



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 04:36 AM UTC

PDB ID : 4MBS / pdb_00004mbs
Title : Crystal Structure of the CCR5 Chemokine Receptor
Authors : Tan, Q.; Zhu, Y.; Han, G.W.; Li, J.; Fenalti, G.; Liu, H.; Cherezov, V.;
Stevens, R.C.; GPCR Network (GPCR); Zhao, Q.; Wu, B.
Deposited on : 2013-08-19
Resolution : 2.71 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

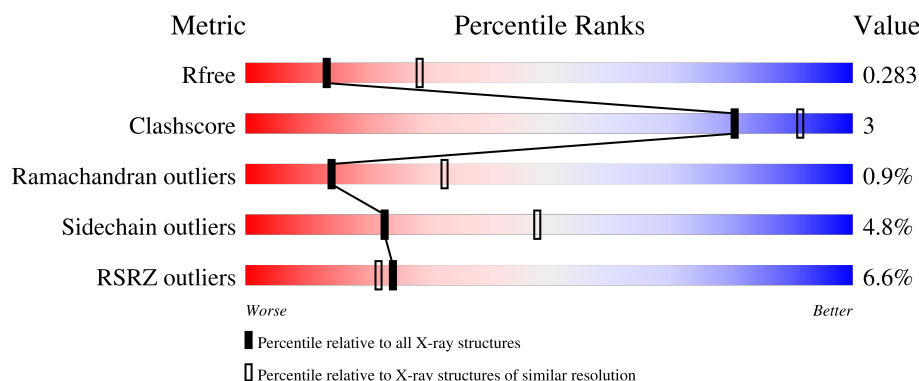
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.71 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	4348 (2.74-2.70)
Clashscore	190562	4665 (2.74-2.70)
Ramachandran outliers	187476	4584 (2.74-2.70)
Sidechain outliers	187428	4585 (2.74-2.70)
RSRZ outliers	180081	4348 (2.74-2.70)

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	414	7% 73% 10% 16%
1	B	414	5% 73% 10% 16%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5764 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 Chimera protein of C-C chemokine receptor type 5 and Rubredoxin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	346	Total	C	N	O	S	0	0	0
			2742	1828	426	469	19			
1	B	346	Total	C	N	O	S	0	0	0
			2744	1828	427	470	19			

There are 32 discrepancies between the modelled and reference sequences:

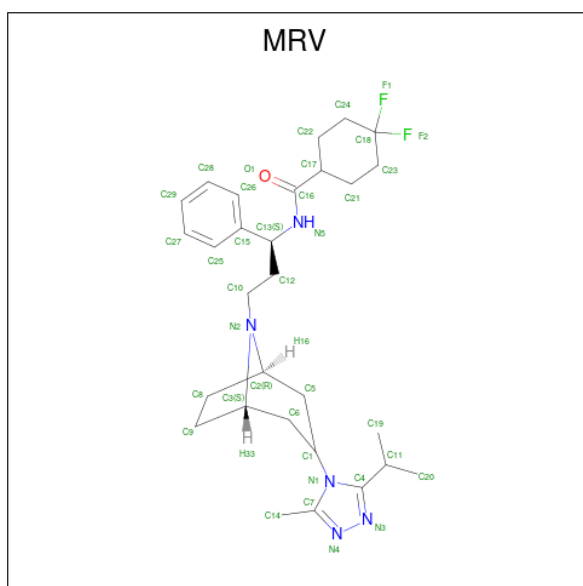
Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP P51681
A	0	ALA	-	expression tag	UNP P51681
A	1	PRO	-	expression tag	UNP P51681
A	58	TYR	CYS	engineered mutation	UNP P51681
A	163	ASN	GLY	engineered mutation	UNP P51681
A	233	ASP	ALA	engineered mutation	UNP P51681
A	303	GLU	LYS	engineered mutation	UNP P51681
A	353	GLY	-	expression tag	UNP P51681
A	354	ARG	-	expression tag	UNP P51681
A	355	PRO	-	expression tag	UNP P51681
A	356	LEU	-	expression tag	UNP P51681
A	357	GLU	-	expression tag	UNP P51681
A	358	VAL	-	expression tag	UNP P51681
A	359	LEU	-	expression tag	UNP P51681
A	360	PHE	-	expression tag	UNP P51681
A	361	GLN	-	expression tag	UNP P51681
B	-1	GLY	-	expression tag	UNP P51681
B	0	ALA	-	expression tag	UNP P51681
B	1	PRO	-	expression tag	UNP P51681
B	58	TYR	CYS	engineered mutation	UNP P51681
B	163	ASN	GLY	engineered mutation	UNP P51681
B	233	ASP	ALA	engineered mutation	UNP P51681
B	303	GLU	LYS	engineered mutation	UNP P51681
B	353	GLY	-	expression tag	UNP P51681

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Chain	Residue	Modelled	Actual	Comment	Reference
B	354	ARG	-	expression tag	UNP P51681
B	355	PRO	-	expression tag	UNP P51681
B	356	LEU	-	expression tag	UNP P51681
B	357	GLU	-	expression tag	UNP P51681
B	358	VAL	-	expression tag	UNP P51681
B	359	LEU	-	expression tag	UNP P51681
B	360	PHE	-	expression tag	UNP P51681
B	361	GLN	-	expression tag	UNP P51681

- Molecule 2 is 4,4-difluoro-N-[(1S)-3-{(3-exo)-3-[3-methyl-5-(propan-2-yl)-4H-1,2,4-triazol-4-yl]-8-azabicyclo[3.2.1]oct-8-yl}-1-phenylpropyl]cyclohexanecarboxamide (CCD ID: MRV) (formula: C₂₉H₄₁F₂N₅O).

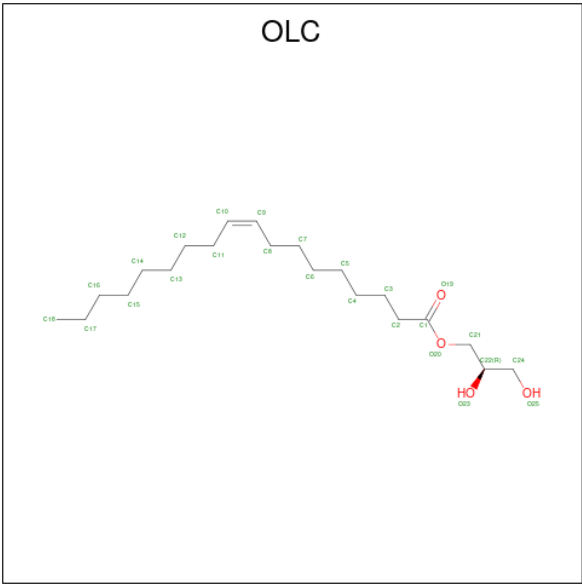


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			37	29	2	5	1		
2	B	1	Total	C	F	N	O	0	0
			37	29	2	5	1		

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Zn	0	0
			1	1		
3	B	1	Total	Zn	0	0
			1	1		

- Molecule 4 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (CCD ID: OLC) (formula: C₂₁H₄₀O₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			16	12	4		
4	A	1	Total	C	O	0	0
			13	9	4		
4	A	1	Total	C	O	0	0
			15	11	4		
4	A	1	Total	C	O	0	0
			25	21	4		
4	A	1	Total	C	O	0	0
			19	15	4		
4	A	1	Total	C	O	0	0
			12	8	4		
4	B	1	Total	C	O	0	0
			17	13	4		
4	B	1	Total	C	O	0	0
			12	8	4		
4	B	1	Total	C	O	0	0
			13	9	4		
4	B	1	Total	C	O	0	0
			12	8	4		

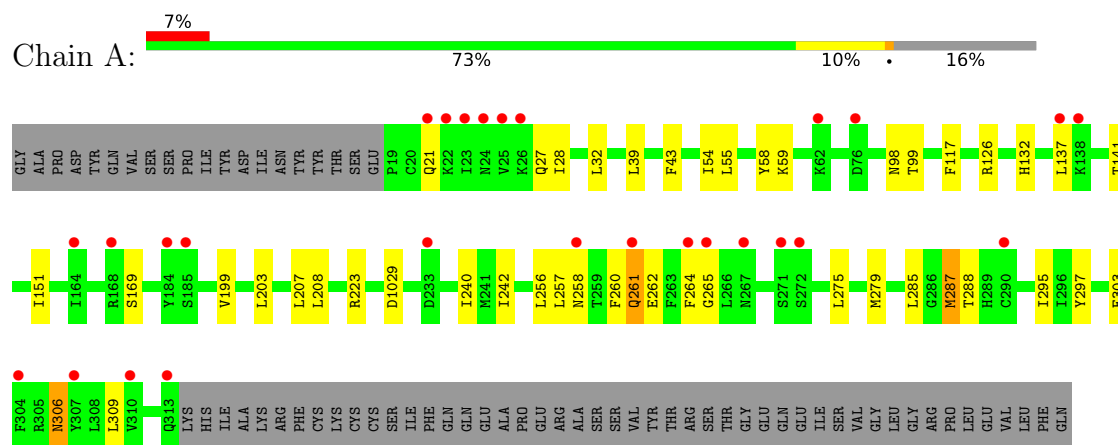
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	22	Total 22	O 22	0	0
5	B	26	Total 26	O 26	0	0

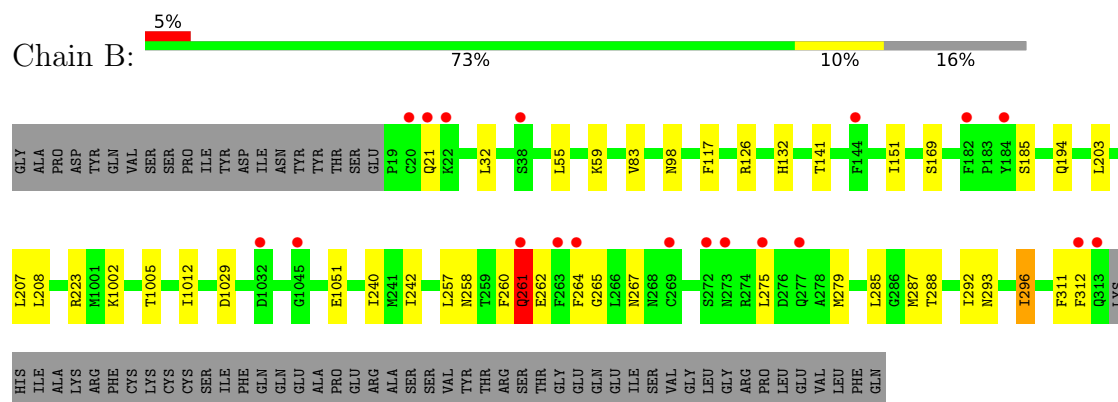
3 Residue-property plots [i](#)

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: Chimera protein of C-C chemokine receptor type 5 and Rubredoxin



- Molecule 1: Chimera protein of C-C chemokine receptor type 5 and Rubredoxin



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	72.92Å 103.52Å 137.47Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	36.33 – 2.71 36.33 – 2.71	Depositor EDS
% Data completeness (in resolution range)	95.5 (36.33-2.71) 95.5 (36.33-2.71)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.50 (at 2.72Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.216 , 0.263 0.224 , 0.283	Depositor DCC
R_{free} test set	1416 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	61.2	Xtriage
Anisotropy	0.392	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 65.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5764	wwPDB-VP
Average B, all atoms (Å ²)	72.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 38.92 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.4299e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MRV, OLC, ZN

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	0.87	0/2820	1.35	6/3850 (0.2%)
1	B	0.86	1/2821 (0.0%)	1.34	9/3848 (0.2%)
All	All	0.86	1/5641 (0.0%)	1.34	15/7698 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	83	VAL	CA-C	5.15	1.58	1.52

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	312	PHE	CA-CB-CG	5.74	119.54	113.80
1	B	1029	ASP	CA-CB-CG	5.66	118.26	112.60
1	A	287	MET	CA-C-N	5.56	128.50	120.38
1	A	287	MET	C-N-CA	5.56	128.50	120.38
1	B	292	ILE	N-CA-C	5.49	115.69	110.53
1	A	1029	ASP	CA-CB-CG	5.48	118.08	112.60
1	B	117	PHE	CA-CB-CG	5.30	119.10	113.80
1	A	117	PHE	CA-CB-CG	5.18	118.98	113.80
1	B	132	HIS	CA-C-N	5.08	127.40	120.54
1	B	132	HIS	C-N-CA	5.08	127.40	120.54
1	B	311	PHE	N-CA-C	-5.05	104.20	110.41
1	A	132	HIS	CA-C-N	5.03	127.78	120.79
1	A	132	HIS	C-N-CA	5.03	127.78	120.79
1	B	185	SER	CA-C-N	5.02	131.13	121.54
1	B	185	SER	C-N-CA	5.02	131.13	121.54

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	2742	0	2679	16	0
1	B	2744	0	2686	14	0
2	A	37	0	41	0	0
2	B	37	0	41	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	100	0	133	1	0
4	B	54	0	63	0	0
5	A	22	0	0	0	0
5	B	26	0	0	0	0
All	All	5764	0	5643	30	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.

All (30) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:240:ILE:HG12	1:B:296:ILE:HD11	1.61	0.81
1:B:257:LEU:HA	1:B:261:GLN:HB2	1.71	0.73
1:A:257:LEU:HA	1:A:261:GLN:HB2	1.73	0.70
1:B:261:GLN:HA	1:B:264:PHE:HB2	1.72	0.70
1:A:261:GLN:HA	1:A:264:PHE:HB2	1.72	0.69
1:A:240:ILE:HD11	1:A:297:TYR:HE1	1.68	0.58
1:A:43:PHE:HE2	1:A:295:ILE:HD11	1.69	0.57
1:A:306:ASN:HA	1:A:309:LEU:HD12	1.89	0.55
1:A:199:VAL:HG21	1:A:256:LEU:HD13	1.91	0.53
1:B:240:ILE:HG12	1:B:296:ILE:CD1	2.38	0.52
1:A:54:ILE:HG23	1:A:58:TYR:HD2	1.75	0.52
1:B:257:LEU:HD12	1:B:261:GLN:HG2	1.93	0.50
1:B:293:ASN:O	1:B:296:ILE:HG12	2.12	0.49
1:A:98:ASN:HA	1:A:169:SER:HB3	1.95	0.49
1:B:1005:THR:HB	1:B:1012:ILE:HD13	1.95	0.47
1:A:43:PHE:CE2	1:A:295:ILE:HD11	2.48	0.46
1:A:258:ASN:HA	1:A:275:LEU:HD23	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:258:ASN:HA	1:B:275:LEU:HD23	1.98	0.46
1:A:260:PHE:C	1:A:262:GLU:H	2.24	0.44
1:B:260:PHE:C	1:B:262:GLU:H	2.24	0.44
1:A:257:LEU:HD12	1:A:261:GLN:HG3	2.00	0.44
1:A:55:LEU:HA	1:A:59:LYS:HB2	2.00	0.44
1:B:203:LEU:O	1:B:207:LEU:HB2	2.18	0.43
1:A:203:LEU:O	1:A:207:LEU:HB2	2.18	0.43
1:B:55:LEU:HA	1:B:59:LYS:HB2	2.00	0.43
1:A:99:THR:HG23	4:A:1106:OLC:H22	2.00	0.42
1:B:98:ASN:HA	1:B:169:SER:HB3	2.02	0.42
1:B:285:LEU:O	1:B:288:THR:HB	2.20	0.42
1:B:1002:LYS:HD3	1:B:1051:GLU:HG3	2.03	0.41
1:A:285:LEU:O	1:A:288:THR:HB	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	344/414 (83%)	332 (96%)	9 (3%)	3 (1%)	14	33
1	B	344/414 (83%)	332 (96%)	9 (3%)	3 (1%)	14	33
All	All	688/828 (83%)	664 (96%)	18 (3%)	6 (1%)	14	33

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	261	GLN
1	B	261	GLN
1	A	21	GLN
1	B	21	GLN
1	B	265	GLY

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Mol	Chain	Res	Type
1	A	265	GLY

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	289/371 (78%)	274 (95%)	15 (5%)	21	45
1	B	289/371 (78%)	276 (96%)	13 (4%)	24	50
All	All	578/742 (78%)	550 (95%)	28 (5%)	23	48

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	27	GLN
1	A	28	ILE
1	A	32	LEU
1	A	39	LEU
1	A	126	ARG
1	A	137	LEU
1	A	141	THR
1	A	151	ILE
1	A	208	LEU
1	A	223	ARG
1	A	242	ILE
1	A	279	MET
1	A	287	MET
1	A	303	GLU
1	A	306	ASN
1	B	32	LEU
1	B	126	ARG
1	B	141	THR
1	B	151	ILE
1	B	194	GLN
1	B	208	LEU
1	B	223	ARG

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Mol	Chain	Res	Type
1	B	242	ILE
1	B	261	GLN
1	B	267	ASN
1	B	279	MET
1	B	287	MET
1	B	296	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	24	ASN
1	A	27	GLN
1	A	102	GLN
1	A	132	HIS
1	A	163	ASN
1	A	186	GLN
1	A	192	ASN
1	A	194	GLN
1	A	1025	ASN
1	A	273	ASN
1	B	132	HIS
1	B	188	GLN
1	B	192	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 2 are monoatomic - leaving 12 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
4	OLC	A	1107	-	18,18,24	1.14	1 (5%)	19,19,25	1.06	2 (10%)
4	OLC	A	1104	-	12,12,24	1.35	1 (8%)	13,13,25	1.21	1 (7%)
4	OLC	A	1105	-	14,14,24	1.25	1 (7%)	15,15,25	0.95	1 (6%)
4	OLC	B	1105	-	12,12,24	1.41	1 (8%)	13,13,25	1.00	1 (7%)
4	OLC	B	1103	-	16,16,24	1.20	1 (6%)	17,17,25	0.99	1 (5%)
4	OLC	A	1106	-	24,24,24	0.97	1 (4%)	25,25,25	0.86	1 (4%)
2	MRV	B	1101	-	41,41,41	2.35	10 (24%)	48,60,60	1.29	5 (10%)
4	OLC	A	1108	-	11,11,24	1.44	1 (9%)	12,12,25	1.06	1 (8%)
4	OLC	B	1106	-	11,11,24	1.44	1 (9%)	12,12,25	1.10	1 (8%)
2	MRV	A	1101	-	41,41,41	2.31	7 (17%)	48,60,60	1.37	4 (8%)
4	OLC	B	1104	-	11,11,24	1.37	1 (9%)	12,12,25	1.10	2 (16%)
4	OLC	A	1103	-	15,15,24	1.24	1 (6%)	16,16,25	1.07	1 (6%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	OLC	A	1107	-	-	10/18/18/24	-
4	OLC	A	1104	-	-	9/12/12/24	-
4	OLC	A	1105	-	-	8/14/14/24	-
4	OLC	B	1105	-	-	7/12/12/24	-
4	OLC	B	1103	-	-	9/16/16/24	-
4	OLC	A	1106	-	-	11/24/24/24	-
2	MRV	B	1101	-	-	3/25/58/58	0/6/5/5
4	OLC	A	1108	-	-	5/11/11/24	-
4	OLC	B	1106	-	-	5/11/11/24	-
2	MRV	A	1101	-	-	2/25/58/58	0/6/5/5
4	OLC	B	1104	-	-	5/11/11/24	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	OLC	A	1103	-	-	9/15/15/24	-

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1101	MRV	C15-C13	-8.71	1.40	1.52
2	B	1101	MRV	C15-C13	-8.37	1.40	1.52
2	A	1101	MRV	N4-N3	-8.20	1.22	1.39
2	B	1101	MRV	N4-N3	-7.50	1.23	1.39
4	B	1105	OLC	O20-C1	4.64	1.46	1.33
4	B	1106	OLC	O20-C1	4.62	1.46	1.33
4	A	1103	OLC	O20-C1	4.60	1.46	1.33
4	A	1108	OLC	O20-C1	4.57	1.46	1.33
4	A	1107	OLC	O20-C1	4.53	1.46	1.33
4	A	1104	OLC	O20-C1	4.53	1.46	1.33
4	B	1103	OLC	O20-C1	4.50	1.46	1.33
4	A	1106	OLC	O20-C1	4.46	1.46	1.33
4	A	1105	OLC	O20-C1	4.43	1.46	1.33
4	B	1104	OLC	O20-C1	4.36	1.46	1.33
2	A	1101	MRV	C7-N1	-3.94	1.33	1.38
2	B	1101	MRV	C24-C18	3.91	1.58	1.50
2	A	1101	MRV	C24-C18	3.43	1.57	1.50
2	B	1101	MRV	C7-N1	-3.40	1.34	1.38
2	A	1101	MRV	C14-C7	3.26	1.54	1.49
2	B	1101	MRV	C14-C7	3.08	1.54	1.49
2	B	1101	MRV	C23-C18	2.80	1.56	1.50
2	B	1101	MRV	C4-N3	2.53	1.34	1.32
2	B	1101	MRV	C6-C1	2.36	1.57	1.53
2	A	1101	MRV	C7-N4	2.12	1.34	1.31
2	A	1101	MRV	C4-N3	2.06	1.34	1.32
2	B	1101	MRV	C24-C22	2.05	1.57	1.53
2	B	1101	MRV	C7-N4	2.01	1.34	1.31

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1101	MRV	C6-C1-C5	4.30	115.52	110.27
2	A	1101	MRV	C24-C18-C23	-4.18	110.18	114.33
2	A	1101	MRV	C6-C1-C5	4.14	115.32	110.27
2	A	1101	MRV	N1-C4-N3	-3.85	109.46	110.99
2	B	1101	MRV	N1-C4-N3	-3.60	109.56	110.99
4	A	1107	OLC	O20-C1-C2	3.06	121.17	111.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1103	OLC	O20-C1-C2	2.94	120.81	111.83
4	A	1104	OLC	O20-C1-C2	2.94	120.80	111.83
2	B	1101	MRV	C24-C18-C23	-2.90	111.45	114.33
4	B	1104	OLC	O20-C1-C2	2.72	120.14	111.83
4	A	1106	OLC	O20-C1-C2	2.71	120.09	111.83
4	B	1103	OLC	O20-C1-C2	2.70	120.08	111.83
2	B	1101	MRV	C14-C7-N1	2.60	126.34	123.28
4	B	1106	OLC	O20-C1-C2	2.57	119.66	111.83
4	A	1107	OLC	O20-C1-O19	-2.52	117.32	123.63
4	A	1105	OLC	O20-C1-C2	2.42	119.23	111.83
4	A	1108	OLC	O20-C1-C2	2.42	119.20	111.83
2	A	1101	MRV	C14-C7-N1	2.22	125.89	123.28
4	B	1105	OLC	O20-C1-C2	2.16	118.44	111.83
4	B	1104	OLC	O20-C1-O19	-2.12	118.32	123.63
2	B	1101	MRV	C3-N2-C2	2.02	102.59	100.97

There are no chirality outliers.

All (83) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1101	MRV	C10-C12-C13-N5
4	A	1103	OLC	O20-C21-C22-C24
4	A	1104	OLC	C21-C22-C24-O25
4	A	1104	OLC	O20-C21-C22-C24
4	A	1104	OLC	O20-C21-C22-O23
4	A	1105	OLC	C21-C22-C24-O25
4	A	1105	OLC	O20-C21-C22-C24
4	A	1107	OLC	C21-C22-C24-O25
4	A	1107	OLC	O20-C21-C22-C24
4	A	1108	OLC	C21-C22-C24-O25
4	B	1105	OLC	O20-C21-C22-O23
4	A	1107	OLC	O19-C1-O20-C21
4	A	1107	OLC	C2-C1-O20-C21
4	A	1106	OLC	C2-C1-O20-C21
4	B	1103	OLC	C2-C1-O20-C21
4	B	1104	OLC	C2-C1-O20-C21
4	B	1104	OLC	O19-C1-O20-C21
4	A	1103	OLC	C2-C1-O20-C21
4	A	1108	OLC	O20-C21-C22-O23
4	B	1103	OLC	O19-C1-O20-C21
4	A	1103	OLC	O19-C1-O20-C21
4	A	1106	OLC	O19-C1-O20-C21

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Mol	Chain	Res	Type	Atoms
4	A	1104	OLC	C2-C1-O20-C21
4	A	1105	OLC	C2-C1-O20-C21
4	A	1106	OLC	O20-C21-C22-C24
4	B	1105	OLC	O20-C21-C22-C24
4	A	1106	OLC	O20-C21-C22-O23
4	A	1107	OLC	O20-C21-C22-O23
4	A	1104	OLC	O19-C1-O20-C21
4	A	1105	OLC	O19-C1-O20-C21
4	A	1103	OLC	C1-C2-C3-C4
4	A	1104	OLC	C1-C2-C3-C4
4	B	1103	OLC	C1-C2-C3-C4
4	A	1103	OLC	O20-C21-C22-O23
4	A	1105	OLC	O20-C21-C22-O23
4	B	1105	OLC	C2-C1-O20-C21
4	B	1106	OLC	C21-C22-C24-O25
4	A	1106	OLC	C4-C5-C6-C7
4	A	1104	OLC	O23-C22-C24-O25
4	A	1105	OLC	O23-C22-C24-O25
4	A	1107	OLC	O23-C22-C24-O25
4	A	1108	OLC	O23-C22-C24-O25
4	B	1106	OLC	O23-C22-C24-O25
4	B	1103	OLC	C4-C5-C6-C7
4	B	1105	OLC	O19-C1-O20-C21
4	A	1106	OLC	C14-C15-C16-C17
4	A	1106	OLC	C2-C3-C4-C5
4	A	1107	OLC	C2-C3-C4-C5
4	B	1103	OLC	C5-C6-C7-C8
4	A	1103	OLC	C3-C4-C5-C6
4	A	1106	OLC	C1-C2-C3-C4
2	A	1101	MRV	C10-C12-C13-N5
4	B	1103	OLC	C6-C7-C8-C9
4	A	1106	OLC	C10-C11-C12-C13
4	A	1105	OLC	C4-C5-C6-C7
4	B	1105	OLC	C2-C3-C4-C5
4	B	1104	OLC	C1-C2-C3-C4
4	A	1103	OLC	C5-C6-C7-C8
4	A	1105	OLC	C3-C4-C5-C6
4	B	1105	OLC	C3-C4-C5-C6
4	B	1104	OLC	C2-C3-C4-C5
4	A	1108	OLC	C2-C3-C4-C5
4	A	1107	OLC	C4-C5-C6-C7
4	A	1103	OLC	C2-C3-C4-C5

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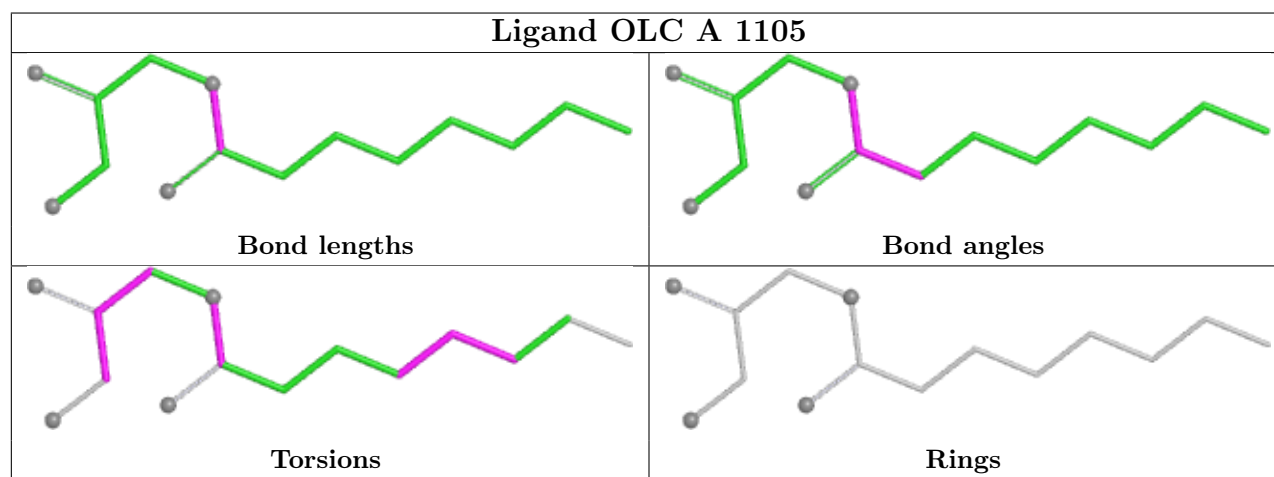
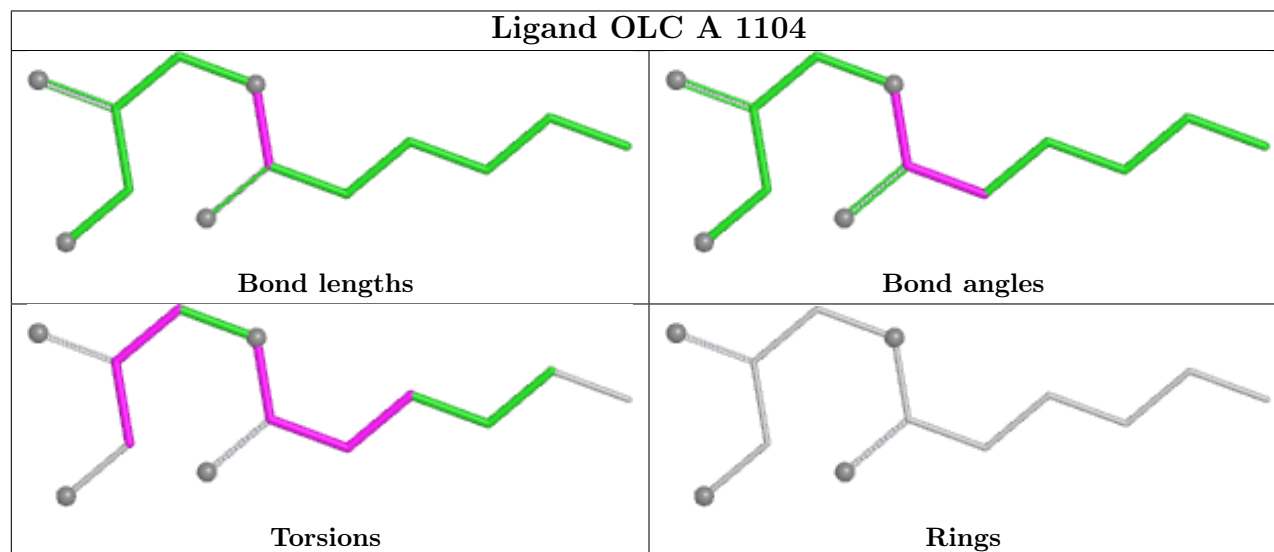
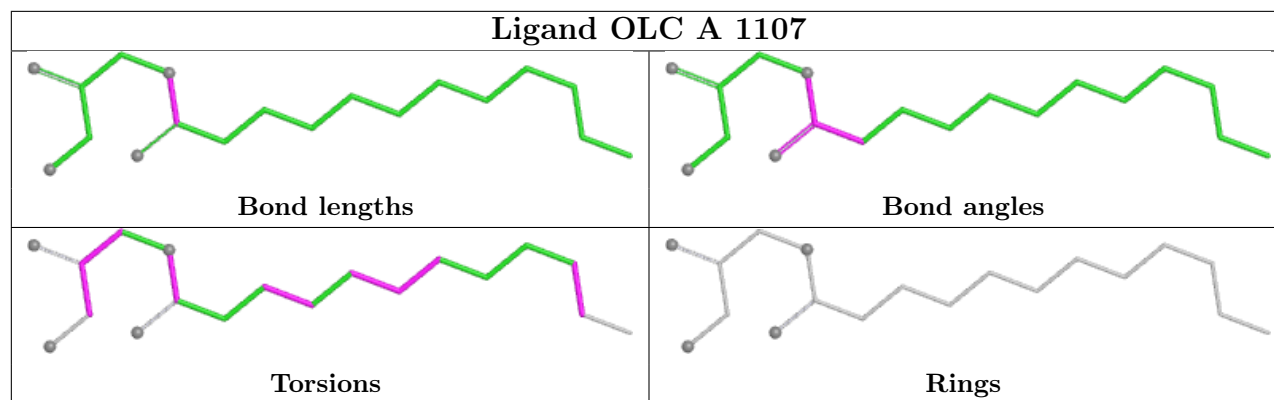
Mol	Chain	Res	Type	Atoms
4	A	1107	OLC	C9-C10-C11-C12
4	B	1106	OLC	C2-C1-O20-C21
4	B	1106	OLC	O19-C1-O20-C21
4	B	1105	OLC	C1-C2-C3-C4
4	B	1106	OLC	C2-C3-C4-C5
4	B	1103	OLC	C3-C4-C5-C6
4	A	1107	OLC	C5-C6-C7-C8
4	B	1103	OLC	C2-C3-C4-C5
4	A	1106	OLC	C15-C16-C17-C18
4	A	1103	OLC	C6-C7-C8-C9
4	A	1106	OLC	C3-C4-C5-C6
4	A	1108	OLC	O20-C21-C22-C24
4	A	1104	OLC	O20-C1-C2-C3
4	B	1103	OLC	C7-C8-C9-C10
2	A	1101	MRV	C10-C12-C13-C15
2	B	1101	MRV	C10-C12-C13-C15
2	B	1101	MRV	N5-C13-C15-C26
4	A	1104	OLC	O19-C1-C2-C3
4	B	1104	OLC	O20-C21-C22-C24

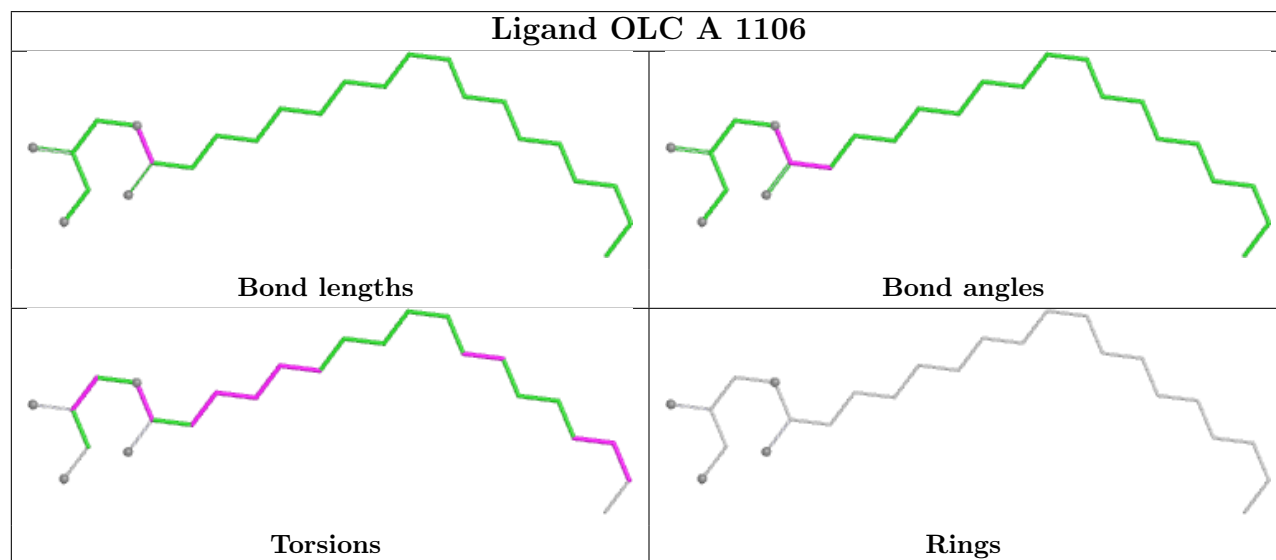
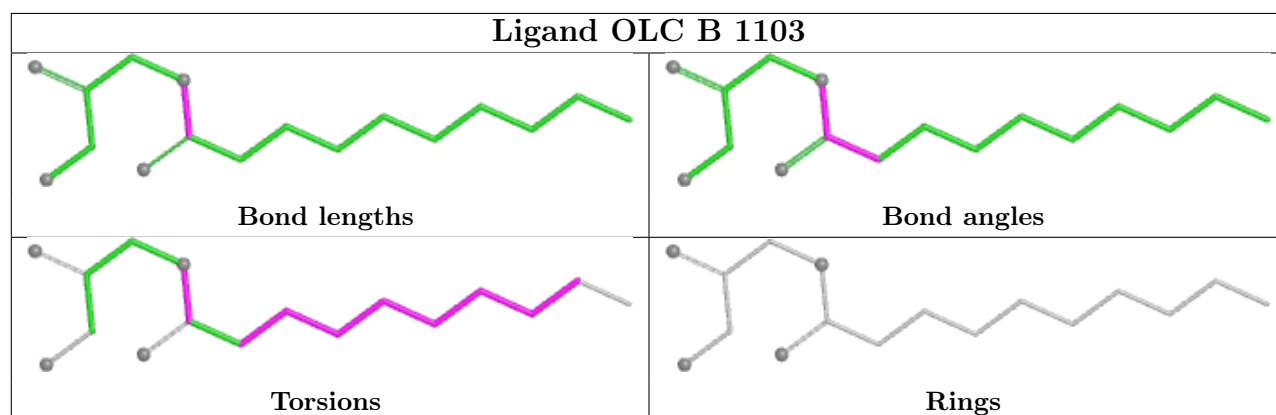
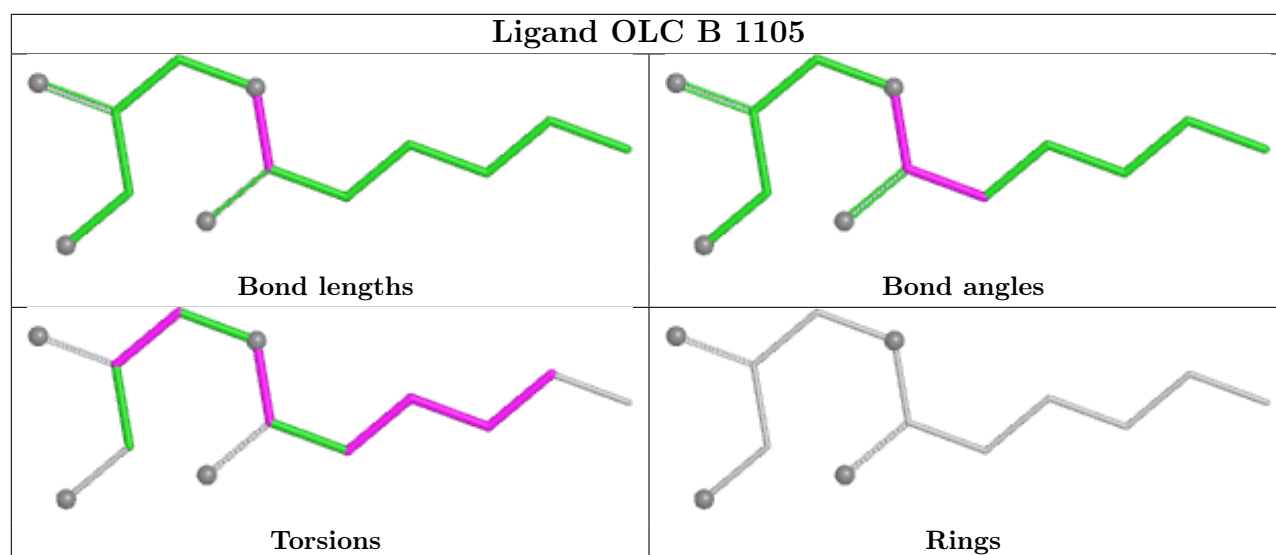
There are no ring outliers.

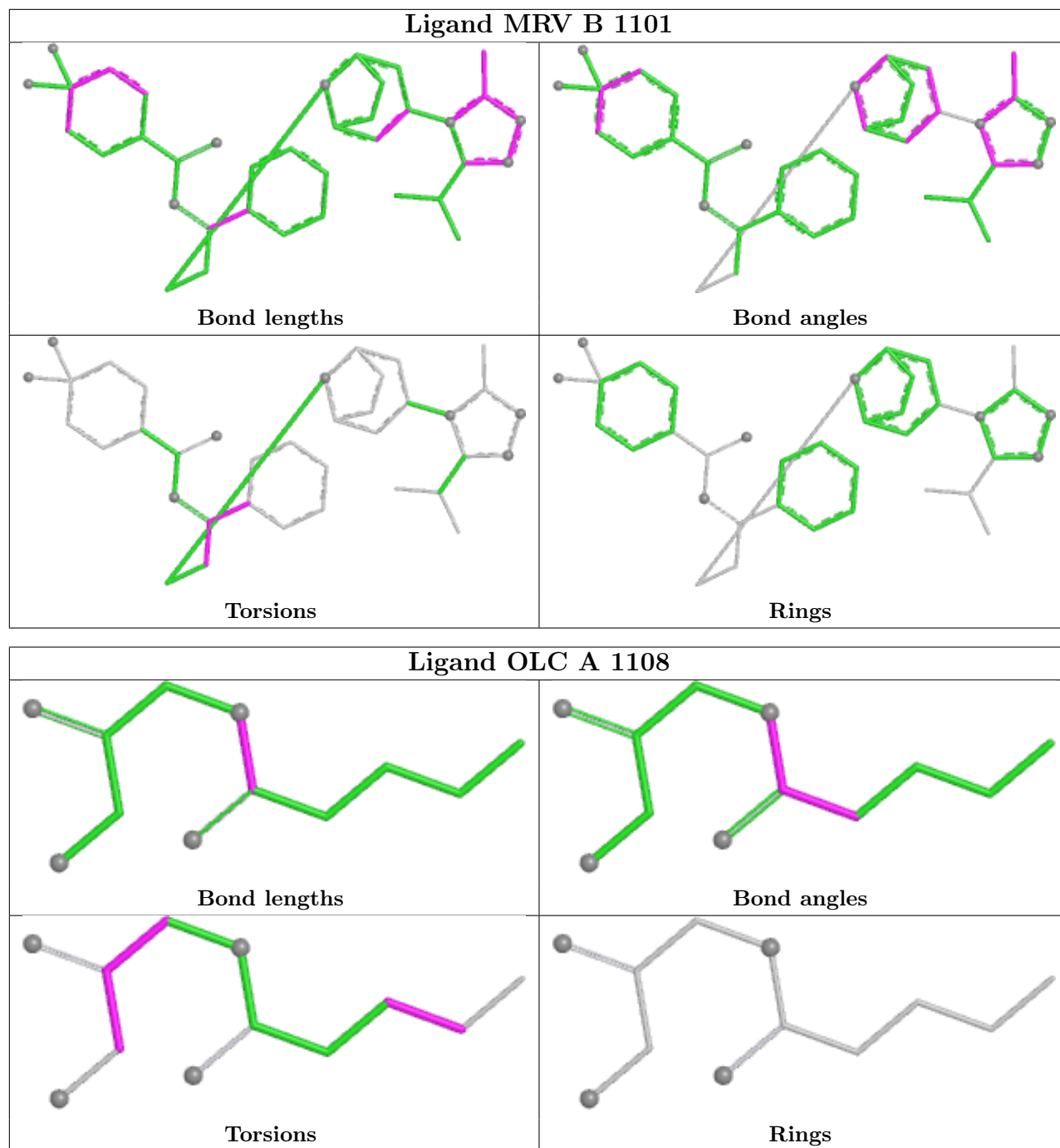
1 monomer is involved in 1 short contact:

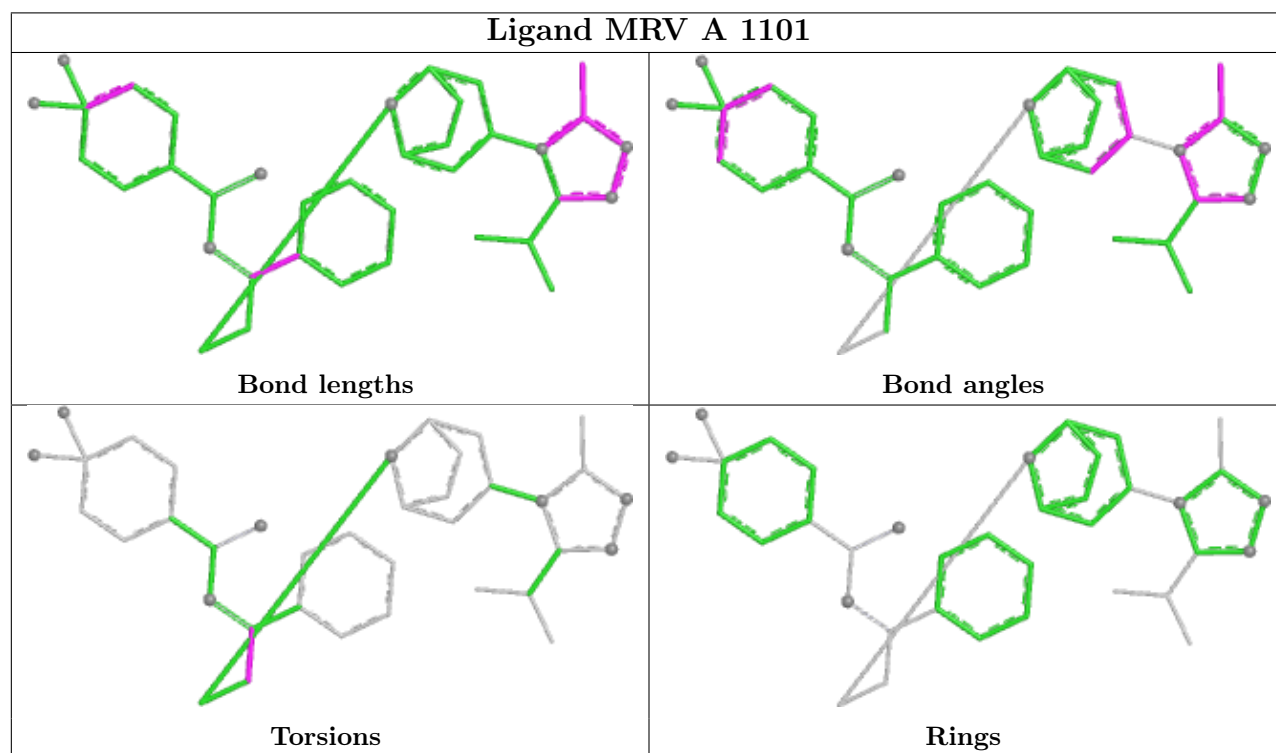
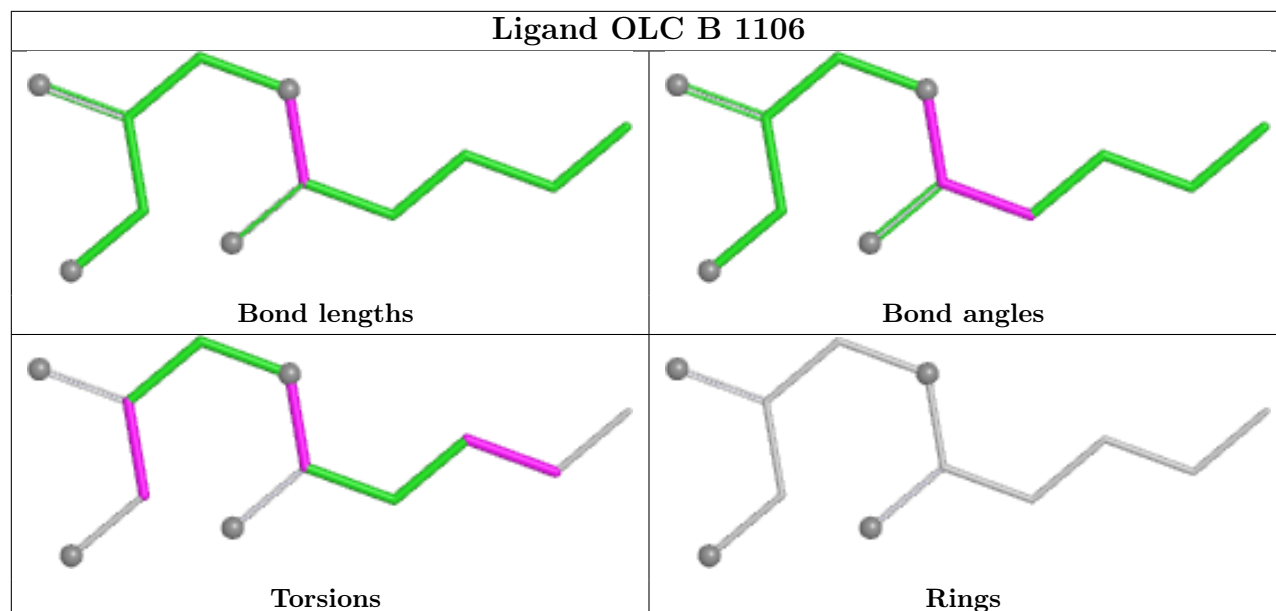
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1106	OLC	1	0

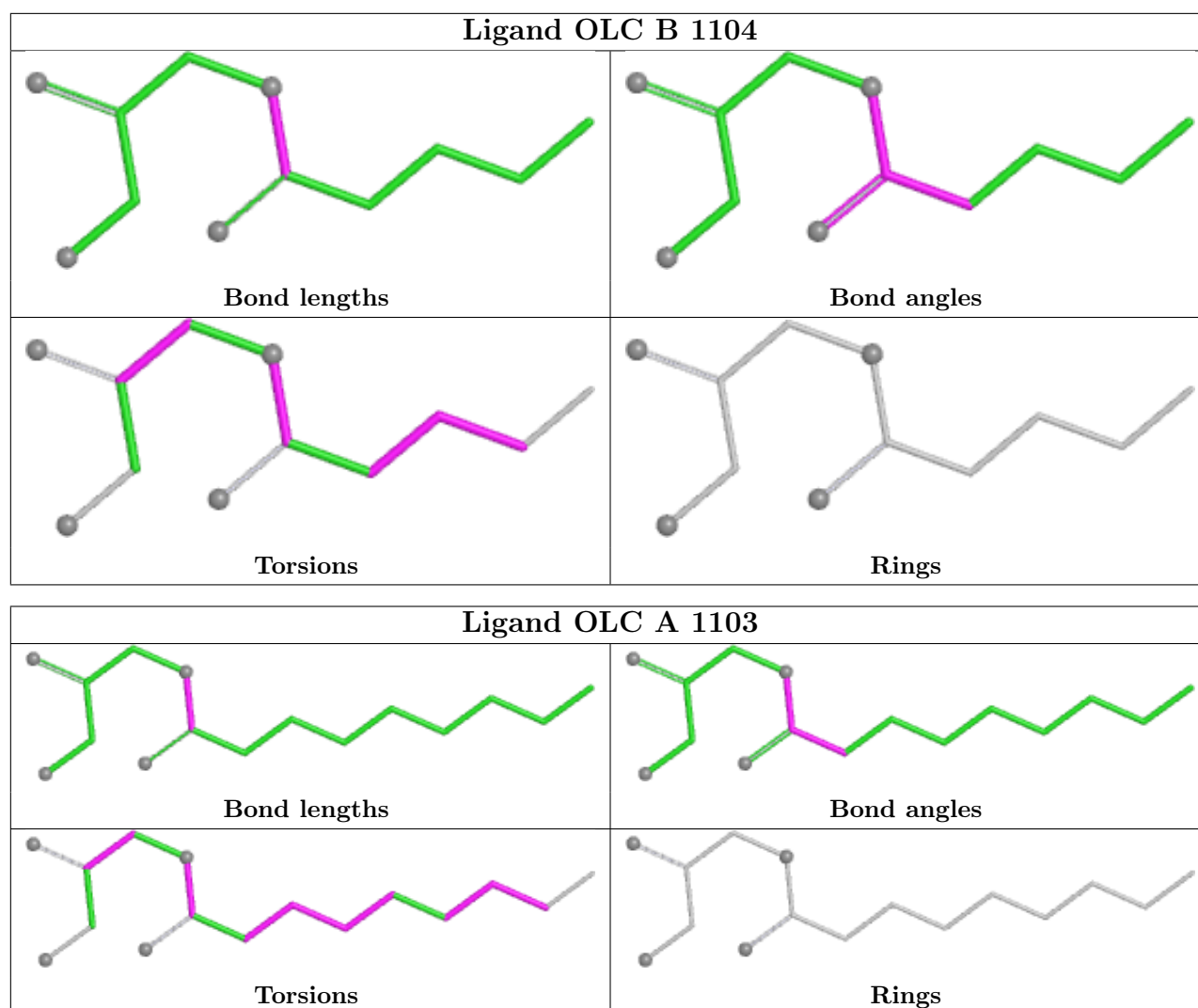
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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	346/414 (83%)	0.57	27 (7%) 19 17	47, 66, 131, 167	0
1	B	346/414 (83%)	0.51	19 (5%) 30 27	44, 67, 117, 154	0
All	All	692/828 (83%)	0.54	46 (6%) 24 22	44, 66, 130, 167	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	273	ASN	5.8
1	B	272	SER	5.6
1	A	304	PHE	5.1
1	A	22	LYS	4.8
1	B	144	PHE	3.9
1	B	261	GLN	3.7
1	A	21	GLN	3.7
1	B	1045	GLY	3.4
1	B	21	GLN	3.3
1	A	272	SER	3.1
1	B	263	PHE	3.1
1	A	307	TYR	3.0
1	A	258	ASN	3.0
1	B	312	PHE	2.9
1	A	313	GLN	2.9
1	A	138	LYS	2.8
1	A	261	GLN	2.8
1	B	184	TYR	2.8
1	B	22	LYS	2.7
1	A	137	LEU	2.7
1	A	264	PHE	2.7
1	B	1032	ASP	2.6
1	B	269	CYS	2.6
1	B	264	PHE	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	233	ASP	2.5
1	A	23	ILE	2.5
1	B	20	CYS	2.5
1	B	275	LEU	2.5
1	A	267	ASN	2.4
1	A	310	VAL	2.4
1	A	26	LYS	2.3
1	A	24	ASN	2.3
1	B	38	SER	2.3
1	A	290	CYS	2.3
1	B	182	PHE	2.3
1	A	25	VAL	2.3
1	B	277	GLN	2.2
1	A	185	SER	2.2
1	A	62	LYS	2.1
1	A	184	TYR	2.1
1	A	76	ASP	2.1
1	A	164	ILE	2.1
1	A	265	GLY	2.1
1	A	271	SER	2.0
1	B	313	GLN	2.0
1	A	168	ARG	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.

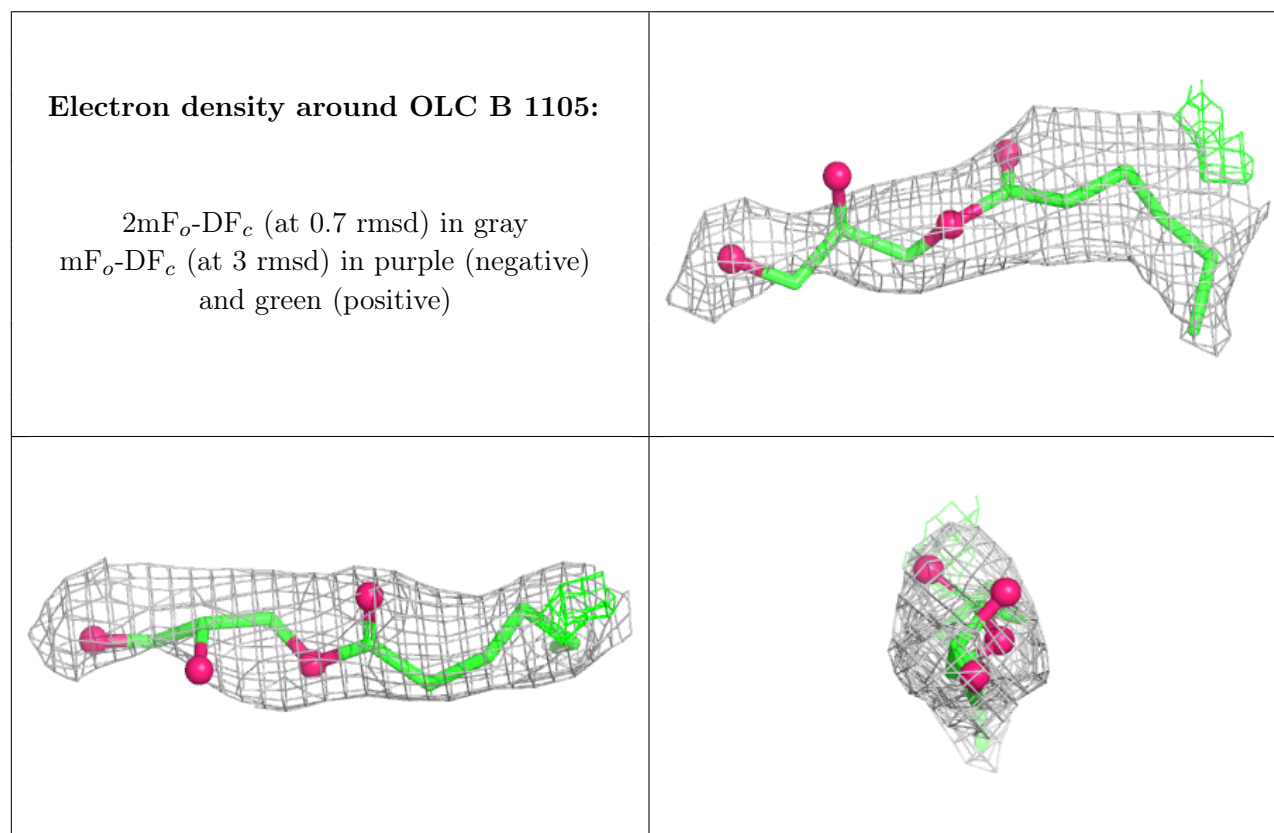
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	OLC	B	1105	13/25	0.72	0.21	107,113,117,118	0

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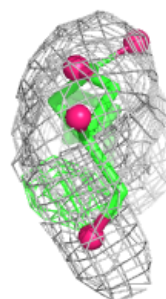
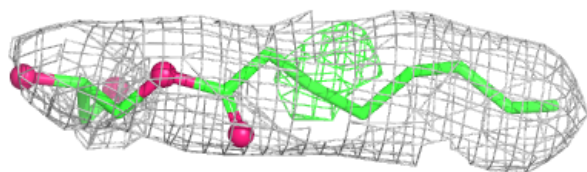
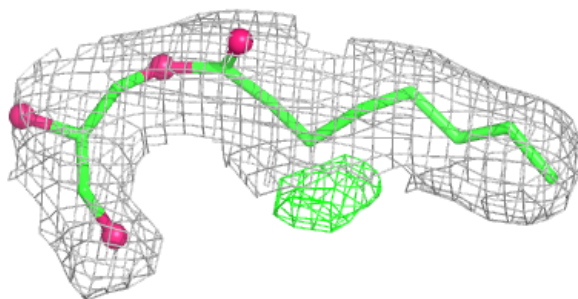
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	OLC	A	1105	15/25	0.73	0.18	92,99,107,107	0
4	OLC	A	1107	19/25	0.75	0.21	75,91,96,97	0
4	OLC	A	1104	13/25	0.76	0.15	87,101,106,108	0
4	OLC	A	1106	25/25	0.77	0.15	80,103,117,118	0
4	OLC	B	1103	17/25	0.78	0.19	98,101,103,103	0
4	OLC	B	1106	12/25	0.78	0.18	90,92,94,94	0
4	OLC	A	1103	16/25	0.80	0.15	97,99,100,100	0
4	OLC	A	1108	12/25	0.81	0.19	83,89,91,92	0
4	OLC	B	1104	12/25	0.86	0.12	98,105,112,113	0
2	MRV	A	1101	37/37	0.92	0.10	44,52,59,61	0
2	MRV	B	1101	37/37	0.92	0.10	47,54,60,61	0
3	ZN	A	1102	1/1	0.99	0.02	61,61,61,61	0
3	ZN	B	1102	1/1	0.99	0.02	72,72,72,72	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.

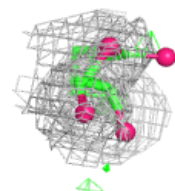
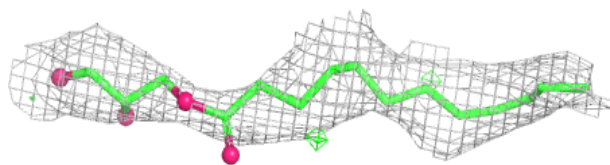
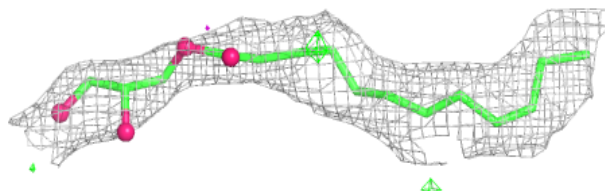


Electron density around OLC A 1105:

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

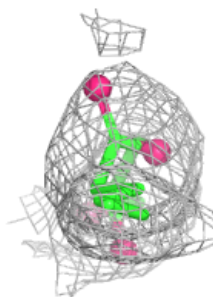
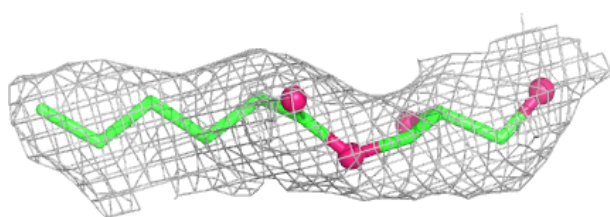
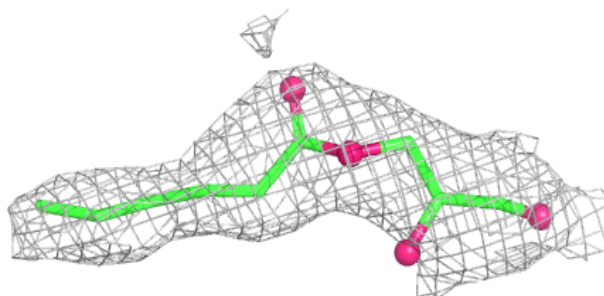
**Electron density around OLC A 1107:**

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

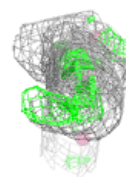
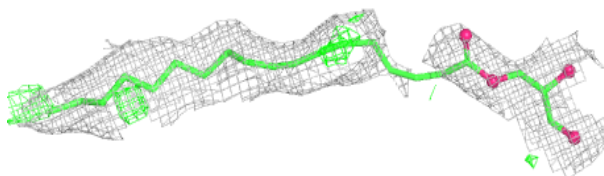


Electron density around OLC A 1104:

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

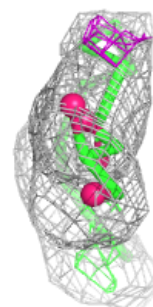
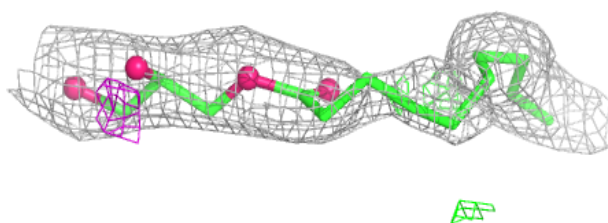
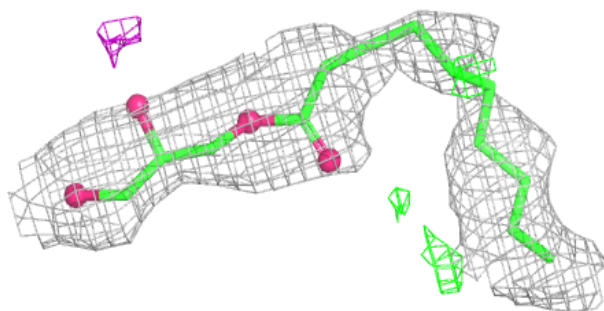
**Electron density around OLC A 1106:**

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

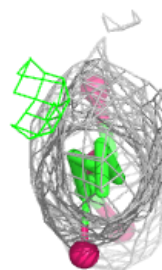
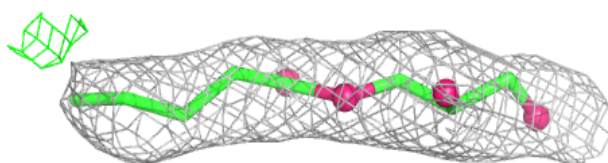
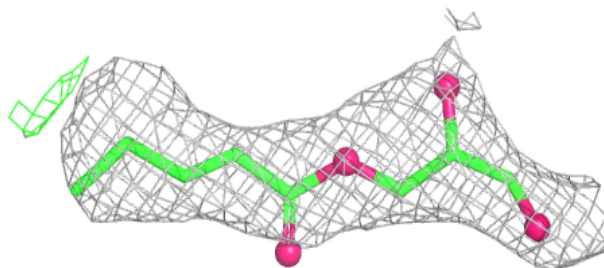


Electron density around OLC B 1103:

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

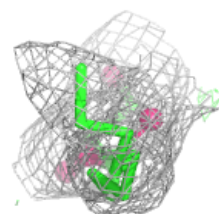
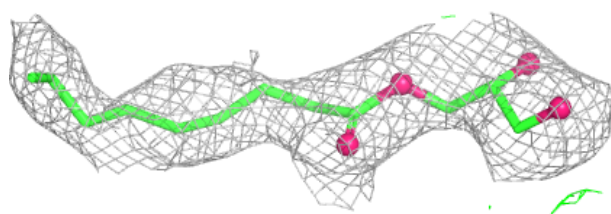
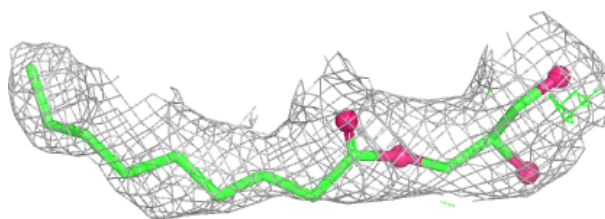
**Electron density around OLC B 1106:**

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

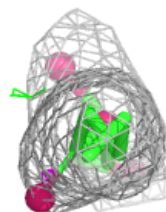
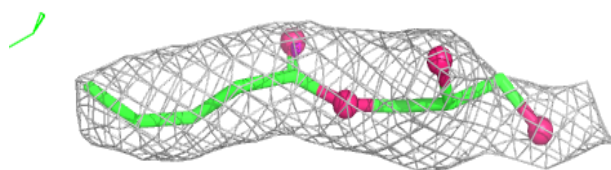
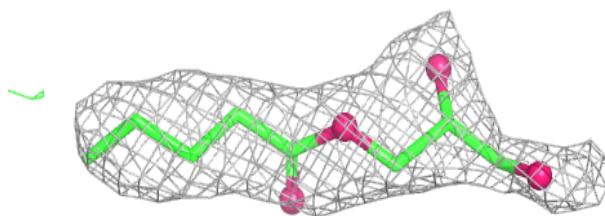


Electron density around OLC A 1103:

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

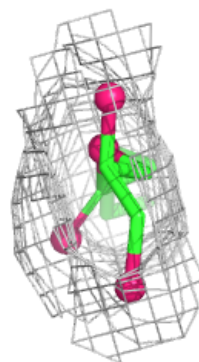
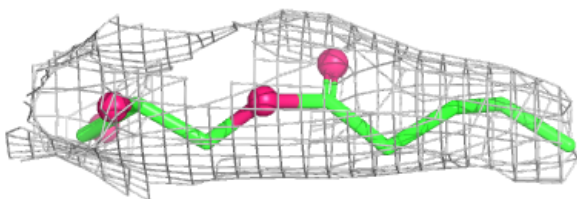
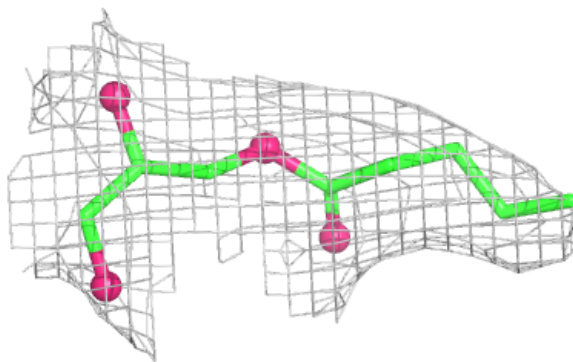
**Electron density around OLC A 1108:**

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

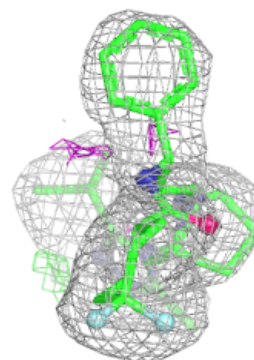
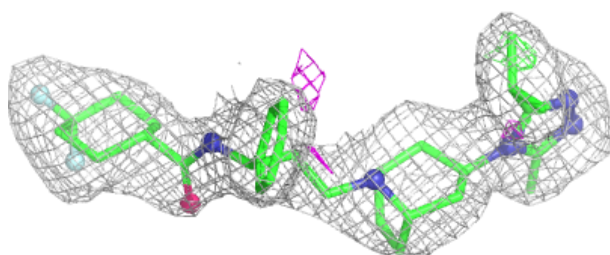
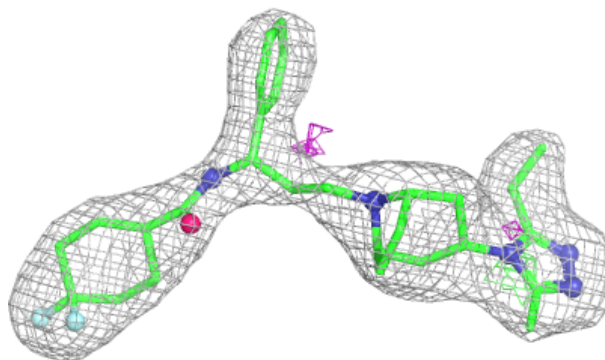


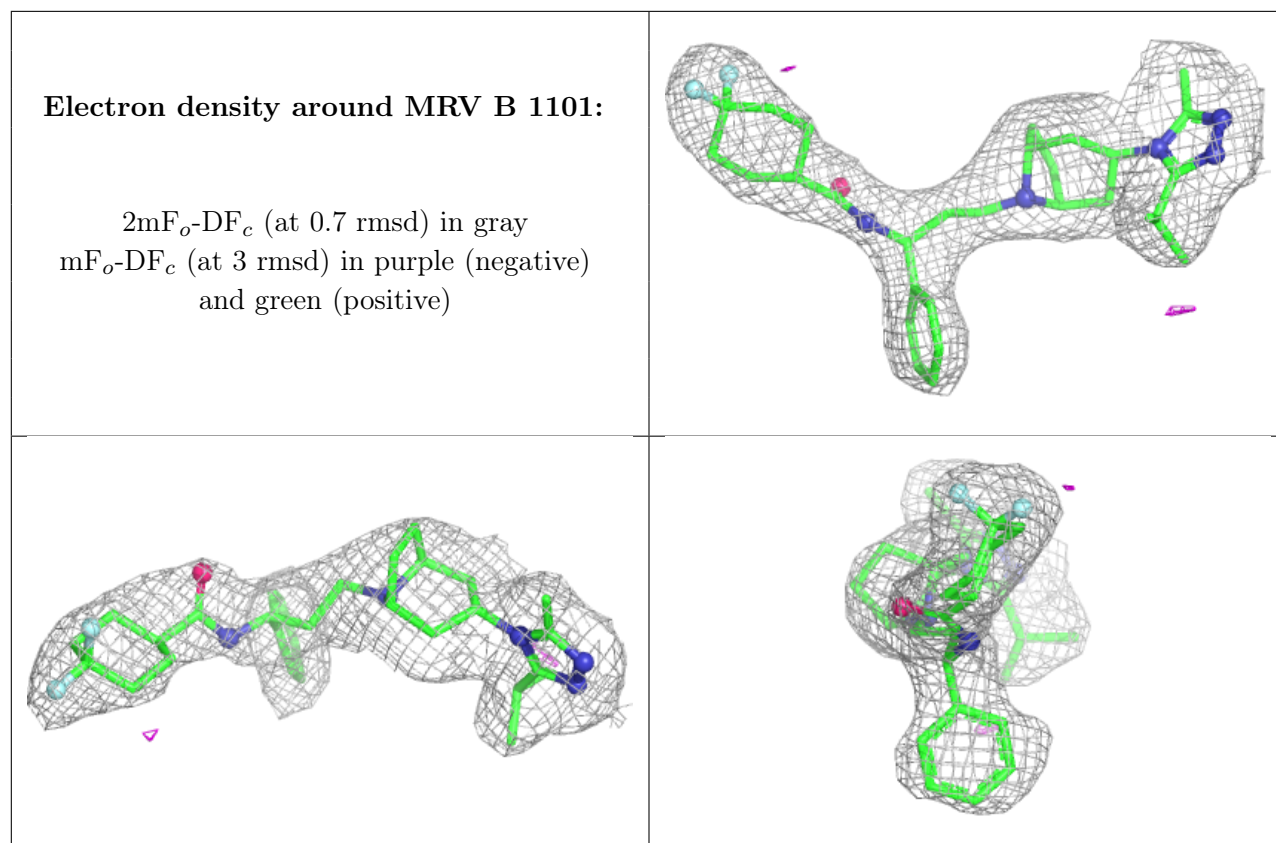
Electron density around OLC B 1104:

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

**Electron density around MRV A 1101:**

$2mF_o-DF_c$ (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.