Full wwPDB X-ray Structure Validation Report (i)

Jan 2, 2025 – 02:07 PM JST

PDB ID	:	9IJN
Title	:	STING LBD domain with an agonist DW18343
Authors	:	Wang, Z.
Deposited on	:	2024-06-25
Resolution	:	1.81 Å(reported)

The following versions of software and data (see references (i)) were used in the production of this report:

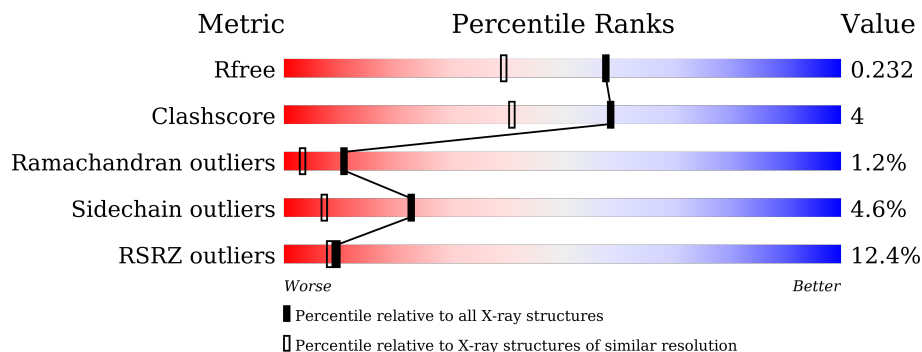|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 1.81 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	Percentile Ranks	Value
Rfree		0.232
Clashscore		4
Ramachandran outliers		1.2%
Sidechain outliers		4.6%
RSRZ outliers		12.4%

Worse .... *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	164625	9242 (1.84-1.80)
Clashscore	180529	1080 (1.82-1.82)
Ramachandran outliers	177936	1073 (1.82-1.82)
Sidechain outliers	177891	1073 (1.82-1.82)
RSRZ outliers	164620	9241 (1.84-1.80)

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	188	12% / 84% / 7% ·· 6%

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 2942 atoms, of which 1390 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 Stimulator of interferon genes protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	177	Total	C	H	N	O	S	0	0	0
			2791	886	1379	252	268	6			

- Molecule 2 is 4-[4-(7-fluoranyl-1H-indol-3-yl)thiophen-2-yl]-4-oxidanylidene-butanoic acid (three-letter code: A1D9I) (formula: $C_{16}H_{12}FNO_3S$) (labeled as "Ligand of Interest" by depositor).
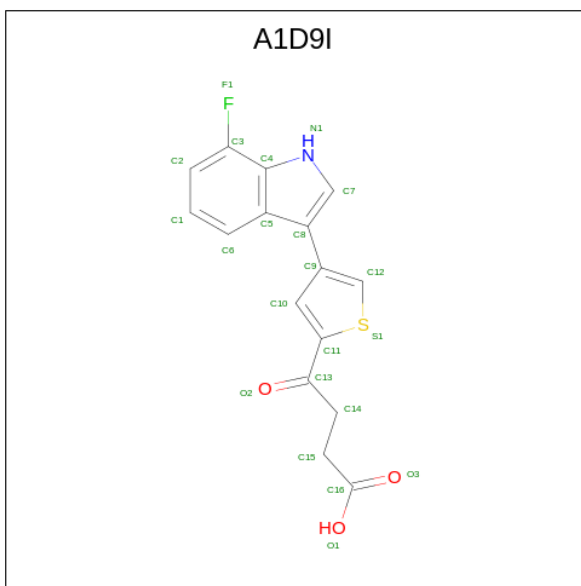
A1D9I

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
2	A	1	Total	C	F	H	N	O	S	0	0
			33	16	1	11	1	3	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	118	Total	O	0	0
			118	118		

3 Residue-property plots ⓘ

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: Stimulator of interferon genes protein
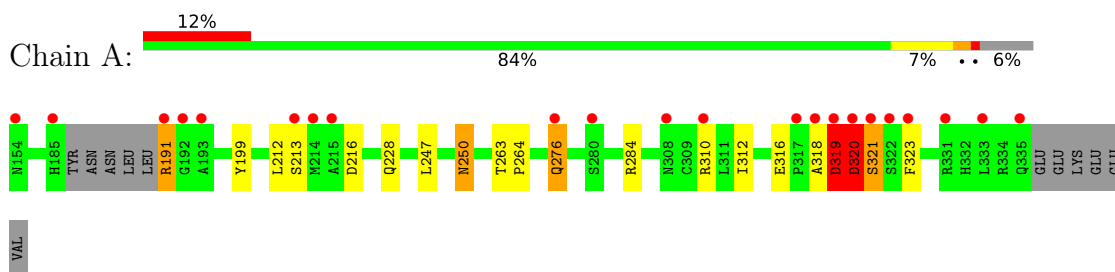
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	110.04Å　110.04Å　35.76Å 90.00°　　90.00°　　90.00°	Depositor
Resolution (Å)	34.80　–　1.81 34.80　–　1.81	Depositor EDS
% Data completeness (in resolution range)	99.9 (34.80-1.81) 99.9 (34.80-1.81)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.44 (at 1.81Å)	Xtriage
Refinement program	PHENIX (1.17.1_3660: ???)	Depositor
R, R_{free}	0.197　,　0.233 0.199　,　0.232	Depositor DCC
R_{free} test set	995 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å^2)	25.3	Xtriage
Anisotropy	0.228	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.43 , 39.3	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	2942	wwPDB-VP
Average B, all atoms (Å^2)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.42% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: A1D9I

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	0.71	3/1438 (0.2%)	0.86	3/1948 (0.2%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	216	ASP	C-N	8.52	1.50	1.34
1	A	250	ASN	CB-CG	-7.23	1.34	1.51
1	A	276	GLN	CG-CD	-5.76	1.37	1.51

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	276	GLN	CG-CD-OE1	-6.56	108.49	121.60
1	A	320	ASP	C-N-CA	6.29	137.43	121.70
1	A	319	ASP	CB-CA-C	6.12	122.63	110.40

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	1412	1379	1381	12	2
2	A	22	11	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	118	0	0	5	0
All	All	1552	1390	1381	12	2

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 4.

All (12) 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:276:GLN:OE1	3:A:501:HOH:O	1.55	1.24
1:A:284:ARG:NE	3:A:502:HOH:O	2.21	0.59
1:A:276:GLN:O	1:A:276:GLN:HG2	2.09	0.52
1:A:191:ARG:O	1:A:191:ARG:HD3	2.10	0.52
1:A:284:ARG:NH2	3:A:502:HOH:O	2.37	0.47
1:A:316:GLU:HG3	1:A:323:PHE:CG	2.51	0.46
1:A:191:ARG:N	3:A:512:HOH:O	2.49	0.46
1:A:228:GLN:NE2	3:A:513:HOH:O	2.50	0.44
1:A:199:TYR:HD2	1:A:312:ILE:HD11	1.83	0.43
1:A:247:LEU:HD22	1:A:247:LEU:N	2.35	0.41
1:A:263:THR:N	1:A:264:PRO:CD	2.84	0.41
1:A:318:ALA:O	1:A:320:ASP:N	2.55	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:250:ASN:OD1	1:A:319:ASP:OD1[4_444]	1.45	0.75
1:A:250:ASN:CG	1:A:319:ASP:OD1[4_444]	2.15	0.05

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	173/188 (92%)	168 (97%)	3 (2%)	2 (1%)	11	3

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	319	ASP
1	A	321	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	151/164 (92%)	144 (95%)	7 (5%)	23	7

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	191	ARG
1	A	212	LEU
1	A	213	SER
1	A	310	ARG
1	A	319	ASP
1	A	320	ASP
1	A	321	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	196	GLN
1	A	228	GLN

5.3.3 RNA (i)

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 ⓘ

1 ligand is 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	A1D9I	A	401	-	19,24,24	6.38	9 (47%)	19,34,34	2.73	7 (36%)

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	A1D9I	A	401	-	-	6/7/13/13	0/3/3/3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	A1D9I	C12-C9	25.21	1.51	1.37
2	A	401	A1D9I	C11-S1	6.37	1.80	1.72
2	A	401	A1D9I	C3-C4	-4.88	1.37	1.41
2	A	401	A1D9I	C2-C3	4.15	1.41	1.36
2	A	401	A1D9I	C8-C9	3.28	1.55	1.49
2	A	401	A1D9I	C1-C2	3.24	1.45	1.38
2	A	401	A1D9I	C6-C5	-2.95	1.36	1.42
2	A	401	A1D9I	C7-N1	-2.68	1.31	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	A1D9I	C14-C13	2.26	1.54	1.51

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	A1D9I	C7-C8-C5	5.84	123.97	108.07
2	A	401	A1D9I	C8-C7-N1	-5.63	98.04	108.91
2	A	401	A1D9I	C2-C3-C4	-4.84	120.62	123.09
2	A	401	A1D9I	C6-C5-C8	3.59	140.76	135.63
2	A	401	A1D9I	F1-C3-C2	2.65	123.02	118.29
2	A	401	A1D9I	F1-C3-C4	-2.64	116.34	117.40
2	A	401	A1D9I	O2-C13-C11	-2.23	117.75	120.19

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	A1D9I	C7-C8-C9-C10
2	A	401	A1D9I	C7-C8-C9-C12
2	A	401	A1D9I	O2-C13-C14-C15
2	A	401	A1D9I	C11-C13-C14-C15
2	A	401	A1D9I	C14-C15-C16-O1
2	A	401	A1D9I	C14-C15-C16-O3

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 A1D9I A 401
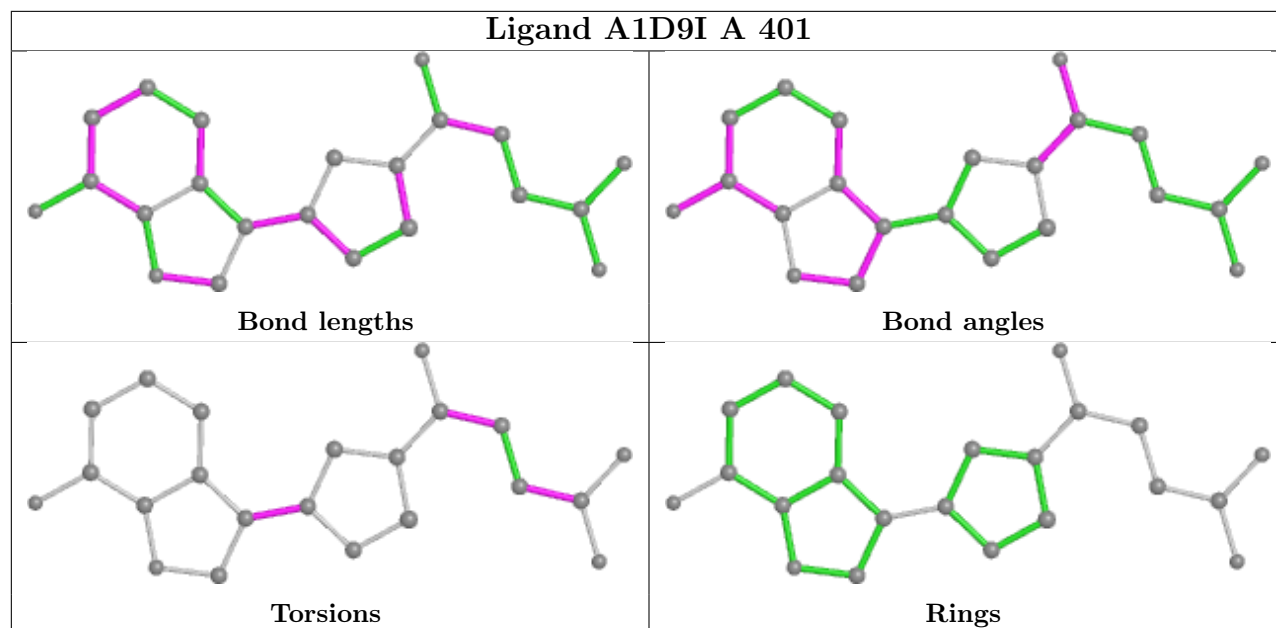
5.7 Other polymers ⓘ

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, 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	177/188 (94%)	0.49	22 (12%)	9	8	16, 31, 58, 88	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	214	MET	5.3
1	A	319	ASP	5.0
1	A	317	PRO	3.8
1	A	185	HIS	3.7
1	A	322	SER	3.6
1	A	318	ALA	3.5
1	A	323	PHE	3.3
1	A	335	GLN	3.2
1	A	333	LEU	3.2
1	A	154	ASN	2.9
1	A	321	SER	2.8
1	A	276	GLN	2.8
1	A	331	ARG	2.5
1	A	192	GLY	2.5
1	A	310	ARG	2.3
1	A	320	ASP	2.3
1	A	193	ALA	2.3
1	A	191	ARG	2.3
1	A	215	ALA	2.2
1	A	213	SER	2.2
1	A	280	SER	2.1
1	A	308	ASN	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.
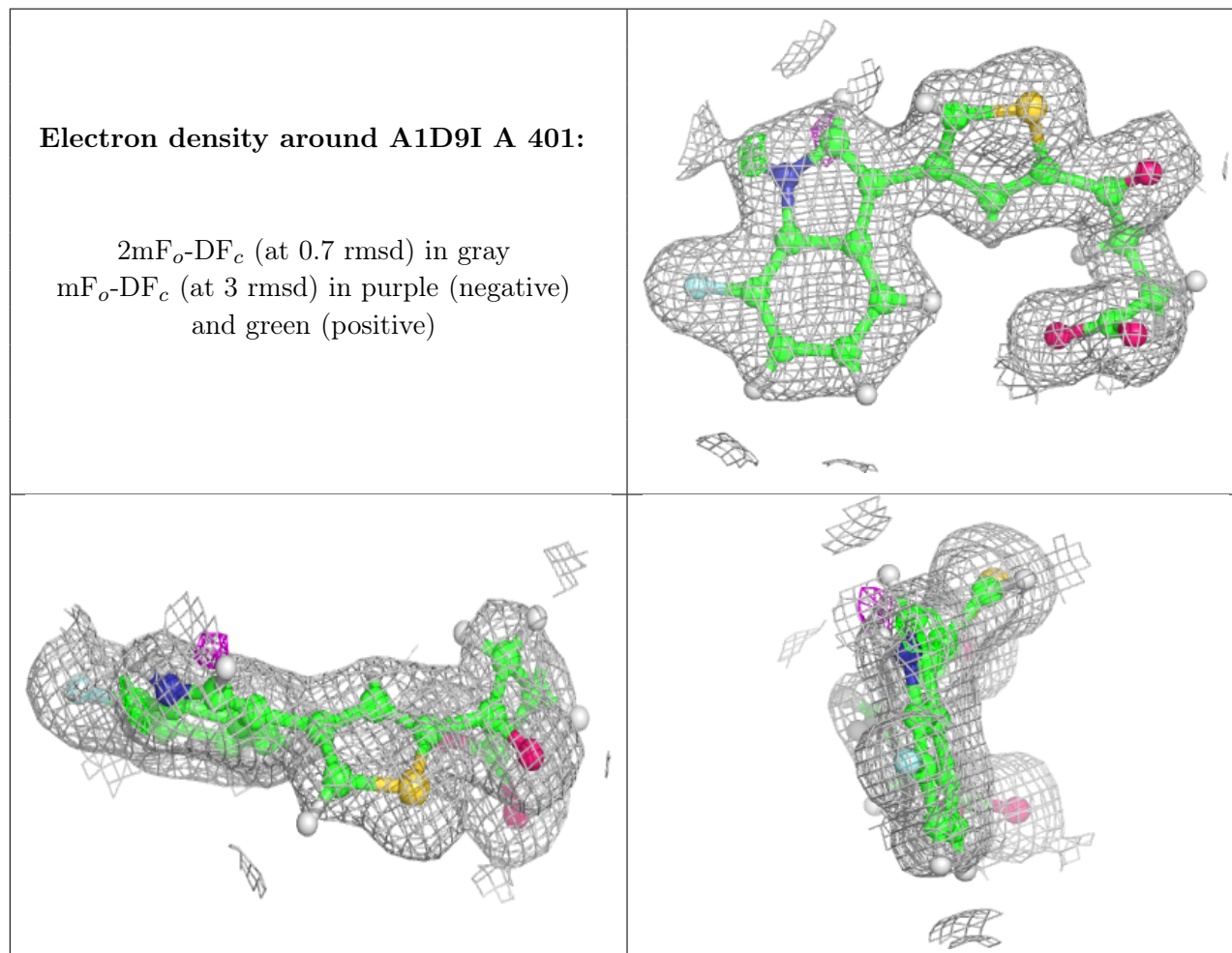
6.3 Carbohydrates (i)

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	A1D9I	A	401	22/22	0.97	0.06	13,17,20,24	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 A1D9I 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)

6.5 Other polymers ⓘ

There are no such residues in this entry.