Full wwPDB X-ray Structure Validation Report (i)

Nov 11, 2026 – 07:08 PM JST

PDB ID	:	25TZ / pdb_000025tz
Title	:	Crystal structure of SktA in complex with 5-bromo-L-tryptophan
Authors	:	Li, H.; Liu, J.; Huang, J.-W.; Chen, C.-C.; Guo, R.-T.
Deposited on	:	2026-04-17
Resolution	:	2.19 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 (i) 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 (i)) were used in the production of this report:

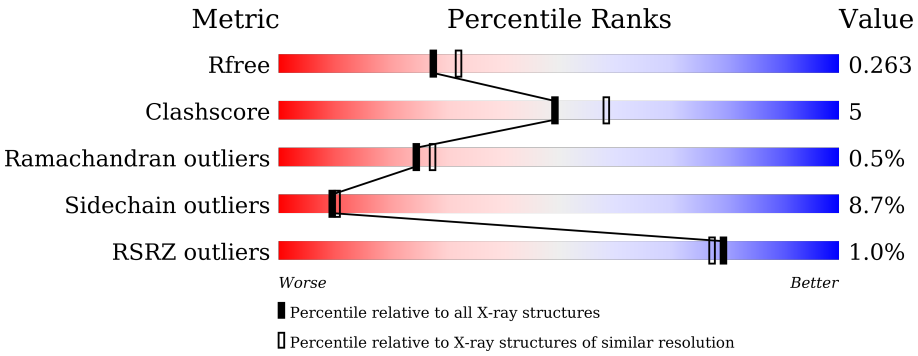
MolProbity	:	4-5-2 with Phenix2.2
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.2
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.51

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.19 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	248	74% 11% • 11%
1	B	248	75% 13% • 10%
1	C	248	68% 18% • 12%
1	D	248	69% 16% • 13%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 7616 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 Iron-containing redox enzyme family protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	223	Total	C	N	O	S	0	0	0
			1862	1200	308	347	7			
1	A	221	Total	C	N	O	S	0	0	0
			1847	1192	304	344	7			
1	C	219	Total	C	N	O	S	0	0	0
			1837	1184	303	343	7			
1	D	216	Total	C	N	O	S	0	0	0
			1801	1161	296	337	7			

There are 44 discrepancies between the modelled and reference sequences:

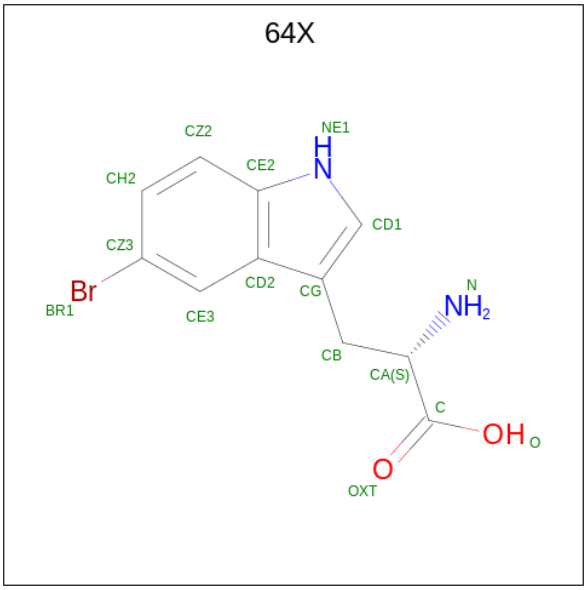
Chain	Residue	Modelled	Actual	Comment	Reference
B	-10	GLY	-	expression tag	UNP A0A367RF96
B	-9	ALA	-	expression tag	UNP A0A367RF96
B	-8	GLY	-	expression tag	UNP A0A367RF96
B	-7	ALA	-	expression tag	UNP A0A367RF96
B	-6	GLY	-	expression tag	UNP A0A367RF96
B	-5	ALA	-	expression tag	UNP A0A367RF96
B	-4	GLY	-	expression tag	UNP A0A367RF96
B	-3	ALA	-	expression tag	UNP A0A367RF96
B	-2	GLY	-	expression tag	UNP A0A367RF96
B	-1	ALA	-	expression tag	UNP A0A367RF96
B	0	GLY	-	expression tag	UNP A0A367RF96
A	-10	GLY	-	expression tag	UNP A0A367RF96
A	-9	ALA	-	expression tag	UNP A0A367RF96
A	-8	GLY	-	expression tag	UNP A0A367RF96
A	-7	ALA	-	expression tag	UNP A0A367RF96
A	-6	GLY	-	expression tag	UNP A0A367RF96
A	-5	ALA	-	expression tag	UNP A0A367RF96
A	-4	GLY	-	expression tag	UNP A0A367RF96
A	-3	ALA	-	expression tag	UNP A0A367RF96
A	-2	GLY	-	expression tag	UNP A0A367RF96
A	-1	ALA	-	expression tag	UNP A0A367RF96

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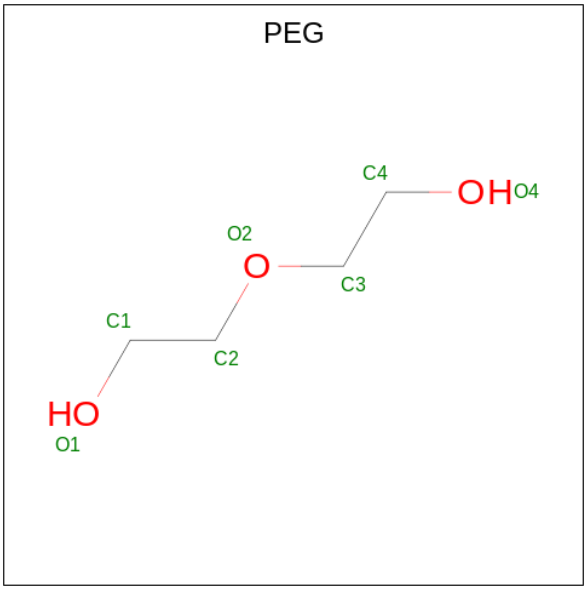
Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP A0A367RF96
C	-10	GLY	-	expression tag	UNP A0A367RF96
C	-9	ALA	-	expression tag	UNP A0A367RF96
C	-8	GLY	-	expression tag	UNP A0A367RF96
C	-7	ALA	-	expression tag	UNP A0A367RF96
C	-6	GLY	-	expression tag	UNP A0A367RF96
C	-5	ALA	-	expression tag	UNP A0A367RF96
C	-4	GLY	-	expression tag	UNP A0A367RF96
C	-3	ALA	-	expression tag	UNP A0A367RF96
C	-2	GLY	-	expression tag	UNP A0A367RF96
C	-1	ALA	-	expression tag	UNP A0A367RF96
C	0	GLY	-	expression tag	UNP A0A367RF96
D	-10	GLY	-	expression tag	UNP A0A367RF96
D	-9	ALA	-	expression tag	UNP A0A367RF96
D	-8	GLY	-	expression tag	UNP A0A367RF96
D	-7	ALA	-	expression tag	UNP A0A367RF96
D	-6	GLY	-	expression tag	UNP A0A367RF96
D	-5	ALA	-	expression tag	UNP A0A367RF96
D	-4	GLY	-	expression tag	UNP A0A367RF96
D	-3	ALA	-	expression tag	UNP A0A367RF96
D	-2	GLY	-	expression tag	UNP A0A367RF96
D	-1	ALA	-	expression tag	UNP A0A367RF96
D	0	GLY	-	expression tag	UNP A0A367RF96

- Molecule 2 is 5-bromo-L-tryptophan (CCD ID: 64X) (formula: $C_{11}H_{11}BrN_2O_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Br C N O 16 1 11 2 2	0	0
2	A	1	Total Br C N O 16 1 11 2 2	0	0
2	C	1	Total Br C N O 16 1 11 2 2	0	0
2	D	1	Total Br C N O 16 1 11 2 2	0	0

- Molecule 3 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total C O 7 4 3	0	0

- Molecule 4 is water.

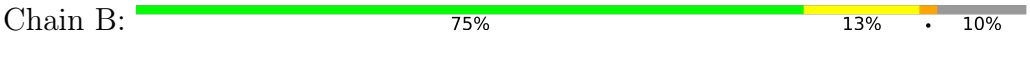
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	61	Total O 61 61	0	0
4	A	49	Total O 49 49	0	0
4	C	47	Total O 47 47	0	0
4	D	41	Total O 41 41	0	0

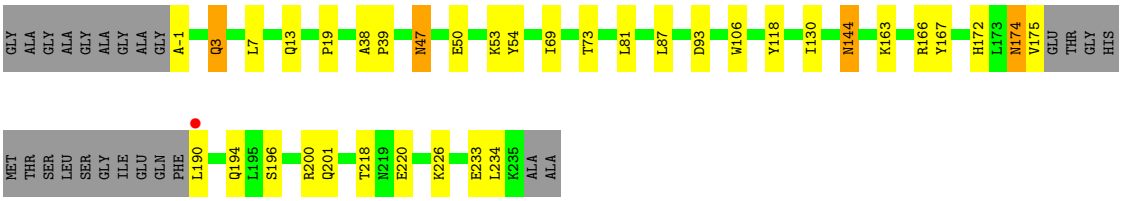
3 Residue-property plots (i)

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: Iron-containing redox enzyme family protein

Chain B:

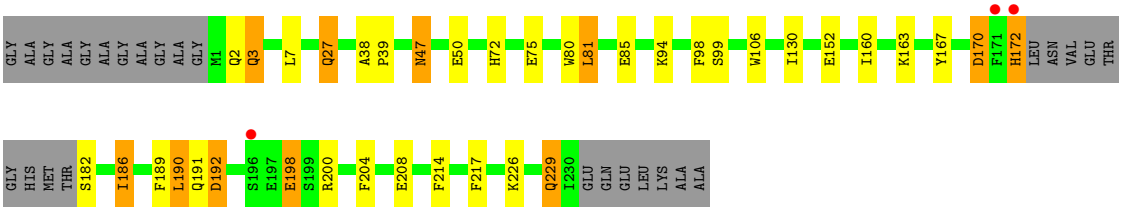




• Molecule 1: Iron-containing redox enzyme family protein

Chain A:

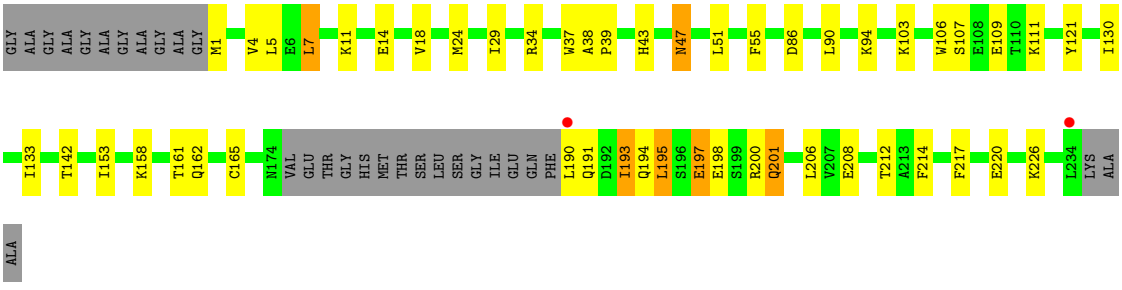




• Molecule 1: Iron-containing redox enzyme family protein

Chain C:

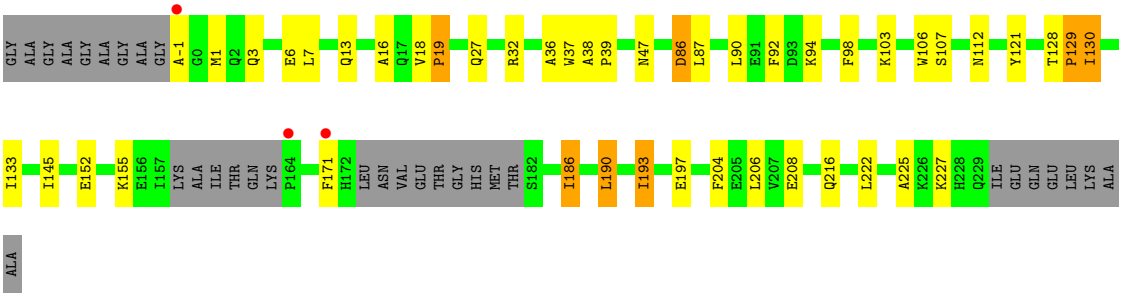




• Molecule 1: Iron-containing redox enzyme family protein

Chain D:




GLY ALA GLY ALA GLY ALA GLY ALA GLY
A-1 G0 M1 Q2 Q3 E6 L7 Q13 A16 Q17 V18 P19 Q27 R32 A36 W37 A38 P39 N47 D86 L87 L90 E91 F92 D93 K94 F98 K103 W106 S107 N112 Y121 T128 P129 I130
I133 I145 E152 K155 E156 I157 LYS ALA ILE THR GLN LYS P164 F171 H172 LEU ASN VAL GLU THR GLY HIS MET THR S182 I186 L190 I193 E197 F204 E205 L206 V207 E208 Q216 L222 A225 K226 K227 H228 Q229 ILE GLU GLN GLU LEU LYS ALA
ALA

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	55.91Å 66.99Å 68.91Å 72.82° 77.00° 76.51°	Depositor
Resolution (Å)	24.17 – 2.19 24.17 – 2.19	Depositor EDS
% Data completeness (in resolution range)	89.5 (24.17-2.19) 92.4 (24.17-2.19)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.52 (at 2.13Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.187 , 0.260 0.191 , 0.263	Depositor DCC
R_{free} test set	2176 reflections (4.32%)	wwPDB-VP
Wilson B-factor (Å^2)	39.5	Xtriage
Anisotropy	0.171	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 38.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.015 for -h,-l,-k	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	7616	wwPDB-VP
Average B, all atoms (Å^2)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.17% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 64X, PEG

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	1.12	0/1891	1.51	3/2555 (0.1%)
1	B	1.11	1/1905 (0.1%)	1.45	4/2574 (0.2%)
1	C	1.08	0/1880	1.48	0/2541
1	D	1.06	0/1844	1.45	1/2490 (0.0%)
All	All	1.09	1/7520 (0.0%)	1.47	8/10160 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	218	THR	C-O	6.15	1.31	1.24

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	53	LYS	CA-C-O	-5.87	114.65	120.82
1	D	98	PHE	N-CA-C	-5.30	105.50	111.28
1	A	98	PHE	N-CA-C	-5.18	105.63	111.28
1	B	54	TYR	CA-C-O	-5.14	113.47	118.97
1	B	50	GLU	CB-CA-C	5.10	119.90	109.55
1	B	220	GLU	CB-CA-C	5.08	118.85	110.88
1	A	198	GLU	CA-C-N	5.01	128.33	120.82
1	A	198	GLU	C-N-CA	5.01	128.33	120.82

There are no chirality outliers.

There are no planarity outliers.

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	1847	0	1805	29	0
1	B	1862	0	1825	12	0
1	C	1837	0	1795	23	0
1	D	1801	0	1745	23	0
2	A	16	0	0	0	0
2	B	16	0	0	0	0
2	C	16	0	0	0	0
2	D	16	0	0	0	0
3	B	7	0	10	0	0
4	A	49	0	0	1	0
4	B	61	0	0	0	0
4	C	47	0	0	2	0
4	D	41	0	0	0	0
All	All	7616	0	7180	79	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 5.

All (79) 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:27:GLN:H	1:A:27:GLN:NE2	1.69	0.89
1:A:27:GLN:H	1:A:27:GLN:HE21	1.27	0.80
1:A:170:ASP:OD2	1:A:170:ASP:N	2.17	0.78
1:D:86:ASP:O	1:D:90:LEU:HB2	1.87	0.74
1:A:204:PHE:O	1:A:208:GLU:HG2	1.89	0.71
1:C:47:ASN:ND2	1:D:106:TRP:HE1	1.90	0.69
1:A:167:TYR:CE2	1:A:172:HIS:HE1	2.14	0.65
1:A:229:GLN:HE21	1:A:229:GLN:HA	1.61	0.65
1:A:80:TRP:CZ3	1:A:81:LEU:HD13	2.32	0.64
1:A:72:HIS:O	1:A:75:GLU:HG2	2.00	0.61
1:A:182:SER:HA	4:A:444:HOH:O	2.02	0.60
1:C:206:LEU:C	1:C:206:LEU:HD23	2.26	0.59
1:D:37:TRP:O	1:D:38:ALA:C	2.46	0.58
1:B:47:ASN:ND2	1:A:106:TRP:HE1	2.01	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:38:ALA:HB3	1:C:39:PRO:HD3	1.86	0.57
1:D:36:ALA:HA	1:D:92:PHE:CZ	2.40	0.56
1:D:222:LEU:O	1:D:225:ALA:N	2.38	0.56
1:A:3:GLN:HE22	1:A:200:ARG:NH1	2.04	0.56
1:C:18:VAL:HB	4:C:401:HOH:O	2.05	0.56
1:D:206:LEU:HD23	1:D:206:LEU:C	2.31	0.56
1:A:27:GLN:HE21	1:A:27:GLN:N	2.01	0.55
1:A:172:HIS:CD2	1:A:172:HIS:C	2.86	0.53
1:A:186:ILE:HD13	1:A:190:LEU:HD13	1.90	0.53
1:A:186:ILE:O	1:A:190:LEU:N	2.39	0.53
1:B:200:ARG:NH1	1:B:201:GLN:OE1	2.42	0.53
1:C:121:TYR:CE2	1:D:121:TYR:CE2	2.97	0.53
1:D:112:ASN:ND2	1:D:216:GLN:HB3	2.24	0.53
1:C:106:TRP:HE1	1:D:47:ASN:ND2	2.08	0.52
1:B:-1:ALA:O	1:B:3:GLN:NE2	2.43	0.51
1:D:103:LYS:O	1:D:107:SER:HB3	2.10	0.51
1:A:229:GLN:HA	1:A:229:GLN:NE2	2.25	0.51
1:A:186:ILE:CD1	1:A:190:LEU:HD13	2.40	0.50
1:A:229:GLN:HE21	1:A:229:GLN:CA	2.24	0.50
1:C:37:TRP:O	1:C:38:ALA:C	2.55	0.50
1:D:190:LEU:HD12	1:D:193:ILE:HG12	1.94	0.50
1:C:86:ASP:OD2	1:C:165:CYS:HB3	2.13	0.49
1:C:197:GLU:O	1:C:201:GLN:HG2	2.12	0.49
1:D:133:ILE:HD12	1:D:186:ILE:HD13	1.94	0.49
1:A:167:TYR:CE2	1:A:172:HIS:CE1	2.99	0.49
1:D:1:MET:SD	1:D:130:ILE:HD11	2.53	0.49
1:C:214:PHE:O	1:C:217:PHE:HB3	2.13	0.48
1:A:27:GLN:NE2	1:A:27:GLN:N	2.51	0.48
1:D:204:PHE:O	1:D:208:GLU:HG2	2.14	0.48
1:A:47:ASN:HD22	1:A:47:ASN:HA	1.52	0.47
1:A:189:PHE:O	1:A:192:ASP:HB2	2.14	0.47
1:B:144:ASN:HD21	1:B:174:ASN:H	1.60	0.47
1:D:38:ALA:HB3	1:D:39:PRO:HD3	1.97	0.47
1:B:69:ILE:O	1:B:73:THR:HG23	2.14	0.47
1:B:93:ASP:OD2	1:A:99:SER:OG	2.29	0.47
1:B:167:TYR:O	1:B:172:HIS:NE2	2.45	0.47
1:B:19:PRO:HG3	1:C:14:GLU:OE1	2.15	0.47
1:C:103:LYS:O	1:C:107:SER:HB3	2.15	0.46
1:B:106:TRP:HE1	1:A:47:ASN:ND2	2.14	0.46
1:A:214:PHE:O	1:A:217:PHE:HB3	2.15	0.45
1:B:118:TYR:OH	1:A:50:GLU:OE1	2.33	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:212:THR:HG21	4:C:443:HOH:O	2.15	0.44
1:D:193:ILE:O	1:D:193:ILE:HG13	2.18	0.44
1:C:7:LEU:HD22	1:C:11:LYS:HG3	1.99	0.44
1:C:51:LEU:HD12	1:C:55:PHE:HB2	2.00	0.43
1:C:1:MET:O	1:C:4:VAL:HB	2.18	0.43
1:C:1:MET:HA	1:C:195:LEU:HD22	2.01	0.43
1:C:142:THR:HG21	1:C:214:PHE:CD2	2.54	0.43
1:D:32:ARG:O	1:D:92:PHE:CZ	2.72	0.42
1:C:109:GLU:O	1:C:220:GLU:CG	2.68	0.42
1:C:161:THR:O	1:C:162:GLN:HB2	2.20	0.42
1:D:-1:ALA:HA	1:D:3:GLN:OE1	2.18	0.42
1:B:233:GLU:C	1:B:234:LEU:HD22	2.45	0.41
1:C:130:ILE:HD11	1:C:193:ILE:HG12	2.02	0.41
1:D:47:ASN:HD22	1:D:47:ASN:HA	1.71	0.41
1:D:18:VAL:HB	1:D:19:PRO:HD2	2.03	0.41
1:D:87:LEU:HD12	1:D:87:LEU:HA	1.80	0.41
1:B:38:ALA:HB3	1:B:39:PRO:HD3	2.02	0.41
1:A:190:LEU:HD12	1:A:190:LEU:HA	1.89	0.41
1:D:16:ALA:HA	1:D:145:ILE:HG21	2.02	0.41
1:D:128:THR:O	1:D:129:PRO:C	2.63	0.41
1:C:24:MET:O	1:C:153:ILE:HD11	2.21	0.41
1:C:24:MET:O	1:C:34:ARG:HD2	2.20	0.41
1:A:38:ALA:HB3	1:A:39:PRO:HD3	2.04	0.40
1:A:226:LYS:HD2	1:A:226:LYS:HA	1.91	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	217/248 (88%)	210 (97%)	5 (2%)	2 (1%)	14 14

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	219/248 (88%)	210 (96%)	8 (4%)	1 (0%)	24 27
1	C	215/248 (87%)	209 (97%)	6 (3%)	0	100 100
1	D	210/248 (85%)	198 (94%)	11 (5%)	1 (0%)	24 27
All	All	861/992 (87%)	827 (96%)	30 (4%)	4 (0%)	24 27

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	198	GLU
1	D	171	PHE
1	A	160	ILE
1	B	196	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	203/216 (94%)	185 (91%)	18 (9%)	9 10
1	B	204/216 (94%)	189 (93%)	15 (7%)	13 14
1	C	202/216 (94%)	181 (90%)	21 (10%)	7 7
1	D	197/216 (91%)	181 (92%)	16 (8%)	11 12
All	All	806/864 (93%)	736 (91%)	70 (9%)	9 10

All (70) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	3	GLN
1	B	7	LEU
1	B	13	GLN
1	B	47	ASN
1	B	81	LEU
1	B	87	LEU
1	B	130	ILE

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Mol	Chain	Res	Type
1	B	144	ASN
1	B	163	LYS
1	B	166	ARG
1	B	174	ASN
1	B	175	VAL
1	B	190	LEU
1	B	194	GLN
1	B	226	LYS
1	A	2	GLN
1	A	3	GLN
1	A	7	LEU
1	A	27	GLN
1	A	47	ASN
1	A	81	LEU
1	A	85	GLU
1	A	94	LYS
1	A	130	ILE
1	A	152	GLU
1	A	163	LYS
1	A	170	ASP
1	A	172	HIS
1	A	186	ILE
1	A	190	LEU
1	A	191	GLN
1	A	192	ASP
1	A	229	GLN
1	C	5	LEU
1	C	7	LEU
1	C	29	ILE
1	C	43	HIS
1	C	47	ASN
1	C	90	LEU
1	C	94	LYS
1	C	111	LYS
1	C	133	ILE
1	C	158	LYS
1	C	190	LEU
1	C	191	GLN
1	C	193	ILE
1	C	194	GLN
1	C	195	LEU
1	C	197	GLU

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Mol	Chain	Res	Type
1	C	198	GLU
1	C	200	ARG
1	C	201	GLN
1	C	208	GLU
1	C	226	LYS
1	D	6	GLU
1	D	7	LEU
1	D	13	GLN
1	D	19	PRO
1	D	27	GLN
1	D	86	ASP
1	D	94	LYS
1	D	129	PRO
1	D	130	ILE
1	D	152	GLU
1	D	155	LYS
1	D	186	ILE
1	D	190	LEU
1	D	193	ILE
1	D	197	GLU
1	D	227	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	17	GLN
1	B	47	ASN
1	B	144	ASN
1	A	3	GLN
1	A	13	GLN
1	A	27	GLN
1	A	47	ASN
1	A	66	GLN
1	A	97	ASN
1	A	119	GLN
1	A	144	ASN
1	A	172	HIS
1	A	191	GLN
1	A	229	GLN
1	C	25	GLN
1	C	27	GLN
1	C	47	ASN

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Mol	Chain	Res	Type
1	C	201	GLN
1	D	27	GLN
1	D	72	HIS
1	D	97	ASN
1	D	112	ASN
1	D	119	GLN
1	D	188	GLN
1	D	228	HIS

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)

5 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	64X	C	301	-	15,17,17	2.95	9 (60%)	22,24,24	1.38	4 (18%)
2	64X	A	301	-	15,17,17	2.53	5 (33%)	22,24,24	1.46	4 (18%)
2	64X	D	301	-	15,17,17	2.95	7 (46%)	22,24,24	1.38	2 (9%)
3	PEG	B	302	-	6,6,6	0.36	0	5,5,5	0.22	0
2	64X	B	301	-	15,17,17	3.17	8 (53%)	22,24,24	1.58	4 (18%)

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	64X	C	301	-	-	0/8/8/8	0/2/2/2
2	64X	A	301	-	-	0/8/8/8	0/2/2/2
2	64X	D	301	-	-	0/8/8/8	0/2/2/2
3	PEG	B	302	-	-	0/4/4/4	-
2	64X	B	301	-	-	0/8/8/8	0/2/2/2

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	301	64X	CD2-CG	-6.53	1.32	1.44
2	D	301	64X	CD2-CG	-6.40	1.33	1.44
2	A	301	64X	CD2-CG	-6.36	1.33	1.44
2	B	301	64X	CD2-CE2	-6.11	1.33	1.41
2	D	301	64X	CD2-CE2	-5.96	1.33	1.41
2	B	301	64X	CD2-CG	-5.48	1.34	1.44
2	B	301	64X	BR1-CZ3	4.88	2.00	1.90
2	C	301	64X	CD2-CE2	-4.79	1.35	1.41
2	A	301	64X	CD2-CE2	-4.21	1.36	1.41
2	B	301	64X	CZ2-CE2	-3.74	1.33	1.39
2	B	301	64X	CE3-CD2	-3.70	1.34	1.39
2	D	301	64X	CE3-CD2	-3.51	1.34	1.39
2	D	301	64X	CZ2-CE2	-3.41	1.33	1.39
2	A	301	64X	CB-CG	3.25	1.56	1.50
2	C	301	64X	CE2-NE1	-3.19	1.32	1.37
2	B	301	64X	CE2-NE1	-3.19	1.32	1.37
2	C	301	64X	CB-CG	3.12	1.56	1.50
2	C	301	64X	CD1-CG	-3.01	1.32	1.36
2	D	301	64X	CB-CG	2.94	1.56	1.50
2	C	301	64X	BR1-CZ3	2.92	1.96	1.90
2	A	301	64X	BR1-CZ3	2.90	1.96	1.90
2	C	301	64X	CD1-NE1	-2.87	1.32	1.37
2	B	301	64X	O-C	-2.56	1.22	1.30
2	A	301	64X	CE3-CD2	-2.52	1.35	1.39
2	B	301	64X	CD1-CG	-2.52	1.32	1.36
2	C	301	64X	CZ2-CE2	-2.48	1.35	1.39
2	D	301	64X	BR1-CZ3	2.45	1.95	1.90
2	D	301	64X	CE2-NE1	-2.45	1.33	1.37
2	C	301	64X	CE3-CD2	-2.28	1.36	1.39

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	301	64X	CG-CD1-NE1	-3.84	105.85	110.31
2	B	301	64X	CB-CG-CD1	-3.66	120.35	126.90
2	B	301	64X	CD2-CG-CD1	3.19	109.60	106.15
2	D	301	64X	CE3-CD2-CG	-2.92	130.22	133.41
2	C	301	64X	CH2-CZ3-CE3	-2.82	117.39	121.48
2	A	301	64X	CE2-NE1-CD1	-2.71	106.51	109.07
2	C	301	64X	CB-CG-CD1	-2.54	122.35	126.90
2	D	301	64X	CE2-NE1-CD1	-2.49	106.72	109.07
2	A	301	64X	CD2-CG-CD1	2.35	108.70	106.15
2	A	301	64X	CE3-CD2-CE2	2.21	121.53	119.42
2	C	301	64X	CD2-CG-CD1	2.17	108.50	106.15
2	C	301	64X	CA-CB-CG	-2.15	109.39	113.50
2	B	301	64X	CH2-CZ3-CE3	-2.11	118.43	121.48
2	A	301	64X	CB-CG-CD1	-2.10	123.13	126.90

There are no chirality outliers.

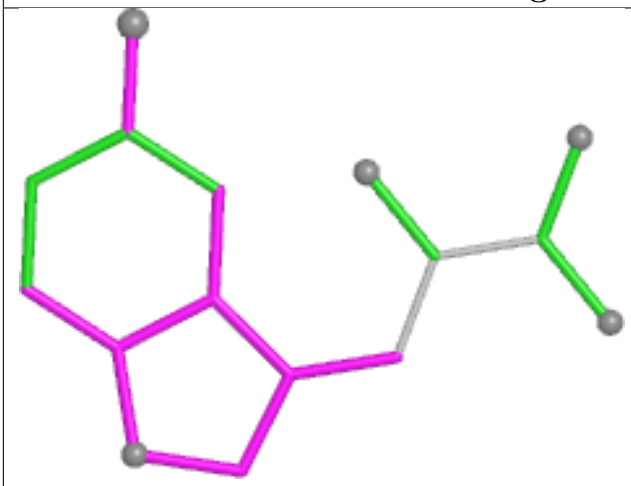
There are no torsion outliers.

There are no ring outliers.

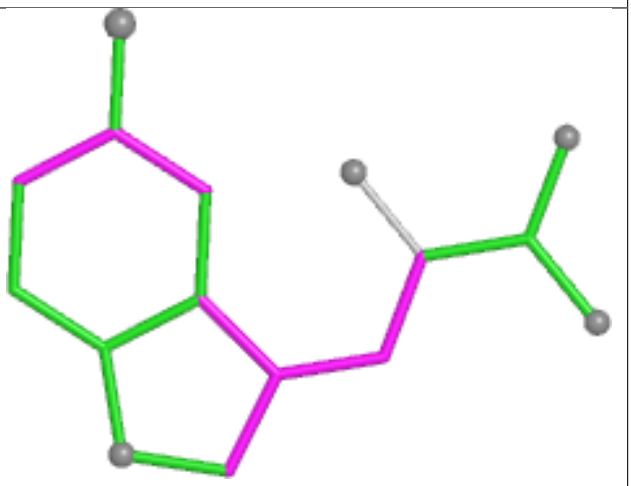
No monomer is involved in short contacts.

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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

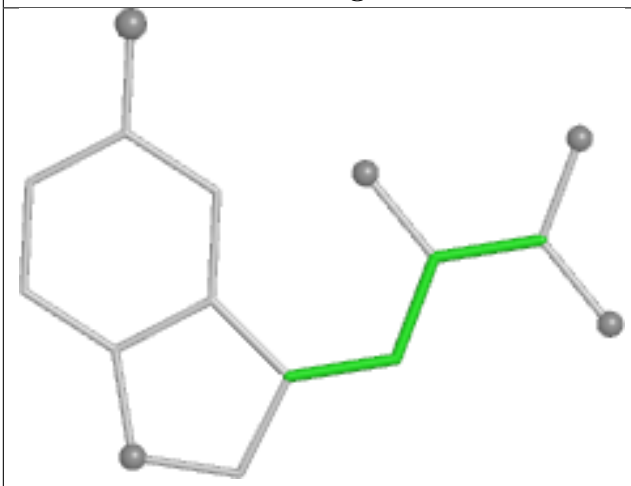
Ligand 64X C 301



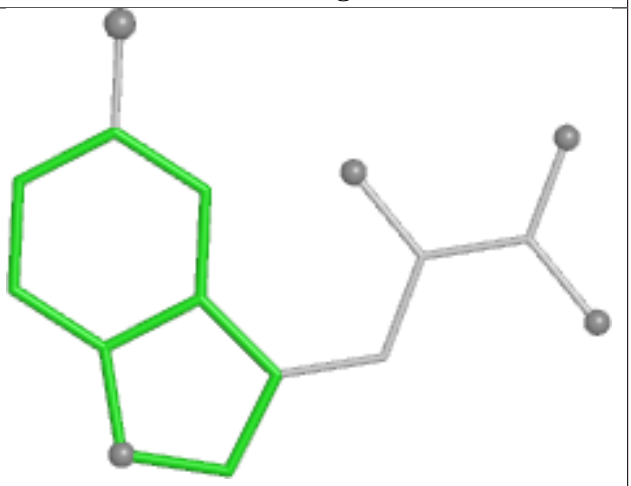
Bond lengths



Bond angles

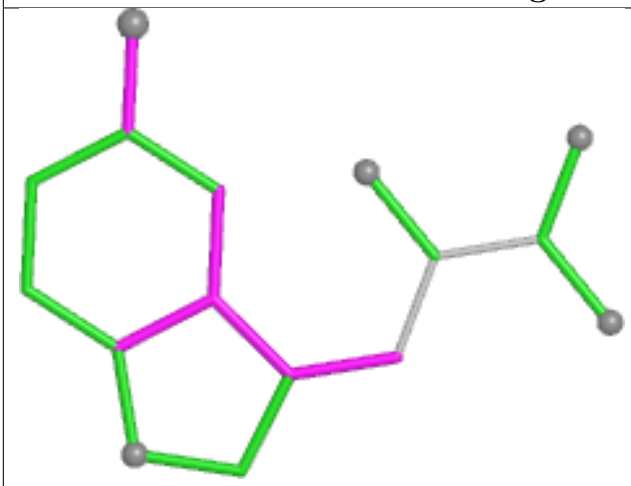


Torsions

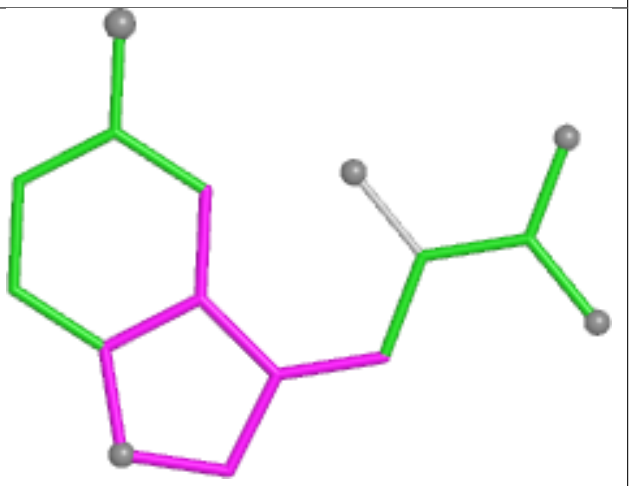


Rings

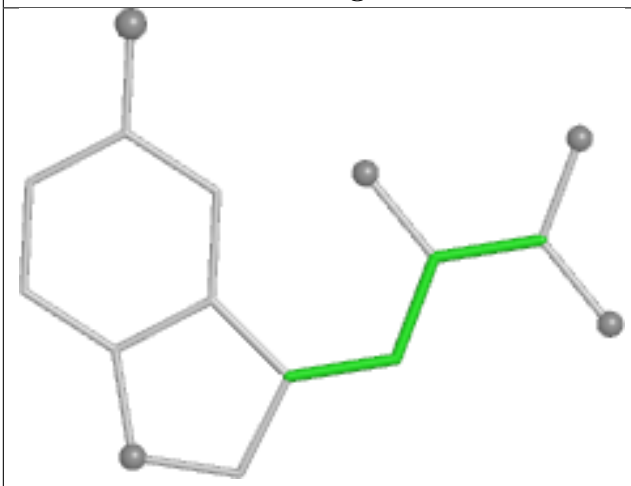
Ligand 64X A 301



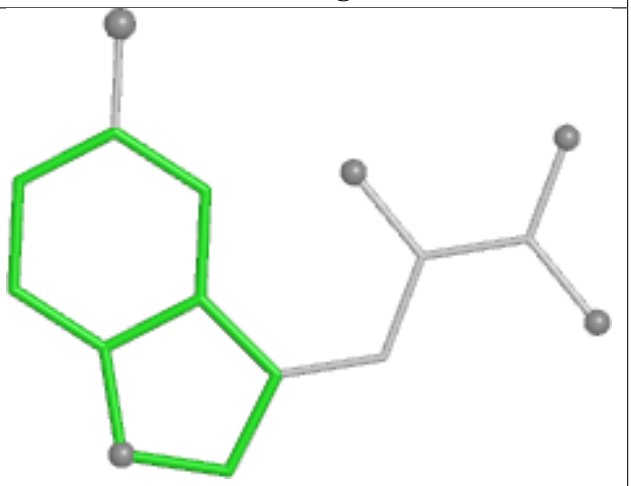
Bond lengths



Bond angles

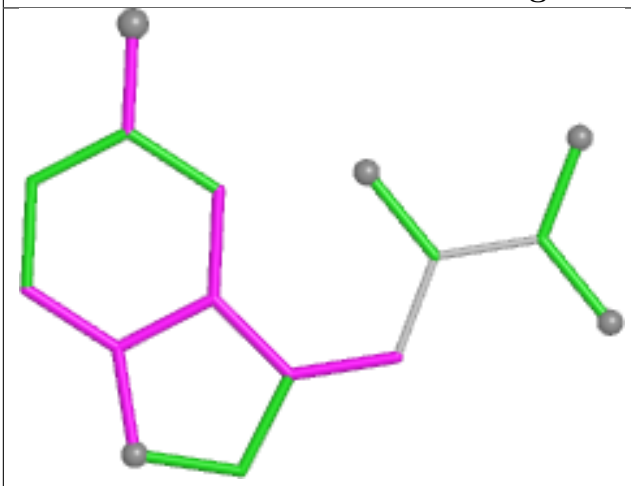


Torsions

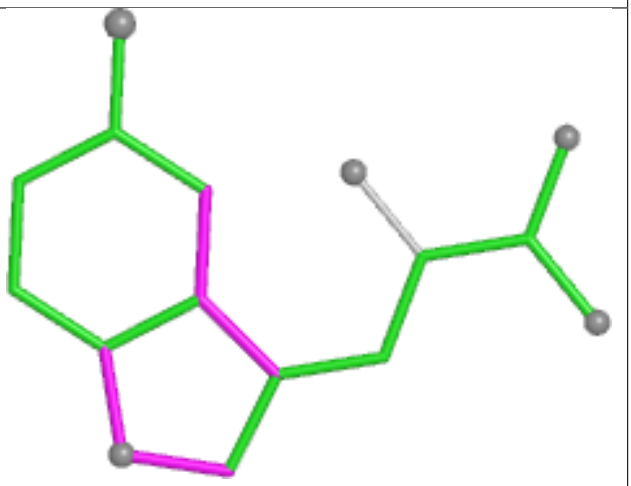


Rings

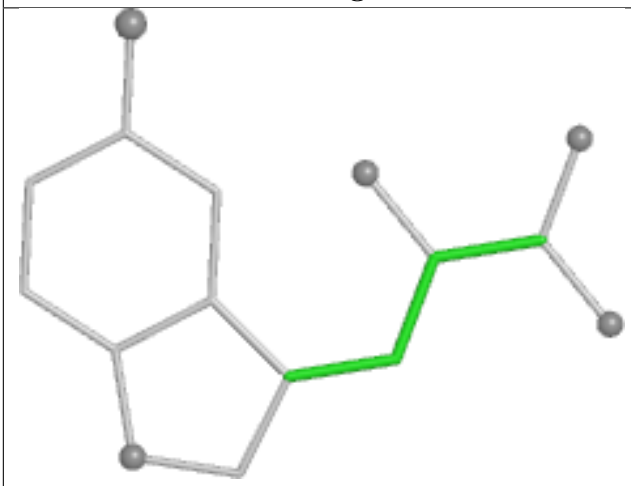
Ligand 64X D 301



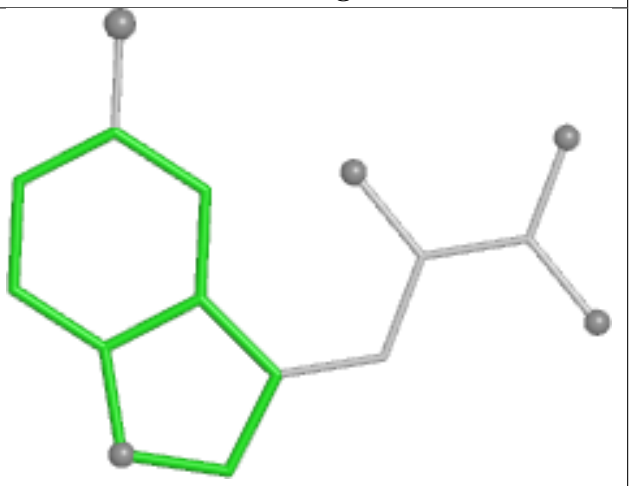
Bond lengths



Bond angles

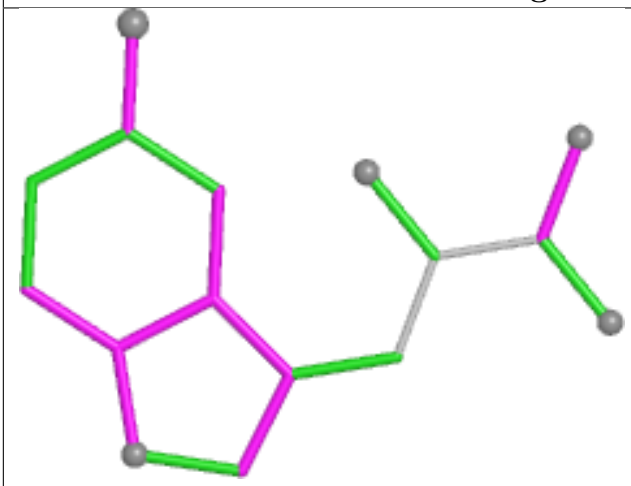


Torsions

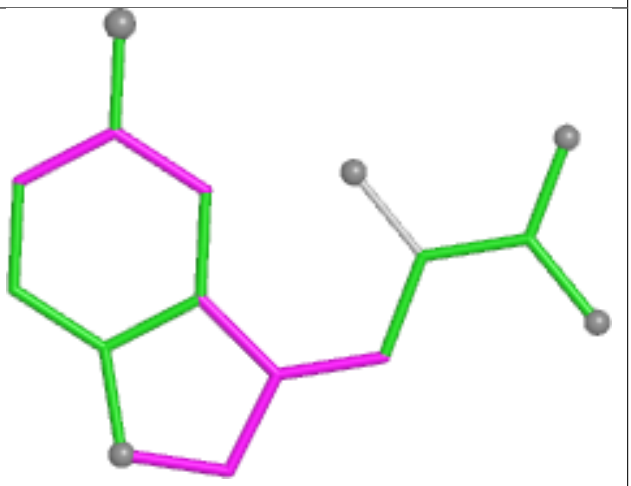


Rings

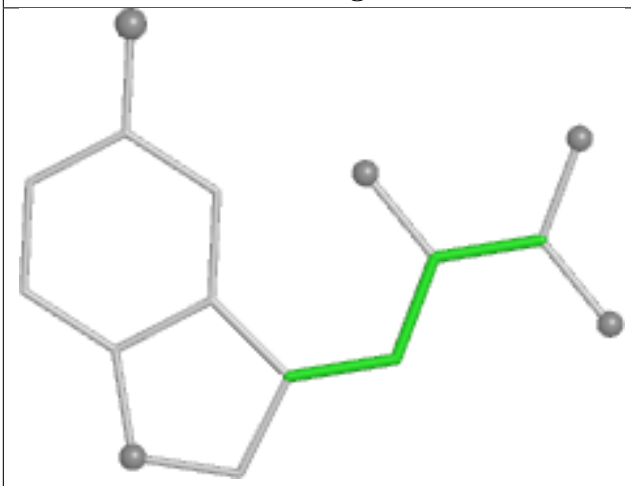
Ligand 64X B 301



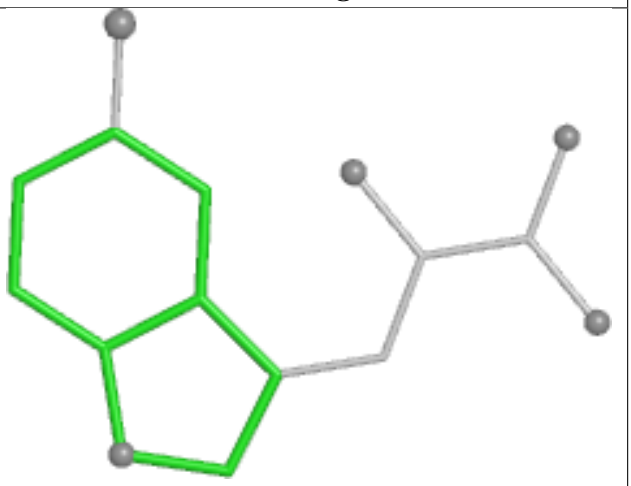
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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, 95^{th} 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	221/248 (89%)	-0.01	3 (1%)	73	71	23, 43, 86, 100	0
1	B	223/248 (89%)	-0.20	1 (0%)	88	87	25, 40, 72, 105	0
1	C	219/248 (88%)	0.13	2 (0%)	81	79	31, 51, 84, 101	0
1	D	216/248 (87%)	0.19	3 (1%)	73	71	32, 57, 87, 117	0
All	All	879/992 (88%)	0.02	9 (1%)	79	77	23, 47, 84, 117	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	171	PHE	3.0
1	D	171	PHE	2.7
1	B	190	LEU	2.7
1	D	-1	ALA	2.5
1	A	172	HIS	2.4
1	C	190	LEU	2.3
1	A	196	SER	2.2
1	D	164	PRO	2.2
1	C	234	LEU	2.1

6.2 Non-standard residues in protein, DNA, RNA chains

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

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands (i)

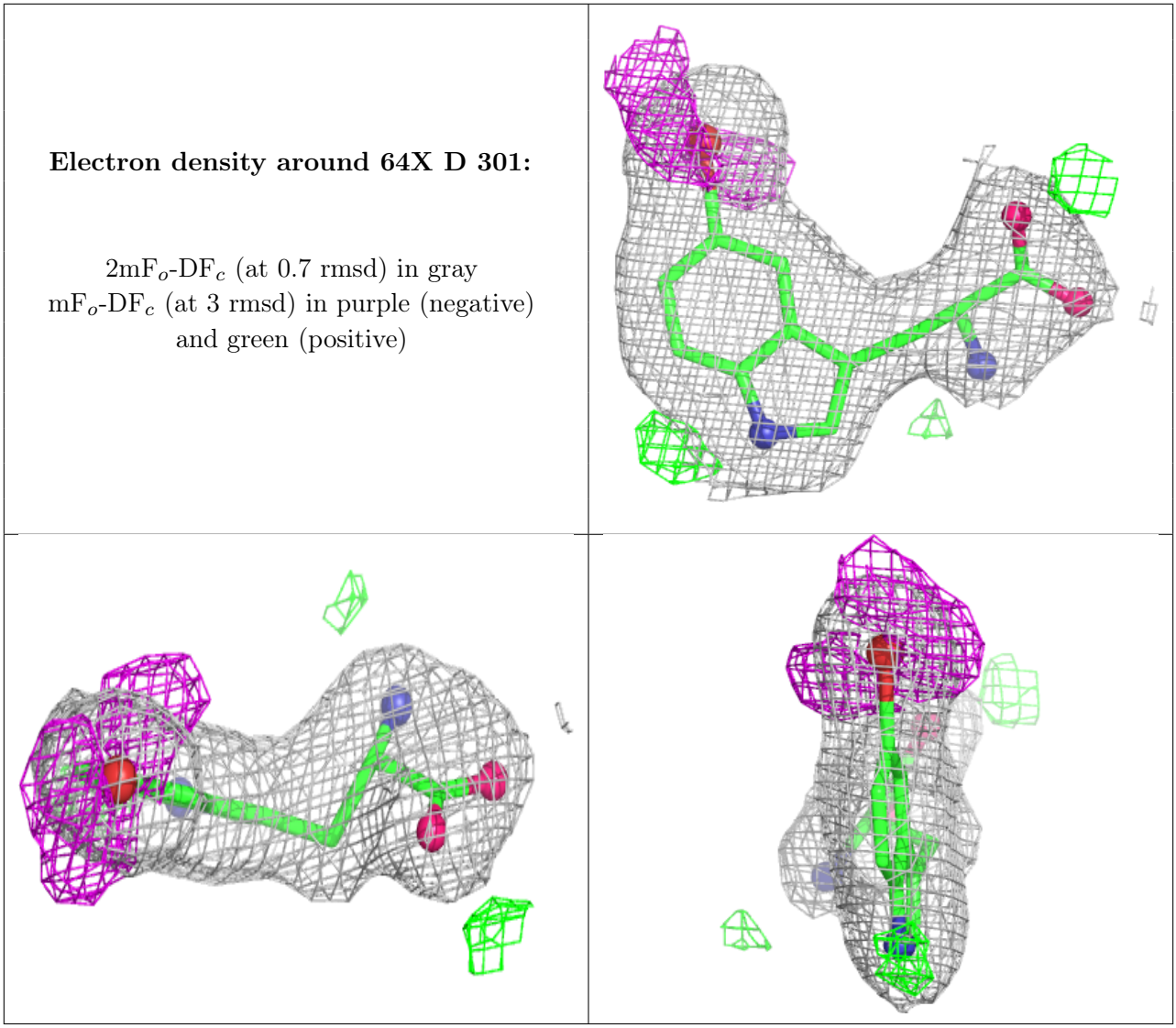
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
3	PEG	B	302	7/7	0.88	0.13	56,67,72,74	0
2	64X	D	301	16/16	0.95	0.07	33,40,58,61	0
2	64X	C	301	16/16	0.98	0.05	32,40,45,60	0
2	64X	B	301	16/16	0.98	0.05	25,28,36,47	0
2	64X	A	301	16/16	0.98	0.05	31,35,43,47	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.

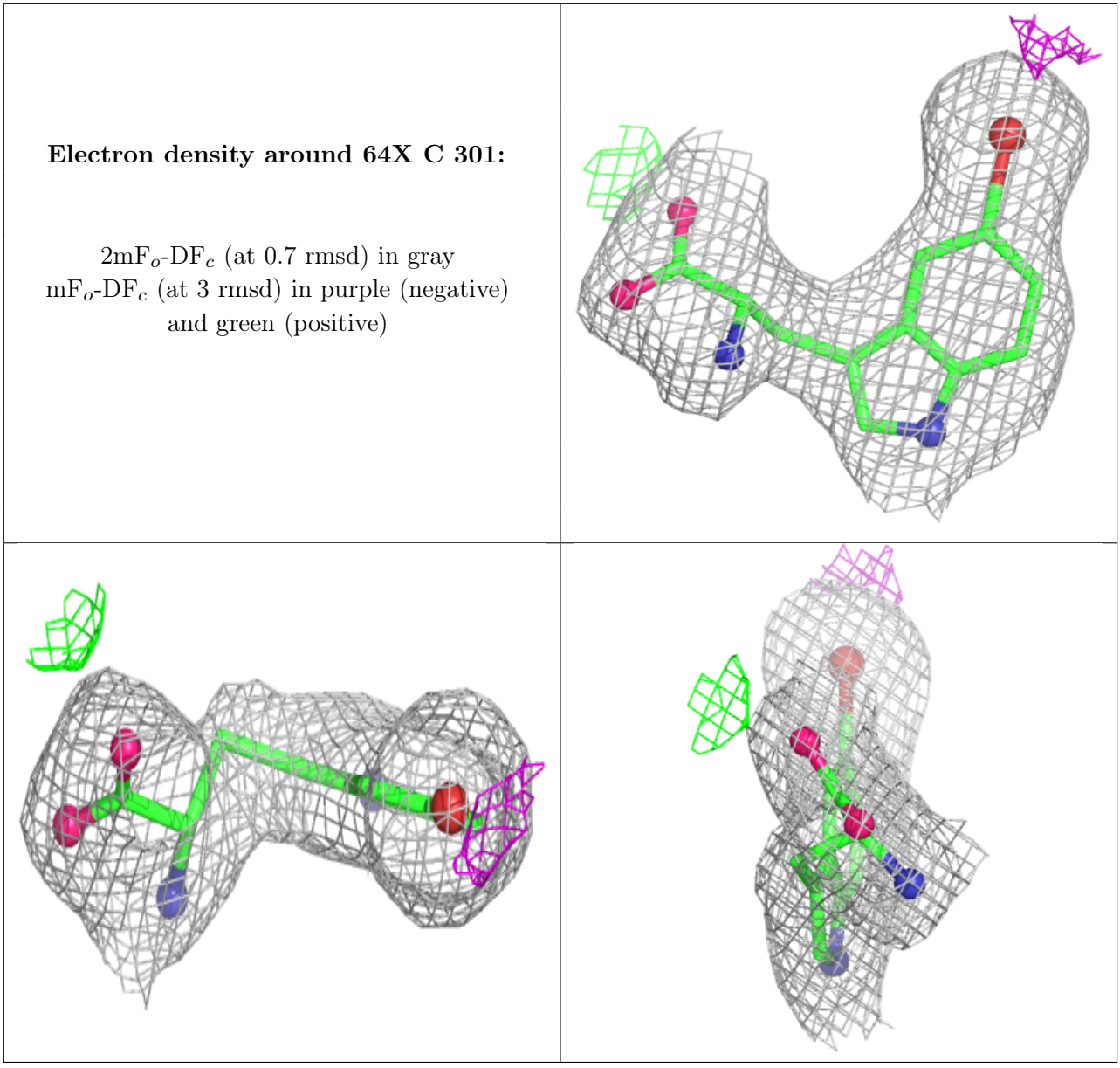
Electron density around 64X D 301:

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



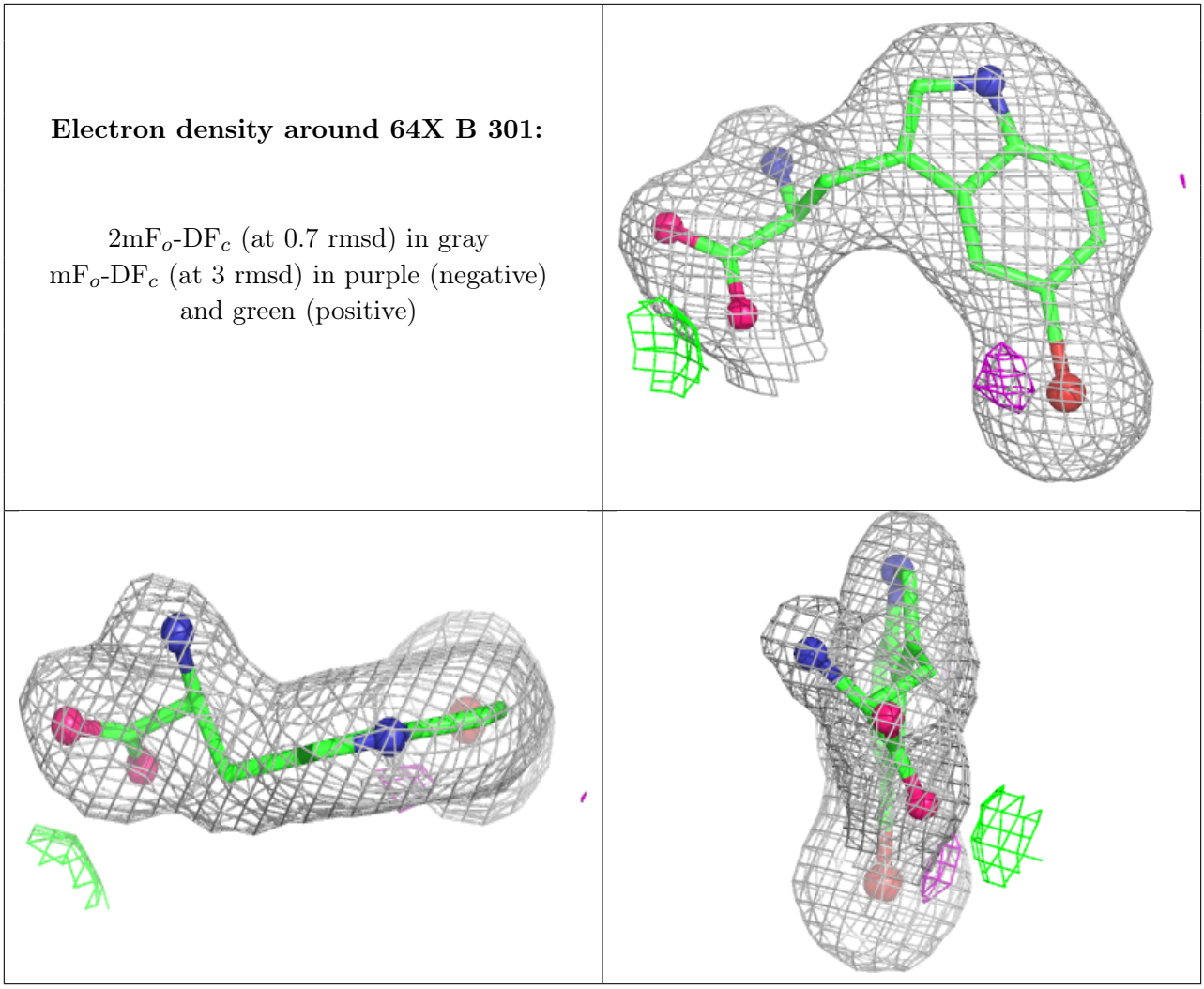
Electron density around 64X C 301:

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



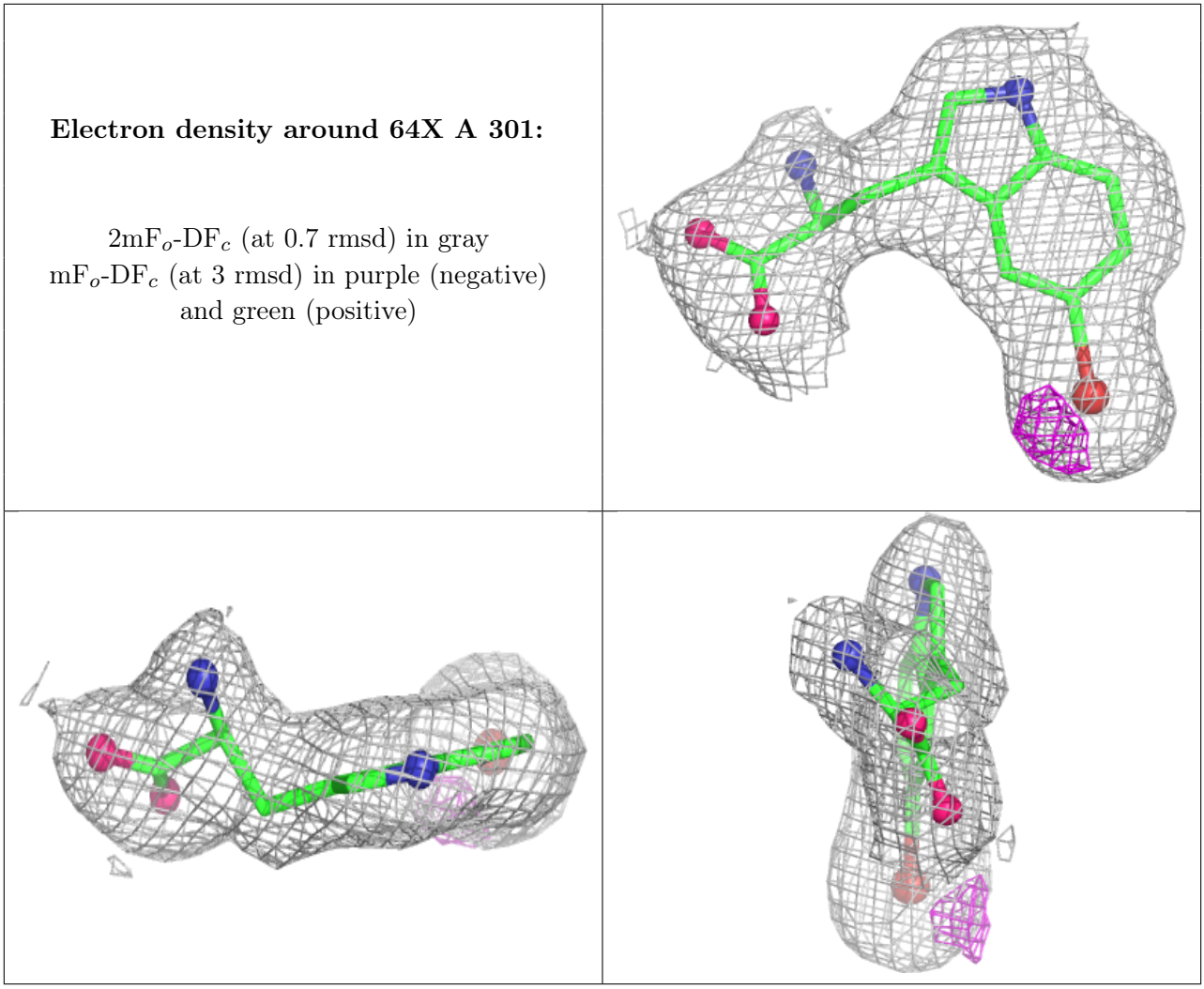
Electron density around 64X B 301:

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



Electron density around 64X 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)



6.5 Other polymers (i)

There are no such residues in this entry.