



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 26, 2024 – 12:29 PM EDT

PDB ID : 8U07
Title : Imine reductase RedE bound with NADP⁺ and arcyriaflavin A (secondary site)
Authors : Daniel-Ivad, P.; Ryan, K.S.
Deposited on : 2023-08-28
Resolution : 1.63 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 : 2022.3.0, CSD as543be (2022)
Xtrriage (Phenix) : 1.20.1
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.002 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.38.3

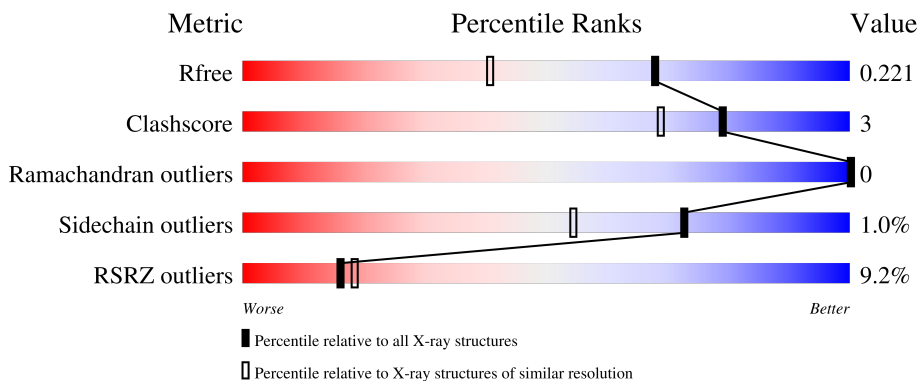
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.63 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}	164625	1015 (1.64-1.64)
Clashscore	180529	1093 (1.64-1.64)
Ramachandran outliers	177936	1077 (1.64-1.64)
Sidechain outliers	177891	1077 (1.64-1.64)
RSRZ outliers	164620	1015 (1.64-1.64)

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	315	
1	B	315	

2 Entry composition i

There are 9 unique types of molecules in this entry. The entry contains 4894 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 RedE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	287	2072	1306	361	394	11	0	1	0
1	B	277	2008	1268	350	379	11	0	1	0

There are 40 discrepancies between the modelled and reference sequences:

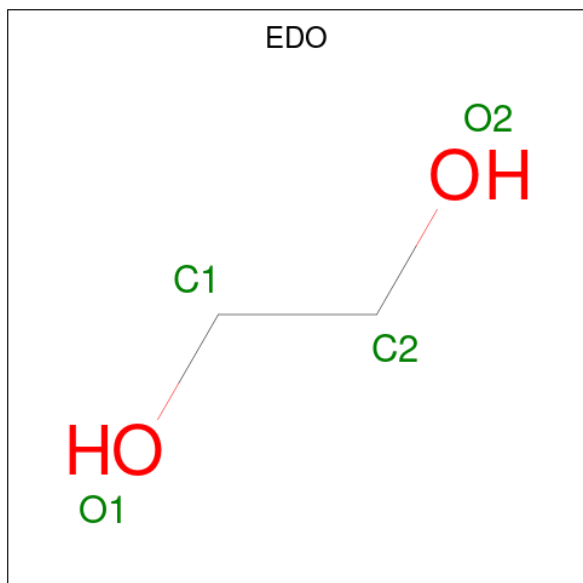
Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP A0A0F7G0Y4
A	-18	GLY	-	expression tag	UNP A0A0F7G0Y4
A	-17	SER	-	expression tag	UNP A0A0F7G0Y4
A	-16	SER	-	expression tag	UNP A0A0F7G0Y4
A	-15	HIS	-	expression tag	UNP A0A0F7G0Y4
A	-14	HIS	-	expression tag	UNP A0A0F7G0Y4
A	-13	HIS	-	expression tag	UNP A0A0F7G0Y4
A	-12	HIS	-	expression tag	UNP A0A0F7G0Y4
A	-11	HIS	-	expression tag	UNP A0A0F7G0Y4
A	-10	HIS	-	expression tag	UNP A0A0F7G0Y4
A	-9	SER	-	expression tag	UNP A0A0F7G0Y4
A	-8	SER	-	expression tag	UNP A0A0F7G0Y4
A	-7	GLY	-	expression tag	UNP A0A0F7G0Y4
A	-6	LEU	-	expression tag	UNP A0A0F7G0Y4
A	-5	VAL	-	expression tag	UNP A0A0F7G0Y4
A	-4	PRO	-	expression tag	UNP A0A0F7G0Y4
A	-3	ARG	-	expression tag	UNP A0A0F7G0Y4
A	-2	GLY	-	expression tag	UNP A0A0F7G0Y4
A	-1	SER	-	expression tag	UNP A0A0F7G0Y4
A	0	HIS	-	expression tag	UNP A0A0F7G0Y4
B	-19	MET	-	initiating methionine	UNP A0A0F7G0Y4
B	-18	GLY	-	expression tag	UNP A0A0F7G0Y4
B	-17	SER	-	expression tag	UNP A0A0F7G0Y4
B	-16	SER	-	expression tag	UNP A0A0F7G0Y4
B	-15	HIS	-	expression tag	UNP A0A0F7G0Y4

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP A0A0F7G0Y4
B	-13	HIS	-	expression tag	UNP A0A0F7G0Y4
B	-12	HIS	-	expression tag	UNP A0A0F7G0Y4
B	-11	HIS	-	expression tag	UNP A0A0F7G0Y4
B	-10	HIS	-	expression tag	UNP A0A0F7G0Y4
B	-9	SER	-	expression tag	UNP A0A0F7G0Y4
B	-8	SER	-	expression tag	UNP A0A0F7G0Y4
B	-7	GLY	-	expression tag	UNP A0A0F7G0Y4
B	-6	LEU	-	expression tag	UNP A0A0F7G0Y4
B	-5	VAL	-	expression tag	UNP A0A0F7G0Y4
B	-4	PRO	-	expression tag	UNP A0A0F7G0Y4
B	-3	ARG	-	expression tag	UNP A0A0F7G0Y4
B	-2	GLY	-	expression tag	UNP A0A0F7G0Y4
B	-1	SER	-	expression tag	UNP A0A0F7G0Y4
B	0	HIS	-	expression tag	UNP A0A0F7G0Y4

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



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

- Molecule 3 is Arcyriaflavin A (three-letter code: A7F) (formula: C₂₀H₁₁N₃O₂) (labeled as "Ligand of Interest" by depositor).

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	B	1	48	21	7	17	3	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	2	Total	Cl	0	0
			2	2		
5	B	5	Total	Cl	0	0
			5	5		

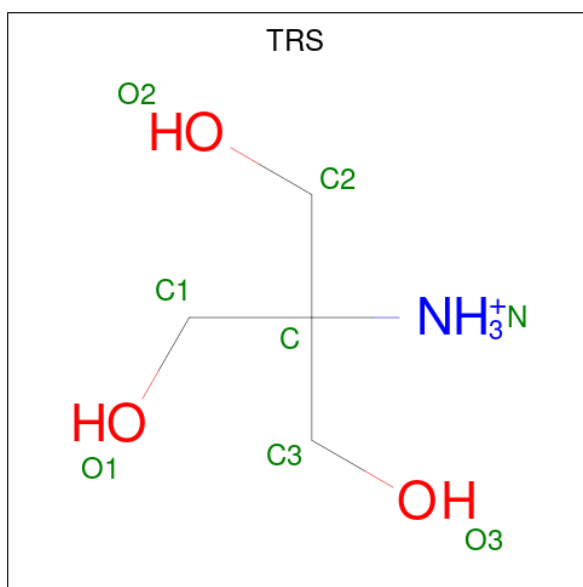
- Molecule 6 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Na	0	0
			1	1		
6	B	1	Total	Na	0	0
			1	1		

- Molecule 7 is IODIDE ION (three-letter code: IOD) (formula: I).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	4	Total	I	0	0
			4	4		
7	B	3	Total	I	0	0
			3	3		

- Molecule 8 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C₄H₁₂NO₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
8	B	1	8	4	1	3	0	0

- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	308	Total	O	0	0
			308	308		
9	B	278	Total	O	0	0
			278	278		

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	54.59Å 111.53Å 67.69Å 90.00° 108.47° 90.00°	Depositor
Resolution (Å)	36.60 – 1.63 36.60 – 1.63	Depositor EDS
% Data completeness (in resolution range)	98.5 (36.60-1.63) 90.2 (36.60-1.63)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.86 (at 1.55Å)	Xtrriage
Refinement program	PHENIX 1.19_4092	Depositor
R, R_{free}	0.194 , 0.221 0.194 , 0.221	Depositor DCC
R_{free} test set	92604 reflections (1.84%)	wwPDB-VP
Wilson B-factor (Å ²)	20.1	Xtrriage
Anisotropy	0.477	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 55.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4894	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.23% 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: A7F, NAP, TRS, NA, CL, IOD, EDO

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	0.33	0/2119	0.54	0/2898
1	B	0.32	0/2053	0.52	0/2808
All	All	0.33	0/4172	0.53	0/5706

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	2072	0	1999	8	0
1	B	2008	0	1941	12	0
2	A	4	0	6	1	0
2	B	4	0	6	1	0
3	A	50	0	0	1	0
3	B	50	0	0	2	0
4	A	48	0	25	2	0
4	B	48	0	25	3	0
5	A	2	0	0	0	0
5	B	5	0	0	1	0
6	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	1	0	0	0	0
7	A	4	0	0	1	0
7	B	3	0	0	0	0
8	B	8	0	12	0	0
9	A	308	0	0	1	0
9	B	278	0	0	5	0
All	All	4894	0	4014	22	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 (22) 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:100:ARG:HH12	2:B:304:EDO:H21	1.52	0.75
4:B:301:NAP:N6A	9:B:402:HOH:O	2.24	0.69
1:B:238:HIS:ND1	9:B:406:HOH:O	2.27	0.66
1:A:97:VAL:HG13	7:A:309:IOD:I	2.66	0.65
1:B:22:LEU:HD11	1:B:46:ALA:HB2	1.85	0.58
1:A:22:LEU:HD11	1:A:46:ALA:HB2	1.87	0.57
1:A:74:GLU:OE1	4:A:303:NAP:N6A	2.38	0.57
1:B:127:LYS:NZ	9:B:410:HOH:O	2.39	0.56
1:B:10:LEU:HB2	1:B:32:ASN:HB2	1.88	0.56
1:B:2:GLY:N	9:B:411:HOH:O	2.40	0.54
2:A:301:EDO:H22	1:B:289:ARG:HB2	1.91	0.53
1:A:13:MET:N	4:A:303:NAP:O2N	2.25	0.52
1:B:122:PRO:HD3	4:B:301:NAP:O7N	2.11	0.49
3:A:302[B]:A7F:C16	1:B:239:LEU:HD21	2.44	0.48
1:A:209:ARG:NH1	9:A:404:HOH:O	2.28	0.48
1:B:289:ARG:NH1	5:B:309:CL:CL	2.81	0.48
1:A:221:TYR:HB3	1:A:282:ALA:HB2	2.00	0.44
1:B:157:LEU:HD13	1:B:167:TYR:CD2	2.53	0.44
1:A:239:LEU:HD21	3:B:302[B]:A7F:C17	2.48	0.43
4:B:301:NAP:H6N	9:B:524:HOH:O	2.18	0.43
1:B:168:ASP:OD2	3:B:302[B]:A7F:N03	2.51	0.42
1:A:51:SER:OG	1:A:54:GLU:HG3	2.22	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	286/315 (91%)	280 (98%)	6 (2%)	0	100	100
1	B	274/315 (87%)	269 (98%)	5 (2%)	0	100	100
All	All	560/630 (89%)	549 (98%)	11 (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	201/231 (87%)	198 (98%)	3 (2%)	60	35
1	B	196/231 (85%)	195 (100%)	1 (0%)	86	78
All	All	397/462 (86%)	393 (99%)	4 (1%)	73	54

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	97	VAL
1	A	235	PHE
1	A	254	ARG
1	B	235	PHE

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 25 ligands modelled in this entry, 16 are monoatomic - leaving 9 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
3	A7F	A	302[A]	-	26,30,30	5.17	19 (73%)	31,47,47	1.83	7 (22%)
3	A7F	B	302[A]	-	26,30,30	5.18	17 (65%)	31,47,47	1.75	6 (19%)
4	NAP	B	301	-	46,52,52	1.33	4 (8%)	61,80,80	1.63	11 (18%)
2	EDO	A	301	-	3,3,3	0.40	0	2,2,2	0.43	0
8	TRS	B	303	-	7,7,7	0.26	0	9,9,9	0.42	0
2	EDO	B	304	-	3,3,3	0.46	0	2,2,2	0.24	0
4	NAP	A	303	-	46,52,52	1.28	4 (8%)	61,80,80	1.54	13 (21%)
3	A7F	A	302[B]	-	26,30,30	5.19	17 (65%)	31,47,47	1.73	6 (19%)
3	A7F	B	302[B]	-	26,30,30	5.21	18 (69%)	31,47,47	1.77	7 (22%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	A7F	A	302[A]	-	-	-	0/6/6/6
3	A7F	B	302[A]	-	-	-	0/6/6/6
4	NAP	B	301	-	-	11/31/67/67	0/5/5/5
2	EDO	A	301	-	-	0/1/1/1	-
8	TRS	B	303	-	-	0/9/9/9	-
2	EDO	B	304	-	-	1/1/1/1	-
4	NAP	A	303	-	-	11/31/67/67	0/5/5/5
3	A7F	A	302[B]	-	-	-	0/6/6/6
3	A7F	B	302[B]	-	-	-	0/6/6/6

All (79) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	302[B]	A7F	C20-C15	9.24	1.57	1.41
3	B	302[B]	A7F	C21-C14	9.22	1.57	1.41
3	A	302[B]	A7F	C20-C15	9.19	1.57	1.41
3	B	302[A]	A7F	C21-C14	9.13	1.57	1.41
3	A	302[B]	A7F	C21-C14	9.11	1.57	1.41
3	A	302[A]	A7F	C20-C15	9.05	1.57	1.41
3	A	302[A]	A7F	C21-C14	8.88	1.56	1.41
3	B	302[A]	A7F	C20-C15	8.83	1.56	1.41
3	B	302[B]	A7F	C19-C13	8.03	1.57	1.41
3	A	302[B]	A7F	C18-C12	7.98	1.57	1.41
3	A	302[A]	A7F	C19-C13	7.96	1.57	1.41
3	B	302[A]	A7F	C19-C13	7.95	1.57	1.41
3	B	302[B]	A7F	C18-C12	7.93	1.57	1.41
3	A	302[A]	A7F	C18-C12	7.86	1.57	1.41
3	A	302[B]	A7F	C19-C13	7.85	1.57	1.41
3	B	302[A]	A7F	C18-C12	7.79	1.56	1.41
3	A	302[B]	A7F	C24-C21	7.10	1.51	1.36
3	A	302[A]	A7F	C22-C18	7.01	1.51	1.36
3	B	302[B]	A7F	C25-C20	7.00	1.51	1.36
3	A	302[B]	A7F	C23-C19	6.97	1.51	1.36
3	B	302[B]	A7F	C22-C18	6.96	1.51	1.36
3	B	302[A]	A7F	C23-C19	6.92	1.51	1.36
3	A	302[A]	A7F	C25-C20	6.92	1.51	1.36
3	B	302[B]	A7F	C24-C21	6.91	1.51	1.36
3	B	302[A]	A7F	C25-C20	6.88	1.51	1.36
3	B	302[A]	A7F	C24-C21	6.82	1.50	1.36
3	A	302[B]	A7F	C22-C18	6.79	1.50	1.36
3	B	302[B]	A7F	C23-C19	6.76	1.50	1.36
3	A	302[B]	A7F	C25-C20	6.76	1.50	1.36
3	B	302[A]	A7F	C22-C18	6.68	1.50	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	302[A]	A7F	C24-C21	6.61	1.50	1.36
3	A	302[A]	A7F	C23-C19	6.58	1.50	1.36
3	B	302[A]	A7F	C10-C06	6.06	1.54	1.43
3	A	302[A]	A7F	C11-C07	5.69	1.53	1.43
3	A	302[B]	A7F	C11-C07	5.54	1.53	1.43
3	B	302[B]	A7F	C11-C07	5.50	1.53	1.43
3	A	302[A]	A7F	C10-C06	5.50	1.53	1.43
3	A	302[A]	A7F	C24-C23	5.45	1.50	1.38
3	B	302[B]	A7F	C10-C06	5.45	1.53	1.43
3	A	302[B]	A7F	C10-C06	5.45	1.53	1.43
3	B	302[A]	A7F	C17-N05	5.45	1.47	1.38
3	A	302[A]	A7F	C16-N05	5.42	1.47	1.38
3	B	302[A]	A7F	C11-C07	5.41	1.53	1.43
3	B	302[B]	A7F	C17-N05	5.40	1.46	1.38
3	B	302[A]	A7F	C16-N05	5.38	1.46	1.38
3	B	302[A]	A7F	C24-C23	5.36	1.50	1.38
3	B	302[B]	A7F	C16-N05	5.36	1.46	1.38
3	A	302[B]	A7F	C16-N05	5.36	1.46	1.38
3	A	302[A]	A7F	C17-N05	5.34	1.46	1.38
3	A	302[B]	A7F	C17-N05	5.33	1.46	1.38
3	A	302[A]	A7F	C25-C22	5.20	1.49	1.38
3	B	302[B]	A7F	C25-C22	5.19	1.49	1.38
3	A	302[B]	A7F	C24-C23	5.13	1.49	1.38
3	A	302[B]	A7F	C25-C22	5.13	1.49	1.38
3	B	302[A]	A7F	C25-C22	5.10	1.49	1.38
3	B	302[B]	A7F	C24-C23	5.08	1.49	1.38
3	B	302[A]	A7F	C10-C16	3.65	1.55	1.49
3	B	302[B]	A7F	C09-C08	3.49	1.53	1.43
4	B	301	NAP	O4B-C1B	3.46	1.45	1.40
4	B	301	NAP	C2N-N1N	-3.41	1.31	1.35
4	A	303	NAP	O4B-C1B	3.31	1.45	1.40
3	A	302[B]	A7F	C09-C08	3.27	1.52	1.43
3	A	302[B]	A7F	C11-C17	3.26	1.54	1.49
3	A	302[A]	A7F	C10-C16	3.18	1.54	1.49
3	A	302[A]	A7F	C09-C08	3.14	1.52	1.43
3	B	302[A]	A7F	C11-C17	3.14	1.54	1.49
3	B	302[B]	A7F	C10-C16	3.09	1.54	1.49
3	A	302[A]	A7F	C11-C17	3.04	1.54	1.49
4	A	303	NAP	O4D-C1D	3.01	1.44	1.40
3	B	302[A]	A7F	C09-C08	3.01	1.52	1.43
4	A	303	NAP	C2N-N1N	-2.97	1.31	1.35
3	A	302[B]	A7F	C10-C16	2.96	1.54	1.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	301	NAP	O4D-C1D	2.91	1.44	1.40
3	B	302[B]	A7F	C11-C17	2.71	1.53	1.49
4	B	301	NAP	C8A-N7A	-2.41	1.30	1.34
4	A	303	NAP	C8A-N7A	-2.30	1.30	1.34
3	A	302[A]	A7F	O02-C17	-2.09	1.18	1.23
3	A	302[A]	A7F	C12-C06	-2.03	1.38	1.45
3	B	302[B]	A7F	O02-C17	-2.00	1.18	1.23

All (50) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	303	NAP	P2B-O2B-C2B	-5.84	107.83	123.43
3	A	302[A]	A7F	C17-N05-C16	-5.62	107.70	112.59
3	B	302[B]	A7F	C17-N05-C16	-5.55	107.77	112.59
4	B	301	NAP	P2B-O2B-C2B	-5.47	108.83	123.43
3	A	302[B]	A7F	C17-N05-C16	-5.31	107.98	112.59
3	B	302[A]	A7F	C17-N05-C16	-5.16	108.11	112.59
4	B	301	NAP	N3A-C2A-N1A	-4.52	122.53	128.67
3	B	302[A]	A7F	C11-C10-C06	-4.48	118.99	122.48
4	A	303	NAP	N3A-C2A-N1A	-4.32	122.81	128.67
3	A	302[B]	A7F	C10-C11-C07	-4.25	119.17	122.48
3	A	302[A]	A7F	C10-C11-C07	-3.92	119.43	122.48
3	B	302[B]	A7F	C11-C10-C06	-3.79	119.53	122.48
4	B	301	NAP	C4B-O4B-C1B	-3.78	106.46	109.92
3	A	302[A]	A7F	C11-C10-C06	-3.72	119.58	122.48
4	B	301	NAP	O4B-C1B-C2B	-3.64	100.40	106.61
4	B	301	NAP	O4B-C1B-N9A	3.42	113.28	108.75
3	B	302[A]	A7F	C10-C11-C07	-3.35	119.87	122.48
4	A	303	NAP	O4B-C1B-C2B	-3.18	101.18	106.61
4	A	303	NAP	C4B-O4B-C1B	-3.11	107.08	109.92
3	B	302[B]	A7F	C10-C11-C07	-3.08	120.08	122.48
4	B	301	NAP	PA-O5B-C5B	-3.04	103.92	121.35
3	A	302[A]	A7F	C11-C17-N05	2.99	108.45	105.83
3	A	302[B]	A7F	C11-C10-C06	-2.99	120.16	122.48
4	A	303	NAP	PA-O5B-C5B	-2.97	104.32	121.35
4	B	301	NAP	C3B-C2B-C1B	-2.95	97.15	102.81
3	B	302[B]	A7F	C11-C17-N05	2.86	108.34	105.83
4	A	303	NAP	C3B-C2B-C1B	-2.83	97.38	102.81
4	B	301	NAP	C4D-O4D-C1D	-2.73	107.42	109.92
4	B	301	NAP	PN-O5D-C5D	-2.71	105.83	121.35
3	B	302[B]	A7F	O02-C17-C11	-2.67	125.29	129.10
3	A	302[B]	A7F	C10-C16-N05	2.55	108.06	105.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	302[A]	A7F	C10-C16-N05	2.53	108.04	105.83
3	A	302[B]	A7F	C11-C17-N05	2.48	108.00	105.83
3	A	302[A]	A7F	C10-C16-N05	2.48	108.00	105.83
4	A	303	NAP	O4B-C1B-N9A	2.46	112.01	108.75
3	B	302[A]	A7F	C11-C17-N05	2.44	107.96	105.83
3	A	302[B]	A7F	O01-C16-C10	-2.43	125.64	129.10
4	A	303	NAP	PN-O5D-C5D	-2.43	107.44	121.35
3	B	302[B]	A7F	C10-C16-N05	2.39	107.92	105.83
4	A	303	NAP	C4D-O4D-C1D	-2.27	107.85	109.92
4	A	303	NAP	C3N-C7N-N7N	2.24	120.50	117.74
3	B	302[B]	A7F	O01-C16-C10	-2.21	125.95	129.10
4	A	303	NAP	C4A-C5A-N7A	-2.13	107.09	109.34
3	B	302[A]	A7F	C06-C12-C15	2.13	108.39	106.09
4	B	301	NAP	C5B-C4B-C3B	-2.09	107.68	115.21
4	A	303	NAP	C5B-C4B-C3B	-2.06	107.79	115.21
3	A	302[A]	A7F	C19-C13-C14	2.03	120.86	118.17
3	A	302[A]	A7F	O01-C16-C10	-2.02	126.22	129.10
4	A	303	NAP	O7N-C7N-N7N	-2.02	119.70	122.62
4	B	301	NAP	C4A-C5A-N7A	-2.01	107.22	109.34

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	303	NAP	C5B-O5B-PA-O1A
4	A	303	NAP	C5D-O5D-PN-O2N
4	A	303	NAP	O4D-C1D-N1N-C2N
4	B	301	NAP	C5D-O5D-PN-O3
4	B	301	NAP	C5D-O5D-PN-O1N
4	B	301	NAP	C5D-O5D-PN-O2N
4	B	301	NAP	O4D-C1D-N1N-C2N
4	B	301	NAP	O4B-C4B-C5B-O5B
4	B	301	NAP	C3B-C4B-C5B-O5B
4	B	301	NAP	O4D-C4D-C5D-O5D
4	A	303	NAP	C3B-C4B-C5B-O5B
2	B	304	EDO	O1-C1-C2-O2
4	A	303	NAP	O4B-C4B-C5B-O5B
4	B	301	NAP	C3D-C4D-C5D-O5D
4	A	303	NAP	C5D-O5D-PN-O3
4	A	303	NAP	C5D-O5D-PN-O1N
4	A	303	NAP	C2D-C1D-N1N-C2N
4	A	303	NAP	C2D-C1D-N1N-C6N

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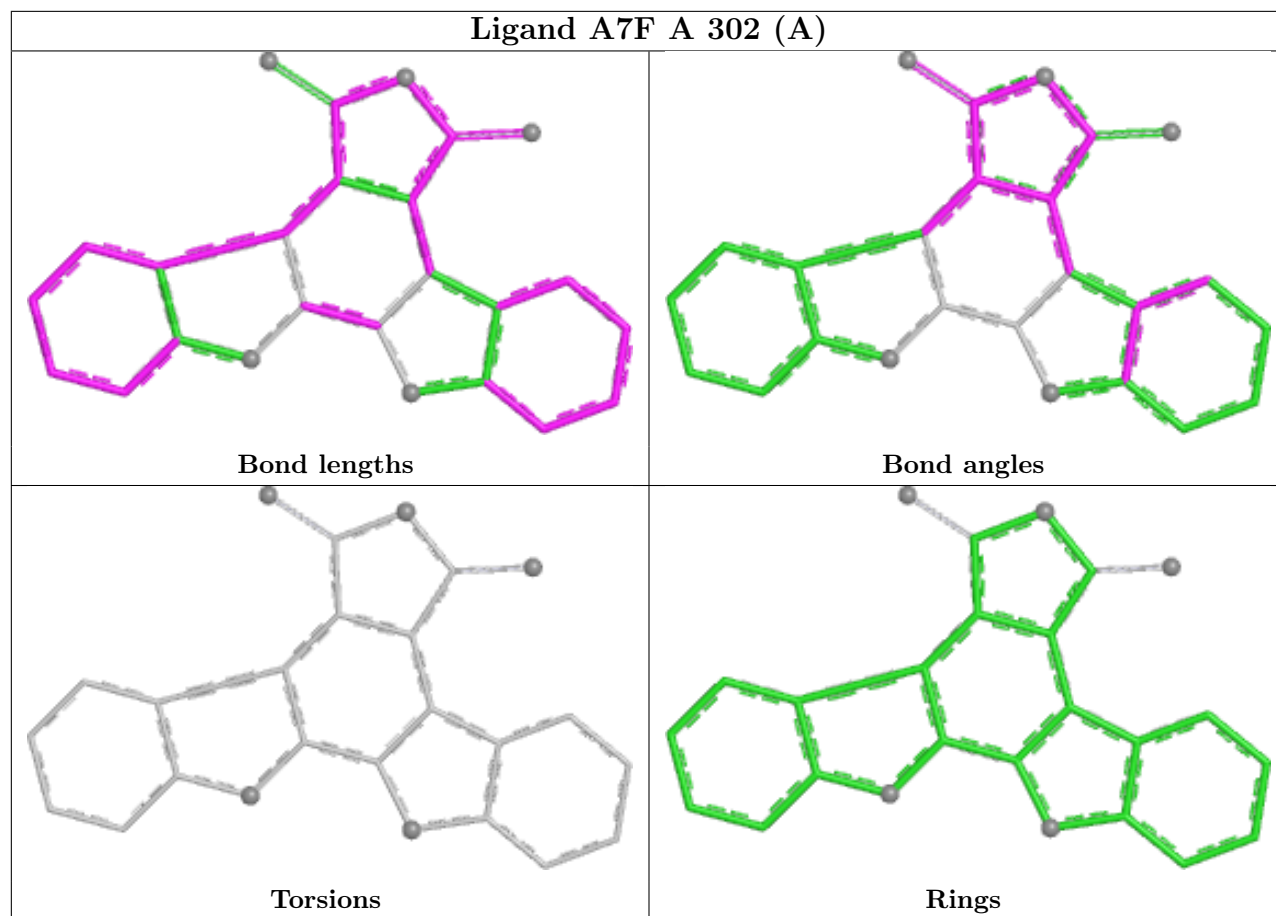
Mol	Chain	Res	Type	Atoms
4	B	301	NAP	C2D-C1D-N1N-C6N
4	A	303	NAP	O4D-C1D-N1N-C6N
4	B	301	NAP	O4D-C1D-N1N-C6N
4	B	301	NAP	C4B-C5B-O5B-PA
4	A	303	NAP	PA-O3-PN-O2N

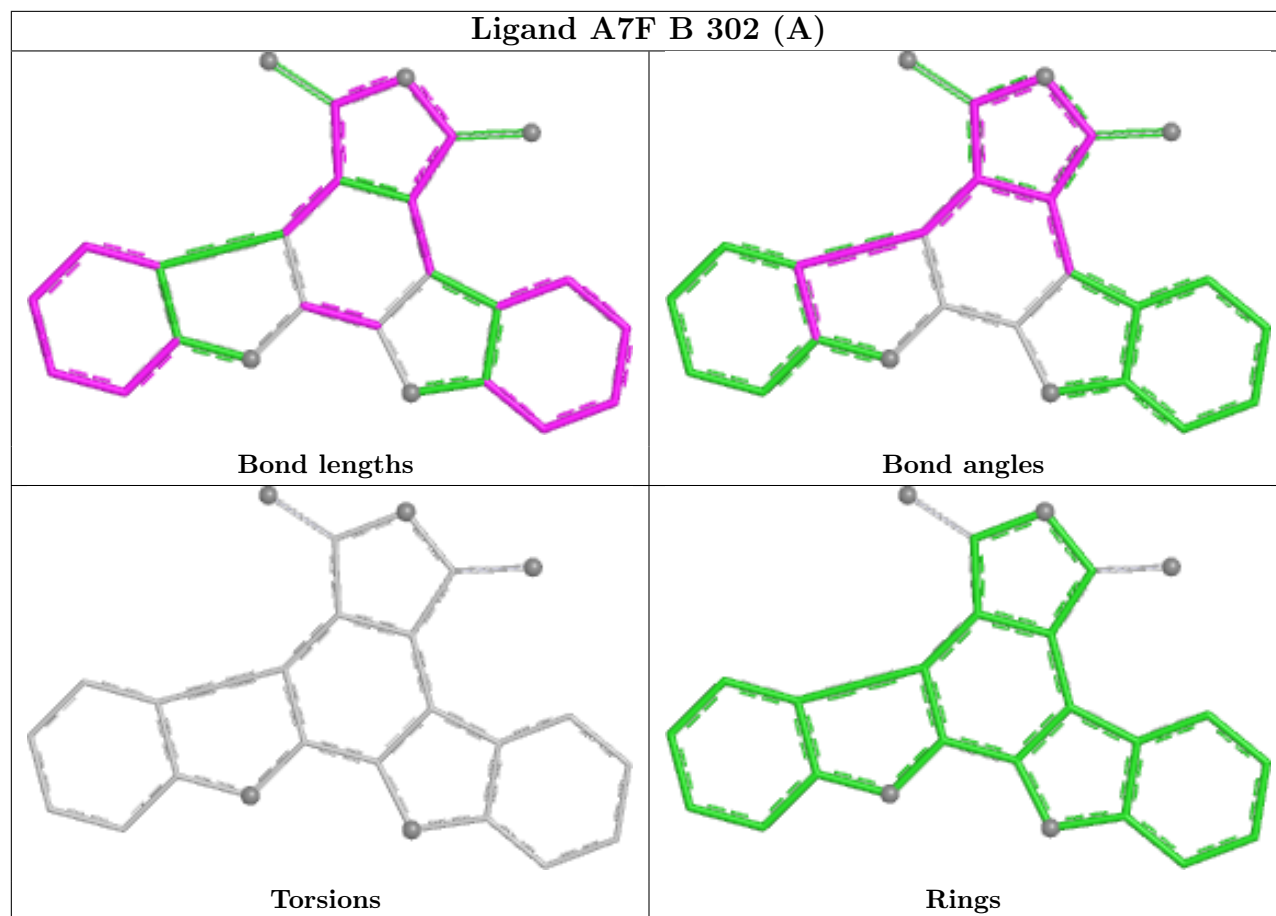
There are no ring outliers.

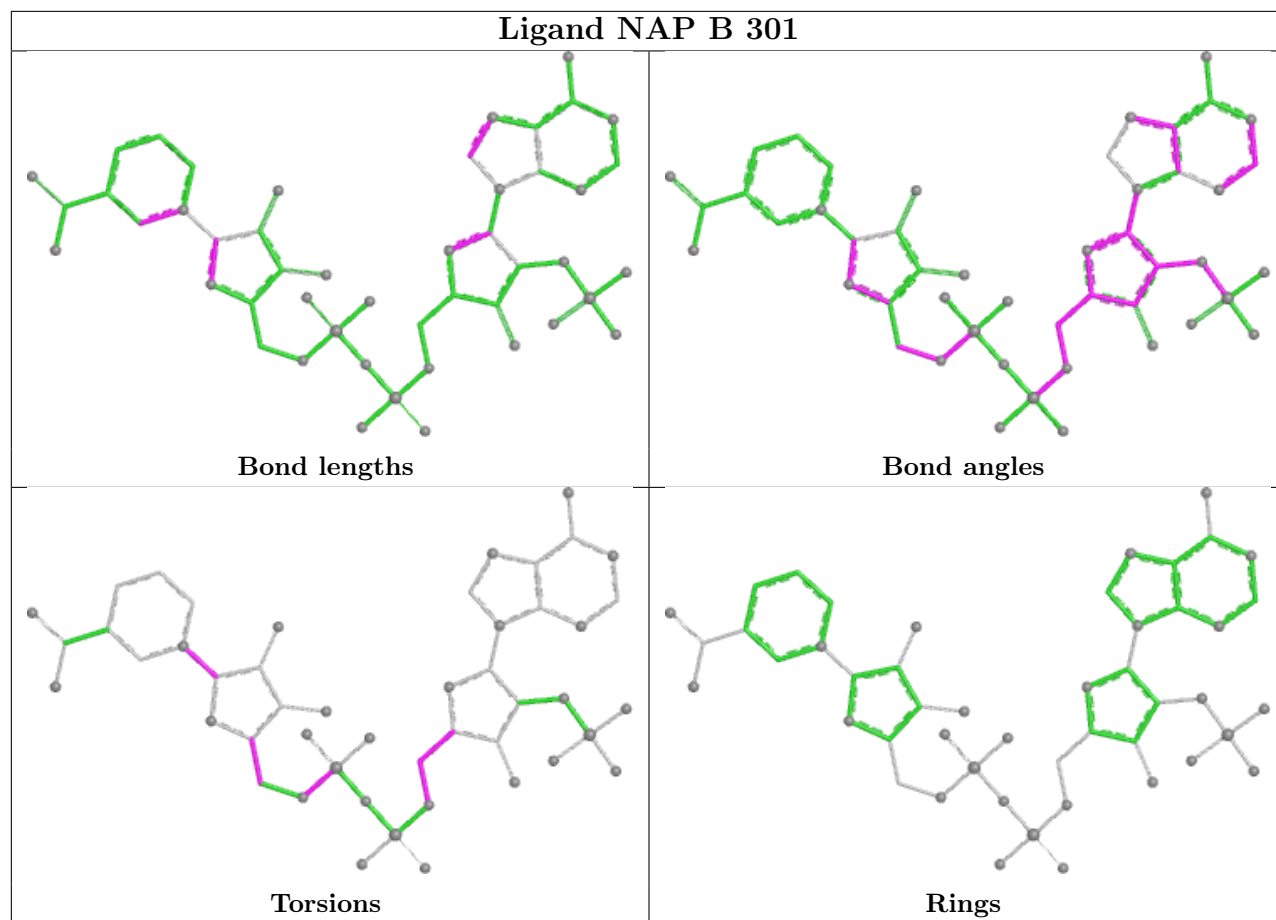
6 monomers are involved in 10 short contacts:

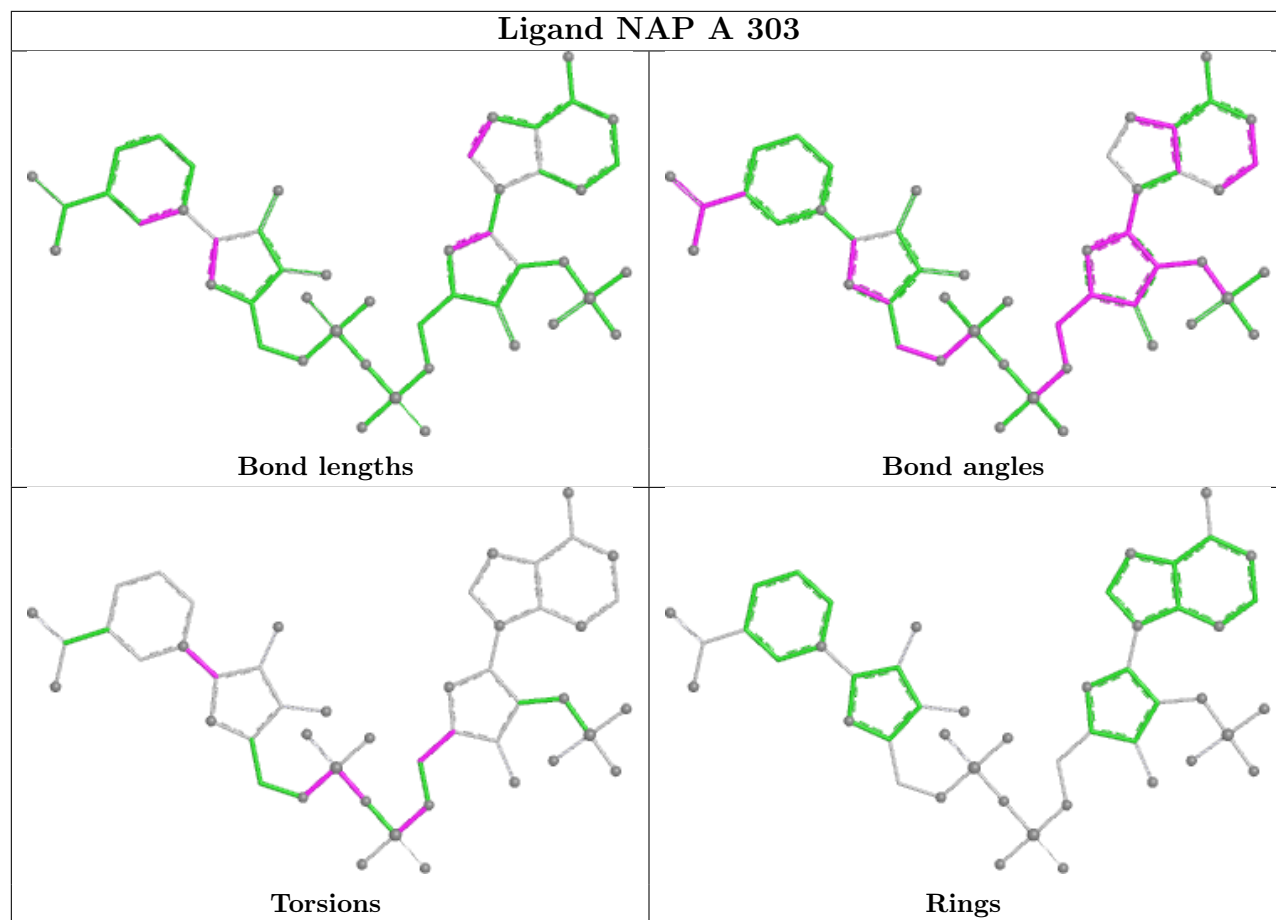
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	301	NAP	3	0
2	A	301	EDO	1	0
2	B	304	EDO	1	0
4	A	303	NAP	2	0
3	A	302[B]	A7F	1	0
3	B	302[B]	A7F	2	0

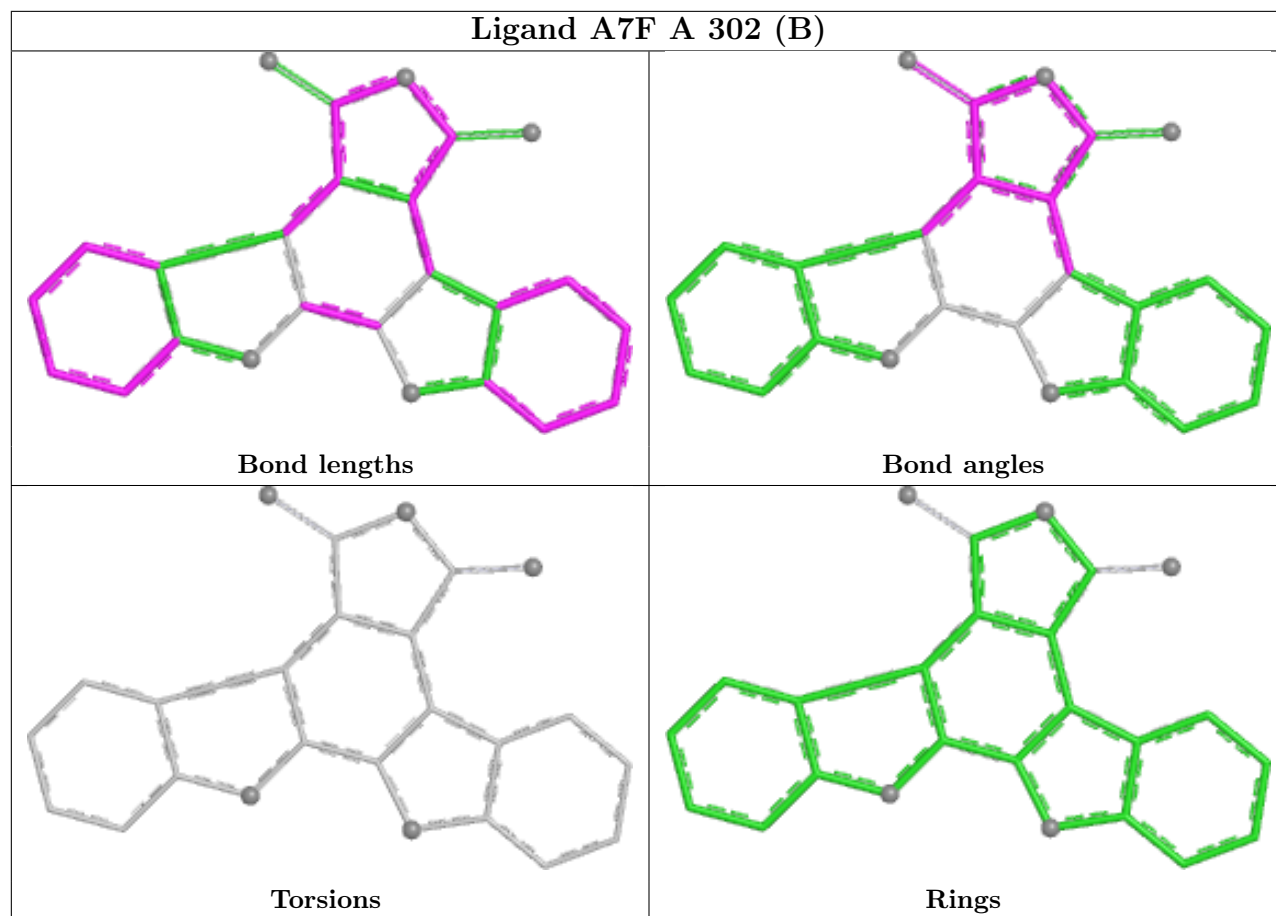
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

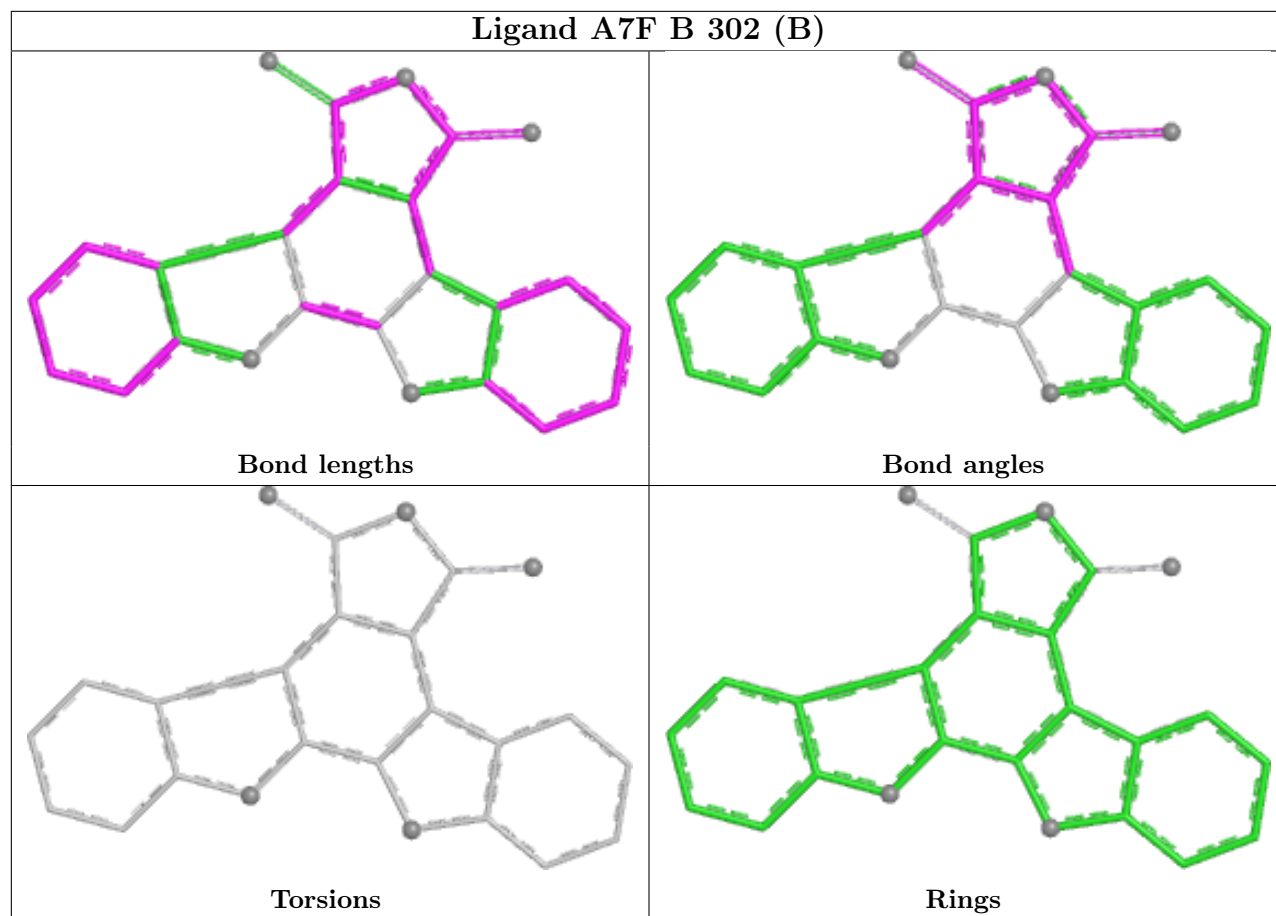












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	287/315 (91%)	0.60	17 (5%) 29 33	14, 28, 43, 77	1 (0%)
1	B	277/315 (87%)	0.99	35 (12%) 9 11	15, 33, 54, 97	1 (0%)
All	All	564/630 (89%)	0.79	52 (9%) 16 18	14, 30, 51, 97	2 (0%)

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	10	LEU	5.8
1	B	45	GLY	5.0
1	B	44	GLU	4.9
1	A	39	GLY	4.4
1	B	22	LEU	4.0
1	B	2	GLY	3.9
1	A	73	HIS	3.6
1	B	128	PRO	3.4
1	B	272	ILE	3.1
1	B	73	HIS	3.1
1	B	23	ALA	3.0
1	B	129	ASP	3.0
1	A	130	TYR	3.0
1	B	274	ALA	3.0
1	B	27	ARG	2.9
1	B	11	GLY	2.9
1	B	25	GLY	2.9
1	B	47	THR	2.8
1	B	32	ASN	2.7
1	A	56	VAL	2.7
1	A	34	THR	2.7
1	B	126	GLY	2.7
1	A	36	GLY	2.6
1	B	130	TYR	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	83	LEU	2.6
1	A	128	PRO	2.6
1	A	84	ALA	2.6
1	B	49	VAL	2.6
1	B	217	PHE	2.5
1	B	3	ALA	2.5
1	A	37	LYS	2.5
1	A	38	GLY	2.4
1	A	97	VAL	2.4
1	A	216	VAL	2.4
1	B	9	GLY	2.4
1	B	275	GLY	2.4
1	B	30	VAL	2.4
1	B	277	GLY	2.3
1	B	127	LYS	2.3
1	B	123	SER	2.3
1	A	235	PHE	2.3
1	B	52	ALA	2.3
1	A	126	GLY	2.2
1	B	31	TRP	2.2
1	B	48	GLU	2.2
1	B	252	GLU	2.2
1	B	287	PHE	2.2
1	B	46	ALA	2.2
1	B	58	ALA	2.2
1	A	35	PRO	2.2
1	B	273	THR	2.1
1	A	129	ASP	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,

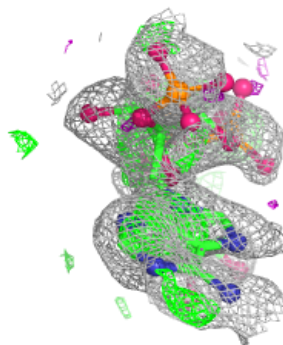
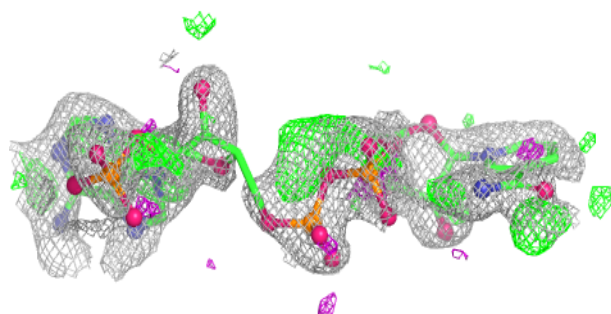
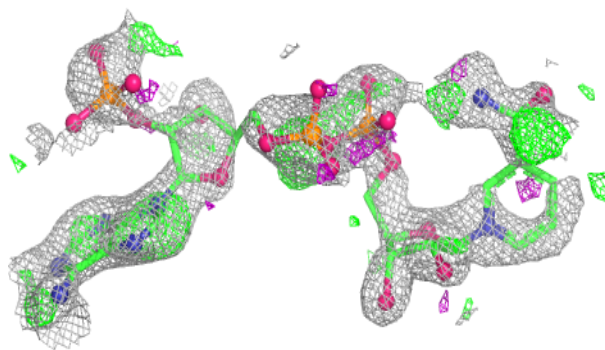
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAP	B	301	48/48	0.70	0.26	26,42,55,58	48
4	NAP	A	303	48/48	0.75	0.24	28,44,55,57	48
2	EDO	A	301	4/4	0.78	0.19	47,52,52,55	0
3	A7F	A	302[A]	25/25	0.84	0.24	19,25,32,34	25
3	A7F	A	302[B]	25/25	0.84	0.24	26,30,37,39	25
3	A7F	B	302[A]	25/25	0.85	0.21	16,20,27,28	25
3	A7F	B	302[B]	25/25	0.85	0.21	25,29,34,36	25
5	CL	B	312	1/1	0.85	0.19	55,55,55,55	0
5	CL	B	313	1/1	0.87	0.16	45,45,45,45	0
2	EDO	B	304	4/4	0.89	0.16	33,37,43,51	0
7	IOD	A	309	1/1	0.89	0.18	66,66,66,66	1
5	CL	B	310	1/1	0.93	0.17	44,44,44,44	0
5	CL	A	310	1/1	0.93	0.12	57,57,57,57	0
8	TRS	B	303	8/8	0.93	0.10	28,34,38,40	0
7	IOD	B	307	1/1	0.94	0.11	60,60,60,60	1
5	CL	B	309	1/1	0.95	0.11	43,43,43,43	0
7	IOD	B	308	1/1	0.96	0.09	59,59,59,59	1
7	IOD	A	306	1/1	0.96	0.09	46,46,46,46	1
7	IOD	A	307	1/1	0.97	0.07	48,48,48,48	1
7	IOD	A	308	1/1	0.97	0.08	45,45,45,45	1
5	CL	B	311	1/1	0.97	0.08	46,46,46,46	0
7	IOD	B	306	1/1	0.98	0.05	34,34,34,34	1
5	CL	A	304	1/1	0.99	0.09	37,37,37,37	0
6	NA	A	305	1/1	0.99	0.08	25,25,25,25	0
6	NA	B	305	1/1	1.00	0.04	26,26,26,26	0

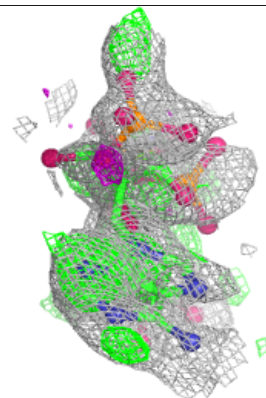
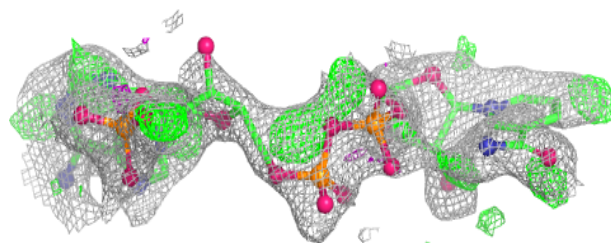
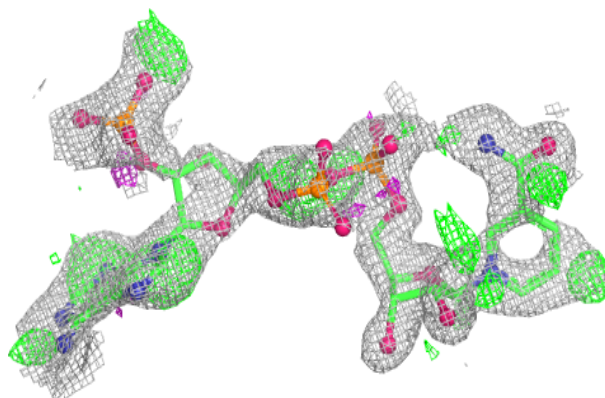
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around NAP 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)

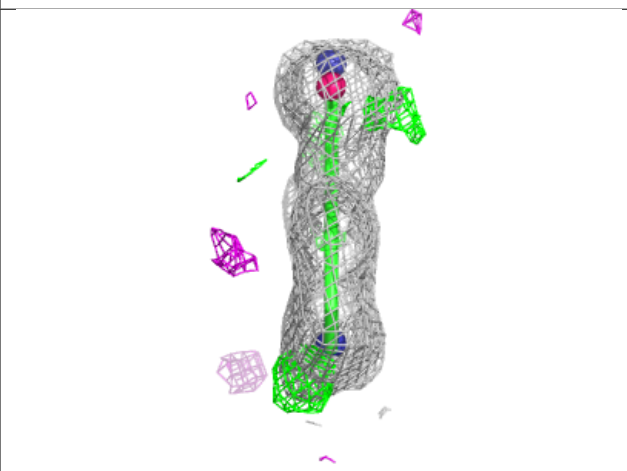
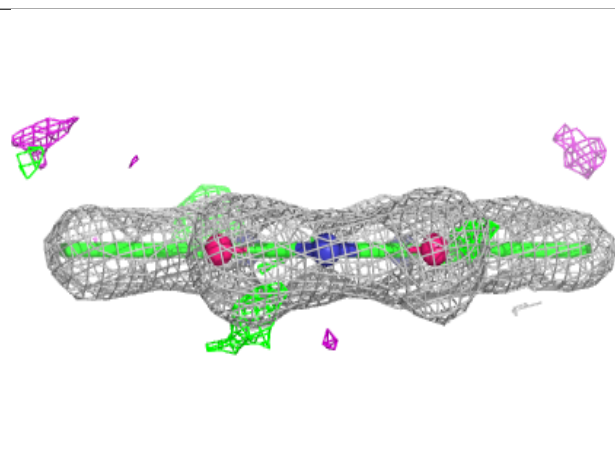
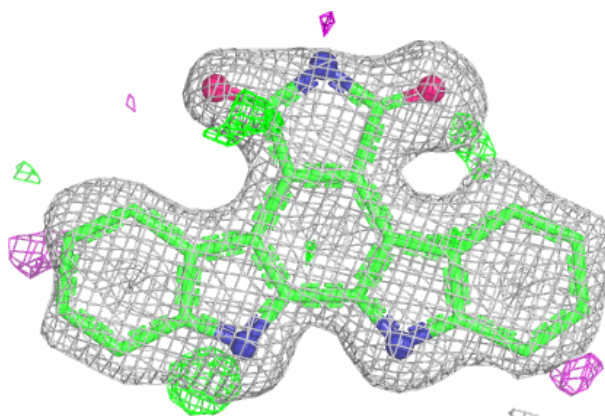
**Electron density around NAP A 303:**

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



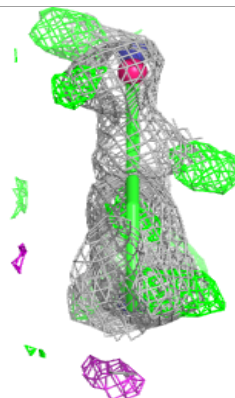
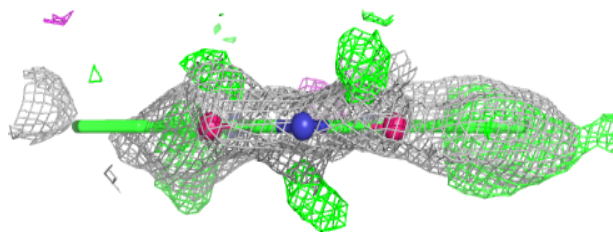
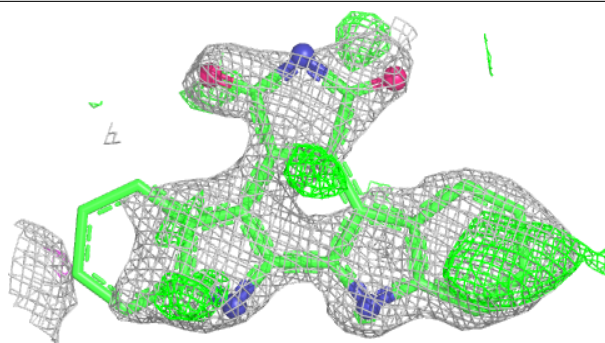
Electron density around A7F A 302 (A):

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

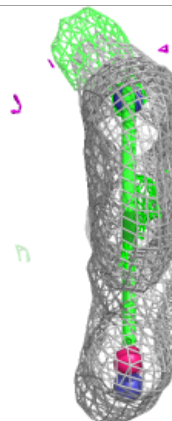
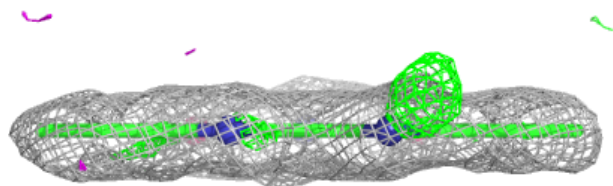
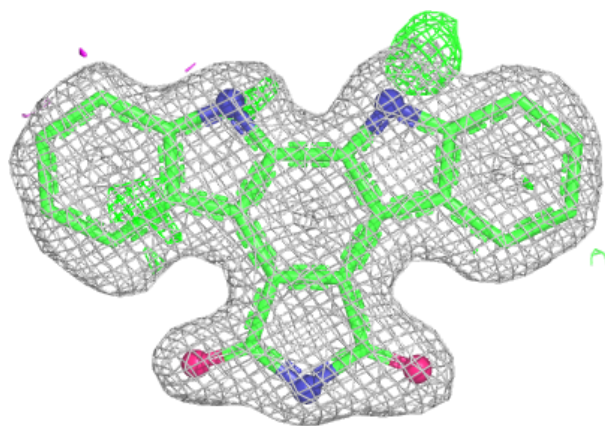


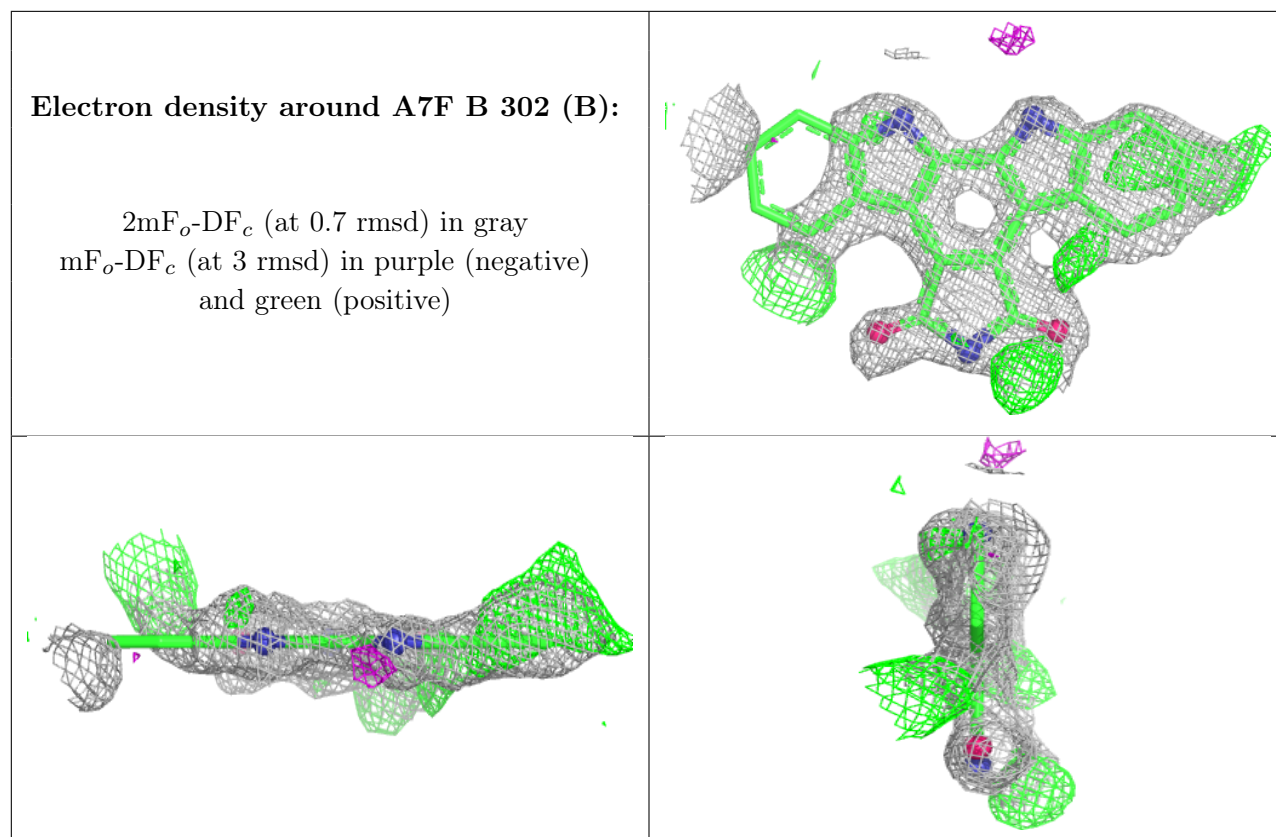
Electron density around A7F A 302 (B):

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

**Electron density around A7F B 302 (A):**

$2mF_o-DF_c$ (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.