



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:33 PM UTC

PDB ID : 9BA3 / pdb_00009ba3
Title : High-resolution crystal structure of the ligand binding domain of the Halomonas titanicae chemoreceptor Htc10 in complex with guanine
Authors : Ramos Ricciuti, F.E.; Herrera Seitz, M.K.; Gasperotti, A.F.; Boyko, A.; Jung, K.; Bellinzoni, M.; Lisa, M.N.; Studdert, C.A.
Deposited on : 2024-04-03
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	:	4-5-2 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

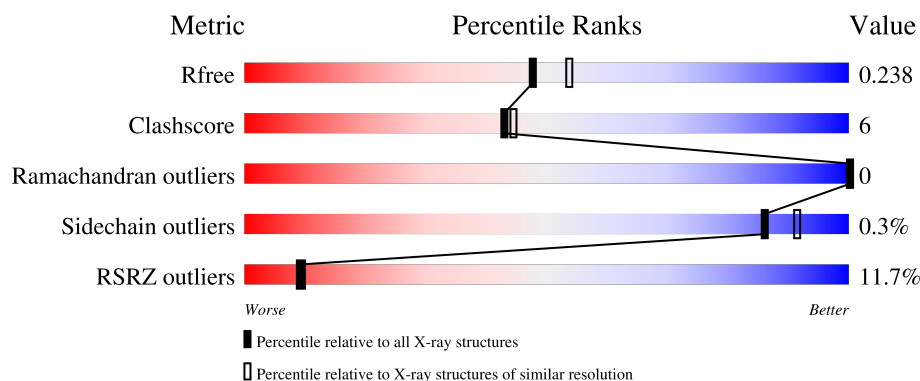
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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.



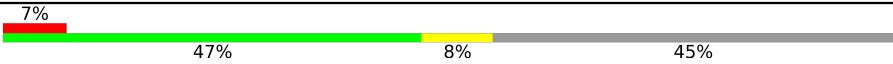
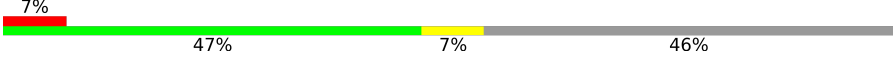
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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	288	8% 47% 8% 44%
1	B	288	5% 51% 5% 45%
1	C	288	6% 51% . 45%
1	D	288	5% 51% . 45%

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Mol	Chain	Length	Quality of chain
1	E	288	
1	F	288	

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
2	GUN	A	401	-	-	X	-
2	GUN	B	401	-	-	X	-
2	GUN	C	401	-	-	X	-
2	GUN	E	401	-	-	X	-

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 8191 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 Chemotaxis protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	160	Total	C	N	O	S	0	0	0
			1274	804	213	255	2			
1	B	159	Total	C	N	O	S	0	1	0
			1274	804	213	255	2			
1	C	159	Total	C	N	O	S	0	0	0
			1265	799	212	252	2			
1	D	157	Total	C	N	O	S	0	1	0
			1259	795	212	250	2			
1	E	157	Total	C	N	O	S	0	0	0
			1250	790	210	248	2			
1	F	155	Total	C	N	O	S	0	0	0
			1233	779	208	244	2			

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	30	MET	-	initiating methionine	UNP A0A0C3EFW7
A	31	GLY	-	expression tag	UNP A0A0C3EFW7
A	310	LEU	-	expression tag	UNP A0A0C3EFW7
A	311	GLU	-	expression tag	UNP A0A0C3EFW7
A	312	HIS	-	expression tag	UNP A0A0C3EFW7
A	313	HIS	-	expression tag	UNP A0A0C3EFW7
A	314	HIS	-	expression tag	UNP A0A0C3EFW7
A	315	HIS	-	expression tag	UNP A0A0C3EFW7
A	316	HIS	-	expression tag	UNP A0A0C3EFW7
A	317	HIS	-	expression tag	UNP A0A0C3EFW7
B	30	MET	-	initiating methionine	UNP A0A0C3EFW7
B	31	GLY	-	expression tag	UNP A0A0C3EFW7
B	310	LEU	-	expression tag	UNP A0A0C3EFW7
B	311	GLU	-	expression tag	UNP A0A0C3EFW7
B	312	HIS	-	expression tag	UNP A0A0C3EFW7
B	313	HIS	-	expression tag	UNP A0A0C3EFW7
B	314	HIS	-	expression tag	UNP A0A0C3EFW7

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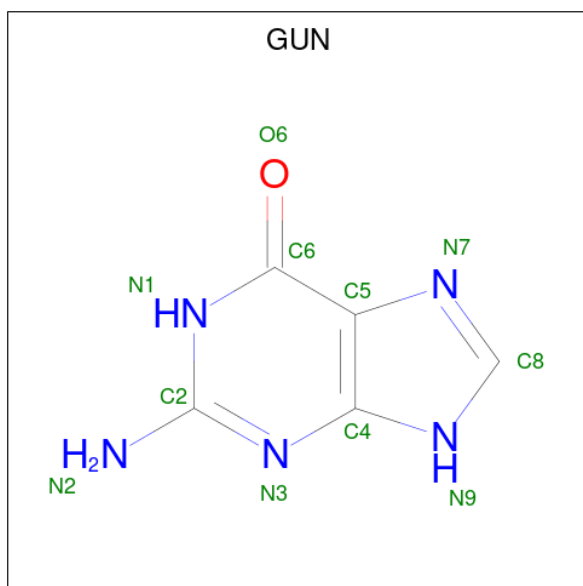
Chain	Residue	Modelled	Actual	Comment	Reference
B	315	HIS	-	expression tag	UNP A0A0C3EFW7
B	316	HIS	-	expression tag	UNP A0A0C3EFW7
B	317	HIS	-	expression tag	UNP A0A0C3EFW7
C	30	MET	-	initiating methionine	UNP A0A0C3EFW7
C	31	GLY	-	expression tag	UNP A0A0C3EFW7
C	310	LEU	-	expression tag	UNP A0A0C3EFW7
C	311	GLU	-	expression tag	UNP A0A0C3EFW7
C	312	HIS	-	expression tag	UNP A0A0C3EFW7
C	313	HIS	-	expression tag	UNP A0A0C3EFW7
C	314	HIS	-	expression tag	UNP A0A0C3EFW7
C	315	HIS	-	expression tag	UNP A0A0C3EFW7
C	316	HIS	-	expression tag	UNP A0A0C3EFW7
C	317	HIS	-	expression tag	UNP A0A0C3EFW7
D	30	MET	-	initiating methionine	UNP A0A0C3EFW7
D	31	GLY	-	expression tag	UNP A0A0C3EFW7
D	310	LEU	-	expression tag	UNP A0A0C3EFW7
D	311	GLU	-	expression tag	UNP A0A0C3EFW7
D	312	HIS	-	expression tag	UNP A0A0C3EFW7
D	313	HIS	-	expression tag	UNP A0A0C3EFW7
D	314	HIS	-	expression tag	UNP A0A0C3EFW7
D	315	HIS	-	expression tag	UNP A0A0C3EFW7
D	316	HIS	-	expression tag	UNP A0A0C3EFW7
D	317	HIS	-	expression tag	UNP A0A0C3EFW7
E	30	MET	-	initiating methionine	UNP A0A0C3EFW7
E	31	GLY	-	expression tag	UNP A0A0C3EFW7
E	310	LEU	-	expression tag	UNP A0A0C3EFW7
E	311	GLU	-	expression tag	UNP A0A0C3EFW7
E	312	HIS	-	expression tag	UNP A0A0C3EFW7
E	313	HIS	-	expression tag	UNP A0A0C3EFW7
E	314	HIS	-	expression tag	UNP A0A0C3EFW7
E	315	HIS	-	expression tag	UNP A0A0C3EFW7
E	316	HIS	-	expression tag	UNP A0A0C3EFW7
E	317	HIS	-	expression tag	UNP A0A0C3EFW7
F	30	MET	-	initiating methionine	UNP A0A0C3EFW7
F	31	GLY	-	expression tag	UNP A0A0C3EFW7
F	310	LEU	-	expression tag	UNP A0A0C3EFW7
F	311	GLU	-	expression tag	UNP A0A0C3EFW7
F	312	HIS	-	expression tag	UNP A0A0C3EFW7
F	313	HIS	-	expression tag	UNP A0A0C3EFW7
F	314	HIS	-	expression tag	UNP A0A0C3EFW7
F	315	HIS	-	expression tag	UNP A0A0C3EFW7
F	316	HIS	-	expression tag	UNP A0A0C3EFW7

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Chain	Residue	Modelled	Actual	Comment	Reference
F	317	HIS	-	expression tag	UNP A0A0C3EFW7

- Molecule 2 is GUANINE (CCD ID: GUN) (formula: $C_5H_5N_5O$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			11	5	5	1		
2	B	1	Total	C	N	O	0	0
			11	5	5	1		
2	C	1	Total	C	N	O	0	0
			11	5	5	1		
2	D	1	Total	C	N	O	0	0
			11	5	5	1		
2	E	1	Total	C	N	O	0	0
			11	5	5	1		
2	F	1	Total	C	N	O	0	0
			11	5	5	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	90	Total	O	0	0
			90	90		
3	B	98	Total	O	0	0
			98	98		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	84	Total 84	O 84	0	0
3	D	101	Total 101	O 101	0	0
3	E	120	Total 120	O 120	0	0
3	F	77	Total 77	O 77	0	0

[illegible]

Chain E:

The sequence logo for Chain E displays the relative frequency of amino acids at each position. The y-axis represents information content in bits, ranging from 0.00 to 1.60. The x-axis shows positions 1 through 79. The plot is divided into three segments: positions 1-28 (green bar, 47% total), positions 29-36 (yellow bar, 8% total), and positions 37-79 (grey bar, 45% total). A red bar at the top indicates a 7% threshold. Red dots above specific residues indicate significant conservation.

Position	Amino Acid	Approx. Information Content (bits)
1	MET	0.15
2	GLY	0.10
3	LEU	0.10
4	GLN	0.10
5	ALA	0.10
6	ARG	0.10
7	SER	0.10
8	HIS	0.10
9	SER	0.10
10	GLN	0.10
11	ALA	0.10
12	ARG	0.10
13	LEU	0.10
14	ASP	0.10
15	ASN	0.10
16	LEU	0.10
17	LEU	0.10
18	ASN	0.10
19	GLN	0.10
20	E49	0.15
21	L50	0.15
22	P51	0.15
23	A52	0.15
24	Q53	0.15
25	V54	0.15
26	K55	0.15
27	G56	0.15
28	L57	0.15
29	A58	0.15
30	A59	0.15
31	H60	0.15
32	I61	0.15
33	N62	0.15
34	L63	0.15
35	S64	0.15
36	L65	0.15
37	S66	0.15
38	D67	0.15
39	D68	0.15
40	L69	0.15
41	W84	0.15
42	G88	0.15
43	L89	0.15
44	P90	0.15
45	Y100	0.15
46	F114	0.15
47	H119	0.15
48	Q120	0.15
49	G121	0.15
50	R122	0.15
51	I137	0.15
52	L160	0.15

Chain F:

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	89.35Å 104.50Å 145.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	84.90 – 2.10 84.90 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (84.90-2.10) 99.9 (84.90-2.10)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 2.10Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.211 , 0.238 0.210 , 0.238	Depositor DCC
R_{free} test set	4034 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	37.8	Xtriage
Anisotropy	0.155	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 48.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8191	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.06% 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: GUN

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	0.18	0/1302	0.40	0/1772
1	B	0.17	0/1302	0.34	0/1772
1	C	0.14	0/1293	0.34	0/1760
1	D	0.15	0/1287	0.34	0/1751
1	E	0.19	0/1278	0.38	0/1739
1	F	0.24	0/1261	0.35	0/1716
All	All	0.18	0/7723	0.36	0/10510

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
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	179	ARG	Sidechain

5.2 Too-close contacts [i](#)

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	1274	0	1196	23	0
1	B	1274	0	1195	14	0
1	C	1265	0	1190	12	0
1	D	1259	0	1184	9	0
1	E	1250	0	1177	20	0
1	F	1233	0	1160	15	0
2	A	11	0	5	4	0
2	B	11	0	5	5	0
2	C	11	0	5	4	0
2	D	11	0	5	3	0
2	E	11	0	5	4	0
2	F	11	0	5	2	0
3	A	90	0	0	2	0
3	B	98	0	0	0	0
3	C	84	0	0	2	0
3	D	101	0	0	2	0
3	E	120	0	0	1	0
3	F	77	0	0	2	0
All	All	8191	0	7132	91	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 6.

All (91) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:60:HIS:HB3	1:A:206:ILE:HG12	1.61	0.81
1:E:100:TYR:HH	1:F:100:TYR:HH	1.30	0.76
1:A:65:LEU:HD21	1:A:160:LEU:HD21	1.68	0.76
1:E:65:LEU:HD21	1:E:160:LEU:HD21	1.70	0.72
1:E:53:GLN:N	1:E:53:GLN:OE1	2.23	0.71
1:E:64:SER:HA	1:E:205:LEU:HB3	1.73	0.70
1:A:203:ALA:HA	1:A:206:ILE:HD12	1.76	0.67
1:A:64:SER:HA	1:A:205:LEU:HB3	1.80	0.64
1:C:114:PHE:CE2	2:C:401:GUN:H8	2.34	0.62
1:A:114:PHE:CE1	2:A:401:GUN:H8	2.36	0.60
1:E:114:PHE:CE2	2:E:401:GUN:H8	2.37	0.59
1:F:198:ASP:OD1	1:F:201:GLN:N	2.25	0.58
1:B:114:PHE:CD2	2:B:401:GUN:H8	2.38	0.58
1:C:60:HIS:ND1	1:C:206:ILE:HD12	2.19	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:114:PHE:CE2	2:B:401:GUN:H8	2.40	0.57
1:E:65:LEU:HB3	1:E:69:LEU:HG	1.86	0.56
1:F:51:PRO:HG2	1:F:54:VAL:HG22	1.87	0.56
1:C:60:HIS:CE1	1:C:206:ILE:HG23	2.41	0.56
1:E:122:ARG:NH2	3:E:502:HOH:O	2.38	0.56
1:A:60:HIS:CB	1:A:206:ILE:HG12	2.36	0.55
1:A:51:PRO:HB2	1:A:55:LYS:HE3	1.87	0.55
1:A:177:ASN:ND2	2:A:401:GUN:N7	2.49	0.55
1:F:136:ARG:NH2	1:F:145:ASP:OD1	2.35	0.54
1:E:114:PHE:CZ	2:E:401:GUN:H8	2.43	0.54
1:C:177:ASN:ND2	2:C:401:GUN:N7	2.49	0.54
1:B:60:HIS:CE1	1:B:206:ILE:HG23	2.43	0.53
1:C:114:PHE:CZ	2:C:401:GUN:H8	2.44	0.53
1:A:154:SER:O	1:A:179:ARG:NH2	2.42	0.53
1:C:84:TRP:CD1	1:C:90:PRO:HD2	2.44	0.53
1:E:65:LEU:O	1:E:69:LEU:HB2	2.09	0.53
1:A:114:PHE:CD1	2:A:401:GUN:H8	2.44	0.52
1:B:139:GLN:NE2	1:B:144:GLU:OE2	2.43	0.52
1:A:60:HIS:HB3	1:A:206:ILE:CG1	2.38	0.52
1:F:114:PHE:CD2	2:F:401:GUN:H8	2.45	0.51
1:B:156:ASN:ND2	1:B:159[A]:GLU:OE2	2.36	0.51
1:E:114:PHE:CD2	2:E:401:GUN:H8	2.45	0.51
1:A:61:ILE:O	1:A:64:SER:HB2	2.11	0.51
1:B:164:SER:O	2:B:401:GUN:N2	2.44	0.51
1:F:50:LEU:HD12	1:F:51:PRO:HD2	1.93	0.51
1:A:84:TRP:CD1	1:A:90:PRO:HD2	2.46	0.49
1:C:114:PHE:CD2	2:C:401:GUN:H8	2.47	0.49
1:A:114:PHE:CZ	2:A:401:GUN:H8	2.48	0.49
1:A:64:SER:HA	1:A:205:LEU:CB	2.42	0.49
1:B:60:HIS:ND1	1:B:206:ILE:HD12	2.28	0.49
1:F:114:PHE:CE2	2:F:401:GUN:H8	2.48	0.48
1:A:51:PRO:O	1:A:55:LYS:HG3	2.12	0.48
1:E:65:LEU:HD21	1:E:160:LEU:HD11	1.94	0.48
1:F:108:LEU:HB3	1:F:110:THR:HG23	1.95	0.48
1:D:114:PHE:CE2	2:D:401:GUN:H8	2.48	0.48
1:D:114:PHE:CD2	2:D:401:GUN:H8	2.49	0.48
1:E:54:VAL:HG13	1:E:57:LEU:HD23	1.97	0.46
1:F:84:TRP:CD1	1:F:90:PRO:HD2	2.50	0.46
1:E:64:SER:HA	1:E:205:LEU:CB	2.43	0.46
1:D:83[B]:GLN:OE1	3:D:501:HOH:O	2.20	0.46
1:F:114:PHE:HZ	1:F:177:ASN:HD22	1.64	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:143:SER:OG	1:A:144:GLU:N	2.50	0.45
1:A:83:GLN:HG2	3:A:578:HOH:O	2.16	0.45
1:A:53:GLN:N	1:A:53:GLN:OE1	2.49	0.45
1:C:202:MET:O	1:C:206:ILE:HG12	2.17	0.45
1:E:84:TRP:CD1	1:E:90:PRO:HD2	2.52	0.45
1:F:176:VAL:O	1:F:194:GLY:HA3	2.16	0.45
1:D:64:SER:OG	1:D:202:MET:HA	2.16	0.45
1:D:143:SER:HB3	1:D:144:GLU:OE1	2.17	0.44
1:F:179:ARG:NH1	3:F:505:HOH:O	2.40	0.44
1:B:114:PHE:CG	2:B:401:GUN:H8	2.52	0.44
1:C:119:HIS:HD2	3:C:518:HOH:O	2.01	0.44
1:B:202:MET:O	1:B:206:ILE:HG12	2.18	0.44
1:B:136:ARG:NH2	1:B:145:ASP:OD1	2.48	0.43
1:A:63:LEU:HD23	1:A:208:ASP:C	2.43	0.43
3:C:545:HOH:O	1:E:120:GLN:HB3	2.19	0.43
1:A:64:SER:O	1:A:205:LEU:HD13	2.19	0.43
1:E:51:PRO:O	1:E:55:LYS:N	2.52	0.43
1:D:198:ASP:OD1	1:D:201:GLN:N	2.30	0.43
1:F:111:GLU:HG2	1:F:173:PHE:CE1	2.54	0.43
1:B:106:GLU:HA	1:C:185:ALA:HB2	2.00	0.42
1:C:176:VAL:O	1:C:194:GLY:HA3	2.19	0.42
1:E:198:ASP:OD1	1:E:201:GLN:HB3	2.19	0.42
1:D:119:HIS:HD2	3:D:540:HOH:O	2.01	0.42
1:B:136:ARG:HH12	1:B:145:ASP:CG	2.24	0.42
1:A:202:MET:O	1:A:206:ILE:HG13	2.19	0.42
1:E:88:GLY:HA2	1:E:119:HIS:CD2	2.56	0.41
1:F:198:ASP:OD1	1:F:198:ASP:C	2.63	0.41
1:F:104:LEU:HD21	3:F:545:HOH:O	2.20	0.41
1:E:60:HIS:NE2	1:E:202:MET:O	2.51	0.41
1:A:119:HIS:HD2	3:A:507:HOH:O	2.03	0.41
1:D:114:PHE:CZ	2:D:401:GUN:H8	2.56	0.41
1:B:114:PHE:CZ	2:B:401:GUN:H8	2.55	0.41
1:E:114:PHE:CE1	2:E:401:GUN:H8	2.56	0.40
1:C:199:LEU:HD23	1:C:199:LEU:HA	1.90	0.40
1:D:176:VAL:O	1:D:194:GLY:HA3	2.22	0.40
1:B:114:PHE:HZ	1:B:177:ASN:HD22	1.69	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	158/288 (55%)	155 (98%)	3 (2%)	0	100	100
1	B	158/288 (55%)	155 (98%)	3 (2%)	0	100	100
1	C	157/288 (54%)	155 (99%)	2 (1%)	0	100	100
1	D	156/288 (54%)	154 (99%)	2 (1%)	0	100	100
1	E	155/288 (54%)	154 (99%)	1 (1%)	0	100	100
1	F	153/288 (53%)	151 (99%)	2 (1%)	0	100	100
All	All	937/1728 (54%)	924 (99%)	13 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	134/242 (55%)	134 (100%)	0	100	100
1	B	134/242 (55%)	134 (100%)	0	100	100
1	C	133/242 (55%)	132 (99%)	1 (1%)	73	81
1	D	132/242 (54%)	132 (100%)	0	100	100
1	E	131/242 (54%)	130 (99%)	1 (1%)	73	81
1	F	129/242 (53%)	129 (100%)	0	100	100
All	All	793/1452 (55%)	791 (100%)	2 (0%)	86	91

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	206	ILE
1	E	137	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	127	GLN
1	B	94	GLN
1	B	139	GLN
1	B	177	ASN
1	C	127	GLN
1	C	139	GLN
1	D	127	GLN
1	D	177	ASN
1	E	120	GLN
1	E	127	GLN
1	F	177	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

6 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	GUN	B	401	-	12,12,12	0.42	0	15,17,17	0.53	0
2	GUN	A	401	-	12,12,12	0.43	0	15,17,17	0.53	0
2	GUN	D	401	-	12,12,12	0.43	0	15,17,17	0.54	0
2	GUN	C	401	-	12,12,12	0.43	0	15,17,17	0.54	0
2	GUN	E	401	-	12,12,12	0.44	0	15,17,17	0.54	0
2	GUN	F	401	-	12,12,12	0.43	0	15,17,17	0.54	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GUN	B	401	-	-	-	0/2/2/2
2	GUN	A	401	-	-	-	0/2/2/2
2	GUN	D	401	-	-	-	0/2/2/2
2	GUN	C	401	-	-	-	0/2/2/2
2	GUN	E	401	-	-	-	0/2/2/2
2	GUN	F	401	-	-	-	0/2/2/2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

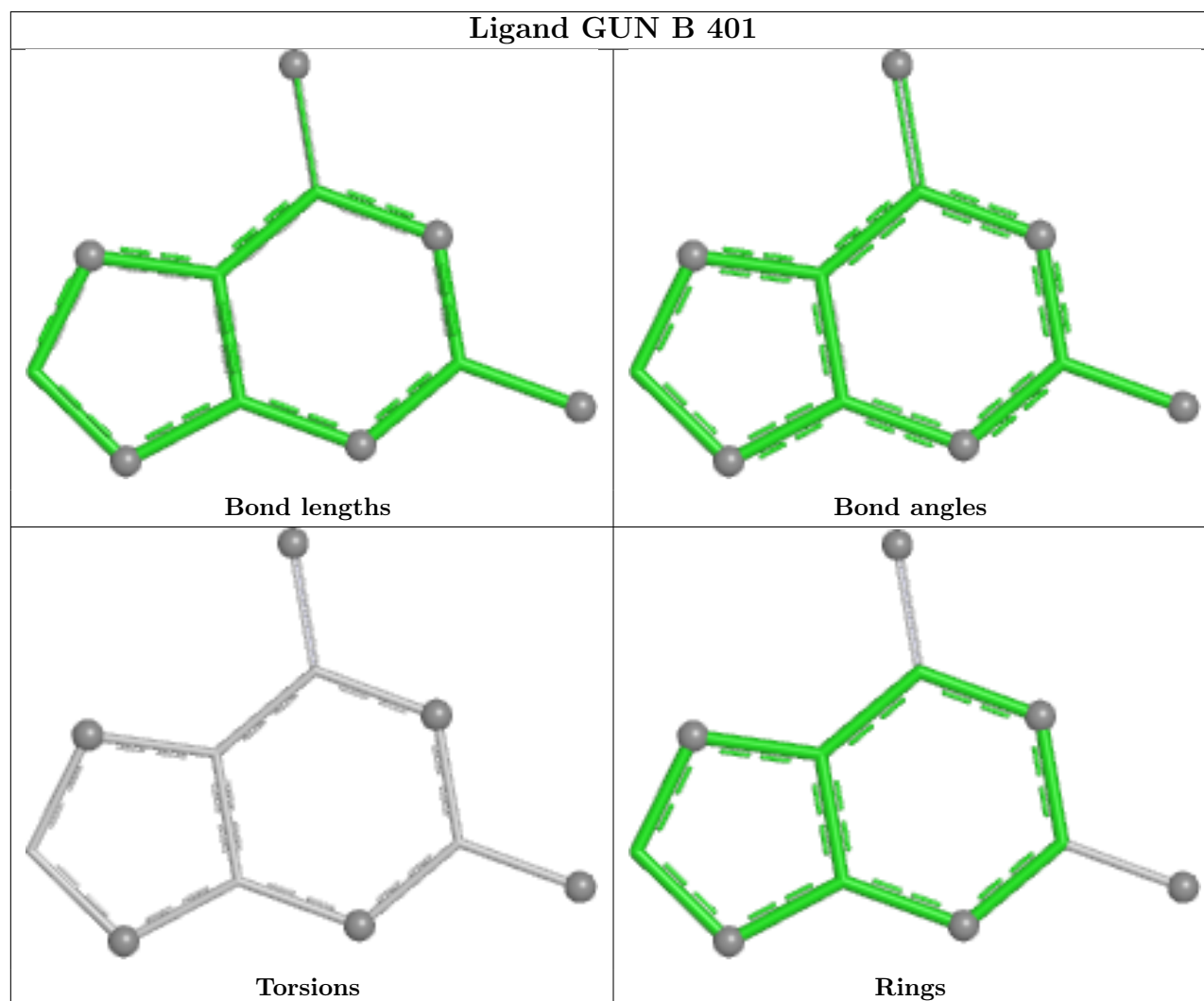
There are no ring outliers.

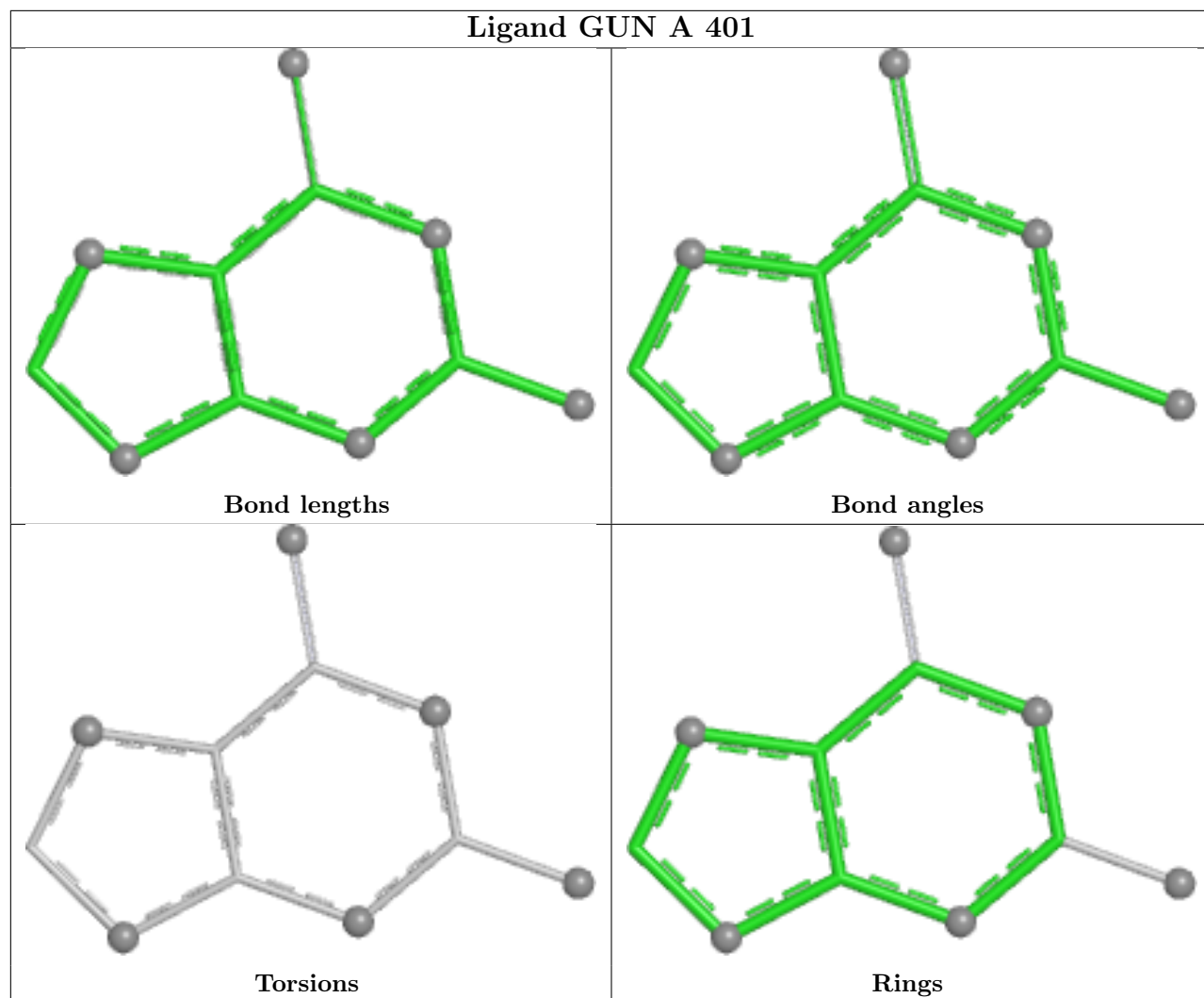
6 monomers are involved in 22 short contacts:

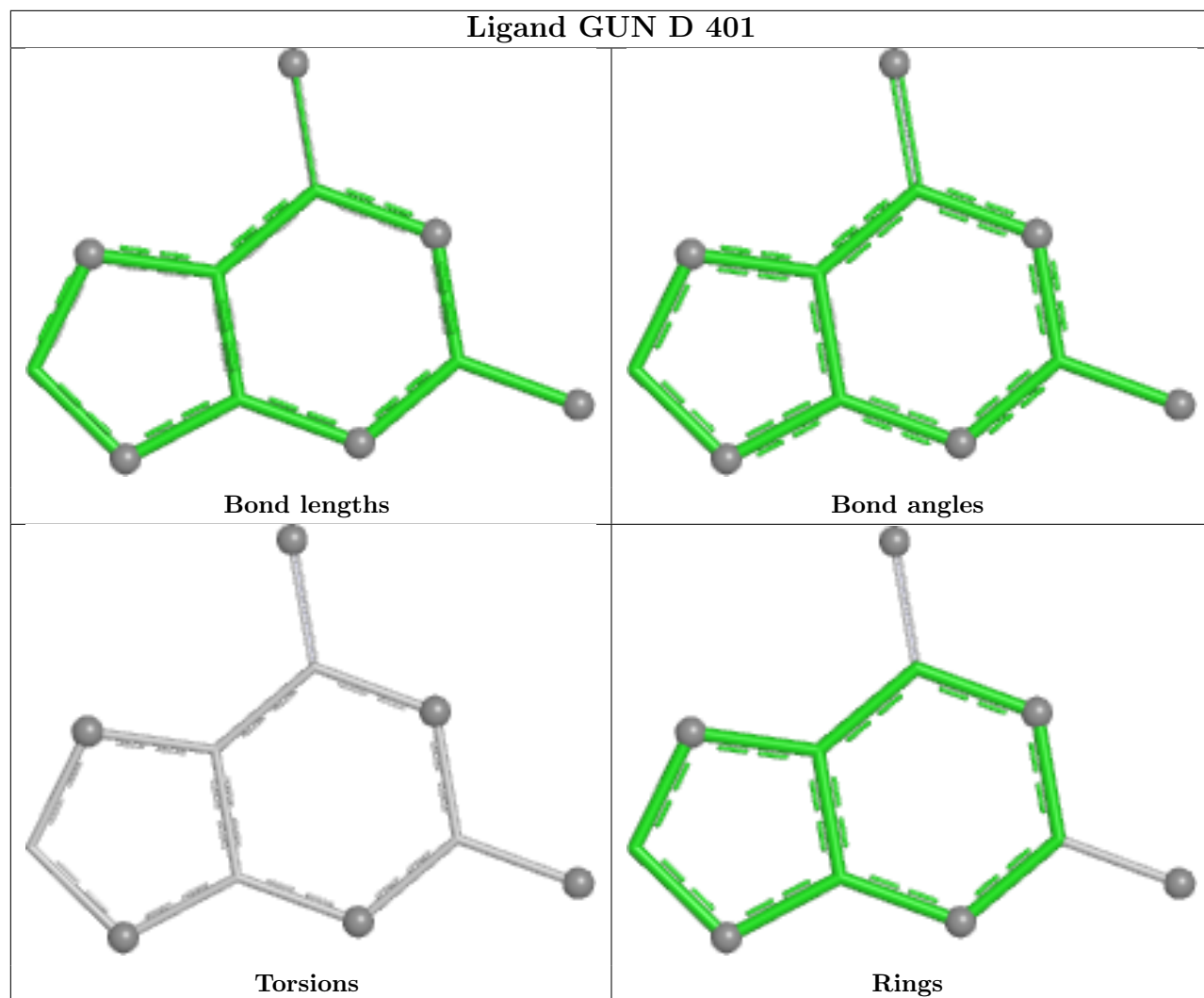
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	GUN	5	0
2	A	401	GUN	4	0
2	D	401	GUN	3	0
2	C	401	GUN	4	0
2	E	401	GUN	4	0
2	F	401	GUN	2	0

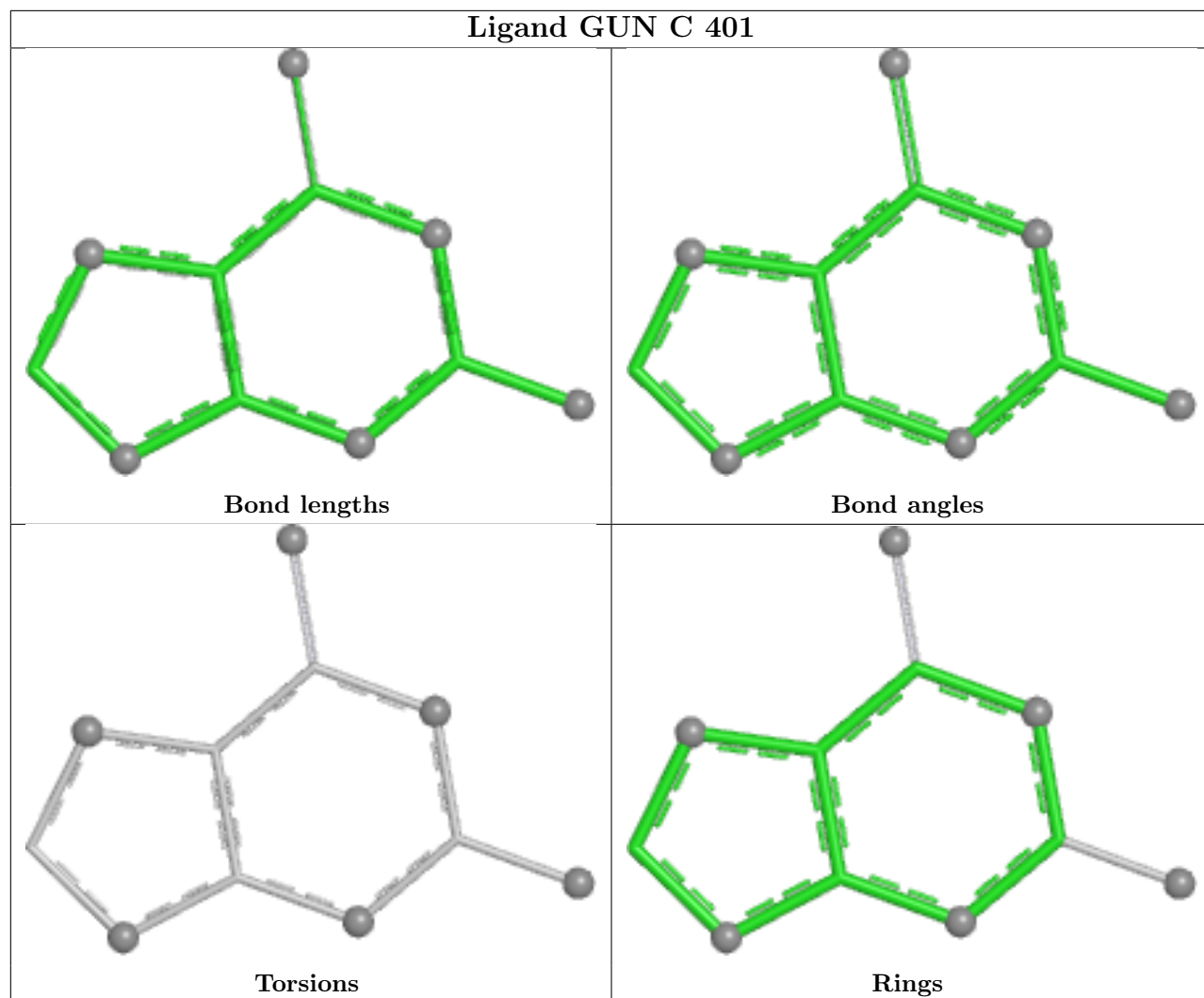
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

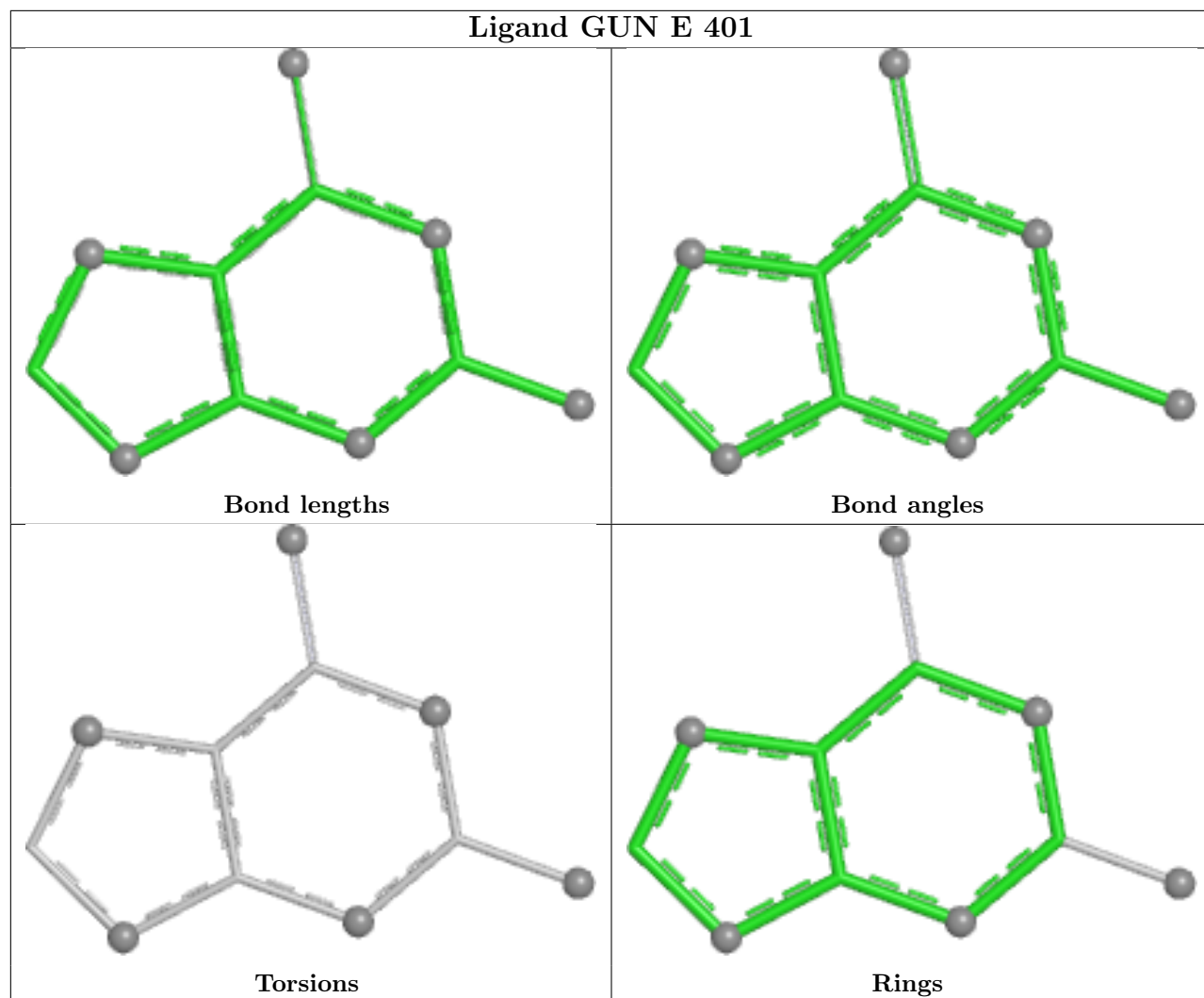
also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted 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.

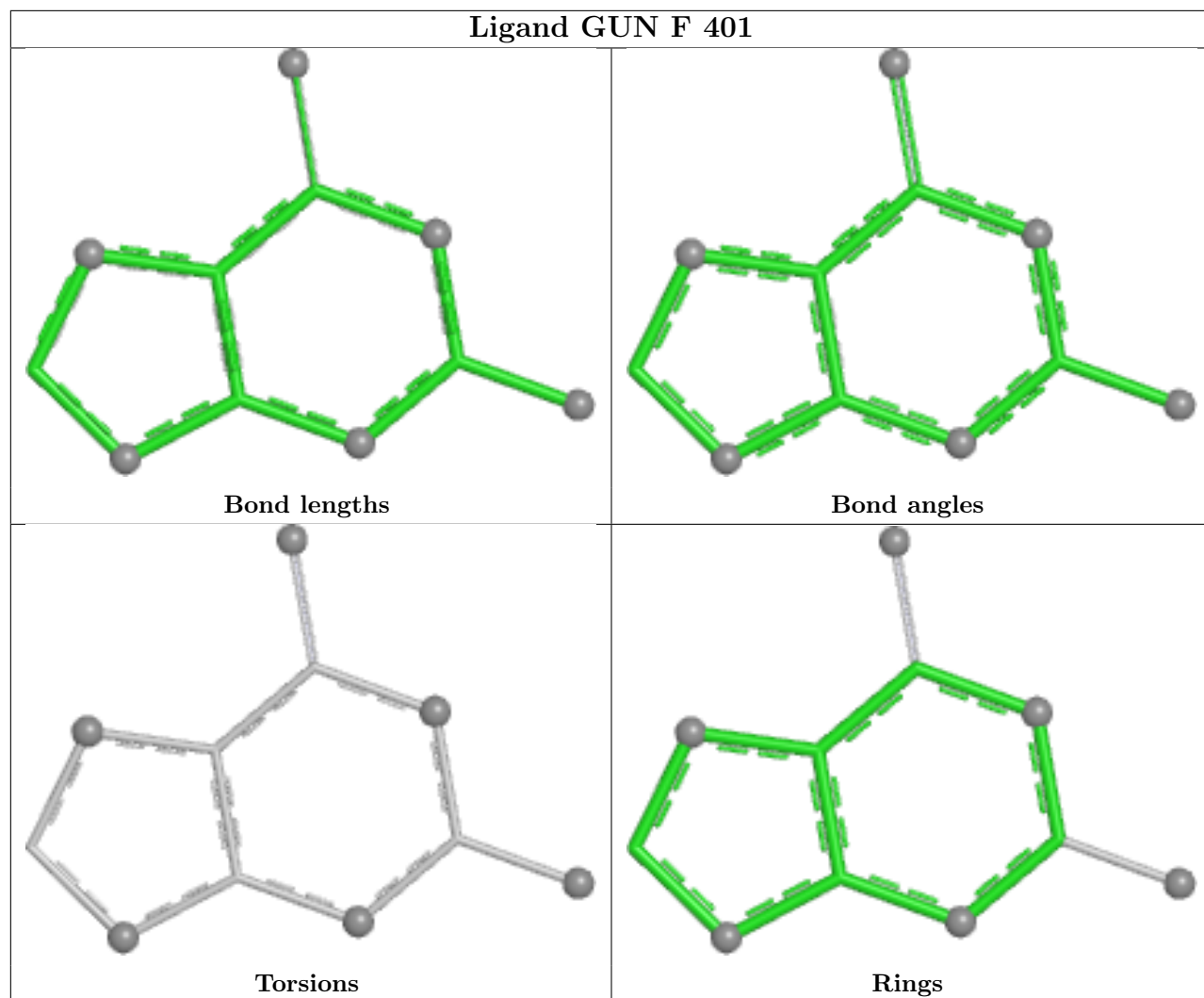












5.7 Other polymers [i](#)

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	160/288 (55%)	0.76	24 (15%)	5 5	28, 42, 100, 131	0
1	B	159/288 (55%)	0.39	15 (9%)	14 14	21, 42, 74, 114	1 (0%)
1	C	159/288 (55%)	0.56	17 (10%)	11 11	30, 45, 88, 109	0
1	D	157/288 (54%)	0.35	15 (9%)	13 14	18, 40, 75, 113	1 (0%)
1	E	157/288 (54%)	0.54	21 (13%)	7 7	27, 40, 87, 145	0
1	F	155/288 (53%)	0.59	19 (12%)	8 8	31, 48, 93, 122	0
All	All	947/1728 (54%)	0.53	111 (11%)	9 9	18, 43, 89, 145	2 (0%)

All (111) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	50	LEU	7.9
1	A	205	LEU	6.7
1	C	54	VAL	6.7
1	A	50	LEU	6.6
1	B	50	LEU	6.1
1	C	50	LEU	6.1
1	A	54	VAL	6.0
1	A	58	ALA	6.0
1	C	52	ALA	5.9
1	A	63	LEU	5.9
1	E	49	GLU	5.8
1	B	54	VAL	5.8
1	C	58	ALA	5.8
1	E	64	SER	5.7
1	A	51	PRO	5.7
1	F	65	LEU	5.6
1	A	59	ALA	5.4
1	A	57	LEU	5.4
1	D	205	LEU	5.4

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Mol	Chain	Res	Type	RSRZ
1	E	65	LEU	5.4
1	A	60	HIS	5.2
1	E	54	VAL	5.1
1	A	61	ILE	5.0
1	A	52	ALA	4.9
1	A	206	ILE	4.9
1	E	51	PRO	4.8
1	E	63	LEU	4.7
1	D	63	LEU	4.7
1	E	58	ALA	4.7
1	D	50	LEU	4.7
1	E	52	ALA	4.6
1	F	63	LEU	4.6
1	E	205	LEU	4.5
1	A	65	LEU	4.4
1	A	53	GLN	4.4
1	A	49	GLU	4.2
1	E	59	ALA	4.2
1	C	53	GLN	4.0
1	E	62	ASN	3.9
1	C	59	ALA	3.9
1	F	58	ALA	3.9
1	A	64	SER	3.8
1	D	56	GLY	3.7
1	F	51	PRO	3.7
1	B	51	PRO	3.6
1	F	57	LEU	3.5
1	C	65	LEU	3.5
1	D	65	LEU	3.5
1	B	56	GLY	3.5
1	B	206	ILE	3.4
1	C	51	PRO	3.3
1	B	52	ALA	3.2
1	B	65	LEU	3.2
1	B	58	ALA	3.2
1	A	62	ASN	3.2
1	E	53	GLN	3.2
1	A	143	SER	3.1
1	B	55	LYS	3.1
1	F	54	VAL	3.1
1	C	57	LEU	3.0
1	E	60	HIS	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	66	SER	3.0
1	E	66	SER	2.9
1	F	59	ALA	2.9
1	A	56	GLY	2.9
1	C	61	ILE	2.9
1	C	55	LYS	2.9
1	A	142	GLY	2.9
1	C	56	GLY	2.8
1	F	64	SER	2.8
1	F	204	SER	2.7
1	F	50	LEU	2.7
1	E	61	ILE	2.7
1	E	55	LYS	2.7
1	D	204	SER	2.7
1	E	203	ALA	2.7
1	D	51	PRO	2.6
1	D	54	VAL	2.6
1	C	62	ASN	2.6
1	D	58	ALA	2.6
1	A	55	LYS	2.5
1	E	67	GLN	2.4
1	F	55	LYS	2.4
1	C	60	HIS	2.4
1	D	52	ALA	2.3
1	B	53	GLN	2.3
1	E	56	GLY	2.3
1	F	56	GLY	2.3
1	B	57	LEU	2.3
1	F	198	ASP	2.3
1	D	55	LYS	2.3
1	D	60	HIS	2.3
1	D	61	ILE	2.3
1	F	53	GLN	2.2
1	F	66	SER	2.2
1	D	64	SER	2.2
1	F	155	ASP	2.2
1	F	52	ALA	2.2
1	B	66	SER	2.2
1	E	122	ARG	2.2
1	B	59	ALA	2.1
1	D	49	GLU	2.1
1	F	138	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	144	GLU	2.1
1	F	62	ASN	2.1
1	A	109	ASP	2.1
1	B	207	ASP	2.1
1	A	197	LEU	2.0
1	C	63	LEU	2.0
1	C	207	ASP	2.0
1	C	142	GLY	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

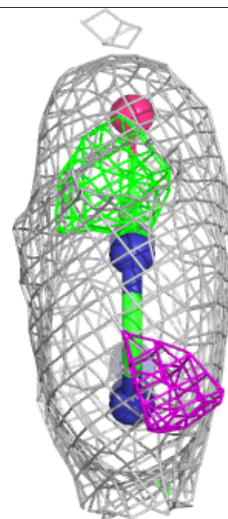
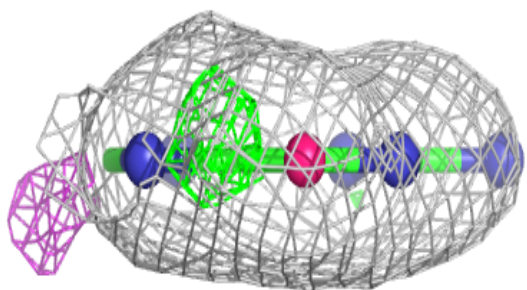
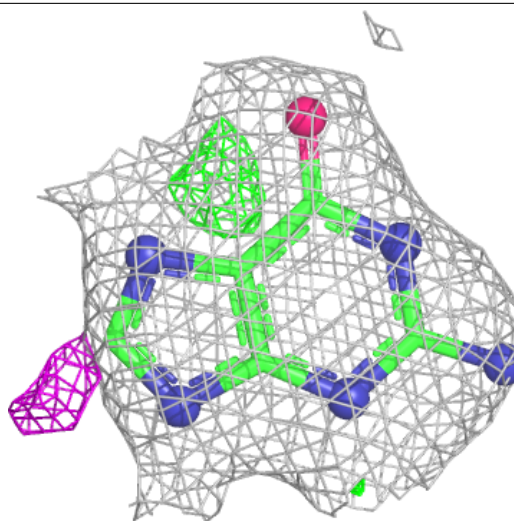
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	GUN	C	401	11/11	0.91	0.13	40,44,48,53	0
2	GUN	E	401	11/11	0.91	0.10	31,35,41,51	0
2	GUN	D	401	11/11	0.93	0.09	33,38,43,52	0
2	GUN	A	401	11/11	0.93	0.10	32,37,43,56	0
2	GUN	B	401	11/11	0.94	0.09	33,36,43,46	0
2	GUN	F	401	11/11	0.95	0.08	38,43,47,56	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.

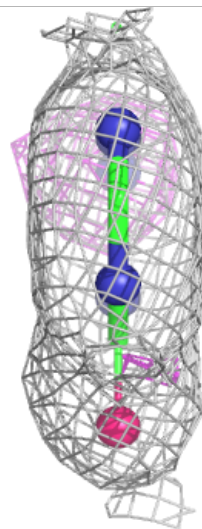
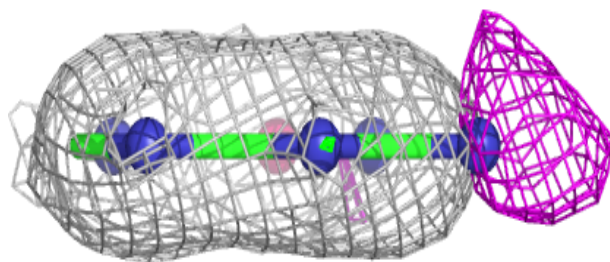
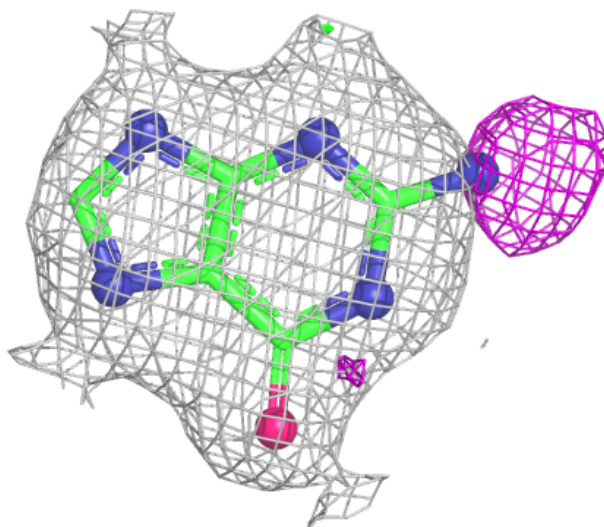
Electron density around GUN C 401:

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



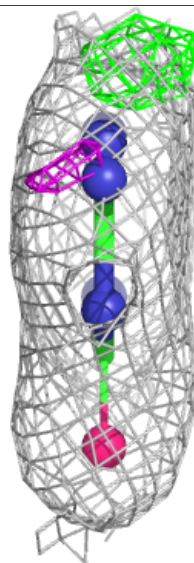
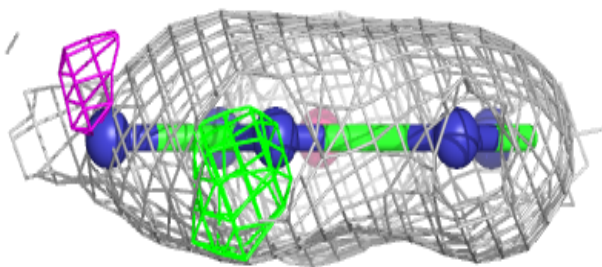
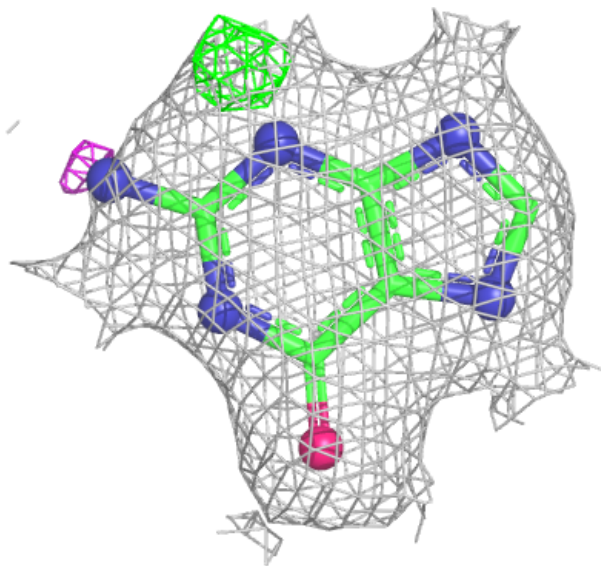
Electron density around GUN E 401:

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



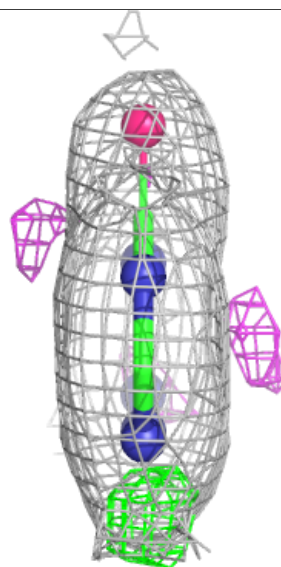
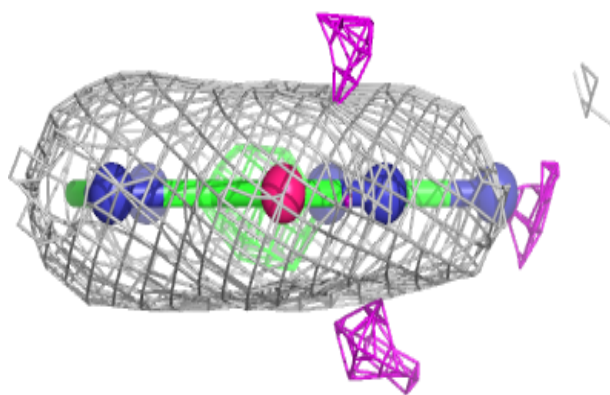
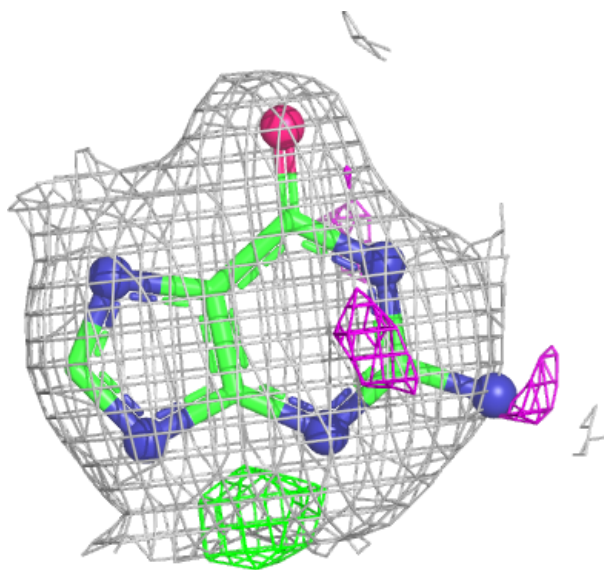
Electron density around GUN D 401:

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



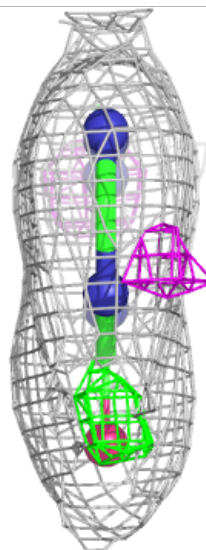
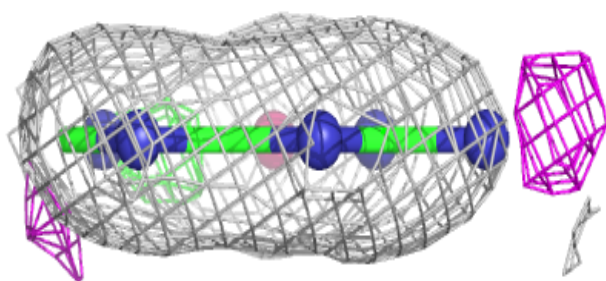
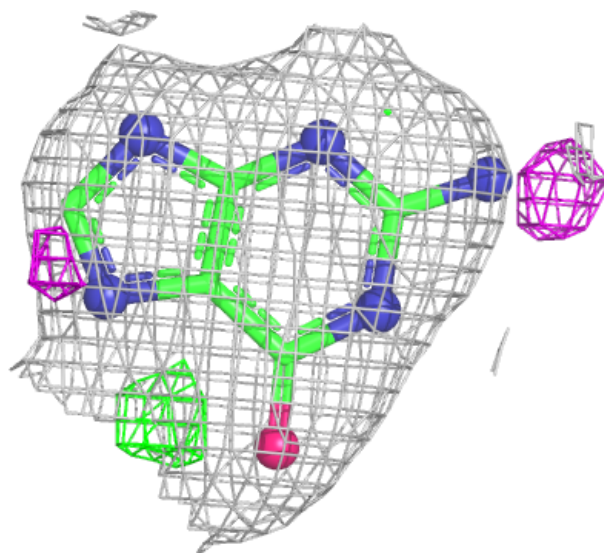
Electron density around GUN A 401:

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



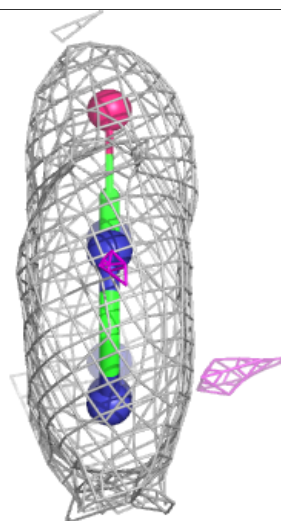
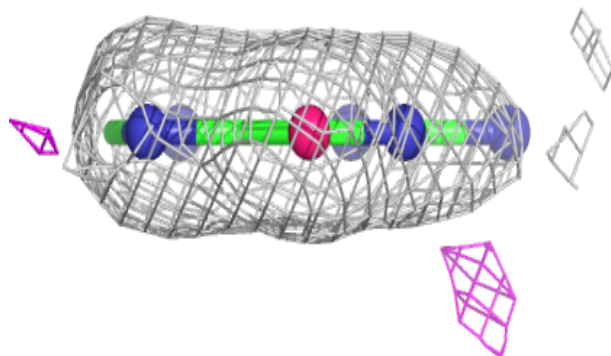
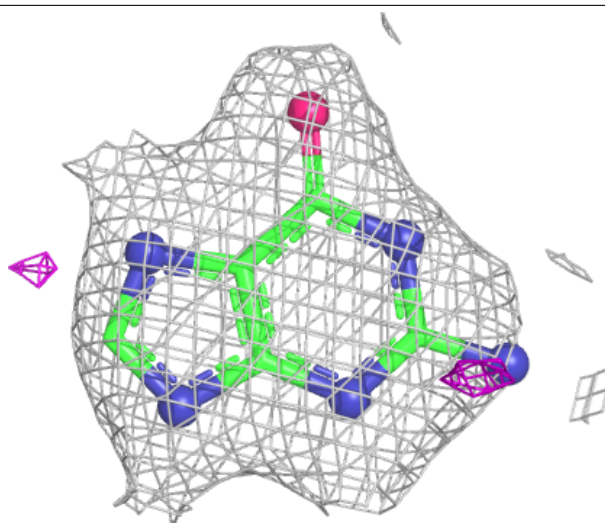
Electron density around GUN B 401:

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



Electron density around GUN F 401:

$2mF_o-DF_c$ (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.