WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Nov 6, 2023 – 08:24 AM EST

PDB ID	:	6WY7
Title	:	CRYSTAL STRUCTURE OF MYELOPEROXIDASE SUBFORM C (MPO) COMPLEX WITH Compound-41 A.K.A 7-[1-phenyl-3-({4-phenylbicyclo[2.2.2]octan-1-yl}amino)propyl]-3H-[1,2,3]triazolo[4,5-b]pyridin-5-amine
Authors	:	Khan, J.A.
Deposited on	:	2020-05-12
Resolution	:	2.09 Å(reported)

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

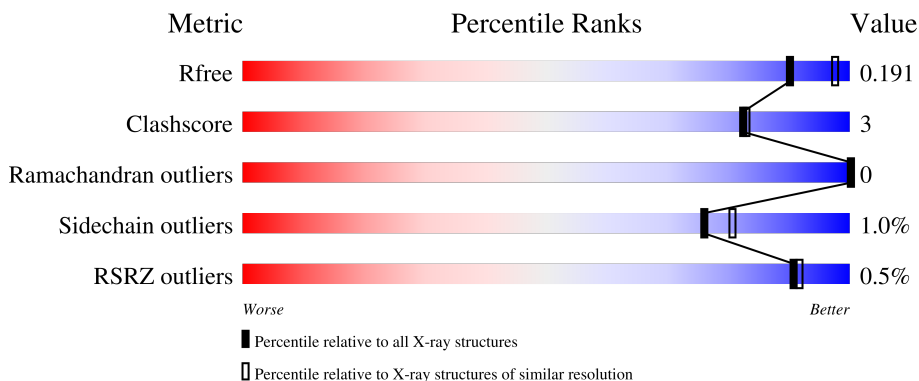|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & 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:
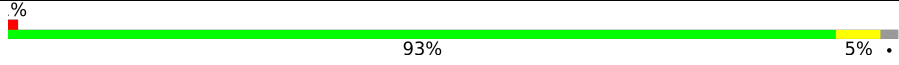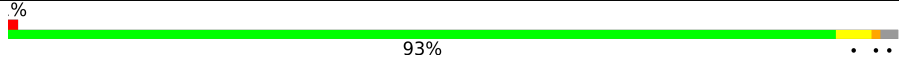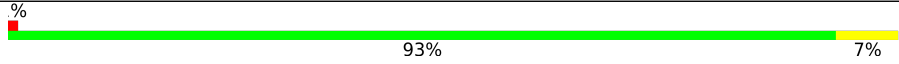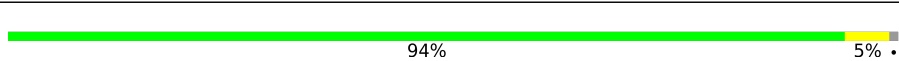*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.09 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	Percentile Ranks	Value
Rfree		0.191
Clashscore		3
Ramachandran outliers		0
Sidechain outliers		1.0%
RSRZ outliers		0.5%

Worse　　　　　　　　　　　　　　　　*Better*

▌ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	6189 (2.10-2.06)
Clashscore	141614	6738 (2.10-2.06)
Ramachandran outliers	138981	6663 (2.10-2.06)
Sidechain outliers	138945	6664 (2.10-2.06)
RSRZ outliers	127900	6057 (2.10-2.06)

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 <=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	105	93% · 5% ·
1	D	105	93% ·
2	B	467	93% · 7%
2	E	467	94% · 5% ·

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Mol	Chain	Length	Quality of chain
3	C	6	50% 50%
3	F	6	50% 50%

2 Entry composition ⓘ

There are 9 unique types of molecules in this entry. The entry contains 10328 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 Myeloperoxidase light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	103	Total	C	N	O	S	0	0	0
			829	525	146	153	5			
1	D	103	Total	C	N	O	S	0	0	0
			828	524	147	152	5			

- Molecule 2 is a protein called Myeloperoxidase heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	465	Total	C	N	O	S	0	0	0
			3701	2335	674	665	27			
2	E	464	Total	C	N	O	S	0	0	0
			3678	2322	668	661	27			

- Molecule 3 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyran ose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[al pha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.
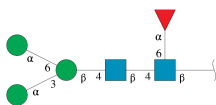
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	6	Total	C	N	O	0	0	0
			71	40	2	29			
3	F	6	Total	C	N	O	0	0	0
			71	40	2	29			

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total Cl 1 1		0	0
4	E	1	Total Cl 1 1		0	0

- Molecule 5 is HEME C (three-letter code: HEC) (formula: $C_{34}H_{34}FeN_4O_4$).
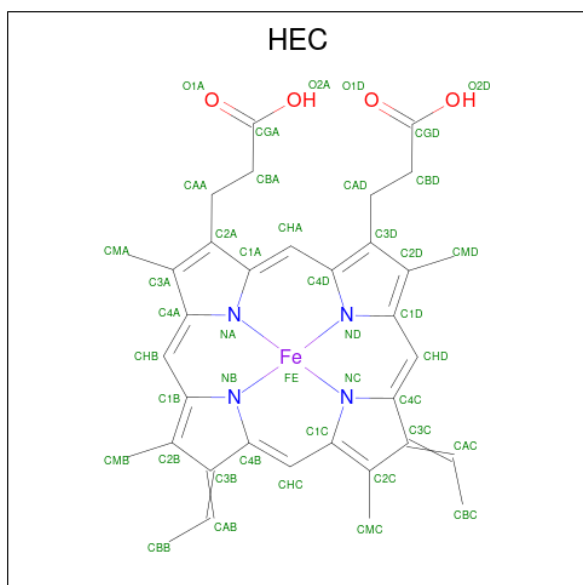
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
5	D	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

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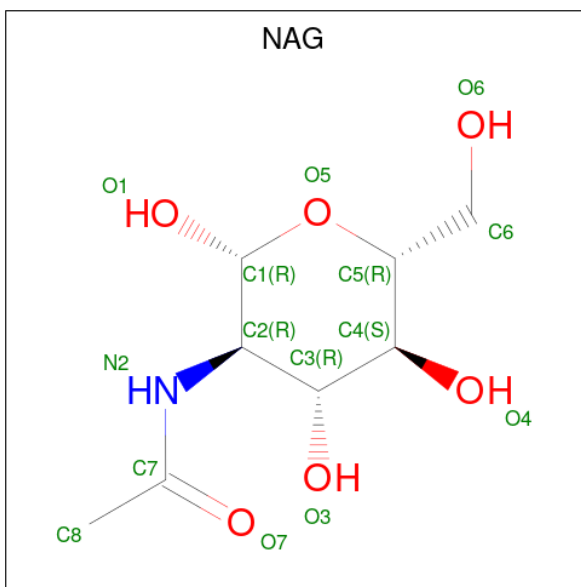
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	B	1	Total 14	C 8	N 1	O 5	0	0
6	B	1	Total 14	C 8	N 1	O 5	0	0
6	E	1	Total 14	C 8	N 1	O 5	0	0

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	1	Total 1	Ca 1	0	0
7	E	1	Total 1	Ca 1	0	0

- Molecule 8 is 7-{(1R)-1-phenyl-3-[(4-phenylbicyclo[2.2.2]octan-1-yl)amino]propyl}-3H-[1,2 ,3]triazolo[4,5-b]pyridin-5-amine (three-letter code: UFD) (formula: $C_{28}H_{32}N_6$) (labeled as "Ligand of Interest" by depositor).

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UFD
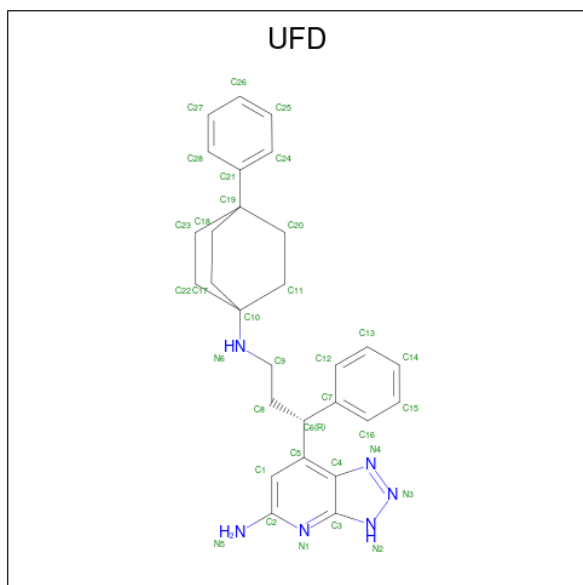
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total 34	C 28	N 6	0	0
8	E	1	Total 34	C 28	N 6	0	0

• Molecule 9 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	83	Total 83	O 83	0	0
9	B	380	Total 380	O 380	0	0
9	D	89	Total 89	O 89	0	0
9	E	397	Total 397	O 397	0	0

3 Residue-property plots ⓘ

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

- Molecule 1: Myeloperoxidase light chain
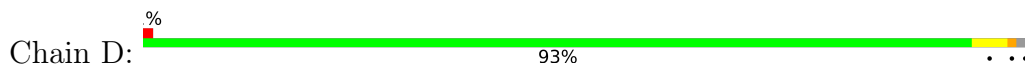
Chain A:

- Molecule 1: Myeloperoxidase light chain

Chain D:

- Molecule 2: Myeloperoxidase heavy chain

Chain B:

- Molecule 2: Myeloperoxidase heavy chain

Chain E:

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

Chain C:

NAG1 NAG2 BMA3 MAN4 MAN5 FUC6

• Molecule 3: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyrano se-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamid o-2-deoxy-beta-D-glucopyranose

Chain F:

50%   50%

NAG1 NAG2 BMA3 MAN4 MAN5 FUC6
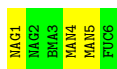
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	105.00Å 105.00Å 224.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.96 – 2.09 46.96 – 2.09	Depositor EDS
% Data completeness (in resolution range)	100.0 (46.96-2.09) 100.0 (46.96-2.09)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$< I/\sigma(I) >$ [1]	3.91 (at 2.08Å)	Xtriage
Refinement program	BUSTER 2.11.7 (17-DEC-2019)	Depositor
R, R_{free}	0.159 , 0.185 0.163 , 0.191	Depositor DCC
R_{free} test set	3777 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	21.8	Xtriage
Anisotropy	0.672	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 60.6	EDS
L-test for twinning[2]	$< |L| > = 0.48$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	10328	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.37% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: HEC, MAN, CA, NAG, CL, UFD, CSO, BMA, FUC

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	0.43	0/854	0.62	0/1163
1	D	0.41	0/853	0.62	0/1162
2	B	0.41	0/3778	0.55	0/5128
2	E	0.42	0/3755	0.55	0/5100
All	All	0.41	0/9240	0.57	0/12553

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	829	0	791	4	0
1	D	828	0	791	3	0
2	B	3701	0	3676	18	0
2	E	3678	0	3644	16	0
3	C	71	0	61	0	0
3	F	71	0	61	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	E	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	43	0	28	2	0
5	D	43	0	28	1	0
6	B	28	0	26	0	0
6	E	14	0	13	0	0
7	B	1	0	0	0	0
7	E	1	0	0	0	0
8	B	34	0	0	0	0
8	E	34	0	0	0	0
9	A	83	0	0	0	0
9	B	380	0	0	0	0
9	D	89	0	0	0	0
9	E	397	0	0	0	0
All	All	10328	0	9119	37	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 3.

The worst 5 of 37 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)
2:B:153:CYS:HG	2:E:153:CYS:HG	1.08	0.91
2:E:115:CYS:HG	2:E:125:CYS:HG	0.85	0.85
2:B:119:CYS:HG	2:B:143:CYS:HG	1.02	0.82
2:B:538:CYS:HG	2:B:564:CYS:HG	0.83	0.82
2:B:440:CYS:HG	2:B:497:CYS:HG	1.08	0.81

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	101/105 (96%)	100 (99%)	1 (1%)	0	100	100
1	D	101/105 (96%)	99 (98%)	2 (2%)	0	100	100
2	B	462/467 (99%)	453 (98%)	9 (2%)	0	100	100
2	E	461/467 (99%)	452 (98%)	9 (2%)	0	100	100
All	All	1125/1144 (98%)	1104 (98%)	21 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	89/90 (99%)	89 (100%)	0	100	100
1	D	89/90 (99%)	88 (99%)	1 (1%)	73	78
2	B	402/411 (98%)	397 (99%)	5 (1%)	71	76
2	E	398/411 (97%)	394 (99%)	4 (1%)	76	81
All	All	978/1002 (98%)	968 (99%)	10 (1%)	76	81

5 of 10 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	E	175	MET
2	E	190	MET
2	E	318	ASP
2	B	348	ASN
2	B	517	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	348	ASN
2	B	409	GLN
2	E	351	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	CSO	B	150	2	3,6,7	0.65	0	0,6,8	-	-
2	CSO	E	150	2	3,6,7	0.76	0	0,6,8	-	-

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	CSO	B	150	2	-	0/1/5/7	-
2	CSO	E	150	2	-	0/1/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates ⓘ

12 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	$\#|Z| > 2$
3	NAG	C	1	3,2	14,14,15	0.35	0	17,19,21	0.95	2 (11%)
3	NAG	C	2	3	14,14,15	0.35	0	17,19,21	0.68	0
3	BMA	C	3	3	11,11,12	0.28	0	15,15,17	0.43	0
3	MAN	C	4	3	11,11,12	0.34	0	15,15,17	1.05	1 (6%)
3	MAN	C	5	3	11,11,12	0.30	0	15,15,17	0.75	1 (6%)
3	FUC	C	6	3	10,10,11	0.44	0	14,14,16	0.68	0
3	NAG	F	1	3,2	14,14,15	0.31	0	17,19,21	0.96	2 (11%)
3	NAG	F	2	3	14,14,15	0.29	0	17,19,21	0.63	0
3	BMA	F	3	3	11,11,12	0.25	0	15,15,17	0.47	0
3	MAN	F	4	3	11,11,12	0.33	0	15,15,17	1.00	1 (6%)
3	MAN	F	5	3	11,11,12	0.29	0	15,15,17	0.76	1 (6%)
3	FUC	F	6	3	10,10,11	0.34	0	14,14,16	0.68	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	C	1	3,2	-	0/6/23/26	0/1/1/1
3	NAG	C	2	3	-	0/6/23/26	0/1/1/1
3	BMA	C	3	3	-	0/2/19/22	0/1/1/1
3	MAN	C	4	3	-	0/2/19/22	0/1/1/1
3	MAN	C	5	3	-	0/2/19/22	0/1/1/1
3	FUC	C	6	3	-	-	0/1/1/1
3	NAG	F	1	3,2	-	0/6/23/26	0/1/1/1
3	NAG	F	2	3	-	0/6/23/26	0/1/1/1
3	BMA	F	3	3	-	0/2/19/22	0/1/1/1
3	MAN	F	4	3	-	0/2/19/22	0/1/1/1
3	MAN	F	5	3	-	0/2/19/22	0/1/1/1
3	FUC	F	6	3	-	-	0/1/1/1

There are no bond length outliers.

The worst 5 of 8 bond angle outliers are listed below:

| Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	4	MAN	C1-O5-C5	3.65	117.13	112.19
3	F	4	MAN	C1-O5-C5	3.46	116.88	112.19
3	C	1	NAG	O5-C1-C2	-2.61	107.17	111.29
3	F	1	NAG	O5-C1-C2	-2.59	107.20	111.29
3	F	5	MAN	C1-O5-C5	2.53	115.63	112.19

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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

Oligosaccharide Chain C

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain F

Bond lengths

Bond angles

Torsions

Rings
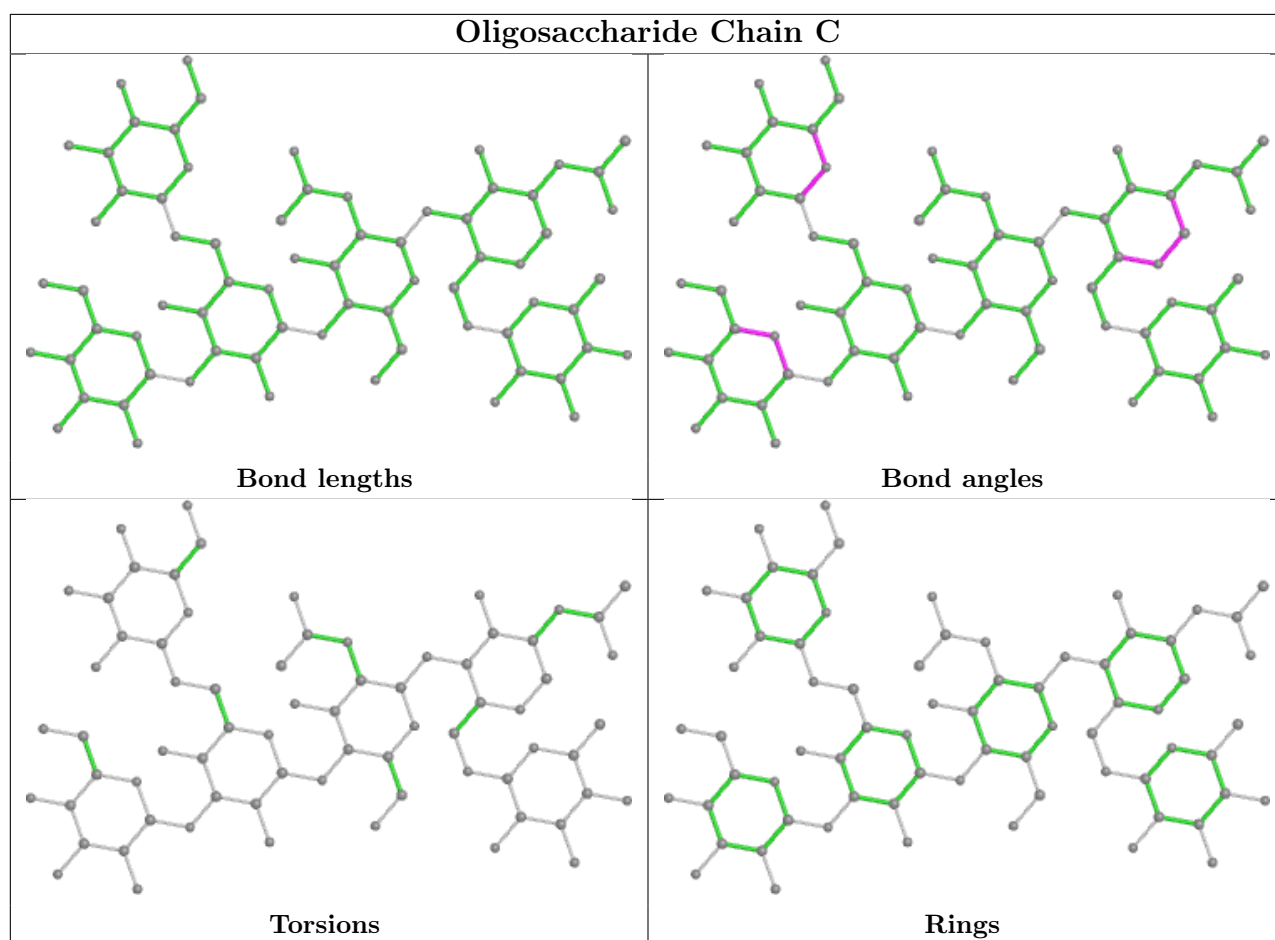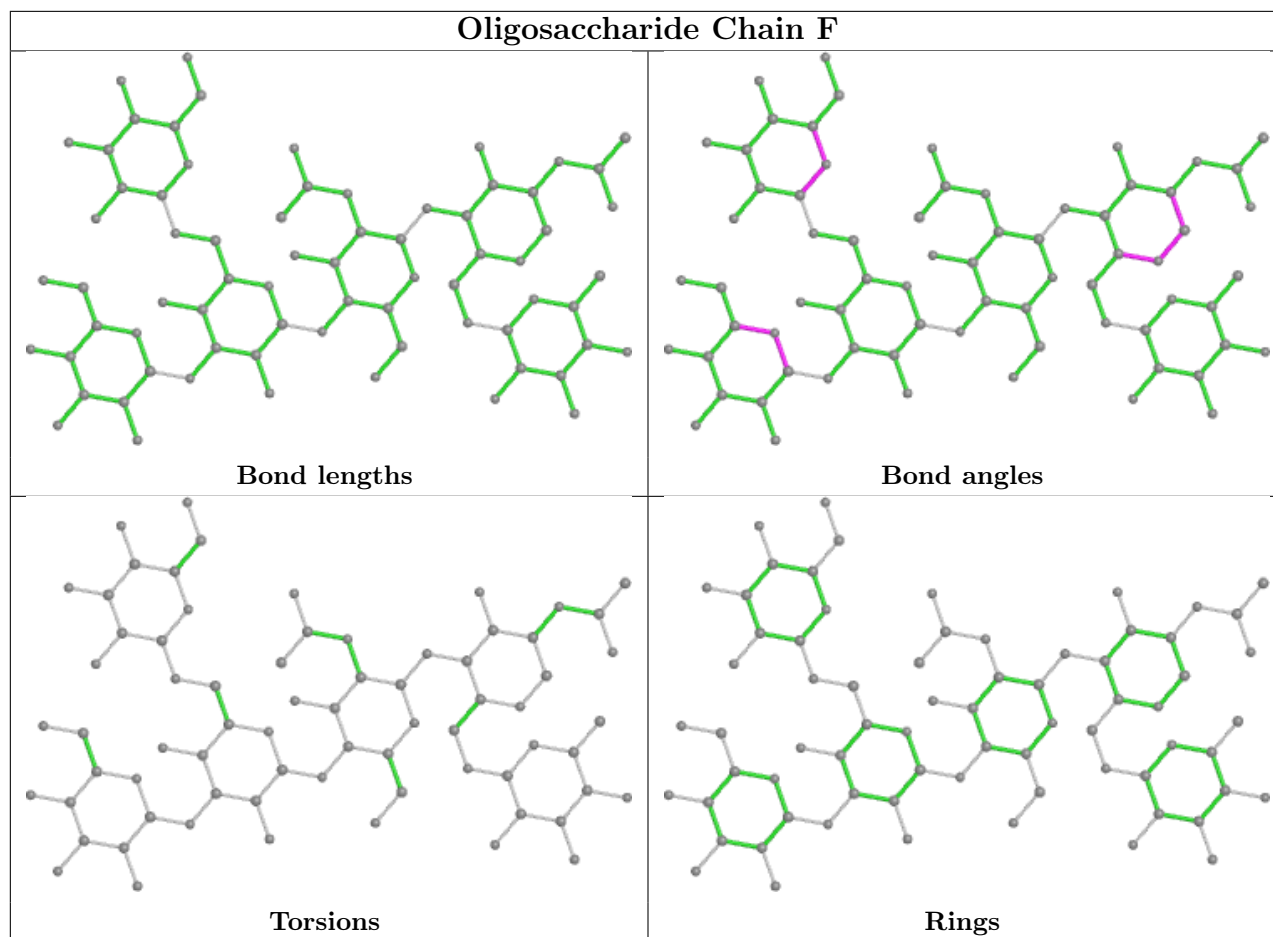
5.6   Ligand geometry ⓘ

Of 12 ligands modelled in this entry, 5 are monoatomic - leaving 7 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
5	HEC	D	201	1,2	32,50,50	1.89	7 (21%)	24,82,82	2.03	10 (41%)
8	UFD	B	612	-	37,39,39	0.79	1 (2%)	46,57,57	0.97	4 (8%)
8	UFD	E	610	-	37,39,39	0.71	0	46,57,57	0.92	2 (4%)
6	NAG	B	603	2	14,14,15	0.30	0	17,19,21	0.96	1 (5%)
6	NAG	E	601	2	14,14,15	0.25	0	17,19,21	0.67	1 (5%)
5	HEC	B	601	1,2	32,50,50	1.65	5 (15%)	24,82,82	1.80	9 (37%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
6	NAG	B	602	2	14,14,15	0.28	0	17,19,21	0.71	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
5	HEC	D	201	1,2	-	4/10/54/54	-
8	UFD	B	612	-	-	3/21/42/42	0/7/6/6
8	UFD	E	610	-	-	6/21/42/42	0/7/6/6
6	NAG	B	603	2	-	0/6/23/26	0/1/1/1
6	NAG	E	601	2	-	0/6/23/26	0/1/1/1
5	HEC	B	601	1,2	-	4/10/54/54	-
6	NAG	B	602	2	-	0/6/23/26	0/1/1/1

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	201	HEC	C2B-C3B	-5.25	1.35	1.40
5	D	201	HEC	C3C-C2C	-4.58	1.36	1.40
5	D	201	HEC	CBC-CAC	-4.23	1.33	1.49
5	B	601	HEC	C4B-C3B	3.79	1.49	1.43
5	B	601	HEC	C2B-C3B	-3.63	1.37	1.40

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	D	201	HEC	O2D-CGD-O1D	-3.95	113.45	123.30
6	B	603	NAG	C1-O5-C5	3.71	117.22	112.19
5	D	201	HEC	CMB-C2B-C3B	3.58	130.03	125.82
5	D	201	HEC	C1D-C2D-C3D	-3.49	104.57	107.00
5	B	601	HEC	C1D-C2D-C3D	-3.45	104.59	107.00

There are no chirality outliers.

5 of 17 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	B	612	UFD	C17-C10-N6-C9
8	E	610	UFD	C18-C19-C21-C24

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PROTEIN DATA BANK

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Mol	Chain	Res	Type	Atoms
8	E	610	UFD	C18-C19-C21-C28
8	E	610	UFD	C20-C19-C21-C28
8	E	610	UFD	C20-C19-C21-C24

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	201	HEC	1	0
5	B	601	HEC	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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand HEC D 201

Bond lengths

Bond angles

Torsions

Rings

Ligand UFD B 612

Bond lengths

Bond angles

Torsions

Rings

Ligand UFD E 610

Bond lengths

Bond angles

Torsions

Rings

Ligand HEC B 601

Bond lengths

Bond angles

Torsions

Rings
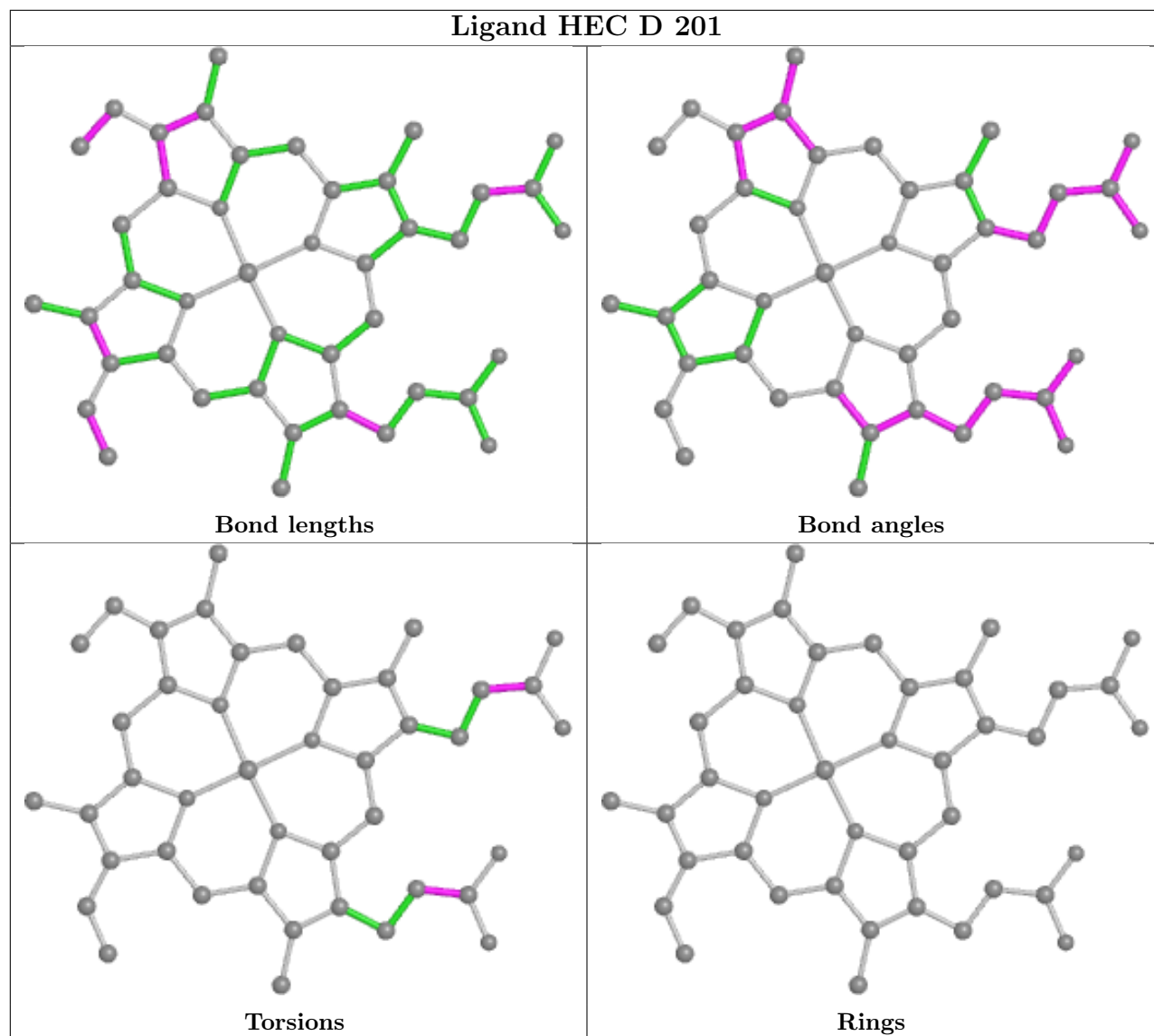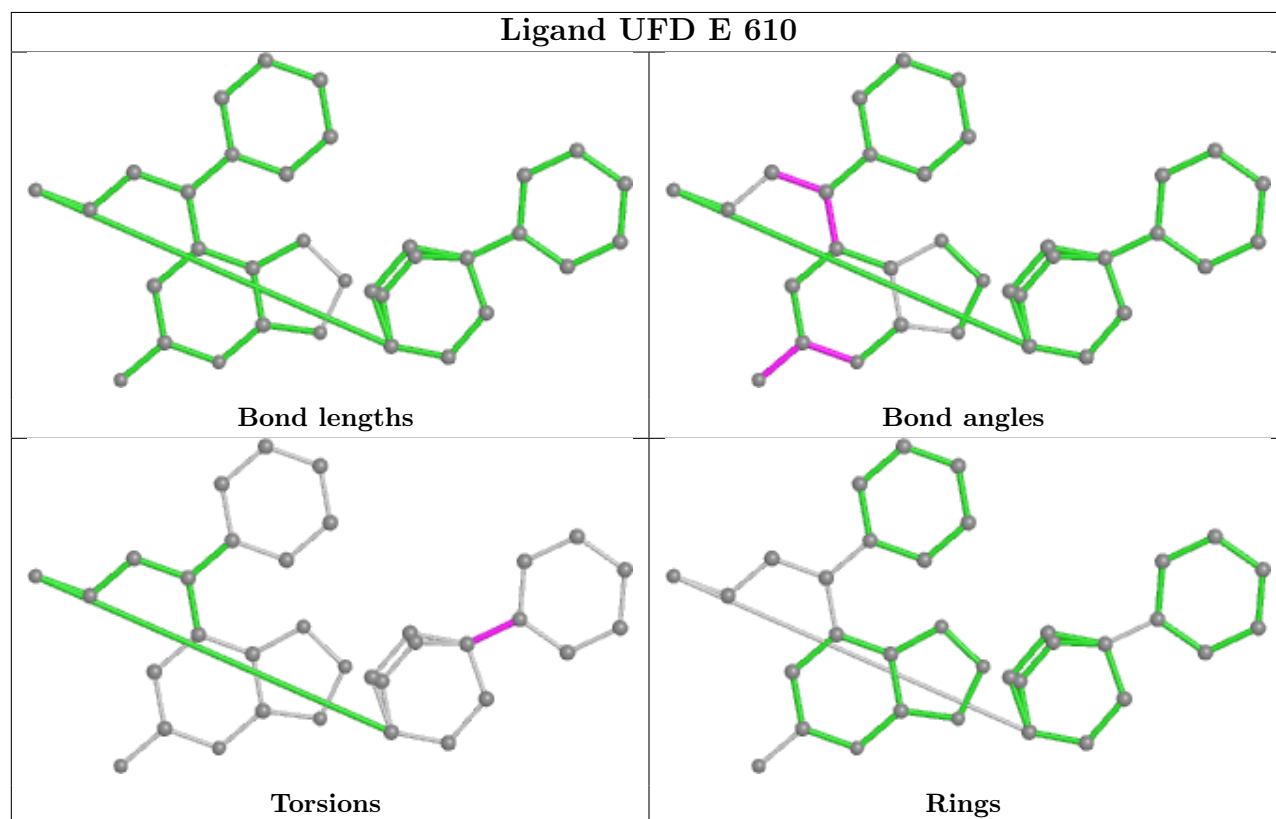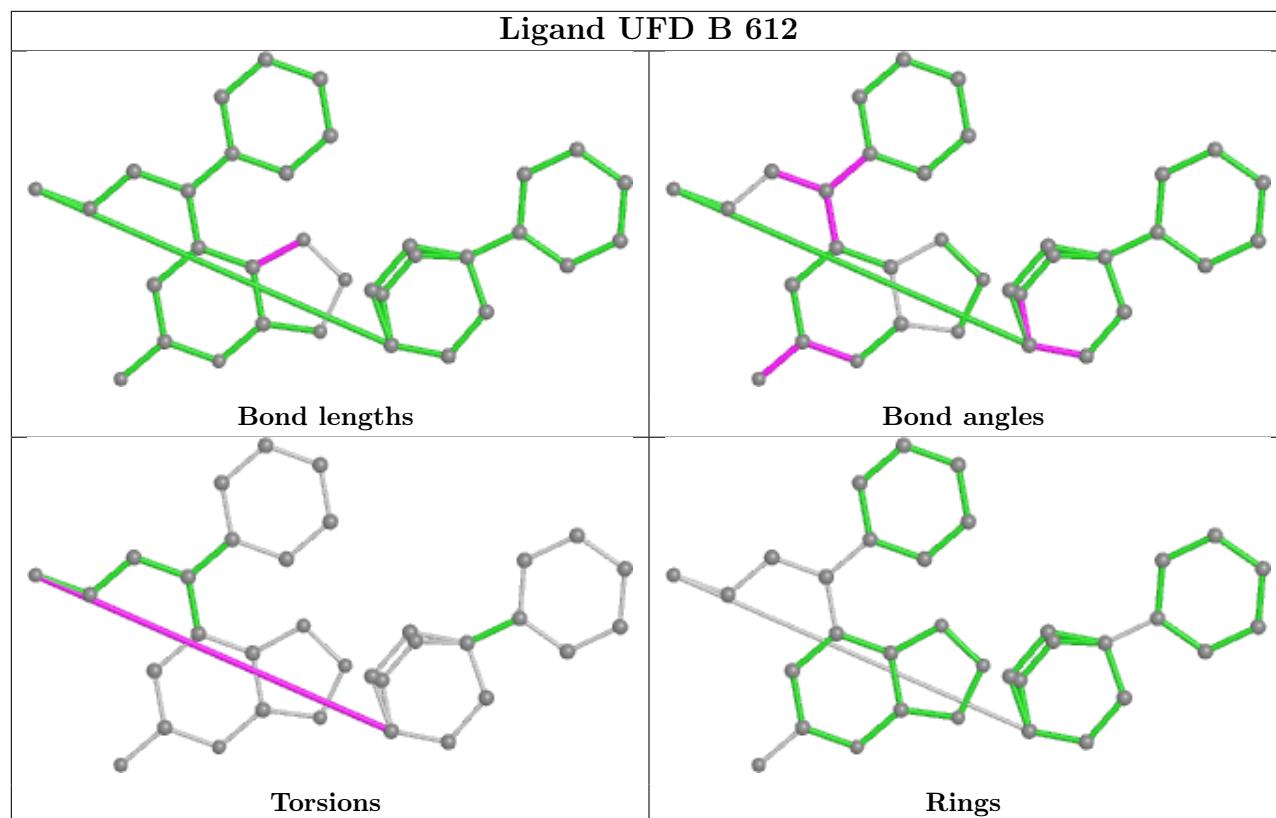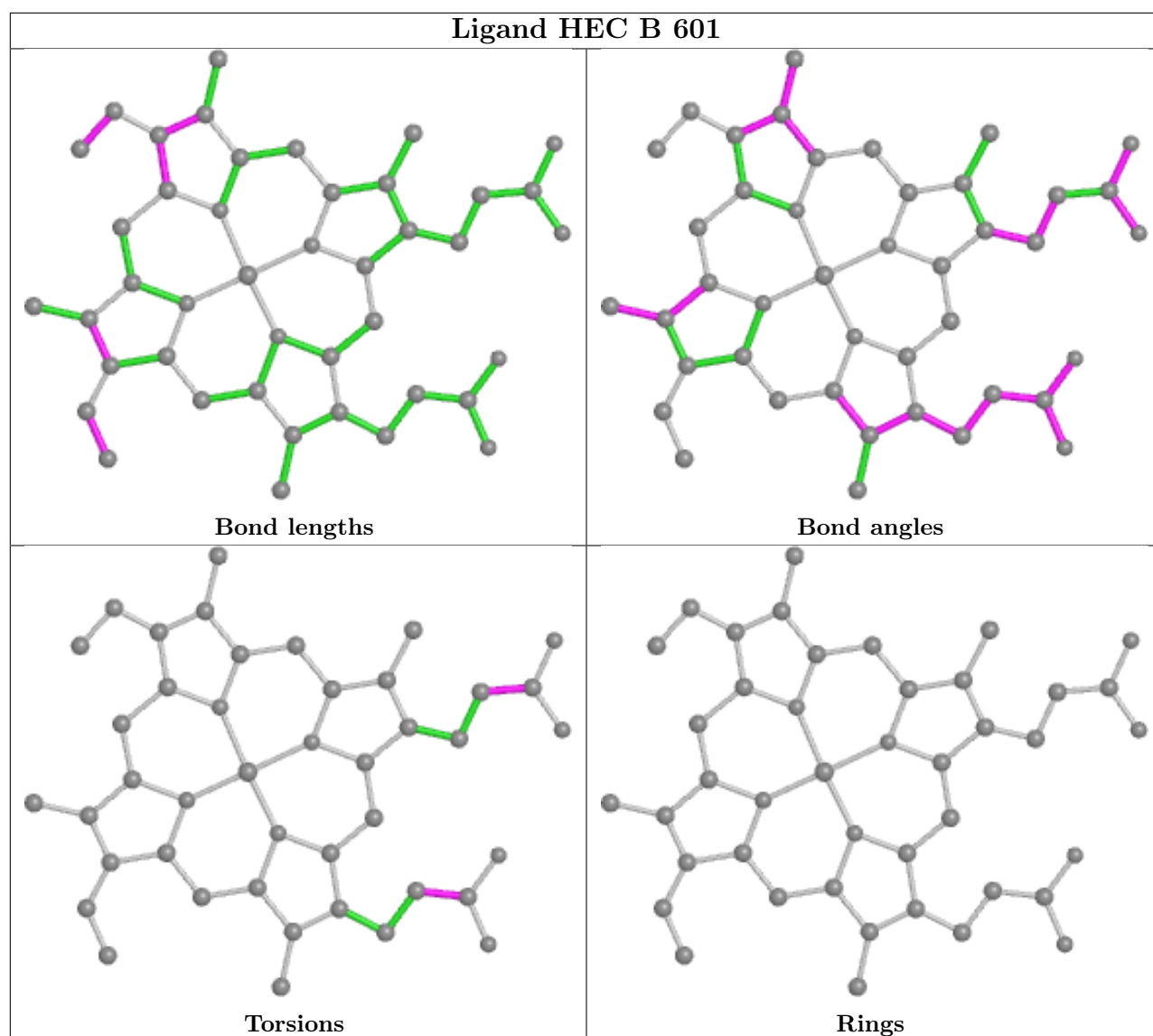
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	103/105 (98%)	-0.49	1 (0%)	82	84	15, 21, 40, 63	0
1	D	103/105 (98%)	-0.53	1 (0%)	82	84	14, 20, 38, 50	0
2	B	464/467 (99%)	-0.49	3 (0%)	89	91	14, 22, 37, 50	0
2	E	463/467 (99%)	-0.63	1 (0%)	95	95	14, 21, 35, 46	0
All	All	1133/1144 (99%)	-0.55	6 (0%)	91	92	14, 22, 37, 63	0

The worst 5 of 6 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	355	PRO	4.4
1	A	3	GLU	2.9
2	B	191	SER	2.4
2	B	576	ARG	2.3
2	E	155	GLY	2.1

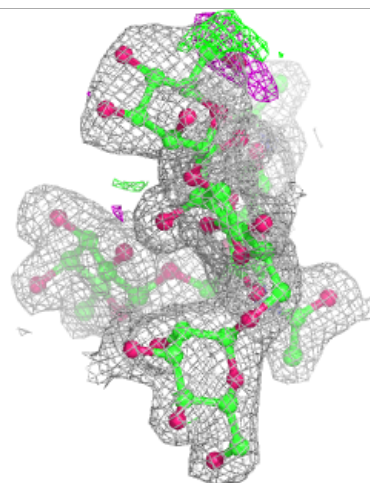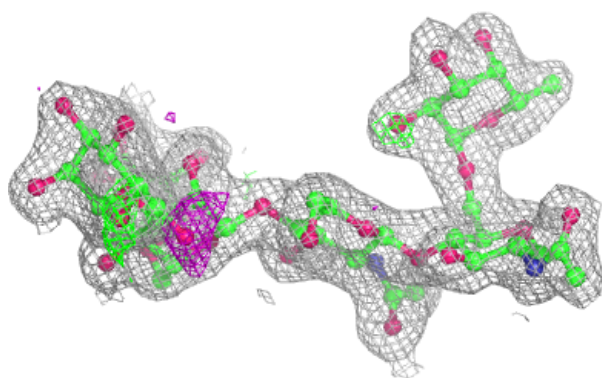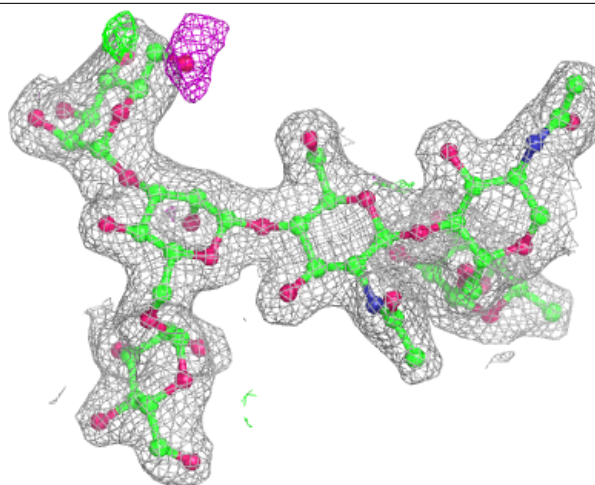## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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	CSO	E	150	7/8	0.96	0.07	19,21,26,27	0
2	CSO	B	150	7/8	0.98	0.05	19,20,25,25	0

6.3　Carbohydrates ⓘ

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.
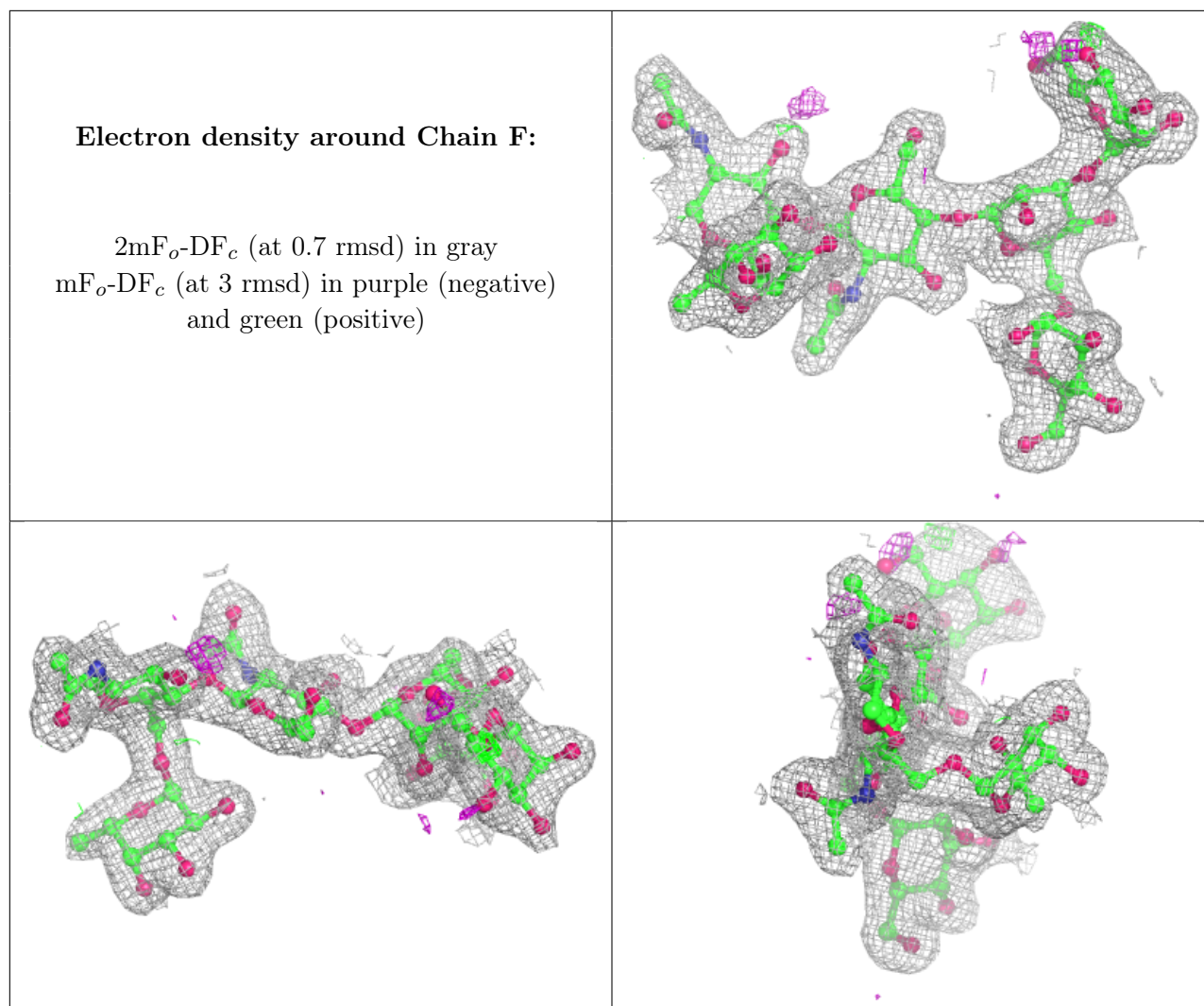
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	MAN	C	4	11/12	0.86	0.15	35,38,40,42	0
3	MAN	F	4	11/12	0.88	0.17	38,41,44,44	0
3	MAN	C	5	11/12	0.94	0.09	25,26,27,28	0
3	BMA	C	3	11/12	0.96	0.06	23,24,27,31	0
3	FUC	C	6	10/11	0.96	0.07	22,23,23,23	0
3	NAG	C	1	14/15	0.96	0.07	20,21,23,23	0
3	FUC	F	6	10/11	0.96	0.07	22,23,24,25	0
3	BMA	F	3	11/12	0.97	0.06	25,26,29,33	0
3	NAG	C	2	14/15	0.97	0.07	18,20,21,22	0
3	MAN	F	5	11/12	0.97	0.06	25,26,26,27	0
3	NAG	F	1	14/15	0.97	0.07	19,21,23,23	0
3	NAG	F	2	14/15	0.98	0.06	19,20,21,23	0

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

Electron density around Chain C:

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

Electron density around Chain F:

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

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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.
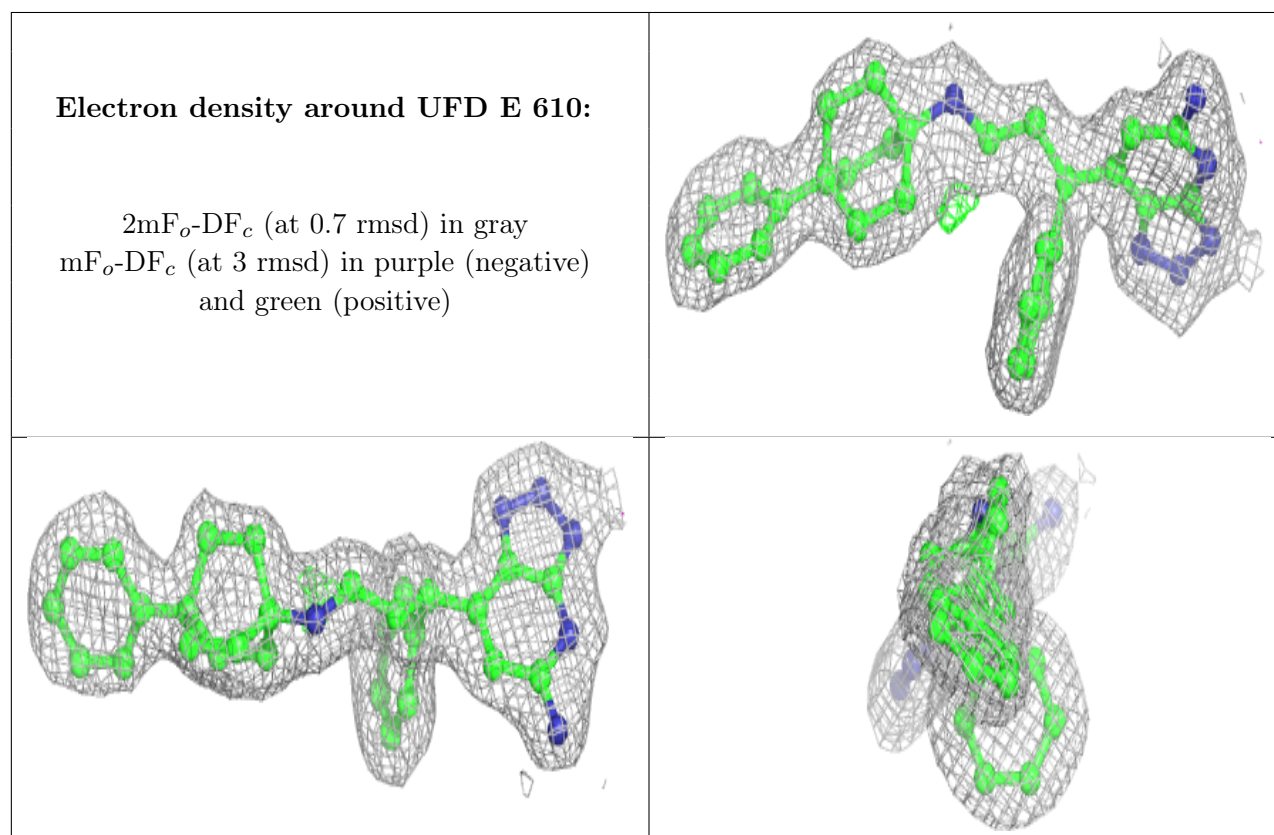
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
6	NAG	B	603	14/15	0.86	0.13	41,43,44,44	0
6	NAG	B	602	14/15	0.89	0.18	31,35,37,37	0
8	UFD	E	610	34/34	0.92	0.10	22,24,27,28	0
8	UFD	B	612	34/34	0.93	0.10	21,22,23,23	0
4	CL	B	611	1/1	0.97	0.20	42,42,42,42	0
6	NAG	E	601	14/15	0.97	0.13	34,36,38,39	0
5	HEC	D	201	43/43	0.98	0.11	15,18,22,27	0
5	HEC	B	601	43/43	0.98	0.12	16,18,21,25	0

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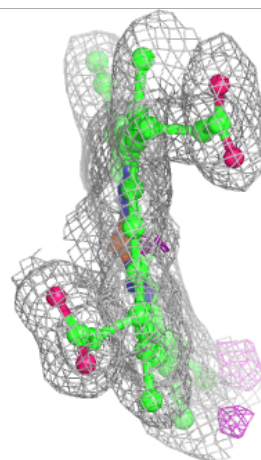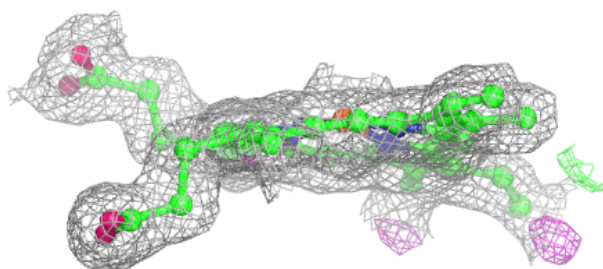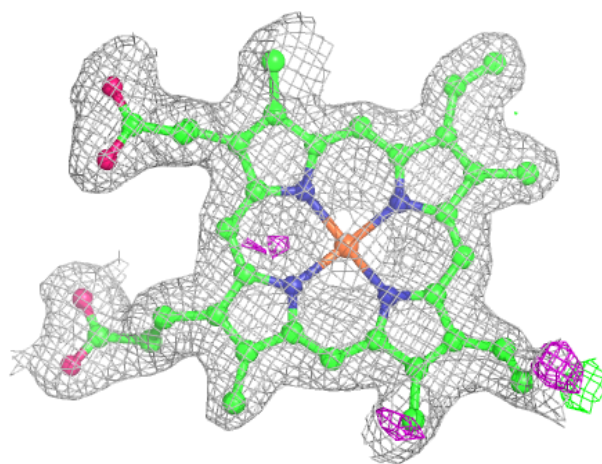| Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
7	CA	E	608	1/1	0.99	0.09	16,16,16,16	0
4	CL	E	609	1/1	0.99	0.18	35,35,35,35	0
4	CL	A	201	1/1	0.99	0.07	16,16,16,16	0
7	CA	B	610	1/1	1.00	0.09	17,17,17,17	0

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.
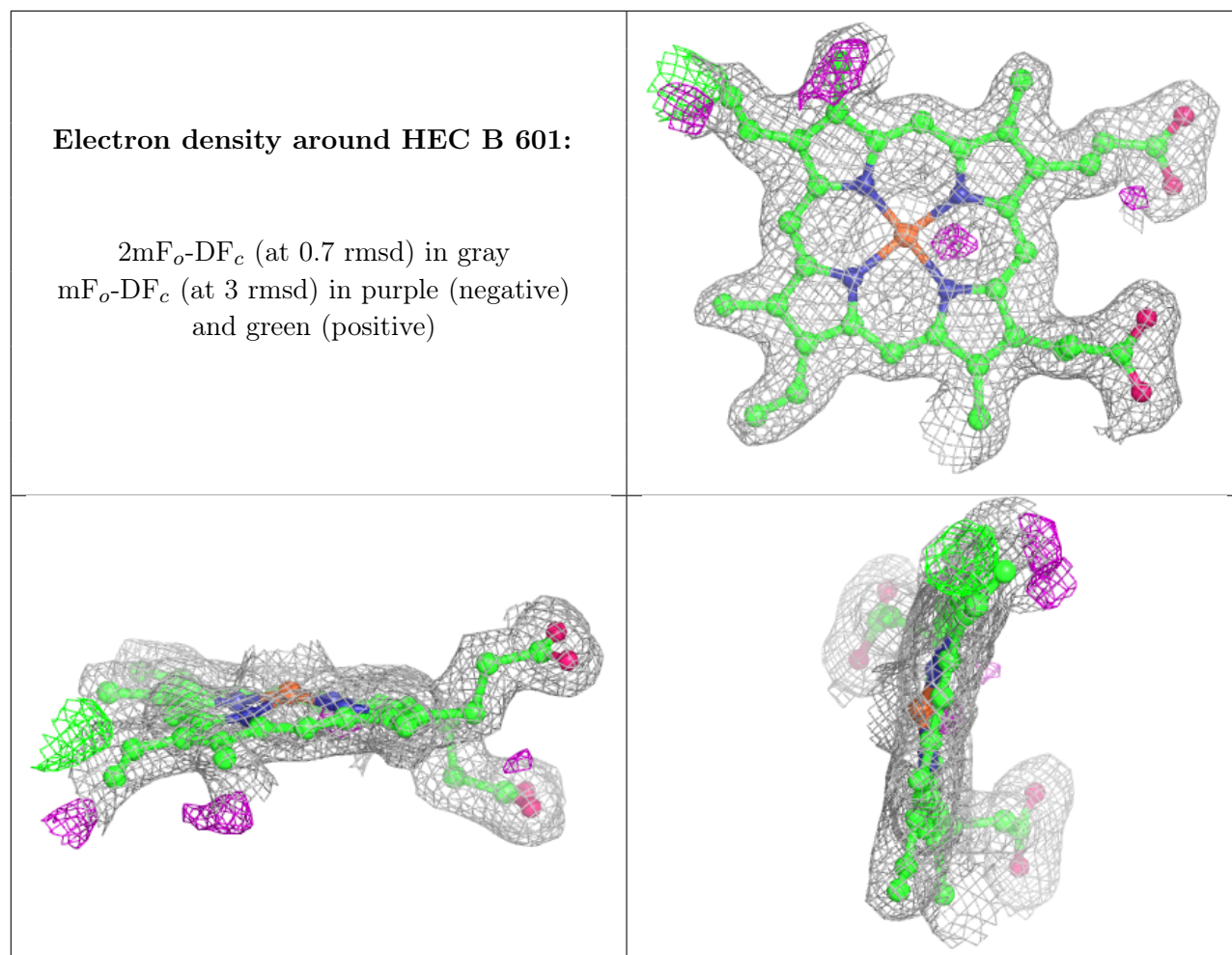
Electron density around UFD E 610:

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

Electron density around UFD B 612:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
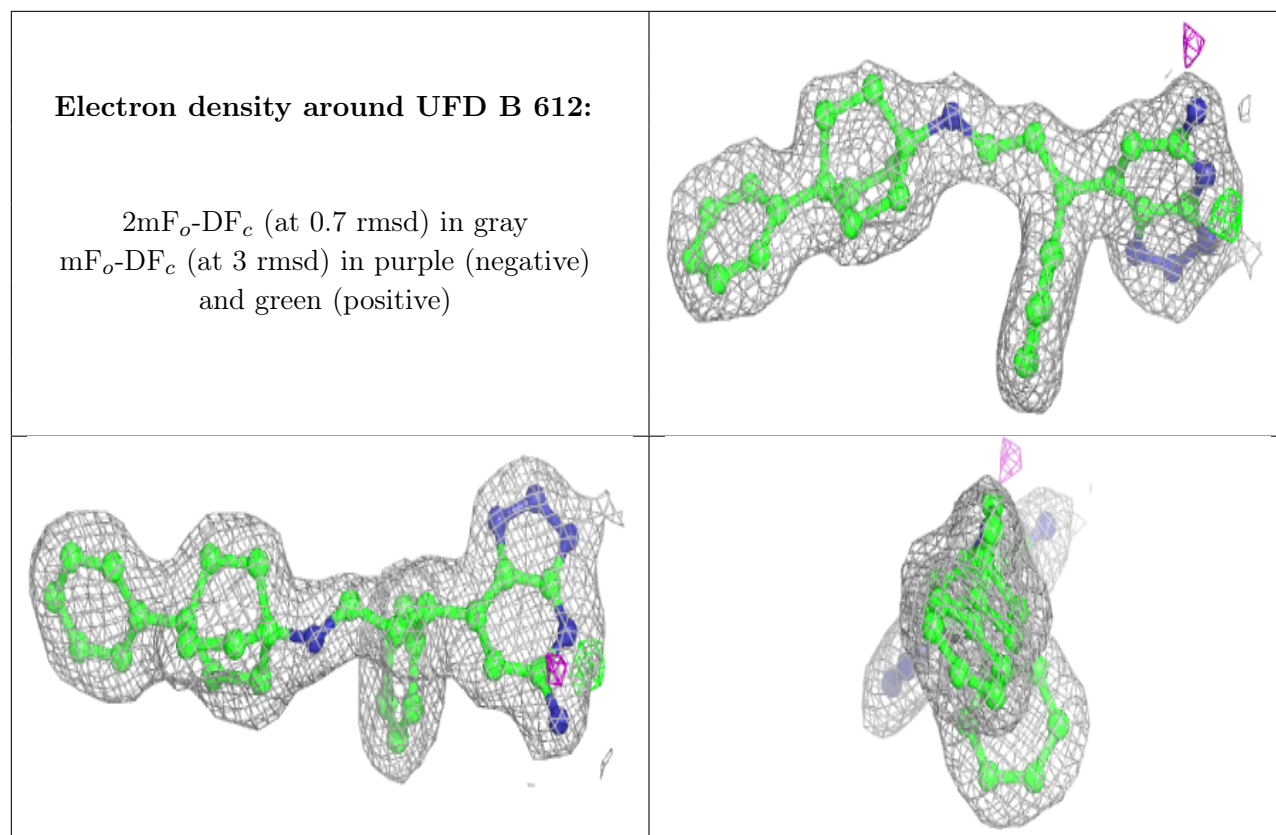
Electron density around HEC D 201:

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

Electron density around HEC B 601:

$2mF_o$-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 ⓘ

There are no such residues in this entry.