



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 12, 2023 – 01:49 PM EDT

PDB ID : 8S99
Title : Crystal structure of the TYK2 pseudokinase domain in complex with compound 11
Authors : Toms, A.V.; Leit, S.; Greenwood, J.R.; Carriero, S.; Mondal, S.; Abel, R.; Ashwell, M.; Blanchette, H.; Boyles, N.; Cartwright, M.; Collis, A.; Feng, S.; Ghanakota, P.; Harriman, G.C.; Hosagrahara, V.; Kaila, N.; Kapeller, R.; Rafi, S.; Romero, D.L.; Tarantino, P.; Timaniya, J.; Wester, R.T.; Westlin, W.; Srivastava, B.; Miao, W.; Tummino, P.; McElwee, J.J.; Edmondson, S.D.; Masee, C.E.
Deposited on : 2023-03-27
Resolution : 1.71 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158

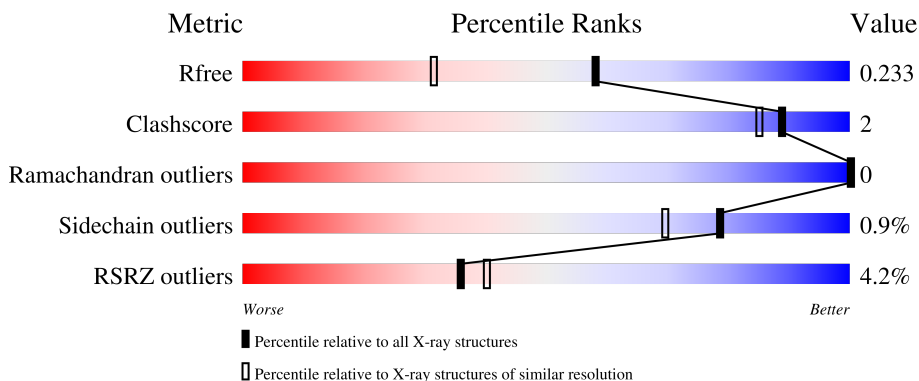
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.71 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	5722 (1.74-1.70)
Clashscore	141614	6152 (1.74-1.70)
Ramachandran outliers	138981	6051 (1.74-1.70)
Sidechain outliers	138945	6051 (1.74-1.70)
RSRZ outliers	127900	5629 (1.74-1.70)

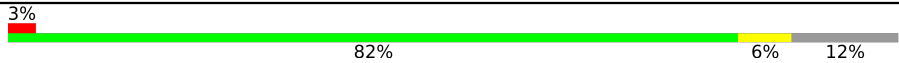
The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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	295	
1	B	295	

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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

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Mol	Chain	Length	Quality of chain
1	C	295	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a small red segment at the beginning labeled '3%', a large green segment labeled '82%', a small yellow segment labeled '6%', and a grey segment at the end labeled '12%'.</p>

2 Entry composition [i](#)

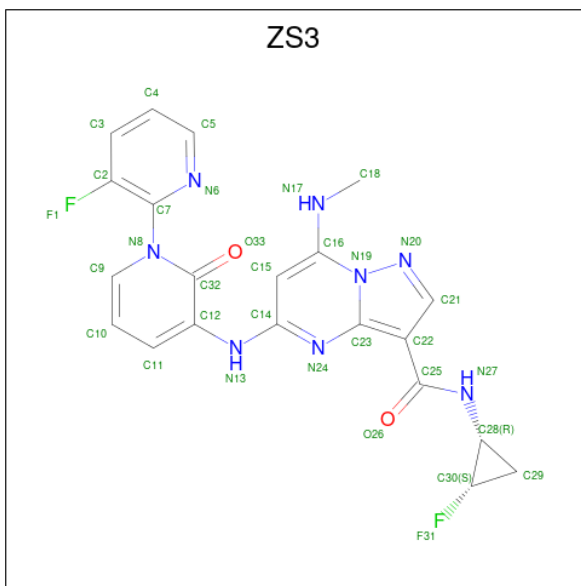
There are 5 unique types of molecules in this entry. The entry contains 7307 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Non-receptor tyrosine-protein kinase TYK2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	261	Total	C	N	O	S	28	12	0
			2175	1365	400	399	11			
1	B	261	Total	C	N	O	S	20	13	0
			2183	1373	401	398	11			
1	C	260	Total	C	N	O	S	33	7	0
			2122	1335	390	386	11			

- Molecule 2 is (8S)-N-[(1R,2S)-2-fluorocyclopropyl]-5-[[[(1M,2'M)-3'-fluoro-2-oxo-2H-[1,2'-bipyridin]-3-yl]amino]-7-(methylamino)pyrazolo[1,5-a]pyrimidine-3-carboxamide (three-letter code: ZS3) (formula: C₂₁H₁₈F₂N₈O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
2	A	1	Total	C	F	N	O	0	1
			40	25	3	9	3		
2	B	1	Total	C	F	N	O	0	1
			40	25	3	9	3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
2	C	1	40	25	3	9	3	0	1

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	4	2	2	0	0
3	A	1	4	2	2	0	0
3	B	1	4	2	2	0	0
3	B	1	4	2	2	0	0
3	C	1	4	2	2	0	0
3	C	1	4	2	2	0	0

- Molecule 4 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0

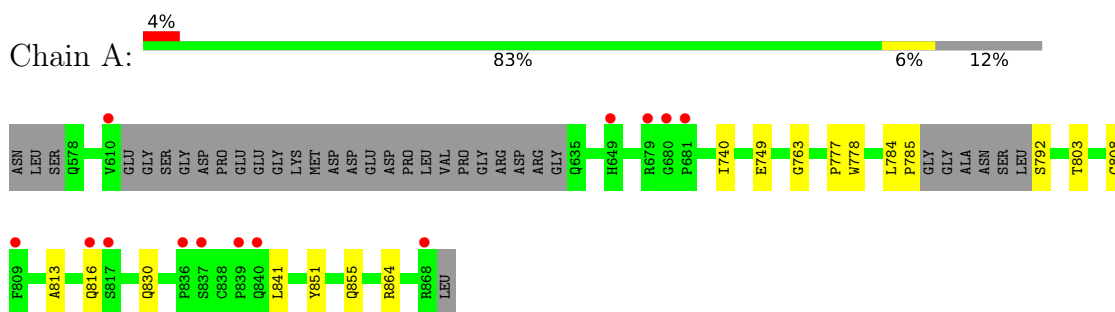
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	219	Total O 219 219	0	0
5	B	225	Total O 225 225	0	0
5	C	227	Total O 227 227	0	0

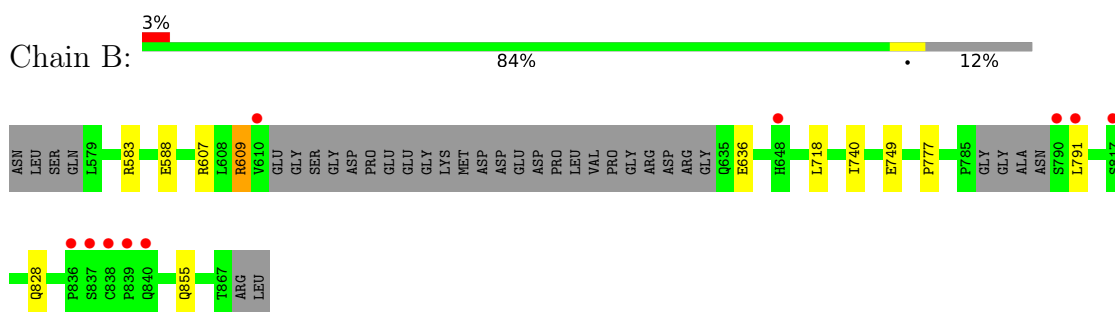
3 Residue-property plots [i](#)

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.

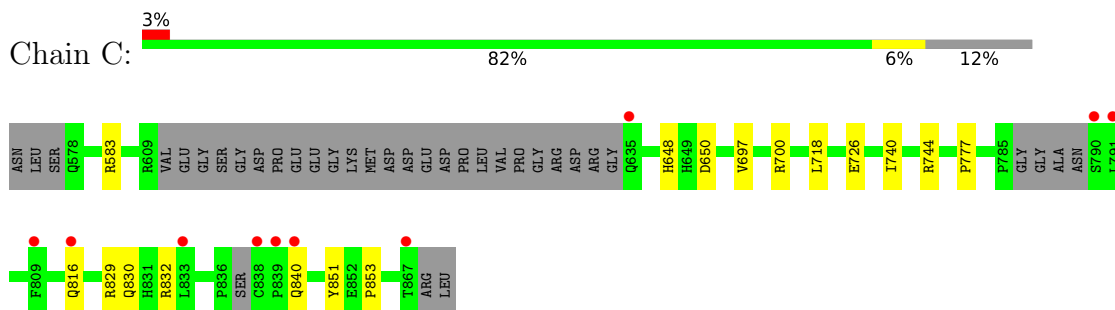
- Molecule 1: Non-receptor tyrosine-protein kinase TYK2



- Molecule 1: Non-receptor tyrosine-protein kinase TYK2



- Molecule 1: Non-receptor tyrosine-protein kinase TYK2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	48.21Å 112.72Å 157.45Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.62 – 1.71 47.58 – 1.71	Depositor EDS
% Data completeness (in resolution range)	99.2 (47.62-1.71) 99.2 (47.58-1.71)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.85 (at 1.71Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.190 , 0.225 0.199 , 0.233	Depositor DCC
R_{free} test set	3022 reflections (3.25%)	wwPDB-VP
Wilson B-factor (Å ²)	19.6	Xtrriage
Anisotropy	0.093	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 44.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7307	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.21% 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: EDO, ACT, ZS3

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	0.69	1/2223 (0.0%)	0.79	1/3012 (0.0%)
1	B	0.70	3/2231 (0.1%)	0.87	4/3023 (0.1%)
1	C	0.68	1/2168 (0.0%)	0.78	1/2937 (0.0%)
All	All	0.69	5/6622 (0.1%)	0.81	6/8972 (0.1%)

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	B	0	1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	749	GLU	CG-CD	-7.76	1.40	1.51
1	B	583	ARG	NE-CZ	7.15	1.42	1.33
1	A	816	GLN	CB-CG	6.43	1.70	1.52
1	C	840	GLN	CG-CD	5.33	1.63	1.51
1	B	791	LEU	CG-CD2	5.30	1.71	1.51

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	609	ARG	NE-CZ-NH1	-14.36	113.12	120.30
1	B	609	ARG	NE-CZ-NH2	13.00	126.80	120.30
1	A	864	ARG	NE-CZ-NH1	7.30	123.95	120.30
1	B	583	ARG	NE-CZ-NH1	6.50	123.55	120.30
1	C	583	ARG	NE-CZ-NH1	5.75	123.17	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	609	ARG	CD-NE-CZ	5.32	131.05	123.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	609	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	2175	0	2147	7	0
1	B	2183	0	2164	5	0
1	C	2122	0	2108	11	0
2	A	40	0	0	1	0
2	B	40	0	0	0	0
2	C	40	0	0	1	0
3	A	8	0	12	0	0
3	B	8	0	12	0	0
3	C	8	0	12	0	0
4	A	4	0	3	0	0
4	B	4	0	3	0	0
4	C	4	0	3	0	0
5	A	219	0	0	2	0
5	B	225	0	0	1	0
5	C	227	0	0	2	0
All	All	7307	0	6464	25	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (25) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:855[A]:GLN:OE1	5:B:1001:HOH:O	1.55	1.21

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:855[A]:GLN:OE1	5:A:1002:HOH:O	2.07	0.72
1:B:828[B]:GLN:HA	1:B:828[B]:GLN:OE1	1.90	0.72
1:A:784:LEU:HB3	1:A:785:PRO:HD3	1.77	0.65
1:B:607:ARG:HB3	1:B:636:GLU:HG3	1.80	0.62
1:C:744[B]:ARG:NH2	5:C:1002:HOH:O	2.33	0.62
1:A:808:CYS:SG	1:A:841:LEU:HD21	2.48	0.54
1:C:816:GLN:HE21	1:C:816:GLN:HA	1.80	0.47
1:B:588[B]:GLU:OE2	1:B:588[B]:GLU:HA	2.16	0.46
1:B:718:LEU:HD22	1:B:740[A]:ILE:HD11	1.96	0.46
1:C:648:HIS:HD2	1:C:650:ASP:H	1.64	0.45
1:C:726:GLU:OE1	5:C:1001:HOH:O	2.21	0.45
1:C:697[B]:VAL:HG12	1:C:700:ARG:HH21	1.81	0.45
1:C:648:HIS:CD2	1:C:650:ASP:H	2.35	0.44
1:A:830:GLN:HA	1:A:851:TYR:CZ	2.54	0.43
1:A:740:ILE:HD11	1:A:803:THR:HG21	2.01	0.42
1:C:832:ARG:HD2	1:C:832:ARG:HA	1.88	0.42
1:C:829[B]:ARG:HD3	1:C:829[B]:ARG:HA	1.85	0.42
1:C:816:GLN:HA	1:C:816:GLN:NE2	2.34	0.42
1:A:778:TRP:CZ2	1:A:813:ALA:CB	3.02	0.42
1:A:763:GLY:HA3	5:A:1005:HOH:O	2.21	0.41
1:C:830:GLN:HA	1:C:851:TYR:CZ	2.56	0.40
1:C:718:LEU:HD22	1:C:740:ILE:HD11	2.04	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	267/295 (90%)	261 (98%)	6 (2%)	0	100	100
1	B	268/295 (91%)	262 (98%)	6 (2%)	0	100	100
1	C	259/295 (88%)	254 (98%)	5 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	794/885 (90%)	777 (98%)	17 (2%)	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	240/254 (94%)	237 (99%)	3 (1%)	69	55
1	B	241/254 (95%)	240 (100%)	1 (0%)	91	86
1	C	234/254 (92%)	232 (99%)	2 (1%)	78	69
All	All	715/762 (94%)	709 (99%)	6 (1%)	78	73

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	749	GLU
1	A	777	PRO
1	A	792	SER
1	B	777	PRO
1	C	777	PRO
1	C	853	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	734	ASN
1	A	830	GLN
1	B	727	ASN
1	B	734	ASN
1	C	648	HIS
1	C	674	HIS
1	C	727	ASN

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Mol	Chain	Res	Type
1	C	734	ASN
1	C	816	GLN

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](#)

15 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	ZS3	B	901[A]	-	29,37,37	2.17	7 (24%)	33,54,54	1.84	9 (27%)
2	ZS3	C	901[B]	-	29,37,37	2.33	8 (27%)	33,54,54	2.06	12 (36%)
4	ACT	A	903	-	3,3,3	0.97	0	3,3,3	0.78	0
3	EDO	A	902	-	3,3,3	0.18	0	2,2,2	0.22	0
3	EDO	C	902	-	3,3,3	0.14	0	2,2,2	0.21	0
2	ZS3	C	901[A]	-	29,37,37	2.18	6 (20%)	33,54,54	2.12	13 (39%)
3	EDO	B	903	-	3,3,3	0.10	0	2,2,2	0.29	0
3	EDO	C	904	-	3,3,3	0.05	0	2,2,2	0.09	0
3	EDO	A	904	-	3,3,3	0.13	0	2,2,2	0.37	0
2	ZS3	A	901[A]	-	29,37,37	2.33	9 (31%)	33,54,54	1.95	11 (33%)
2	ZS3	A	901[B]	-	29,37,37	2.45	10 (34%)	33,54,54	1.88	10 (30%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	ACT	C	903	-	3,3,3	0.94	0	3,3,3	0.81	0
3	EDO	B	902	-	3,3,3	0.13	0	2,2,2	0.25	0
4	ACT	B	904	-	3,3,3	0.95	0	3,3,3	0.78	0
2	ZS3	B	901[B]	-	29,37,37	2.22	8 (27%)	33,54,54	1.88	10 (30%)

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	ZS3	B	901[A]	-	-	0/14/23/23	0/5/5/5
2	ZS3	C	901[B]	-	-	2/14/23/23	0/5/5/5
3	EDO	A	902	-	-	0/1/1/1	-
3	EDO	C	902	-	-	0/1/1/1	-
2	ZS3	C	901[A]	-	-	0/14/23/23	0/5/5/5
3	EDO	B	903	-	-	1/1/1/1	-
3	EDO	C	904	-	-	0/1/1/1	-
3	EDO	A	904	-	-	0/1/1/1	-
2	ZS3	A	901[A]	-	-	0/14/23/23	0/5/5/5
2	ZS3	A	901[B]	-	-	1/14/23/23	0/5/5/5
3	EDO	B	902	-	-	0/1/1/1	-
2	ZS3	B	901[B]	-	-	2/14/23/23	0/5/5/5

All (48) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	901[A]	ZS3	C22-C25	-8.85	1.35	1.50
2	A	901[B]	ZS3	C22-C25	-8.63	1.35	1.50
2	A	901[A]	ZS3	C22-C25	-8.44	1.36	1.50
2	B	901[A]	ZS3	C22-C25	-8.41	1.36	1.50
2	C	901[B]	ZS3	C22-C25	-8.36	1.36	1.50
2	B	901[B]	ZS3	C22-C25	-8.23	1.36	1.50
2	C	901[B]	ZS3	F31-C30	-4.59	1.29	1.40
2	A	901[A]	ZS3	C5-N6	3.91	1.42	1.34
2	A	901[B]	ZS3	C5-N6	3.91	1.42	1.34
2	C	901[A]	ZS3	C5-N6	3.59	1.42	1.34
2	C	901[B]	ZS3	C5-N6	3.59	1.42	1.34
2	B	901[A]	ZS3	C5-N6	3.55	1.42	1.34
2	B	901[B]	ZS3	C5-N6	3.55	1.42	1.34
2	B	901[A]	ZS3	C7-N8	-3.43	1.35	1.42
2	B	901[B]	ZS3	C7-N8	-3.43	1.35	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	901[B]	ZS3	F31-C30	-3.40	1.32	1.40
2	A	901[A]	ZS3	F1-C2	-3.28	1.27	1.35
2	A	901[B]	ZS3	F1-C2	-3.28	1.27	1.35
2	A	901[A]	ZS3	C7-N8	-3.22	1.36	1.42
2	A	901[B]	ZS3	C7-N8	-3.22	1.36	1.42
2	C	901[A]	ZS3	C7-N8	-3.17	1.36	1.42
2	C	901[B]	ZS3	C7-N8	-3.17	1.36	1.42
2	A	901[A]	ZS3	C7-C2	-3.10	1.38	1.42
2	A	901[B]	ZS3	C7-C2	-3.10	1.38	1.42
2	C	901[B]	ZS3	C29-C28	2.67	1.53	1.49
2	B	901[A]	ZS3	C12-C32	-2.67	1.41	1.47
2	B	901[B]	ZS3	C12-C32	-2.67	1.41	1.47
2	A	901[A]	ZS3	C18-N17	2.62	1.49	1.45
2	A	901[B]	ZS3	C18-N17	2.62	1.49	1.45
2	A	901[B]	ZS3	C29-C28	2.58	1.53	1.49
2	C	901[A]	ZS3	C12-C32	-2.55	1.41	1.47
2	C	901[B]	ZS3	C12-C32	-2.55	1.41	1.47
2	B	901[B]	ZS3	C29-C28	2.50	1.52	1.49
2	A	901[A]	ZS3	C12-C32	-2.47	1.41	1.47
2	A	901[B]	ZS3	C12-C32	-2.47	1.41	1.47
2	C	901[A]	ZS3	C7-C2	-2.38	1.39	1.42
2	C	901[B]	ZS3	C7-C2	-2.38	1.39	1.42
2	B	901[A]	ZS3	C18-N17	2.34	1.49	1.45
2	B	901[B]	ZS3	C18-N17	2.34	1.49	1.45
2	B	901[A]	ZS3	C7-C2	-2.30	1.39	1.42
2	B	901[B]	ZS3	C7-C2	-2.30	1.39	1.42
2	C	901[A]	ZS3	C32-N8	-2.16	1.36	1.41
2	C	901[B]	ZS3	C32-N8	-2.16	1.36	1.41
2	B	901[A]	ZS3	C32-N8	-2.11	1.36	1.41
2	B	901[B]	ZS3	C32-N8	-2.11	1.36	1.41
2	A	901[A]	ZS3	C29-C28	2.10	1.52	1.49
2	A	901[A]	ZS3	C32-N8	-2.04	1.36	1.41
2	A	901[B]	ZS3	C32-N8	-2.04	1.36	1.41

All (65) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	901[A]	ZS3	N6-C7-N8	4.31	119.21	114.57
2	A	901[B]	ZS3	N6-C7-N8	4.31	119.21	114.57
2	B	901[A]	ZS3	C14-N24-C23	4.25	121.46	117.59
2	B	901[B]	ZS3	C14-N24-C23	4.25	121.46	117.59
2	C	901[A]	ZS3	C14-N24-C23	4.24	121.45	117.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	901[B]	ZS3	C14-N24-C23	4.24	121.45	117.59
2	B	901[A]	ZS3	C7-N8-C32	3.85	122.42	117.20
2	B	901[B]	ZS3	C7-N8-C32	3.85	122.42	117.20
2	C	901[A]	ZS3	C7-N8-C32	3.78	122.33	117.20
2	C	901[B]	ZS3	C7-N8-C32	3.78	122.33	117.20
2	C	901[A]	ZS3	N13-C14-N24	3.73	124.10	113.52
2	C	901[B]	ZS3	N13-C14-N24	3.73	124.10	113.52
2	C	901[A]	ZS3	C18-N17-C16	-3.67	119.77	123.37
2	C	901[B]	ZS3	C18-N17-C16	-3.67	119.77	123.37
2	B	901[A]	ZS3	N13-C14-N24	3.64	123.85	113.52
2	B	901[B]	ZS3	N13-C14-N24	3.64	123.85	113.52
2	A	901[A]	ZS3	N13-C14-N24	3.62	123.77	113.52
2	A	901[B]	ZS3	N13-C14-N24	3.62	123.77	113.52
2	A	901[A]	ZS3	C30-C28-N27	-3.57	112.11	118.58
2	C	901[A]	ZS3	C32-C12-N13	3.51	115.58	112.34
2	C	901[B]	ZS3	C32-C12-N13	3.51	115.58	112.34
2	A	901[A]	ZS3	C14-N24-C23	3.50	120.77	117.59
2	A	901[B]	ZS3	C14-N24-C23	3.50	120.77	117.59
2	C	901[A]	ZS3	C30-C28-N27	-3.46	112.31	118.58
2	A	901[A]	ZS3	C7-N8-C32	3.29	121.66	117.20
2	A	901[B]	ZS3	C7-N8-C32	3.29	121.66	117.20
2	C	901[A]	ZS3	N6-C7-N8	3.02	117.83	114.57
2	C	901[B]	ZS3	N6-C7-N8	3.02	117.83	114.57
2	C	901[A]	ZS3	C15-C14-N24	-2.86	118.67	123.91
2	C	901[B]	ZS3	C15-C14-N24	-2.86	118.67	123.91
2	A	901[A]	ZS3	C15-C14-N24	-2.85	118.69	123.91
2	A	901[B]	ZS3	C15-C14-N24	-2.85	118.69	123.91
2	B	901[A]	ZS3	C15-C14-N24	-2.75	118.86	123.91
2	B	901[B]	ZS3	C15-C14-N24	-2.75	118.86	123.91
2	B	901[A]	ZS3	N6-C7-N8	2.73	117.51	114.57
2	B	901[B]	ZS3	N6-C7-N8	2.73	117.51	114.57
2	C	901[A]	ZS3	C5-N6-C7	2.54	121.03	115.14
2	C	901[B]	ZS3	C5-N6-C7	2.54	121.03	115.14
2	B	901[B]	ZS3	C30-C28-N27	2.52	123.15	118.58
2	A	901[A]	ZS3	C5-N6-C7	2.49	120.91	115.14
2	A	901[B]	ZS3	C5-N6-C7	2.49	120.91	115.14
2	C	901[A]	ZS3	C4-C5-N6	-2.48	119.38	123.43
2	C	901[B]	ZS3	C4-C5-N6	-2.48	119.38	123.43
2	B	901[A]	ZS3	C4-C5-N6	-2.45	119.43	123.43
2	B	901[B]	ZS3	C4-C5-N6	-2.45	119.43	123.43
2	B	901[A]	ZS3	C5-N6-C7	2.34	120.56	115.14
2	B	901[B]	ZS3	C5-N6-C7	2.34	120.56	115.14

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	901[A]	ZS3	C3-C2-C7	-2.32	120.25	121.73
2	C	901[B]	ZS3	C3-C2-C7	-2.32	120.25	121.73
2	A	901[A]	ZS3	C18-N17-C16	-2.30	121.11	123.37
2	A	901[B]	ZS3	C18-N17-C16	-2.30	121.11	123.37
2	A	901[A]	ZS3	F1-C2-C7	-2.30	117.71	119.92
2	A	901[B]	ZS3	F1-C2-C7	-2.30	117.71	119.92
2	C	901[A]	ZS3	C11-C12-C32	-2.29	118.99	120.30
2	C	901[B]	ZS3	C11-C12-C32	-2.29	118.99	120.30
2	C	901[A]	ZS3	C21-N20-N19	2.17	107.37	103.94
2	C	901[B]	ZS3	C21-N20-N19	2.17	107.37	103.94
2	A	901[A]	ZS3	O33-C32-C12	-2.09	119.85	122.29
2	A	901[B]	ZS3	O33-C32-C12	-2.09	119.85	122.29
2	B	901[A]	ZS3	O33-C32-C12	-2.07	119.89	122.29
2	B	901[B]	ZS3	O33-C32-C12	-2.07	119.89	122.29
2	A	901[A]	ZS3	C32-C12-N13	2.03	114.21	112.34
2	A	901[B]	ZS3	C32-C12-N13	2.03	114.21	112.34
2	B	901[A]	ZS3	C32-C12-N13	2.01	114.19	112.34
2	B	901[B]	ZS3	C32-C12-N13	2.01	114.19	112.34

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	901[B]	ZS3	C21-C22-C25-N27
2	C	901[B]	ZS3	C21-C22-C25-N27
3	B	903	EDO	O1-C1-C2-O2
2	B	901[B]	ZS3	C21-C22-C25-N27
2	B	901[B]	ZS3	C30-C28-N27-C25
2	C	901[B]	ZS3	C30-C28-N27-C25

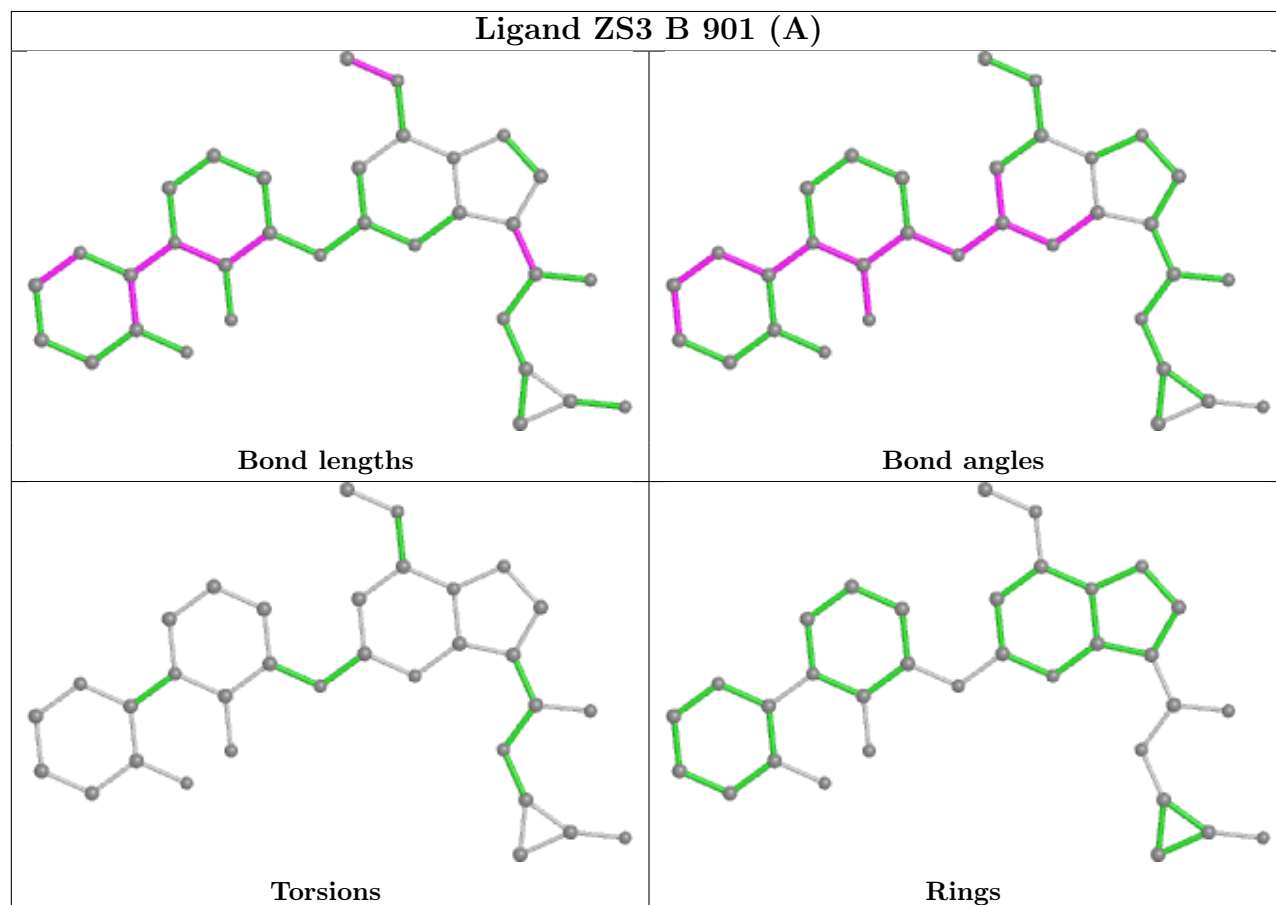
There are no ring outliers.

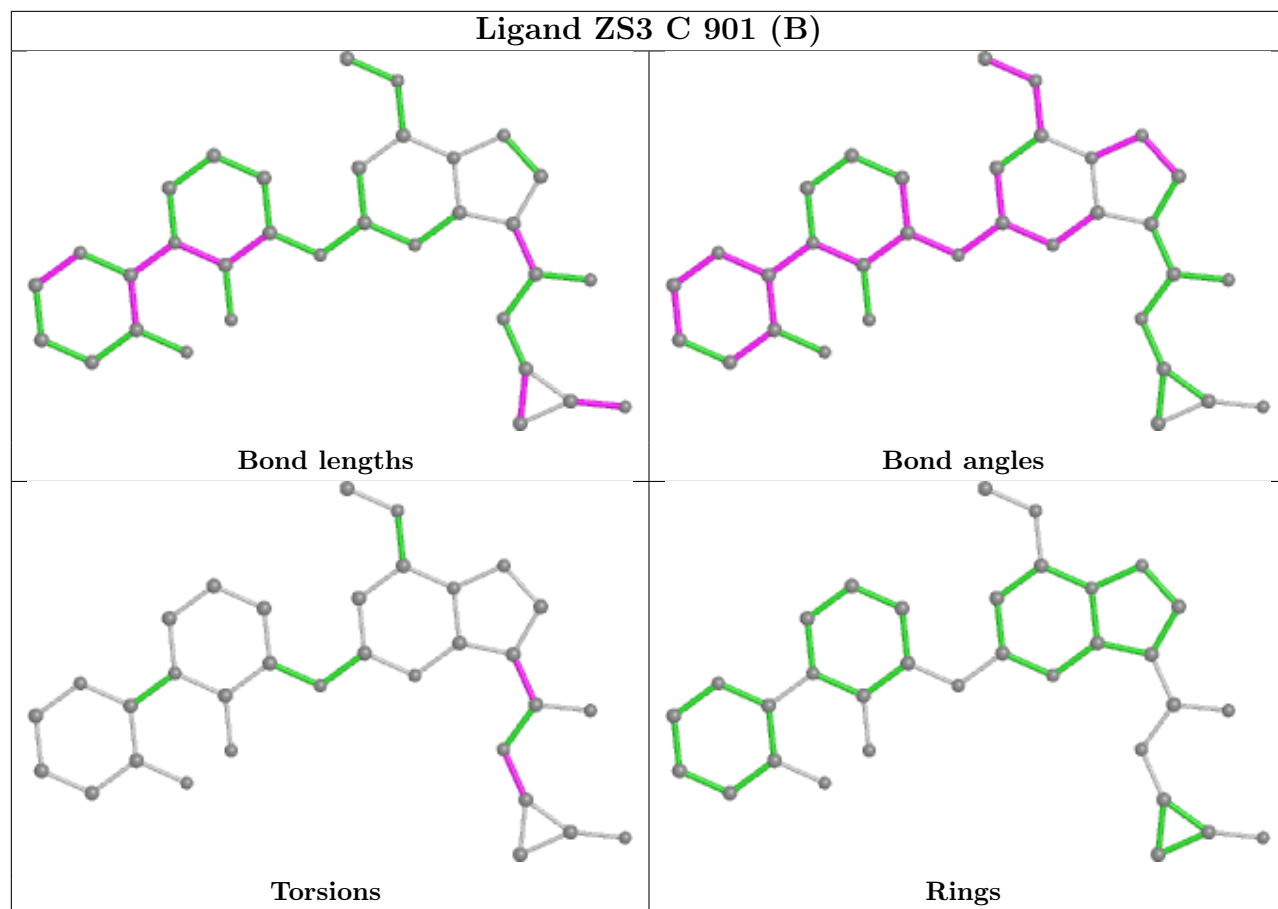
2 monomers are involved in 2 short contacts:

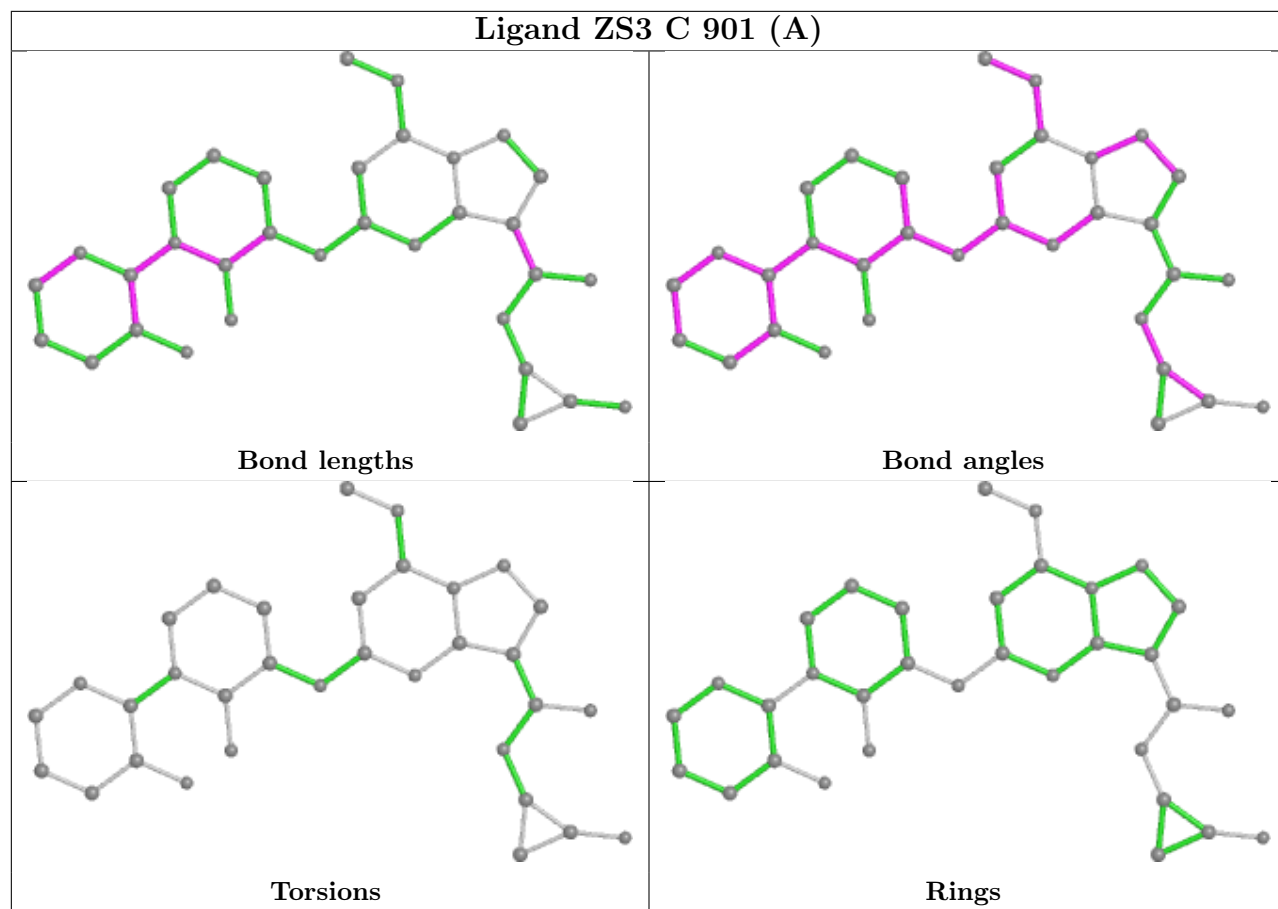
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	901[A]	ZS3	1	0
2	A	901[A]	ZS3	1	0

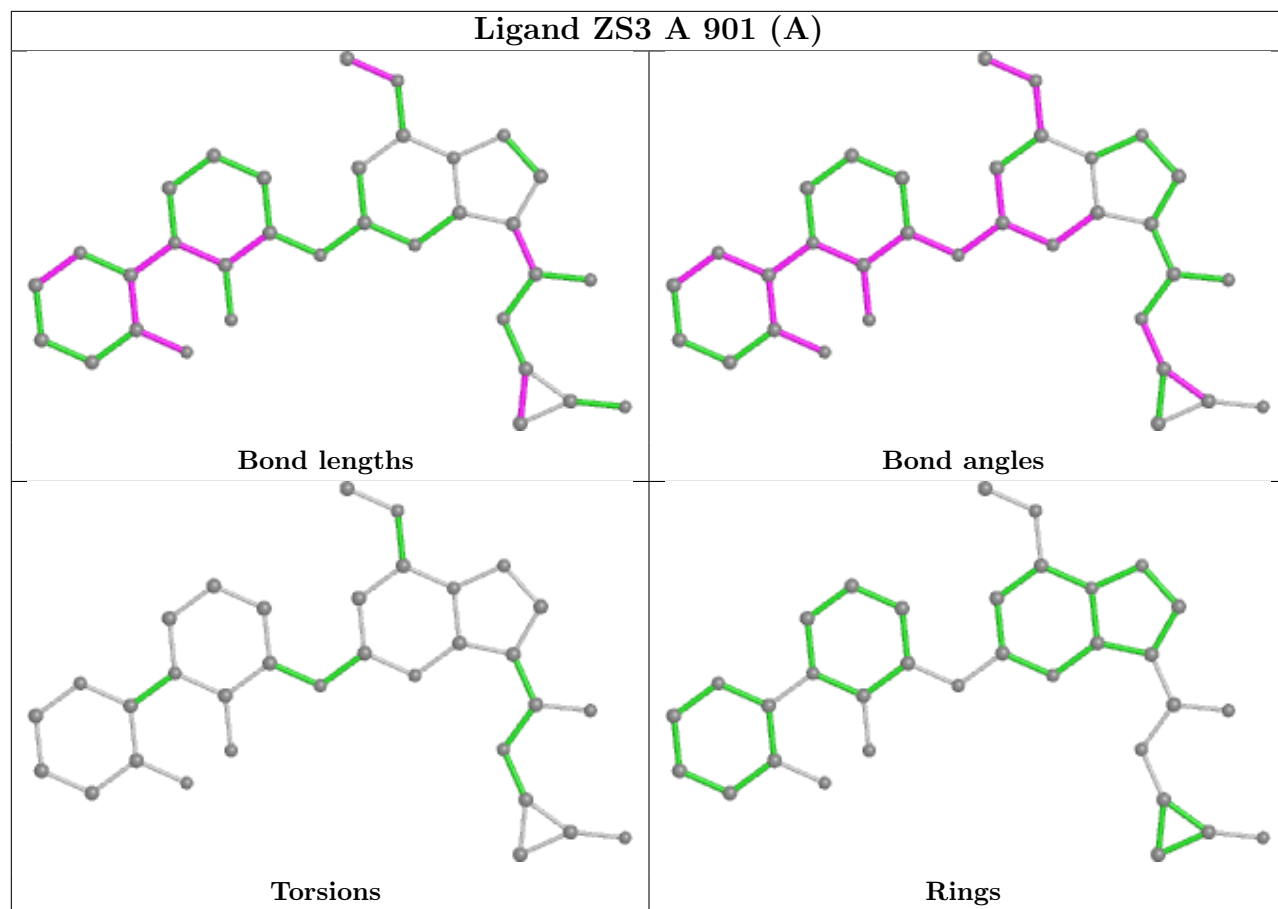
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

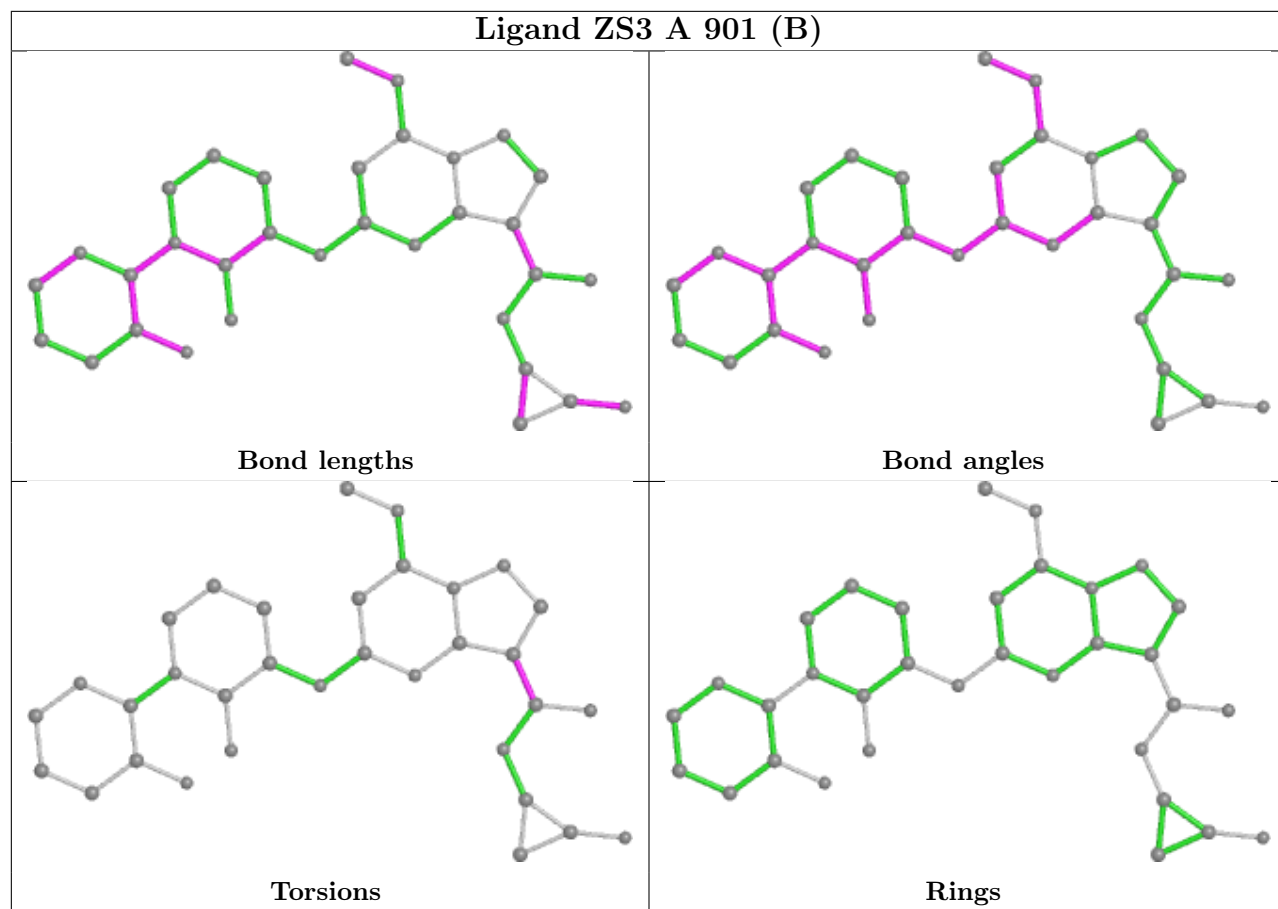
Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD 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.

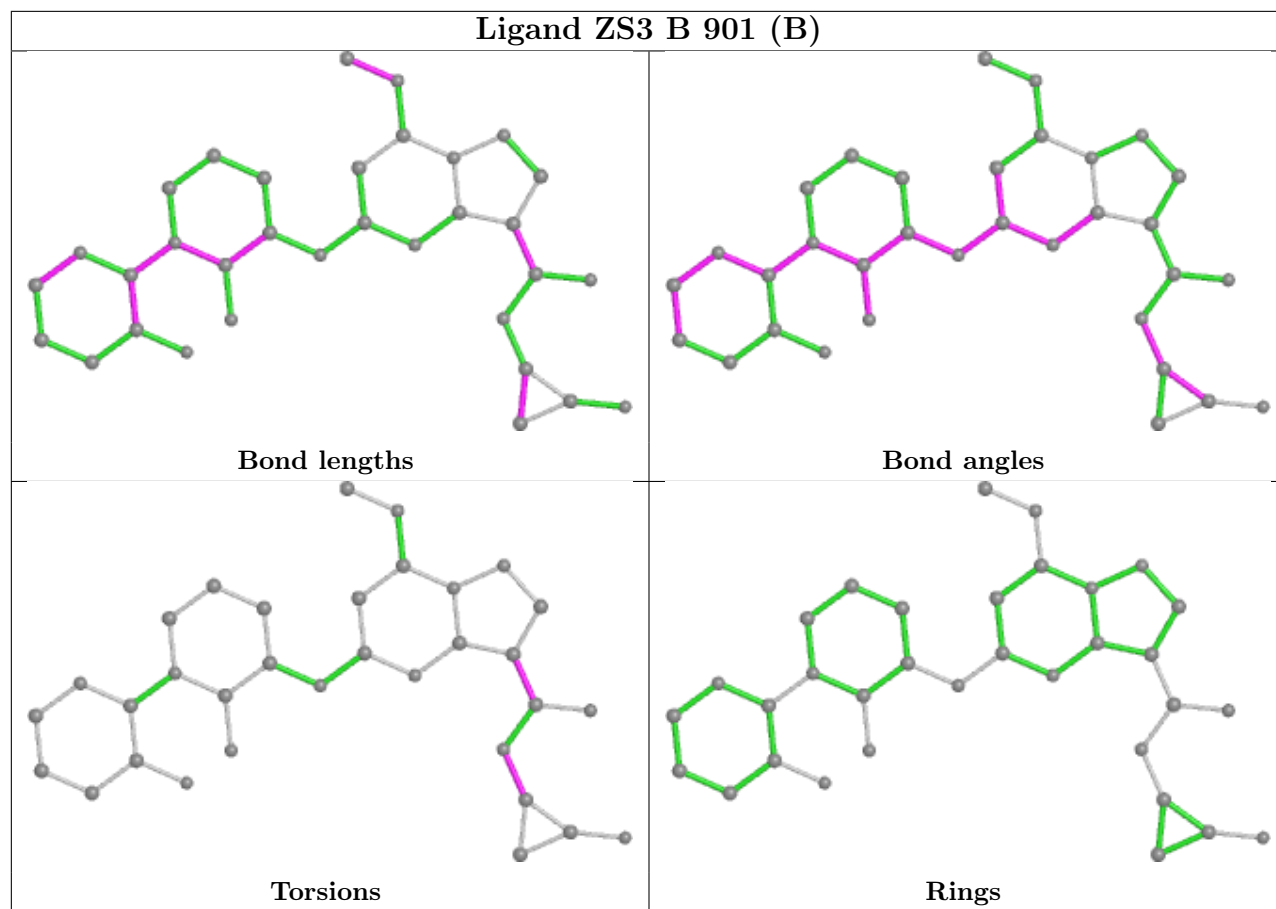












5.7 Other polymers [i](#)

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

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	261/295 (88%)	0.26	13 (4%) 28 32	12, 21, 41, 60	8 (3%)
1	B	261/295 (88%)	0.21	10 (3%) 40 45	12, 22, 37, 53	7 (2%)
1	C	260/295 (88%)	0.17	10 (3%) 40 45	12, 20, 39, 61	10 (3%)
All	All	782/885 (88%)	0.21	33 (4%) 36 40	12, 20, 39, 61	25 (3%)

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	817	SER	9.7
1	B	791	LEU	5.9
1	B	839	PRO	4.6
1	C	840	GLN	4.2
1	A	681	PRO	4.1
1	A	839	PRO	4.1
1	A	610	VAL	4.0
1	B	837	SER	3.7
1	A	816	GLN	3.7
1	A	837	SER	3.6
1	C	839	PRO	3.4
1	A	836	PRO	3.3
1	A	868	ARG	3.0
1	C	791	LEU	3.0
1	A	649	HIS	2.9
1	A	679	ARG	2.8
1	C	833	LEU	2.8
1	C	790	SER	2.6
1	C	816	GLN	2.5
1	A	840	GLN	2.5
1	B	838	CYS	2.5
1	C	838	CYS	2.5
1	C	635	GLN	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	817	SER	2.3
1	B	836	PRO	2.2
1	B	840	GLN	2.2
1	B	648	HIS	2.2
1	B	790	SER	2.2
1	C	867	THR	2.2
1	A	680	GLY	2.1
1	B	610	VAL	2.1
1	C	809	PHE	2.0
1	A	809	PHE	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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

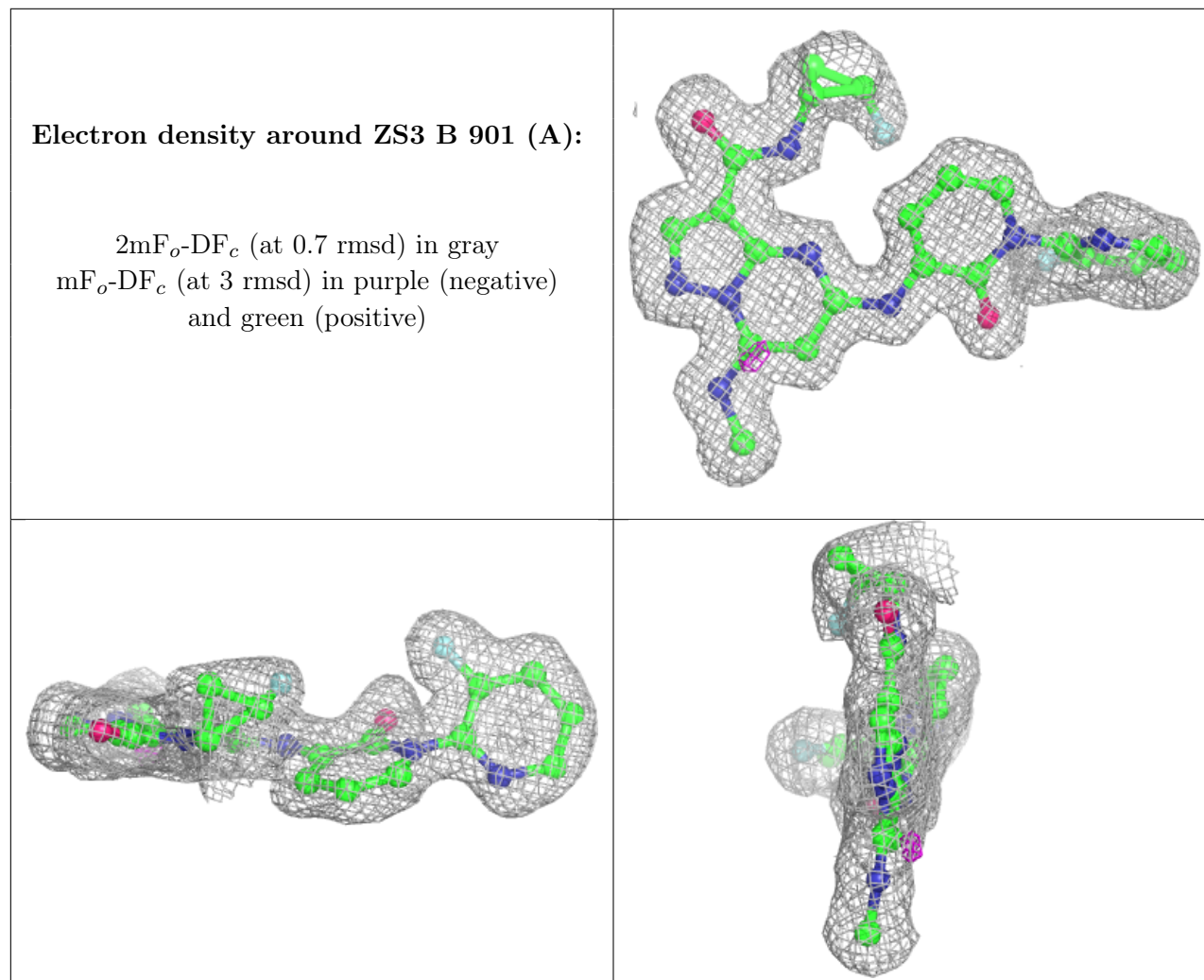
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	ACT	C	903	4/4	0.61	0.26	40,42,42,42	0
4	ACT	B	904	4/4	0.75	0.20	37,38,38,41	0
4	ACT	A	903	4/4	0.78	0.16	34,34,34,36	0
3	EDO	A	902	4/4	0.88	0.12	20,23,23,24	0
3	EDO	A	904	4/4	0.89	0.20	36,37,38,38	0
3	EDO	B	903	4/4	0.90	0.12	26,29,31,33	0
3	EDO	C	902	4/4	0.90	0.19	17,21,22,22	0
3	EDO	C	904	4/4	0.90	0.13	35,35,37,38	0
2	ZS3	B	901[A]	33/33	0.94	0.10	12,15,21,22	7
2	ZS3	B	901[B]	33/33	0.94	0.10	12,13,21,22	7
3	EDO	B	902	4/4	0.94	0.10	20,23,23,23	0
2	ZS3	A	901[B]	33/33	0.95	0.10	12,14,22,23	7
2	ZS3	A	901[A]	33/33	0.95	0.10	12,13,22,23	7

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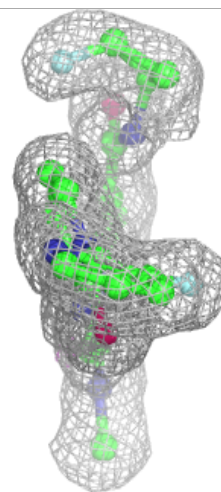
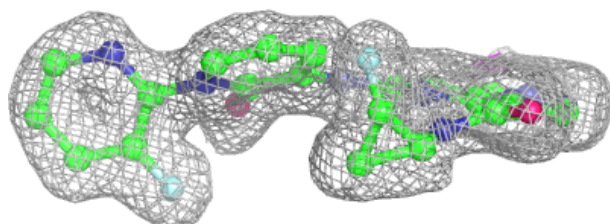
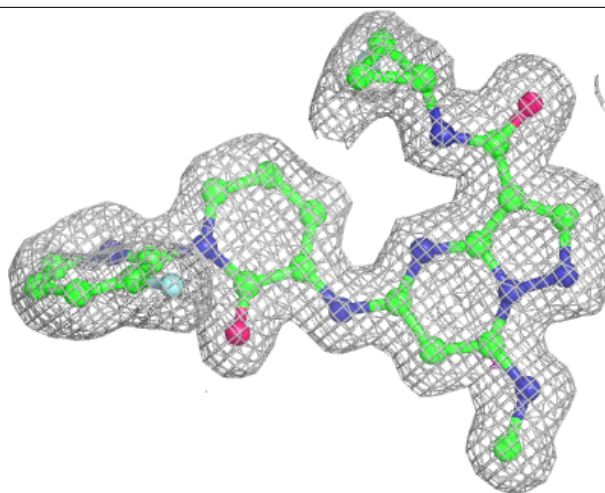
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	ZS3	C	901[B]	33/33	0.96	0.09	12,12,20,20	7
2	ZS3	C	901[A]	33/33	0.96	0.09	12,14,20,20	7

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.



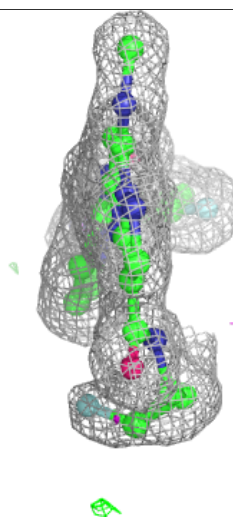
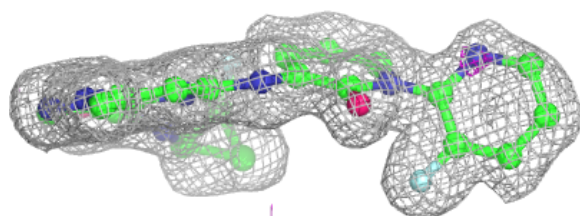
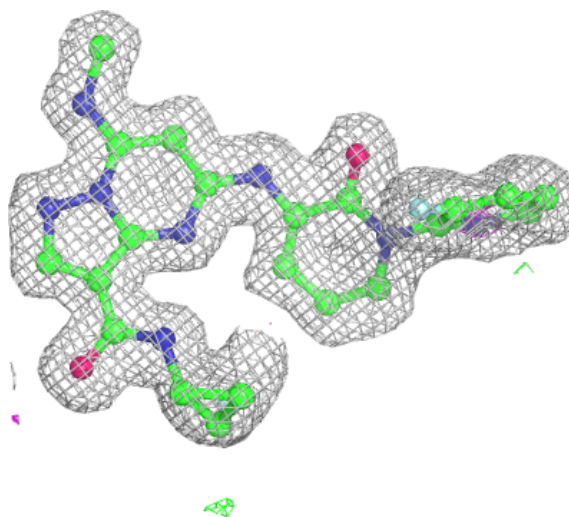
Electron density around ZS3 B 901 (B):

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



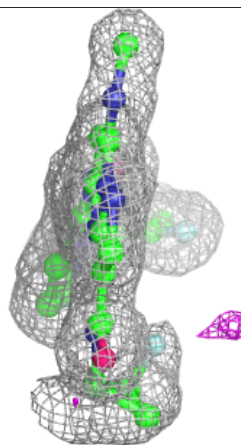
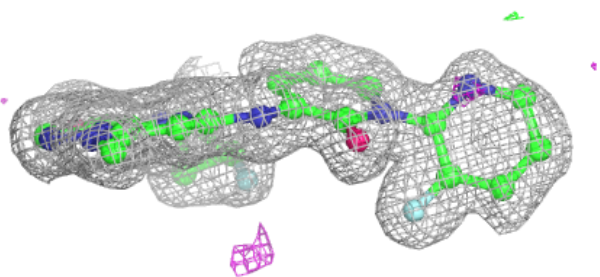
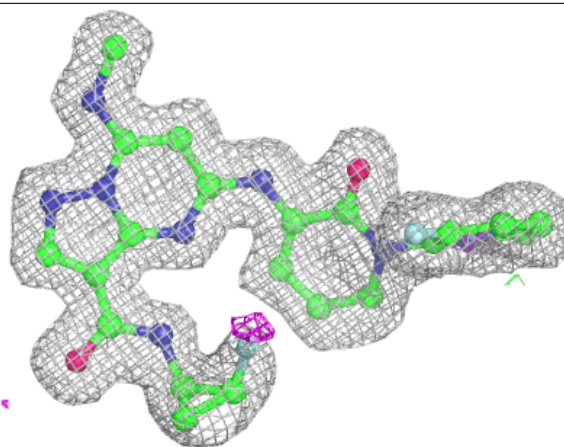
Electron density around ZS3 A 901 (B):

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



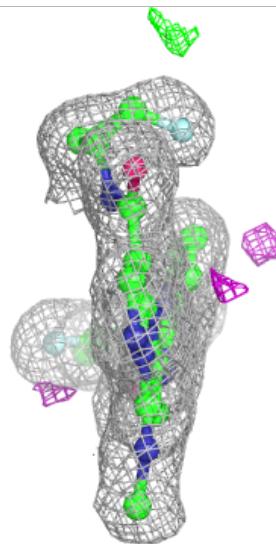
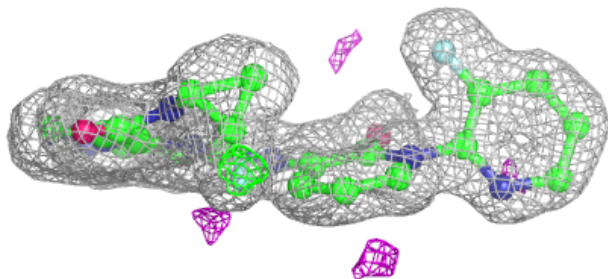
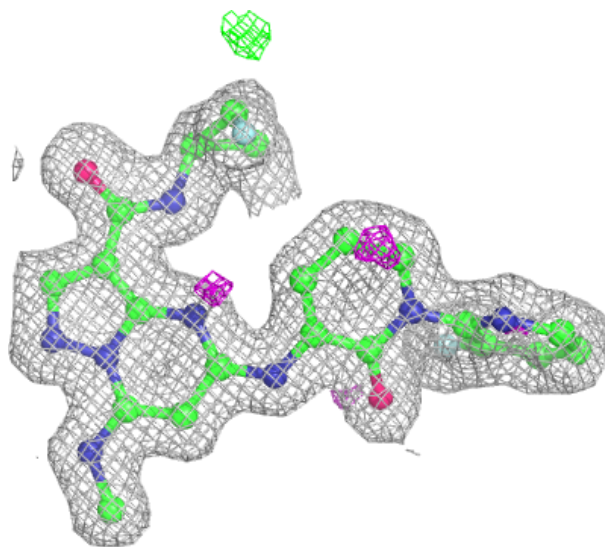
Electron density around ZS3 A 901 (A):

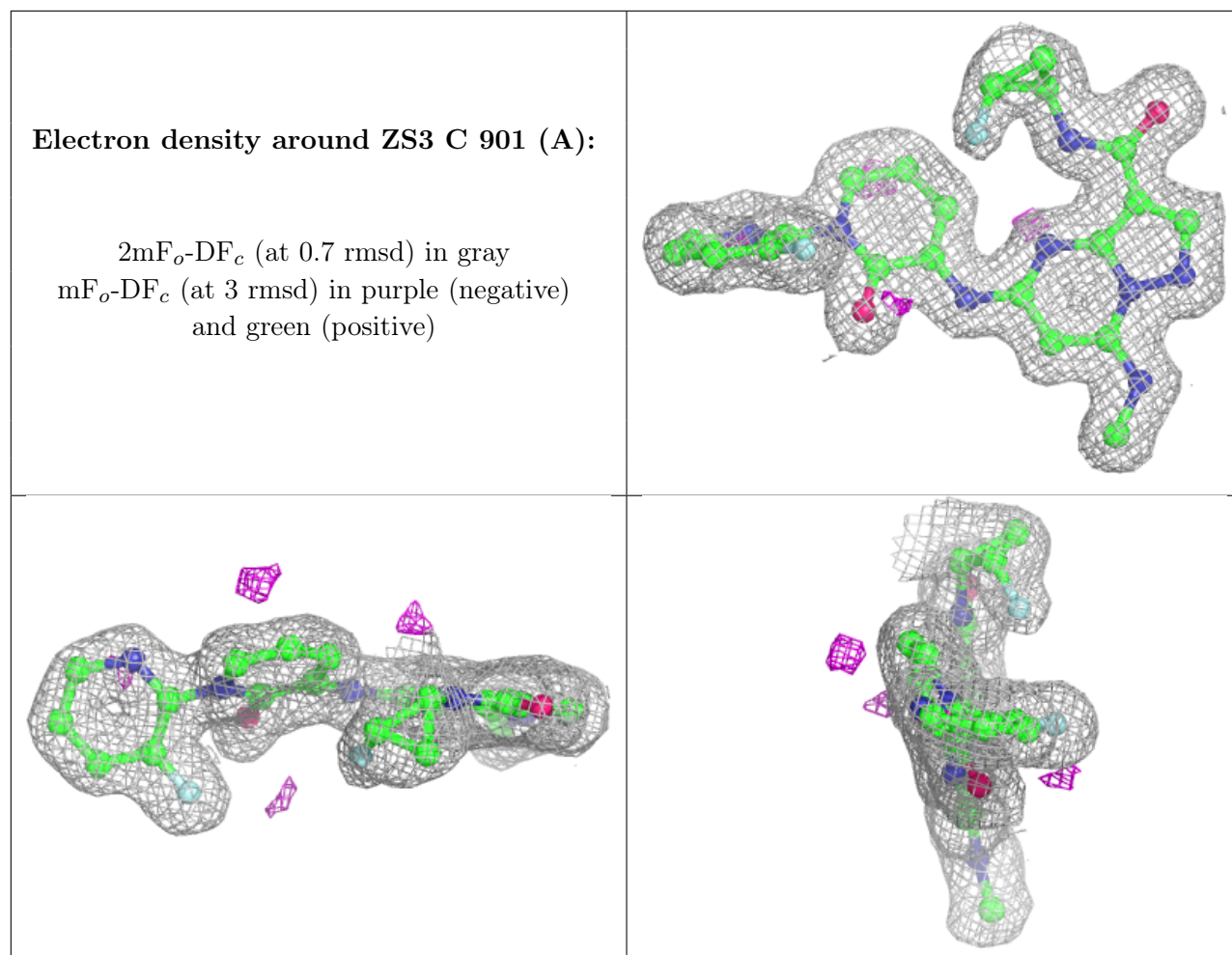
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around ZS3 C 901 (B):

$2mF_o-DF_c$ (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.