



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 24, 2023 – 01:39 pm BST

PDB ID : 8ONN
Title : Crystal structure of D-amino acid aminotransferase from Aminobacterium colombiense point mutant E113A complexed with 3-aminooxypropionic acid
Authors : Matyuta, I.O.; Boyko, K.M.; Minyaev, M.E.; Shilova, S.A.; Bezsudnova, E.Y.; Popov, V.O.
Deposited on : 2023-04-03
Resolution : 2.10 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35

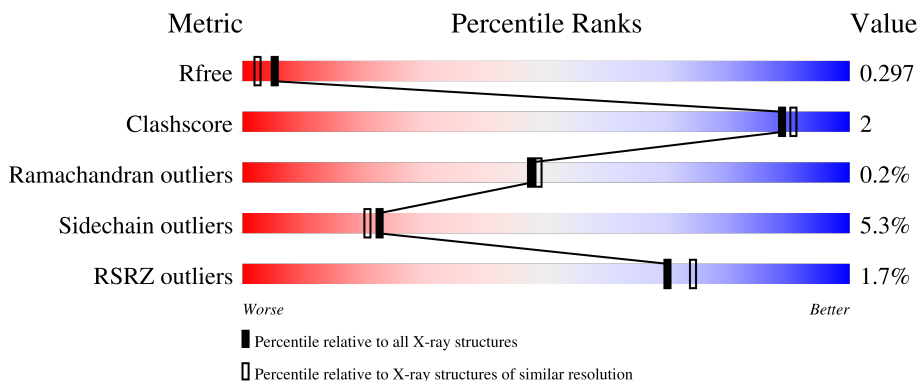
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 Å.

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



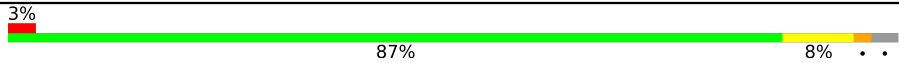
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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	277	 88% 12%
1	B	277	 5% 88% 10% ..
1	C	277	 91% 7% ..
1	D	277	 88% 10% .

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Mol	Chain	Length	Quality of chain
1	E	277	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into segments: a small red segment at the beginning labeled '3%', a large green segment in the middle labeled '87%', and a small yellow/orange segment at the end labeled '8%'. There are two small black dots at the far right end of the bar.</p>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 10812 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.

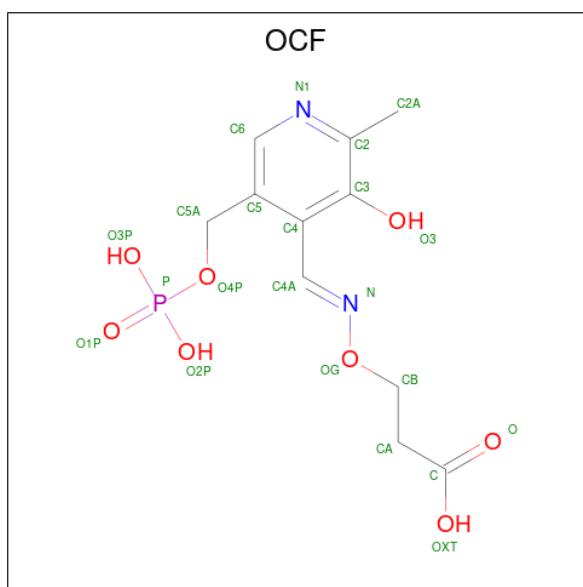
- Molecule 1 is a protein called Aminotransferase class IV.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	276	2145	1370	364	400	11	0	2	0
1	B	275	2079	1333	346	389	11	0	0	0
1	C	275	2127	1360	361	395	11	0	1	0
1	D	277	2150	1373	368	398	11	0	2	0
1	E	268	2064	1329	339	385	11	0	3	0

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP D5EHC5
A	0	HIS	-	expression tag	UNP D5EHC5
A	113	ALA	GLU	engineered mutation	UNP D5EHC5
B	-1	GLY	-	expression tag	UNP D5EHC5
B	0	HIS	-	expression tag	UNP D5EHC5
B	113	ALA	GLU	engineered mutation	UNP D5EHC5
C	-1	GLY	-	expression tag	UNP D5EHC5
C	0	HIS	-	expression tag	UNP D5EHC5
C	113	ALA	GLU	engineered mutation	UNP D5EHC5
D	-1	GLY	-	expression tag	UNP D5EHC5
D	0	HIS	-	expression tag	UNP D5EHC5
D	113	ALA	GLU	engineered mutation	UNP D5EHC5
E	-1	GLY	-	expression tag	UNP D5EHC5
E	0	HIS	-	expression tag	UNP D5EHC5
E	113	ALA	GLU	engineered mutation	UNP D5EHC5

- Molecule 2 is 3-[(E)-[2-methyl-3-oxidanyl-5-(phosphonooxymethyl)pyridin-4-yl]methylideneamino]oxypropanoic acid (three-letter code: OCF) (formula: C₁₁H₁₅N₂O₈P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			22	11	2	8	1		
2	B	1	Total	C	N	O	P	0	0
			22	11	2	8	1		
2	C	1	Total	C	N	O	P	0	0
			22	11	2	8	1		
2	D	1	Total	C	N	O	P	6	0
			22	11	2	8	1		

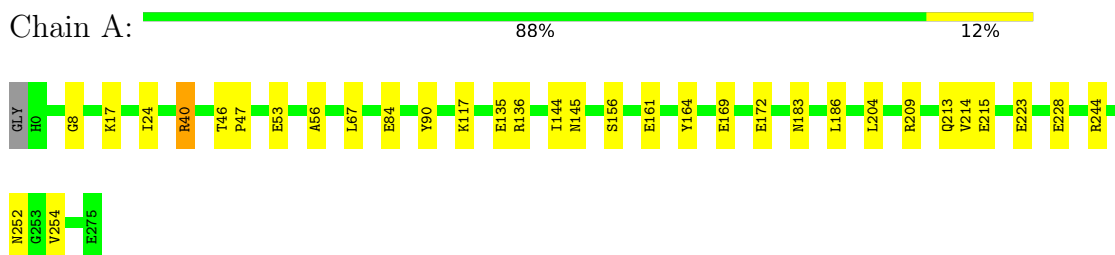
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	53	Total	O	0	0
			53	53		
3	B	11	Total	O	0	0
			11	11		
3	C	44	Total	O	0	0
			44	44		
3	D	20	Total	O	0	0
			20	20		
3	E	31	Total	O	0	0
			31	31		

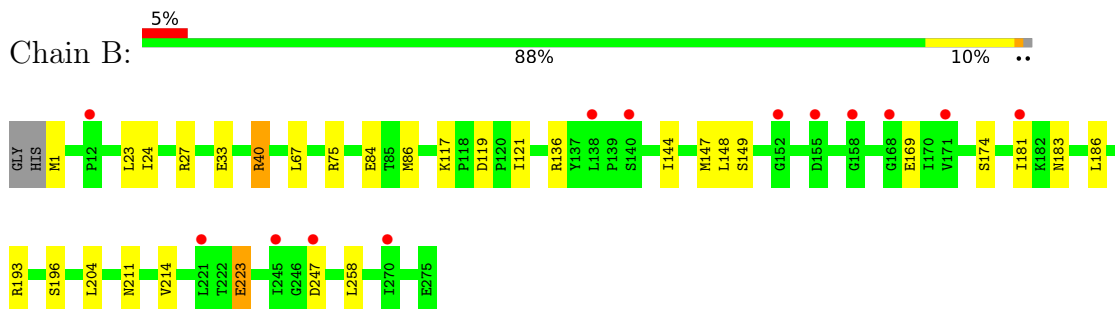
3 Residue-property plots [i](#)

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.

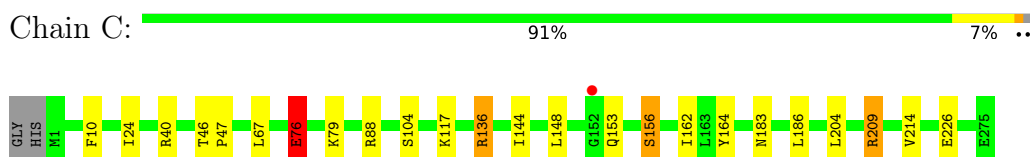
- Molecule 1: Aminotransferase class IV



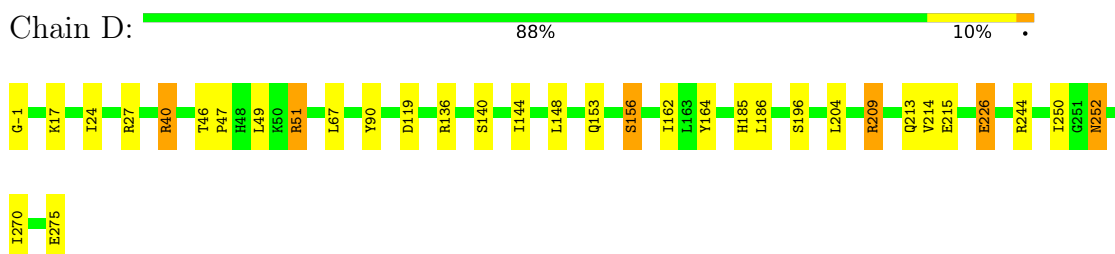
- Molecule 1: Aminotransferase class IV



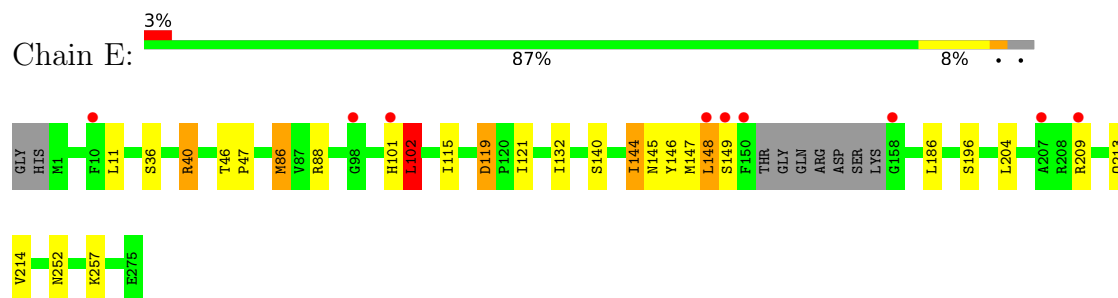
- Molecule 1: Aminotransferase class IV



- Molecule 1: Aminotransferase class IV



- Molecule 1: Aminotransferase class IV



4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	141.10Å 51.34Å 205.29Å 90.00° 110.03° 90.00°	Depositor
Resolution (Å)	47.55 – 2.10 47.55 – 2.10	Depositor EDS
% Data completeness (in resolution range)	97.8 (47.55-2.10) 97.8 (47.55-2.10)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.59 (at 2.10Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.256 , 0.298 0.259 , 0.297	Depositor DCC
R_{free} test set	3973 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	29.1	Xtrriage
Anisotropy	0.390	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 27.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	0.037 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	10812	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.96% 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 i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: OCF

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	1.11	10/2196 (0.5%)	1.16	11/2975 (0.4%)
1	B	0.94	2/2121 (0.1%)	1.11	6/2881 (0.2%)
1	C	0.97	0/2173	1.15	11/2946 (0.4%)
1	D	0.99	3/2200 (0.1%)	1.11	9/2979 (0.3%)
1	E	0.92	0/2116	1.11	4/2871 (0.1%)
All	All	0.99	15/10806 (0.1%)	1.13	41/14652 (0.3%)

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	226	GLU	CD-OE1	7.72	1.34	1.25
1	A	161	GLU	CD-OE1	7.41	1.33	1.25
1	A	215	GLU	CD-OE1	6.71	1.33	1.25
1	B	33	GLU	CD-OE1	6.40	1.32	1.25
1	D	275	GLU	CD-OE1	6.34	1.32	1.25
1	A	53	GLU	CD-OE1	6.17	1.32	1.25
1	A	228	GLU	CD-OE1	6.12	1.32	1.25
1	A	56	ALA	C-O	5.82	1.34	1.23
1	D	-1	GLY	N-CA	5.70	1.54	1.46
1	A	223	GLU	CD-OE1	5.62	1.31	1.25
1	A	84	GLU	CD-OE2	-5.47	1.19	1.25
1	B	84	GLU	CD-OE1	5.42	1.31	1.25
1	A	172	GLU	CD-OE2	-5.41	1.19	1.25
1	A	8	GLY	C-O	5.16	1.31	1.23
1	A	169	GLU	CD-OE2	5.15	1.31	1.25

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	209	ARG	NE-CZ-NH2	9.09	124.84	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	136	ARG	NE-CZ-NH2	-9.01	115.80	120.30
1	B	40	ARG	NE-CZ-NH1	8.52	124.56	120.30
1	D	136	ARG	NE-CZ-NH1	8.36	124.48	120.30
1	B	136	ARG	NE-CZ-NH1	8.00	124.30	120.30
1	D	209	ARG	NE-CZ-NH2	-7.82	116.39	120.30
1	B	27	ARG	NE-CZ-NH2	-6.85	116.88	120.30
1	C	88[A]	ARG	CB-CG-CD	6.84	129.40	111.60
1	C	88[B]	ARG	CB-CG-CD	6.84	129.40	111.60
1	A	90	TYR	CB-CG-CD1	6.84	125.10	121.00
1	A	40	ARG	NE-CZ-NH1	6.75	123.67	120.30
1	E	88	ARG	NE-CZ-NH2	-6.57	117.02	120.30
1	D	40	ARG	NE-CZ-NH1	6.38	123.49	120.30
1	C	136	ARG	NE-CZ-NH2	-6.25	117.18	120.30
1	D	136	ARG	NE-CZ-NH2	-6.25	117.18	120.30
1	A	136	ARG	NE-CZ-NH1	6.24	123.42	120.30
1	A	164	TYR	CB-CG-CD2	5.96	124.58	121.00
1	D	27	ARG	NE-CZ-NH2	-5.92	117.34	120.30
1	C	209	ARG	CB-CG-CD	5.90	126.94	111.60
1	E	40	ARG	NE-CZ-NH1	5.89	123.25	120.30
1	D	27	ARG	NE-CZ-NH1	5.85	123.22	120.30
1	A	164	TYR	CB-CG-CD1	-5.71	117.57	121.00
1	E	146	TYR	CB-CG-CD2	-5.66	117.60	121.00
1	C	209	ARG	NE-CZ-NH1	-5.63	117.48	120.30
1	B	223	GLU	N-CA-CB	5.60	120.68	110.60
1	A	145[A]	ASN	N-CA-CB	5.57	120.63	110.60
1	A	145[B]	ASN	N-CA-CB	5.57	120.63	110.60
1	C	88[A]	ARG	NE-CZ-NH1	5.56	123.08	120.30
1	C	88[B]	ARG	NE-CZ-NH1	5.56	123.08	120.30
1	D	136	ARG	CG-CD-NE	-5.55	100.14	111.80
1	B	136	ARG	NE-CZ-NH2	-5.51	117.54	120.30
1	A	40	ARG	CB-CG-CD	5.50	125.91	111.60
1	D	244	ARG	NE-CZ-NH1	5.46	123.03	120.30
1	A	136	ARG	CG-CD-NE	-5.44	100.37	111.80
1	E	146	TYR	CB-CG-CD1	5.34	124.20	121.00
1	C	88[A]	ARG	NE-CZ-NH2	-5.34	117.63	120.30
1	C	88[B]	ARG	NE-CZ-NH2	-5.34	117.63	120.30
1	A	209	ARG	NE-CZ-NH1	5.24	122.92	120.30
1	D	90	TYR	CB-CG-CD1	5.16	124.10	121.00
1	C	76	GLU	CB-CG-CD	5.04	127.81	114.20
1	B	75	ARG	NE-CZ-NH1	5.03	122.81	120.30

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	2145	0	2168	5	0
1	B	2079	0	2055	7	0
1	C	2127	0	2147	7	0
1	D	2150	0	2170	11	0
1	E	2064	0	2065	11	0
2	A	22	0	0	0	0
2	B	22	0	0	0	0
2	C	22	0	0	0	0
2	D	22	0	0	0	0
3	A	53	0	0	1	0
3	B	11	0	0	1	0
3	C	44	0	0	1	0
3	D	20	0	0	0	0
3	E	31	0	0	1	0
All	All	10812	0	10605	41	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 2.

All (41) 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:169:GLU:OE1	1:B:193:ARG:NH1	2.25	0.69
1:D:153:GLN:HA	1:D:156:SER:HB3	1.74	0.69
1:C:153:GLN:HA	1:C:156:SER:HB3	1.76	0.68
1:D:162:ILE:HD11	1:D:164:TYR:CE1	2.30	0.65
1:C:162:ILE:HD11	1:C:164:TYR:CE1	2.36	0.60
1:A:46:THR:HB	1:A:47:PRO:HD3	1.86	0.58
1:D:51:ARG:NH1	1:D:196:SER:O	2.39	0.55
1:A:204:LEU:HD22	1:A:214:VAL:HG11	1.88	0.55
1:C:46:THR:HB	1:C:47:PRO:HD3	1.89	0.53
1:E:86:MET:CE	3:E:305:HOH:O	2.57	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:204:LEU:HD22	1:C:214:VAL:HG11	1.93	0.50
1:A:252:ASN:HD21	1:A:254:VAL:HG22	1.77	0.50
1:E:132:ILE:HG21	1:E:144:ILE:HD13	1.94	0.50
1:B:204:LEU:HD22	1:B:214:VAL:HG11	1.94	0.49
1:E:204:LEU:HD22	1:E:214:VAL:HG11	1.95	0.49
1:E:132:ILE:HG21	1:E:144:ILE:CD1	2.44	0.47
1:E:119:ASP:OD2	1:E:119:ASP:N	2.48	0.46
1:B:119:ASP:OD1	1:B:121:ILE:HG22	2.15	0.46
1:D:46:THR:HB	1:D:47:PRO:HD3	1.98	0.46
1:B:149:SER:HB2	1:B:174:SER:HB2	1.97	0.46
1:D:204:LEU:HD22	1:D:214:VAL:HG11	1.97	0.46
1:B:24:ILE:HD11	1:B:144:ILE:HG21	1.97	0.45
1:D:24:ILE:HD11	1:D:144:ILE:HG21	1.99	0.45
1:D:185:HIS:HE1	1:D:215:GLU:OE2	2.01	0.43
1:C:24:ILE:HD11	1:C:144:ILE:HG21	1.99	0.43
1:E:145:ASN:O	1:E:148:LEU:HG	2.18	0.43
1:E:144:ILE:HB	1:E:147:MET:CE	2.48	0.43
1:D:185:HIS:CE1	1:D:215:GLU:OE2	2.72	0.43
1:A:135:GLU:HB2	3:A:445:HOH:O	2.19	0.42
1:D:250:ILE:O	1:D:252:ASN:O	2.36	0.42
1:E:36:SER:HB2	1:E:115:ILE:HD11	2.02	0.42
1:A:24:ILE:HD11	1:A:144:ILE:HG21	2.03	0.41
1:B:181:ILE:HD13	1:B:258:LEU:HD23	2.02	0.41
1:C:136:ARG:HD2	3:C:431:HOH:O	2.19	0.41
1:D:270:ILE:HD12	1:D:270:ILE:HA	1.90	0.41
1:E:46:THR:HB	1:E:47:PRO:HD3	2.02	0.41
1:E:140:SER:O	1:E:144:ILE:HG23	2.21	0.41
1:E:101:HIS:O	1:E:102:LEU:HB2	2.21	0.41
1:D:49:LEU:HD23	1:D:49:LEU:HA	1.94	0.40
1:C:10:PHE:CE2	1:C:76:GLU:HG2	2.57	0.40
1:B:211:ASN:HB3	3:B:404:HOH:O	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	276/277 (100%)	269 (98%)	7 (2%)	0	100	100
1	B	273/277 (99%)	265 (97%)	7 (3%)	1 (0%)	34	32
1	C	274/277 (99%)	264 (96%)	10 (4%)	0	100	100
1	D	277/277 (100%)	269 (97%)	8 (3%)	0	100	100
1	E	267/277 (96%)	260 (97%)	5 (2%)	2 (1%)	22	18
All	All	1367/1385 (99%)	1327 (97%)	37 (3%)	3 (0%)	47	49

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	223	GLU
1	E	102	LEU
1	E	149	SER

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	236/240 (98%)	227 (96%)	9 (4%)	33	34
1	B	218/240 (91%)	206 (94%)	12 (6%)	21	19
1	C	230/240 (96%)	218 (95%)	12 (5%)	23	21
1	D	233/240 (97%)	220 (94%)	13 (6%)	21	18
1	E	222/240 (92%)	207 (93%)	15 (7%)	16	13
All	All	1139/1200 (95%)	1078 (95%)	61 (5%)	22	20

All (61) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	LYS
1	A	40	ARG

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Mol	Chain	Res	Type
1	A	67	LEU
1	A	117	LYS
1	A	156	SER
1	A	183	ASN
1	A	186	LEU
1	A	213	GLN
1	A	244	ARG
1	B	1	MET
1	B	23	LEU
1	B	40	ARG
1	B	67	LEU
1	B	86	MET
1	B	117	LYS
1	B	147	MET
1	B	148	LEU
1	B	183	ASN
1	B	186	LEU
1	B	196	SER
1	B	247	ASP
1	C	40	ARG
1	C	67	LEU
1	C	76	GLU
1	C	79	LYS
1	C	104	SER
1	C	117	LYS
1	C	148	LEU
1	C	156	SER
1	C	183	ASN
1	C	186	LEU
1	C	209	ARG
1	C	226	GLU
1	D	17	LYS
1	D	40	ARG
1	D	51	ARG
1	D	67	LEU
1	D	119	ASP
1	D	140	SER
1	D	148	LEU
1	D	156	SER
1	D	186	LEU
1	D	209	ARG
1	D	213	GLN

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Mol	Chain	Res	Type
1	D	226	GLU
1	D	252	ASN
1	E	11	LEU
1	E	40	ARG
1	E	86	MET
1	E	102	LEU
1	E	119	ASP
1	E	121	ILE
1	E	144	ILE
1	E	148	LEU
1	E	186	LEU
1	E	196	SER
1	E	209[A]	ARG
1	E	209[B]	ARG
1	E	213	GLN
1	E	252	ASN
1	E	257	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	B	2	ASN
1	C	2	ASN
1	C	145	ASN
1	D	38	HIS
1	D	185	HIS
1	E	26	GLN
1	E	252	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	OCF	A	301	-	22,22,22	1.21	2 (9%)	26,30,30	1.34	4 (15%)
2	OCF	C	301	-	22,22,22	0.86	0	26,30,30	1.60	6 (23%)
2	OCF	B	301	-	22,22,22	0.86	0	26,30,30	1.08	2 (7%)
2	OCF	D	301	-	22,22,22	1.73	4 (18%)	26,30,30	1.53	4 (15%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	OCF	A	301	-	-	3/14/14/14	0/1/1/1
2	OCF	C	301	-	-	5/14/14/14	0/1/1/1
2	OCF	B	301	-	-	5/14/14/14	0/1/1/1
2	OCF	D	301	-	-	4/14/14/14	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	301	OCF	OXT-C	-4.66	1.15	1.30
2	D	301	OCF	CA-CB	3.42	1.60	1.51
2	A	301	OCF	C3-C2	-3.22	1.37	1.40
2	D	301	OCF	O3-C3	-2.67	1.30	1.37
2	A	301	OCF	O3-C3	-2.13	1.32	1.37
2	D	301	OCF	C4-C3	2.11	1.44	1.40

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301	OCF	O4P-C5A-C5	3.84	116.67	109.35
2	C	301	OCF	O3P-P-O2P	3.72	121.85	107.64
2	C	301	OCF	O3P-P-O4P	-3.61	97.12	106.73
2	C	301	OCF	O4P-C5A-C5	3.21	115.47	109.35
2	D	301	OCF	O3P-P-O2P	3.12	119.56	107.64
2	A	301	OCF	O2P-P-O4P	-3.11	98.45	106.73
2	B	301	OCF	O4P-C5A-C5	2.61	114.33	109.35
2	D	301	OCF	OG-N-C4A	2.60	114.80	110.80
2	A	301	OCF	O-C-CA	-2.46	115.17	123.08
2	A	301	OCF	O3P-P-O1P	2.39	120.03	110.68
2	D	301	OCF	C3-C2-N1	-2.29	117.80	120.77
2	A	301	OCF	C6-N1-C2	2.23	123.30	119.17
2	C	301	OCF	OG-N-C4A	2.20	114.19	110.80
2	C	301	OCF	OG-CB-CA	2.19	115.73	109.14
2	C	301	OCF	C3-C4-C4A	-2.04	116.61	120.41
2	B	301	OCF	C4-C3-C2	-2.02	118.94	120.19

There are no chirality outliers.

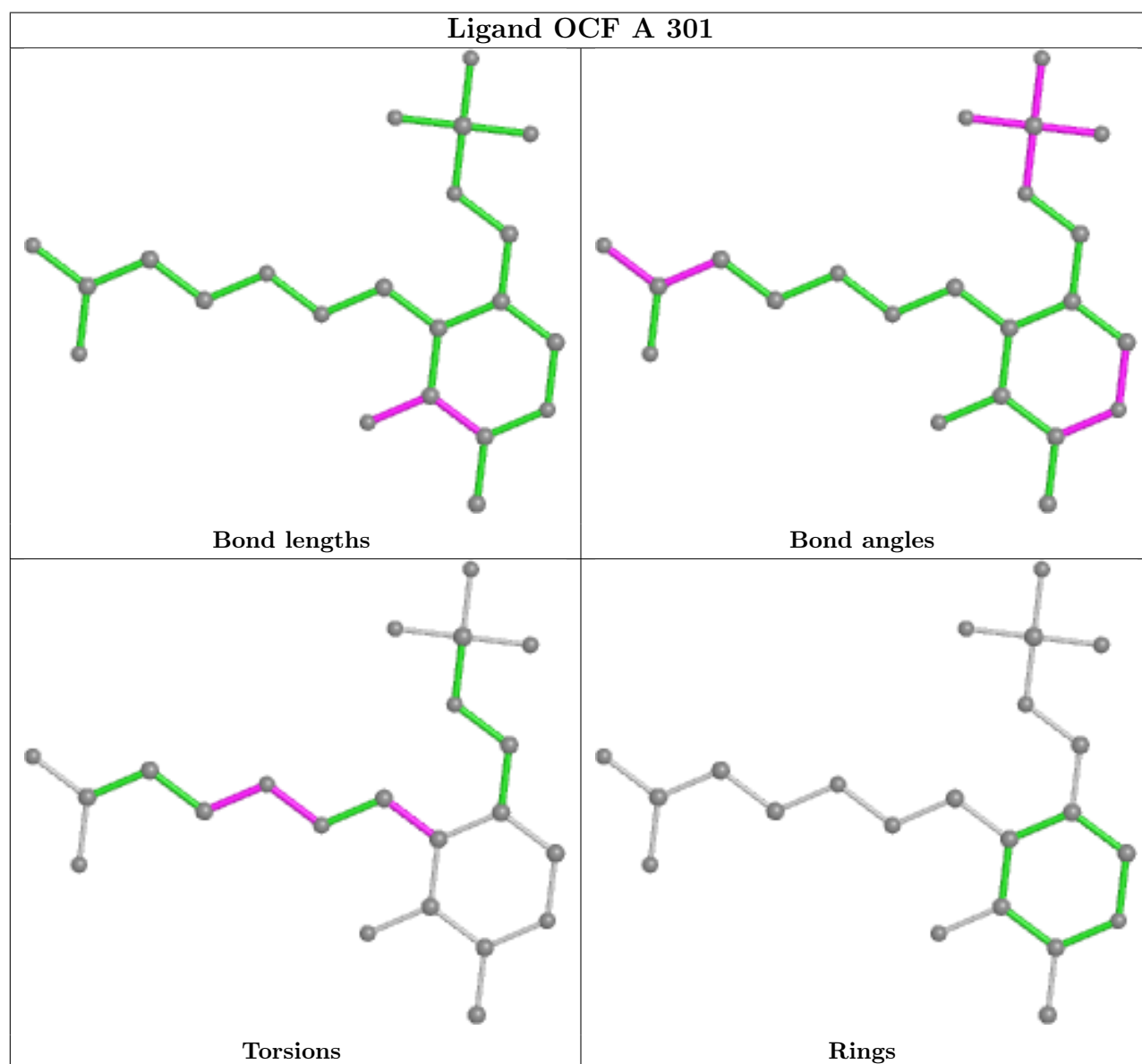
All (17) torsion outliers are listed below:

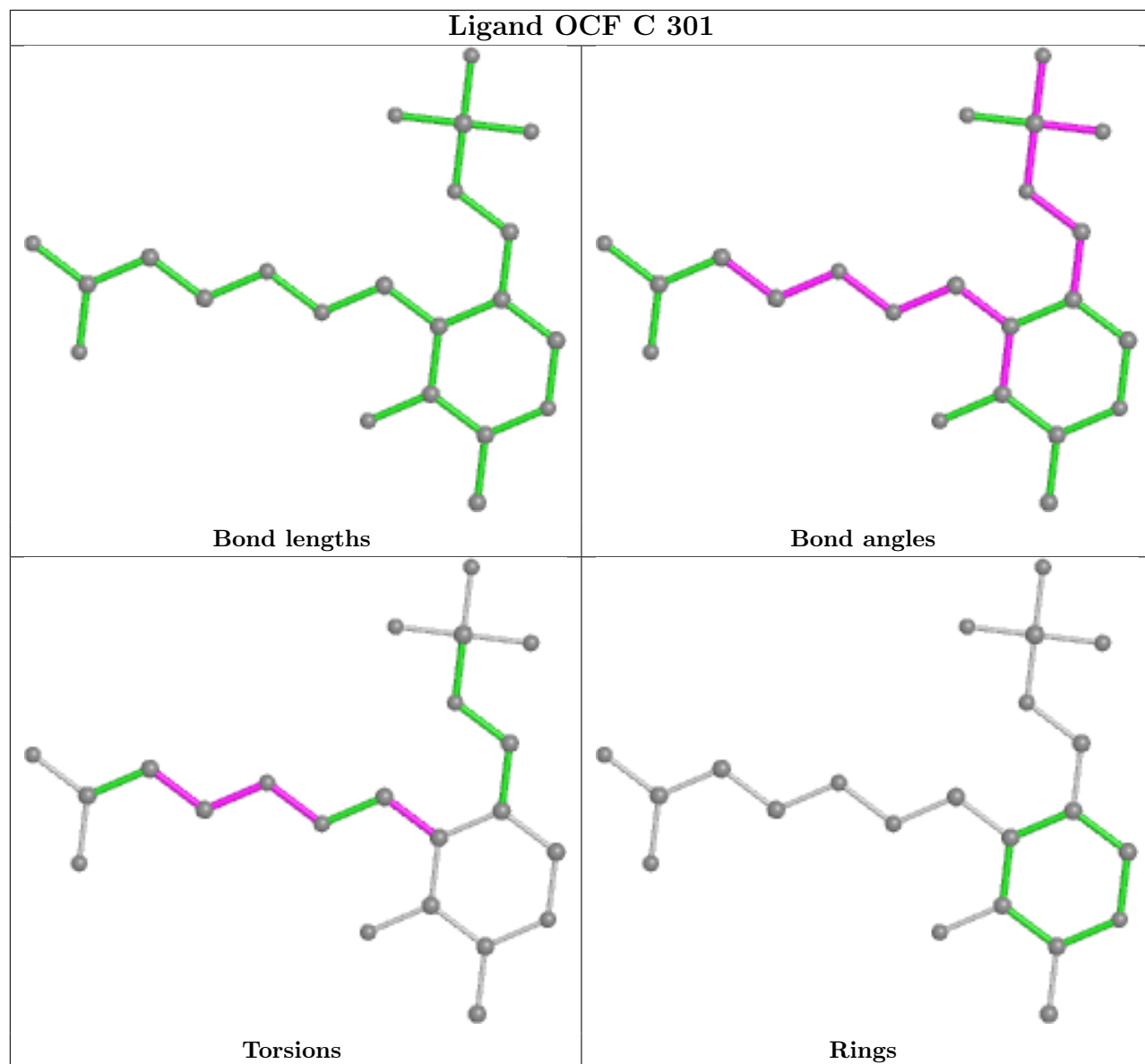
Mol	Chain	Res	Type	Atoms
2	A	301	OCF	C4A-N-OG-CB
2	A	301	OCF	CA-CB-OG-N
2	B	301	OCF	C3-C4-C4A-N
2	B	301	OCF	C4-C4A-N-OG
2	B	301	OCF	C-CA-CB-OG
2	C	301	OCF	C3-C4-C4A-N
2	C	301	OCF	C4A-N-OG-CB
2	C	301	OCF	C-CA-CB-OG
2	D	301	OCF	C3-C4-C4A-N
2	D	301	OCF	C-CA-CB-OG
2	C	301	OCF	CA-CB-OG-N
2	D	301	OCF	CA-CB-OG-N
2	B	301	OCF	OXT-C-CA-CB
2	B	301	OCF	O-C-CA-CB
2	C	301	OCF	C5-C4-C4A-N
2	A	301	OCF	C3-C4-C4A-N
2	D	301	OCF	C5A-O4P-P-O1P

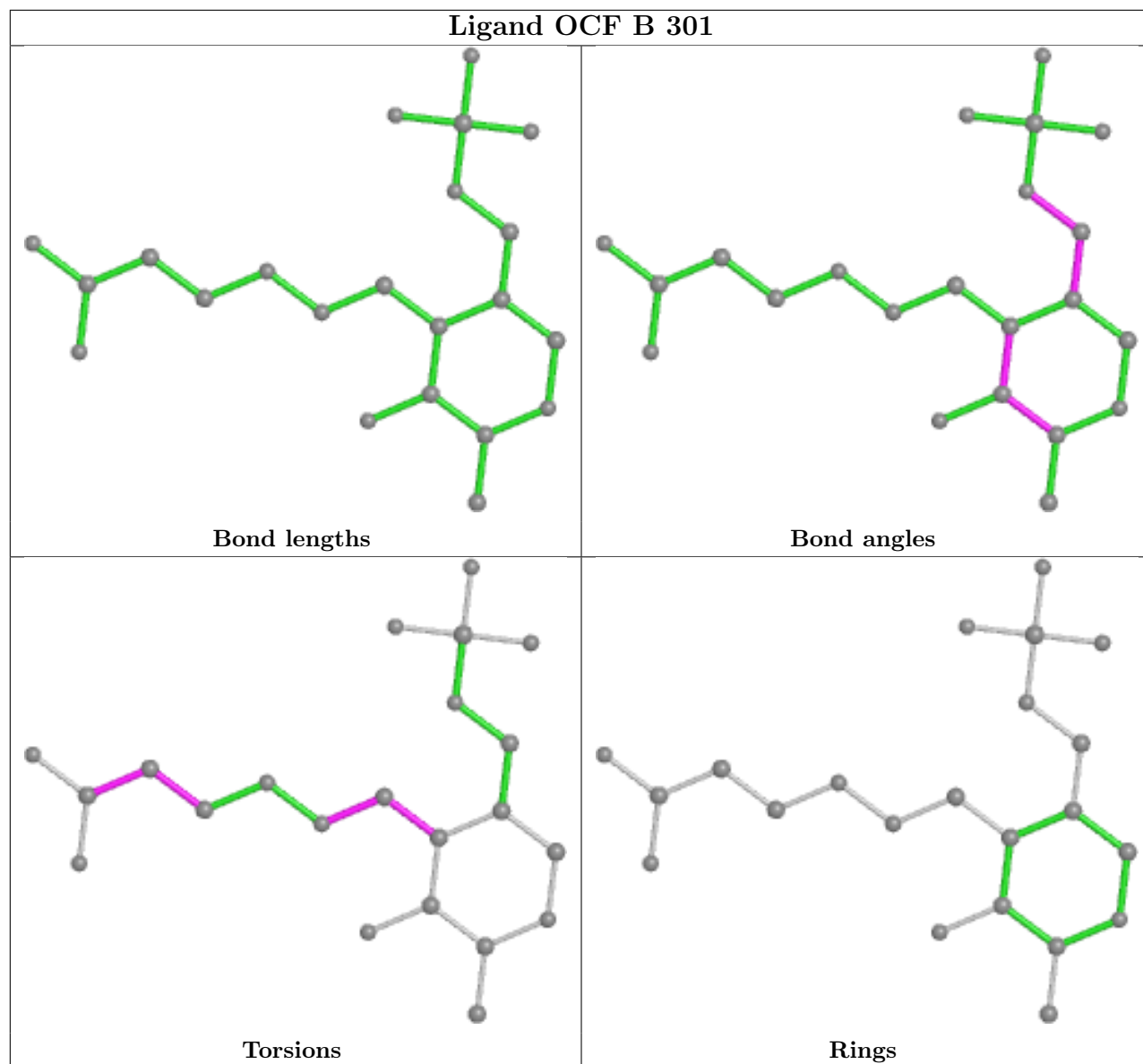
There are no ring outliers.

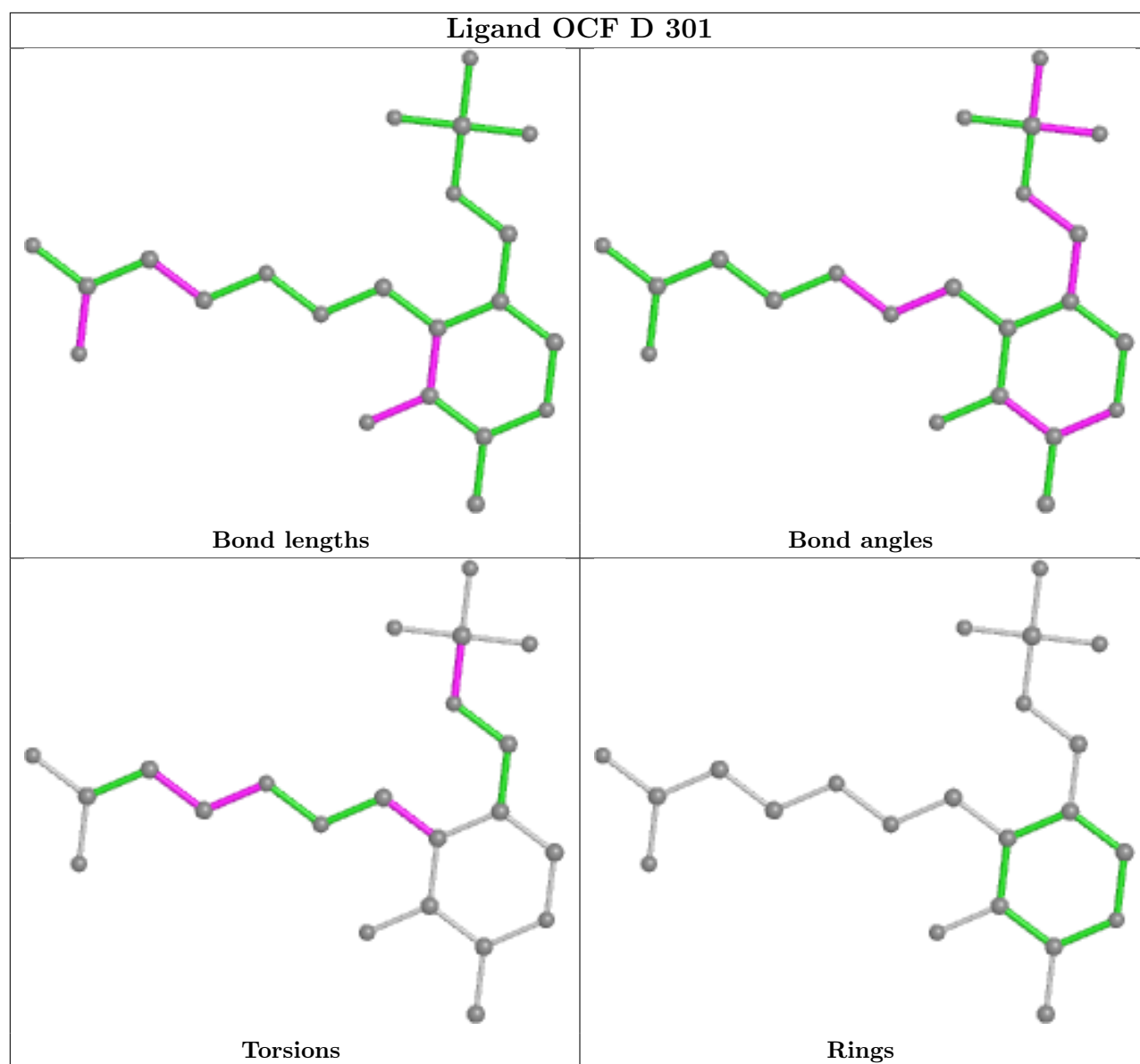
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for 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	276/277 (99%)	0.08	0 100 100	20, 30, 46, 76	0
1	B	275/277 (99%)	0.53	13 (4%) 31 37	29, 48, 77, 92	0
1	C	275/277 (99%)	0.17	1 (0%) 92 93	27, 38, 57, 78	0
1	D	277/277 (100%)	0.18	0 100 100	28, 40, 55, 76	0
1	E	268/277 (96%)	0.34	9 (3%) 45 51	26, 41, 62, 87	0
All	All	1371/1385 (98%)	0.26	23 (1%) 70 74	20, 39, 63, 92	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	168	GLY	3.8
1	C	152	GLY	3.8
1	E	150	PHE	3.6
1	B	221	LEU	3.6
1	B	158	GLY	3.5
1	B	247	ASP	3.3
1	B	181	ILE	3.3
1	B	245	ILE	3.1
1	B	155	ASP	3.1
1	B	138	LEU	3.1
1	E	98	GLY	3.0
1	E	158	GLY	3.0
1	E	149	SER	2.5
1	E	209[A]	ARG	2.4
1	E	148	LEU	2.3
1	E	207	ALA	2.3
1	E	101	HIS	2.2
1	B	140	SER	2.2
1	E	10	PHE	2.1
1	B	12	PRO	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	270	ILE	2.1
1	B	152	GLY	2.0
1	B	171	VAL	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 monosaccharides in this entry.

6.4 Ligands [i](#)

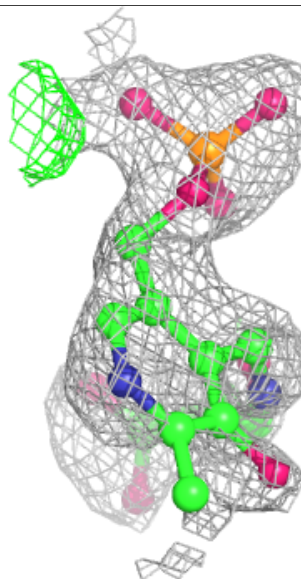
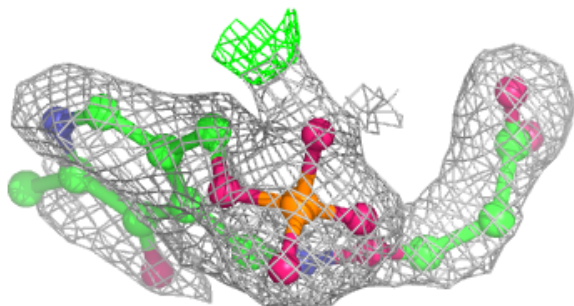
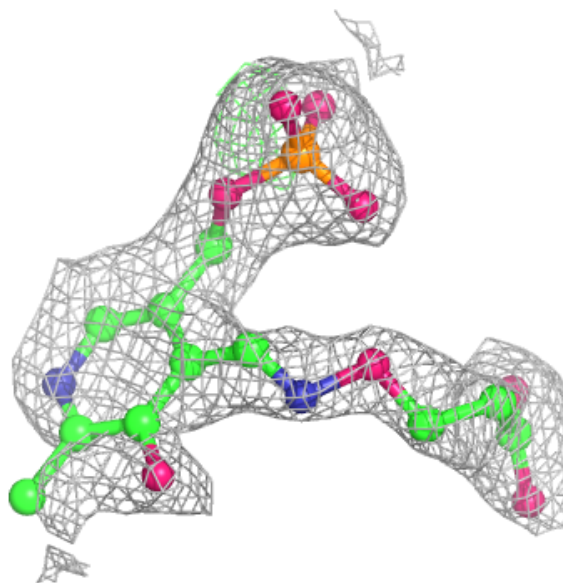
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	OCF	B	301	22/22	0.92	0.20	26,33,36,36	22
2	OCF	A	301	22/22	0.95	0.14	20,27,43,50	0
2	OCF	D	301	22/22	0.95	0.10	0,30,32,34	6
2	OCF	C	301	22/22	0.96	0.13	29,37,50,51	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.

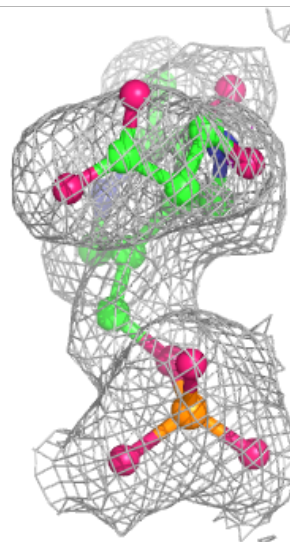
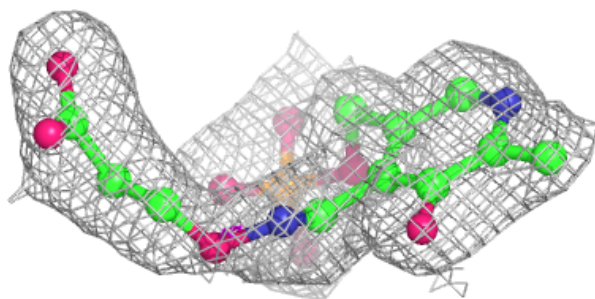
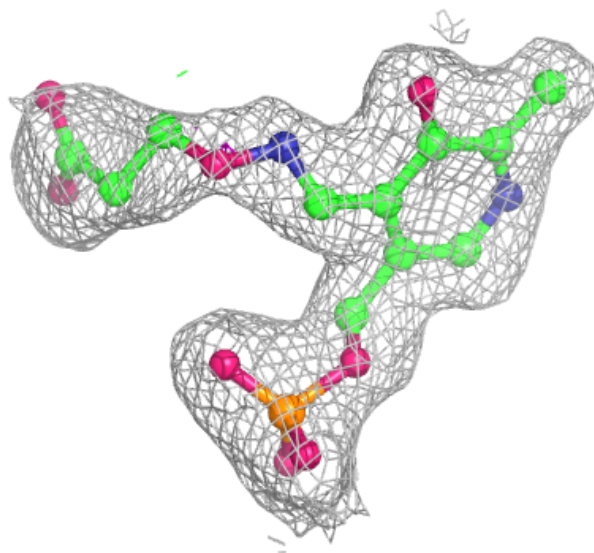
Electron density around OCF B 301:

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



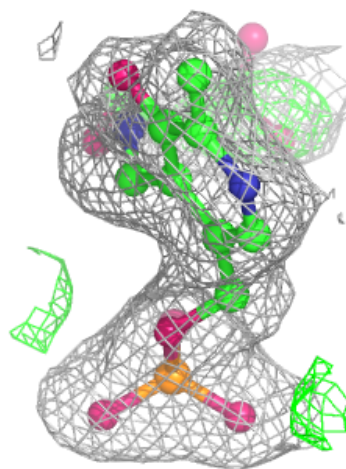
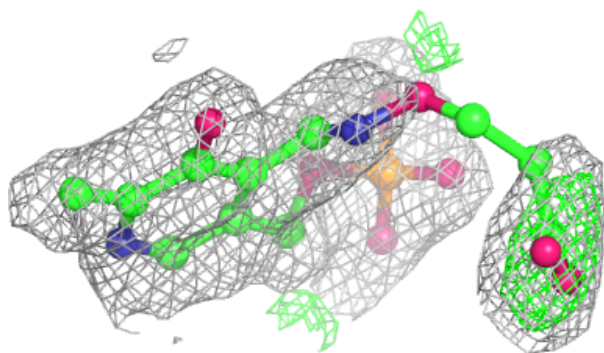
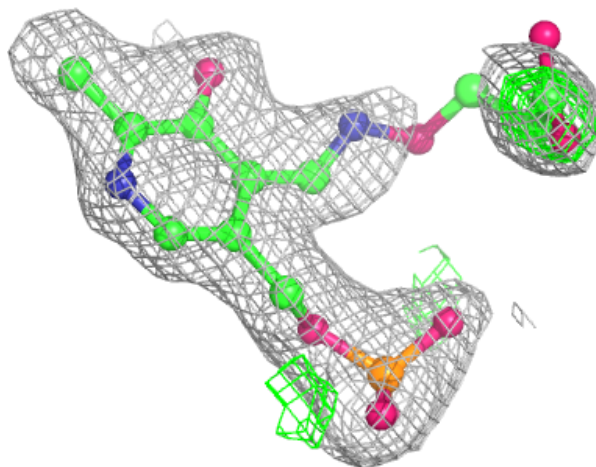
Electron density around OCF A 301:

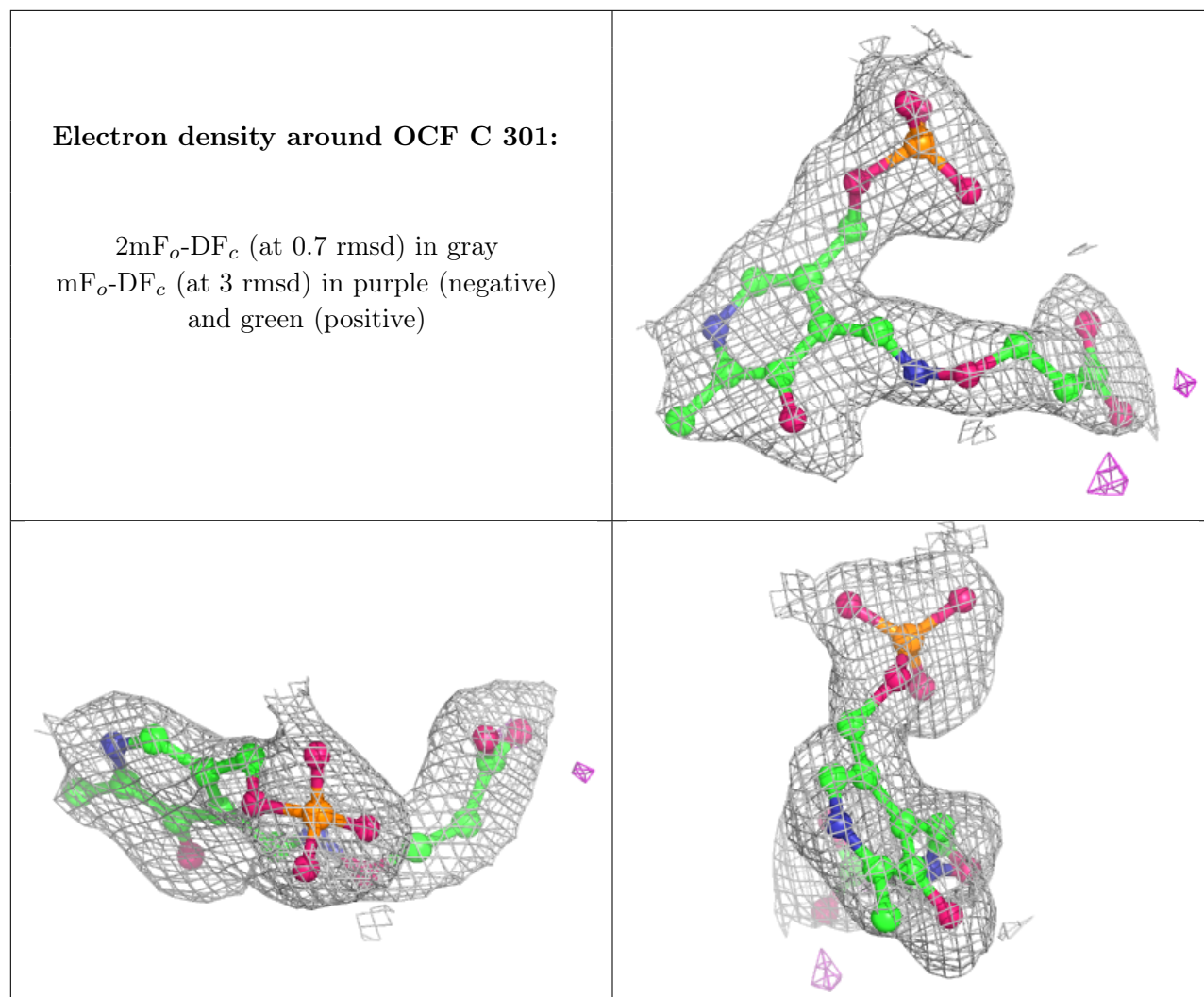
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around OCF D 301:

$2mF_o-DF_c$ (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.