



# Full wwPDB X-ray Structure Validation Report

Oct 8, 2023 – 06:44 PM EDT

PDB ID : 6W75  
Title : 1.95 Angstrom Resolution Crystal Structure of NSP10 - NSP16 Complex from SARS-CoV-2  
Authors : Minasov, G.; Shuvalova, L.; Rosas-Lemus, M.; Kiryukhina, O.; Wiersum, G.; Godzik, A.; Jaroszewski, L.; Stogios, P.J.; Skarina, T.; Satchell, K.J.F.; Center for Structural Genomics of Infectious Diseases (CSGID)  
Deposited on : 2020-03-18  
Resolution : 1.95 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](mailto: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>.

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The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.35.1  
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

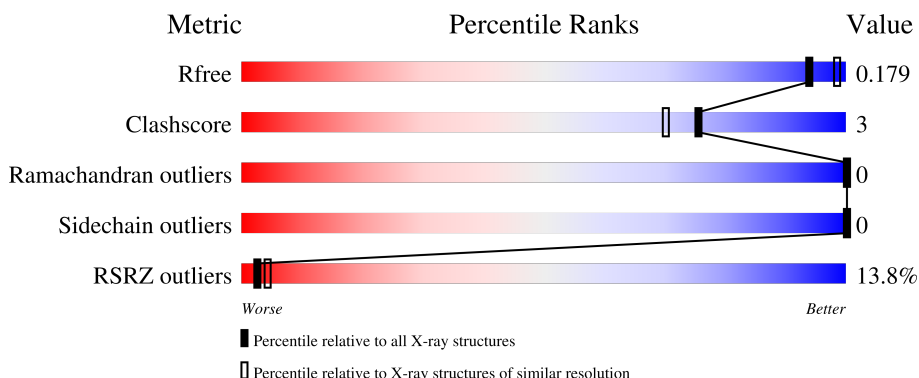
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.95 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	2580 (1.96-1.96)
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)
RSRZ outliers	127900	2539 (1.96-1.96)

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  $\geq 3$ , 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	301	<div style="display: flex; justify-content: space-between;"> <span>13%</span> <span>92%</span> <span>6%</span> </div>
1	C	301	<div style="display: flex; justify-content: space-between;"> <span>9%</span> <span>91%</span> <span>6%</span> </div>
2	B	142	<div style="display: flex; justify-content: space-between;"> <span>18%</span> <span>82%</span> <span>14%</span> </div>
2	D	142	<div style="display: flex; justify-content: space-between;"> <span>18%</span> <span>77%</span> <span>19%</span> </div>

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 7676 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 2'-O-methyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	297	Total	C	N	O	S	0	20	0
			2494	1590	419	468	17			
1	C	292	Total	C	N	O	S	0	17	0
			2430	1554	409	450	17			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	6796	SER	-	expression tag	UNP P0DTD1
A	6797	ASN	-	expression tag	UNP P0DTD1
A	6798	ALA	-	expression tag	UNP P0DTD1
C	6796	SER	-	expression tag	UNP P0DTD1
C	6797	ASN	-	expression tag	UNP P0DTD1
C	6798	ALA	-	expression tag	UNP P0DTD1

- Molecule 2 is a protein called Non-structural protein 10.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	122	Total	C	N	O	S	0	4	0
			941	585	159	180	17			
2	D	115	Total	C	N	O	S	0	4	0
			878	547	147	169	15			

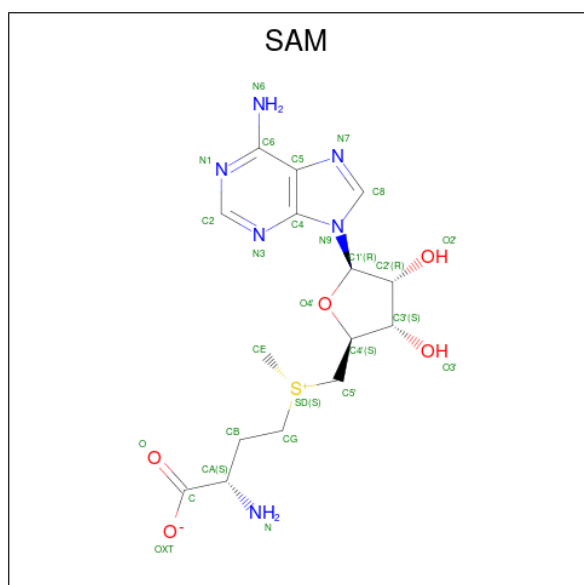
There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	4251	SER	-	expression tag	UNP P0DTD1
B	4252	ASN	-	expression tag	UNP P0DTD1
B	4253	ALA	-	expression tag	UNP P0DTD1
D	4251	SER	-	expression tag	UNP P0DTD1
D	4252	ASN	-	expression tag	UNP P0DTD1
D	4253	ALA	-	expression tag	UNP P0DTD1

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Na 1 1	0	0
3	B	1	Total Na 1 1	0	0
3	C	4	Total Na 4 4	0	0
3	D	1	Total Na 1 1	0	0

- Molecule 4 is S-ADENOSYLMETHIONINE (three-letter code: SAM) (formula: C<sub>15</sub>H<sub>22</sub>N<sub>6</sub>O<sub>5</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O S 27 15 6 5 1	0	0
4	C	1	Total C N O S 27 15 6 5 1	0	0

- Molecule 5 is FORMIC ACID (three-letter code: FMT) (formula: CH<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	A	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	D	1	Total C O 3 1 2	0	0

- Molecule 6 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	2	Total Zn 2 2	0	0
6	D	2	Total Zn 2 2	0	0

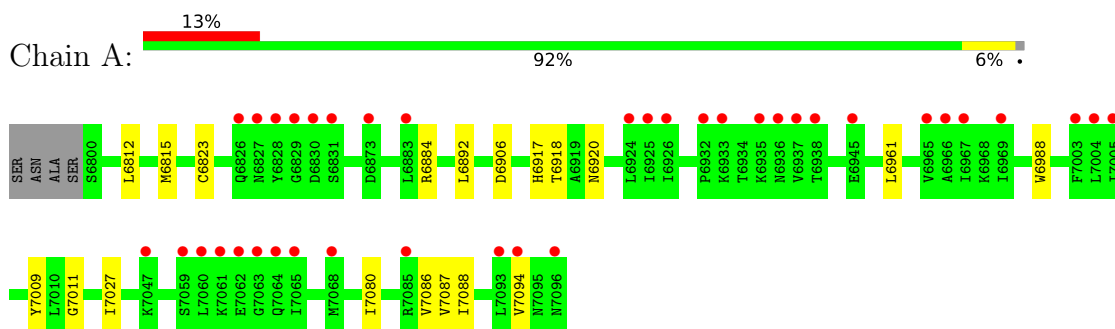
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	258	Total O 275 275	0	24
7	B	98	Total O 101 101	0	5
7	C	295	Total O 327 327	0	40
7	D	94	Total O 105 105	0	11

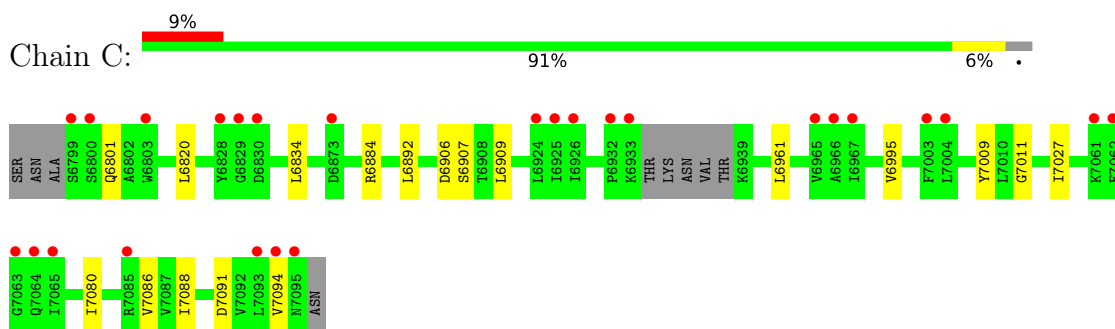
### 3 Residue-property plots [i](#)

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.

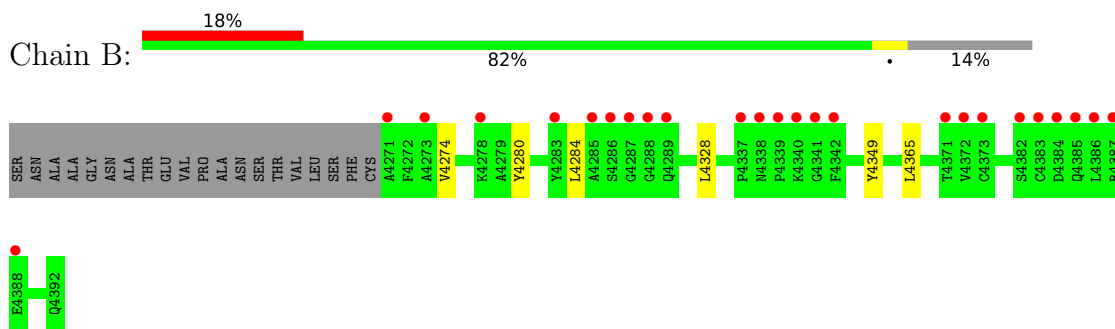
- Molecule 1: 2'-O-methyltransferase



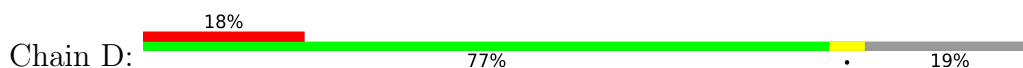
- Molecule 1: 2'-O-methyltransferase



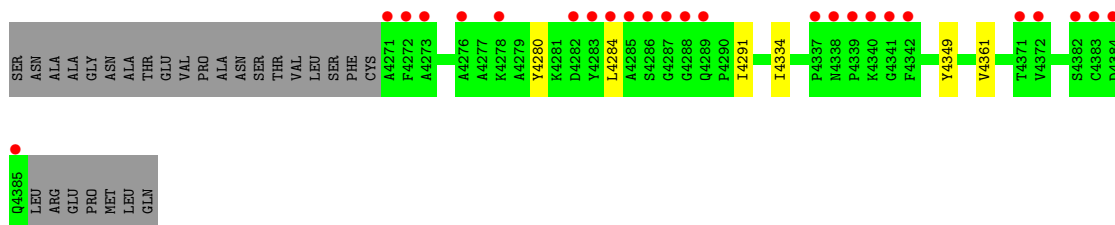
- Molecule 2: Non-structural protein 10



- Molecule 2: Non-structural protein 10







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	166.25Å 166.25Å 98.28Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.93 – 1.95 29.93 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.93-1.95) 100.0 (29.93-1.95)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.27 (at 1.95Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.157 , 0.174 0.164 , 0.179	Depositor DCC
$R_{free}$ test set	5610 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.4	Xtrriage
Anisotropy	0.086	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 54.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.020 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7676	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.21% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: NA, FMT, ZN, SAM

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	0.65	0/2546	0.73	0/3453
1	C	0.64	0/2481	0.72	0/3364
2	B	0.66	0/961	0.72	0/1301
2	D	0.66	0/897	0.71	0/1218
All	All	0.65	0/6885	0.73	0/9336

There are no bond length outliers.

There are no bond angle outliers.

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	2494	0	2473	24	0
1	C	2430	0	2413	20	0
2	B	941	0	902	5	0
2	D	878	0	837	5	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	4	0	0	0	0
3	D	1	0	0	0	0
4	A	27	0	22	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	C	27	0	22	0	0
5	A	27	0	9	1	0
5	C	30	0	10	0	0
5	D	3	0	1	0	0
6	B	2	0	0	0	0
6	D	2	0	0	0	0
7	A	275	0	0	0	0
7	B	101	0	0	0	0
7	C	327	0	0	1	0
7	D	105	0	0	0	0
All	All	7676	0	6689	42	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (42) 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:6892[B]:LEU:HD11	1:C:7094:VAL:HG12	1.60	0.83
1:C:6834:LEU:HD21	1:C:6995[B]:VAL:CG2	2.33	0.58
1:A:6892[B]:LEU:HD21	1:A:7086:VAL:HG11	1.86	0.57
1:A:7094:VAL:HB	1:C:6892[B]:LEU:HD11	1.87	0.56
1:A:6892[B]:LEU:CD1	1:C:7094:VAL:HG12	2.32	0.56
1:C:6820:LEU:HD11	1:C:7027[B]:ILE:HD12	1.86	0.56
1:A:6892[B]:LEU:HD11	1:C:7094:VAL:CG1	2.35	0.55
2:B:4328:LEU:HD22	2:B:4365:LEU:HD11	1.92	0.52
1:C:6820:LEU:CD1	1:C:7027[B]:ILE:HD12	2.39	0.52
1:A:6884[A]:ARG:HH22	1:A:6906:ASP:CG	2.12	0.51
1:A:6917:HIS:O	1:A:7088[A]:ILE:HG13	2.10	0.51
1:A:6812[A]:LEU:HD23	1:A:6815:MET:CE	2.40	0.51
1:C:6884[A]:ARG:HH22	1:C:6906:ASP:CG	2.14	0.50
1:C:6884[B]:ARG:HB3	2:D:4349:TYR:OH	2.12	0.50
1:A:6812[A]:LEU:HD23	1:A:6815:MET:HE3	1.93	0.49
1:A:6823:CYS:HB2	1:A:7027[A]:ILE:HD12	1.94	0.49
1:C:6961:LEU:HB2	1:C:7080:ILE:HB	1.92	0.49
1:A:7094:VAL:HG21	1:C:6892[B]:LEU:HD21	1.95	0.49
1:A:6884[B]:ARG:HB3	2:B:4349:TYR:OH	2.12	0.49
1:C:6892[B]:LEU:HD21	1:C:7086:VAL:HG11	1.95	0.48
1:A:6812[B]:LEU:HA	1:A:6815:MET:HE2	1.95	0.47
1:A:6892[B]:LEU:CD2	1:A:7086:VAL:HG11	2.44	0.47
1:A:7009:TYR:CZ	1:A:7011:GLY:HA2	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:6884[A]:ARG:NH2	1:A:6906:ASP:OD2	2.43	0.47
1:A:6961:LEU:HB2	1:A:7080:ILE:HB	1.95	0.47
2:B:4280:TYR:CE2	2:B:4284:LEU:HD11	2.50	0.47
1:A:7087:VAL:HG13	1:C:7091:ASP:HB3	1.97	0.47
1:C:7009:TYR:CZ	1:C:7011:GLY:HA2	2.52	0.45
1:A:7094:VAL:HG12	1:C:6907:SER:OG	2.16	0.45
1:A:7094:VAL:CG2	1:C:6892[B]:LEU:HD21	2.47	0.44
1:A:6812[A]:LEU:HA	1:A:6815:MET:HE2	1.97	0.44
1:A:6988:TRP:HE1	5:A:7111:FMT:C	2.30	0.44
2:B:4274:VAL:HG21	2:D:4334[B]:ILE:HD11	1.99	0.44
1:C:6884[A]:ARG:NH2	1:C:6906:ASP:OD2	2.44	0.43
1:C:6801:GLN:NE2	7:C:7211:HOH:O	2.52	0.43
1:A:6920:ASN:ND2	1:A:7086:VAL:HA	2.35	0.42
1:C:6909:LEU:HD11	1:C:7088[A]:ILE:HG12	2.02	0.42
2:D:4280:TYR:CE2	2:D:4284:LEU:HD11	2.55	0.41
2:B:4274:VAL:HG21	2:D:4334[B]:ILE:CD1	2.50	0.41
2:D:4291:ILE:HD12	2:D:4361:VAL:HG11	2.02	0.40
1:A:6918:THR:HB	1:A:7088[A]:ILE:HG13	2.03	0.40
1:C:6892[B]:LEU:CD2	1:C:7086:VAL:HG11	2.52	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	315/301 (105%)	306 (97%)	9 (3%)	0	100	100
1	C	305/301 (101%)	295 (97%)	10 (3%)	0	100	100
2	B	124/142 (87%)	119 (96%)	5 (4%)	0	100	100
2	D	117/142 (82%)	113 (97%)	4 (3%)	0	100	100
All	All	861/886 (97%)	833 (97%)	28 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	276/260 (106%)	276 (100%)	0	100	100
1	C	268/260 (103%)	268 (100%)	0	100	100
2	B	104/115 (90%)	104 (100%)	0	100	100
2	D	97/115 (84%)	97 (100%)	0	100	100
All	All	745/750 (99%)	745 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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](#)

Of 33 ligands modelled in this entry, 11 are monoatomic - leaving 22 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	FMT	A	7105	-	2,2,2	0.27	0	1,1,1	0.15	0
5	FMT	A	7106	-	2,2,2	0.30	0	1,1,1	0.18	0
5	FMT	C	7110	-	2,2,2	0.31	0	1,1,1	0.14	0
5	FMT	C	7113	-	2,2,2	0.24	0	1,1,1	0.18	0
4	SAM	A	7102	-	24,29,29	0.69	0	23,42,42	1.01	2 (8%)
5	FMT	C	7109	-	2,2,2	0.25	0	1,1,1	0.18	0
5	FMT	C	7107	-	2,2,2	0.21	0	1,1,1	0.21	0
5	FMT	A	7103	-	2,2,2	0.24	0	1,1,1	0.20	0
5	FMT	C	7108	-	2,2,2	0.28	0	1,1,1	0.15	0
5	FMT	A	7108	-	2,2,2	0.27	0	1,1,1	0.16	0
5	FMT	A	7104	-	2,2,2	0.24	0	1,1,1	0.16	0
5	FMT	C	7106	-	2,2,2	0.26	0	1,1,1	0.18	0
5	FMT	A	7111	-	2,2,2	0.25	0	1,1,1	0.15	0
5	FMT	A	7109	-	2,2,2	0.24	0	1,1,1	0.16	0
5	FMT	D	4404	-	2,2,2	0.27	0	1,1,1	0.18	0
5	FMT	A	7110	-	2,2,2	0.23	0	1,1,1	0.17	0
5	FMT	C	7111	-	2,2,2	0.28	0	1,1,1	0.16	0
5	FMT	C	7112	-	2,2,2	0.28	0	1,1,1	0.15	0
4	SAM	C	7105	-	24,29,29	0.68	0	23,42,42	1.02	2 (8%)
5	FMT	C	7114	-	2,2,2	0.22	0	1,1,1	0.19	0
5	FMT	C	7115	-	2,2,2	0.32	0	1,1,1	0.14	0
5	FMT	A	7107	-	2,2,2	0.26	0	1,1,1	0.17	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
4	SAM	A	7102	-	-	2/12/33/33	0/3/3/3
4	SAM	C	7105	-	-	2/12/33/33	0/3/3/3

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	7105	SAM	C5-C6-N6	2.55	124.22	120.35
4	A	7102	SAM	C5-C6-N6	2.44	124.06	120.35
4	A	7102	SAM	O4'-C1'-C2'	-2.27	103.60	106.93
4	C	7105	SAM	O4'-C1'-C2'	-2.22	103.69	106.93

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	7102	SAM	O-C-CA-CB
4	A	7102	SAM	OXT-C-CA-CB
4	C	7105	SAM	O-C-CA-CB
4	C	7105	SAM	OXT-C-CA-CB

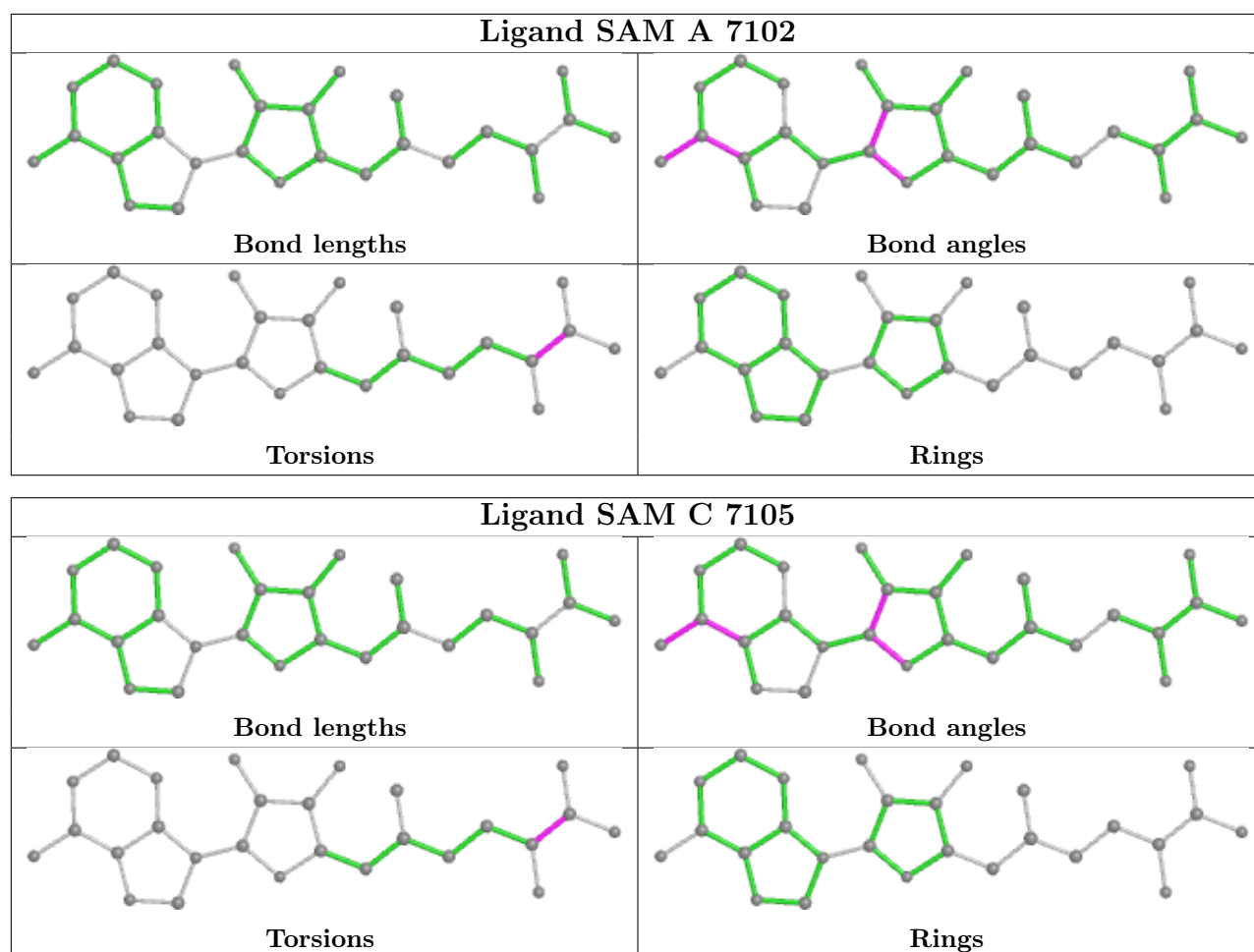
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	7111	FMT	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	297/301 (98%)	0.54	38 (12%) <b>3</b> <b>6</b>	19, 30, 68, 108	0
1	C	292/301 (97%)	0.24	26 (8%) <b>9</b> <b>15</b>	19, 28, 55, 91	0
2	B	122/142 (85%)	0.91	25 (20%) <b>1</b> <b>1</b>	25, 42, 68, 88	0
2	D	115/142 (80%)	0.73	25 (21%) <b>0</b> <b>1</b>	22, 39, 70, 93	0
All	All	826/886 (93%)	0.51	114 (13%) <b>2</b> <b>4</b>	19, 31, 67, 108	0

All (114) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	6937	VAL	8.7
1	A	6936	ASN	8.6
2	B	4386[A]	LEU	8.4
2	B	4339	PRO	7.6
1	C	7062	GLU	6.6
1	A	6933	LYS	6.3
2	D	4383	CYS	6.2
1	A	7061	LYS	6.1
2	B	4342	PHE	5.9
2	B	4340	LYS	5.9
2	D	4339	PRO	5.9
1	A	6828	TYR	5.7
2	D	4285	ALA	5.4
1	A	6932	PRO	5.4
2	B	4387	ARG	5.1
2	B	4287	GLY	5.0
2	B	4285	ALA	5.0
1	A	6829	GLY	4.9
2	D	4340	LYS	4.7
1	C	6799	SER	4.7
1	A	7093	LEU	4.6

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	D	4384	ASP	4.6
2	D	4271	ALA	4.5
1	A	6938	THR	4.5
2	B	4286	SER	4.4
1	C	6803	TRP	4.3
2	B	4385[A]	GLN	4.3
2	B	4384	ASP	4.3
1	C	6828	TYR	4.2
2	D	4289	GLN	4.2
2	D	4272	PHE	4.2
1	C	6933	LYS	4.2
2	D	4371	THR	4.1
2	D	4342	PHE	4.0
2	B	4288	GLY	4.0
2	D	4341	GLY	4.0
2	B	4271	ALA	3.9
2	D	4372	VAL	3.8
2	D	4286	SER	3.7
1	A	7085	ARG	3.7
2	D	4273	ALA	3.6
1	A	7062	GLU	3.6
1	A	6830	ASP	3.6
2	D	4288	GLY	3.6
1	A	6967	ILE	3.6
2	D	4385	GLN	3.5
1	C	6932	PRO	3.5
2	B	4273	ALA	3.5
1	C	7063	GLY	3.5
2	D	4382	SER	3.4
1	A	6831	SER	3.4
1	A	7064	GLN	3.4
2	B	4289	GLN	3.3
1	C	6800	SER	3.3
2	B	4382	SER	3.3
1	A	6926	ILE	3.2
1	A	6966	ALA	3.2
1	C	7095	ASN	3.2
2	D	4287	GLY	3.1
1	C	7065	ILE	3.1
1	C	7061	LYS	3.1
1	A	7065[A]	ILE	3.1
2	B	4383	CYS	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	C	7093	LEU	3.1
2	B	4283	TYR	3.0
2	B	4341	GLY	3.0
1	A	6826	GLN	3.0
1	A	6935	LYS	2.9
1	A	6873	ASP	2.9
2	B	4373	CYS	2.9
1	A	6924	LEU	2.8
1	A	6925	ILE	2.8
1	A	6965	VAL	2.8
2	D	4278	LYS	2.8
1	C	7064	GLN	2.8
2	B	4338	ASN	2.8
2	B	4372	VAL	2.8
1	A	7005	ILE	2.7
1	A	7096	ASN	2.7
2	D	4282	ASP	2.6
1	C	7094	VAL	2.6
1	A	7004	LEU	2.6
1	A	7059	SER	2.6
1	C	6873[A]	ASP	2.6
1	C	6967	ILE	2.5
1	C	6926	ILE	2.5
2	D	4283	TYR	2.5
1	C	7085	ARG	2.5
1	A	7003	PHE	2.5
1	A	7068	MET	2.5
1	A	7063	GLY	2.5
1	C	6924	LEU	2.4
1	A	7060	LEU	2.4
1	C	6830	ASP	2.4
2	D	4338	ASN	2.4
1	A	6883	LEU	2.4
1	A	6969	ILE	2.3
2	B	4337	PRO	2.3
1	C	7003	PHE	2.3
2	B	4371	THR	2.3
1	A	7094	VAL	2.3
2	D	4284	LEU	2.3
1	C	7004	LEU	2.2
1	A	7047	LYS	2.2
2	B	4278	LYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	6827	ASN	2.1
1	C	6925	ILE	2.1
1	C	6829	GLY	2.1
1	C	6965	VAL	2.1
1	C	6966	ALA	2.1
2	D	4276	ALA	2.1
1	A	6945	GLU	2.0
2	D	4337	PRO	2.0
2	B	4388	GLU	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, 95<sup>th</sup> 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
3	NA	B	4403	1/1	0.44	0.15	66,66,66,66	1
3	NA	C	7102	1/1	0.84	0.20	59,59,59,59	0
5	FMT	A	7108	3/3	0.86	0.49	54,54,59,62	0
5	FMT	C	7110	3/3	0.86	0.24	47,47,57,62	0
5	FMT	C	7112	3/3	0.86	0.32	49,49,56,58	0
3	NA	D	4403	1/1	0.90	0.06	64,64,64,64	0
5	FMT	D	4404	3/3	0.90	0.16	53,53,61,64	0
3	NA	C	7103	1/1	0.91	0.11	50,50,50,50	0
3	NA	A	7101	1/1	0.93	0.19	45,45,45,45	0
5	FMT	C	7108	3/3	0.94	0.17	39,39,50,55	0
5	FMT	A	7107	3/3	0.94	0.25	47,47,57,61	0
6	ZN	D	4402	1/1	0.94	0.07	46,46,46,46	0
5	FMT	A	7104	3/3	0.95	0.16	44,44,53,59	0
3	NA	C	7104	1/1	0.95	0.14	53,53,53,53	0

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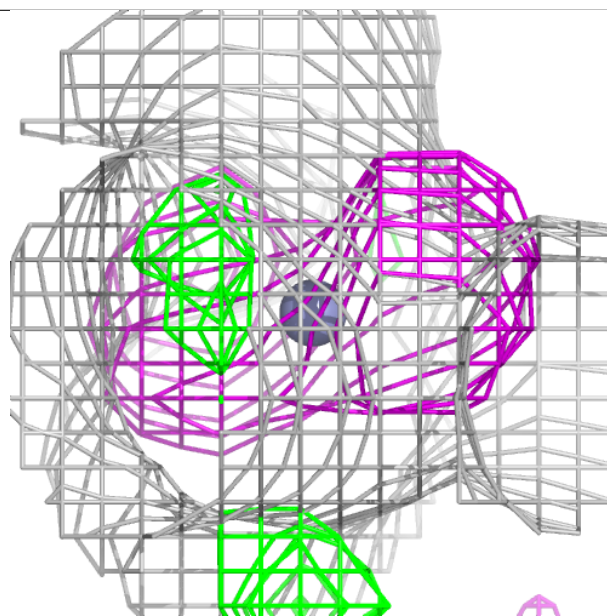
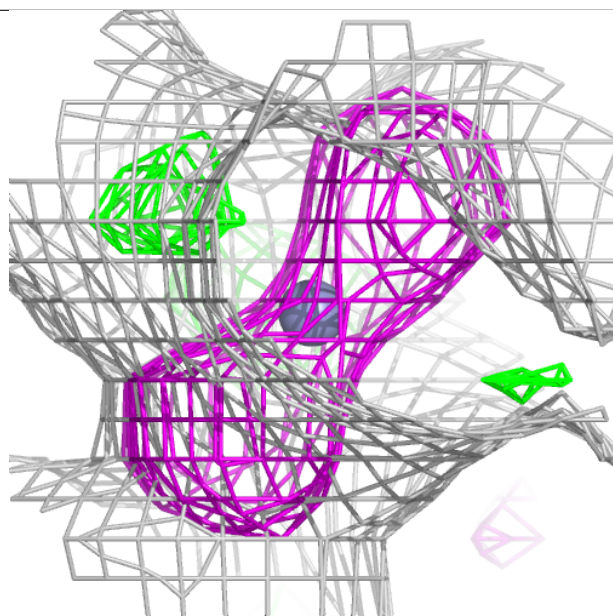
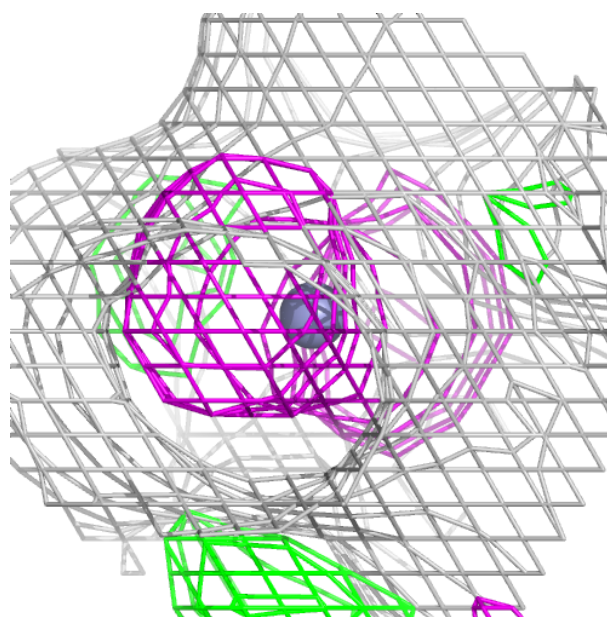
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	SAM	A	7102	27/27	0.95	0.10	26,31,33,36	0
5	FMT	C	7114	3/3	0.95	0.10	46,46,47,48	0
5	FMT	C	7115	3/3	0.95	0.17	38,38,38,41	0
5	FMT	A	7110	3/3	0.95	0.16	54,54,55,57	0
5	FMT	A	7111	3/3	0.95	0.11	46,46,46,51	0
5	FMT	A	7109	3/3	0.96	0.20	49,49,49,50	0
4	SAM	C	7105	27/27	0.96	0.09	25,28,30,33	0
5	FMT	C	7111	3/3	0.97	0.09	43,43,49,49	0
6	ZN	B	4402	1/1	0.97	0.09	44,44,44,44	0
6	ZN	D	4401	1/1	0.97	0.06	31,31,31,31	0
3	NA	C	7101	1/1	0.97	0.18	38,38,38,38	0
5	FMT	A	7106	3/3	0.98	0.15	47,47,50,50	0
5	FMT	C	7109	3/3	0.98	0.12	42,42,45,52	0
5	FMT	A	7105	3/3	0.98	0.11	42,42,50,53	0
6	ZN	B	4401	1/1	0.98	0.05	34,34,34,34	0
5	FMT	C	7106	3/3	0.98	0.09	34,34,34,35	0
5	FMT	C	7107	3/3	0.98	0.09	28,28,29,30	0
5	FMT	C	7113	3/3	0.98	0.12	44,44,46,48	0
5	FMT	A	7103	3/3	0.99	0.07	25,25,28,28	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.

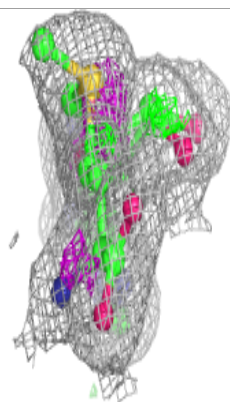
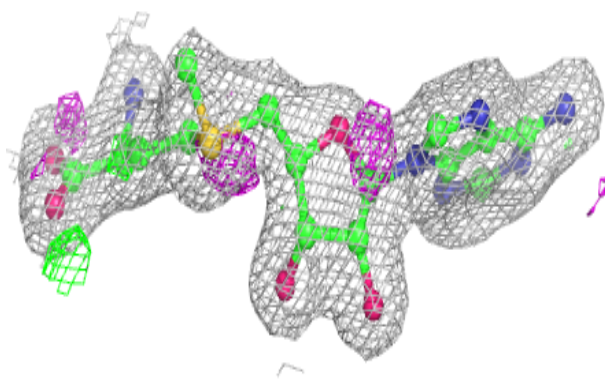
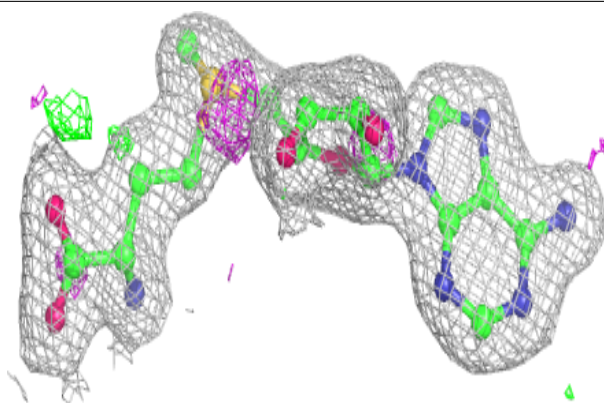
**Electron density around ZN D 4402:**

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

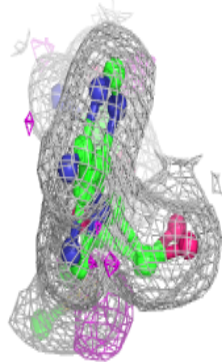
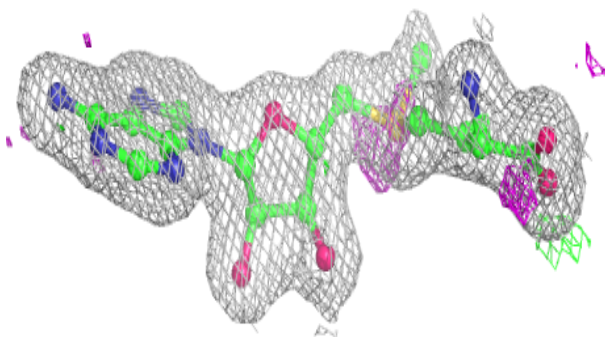
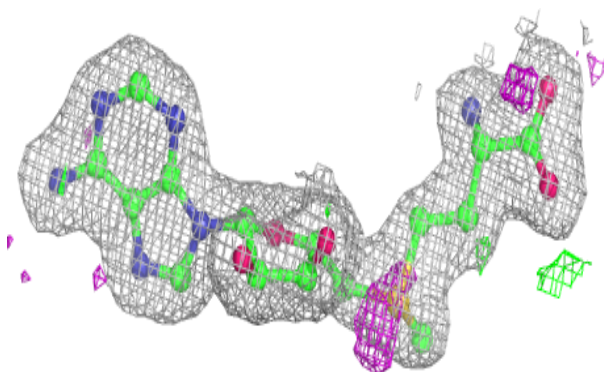


**Electron density around SAM A 7102:**

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

**Electron density around SAM C 7105:**

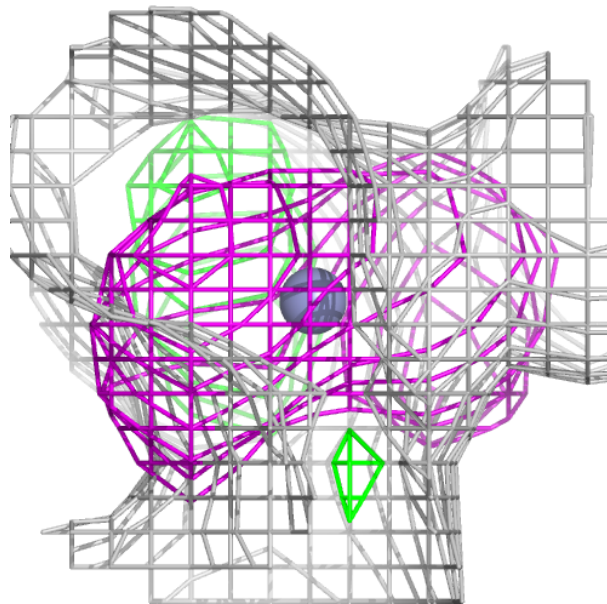
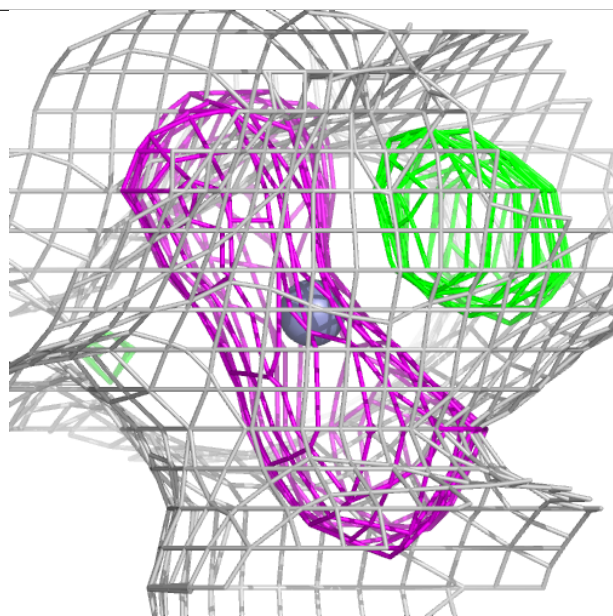
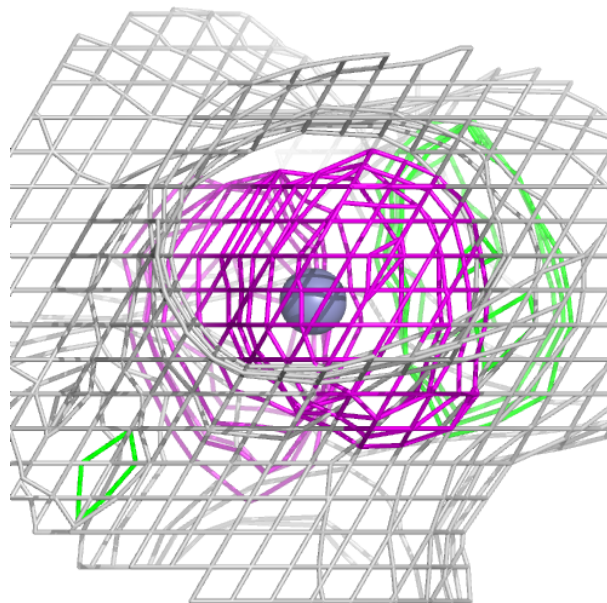
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





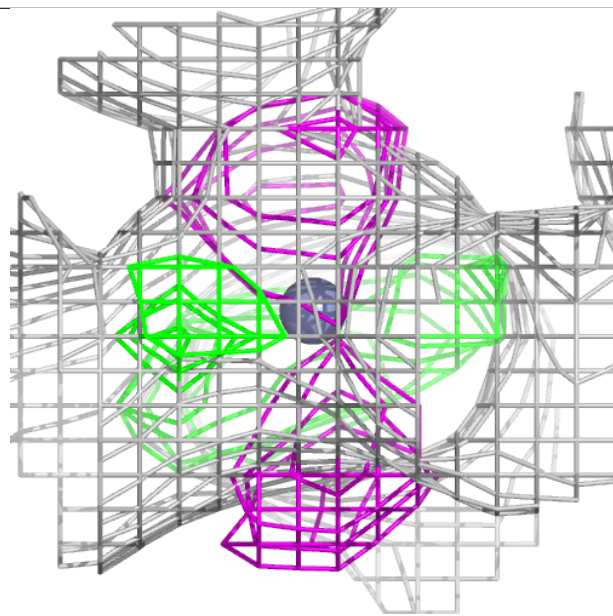
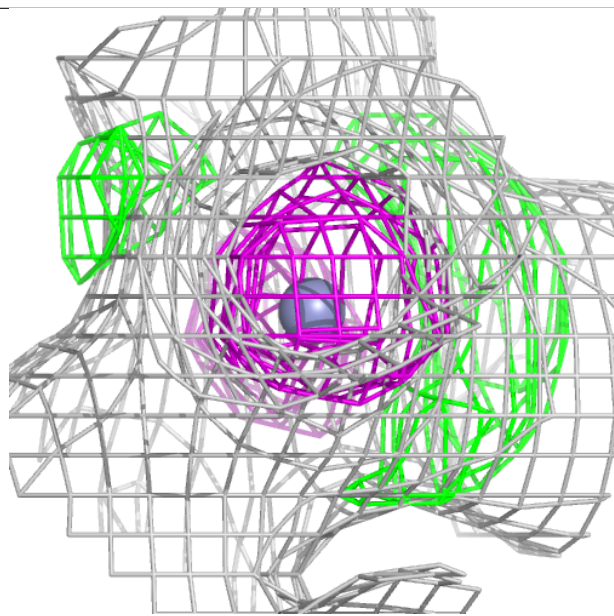
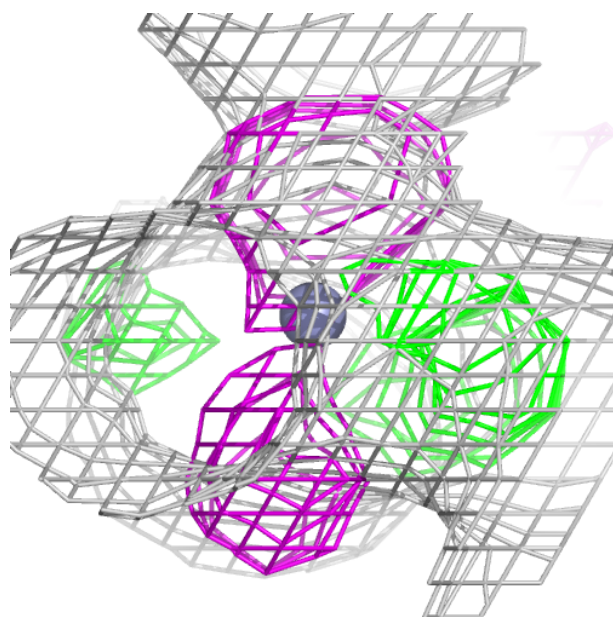
**Electron density around ZN B 4402:**

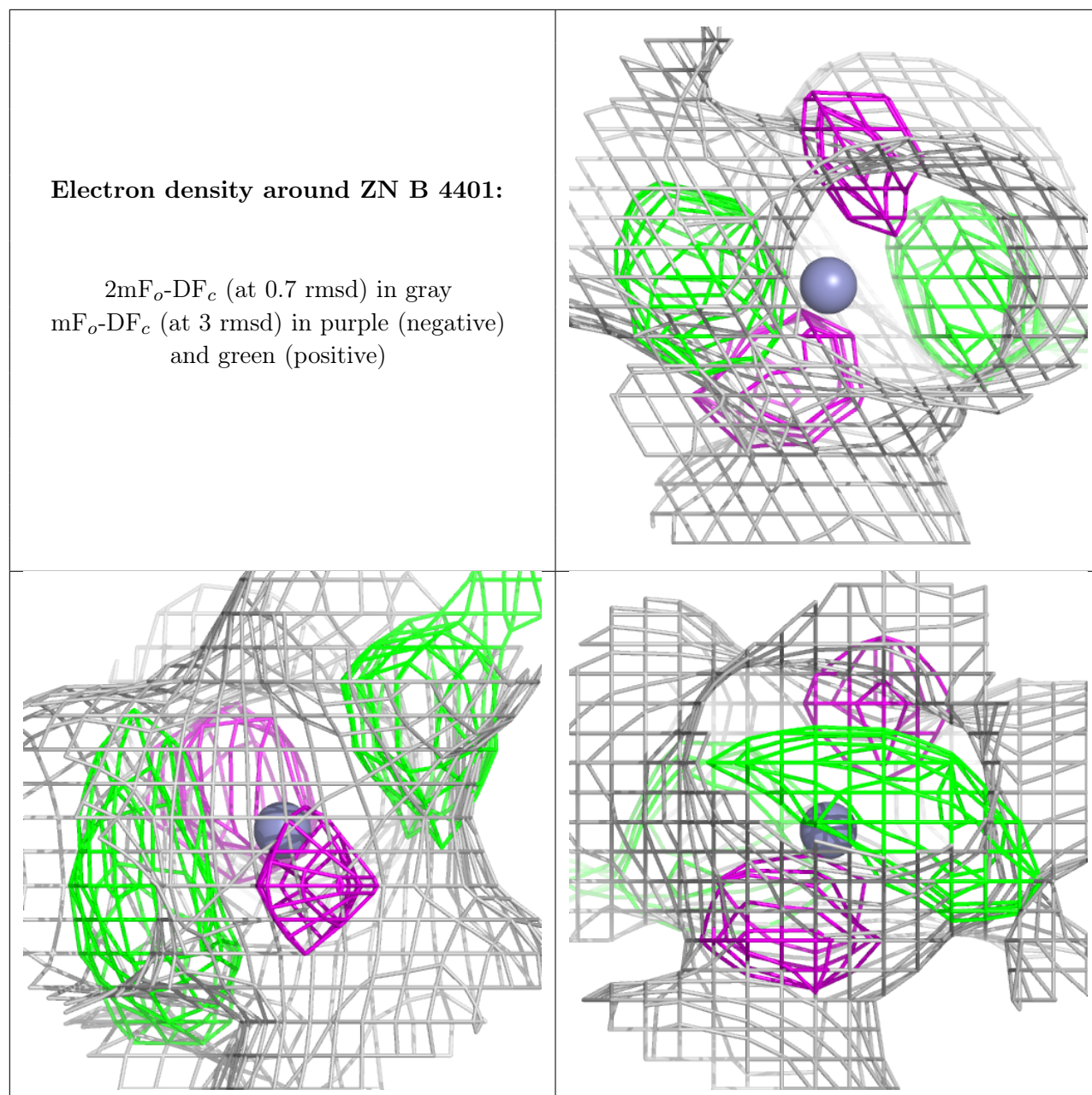
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around ZN D 4401:**

$2mF_o-DF_c$  (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.