



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 08:45 PM UTC

PDB ID : 8PZ4 / pdb_00008pz4
Title : Structure of alginate transporter, AlgE, solved at wavelength 2.755 Å
Authors : Duman, R.; El Omari, K.; Mykhaylyk, V.; Orr, C.; Wagner, A.; Vogeley, L.; Brown, D.G.
Deposited on : 2023-07-26
Resolution : 1.77 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

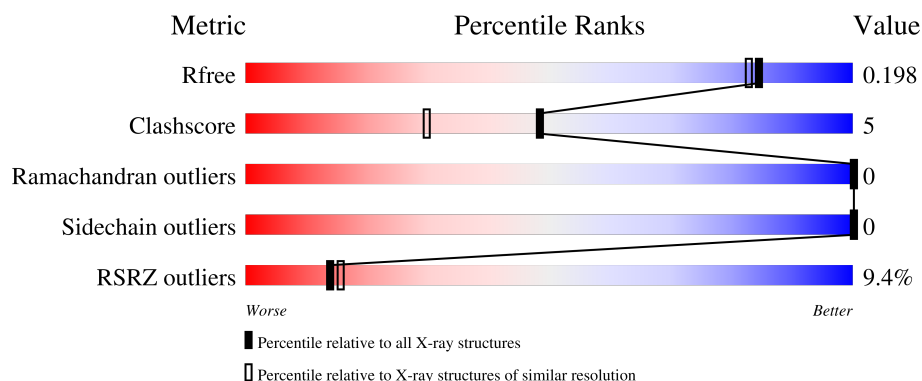
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.77 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1365 (1.78-1.78)
Clashscore	190562	1395 (1.78-1.78)
Ramachandran outliers	187476	1382 (1.78-1.78)
Sidechain outliers	187428	1382 (1.78-1.78)
RSRZ outliers	180081	1365 (1.78-1.78)

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

Mol	Chain	Length	Quality of chain
1	A	479	9% 88% 9% .

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 4174 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 Alginate production protein AlgE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	466	Total	C	N	O	S	0	2	0
			3699	2306	668	720	5			

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP P18895
A	2	GLY	-	expression tag	UNP P18895
A	3	SER	-	expression tag	UNP P18895
A	4	SER	-	expression tag	UNP P18895
A	5	HIS	-	expression tag	UNP P18895
A	6	HIS	-	expression tag	UNP P18895
A	7	HIS	-	expression tag	UNP P18895
A	8	HIS	-	expression tag	UNP P18895
A	9	HIS	-	expression tag	UNP P18895
A	10	HIS	-	expression tag	UNP P18895
A	11	SER	-	expression tag	UNP P18895
A	12	SER	-	expression tag	UNP P18895
A	13	GLY	-	expression tag	UNP P18895
A	14	LEU	-	expression tag	UNP P18895
A	15	VAL	-	expression tag	UNP P18895
A	16	PRO	-	expression tag	UNP P18895
A	17	ARG	-	expression tag	UNP P18895
A	18	GLY	-	expression tag	UNP P18895
A	19	SER	-	expression tag	UNP P18895
A	20	HIS	-	expression tag	UNP P18895
A	21	MET	-	expression tag	UNP P18895

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S) (labeled as "Ligand of Interest" by depositor).

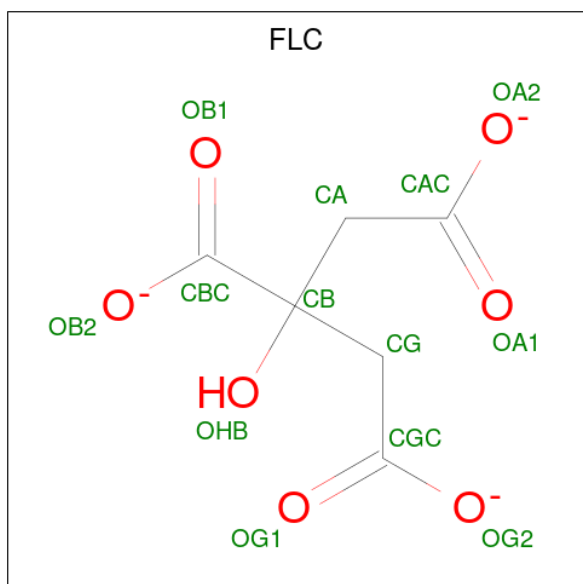


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

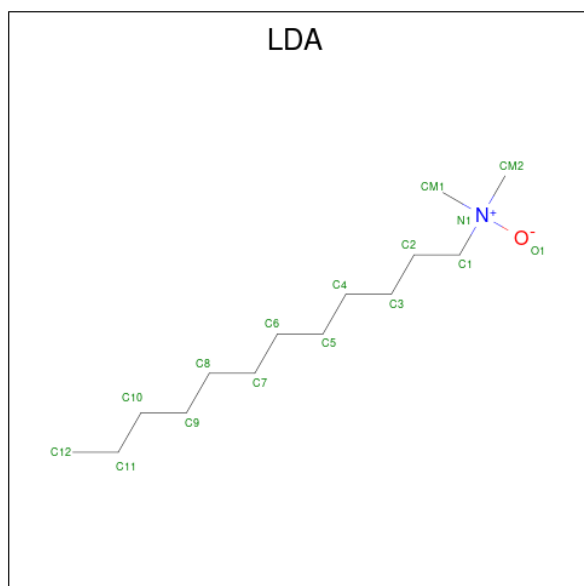
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Ca	0	0
			2	2		

- Molecule 4 is CITRATE ANION (CCD ID: FLC) (formula: C₆H₅O₇) (labeled as "Ligand of Interest" by depositor).



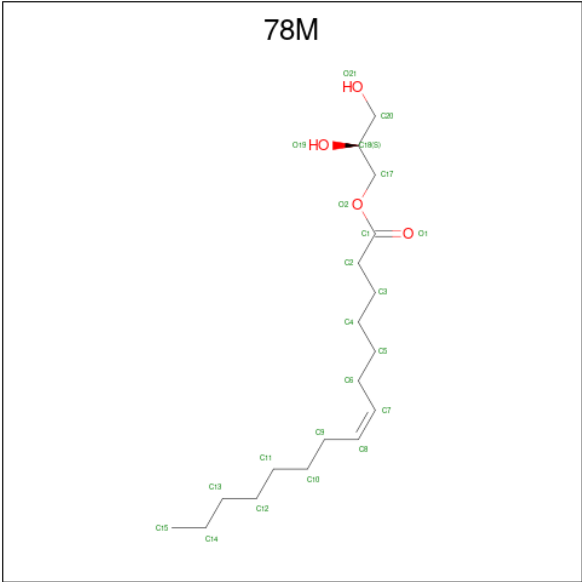
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			13	6	7		

- Molecule 5 is LAURYL DIMETHYLAMINE-N-OXIDE (CCD ID: LDA) (formula: $C_{14}H_{31}NO$) (labeled as "Ligand of Interest" by depositor).



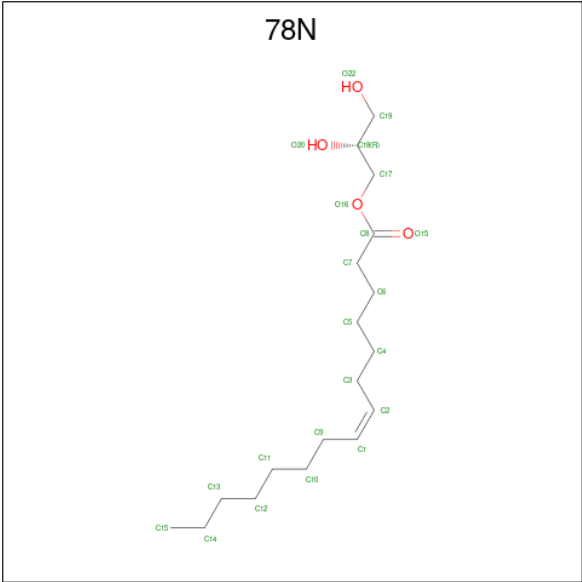
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			11	9	1	1		
5	A	1	Total	C			0	0
			12	12				
5	A	1	Total	C	N	O	0	0
			16	14	1	1		
5	A	1	Total	C			0	0
			9	9				
5	A	1	Total	C			0	0
			12	12				
5	A	1	Total	C			0	0
			9	9				
5	A	1	Total	C			0	0
			9	9				
5	A	1	Total	C			0	0
			11	11				

- Molecule 6 is (2S)-2,3-DIHYDROXYPROPYL(7Z)-PENTADEC-7-ENOATE (CCD ID: 78M) (formula: $C_{18}H_{34}O_4$) (labeled as "Ligand of Interest" by depositor).



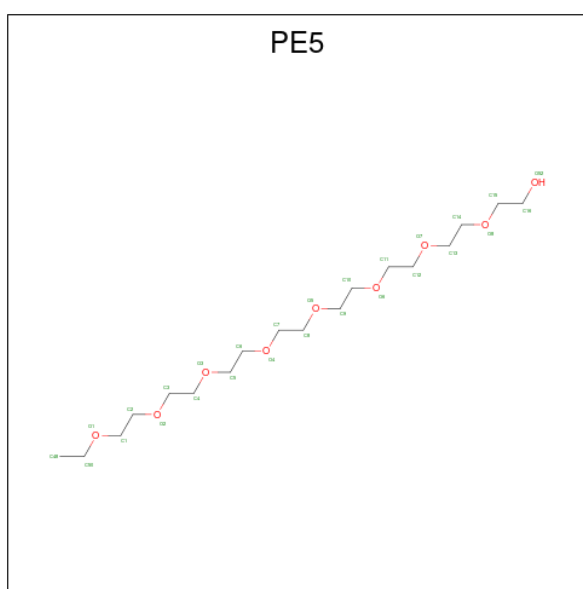
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			22	18	4		
6	A	1	Total	C	O	0	0
			22	18	4		
6	A	1	Total	C	O	0	0
			22	18	4		

- Molecule 7 is (2R)-2,3-DIHYDROXYPROPYL(7Z)-PENTADEC-7-ENOATE (CCD ID: 78N) (formula: C₁₈H₃₄O₄) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total 22	C 18	O 4	0	0
7	A	1	Total 22	C 18	O 4	0	0
7	A	1	Total 22	C 18	O 4	0	0
7	A	1	Total 22	C 18	O 4	0	0

- Molecule 8 is 3,6,9,12,15,18,21,24-OCTAOXAHEXACOSAN-1-OL (CCD ID: PE5) (formula: $C_{18}H_{38}O_9$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			15	10	5		
8	A	1	Total	C	O	0	0
			8	5	3		

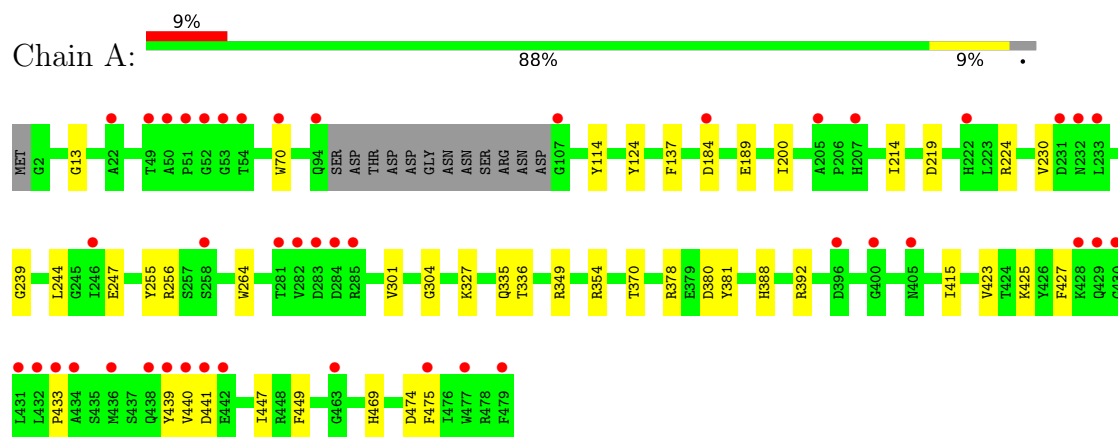
- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	189	Total O 189 189	0	0

3 Residue-property plots [i](#)

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

- Molecule 1: Alginate production protein AlgE



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	57.35Å 74.69Å 115.90Å 90.00° 102.48° 90.00°	Depositor
Resolution (Å)	56.58 – 1.77 56.58 – 1.77	Depositor EDS
% Data completeness (in resolution range)	96.1 (56.58-1.77) 92.7 (56.58-1.77)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.26 (at 1.77Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.188 , 0.234 0.190 , 0.198	Depositor DCC
R_{free} test set	1993 reflections (4.41%)	wwPDB-VP
Wilson B-factor (Å ²)	21.5	Xtriage
Anisotropy	0.480	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 43.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.009 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4174	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.32% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PE5, 78N, 78M, LDA, CA, FLC, SO4

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	0.32	0/3796	0.58	0/5148

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	3699	0	3436	40	1
2	A	5	0	0	0	0
3	A	2	0	0	0	0
4	A	13	0	5	0	0
5	A	89	0	155	4	0
6	A	66	0	102	6	0
7	A	88	0	136	5	0
8	A	23	0	26	2	0
9	A	189	0	0	3	0
All	All	4174	0	3860	43	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (43) 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:A:469:HIS:HE1	6:A:1016:78M:H18	1.56	0.70
1:A:200:ILE:HD11	5:A:1007:LDA:H42	1.75	0.68
1:A:392:ARG:HG3	1:A:415:ILE:HD11	1.83	0.61
1:A:70:TRP:HZ2	6:A:1012:78M:H21C	1.70	0.55
1:A:441:ASP:N	1:A:441:ASP:OD1	2.34	0.55
1:A:354:ARG:HH12	1:A:370:THR:HG21	1.70	0.54
1:A:469:HIS:CE1	6:A:1016:78M:H18	2.40	0.54
1:A:427:PHE:CD1	1:A:433:PRO:HG3	2.42	0.54
1:A:264:TRP:CZ2	1:A:304:GLY:HA3	2.43	0.54
1:A:423:VAL:HG12	7:A:1015:78N:H92C	1.92	0.51
1:A:370:THR:HG23	9:A:1169:HOH:O	2.12	0.50
1:A:447[A]:ILE:HD13	1:A:475:PHE:CD1	2.47	0.50
1:A:447[A]:ILE:HD13	1:A:475:PHE:CE1	2.48	0.48
1:A:184:ASP:OD2	7:A:1020:78N:O22	2.20	0.47
1:A:336:THR:HG23	8:A:1018:PE5:C5	2.44	0.47
7:A:1015:78N:H1	7:A:1015:78N:H111	1.51	0.47
1:A:70:TRP:HE1	6:A:1012:78M:H171	1.80	0.46
1:A:449:PHE:HZ	6:A:1016:78M:H91C	1.80	0.46
5:A:1005:LDA:H51	5:A:1005:LDA:H82	1.40	0.46
1:A:264:TRP:CE2	1:A:304:GLY:HA3	2.51	0.46
1:A:189:GLU:H	1:A:189:GLU:CD	2.24	0.45
1:A:378:ARG:HD3	1:A:439:TYR:CD1	2.51	0.45
1:A:327:LYS:O	1:A:327:LYS:HG3	2.15	0.45
1:A:219:ASP:HB2	1:A:239:GLY:H	1.83	0.44
1:A:335:GLN:HG2	8:A:1018:PE5:H42	1.99	0.44
1:A:255:TYR:CE1	1:A:349:ARG:HG2	2.52	0.44
1:A:114:TYR:OH	9:A:1101:HOH:O	2.16	0.44
1:A:427:PHE:HA	1:A:440:VAL:HG11	1.99	0.43
1:A:427:PHE:CG	1:A:433:PRO:HG3	2.52	0.43
1:A:301:VAL:HG21	5:A:1008:LDA:H61	2.01	0.43
1:A:381:TYR:CE1	7:A:1015:78N:H172	2.53	0.43
1:A:380:ASP:OD1	1:A:440:VAL:HG22	2.19	0.42
1:A:255:TYR:CE2	1:A:256:ARG:HG2	2.54	0.42
1:A:247:GLU:HG2	9:A:1253:HOH:O	2.19	0.42
1:A:370:THR:HG22	1:A:388:HIS:ND1	2.34	0.42
1:A:13:GLY:O	1:A:349:ARG:NH2	2.53	0.41
1:A:214:ILE:HG13	1:A:244:LEU:HD23	2.02	0.41
1:A:137:PHE:CE1	5:A:1011:LDA:H71	2.56	0.41
1:A:447[A]:ILE:HD12	1:A:474:ASP:O	2.21	0.41
1:A:224:ARG:HG3	1:A:230:VAL:HG12	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:381:TYR:CE2	1:A:425:LYS:HD3	2.56	0.41
6:A:1016:78M:H92C	6:A:1016:78M:H61C	1.92	0.40
1:A:381:TYR:CE1	7:A:1015:78N:H191	2.57	0.40

All (1) 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)
1:A:124:TYR:OH	1:A:433:PRO:O[3_545]	2.04	0.16

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	464/479 (97%)	449 (97%)	15 (3%)	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	378/388 (97%)	378 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

Mol	Chain	Res	Type
1	A	69	GLN
1	A	150	GLN
1	A	153	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 21 ligands modelled in this entry, 2 are monoatomic - leaving 19 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	LDA	A	1004	-	8,10,15	2.93	2 (25%)	9,12,17	0.46	0
6	78M	A	1016	-	21,21,21	0.86	1 (4%)	22,22,22	0.99	1 (4%)
6	78M	A	1012	-	21,21,21	0.86	2 (9%)	22,22,22	1.09	2 (9%)
7	78N	A	1020	-	21,21,21	0.77	2 (9%)	22,22,22	1.13	2 (9%)
7	78N	A	1015	-	21,21,21	0.87	2 (9%)	22,22,22	0.97	1 (4%)
6	78M	A	1014	-	21,21,21	0.88	1 (4%)	22,22,22	1.01	1 (4%)
4	FLC	A	1003	-	12,12,12	1.09	0	17,17,17	1.45	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	78N	A	1013	-	21,21,21	0.85	2 (9%)	22,22,22	1.03	1 (4%)
5	LDA	A	1011	-	10,10,15	0.28	0	9,9,17	0.62	0
2	SO4	A	1000	-	4,4,4	0.26	0	6,6,6	0.22	0
8	PE5	A	1017	-	14,14,26	0.54	0	13,13,25	0.25	0
8	PE5	A	1018	-	7,7,26	0.45	0	6,6,25	0.29	0
5	LDA	A	1006	-	13,15,15	2.40	2 (15%)	14,17,17	0.41	0
5	LDA	A	1010	-	8,8,15	0.27	0	7,7,17	0.49	0
5	LDA	A	1005	-	11,11,15	0.23	0	10,10,17	0.68	0
7	78N	A	1019	-	21,21,21	0.90	1 (4%)	22,22,22	0.98	1 (4%)
5	LDA	A	1008	-	11,11,15	0.25	0	10,10,17	0.60	0
5	LDA	A	1009	-	8,8,15	0.28	0	7,7,17	0.48	0
5	LDA	A	1007	-	8,8,15	0.28	0	7,7,17	0.43	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
5	LDA	A	1004	-	-	0/8/8/13	-
7	78N	A	1015	-	-	9/21/21/21	-
6	78M	A	1014	-	-	8/21/21/21	-
4	FLC	A	1003	-	-	6/16/16/16	-
5	LDA	A	1005	-	-	5/9/9/13	-
7	78N	A	1019	-	-	7/21/21/21	-
5	LDA	A	1009	-	-	3/6/6/13	-
7	78N	A	1013	-	-	7/21/21/21	-
8	PE5	A	1018	-	-	3/5/5/24	-
6	78M	A	1016	-	-	8/21/21/21	-
5	LDA	A	1011	-	-	4/8/8/13	-
6	78M	A	1012	-	-	5/21/21/21	-
8	PE5	A	1017	-	-	3/12/12/24	-
7	78N	A	1020	-	-	12/21/21/21	-
5	LDA	A	1008	-	-	4/9/9/13	-
5	LDA	A	1006	-	-	5/13/13/13	-
5	LDA	A	1010	-	-	4/6/6/13	-
5	LDA	A	1007	-	-	4/6/6/13	-

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1004	LDA	O1-N1	-6.72	1.25	1.42
5	A	1006	LDA	O1-N1	-6.70	1.25	1.42
5	A	1006	LDA	C1-N1	-5.38	1.45	1.51
5	A	1004	LDA	C1-N1	-4.79	1.46	1.51
6	A	1014	78M	O2-C1	2.66	1.41	1.33
7	A	1019	78N	O16-C8	2.61	1.41	1.33
6	A	1016	78M	O2-C1	2.48	1.40	1.33
7	A	1015	78N	O16-C8	2.44	1.40	1.33
7	A	1013	78N	O16-C8	2.43	1.40	1.33
6	A	1012	78M	O2-C1	2.40	1.40	1.33
6	A	1012	78M	O2-C17	-2.19	1.40	1.45
7	A	1015	78N	O16-C17	-2.18	1.40	1.45
7	A	1020	78N	O16-C8	2.11	1.39	1.33
7	A	1013	78N	O16-C17	-2.08	1.40	1.45
7	A	1020	78N	O16-C17	-2.07	1.40	1.45

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1003	FLC	OB2-CBC-CB	4.01	120.83	113.14
6	A	1012	78M	O2-C1-C2	3.27	121.82	111.83
7	A	1019	78N	O16-C8-C7	3.18	121.53	111.83
6	A	1014	78M	O2-C1-C2	3.14	121.42	111.83
6	A	1016	78M	O2-C1-C2	3.01	121.00	111.83
7	A	1013	78N	O16-C8-C7	2.87	120.60	111.83
7	A	1015	78N	O16-C8-C7	2.79	120.35	111.83
7	A	1020	78N	O16-C8-C7	2.64	119.88	111.83
7	A	1020	78N	C5-C6-C7	-2.21	105.01	113.13
6	A	1012	78M	O2-C1-O1	-2.05	118.50	123.63

There are no chirality outliers.

All (97) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	1012	78M	O2-C17-C18-O19
6	A	1012	78M	O1-C1-O2-C17
6	A	1012	78M	C2-C1-O2-C17
6	A	1016	78M	O1-C1-O2-C17
7	A	1015	78N	O15-C8-O16-C17
6	A	1016	78M	C2-C1-O2-C17
7	A	1015	78N	C7-C8-O16-C17

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Mol	Chain	Res	Type	Atoms
6	A	1014	78M	O1-C1-O2-C17
7	A	1015	78N	O16-C17-C18-O20
6	A	1014	78M	C2-C1-O2-C17
6	A	1012	78M	O2-C17-C18-C20
5	A	1005	LDA	C5-C6-C7-C8
8	A	1018	PE5	O1-C1-C2-O2
7	A	1019	78N	O16-C17-C18-O20
7	A	1020	78N	O16-C17-C18-O20
7	A	1019	78N	O16-C17-C18-C19
7	A	1020	78N	O16-C17-C18-C19
7	A	1015	78N	C17-C18-C19-O22
7	A	1020	78N	C17-C18-C19-O22
8	A	1017	PE5	O1-C1-C2-O2
5	A	1007	LDA	C5-C6-C7-C8
6	A	1016	78M	C3-C4-C5-C6
7	A	1020	78N	O20-C18-C19-O22
5	A	1006	LDA	C11-C10-C9-C8
5	A	1008	LDA	C4-C5-C6-C7
5	A	1011	LDA	C3-C4-C5-C6
5	A	1008	LDA	C5-C6-C7-C8
5	A	1005	LDA	C4-C5-C6-C7
7	A	1020	78N	C11-C12-C13-C14
5	A	1010	LDA	C4-C5-C6-C7
5	A	1009	LDA	C4-C5-C6-C7
5	A	1006	LDA	C7-C8-C9-C10
5	A	1006	LDA	C3-C4-C5-C6
5	A	1007	LDA	C3-C4-C5-C6
6	A	1014	78M	C10-C11-C12-C13
7	A	1015	78N	C4-C5-C6-C7
7	A	1015	78N	O20-C18-C19-O22
6	A	1012	78M	C4-C5-C6-C7
5	A	1008	LDA	C7-C8-C9-C10
6	A	1016	78M	C4-C5-C6-C7
6	A	1014	78M	C3-C4-C5-C6
6	A	1016	78M	C11-C10-C9-C8
5	A	1006	LDA	C1-C2-C3-C4
5	A	1011	LDA	C11-C10-C9-C8
7	A	1020	78N	C2-C3-C4-C5
5	A	1005	LDA	C1-C2-C3-C4
5	A	1011	LDA	C1-C2-C3-C4
8	A	1017	PE5	C10-C9-O5-C8
5	A	1007	LDA	C1-C2-C3-C4

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Mol	Chain	Res	Type	Atoms
7	A	1015	78N	C11-C10-C9-C1
5	A	1006	LDA	C9-C10-C11-C12
5	A	1009	LDA	C3-C4-C5-C6
7	A	1020	78N	C3-C4-C5-C6
7	A	1019	78N	O20-C18-C19-O22
6	A	1014	78M	C11-C10-C9-C8
5	A	1007	LDA	C4-C5-C6-C7
7	A	1013	78N	C17-C18-C19-O22
7	A	1013	78N	C4-C5-C6-C7
6	A	1016	78M	C9-C10-C11-C12
7	A	1020	78N	C7-C8-O16-C17
7	A	1013	78N	C3-C4-C5-C6
6	A	1016	78M	C1-C2-C3-C4
7	A	1019	78N	C12-C13-C14-C15
5	A	1010	LDA	C3-C4-C5-C6
8	A	1017	PE5	C7-C8-O5-C9
4	A	1003	FLC	CB-CA-CAC-OA2
7	A	1020	78N	O15-C8-O16-C17
7	A	1013	78N	C2-C3-C4-C5
8	A	1018	PE5	C3-C4-O3-C5
4	A	1003	FLC	CA-CB-CBC-OB1
4	A	1003	FLC	CA-CB-CBC-OB2
4	A	1003	FLC	CG-CB-CBC-OB1
4	A	1003	FLC	CG-CB-CBC-OB2
7	A	1013	78N	C12-C13-C14-C15
4	A	1003	FLC	CB-CA-CAC-OA1
7	A	1020	78N	C6-C7-C8-O16
7	A	1015	78N	O16-C17-C18-C19
7	A	1019	78N	C11-C12-C13-C14
6	A	1014	78M	C5-C6-C7-C8
7	A	1019	78N	C3-C4-C5-C6
5	A	1011	LDA	C7-C8-C9-C10
7	A	1013	78N	C11-C12-C13-C14
7	A	1013	78N	C10-C11-C12-C13
7	A	1020	78N	C2-C1-C9-C10
5	A	1010	LDA	C1-C2-C3-C4
6	A	1016	78M	C7-C8-C9-C10
7	A	1015	78N	C1-C2-C3-C4
5	A	1005	LDA	C6-C7-C8-C9
7	A	1019	78N	C1-C2-C3-C4
5	A	1008	LDA	C1-C2-C3-C4
6	A	1014	78M	O2-C17-C18-O19

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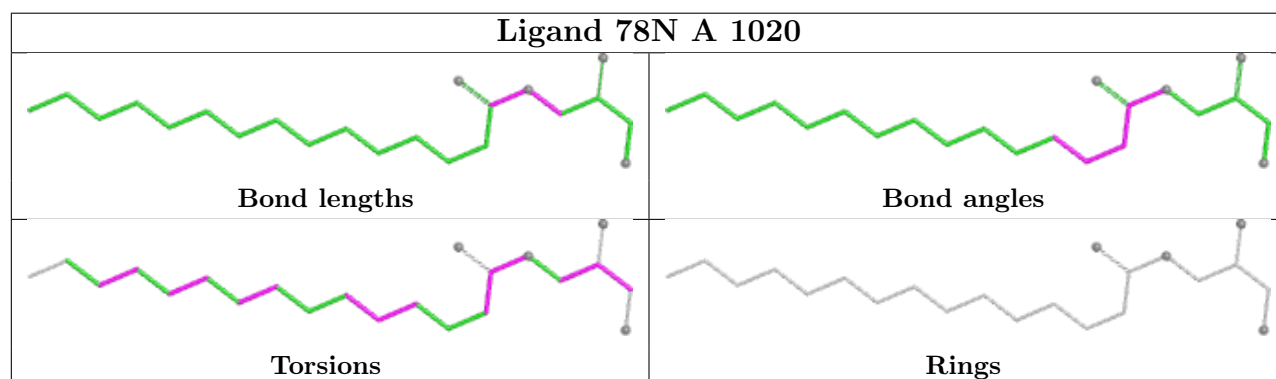
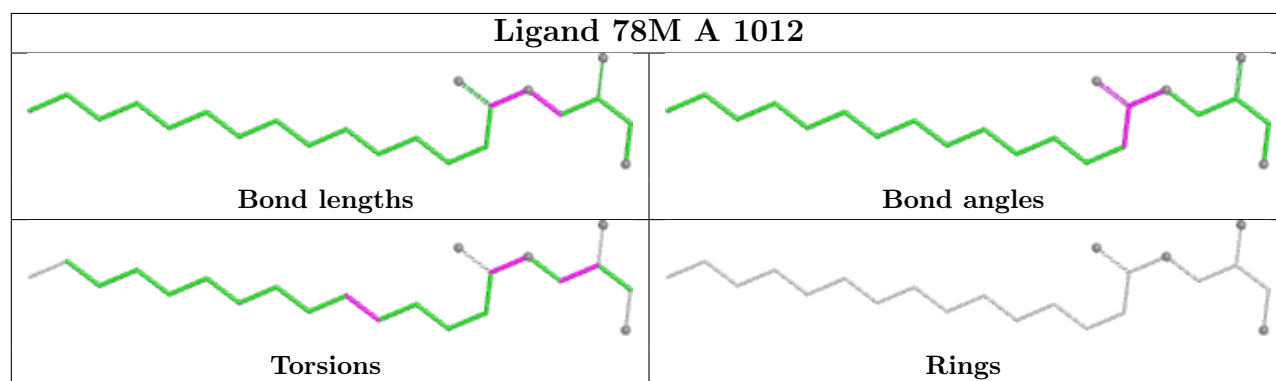
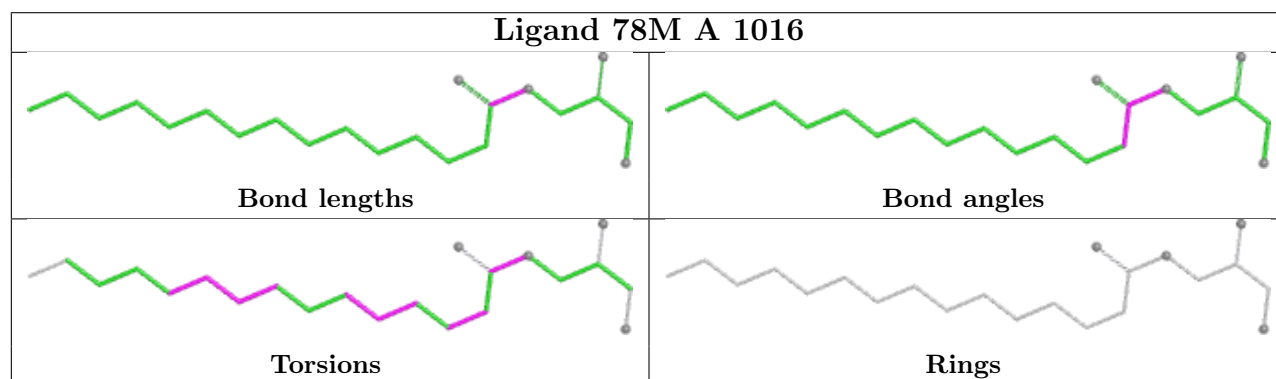
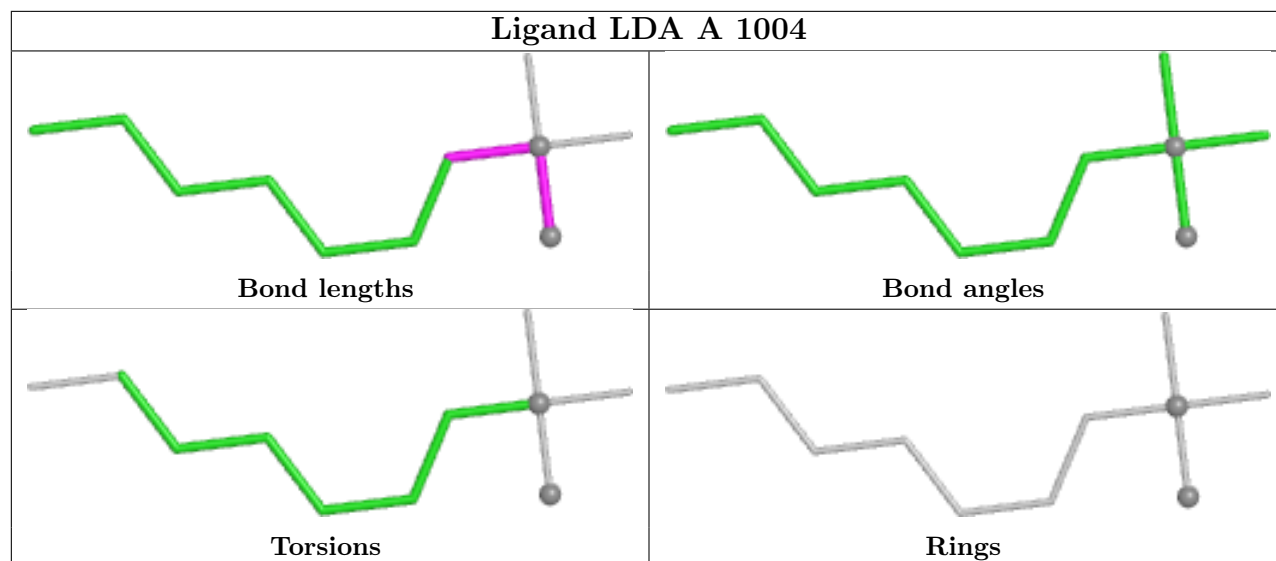
Mol	Chain	Res	Type	Atoms
6	A	1014	78M	C4-C5-C6-C7
8	A	1018	PE5	O2-C3-C4-O3
5	A	1010	LDA	C2-C3-C4-C5
7	A	1020	78N	C9-C10-C11-C12
5	A	1005	LDA	C9-C10-C11-C12
5	A	1009	LDA	C1-C2-C3-C4

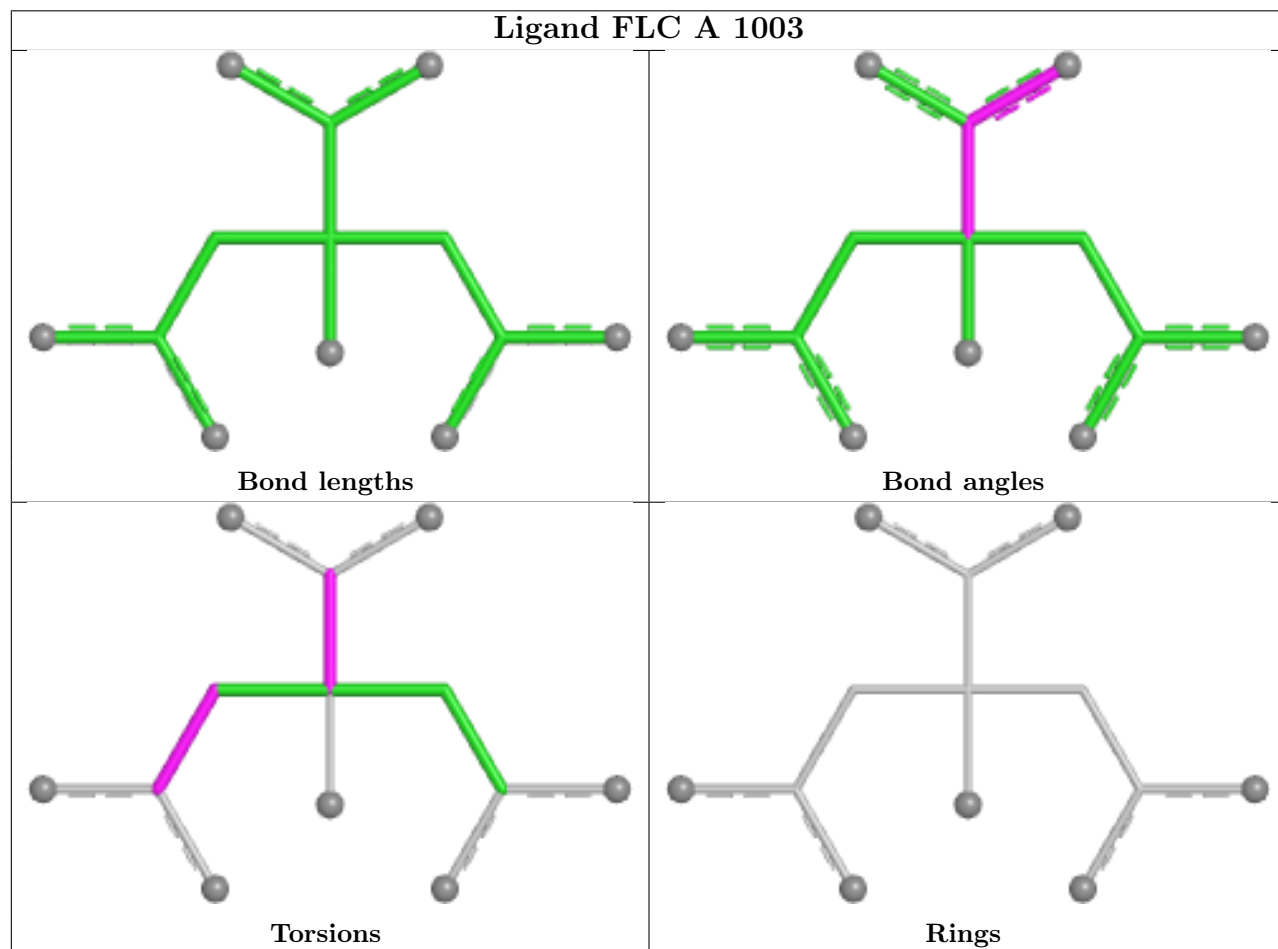
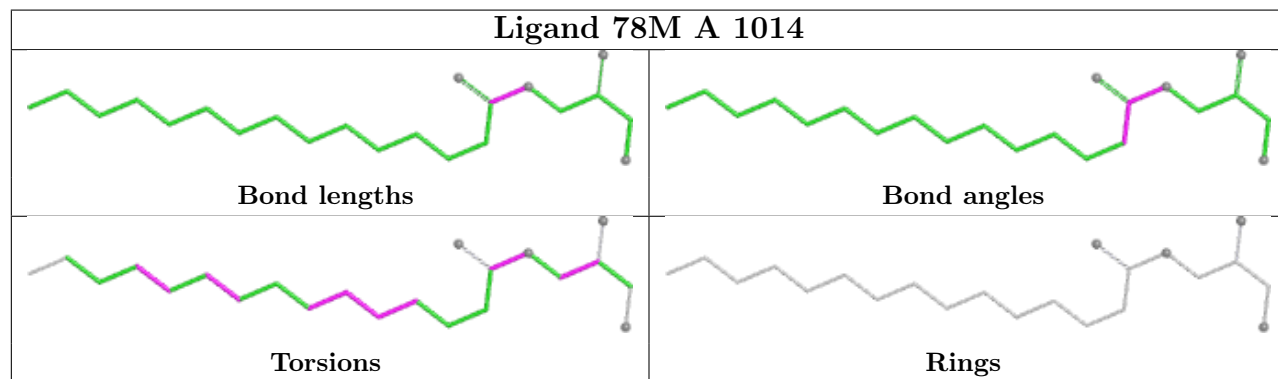
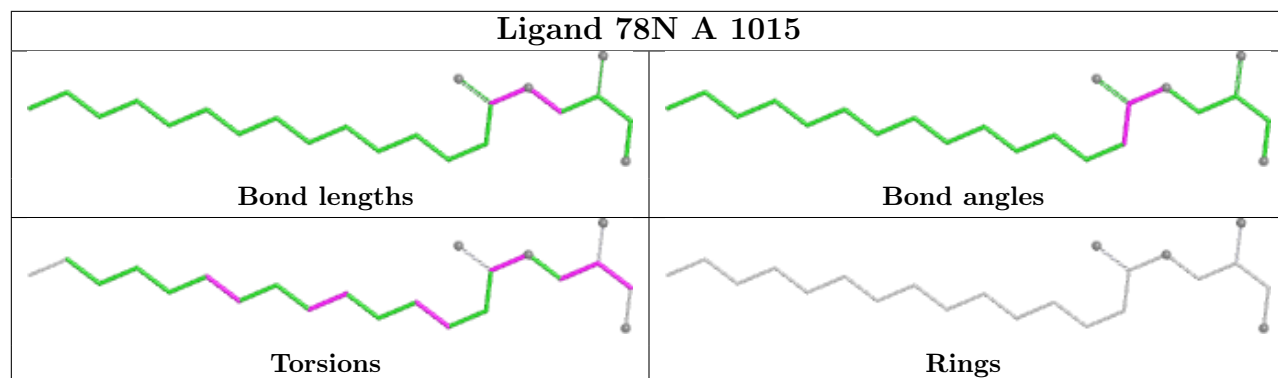
There are no ring outliers.

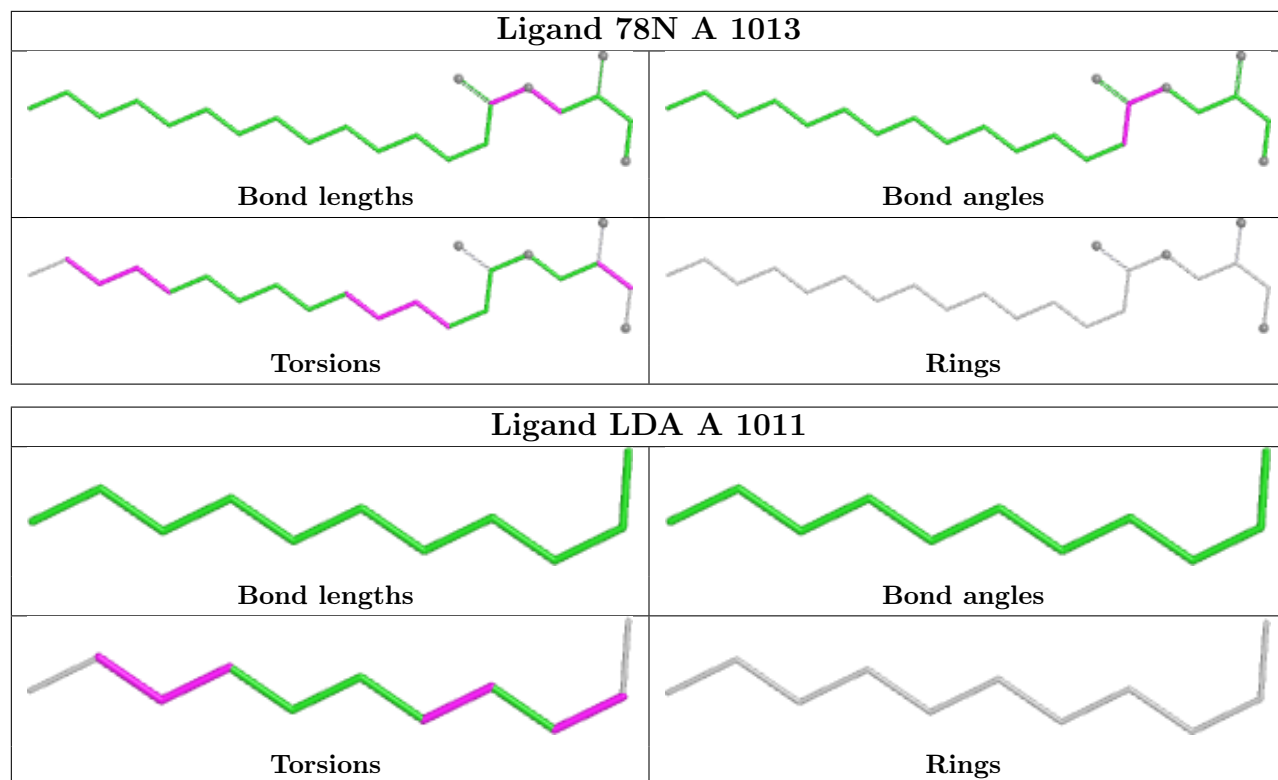
9 monomers are involved in 17 short contacts:

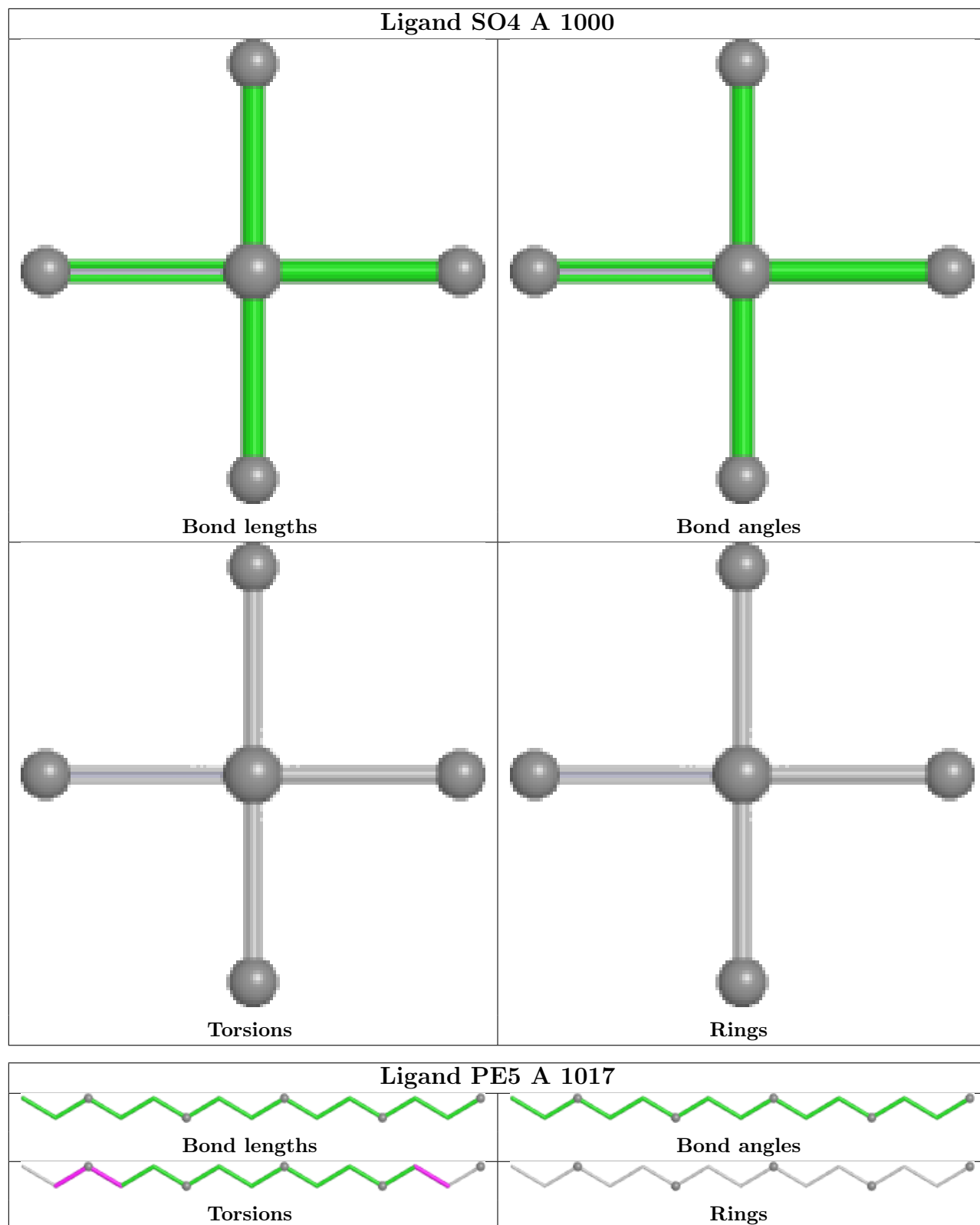
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	1016	78M	4	0
6	A	1012	78M	2	0
7	A	1020	78N	1	0
7	A	1015	78N	4	0
5	A	1011	LDA	1	0
8	A	1018	PE5	2	0
5	A	1005	LDA	1	0
5	A	1008	LDA	1	0
5	A	1007	LDA	1	0

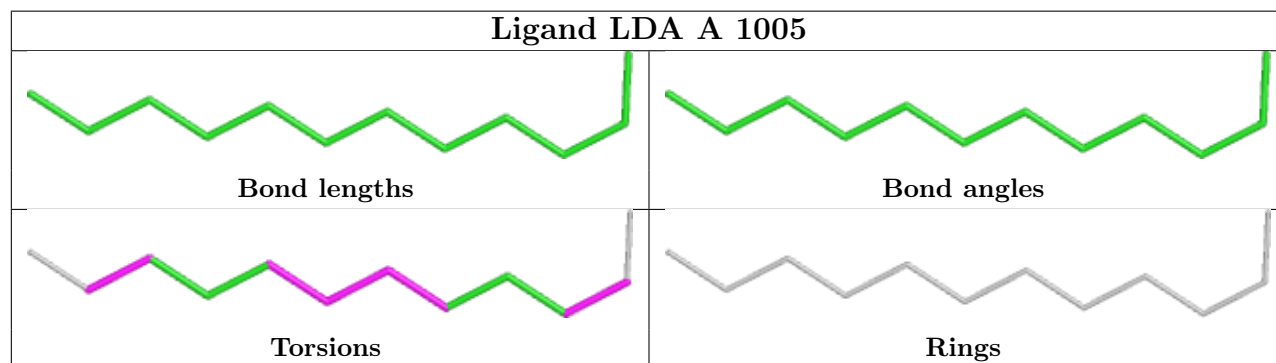
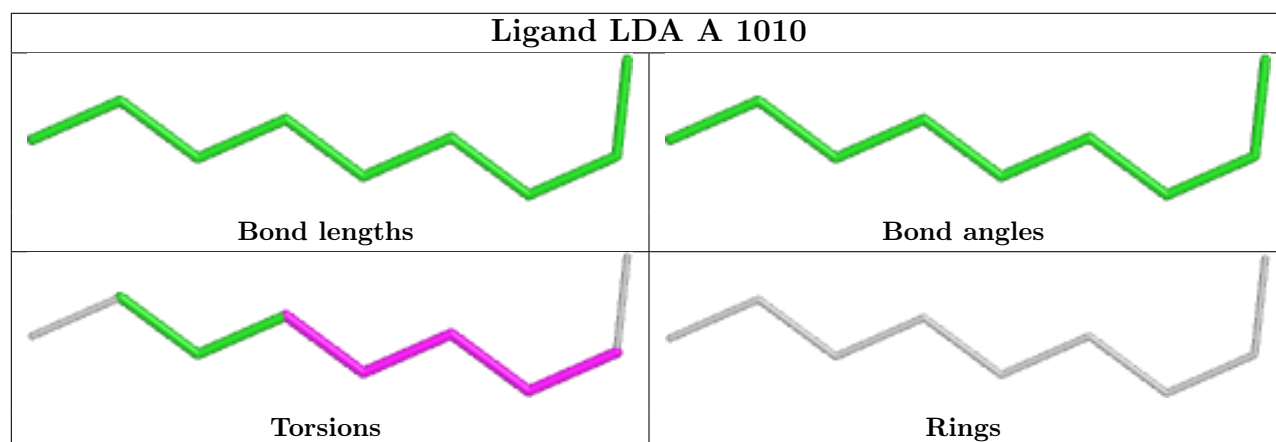
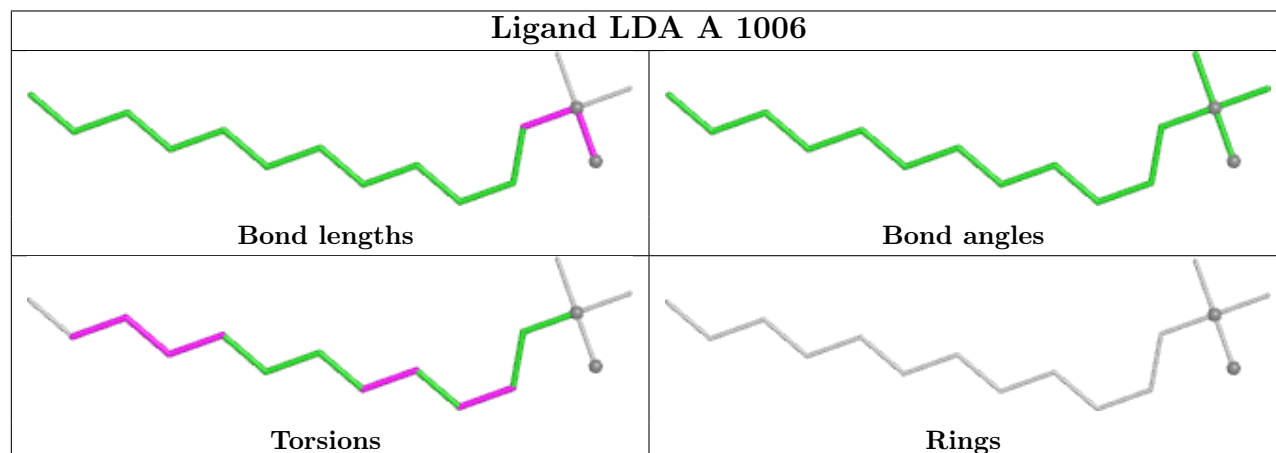
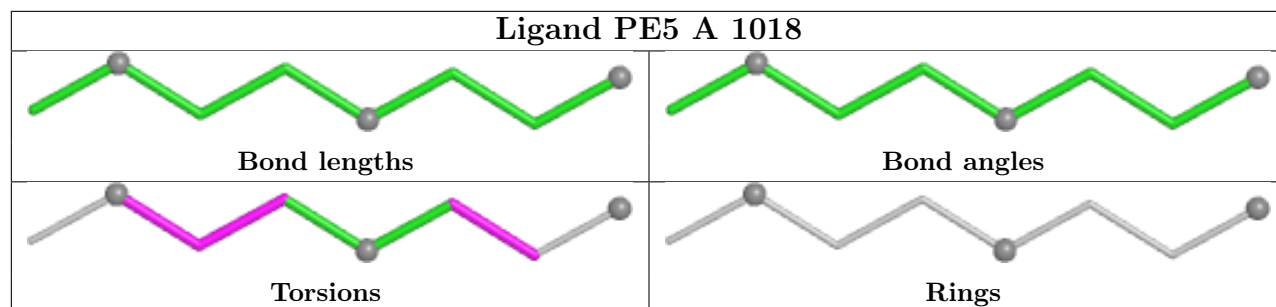
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

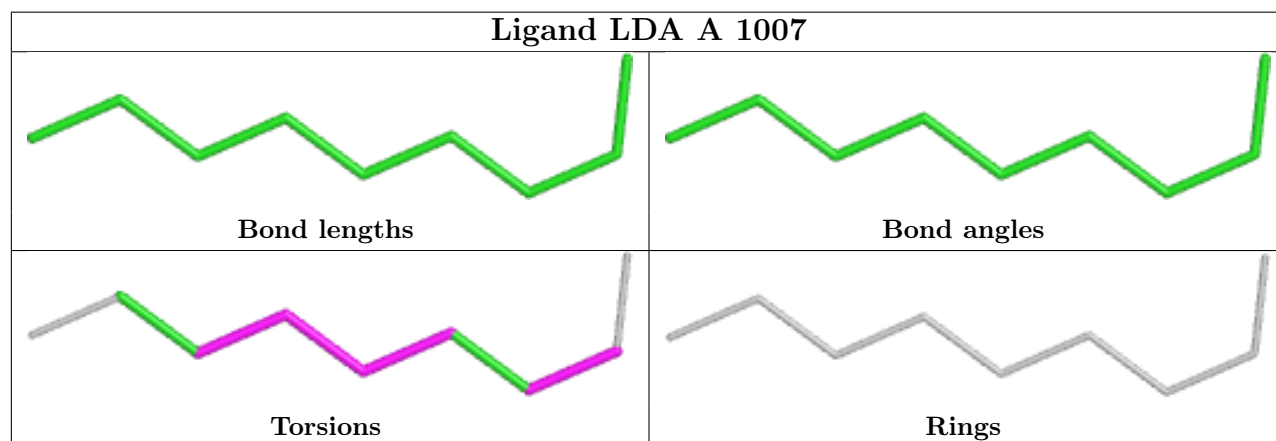
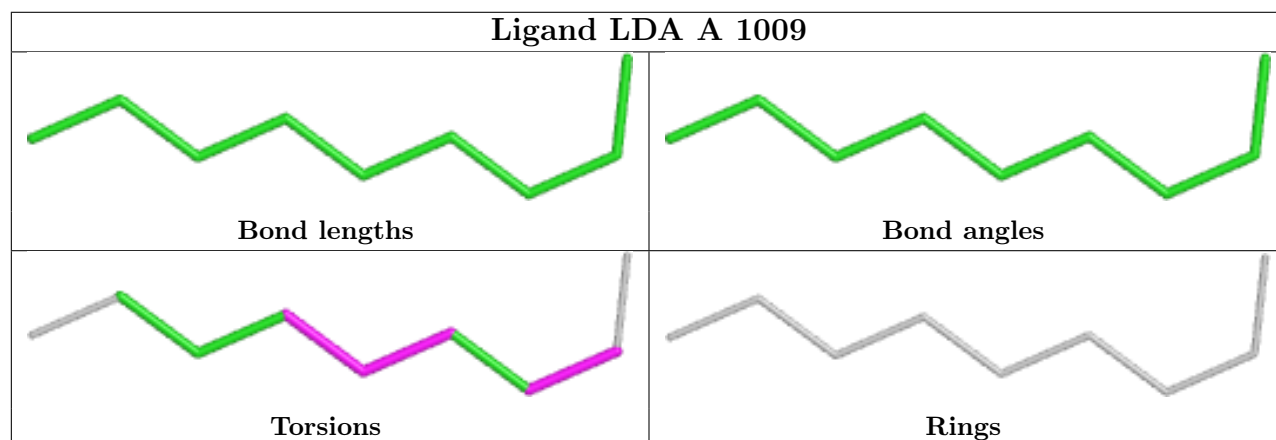
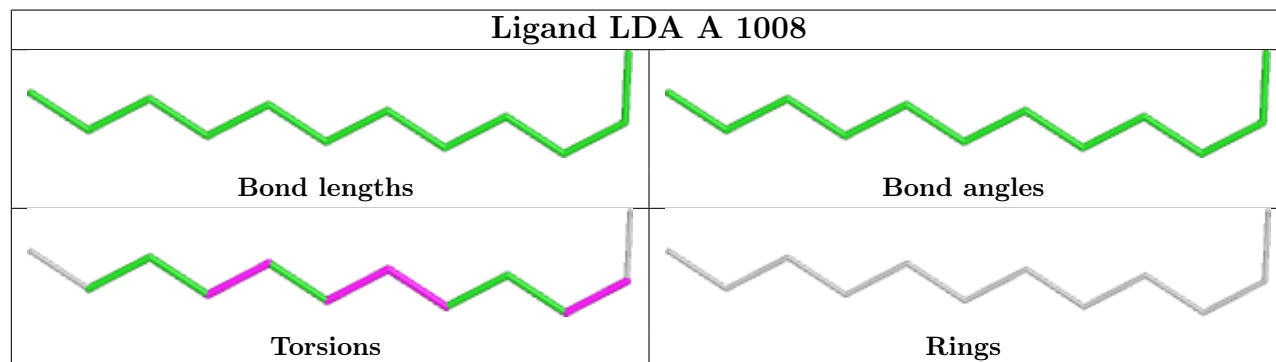
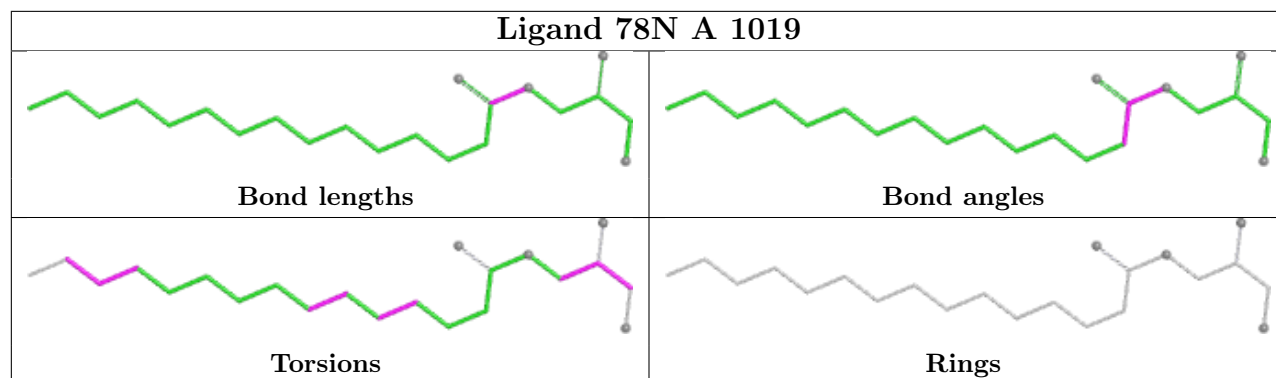












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	466/479 (97%)	0.54	44 (9%) 14 16	10, 26, 51, 105	2 (0%)

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	282	VAL	4.4
1	A	431	LEU	4.2
1	A	440	VAL	4.1
1	A	439	TYR	4.1
1	A	94	GLN	3.8
1	A	433	PRO	3.7
1	A	475	PHE	3.5
1	A	438	GLN	3.4
1	A	434	ALA	3.3
1	A	50	ALA	3.2
1	A	70	TRP	3.2
1	A	281	THR	3.2
1	A	233	LEU	3.0
1	A	232	ASN	3.0
1	A	53	GLY	2.9
1	A	283	ASP	2.9
1	A	51	PRO	2.9
1	A	184	ASP	2.8
1	A	405	ASN	2.8
1	A	222	HIS	2.8
1	A	284	ASP	2.8
1	A	52	GLY	2.7
1	A	107	GLY	2.7
1	A	430	GLY	2.7
1	A	479	PHE	2.6
1	A	246[A]	ILE	2.5
1	A	432	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	463	GLY	2.5
1	A	54	THR	2.4
1	A	436	MET	2.3
1	A	477	TRP	2.3
1	A	396	ASP	2.3
1	A	49	THR	2.3
1	A	231	ASP	2.3
1	A	441	ASP	2.3
1	A	207	HIS	2.2
1	A	205	ALA	2.2
1	A	429	GLN	2.1
1	A	442	GLU	2.1
1	A	22	ALA	2.1
1	A	428	LYS	2.1
1	A	400	GLY	2.1
1	A	285	ARG	2.0
1	A	258	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](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

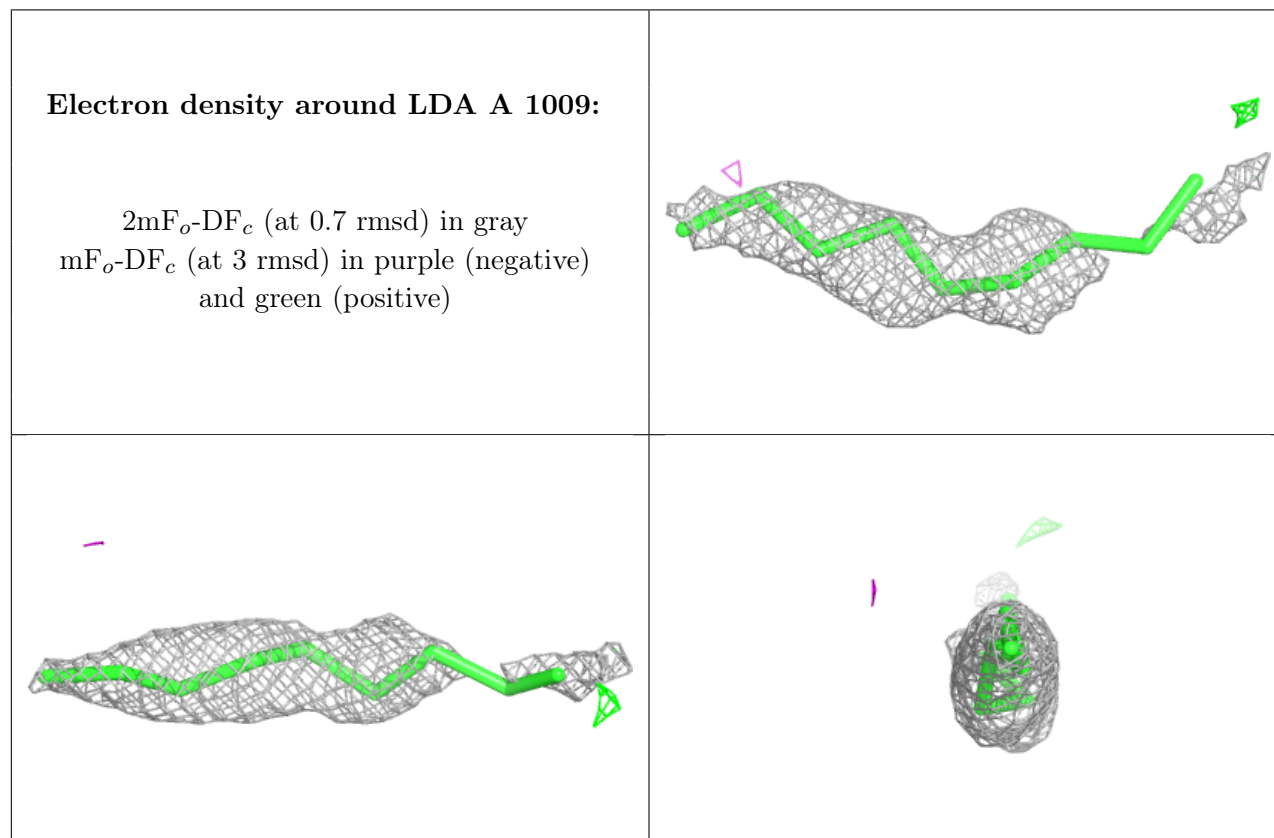
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	LDA	A	1009	9/16	0.71	0.21	48,52,58,64	0
5	LDA	A	1004	11/16	0.74	0.21	39,44,67,74	0
6	78M	A	1016	22/22	0.76	0.20	45,60,66,66	0
5	LDA	A	1006	16/16	0.77	0.18	35,46,71,71	0
5	LDA	A	1005	12/16	0.78	0.17	25,38,43,45	0
5	LDA	A	1010	9/16	0.79	0.18	34,40,57,61	0

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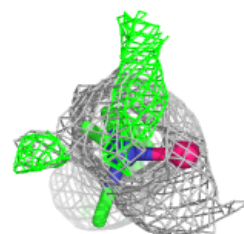
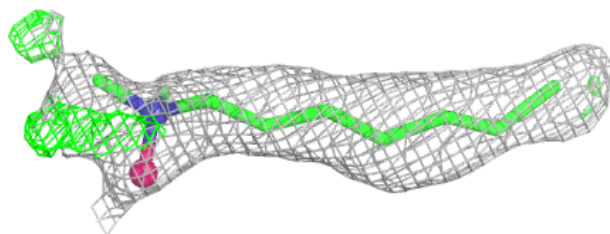
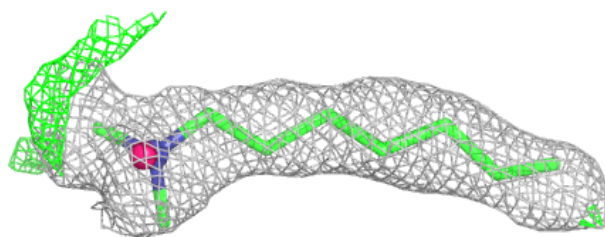
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	LDA	A	1007	9/16	0.82	0.16	38,39,45,48	0
7	78N	A	1020	22/22	0.82	0.16	28,39,53,64	0
5	LDA	A	1008	12/16	0.83	0.19	29,43,65,65	0
7	78N	A	1015	22/22	0.83	0.16	34,43,48,55	0
7	78N	A	1019	22/22	0.83	0.14	26,30,56,64	0
6	78M	A	1014	22/22	0.83	0.17	46,54,59,63	0
7	78N	A	1013	22/22	0.84	0.15	37,45,58,63	0
6	78M	A	1012	22/22	0.85	0.15	28,39,53,61	0
8	PE5	A	1018	8/27	0.86	0.12	14,26,30,38	0
5	LDA	A	1011	11/16	0.87	0.14	25,30,42,43	0
4	FLC	A	1003	13/13	0.88	0.09	28,34,39,43	0
8	PE5	A	1017	15/27	0.90	0.11	26,33,53,60	0
3	CA	A	1002	1/1	0.90	0.20	75,75,75,75	0
2	SO4	A	1000	5/5	0.97	0.07	26,29,29,31	0
3	CA	A	1001	1/1	0.98	0.17	36,36,36,36	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.

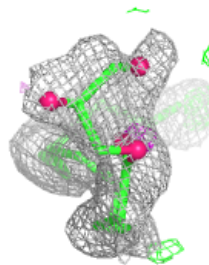
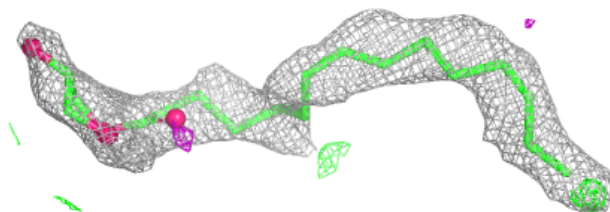
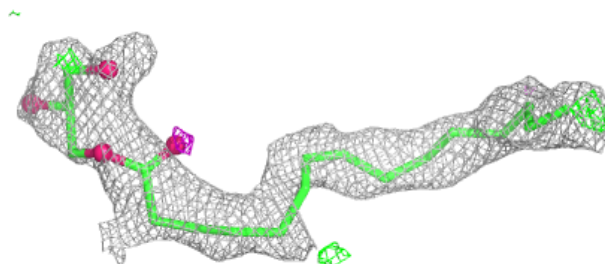


Electron density around LDA A 1004:

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

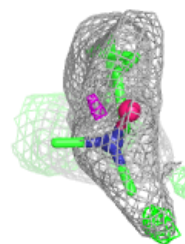
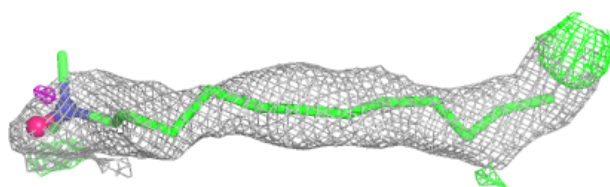
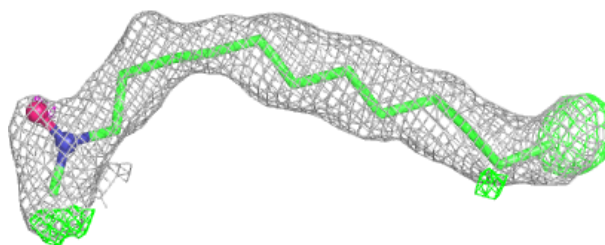
**Electron density around 78M A 1016:**

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

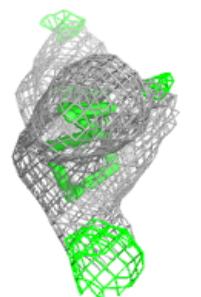
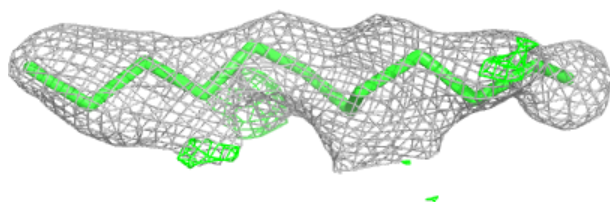
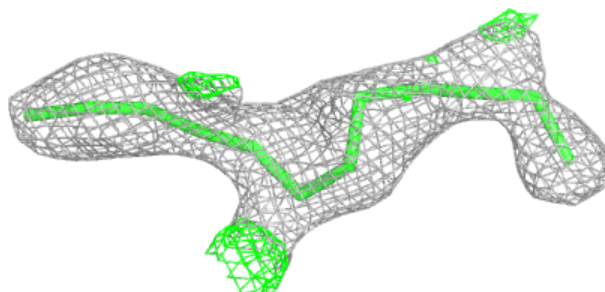


Electron density around LDA A 1006:

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

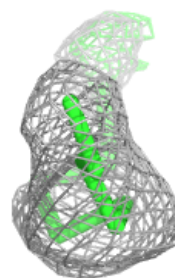
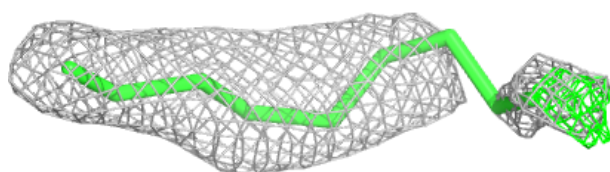
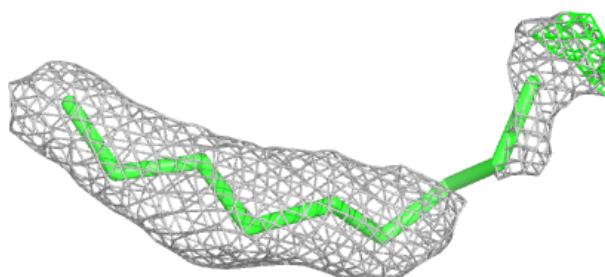
**Electron density around LDA A 1005:**

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

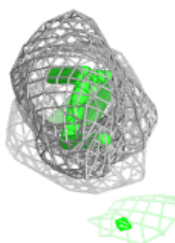
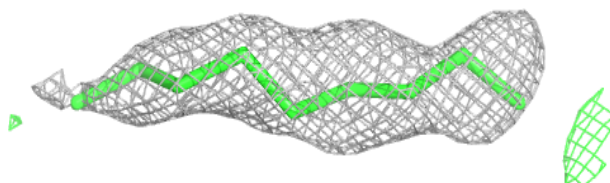
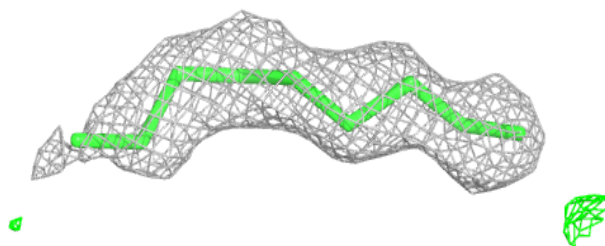


Electron density around LDA A 1010:

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

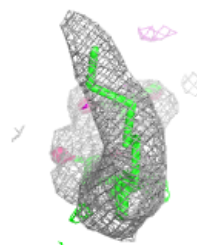
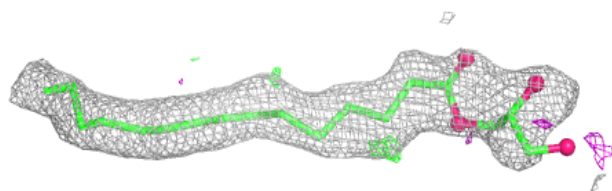
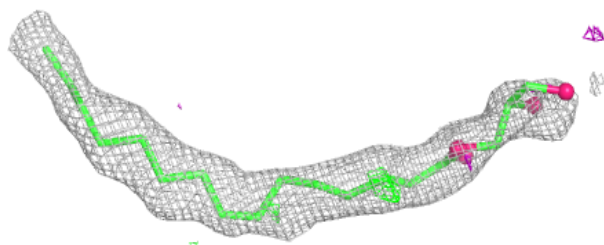
**Electron density around LDA A 1007:**

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

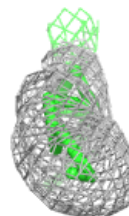
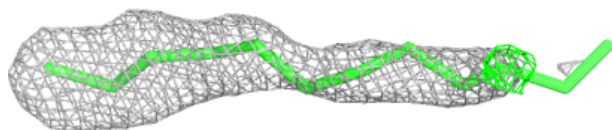
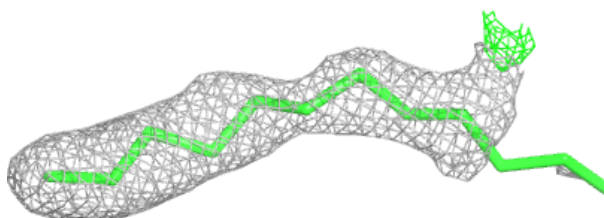


Electron density around 78N A 1020:

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

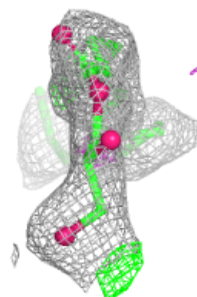
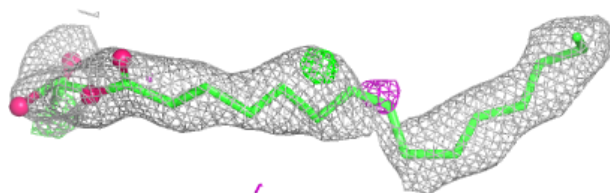
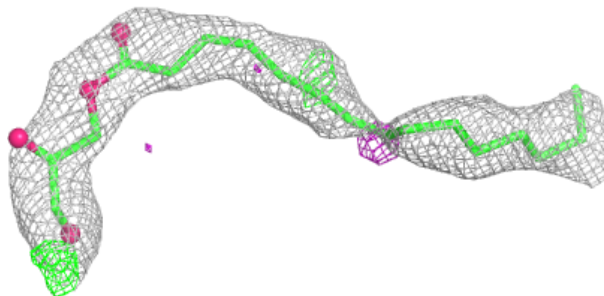
**Electron density around LDA A 1008:**

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

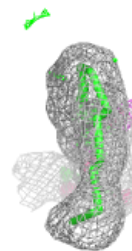
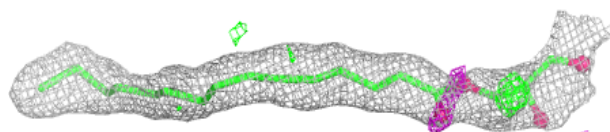
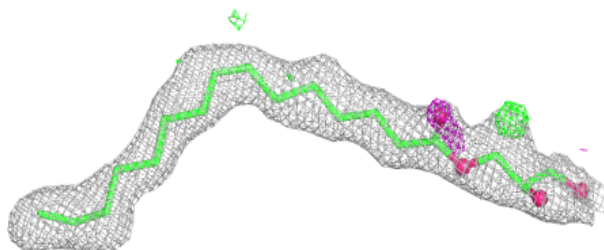


Electron density around 78N A 1015:

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

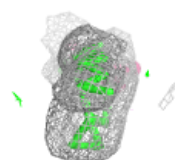
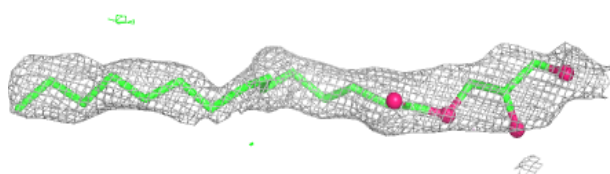
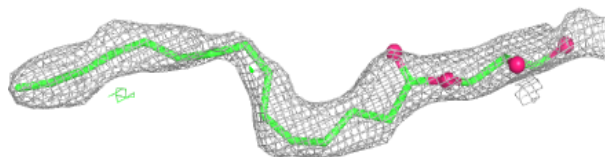
**Electron density around 78N A 1019:**

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

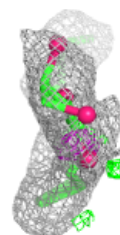
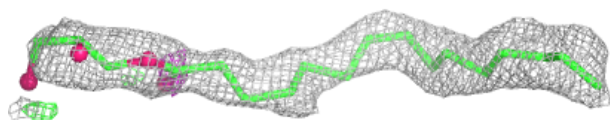
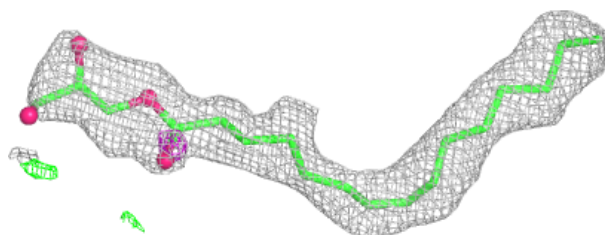


Electron density around 78M A 1014:

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

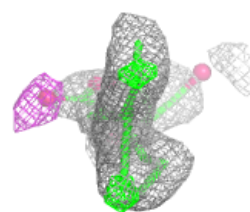
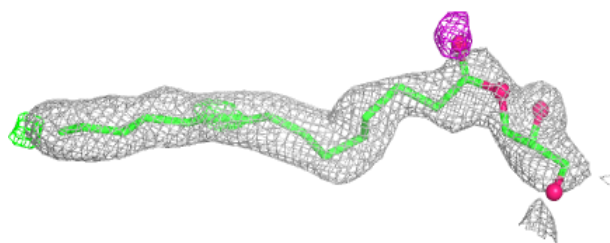
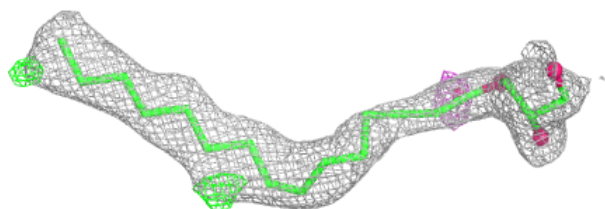
**Electron density around 78N A 1013:**

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

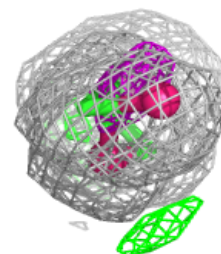
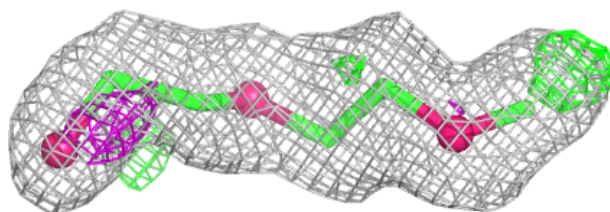
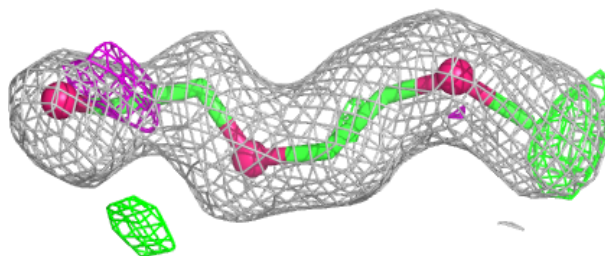


Electron density around 78M A 1012:

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

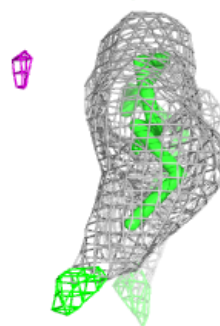
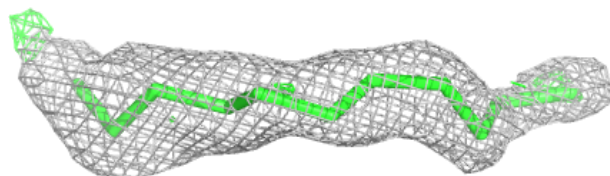
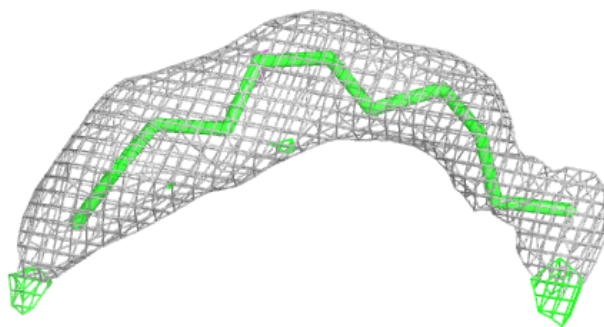
**Electron density around PE5 A 1018:**

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



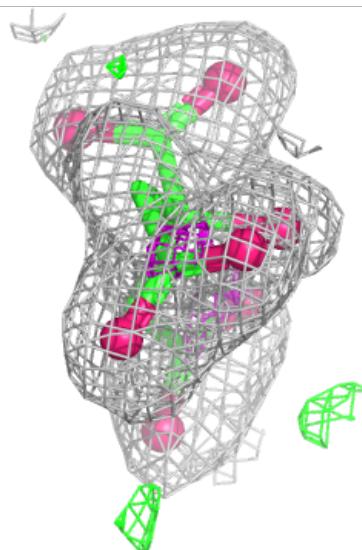
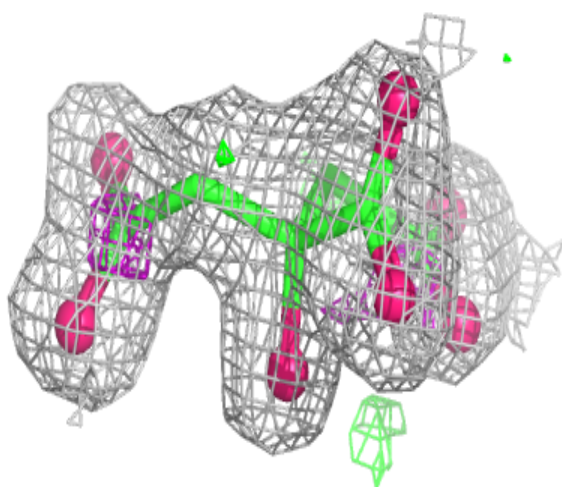
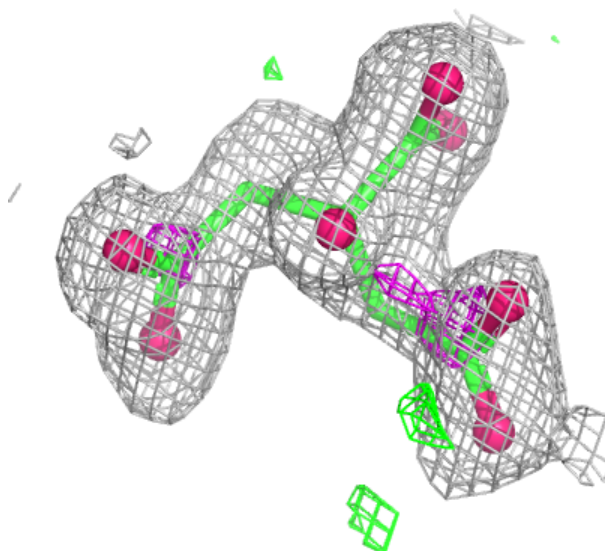
Electron density around LDA A 1011:

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



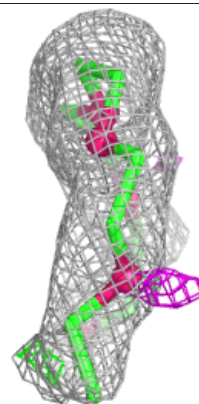
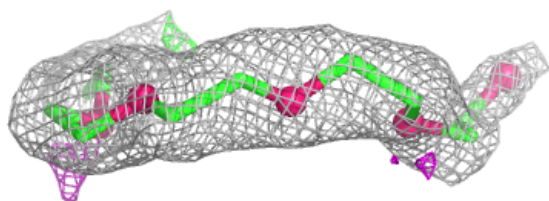
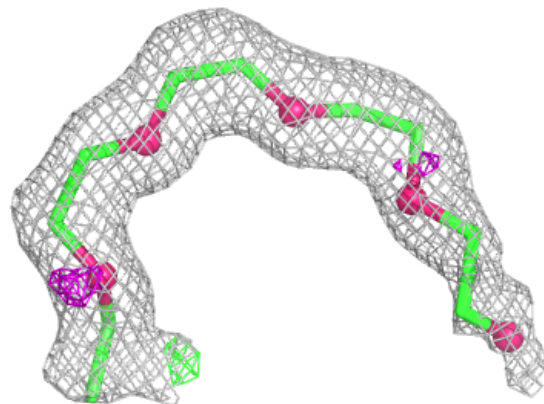
Electron density around FLC A 1003:

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



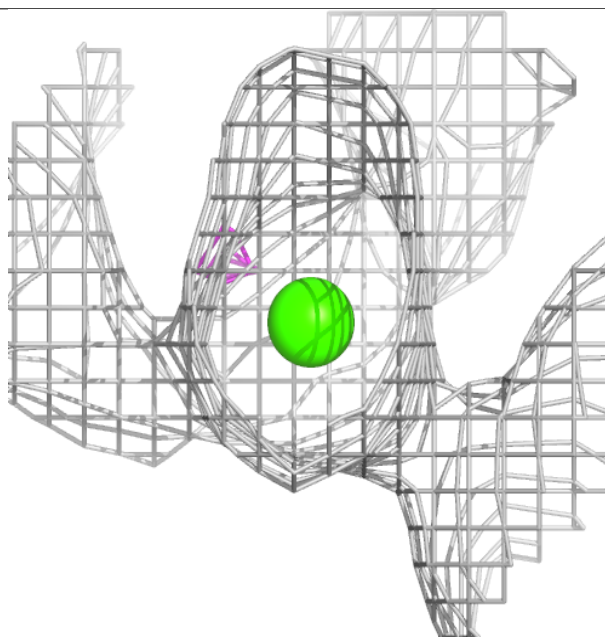
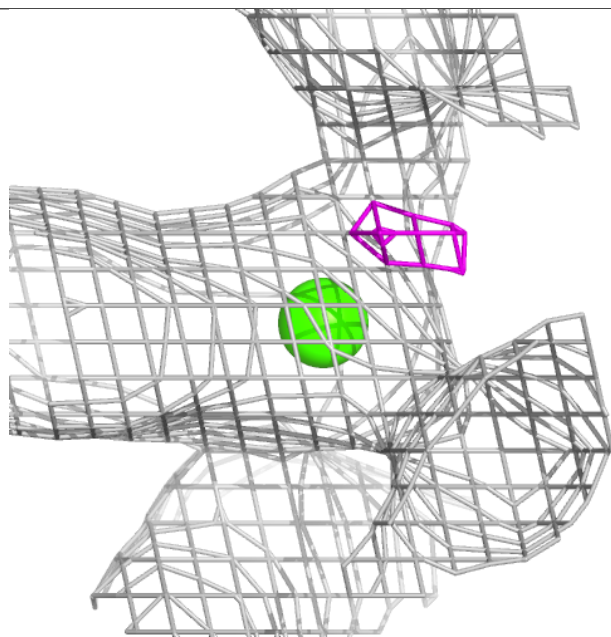
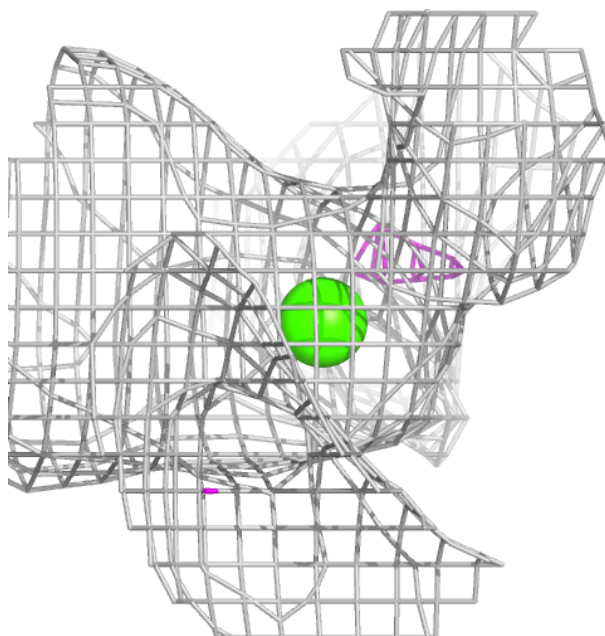
Electron density around PE5 A 1017:

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



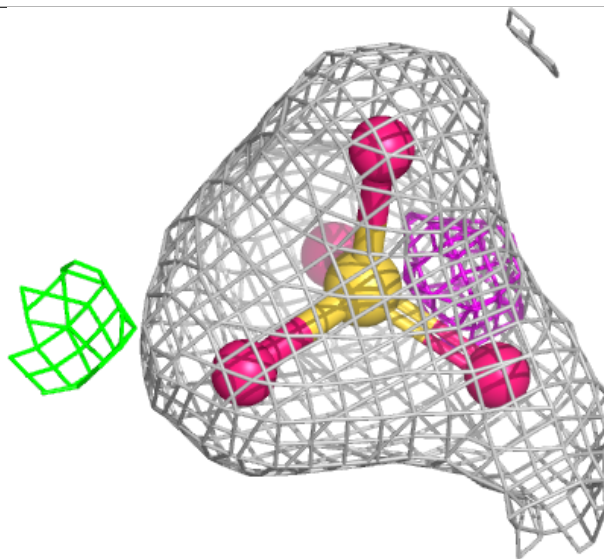
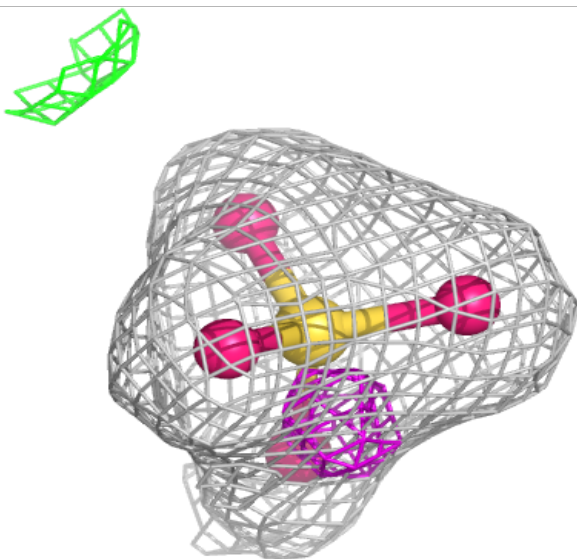
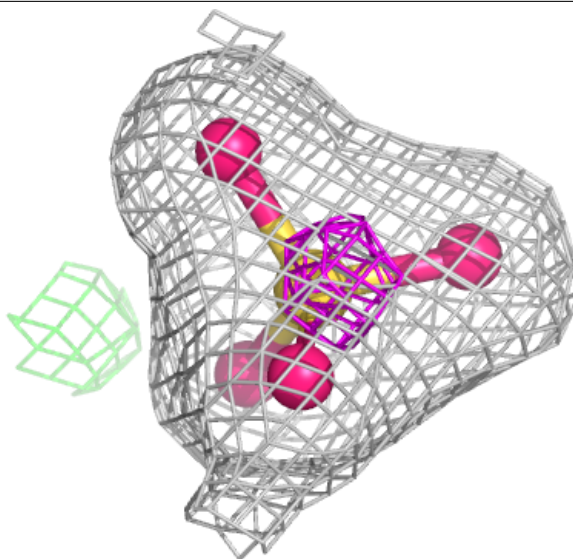
Electron density around CA A 1002:

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



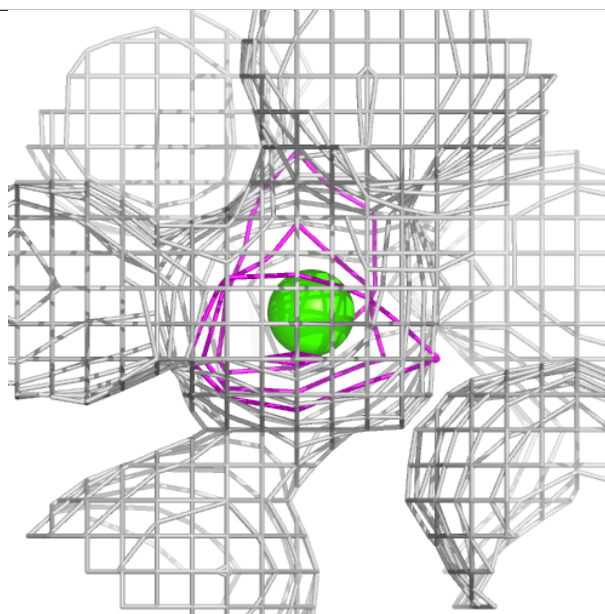
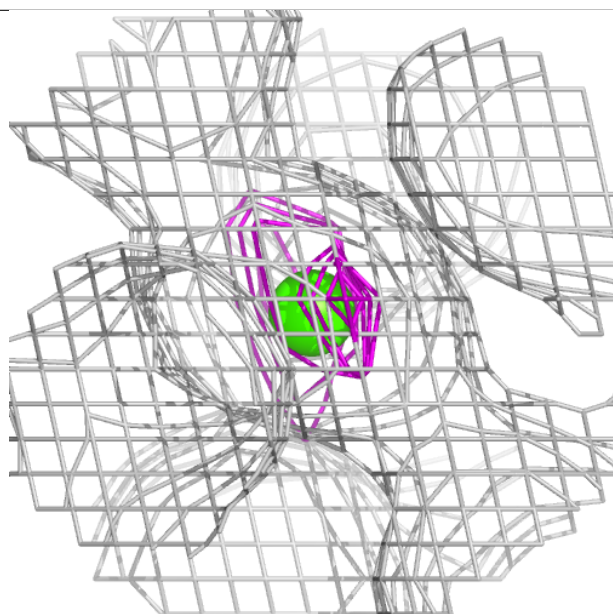
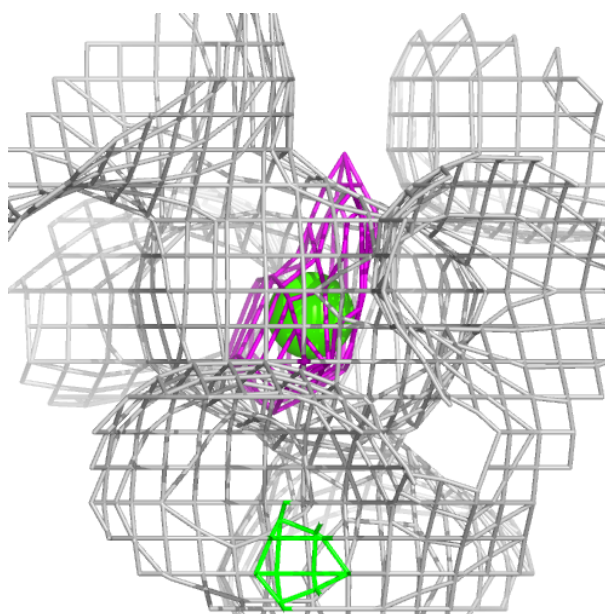
Electron density around SO4 A 1000:

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



Electron density around CA A 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 ⓘ

There are no such residues in this entry.