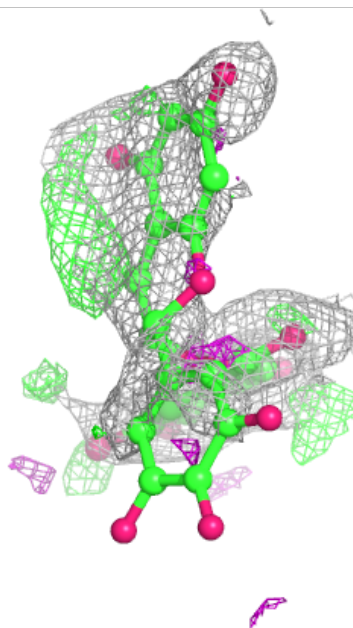
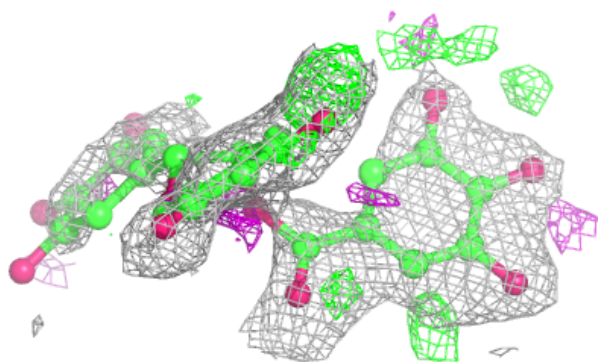
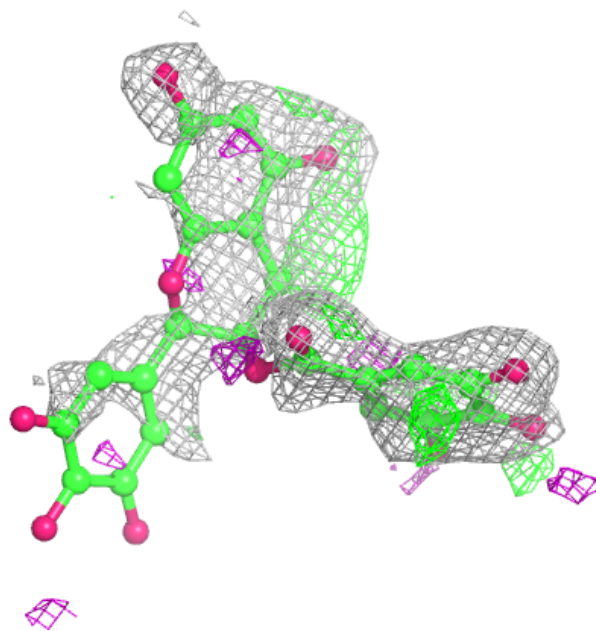
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	KDH	B	1006	33/33	0.72	0.48	71,85,101,104	0
6	KDH	A	1006	33/33	0.74	0.43	57,67,88,90	0
8	NAG	B	1215	14/15	0.74	0.61	79,86,90,94	0
8	NAG	A	1606	14/15	0.76	0.30	50,56,60,68	0
8	NAG	B	1539	14/15	0.76	0.38	71,78,81,81	0
6	KDH	B	1004	33/33	0.77	0.32	65,69,99,101	0
8	NAG	A	1215	14/15	0.78	0.40	75,84,90,90	0
8	NAG	B	1242	14/15	0.78	0.44	81,87,91,92	0
6	KDH	B	1002	33/33	0.78	0.20	42,69,89,89	0
7	EDO	B	1011	4/4	0.79	0.19	53,55,55,57	0
6	KDH	B	1005	33/33	0.79	0.40	65,71,83,86	0
6	KDH	A	1004	33/33	0.80	0.29	63,67,101,104	0
8	NAG	A	1555	14/15	0.80	0.34	60,74,80,81	0
6	KDH	A	1002	33/33	0.82	0.20	35,63,81,82	0
8	NAG	A	1539	14/15	0.83	0.27	53,61,65,70	0
8	NAG	B	1483	14/15	0.84	0.34	75,81,83,83	0
8	NAG	B	1319	14/15	0.84	0.44	82,88,93,94	0
8	NAG	A	1242	14/15	0.85	0.46	67,70,74,74	0
8	NAG	A	1483	14/15	0.85	0.21	54,60,66,66	0
8	NAG	A	1576	14/15	0.85	0.27	52,59,63,71	0
8	NAG	B	1555	14/15	0.85	0.26	53,57,59,59	0
8	NAG	B	1052	14/15	0.86	0.42	70,79,81,85	0
6	KDH	A	1005	33/33	0.86	0.31	46,56,70,76	0
8	NAG	B	1576	14/15	0.86	0.22	57,63,68,69	0
8	NAG	A	1052	14/15	0.91	0.37	60,66,70,73	0
6	KDH	B	1003	33/33	0.92	0.19	40,45,50,53	0
8	NAG	B	1357	14/15	0.93	0.17	52,54,58,61	0
8	NAG	B	1444	14/15	0.94	0.12	41,47,51,52	0
8	NAG	B	1471	14/15	0.94	0.12	36,38,46,47	0
8	NAG	A	1236	14/15	0.94	0.13	31,38,41,43	0
8	NAG	B	1644	14/15	0.94	0.16	35,37,40,45	0
6	KDH	A	1003	33/33	0.95	0.15	34,38,42,45	0
8	NAG	A	1471	14/15	0.96	0.10	31,33,37,45	0
8	NAG	A	1444	14/15	0.96	0.09	30,32,37,42	0
8	NAG	A	1644	14/15	0.96	0.13	28,31,35,38	0
5	FRU	B	1001	12/12	0.97	0.14	24,26,27,27	0
8	NAG	A	1357	14/15	0.97	0.10	40,42,48,49	0
5	FRU	A	1001	12/12	0.98	0.14	18,19,20,20	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.

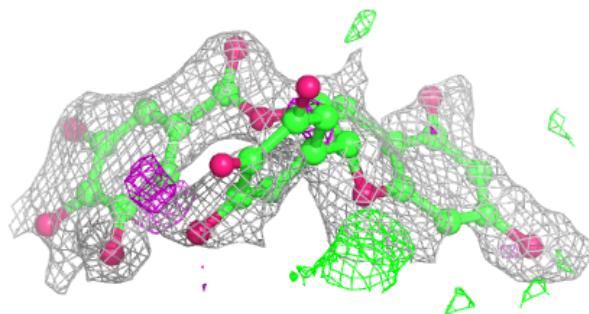
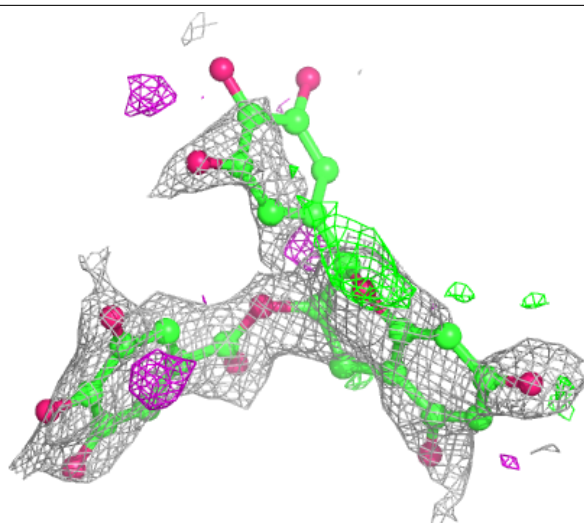
**Electron density around KDH A 1009:**

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



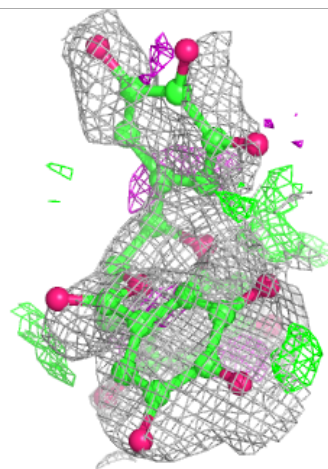
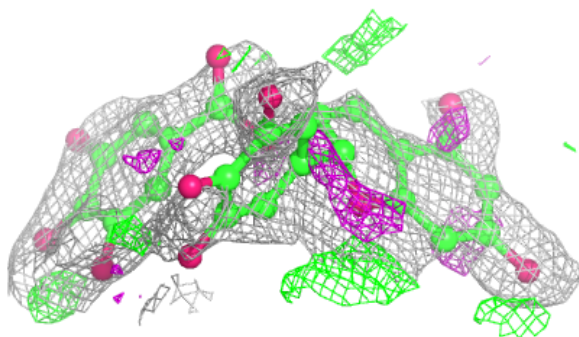
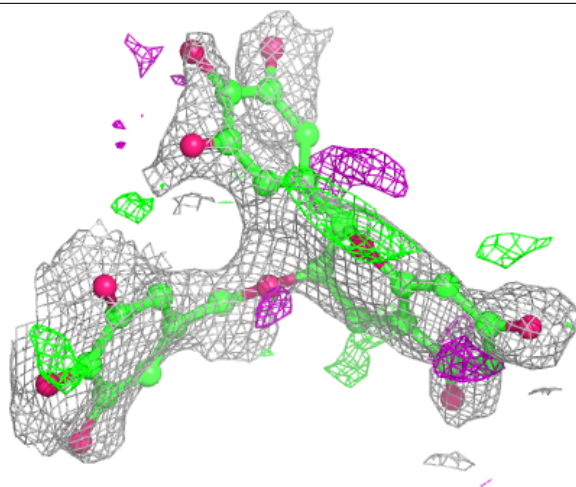
**Electron density around KDH B 1008:**

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



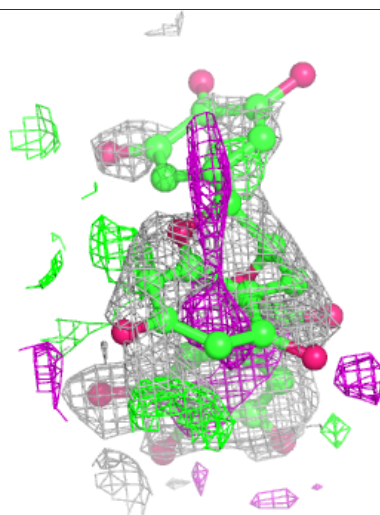
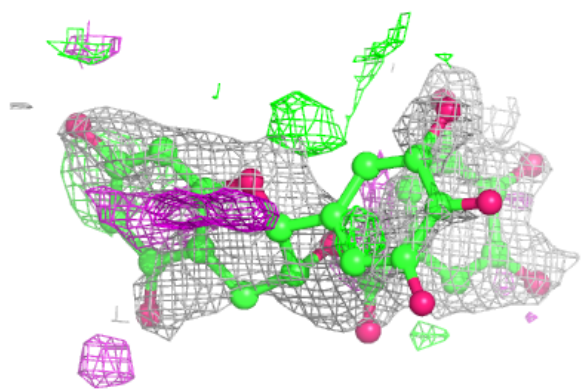
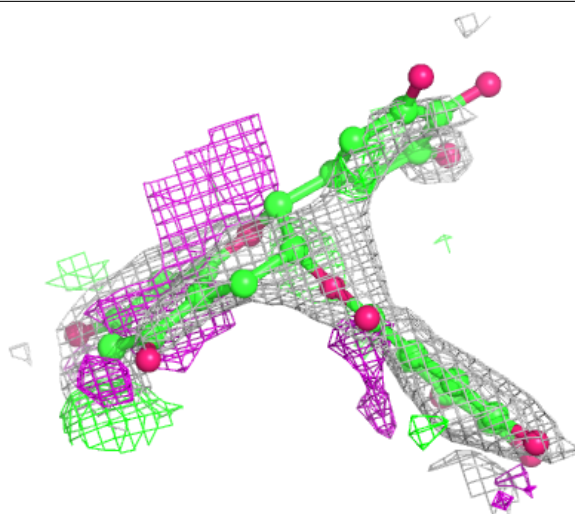
**Electron density around KDH A 1008:**

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



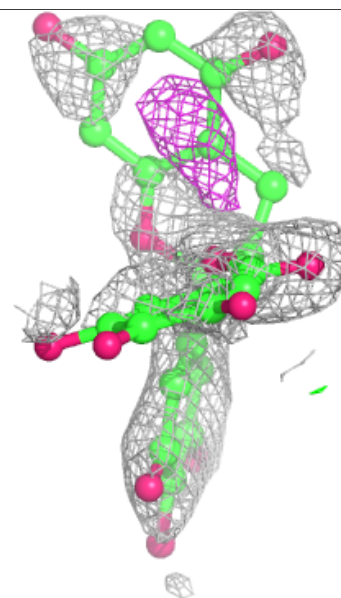
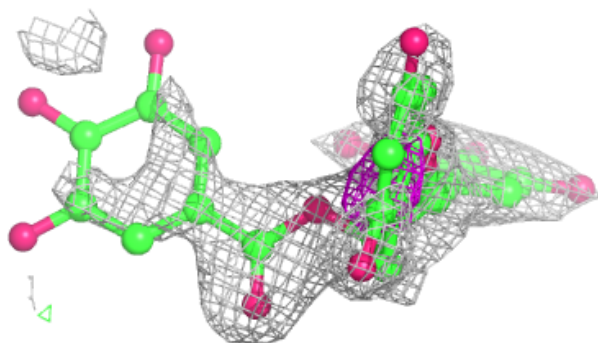
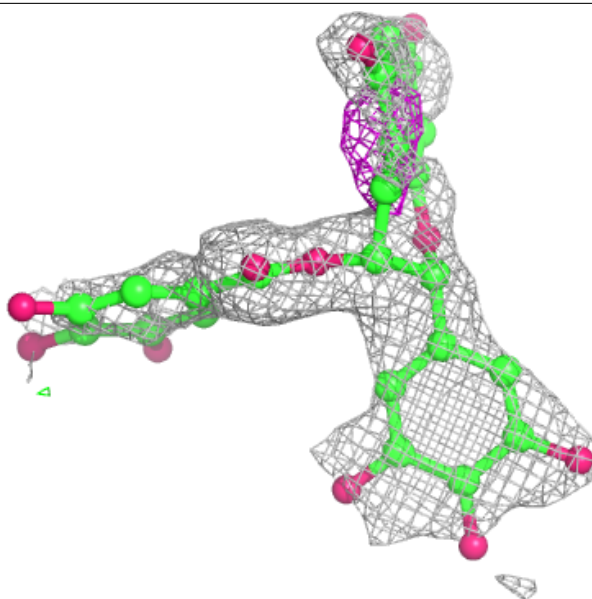
**Electron density around KDH A 1007:**

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



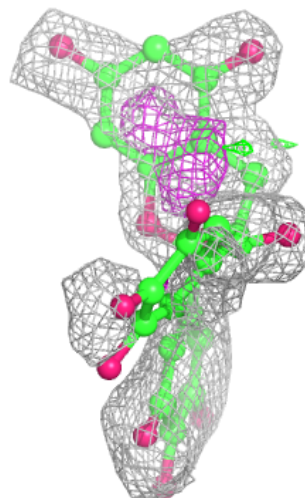
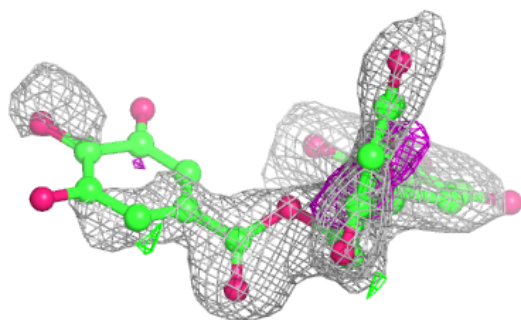
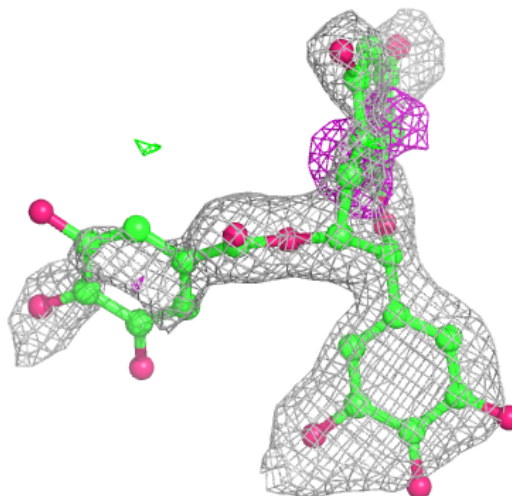
**Electron density around KDH B 1006:**

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



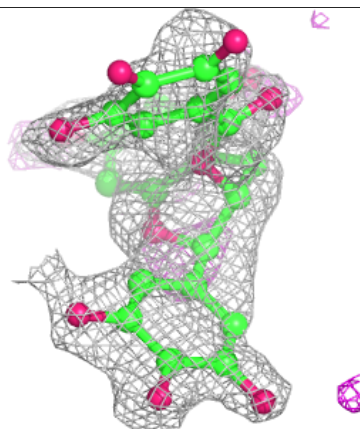
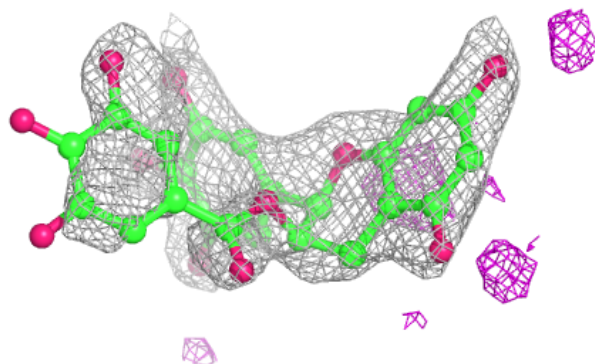
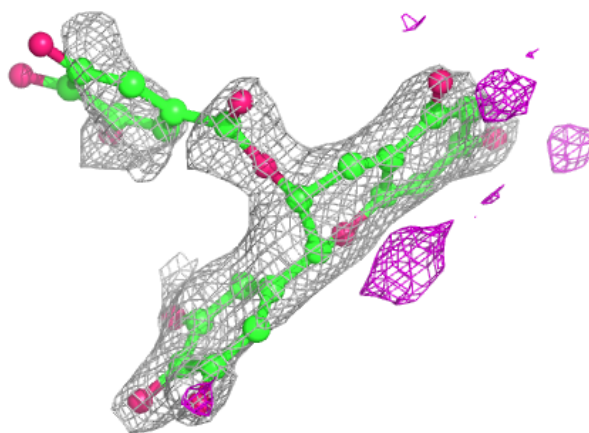
**Electron density around KDH A 1006:**

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



**Electron density around KDH B 1004:**

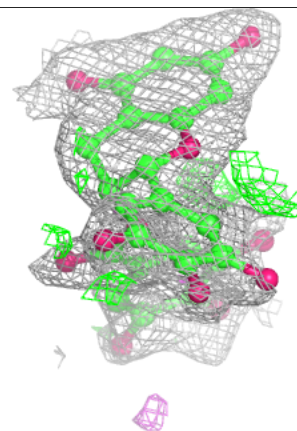
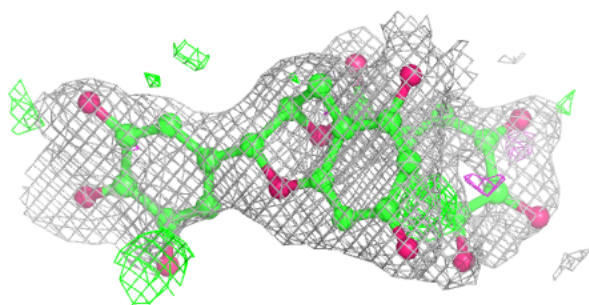
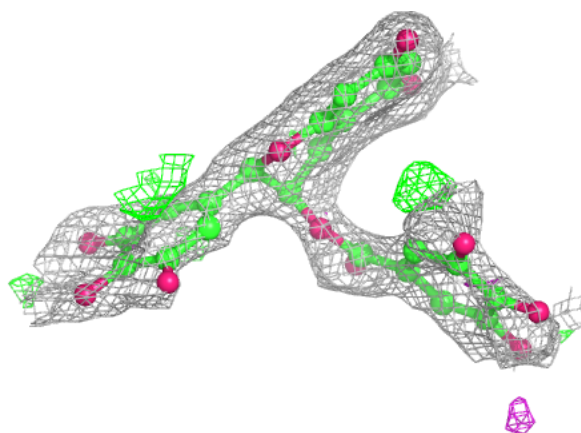
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





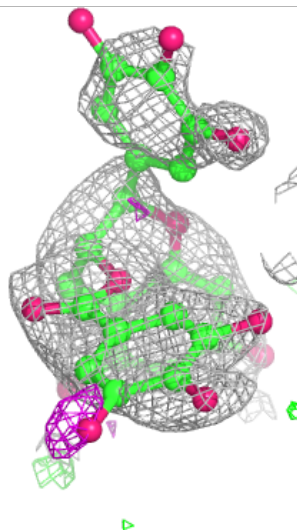
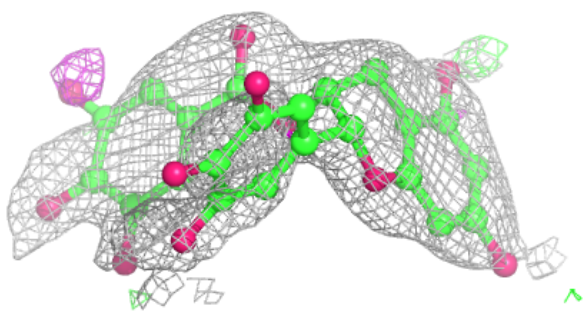
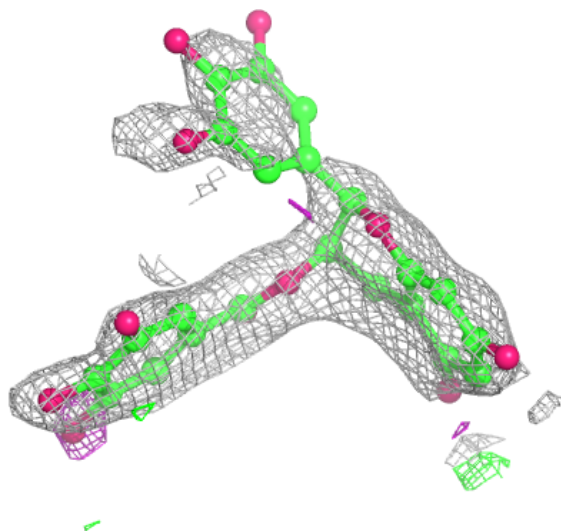
**Electron density around KDH B 1002:**

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



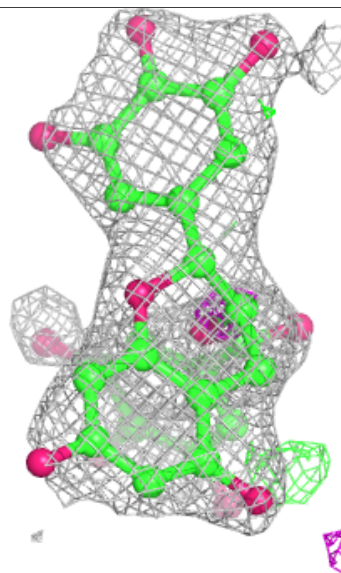
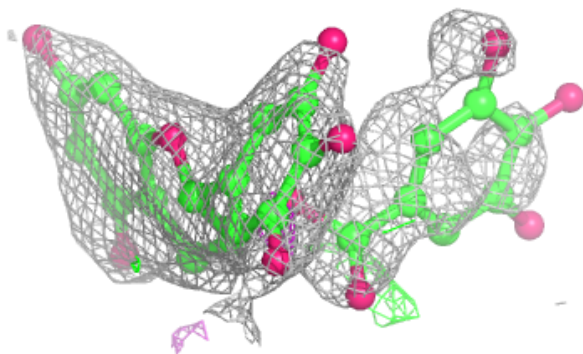
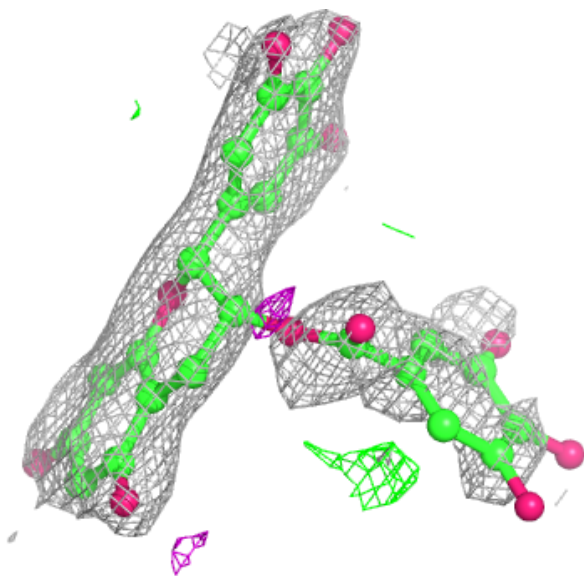
**Electron density around KDH B 1005:**

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



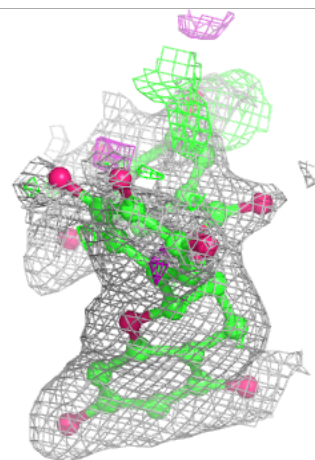
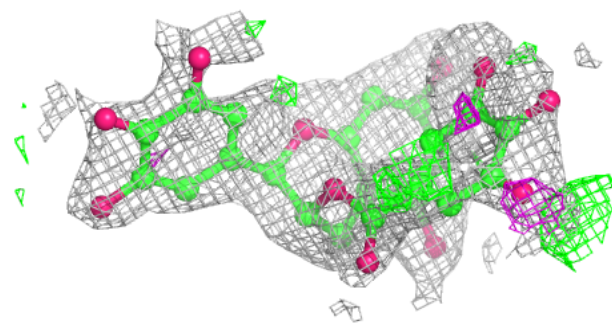
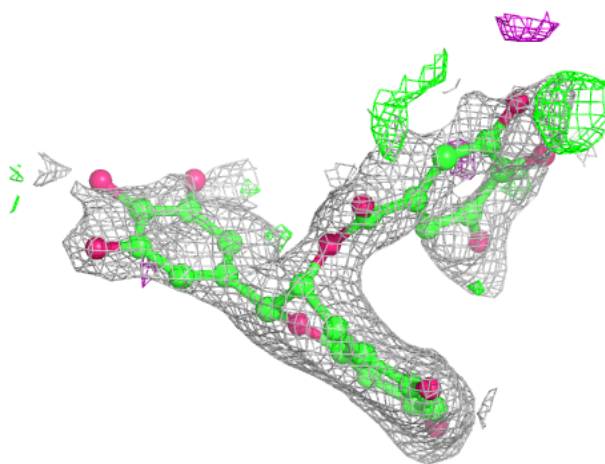
**Electron density around KDH A 1004:**

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



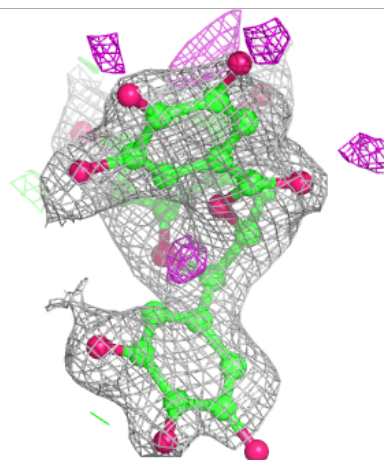
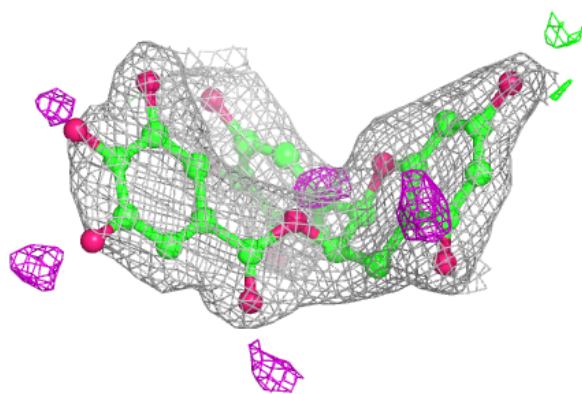
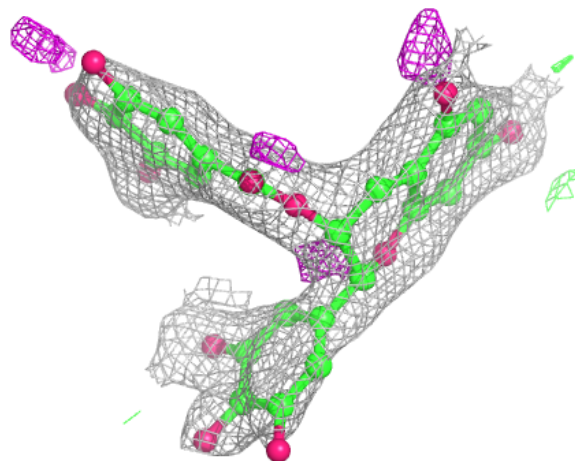
**Electron density around KDH A 1002:**

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



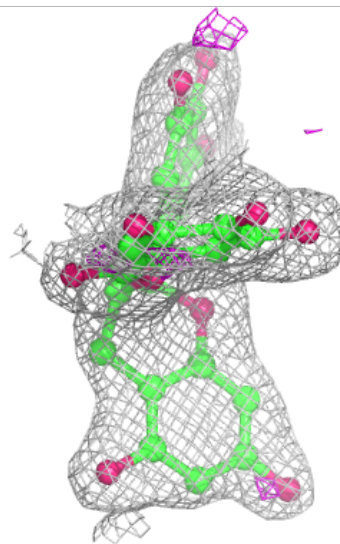
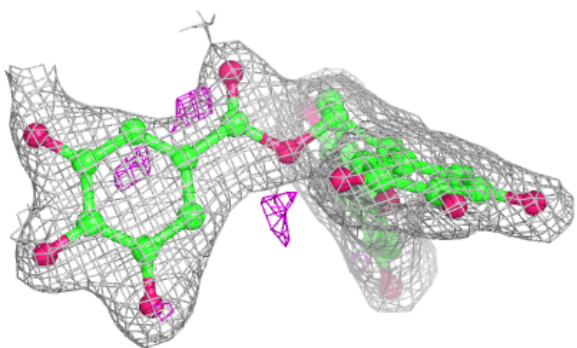
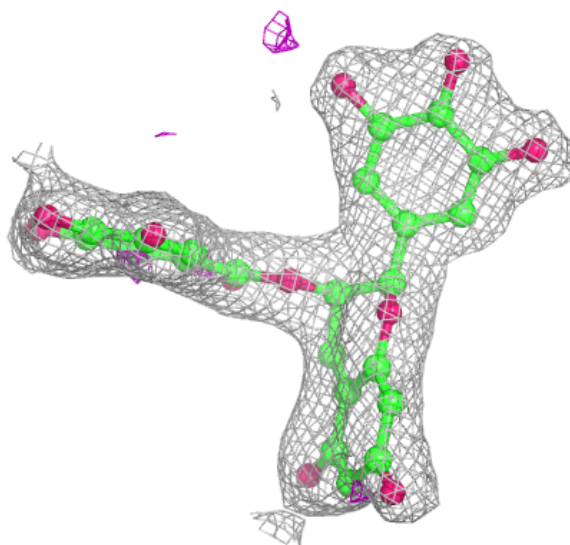
**Electron density around KDH A 1005:**

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



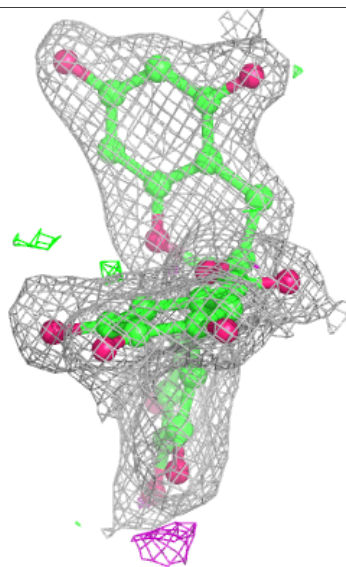
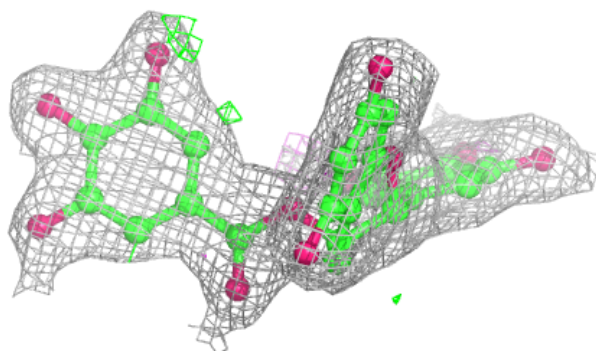
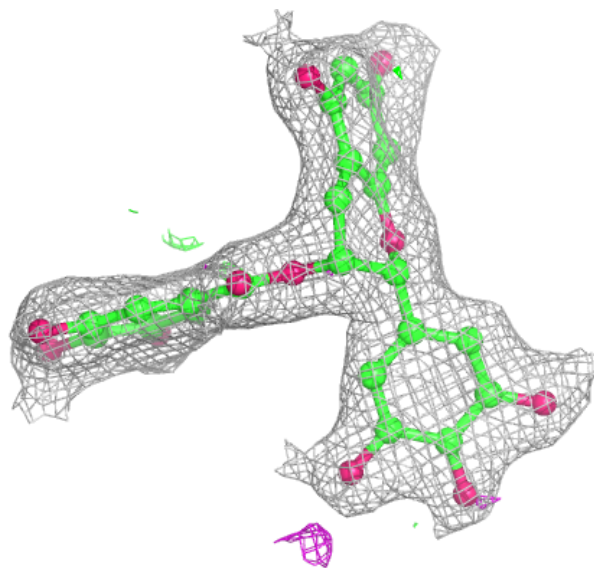
**Electron density around KDH B 1003:**

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



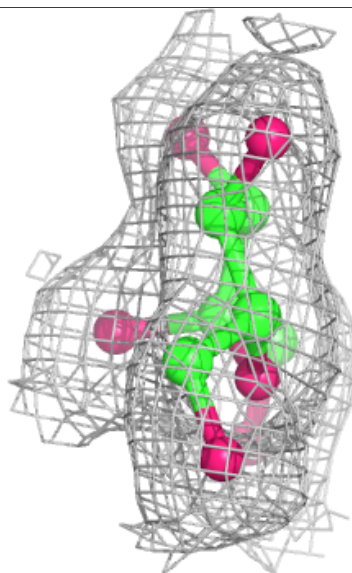
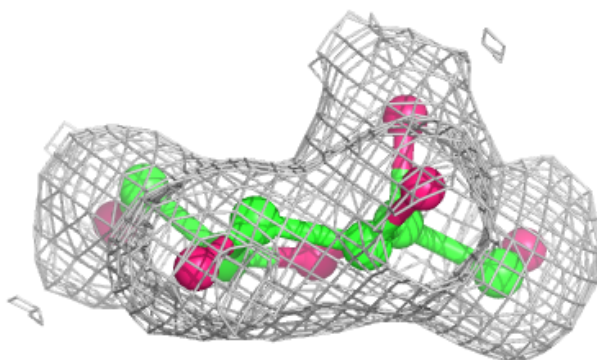
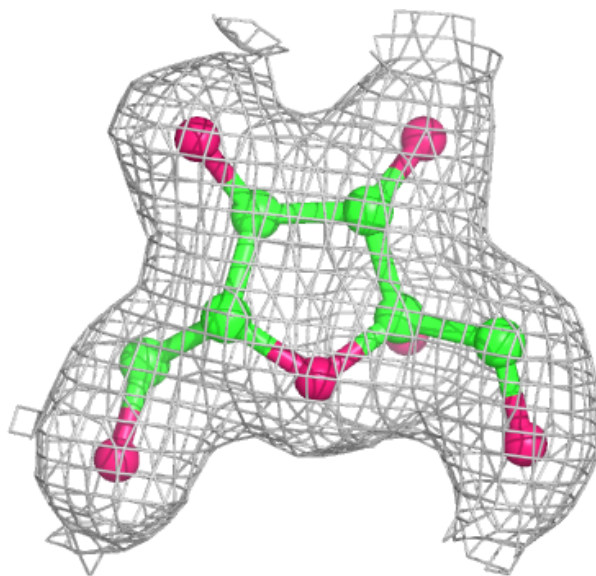
**Electron density around KDH A 1003:**

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

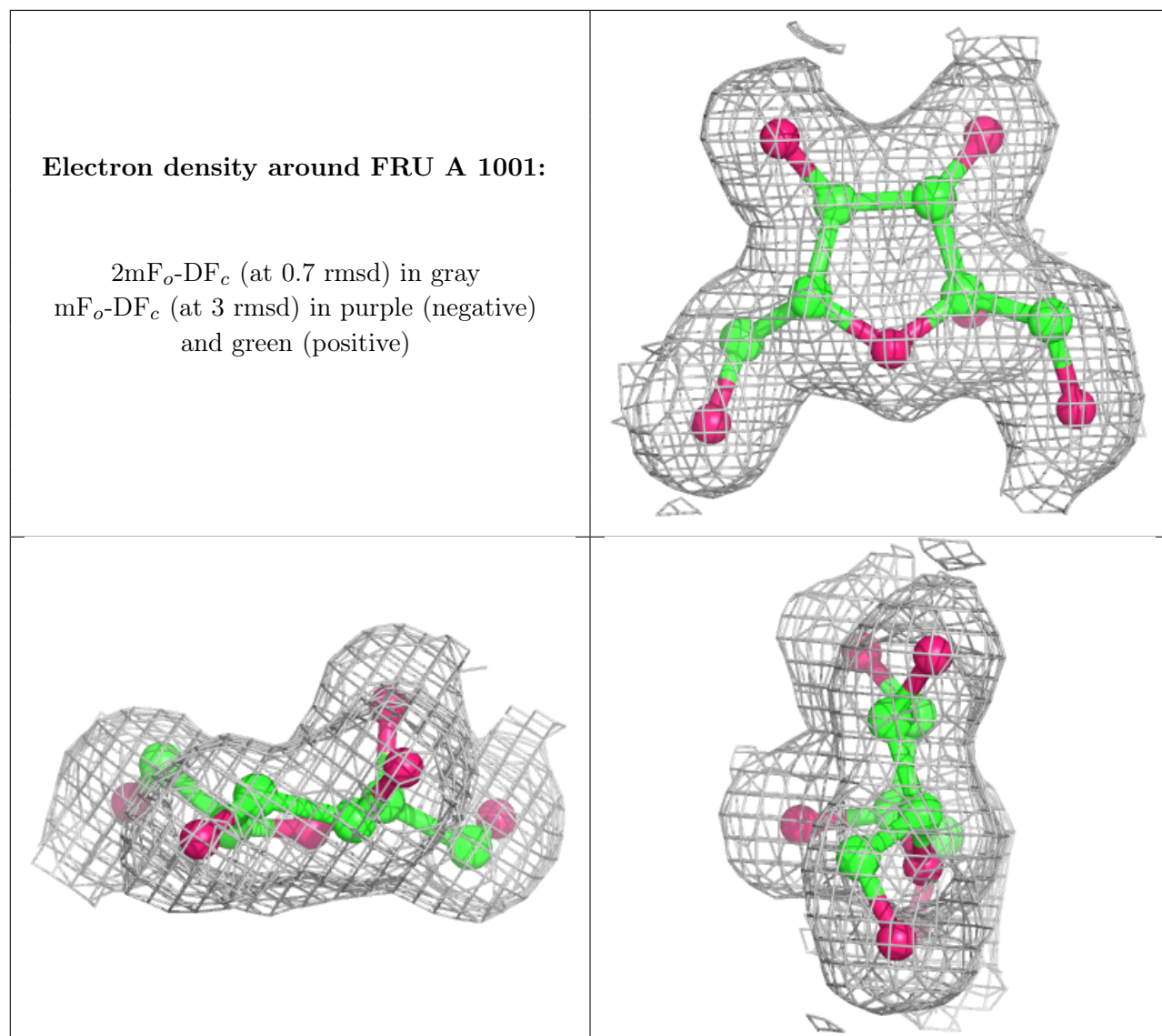


**Electron density around FRU B 1001:**

$2mF_o-DF_c$  (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.