



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 5, 2026 – 09:52 PM EDT

PDB ID : 4IN5 / pdb_00004in5
Title : (M)L214G mutant of the Rhodobacter sphaeroides Reaction Center
Authors : Saer, R.G.; Hardjasa, A.; Murphy, M.E.; Beatty, J.T.
Deposited on : 2013-01-04
Resolution : 2.20 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

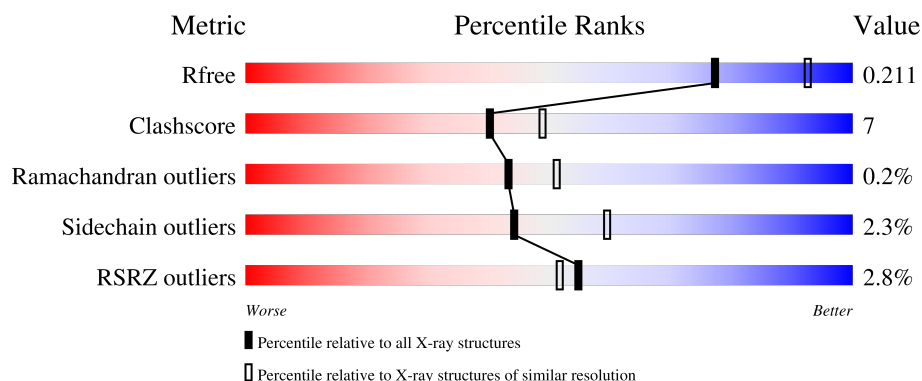
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	L	282	2% 93% 6% .
2	M	307	3% 87% 10% ..
3	H	266	2% 79% 9% 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
10	GOL	H	301	-	-	X	-
10	GOL	L	314	-	-	X	-
13	PC1	M	408	-	-	-	X
8	PO4	M	411	-	-	X	-

2 Entry composition

There are 15 unique types of molecules in this entry. The entry contains 7489 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 Reaction center protein L chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	L	281	Total	C	N	O	S	0	2	0
			2242	1515	356	363	8			

- Molecule 2 is a protein called Reaction center protein M chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	M	302	Total	C	N	O	S	0	1	0
			2407	1604	395	398	10			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
M	214	GLY	LEU	engineered mutation	UNP P0C0Y9

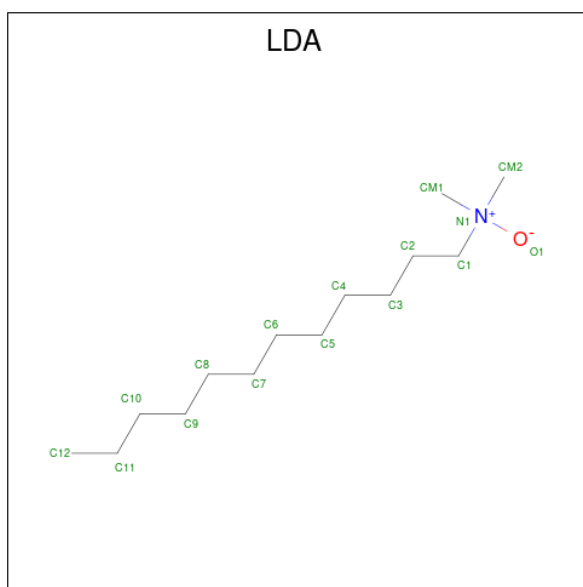
- Molecule 3 is a protein called Reaction center protein H chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	240	Total	C	N	O	S	0	5	0
			1850	1184	320	337	9			

There are 6 discrepancies between the modelled and reference sequences:

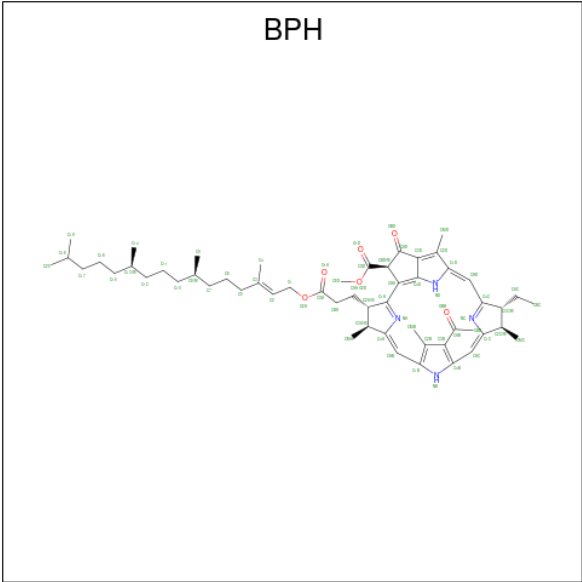
Chain	Residue	Modelled	Actual	Comment	Reference
H	-5	HIS	-	expression tag	UNP P0C0Y7
H	-4	HIS	-	expression tag	UNP P0C0Y7
H	-3	HIS	-	expression tag	UNP P0C0Y7
H	-2	HIS	-	expression tag	UNP P0C0Y7
H	-1	HIS	-	expression tag	UNP P0C0Y7
H	0	HIS	-	expression tag	UNP P0C0Y7

- Molecule 4 is LAURYL DIMETHYLAMINE-N-OXIDE (CCD ID: LDA) (formula: C₁₄H₃₁NO).



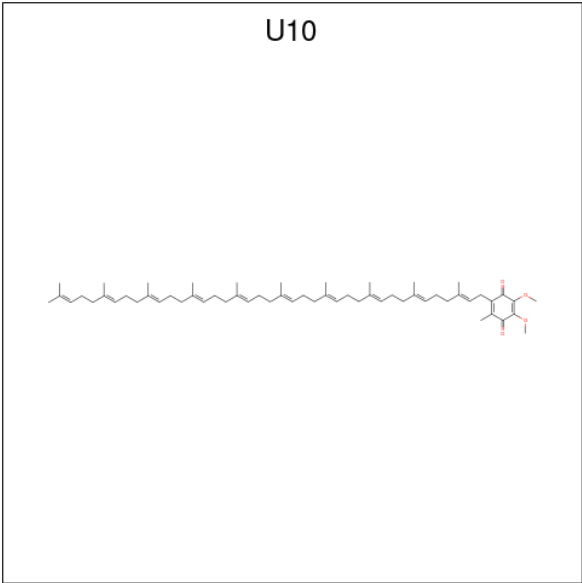
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	L	1	Total	C	N	O	0	0
			16	14	1	1		
4	L	1	Total	C	N	O	0	0
			16	14	1	1		
4	M	1	Total	C	N	O	0	0
			16	14	1	1		
4	M	1	Total	C	N	O	0	0
			16	14	1	1		
4	H	1	Total	C	N	O	0	0
			16	14	1	1		
4	H	1	Total	C	N	O	0	0
			16	14	1	1		

- Molecule 5 is BACTERIOPHEOPHYTIN A (CCD ID: BPH) (formula: $C_{55}H_{76}N_4O_6$).



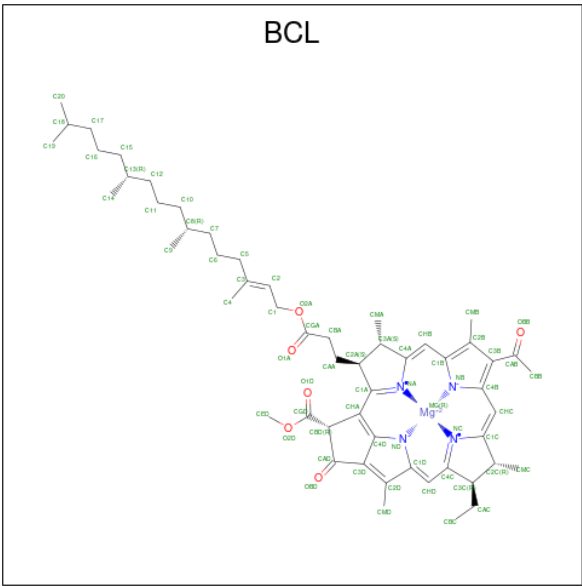
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	L	1	Total	C	N	O	0	0
			65	55	4	6		
5	L	1	Total	C	N	O	0	0
			65	55	4	6		

- Molecule 6 is UBIQUINONE-10 (CCD ID: U10) (formula: C₅₉H₉₀O₄).



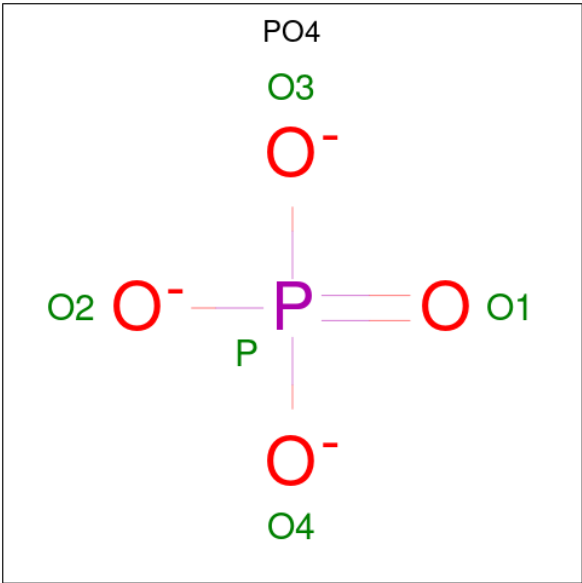
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	L	1	Total	C	O	0	1
			46	38	8		
6	M	1	Total	C	O	0	0
			48	44	4		

- Molecule 7 is BACTERIOCHLOROPHYLL A (CCD ID: BCL) (formula: $C_{55}H_{74}MgN_4O_6$).



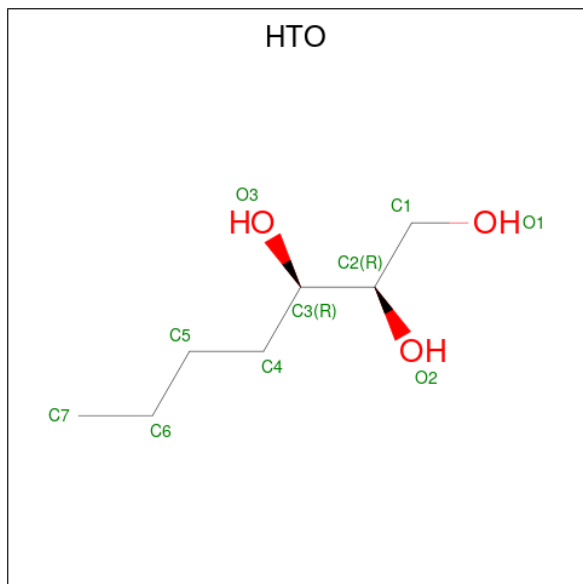
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	L	1	Total	C	Mg	N	O	0	0
			66	55	1	4	6		
7	M	1	Total	C	Mg	N	O	0	1
			86	75	1	4	6		
7	M	1	Total	C	Mg	N	O	0	0
			66	55	1	4	6		
7	M	1	Total	C	Mg	N	O	0	0
			66	55	1	4	6		

- Molecule 8 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



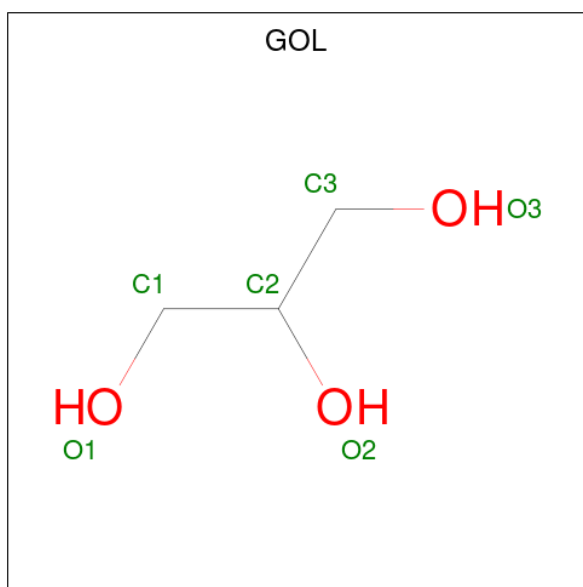
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	L	1	Total	O	P	0	0
			5	4	1		
8	M	1	Total	O	P	0	0
			5	4	1		
8	M	1	Total	O	P	0	0
			5	4	1		

- Molecule 9 is HEPTANE-1,2,3-TRIOL (CCD ID: HTO) (formula: $C_7H_{16}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	L	1	Total	C	O	0	0
			10	7	3		
9	H	1	Total	C	O	0	0
			10	7	3		

- Molecule 10 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).

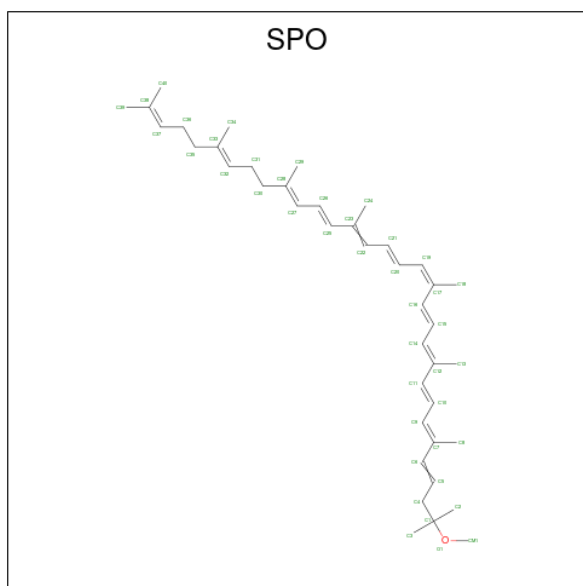


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	L	1	Total	C	O	0	0
			6	3	3		
10	L	1	Total	C	O	0	0
			6	3	3		
10	L	1	Total	C	O	0	0
			6	3	3		
10	L	1	Total	C	O	0	0
			6	3	3		
10	L	1	Total	C	O	0	0
			6	3	3		
10	M	1	Total	C	O	0	0
			6	3	3		
10	H	1	Total	C	O	0	0
			6	3	3		
10	H	1	Total	C	O	0	0
			6	3	3		
10	H	1	Total	C	O	0	0
			6	3	3		
10	H	1	Total	C	O	0	0
			6	3	3		
10	H	1	Total	C	O	0	0
			6	3	3		

- Molecule 11 is FE (III) ION (CCD ID: FE) (formula: Fe).

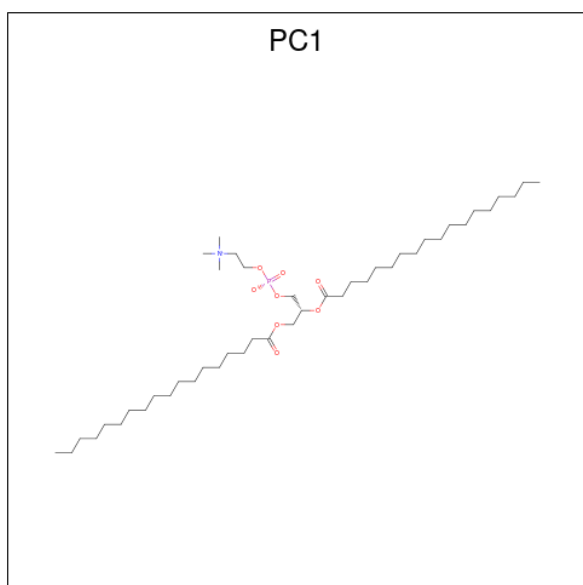
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	M	1	Total	Fe	0	0
			1	1		

- Molecule 12 is SPHEROIDENE (CCD ID: SPO) (formula: $C_{41}H_{60}O$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
12	M	1	Total	C	O	0	0
			42	41	1		

- Molecule 13 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (CCD ID: PC1) (formula: $C_{44}H_{88}NO_8P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
13	M	1	Total	C	N	O	P	0	0
			43	33	1	8	1		

- Molecule 14 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	H	1	Total	K	0	0
			1	1		

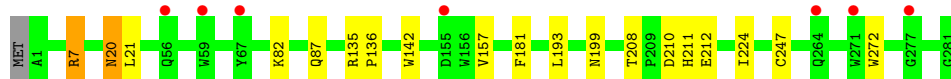
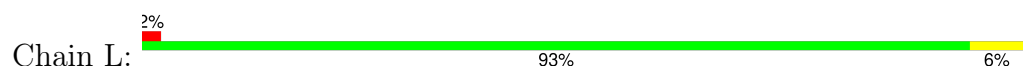
- Molecule 15 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	L	56	Total	O	0	0
			56	56		
15	M	53	Total	O	0	0
			53	53		
15	H	83	Total	O	0	0
			83	83		

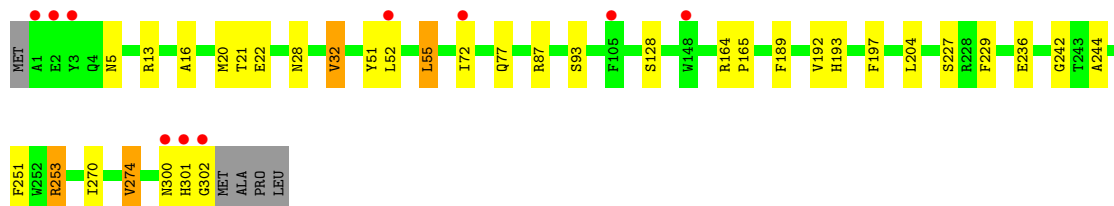
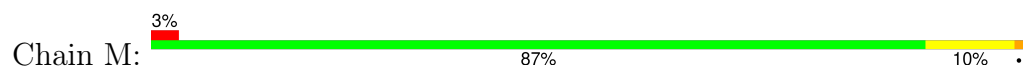
3 Residue-property plots [i](#)

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.

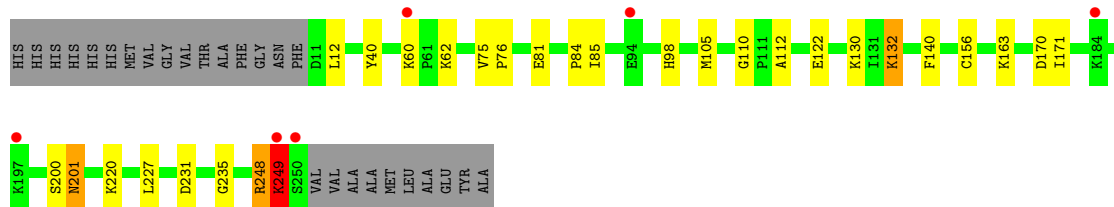
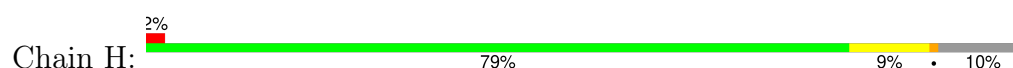
- Molecule 1: Reaction center protein L chain



- Molecule 2: Reaction center protein M chain



- Molecule 3: Reaction center protein H chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	139.11Å 139.11Å 184.69Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	55.62 – 2.20 55.62 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (55.62-2.20) 99.9 (55.62-2.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.32 (at 2.20Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.181 , 0.206 0.188 , 0.211	Depositor DCC
R_{free} test set	5239 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	39.1	Xtriage
Anisotropy	0.015	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 30.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.017 for -h,-k,l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7489	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.56% 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: FE, U10, K, SPO, PO4, PC1, BCL, BPH, HTO, GOL, LDA

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	L	1.18	0/2342	1.02	3/3206 (0.1%)
2	M	1.10	3/2504 (0.1%)	1.02	2/3418 (0.1%)
3	H	1.16	2/1923 (0.1%)	1.05	3/2611 (0.1%)
All	All	1.14	5/6769 (0.1%)	1.03	8/9235 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
3	H	0	1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	132	LYS	CA-C	-6.72	1.44	1.52
2	M	242	GLY	N-CA	5.76	1.49	1.44
2	M	32	VAL	N-CA	-5.60	1.39	1.46
2	M	227	SER	C-O	-5.50	1.17	1.24
3	H	105	MET	N-CA	5.19	1.52	1.46

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	M	5	ASN	N-CA-C	5.78	119.64	112.24
1	L	208	THR	CA-C-N	-5.53	113.97	119.56
1	L	208	THR	C-N-CA	-5.53	113.97	119.56
1	L	7	ARG	N-CA-C	5.47	117.24	111.28
3	H	62	LYS	N-CA-C	-5.28	101.34	109.52

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	H	248	ARG	Peptide

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	L	2242	0	2194	17	0
2	M	2407	0	2315	22	0
3	H	1850	0	1875	21	0
4	H	32	0	62	3	0
4	L	32	0	62	1	0
4	M	32	0	62	3	0
5	L	130	0	152	10	0
6	L	46	0	46	9	0
6	M	48	0	63	2	0
7	L	66	0	74	0	0
7	M	218	0	226	19	0
8	L	5	0	0	1	0
8	M	10	0	0	3	0
9	H	10	0	16	1	0
9	L	10	0	16	0	0
10	H	30	0	40	5	0
10	L	36	0	48	7	0
10	M	6	0	8	0	0
11	M	1	0	0	0	0
12	M	42	0	60	1	0
13	M	43	0	60	0	0
14	H	1	0	0	0	0
15	H	83	0	0	3	0
15	L	56	0	0	3	0
15	M	53	0	0	2	0
All	All	7489	0	7379	94	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

The worst 5 of 94 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)
6:L:304[B]:U10:H1M3	6:L:304[B]:U10:C8	1.83	1.07
6:L:304[B]:U10:H1M3	6:L:304[B]:U10:H8	1.45	0.98
6:L:304[B]:U10:C8	6:L:304[B]:U10:C1M	2.54	0.84
5:L:313:BPH:HBB3	5:L:313:BPH:HHC	1.60	0.84
5:L:303:BPH:HBB3	5:L:303:BPH:HHC	1.60	0.83

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	L	281/282 (100%)	276 (98%)	5 (2%)	0	100	100
2	M	301/307 (98%)	290 (96%)	10 (3%)	1 (0%)	36	42
3	H	243/266 (91%)	240 (99%)	1 (0%)	2 (1%)	16	16
All	All	825/855 (96%)	806 (98%)	16 (2%)	3 (0%)	43	34

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	H	249[A]	LYS
3	H	249[B]	LYS
2	M	301	HIS

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	L	222/221 (100%)	219 (99%)	3 (1%)	59	75
2	M	236/239 (99%)	231 (98%)	5 (2%)	47	63
3	H	200/214 (94%)	190 (95%)	10 (5%)	22	28
All	All	658/674 (98%)	640 (97%)	18 (3%)	44	53

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	H	220[B]	LYS
3	H	249[B]	LYS
3	H	249[A]	LYS
3	H	12	LEU
3	H	220[A]	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
3	H	201	ASN
3	H	98	HIS
2	M	187	ASN
2	M	77	GLN
2	M	193	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 37 ligands modelled in this entry, 2 are monoatomic - leaving 35 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
7	BCL	M	401[B]	-	69,74,74	1.77	18 (26%)	79,115,115	2.06	25 (31%)
4	LDA	M	412	-	13,15,15	1.97	2 (15%)	14,17,17	0.80	0
4	LDA	L	302	-	13,15,15	2.03	1 (7%)	14,17,17	0.67	0
5	BPH	L	303	-	59,70,70	2.32	17 (28%)	59,101,101	2.13	16 (27%)
7	BCL	M	403	2	69,74,74	1.77	14 (20%)	79,115,115	2.05	22 (27%)
12	SPO	M	407	-	41,41,41	0.91	1 (2%)	47,50,50	1.65	7 (14%)
9	HTO	H	308	-	9,9,9	0.65	0	10,10,10	0.64	0
4	LDA	M	404	-	13,15,15	1.91	1 (7%)	14,17,17	0.68	0
13	PC1	M	408	-	42,42,53	1.18	2 (4%)	48,50,61	1.50	7 (14%)
10	GOL	H	303	-	5,5,5	0.50	0	5,5,5	0.50	0
6	U10	L	304[B]	-	23,23,63	2.04	2 (8%)	30,31,79	1.17	3 (10%)
8	PO4	M	409	-	4,4,4	0.62	0	6,6,6	0.81	0
8	PO4	L	306	-	4,4,4	0.73	0	6,6,6	1.02	0
7	BCL	M	401[A]	-	69,74,74	1.77	18 (26%)	79,115,115	2.19	27 (34%)
5	BPH	L	313	-	59,70,70	2.28	18 (30%)	59,101,101	2.03	14 (23%)
8	PO4	M	411	-	4,4,4	2.02	2 (50%)	6,6,6	1.42	1 (16%)
10	GOL	H	301	-	5,5,5	1.09	0	5,5,5	1.83	3 (60%)
10	GOL	L	314	-	5,5,5	0.77	0	5,5,5	0.61	0
9	HTO	L	307	-	9,9,9	0.98	0	10,10,10	0.71	0
10	GOL	L	308	-	5,5,5	1.22	0	5,5,5	1.35	0
10	GOL	H	302	-	5,5,5	0.58	0	5,5,5	0.80	0
10	GOL	L	312	-	5,5,5	0.43	0	5,5,5	0.75	0
4	LDA	L	301	-	13,15,15	1.94	1 (7%)	14,17,17	0.36	0
6	U10	L	304[A]	-	23,23,63	2.06	2 (8%)	30,31,79	2.09	11 (36%)
10	GOL	H	307	-	5,5,5	0.26	0	5,5,5	0.61	0
10	GOL	L	310	-	5,5,5	1.29	0	5,5,5	1.51	1 (20%)
4	LDA	H	309	-	13,15,15	1.97	1 (7%)	14,17,17	0.27	0
10	GOL	M	410	-	5,5,5	0.79	0	5,5,5	0.80	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	BCL	M	402	2	69,74,74	1.67	17 (24%)	79,115,115	2.15	25 (31%)
10	GOL	L	311	-	5,5,5	0.50	0	5,5,5	0.87	0
10	GOL	L	309	-	5,5,5	0.42	0	5,5,5	0.32	0
10	GOL	H	305	-	5,5,5	0.54	0	5,5,5	0.80	0
4	LDA	H	304	-	13,15,15	2.26	2 (15%)	14,17,17	1.15	1 (7%)
6	U10	M	406	-	48,48,63	1.36	3 (6%)	60,61,79	1.55	14 (23%)
7	BCL	L	305	1	69,74,74	1.50	12 (17%)	79,115,115	1.91	20 (25%)

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
7	BCL	M	401[B]	-	-	13/41/137/137	-
4	LDA	M	412	-	-	6/13/13/13	-
4	LDA	L	302	-	-	7/13/13/13	-
5	BPH	L	303	-	-	7/37/105/105	0/5/6/6
7	BCL	M	403	2	-	2/41/137/137	-
12	SPO	M	407	-	-	4/47/47/47	-
9	HTO	H	308	-	-	2/10/10/10	-
4	LDA	M	404	-	-	6/13/13/13	-
13	PC1	M	408	-	-	19/46/46/57	-
10	GOL	H	303	-	-	3/4/4/4	-
6	U10	L	304[B]	-	-	6/15/39/87	0/1/1/1
7	BCL	M	401[A]	-	-	7/41/137/137	-
5	BPH	L	313	-	-	5/37/105/105	0/5/6/6
10	GOL	H	301	-	-	0/4/4/4	-
10	GOL	L	314	-	-	2/4/4/4	-
9	HTO	L	307	-	-	7/10/10/10	-
10	GOL	L	308	-	-	2/4/4/4	-
10	GOL	H	302	-	-	2/4/4/4	-
10	GOL	L	312	-	-	1/4/4/4	-
4	LDA	L	301	-	-	7/13/13/13	-
6	U10	L	304[A]	-	-	1/15/39/87	0/1/1/1
10	GOL	H	307	-	-	3/4/4/4	-
10	GOL	L	310	-	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	LDA	H	309	-	-	6/13/13/13	-
10	GOL	M	410	-	-	2/4/4/4	-
7	BCL	M	402	2	-	9/41/137/137	-
10	GOL	L	311	-	-	0/4/4/4	-
10	GOL	L	309	-	-	0/4/4/4	-
10	GOL	H	305	-	-	2/4/4/4	-
4	LDA	H	304	-	-	4/13/13/13	-
6	U10	M	406	-	-	8/45/69/87	0/1/1/1
7	BCL	L	305	1	-	3/41/137/137	-

The worst 5 of 134 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	L	303	BPH	C1B-C2B	8.60	1.48	1.39
6	L	304[B]	U10	C6-C1	8.41	1.50	1.35
6	L	304[A]	U10	C6-C1	8.27	1.50	1.35
5	L	313	BPH	C1D-C2D	7.82	1.48	1.39
5	L	313	BPH	C1B-C2B	7.20	1.47	1.39

The worst 5 of 197 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	M	401[A]	BCL	C1C-NC-C4C	-7.86	103.09	106.68
7	M	401[B]	BCL	C1C-NC-C4C	-7.86	103.09	106.68
7	M	403	BCL	CMD-C2D-C1D	7.83	138.51	124.73
5	L	303	BPH	O2D-CGD-CBD	7.38	119.06	110.95
7	L	305	BCL	CMD-C2D-C1D	7.12	137.26	124.73

There are no chirality outliers.

5 of 146 torsion outliers are listed below:

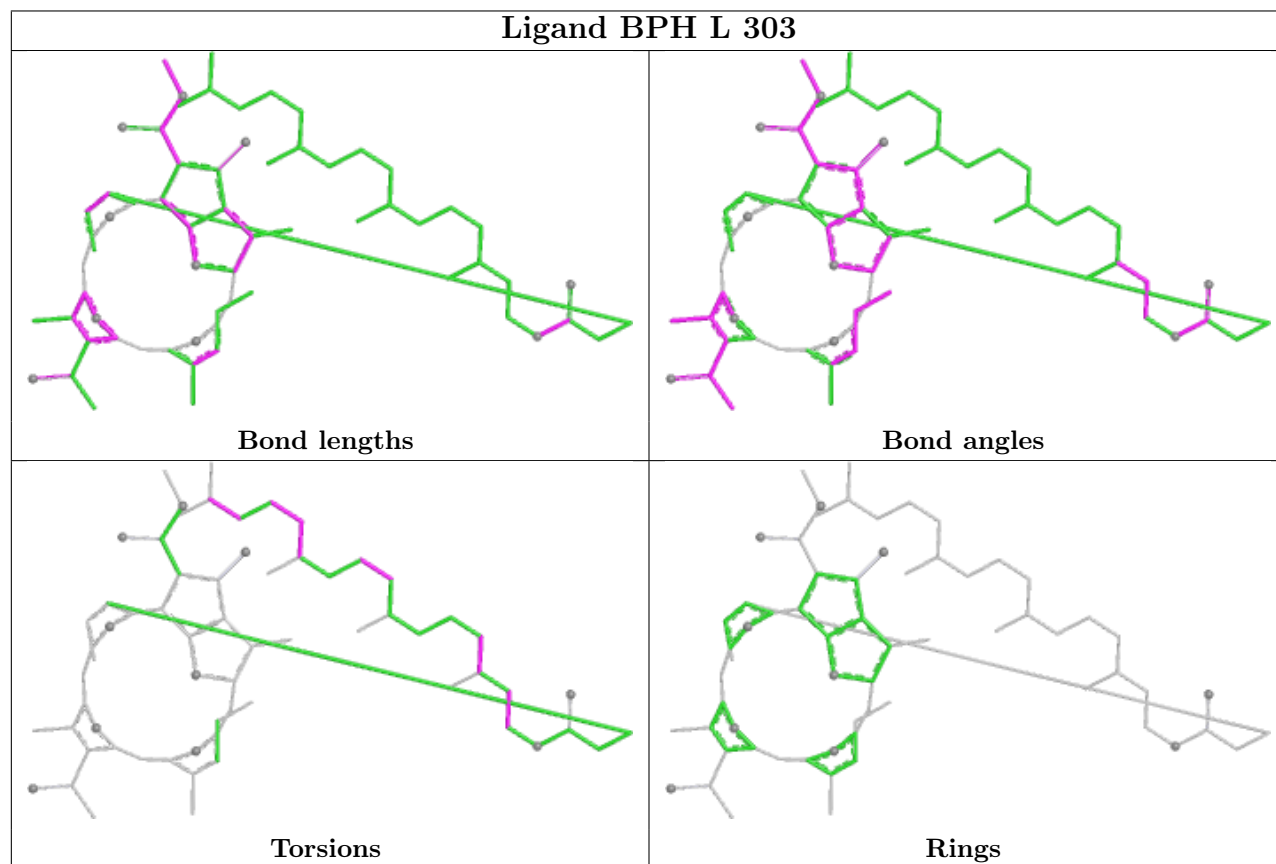
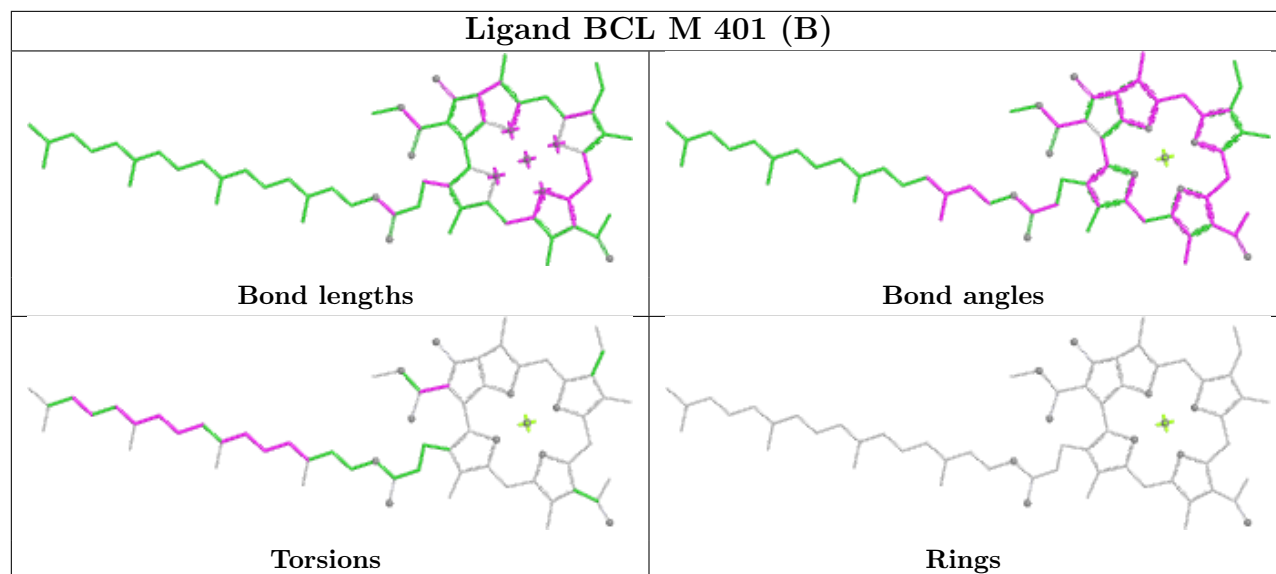
Mol	Chain	Res	Type	Atoms
4	M	404	LDA	C2-C1-N1-O1
4	M	404	LDA	C2-C1-N1-CM2
6	L	304[B]	U10	C1-C6-C7-C8
6	L	304[B]	U10	C5-C6-C7-C8
7	M	402	BCL	C2-C1-O2A-CGA

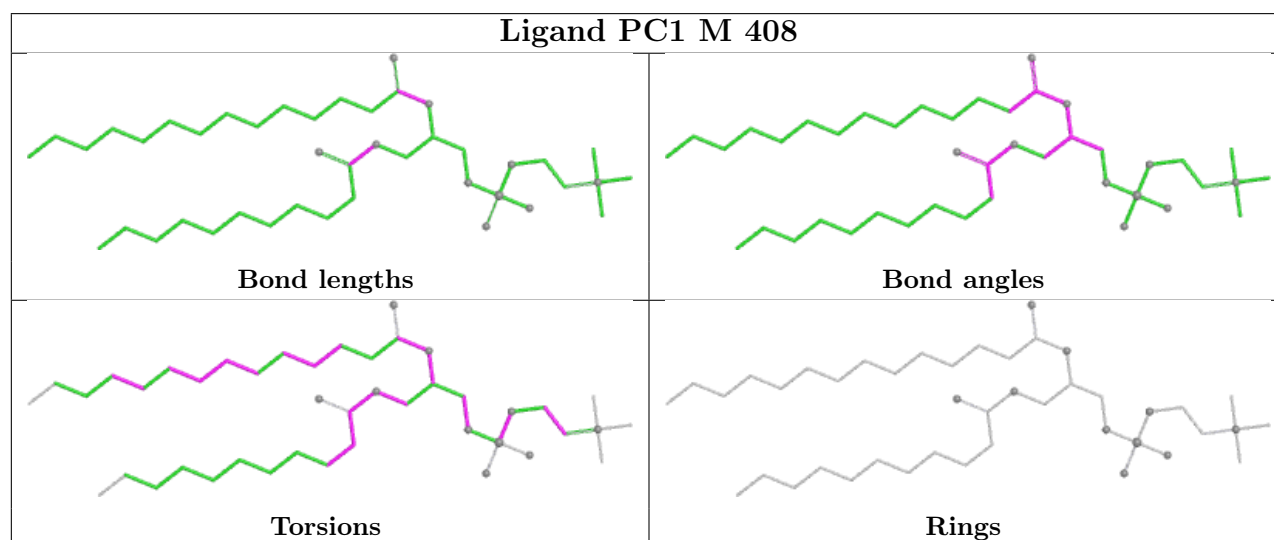
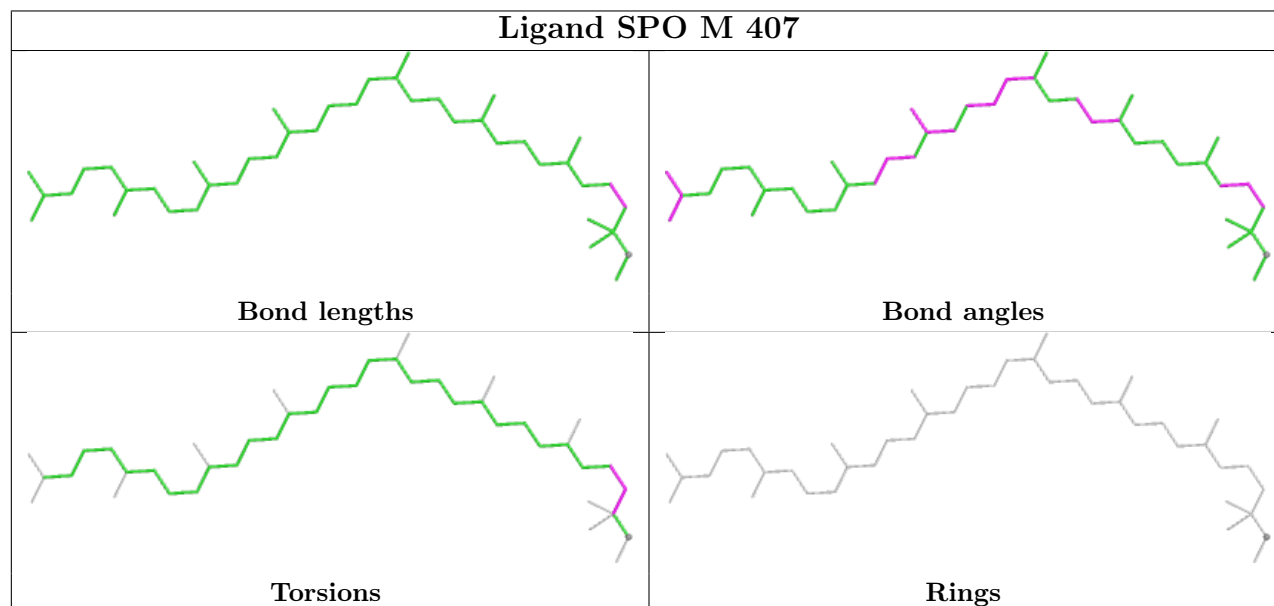
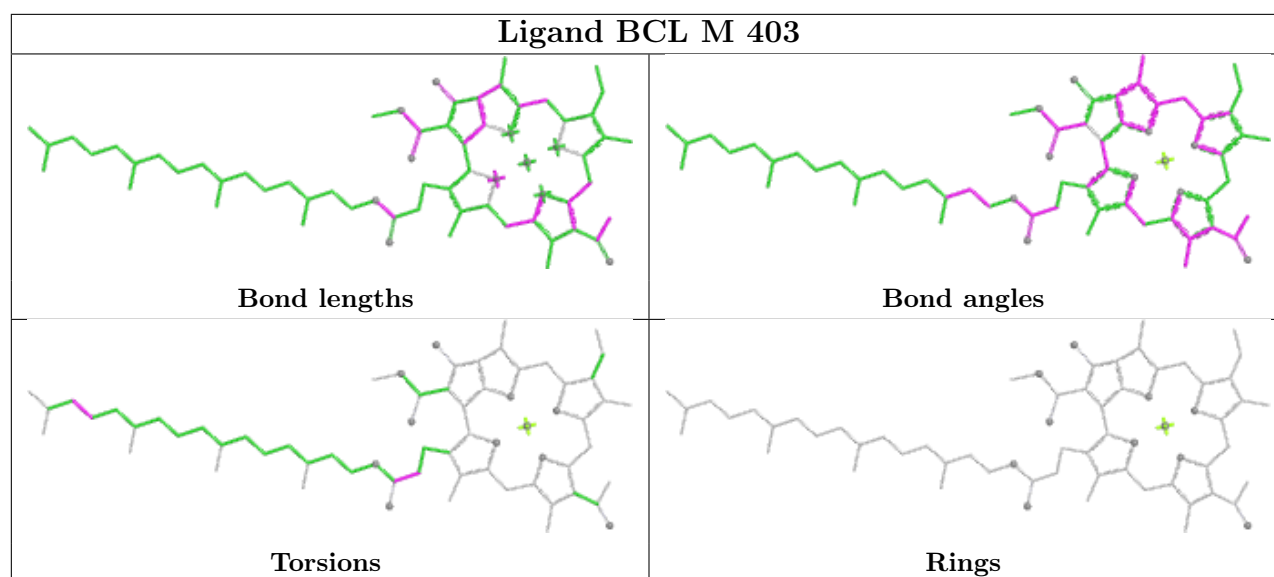
There are no ring outliers.

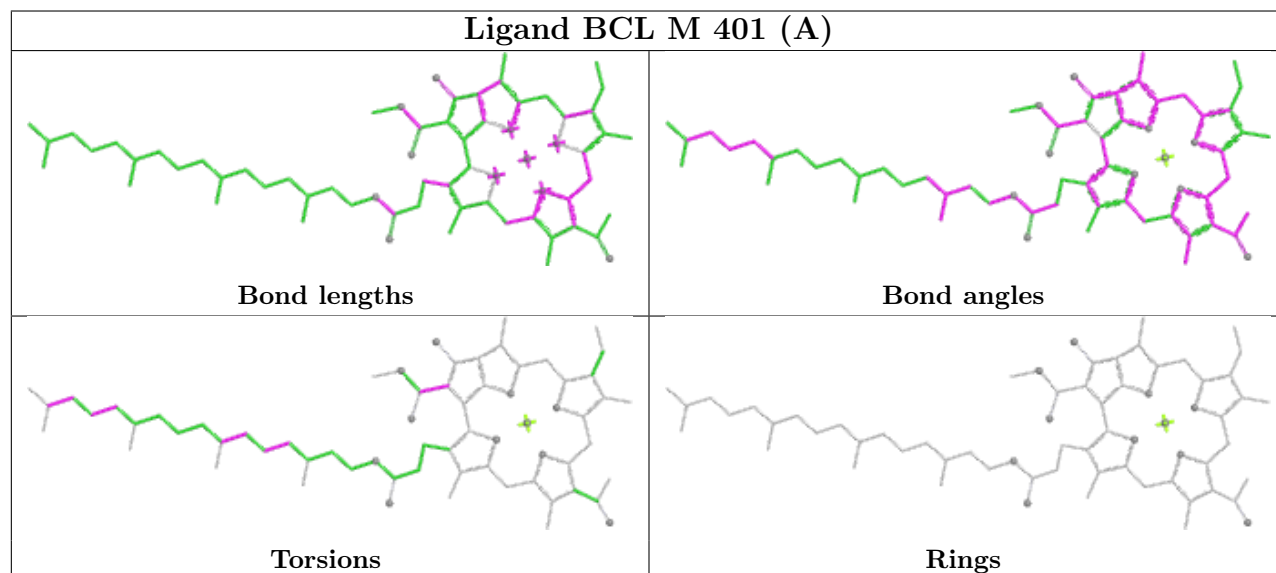
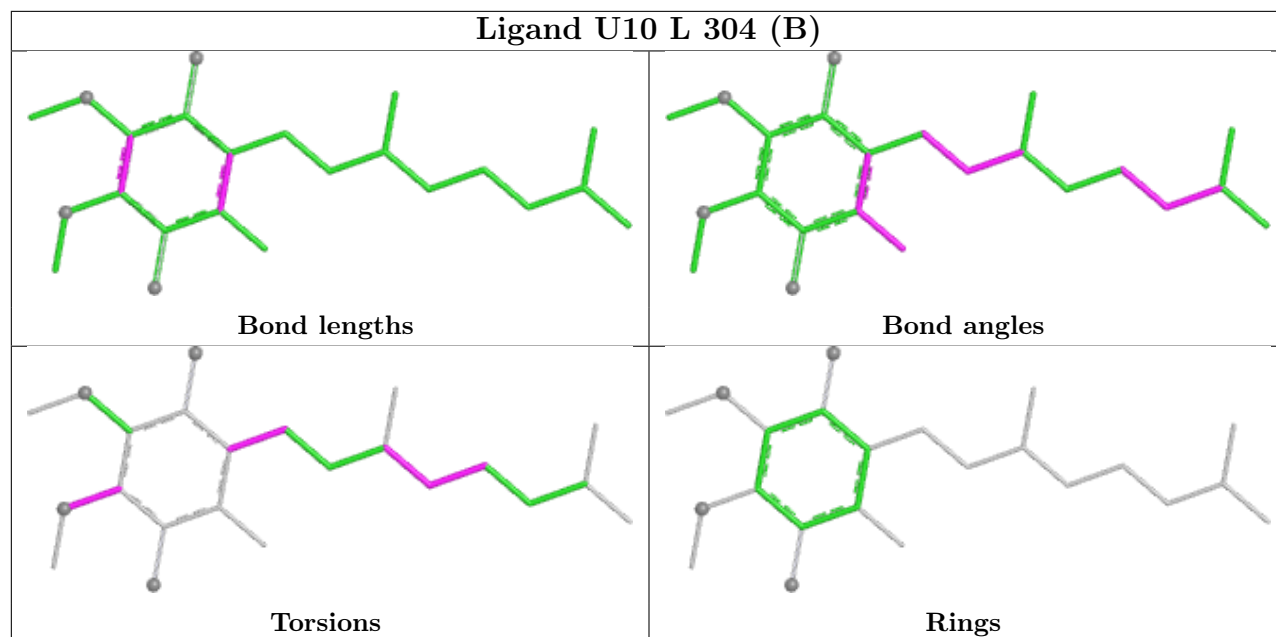
21 monomers are involved in 58 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	M	401[B]	BCL	3	0
4	M	412	LDA	3	0
4	L	302	LDA	1	0
5	L	303	BPH	3	0
7	M	403	BCL	11	0
12	M	407	SPO	1	0
9	H	308	HTO	1	0
6	L	304[B]	U10	6	0
8	L	306	PO4	1	0
7	M	401[A]	BCL	1	0
5	L	313	BPH	7	0
8	M	411	PO4	3	0
10	H	301	GOL	4	0
10	L	314	GOL	5	0
10	L	308	GOL	1	0
10	L	312	GOL	1	0
6	L	304[A]	U10	3	0
10	H	307	GOL	1	0
7	M	402	BCL	6	0
4	H	304	LDA	3	0
6	M	406	U10	2	0

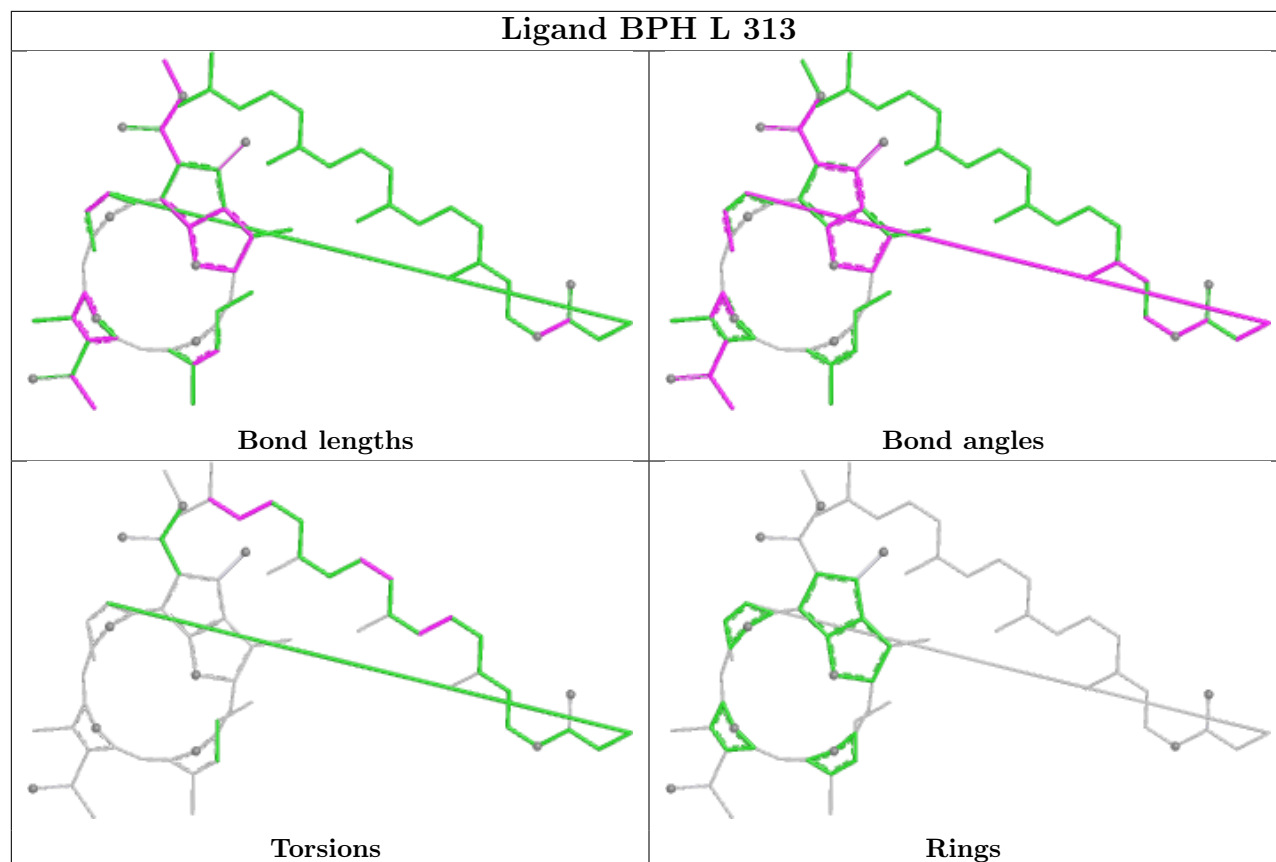
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



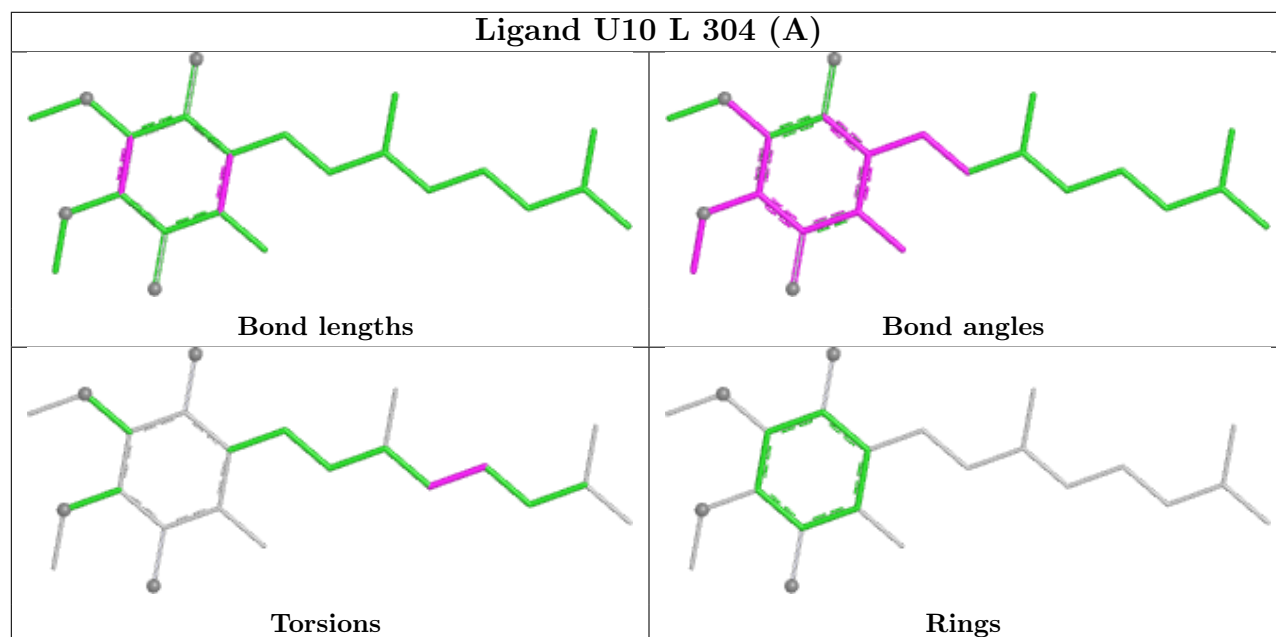


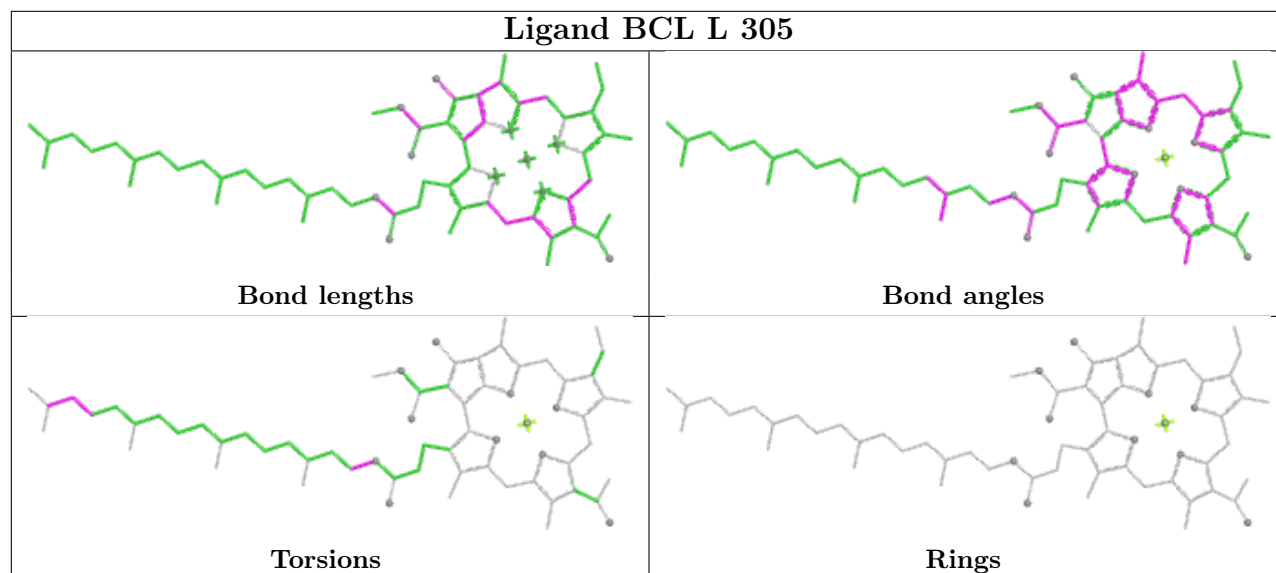
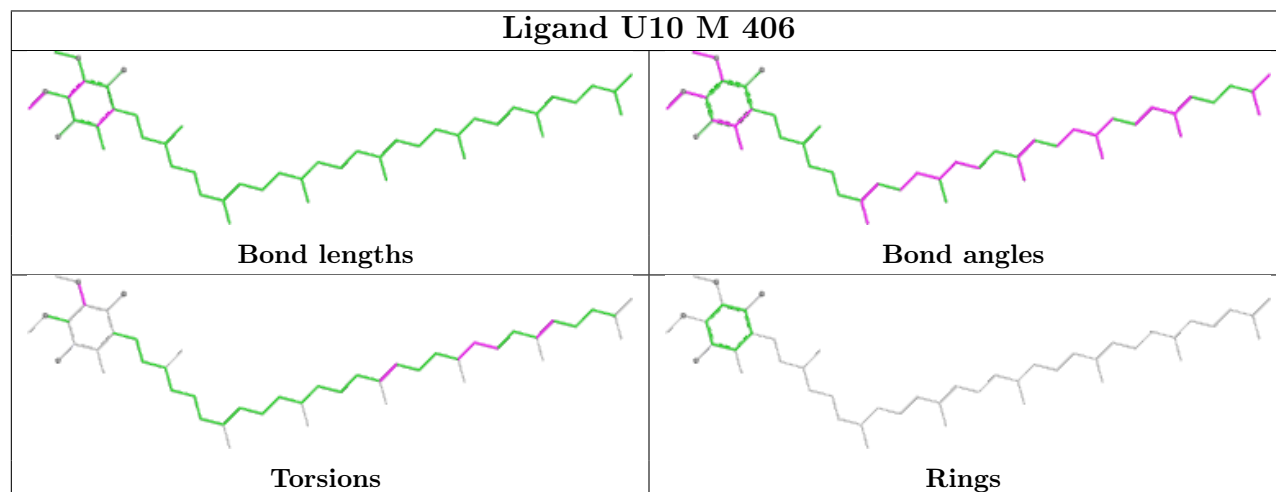
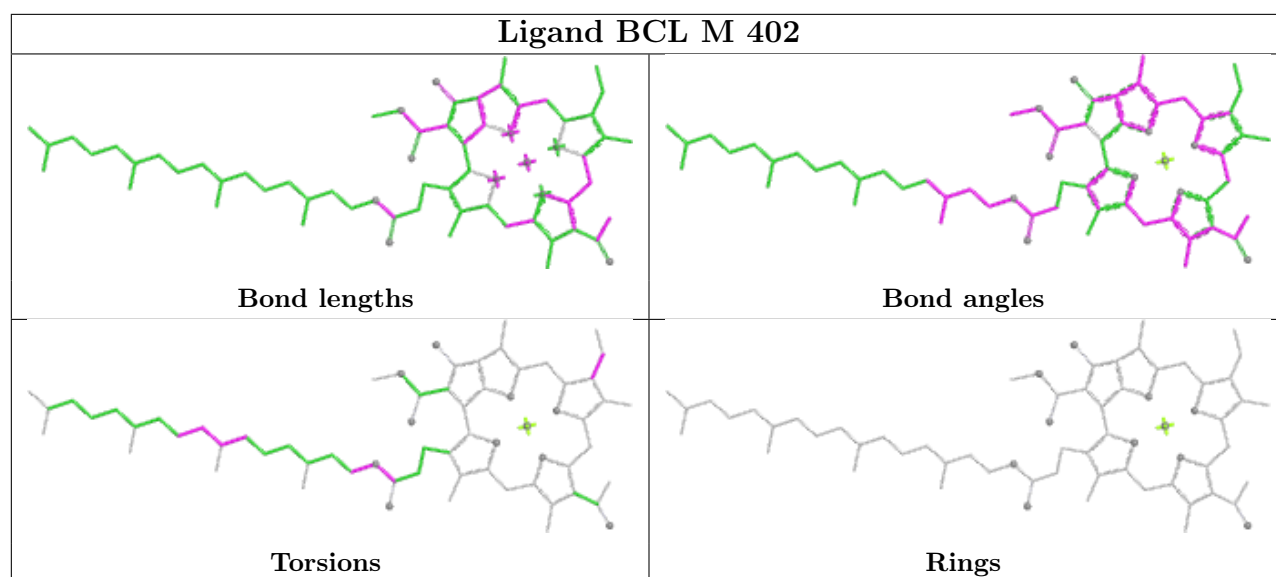


Ligand BPH L 313



Ligand U10 L 304 (A)





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	L	281/282 (99%)	0.21	7 (2%) 58 55	28, 38, 63, 83	2 (0%)
2	M	302/307 (98%)	0.27	10 (3%) 49 46	29, 42, 63, 104	7 (2%)
3	H	240/266 (90%)	0.09	6 (2%) 58 55	30, 40, 56, 106	8 (3%)
All	All	823/855 (96%)	0.20	23 (2%) 55 52	28, 40, 62, 106	17 (2%)

The worst 5 of 23 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	M	1	ALA	17.6
2	M	2	GLU	9.8
2	M	301	HIS	7.0
3	H	250	SER	6.3
3	H	249[A]	LYS	5.9

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](#)

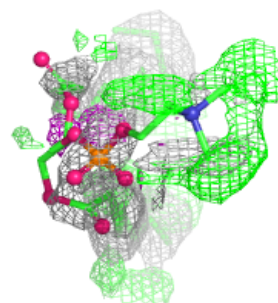
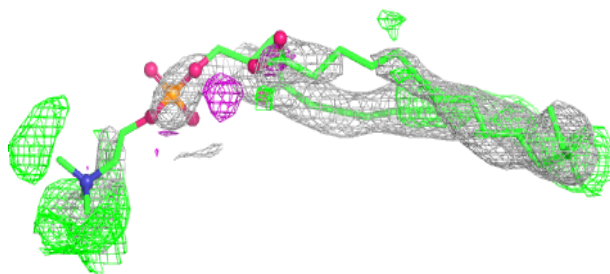
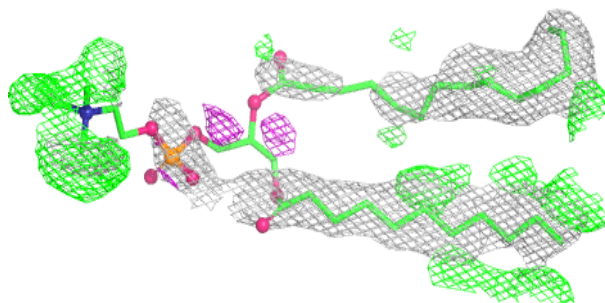
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q < 0.9’ lists 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
13	PC1	M	408	43/54	0.63	0.45	78,108,166,179	0
9	HTO	H	308	10/10	0.67	0.34	71,98,111,112	0
9	HTO	L	307	10/10	0.75	0.38	75,90,100,103	0
4	LDA	H	309	16/16	0.78	0.38	78,89,134,144	0
4	LDA	L	302	16/16	0.78	0.40	91,97,115,118	0
8	PO4	M	409	5/5	0.80	0.12	63,69,76,81	0
4	LDA	M	412	16/16	0.81	0.30	66,76,87,101	0
4	LDA	L	301	16/16	0.81	0.36	84,96,122,123	0
10	GOL	H	301	6/6	0.83	0.20	42,59,64,66	0
10	GOL	L	310	6/6	0.84	0.23	49,64,77,81	0
10	GOL	M	410	6/6	0.85	0.16	61,61,69,69	0
10	GOL	L	309	6/6	0.85	0.20	82,82,88,89	0
10	GOL	H	303	6/6	0.85	0.15	73,80,83,83	0
4	LDA	M	404	16/16	0.85	0.27	66,78,98,98	0
10	GOL	H	302	6/6	0.87	0.21	68,76,78,88	0
6	U10	L	304[A]	23/63	0.90	0.22	32,59,75,78	23
6	U10	L	304[B]	23/63	0.90	0.22	47,64,69,74	23
10	GOL	L	314	6/6	0.91	0.19	58,69,75,77	0
7	BCL	M	401[B]	66/66	0.91	0.17	24,35,62,70	20
10	GOL	L	308	6/6	0.91	0.18	42,58,66,72	0
4	LDA	H	304	16/16	0.91	0.18	49,66,81,82	0
7	BCL	M	401[A]	66/66	0.91	0.17	24,35,53,65	20
10	GOL	H	305	6/6	0.91	0.15	41,49,58,68	0
10	GOL	L	311	6/6	0.91	0.17	54,67,77,82	0
10	GOL	H	307	6/6	0.93	0.16	56,73,81,85	0
10	GOL	L	312	6/6	0.93	0.13	53,55,60,61	0
6	U10	M	406	48/63	0.94	0.14	30,53,78,90	0
12	SPO	M	407	42/42	0.95	0.12	34,43,80,96	0
5	BPH	L	313	65/65	0.95	0.13	31,41,118,122	0
8	PO4	L	306	5/5	0.96	0.11	56,56,61,64	0
5	BPH	L	303	65/65	0.96	0.09	27,34,44,49	0
7	BCL	L	305	66/66	0.97	0.08	28,35,50,71	0
7	BCL	M	402	66/66	0.97	0.10	29,36,81,84	0
7	BCL	M	403	66/66	0.97	0.08	28,33,55,81	0
8	PO4	M	411	5/5	0.98	0.07	47,48,60,64	0
14	K	H	306	1/1	0.98	0.05	46,46,46,46	0
11	FE	M	405	1/1	1.00	0.01	30,30,30,30	0

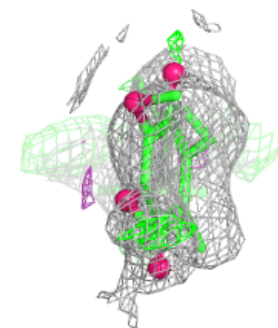
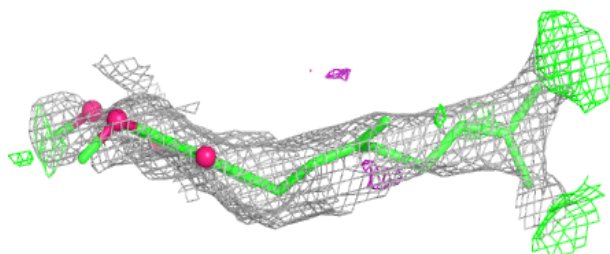
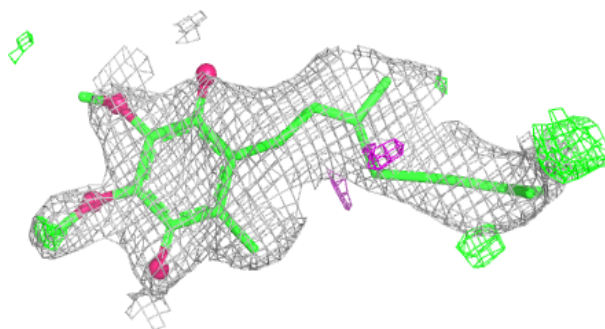
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around PC1 M 408:

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

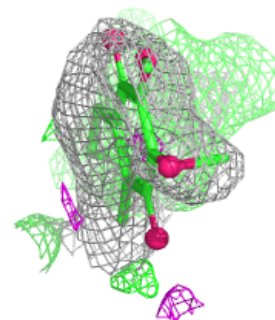
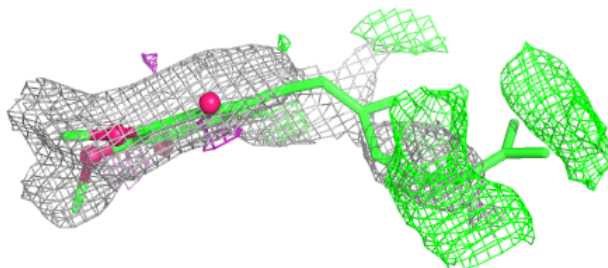
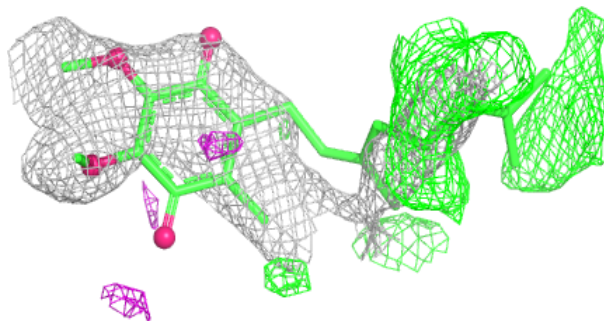
**Electron density around U10 L 304 (A):**

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



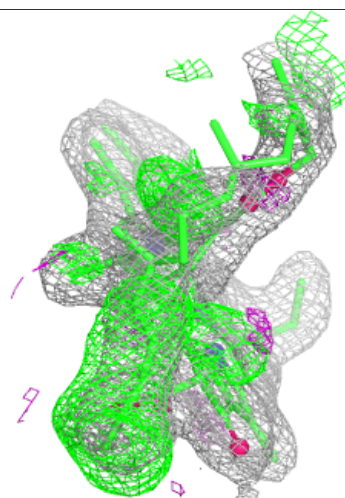
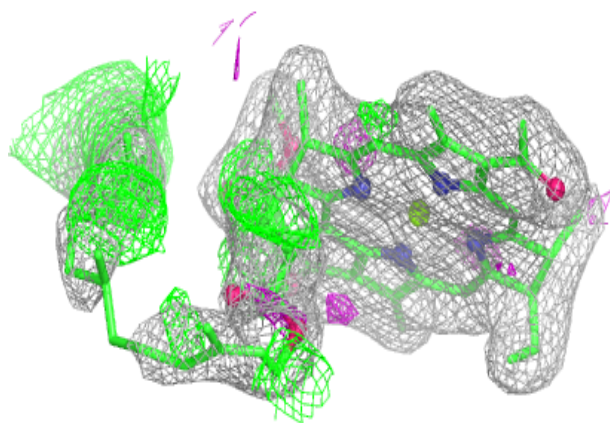
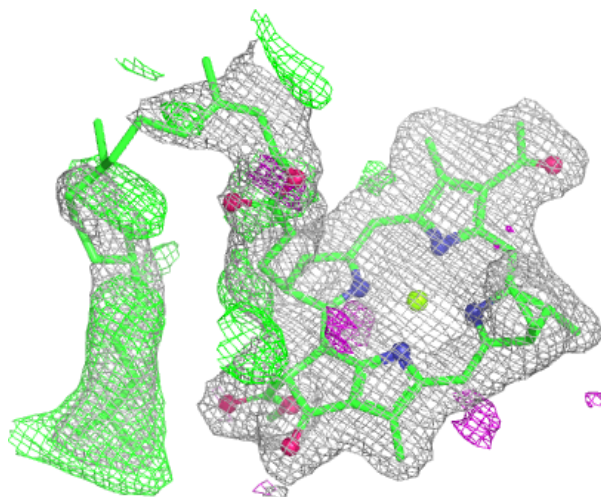
Electron density around U10 L 304 (B):

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



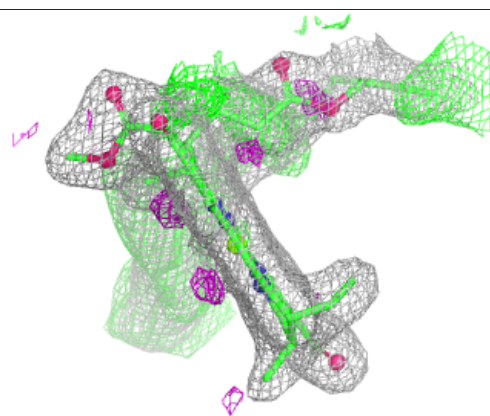
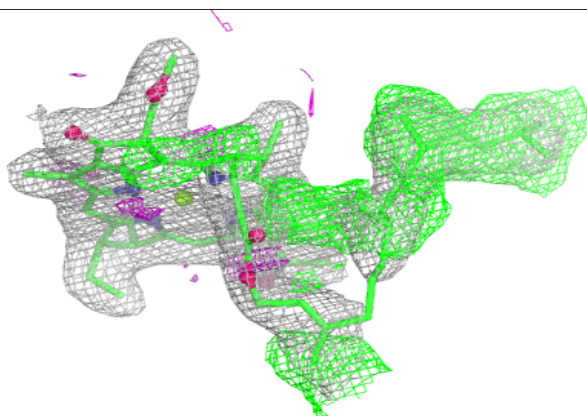
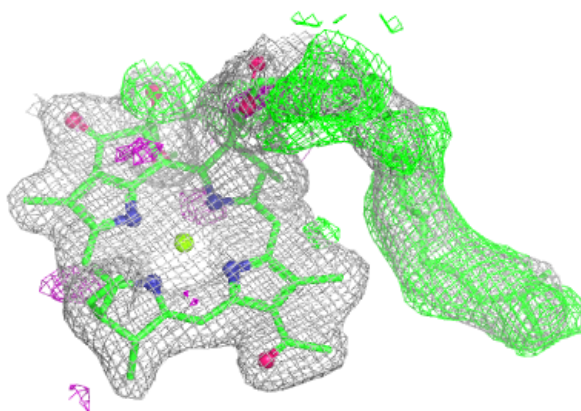
Electron density around BCL M 401 (B):

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

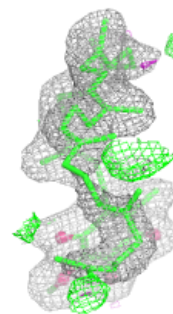
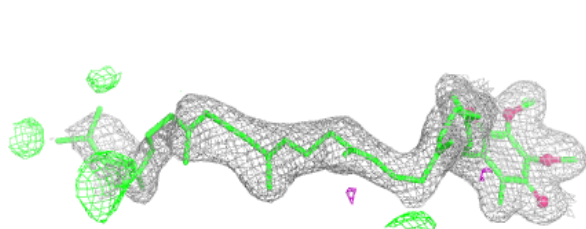
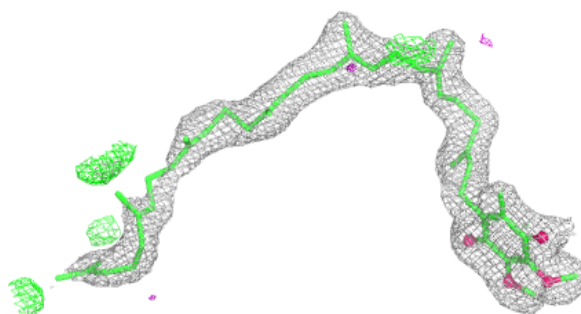


Electron density around BCL M 401 (A):

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

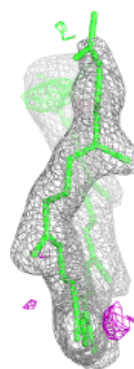
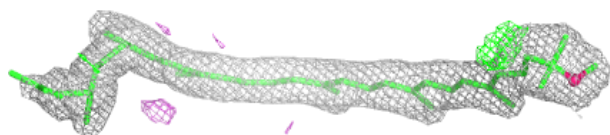
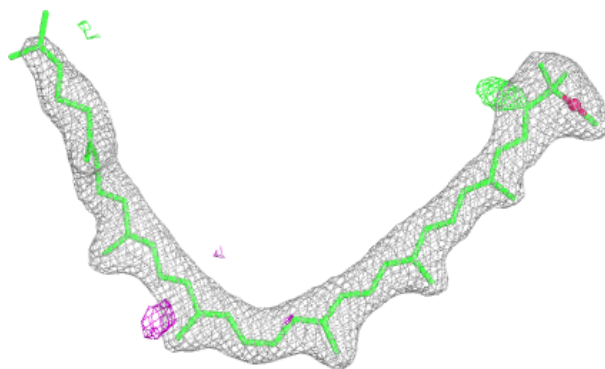
**Electron density around U10 M 406:**

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

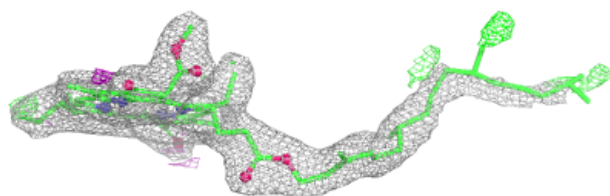
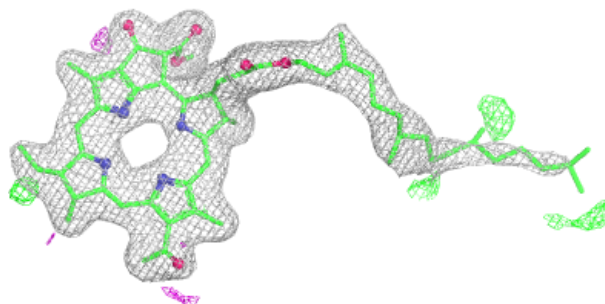


Electron density around SPO M 407:

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

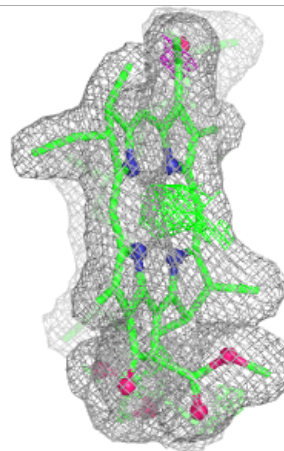
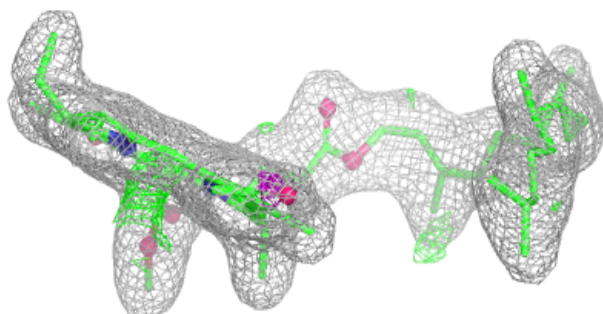
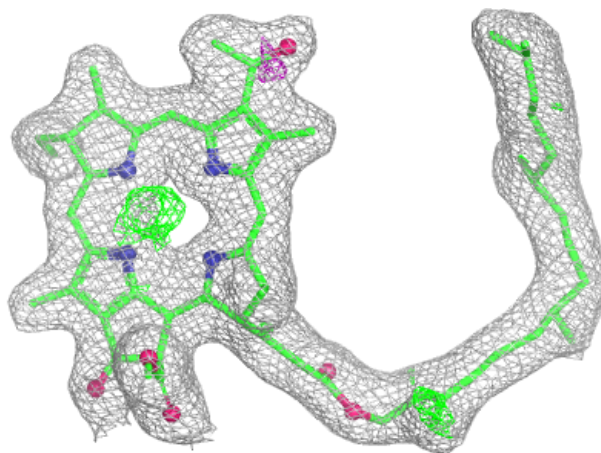
**Electron density around BPH L 313:**

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



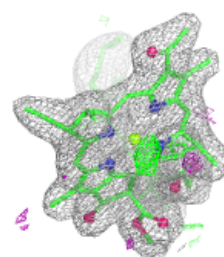
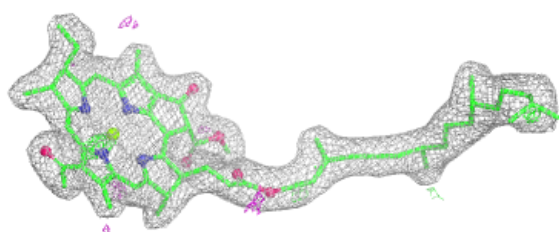
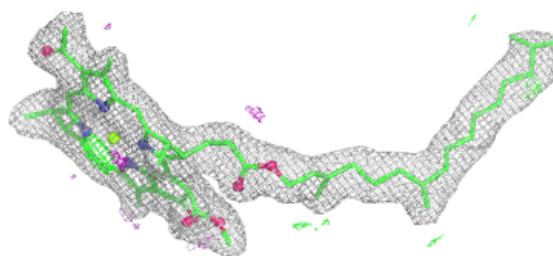
Electron density around BPH L 303:

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

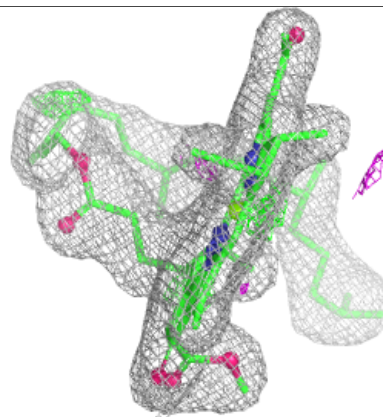
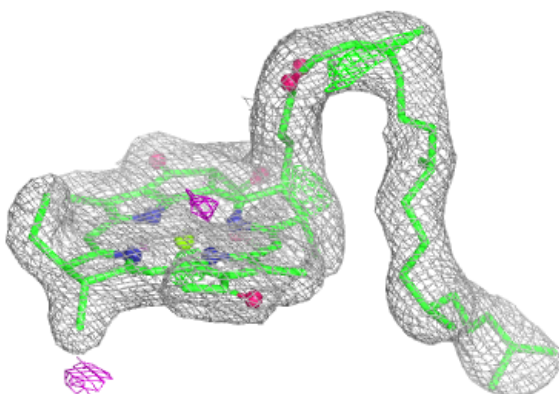
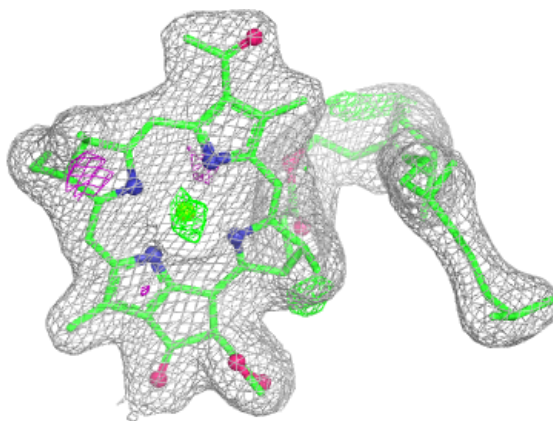


Electron density around BCL L 305:

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

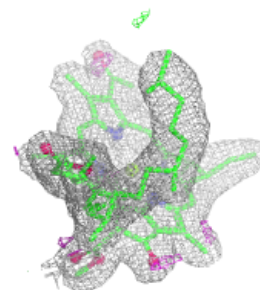
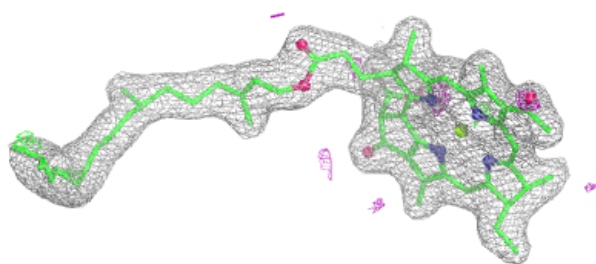
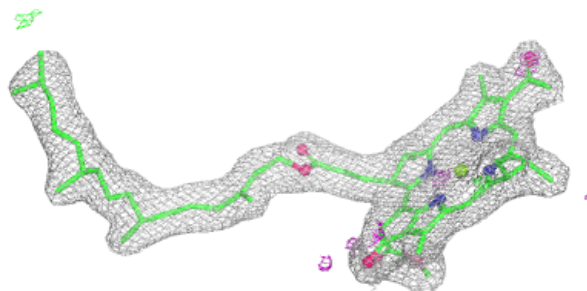
**Electron density around BCL M 402:**

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



Electron density around BCL M 403:

$2mF_o-DF_c$ (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.