



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 30, 2023 – 10:13 PM JST

PDB ID : 7YB2
Title : Crystal Structure of anthrol reductase (CbAR) in complex with NADP⁺ and emodin
Authors : Hou, X.D.; Rao, Y.J.
Deposited on : 2022-06-28
Resolution : 1.85 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 : 2.36
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) : 2.36

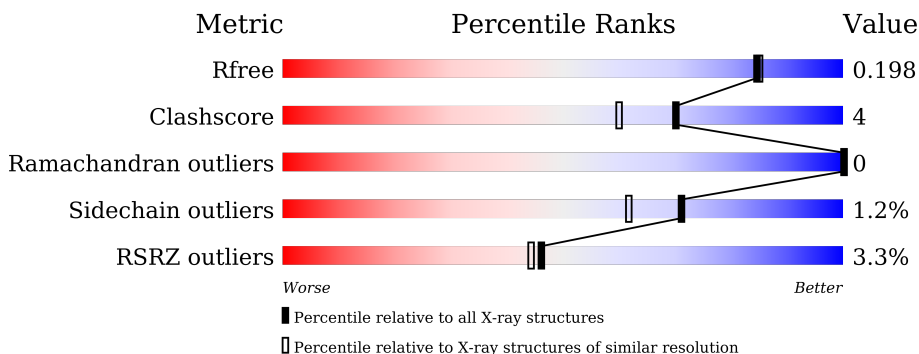
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

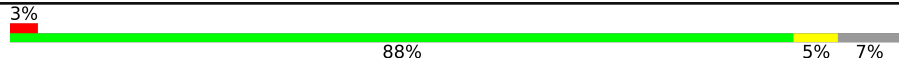

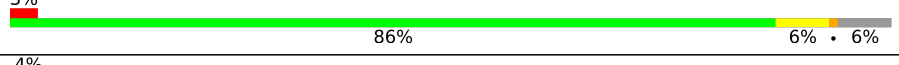
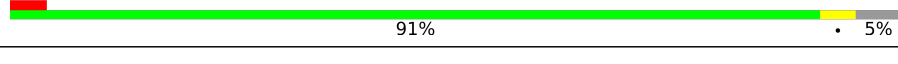
The reported resolution of this entry is 1.85 Å.

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	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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	279	 3% 88% 5% 7%
1	B	279	 3% 85% 8% 7%
1	C	279	 3% 86% 6% 6%
1	D	279	 4% 91% 5%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 8780 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 Versicolorin reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	260	1966	1236	354	372	4	0	0	0
1	B	260	1966	1236	354	372	4	0	0	0
1	C	261	1985	1251	356	374	4	0	1	0
1	D	264	1998	1255	359	380	4	0	0	0

There are 44 discrepancies between the modelled and reference sequences:

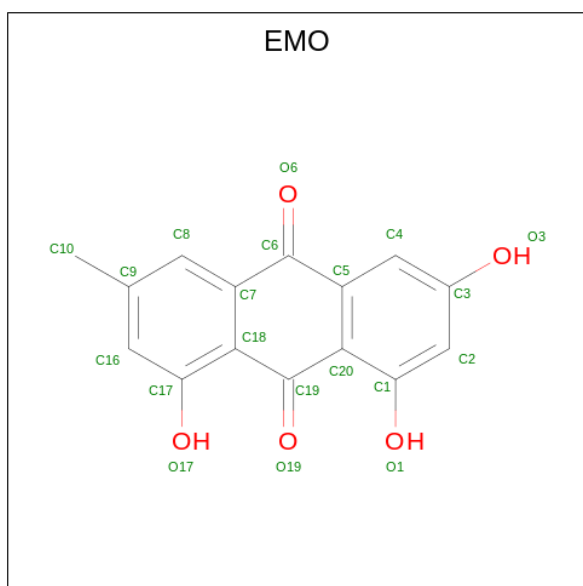
Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	initiating methionine	UNP A0A2G5I2X5
A	0	ALA	-	expression tag	UNP A0A2G5I2X5
A	269	ALA	-	expression tag	UNP A0A2G5I2X5
A	270	LEU	-	expression tag	UNP A0A2G5I2X5
A	271	GLU	-	expression tag	UNP A0A2G5I2X5
A	272	HIS	-	expression tag	UNP A0A2G5I2X5
A	273	HIS	-	expression tag	UNP A0A2G5I2X5
A	274	HIS	-	expression tag	UNP A0A2G5I2X5
A	275	HIS	-	expression tag	UNP A0A2G5I2X5
A	276	HIS	-	expression tag	UNP A0A2G5I2X5
A	277	HIS	-	expression tag	UNP A0A2G5I2X5
B	-1	MET	-	initiating methionine	UNP A0A2G5I2X5
B	0	ALA	-	expression tag	UNP A0A2G5I2X5
B	269	ALA	-	expression tag	UNP A0A2G5I2X5
B	270	LEU	-	expression tag	UNP A0A2G5I2X5
B	271	GLU	-	expression tag	UNP A0A2G5I2X5
B	272	HIS	-	expression tag	UNP A0A2G5I2X5
B	273	HIS	-	expression tag	UNP A0A2G5I2X5
B	274	HIS	-	expression tag	UNP A0A2G5I2X5
B	275	HIS	-	expression tag	UNP A0A2G5I2X5
B	276	HIS	-	expression tag	UNP A0A2G5I2X5

Continued on next page...

Continued from previous page...

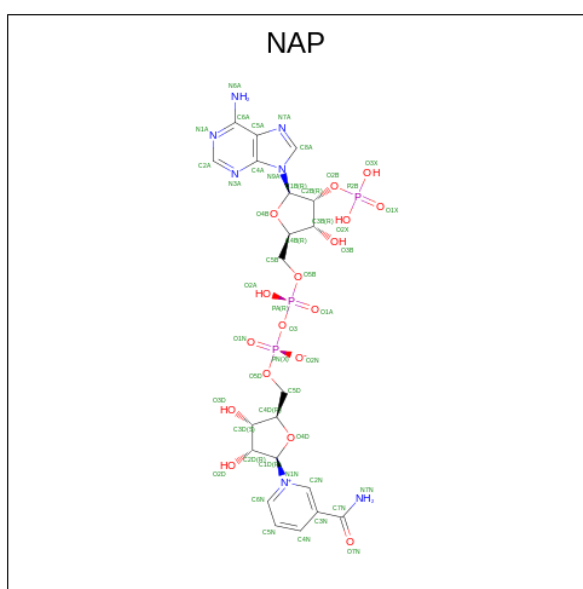
Chain	Residue	Modelled	Actual	Comment	Reference
B	277	HIS	-	expression tag	UNP A0A2G5I2X5
C	-1	MET	-	initiating methionine	UNP A0A2G5I2X5
C	0	ALA	-	expression tag	UNP A0A2G5I2X5
C	269	ALA	-	expression tag	UNP A0A2G5I2X5
C	270	LEU	-	expression tag	UNP A0A2G5I2X5
C	271	GLU	-	expression tag	UNP A0A2G5I2X5
C	272	HIS	-	expression tag	UNP A0A2G5I2X5
C	273	HIS	-	expression tag	UNP A0A2G5I2X5
C	274	HIS	-	expression tag	UNP A0A2G5I2X5
C	275	HIS	-	expression tag	UNP A0A2G5I2X5
C	276	HIS	-	expression tag	UNP A0A2G5I2X5
C	277	HIS	-	expression tag	UNP A0A2G5I2X5
D	-1	MET	-	initiating methionine	UNP A0A2G5I2X5
D	0	ALA	-	expression tag	UNP A0A2G5I2X5
D	269	ALA	-	expression tag	UNP A0A2G5I2X5
D	270	LEU	-	expression tag	UNP A0A2G5I2X5
D	271	GLU	-	expression tag	UNP A0A2G5I2X5
D	272	HIS	-	expression tag	UNP A0A2G5I2X5
D	273	HIS	-	expression tag	UNP A0A2G5I2X5
D	274	HIS	-	expression tag	UNP A0A2G5I2X5
D	275	HIS	-	expression tag	UNP A0A2G5I2X5
D	276	HIS	-	expression tag	UNP A0A2G5I2X5
D	277	HIS	-	expression tag	UNP A0A2G5I2X5

- Molecule 2 is 3-METHYL-1,6,8-TRIHIDROXYANTHRAQUINONE (three-letter code: EMO) (formula: C₁₅H₁₀O₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			20	15	5		
2	B	1	Total	C	O	0	0
			20	15	5		
2	C	1	Total	C	O	0	0
			20	15	5		
2	D	1	Total	C	O	0	0
			20	15	5		

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0

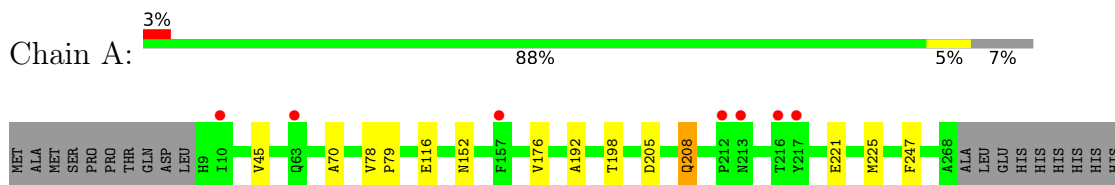
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	112	Total O 112 112	0	0
5	B	144	Total O 144 144	0	0
5	C	154	Total O 154 154	0	0
5	D	159	Total O 159 159	0	0

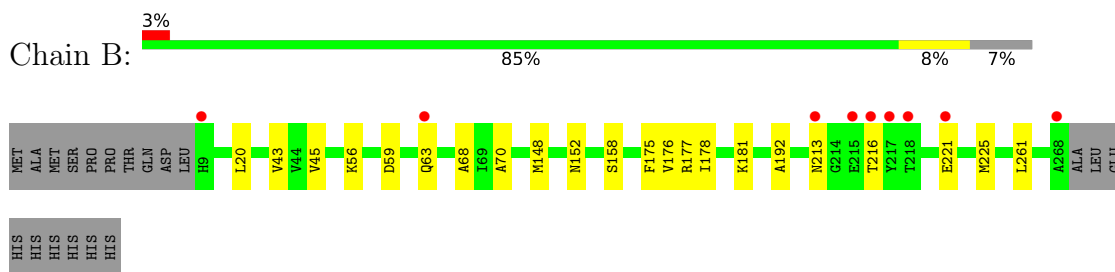
3 Residue-property plots [i](#)

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.

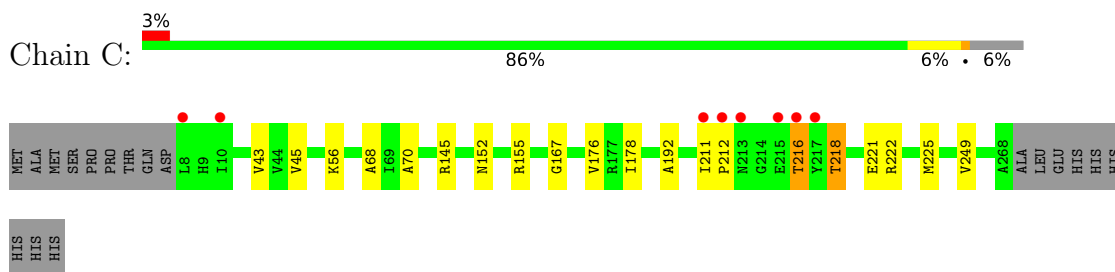
- Molecule 1: Versicolorin reductase



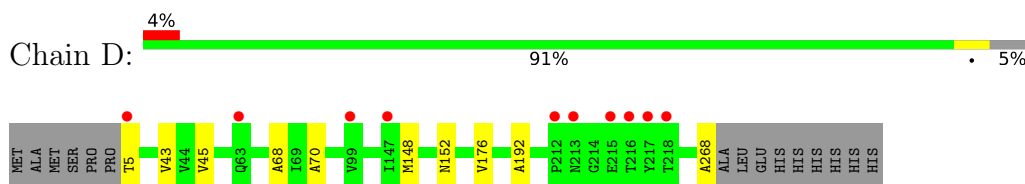
- Molecule 1: Versicolorin reductase



- Molecule 1: Versicolorin reductase



- Molecule 1: Versicolorin reductase



4 Data and refinement statistics

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α , β , γ	66.80Å 123.36Å 126.11Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.89 – 1.85 24.87 – 1.85	Depositor EDS
% Data completeness (in resolution range)	98.3 (45.89-1.85) 98.4 (24.87-1.85)	Depositor EDS
R_{merge}	1.00	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.22 (at 1.85Å)	Xtrriage
Refinement program	REFMAC 5.5	Depositor
R, R_{free}	0.151 , 0.188 0.164 , 0.198	Depositor DCC
R_{free} test set	4568 reflections (5.15%)	wwPDB-VP
Wilson B-factor (Å ²)	18.2	Xtrriage
Anisotropy	0.027	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 48.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.009 for -h,l,k	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8780	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.08% 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: EMO, GOL, NAP

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	0.76	0/2005	0.84	0/2714
1	B	0.77	0/2005	0.83	0/2714
1	C	0.79	0/2025	0.88	0/2741
1	D	0.78	0/2037	0.84	0/2758
All	All	0.77	0/8072	0.85	0/10927

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	1966	0	1943	8	0
1	B	1966	0	1943	15	0
1	C	1985	0	1962	22	0
1	D	1998	0	1973	6	0
2	A	20	0	10	2	0
2	B	20	0	10	3	0
2	C	20	0	10	2	0
2	D	20	0	10	3	0
3	A	48	0	25	3	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	48	0	25	3	0
3	C	48	0	25	2	0
3	D	48	0	25	3	0
4	A	12	0	16	2	0
4	B	6	0	8	0	0
4	D	6	0	8	0	0
5	A	112	0	0	2	0
5	B	144	0	0	0	0
5	C	154	0	0	2	0
5	D	159	0	0	0	0
All	All	8780	0	7993	58	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 4.

All (58) 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:C:218:THR:HG22	1:C:221:GLU:OE2	1.63	0.97
1:C:218:THR:HG23	1:C:221:GLU:H	1.38	0.86
1:C:222:ARG:HA	1:C:225:MET:HE3	1.61	0.83
1:C:218:THR:HG23	1:C:221:GLU:HB2	1.74	0.70
1:A:116:GLU:HG2	5:A:508:HOH:O	1.92	0.68
2:D:301:EMO:C3	3:D:302:NAP:C4N	2.73	0.66
1:B:213:ASN:O	1:B:216:THR:HB	1.96	0.65
1:C:218:THR:HG23	1:C:221:GLU:CB	2.27	0.64
1:C:218:THR:HG23	1:C:221:GLU:N	2.13	0.62
2:B:301:EMO:C3	3:B:302:NAP:C4N	2.78	0.61
1:D:45:VAL:O	1:D:70:ALA:HA	2.00	0.60
1:C:218:THR:CG2	1:C:221:GLU:CG	2.80	0.60
1:C:218:THR:CG2	1:C:221:GLU:HG3	2.32	0.60
2:C:301:EMO:C3	3:C:302:NAP:C4N	2.83	0.57
1:C:218:THR:CG2	1:C:221:GLU:HB2	2.34	0.56
1:C:155:ARG:CZ	5:C:412:HOH:O	2.54	0.56
2:B:301:EMO:O3	3:B:302:NAP:C5N	2.55	0.55
1:A:205:ASP:C	1:A:208:GLN:HE22	2.11	0.54
1:B:43:VAL:O	1:B:68:ALA:HA	2.09	0.53
1:A:221:GLU:O	1:A:225:MET:HG3	2.08	0.53
2:D:301:EMO:O3	3:D:302:NAP:C5N	2.56	0.52
2:A:301:EMO:C3	3:A:302:NAP:C4N	2.88	0.51
2:A:301:EMO:O3	3:A:302:NAP:C5N	2.59	0.51

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:218:THR:CG2	1:C:221:GLU:CB	2.89	0.50
1:C:45:VAL:O	1:C:70:ALA:HA	2.11	0.50
1:C:218:THR:HG22	1:C:221:GLU:CD	2.30	0.50
1:B:181:LYS:HE3	1:D:268:ALA:HB2	1.94	0.49
1:A:45:VAL:O	1:A:70:ALA:HA	2.14	0.48
1:C:43:VAL:O	1:C:68:ALA:HA	2.15	0.47
1:C:218:THR:HG22	1:C:221:GLU:CG	2.45	0.47
1:B:178:ILE:HD13	1:B:178:ILE:N	2.28	0.47
2:D:301:EMO:C3	3:D:302:NAP:C5N	2.93	0.46
4:A:304:GOL:C3	5:A:486:HOH:O	2.63	0.46
1:B:175:PHE:CE1	1:C:167:GLY:HA3	2.51	0.46
2:B:301:EMO:C3	3:B:302:NAP:C5N	2.94	0.46
1:B:221:GLU:O	1:B:225:MET:HG3	2.16	0.46
1:B:158:SER:HA	1:C:178:ILE:CD1	2.46	0.45
1:A:198:THR:H	3:A:302:NAP:H72N	1.62	0.45
1:A:247:PHE:N	4:A:304:GOL:H12	2.31	0.45
1:B:45:VAL:O	1:B:70:ALA:HA	2.17	0.45
1:B:176:VAL:HG11	1:B:192:ALA:HB2	1.98	0.44
1:C:176:VAL:HG11	1:C:192:ALA:HB2	1.98	0.44
1:D:43:VAL:O	1:D:68:ALA:HA	2.17	0.44
1:B:56:LYS:HE2	1:B:56:LYS:HB2	1.85	0.44
2:C:301:EMO:O3	3:C:302:NAP:C5N	2.66	0.43
1:B:261:LEU:HD12	1:B:261:LEU:N	2.34	0.43
1:A:176:VAL:HG11	1:A:192:ALA:HB2	2.01	0.42
1:B:59:ASP:O	1:B:63:GLN:HG3	2.18	0.42
1:B:148:MET:O	1:B:192:ALA:HA	2.20	0.42
1:C:145:ARG:HG3	1:C:249:VAL:HA	2.01	0.42
1:A:78:VAL:N	1:A:79:PRO:CD	2.83	0.42
1:D:148:MET:O	1:D:192:ALA:HA	2.20	0.42
1:C:211:ILE:HA	1:C:212:PRO:HD3	1.83	0.41
1:C:216:THR:HG23	1:C:216:THR:O	2.20	0.41
1:D:176:VAL:HG11	1:D:192:ALA:HB2	2.02	0.41
1:B:20:LEU:HD23	1:B:20:LEU:C	2.41	0.40
1:C:155:ARG:NH2	5:C:412:HOH:O	2.53	0.40
1:B:181:LYS:CE	1:D:268:ALA:HB2	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	258/279 (92%)	250 (97%)	8 (3%)	0	100	100
1	B	258/279 (92%)	249 (96%)	9 (4%)	0	100	100
1	C	260/279 (93%)	254 (98%)	6 (2%)	0	100	100
1	D	262/279 (94%)	251 (96%)	11 (4%)	0	100	100
All	All	1038/1116 (93%)	1004 (97%)	34 (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	208/225 (92%)	206 (99%)	2 (1%)	76	69
1	B	208/225 (92%)	206 (99%)	2 (1%)	76	69
1	C	210/225 (93%)	206 (98%)	4 (2%)	57	43
1	D	212/225 (94%)	210 (99%)	2 (1%)	78	72
All	All	838/900 (93%)	828 (99%)	10 (1%)	71	62

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	152	ASN
1	A	208	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	152	ASN
1	B	177	ARG
1	C	56	LYS
1	C	152	ASN
1	C	216	THR
1	C	218	THR
1	D	5	THR
1	D	152	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	152	ASN
1	A	208	GLN
1	B	53	HIS
1	B	55	GLN
1	B	142	ASN
1	B	152	ASN
1	C	152	ASN
1	C	204	HIS
1	C	209	HIS
1	D	152	ASN
1	D	204	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

12 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	EMO	A	301	-	22,22,22	2.04	9 (40%)	34,34,34	1.20	4 (11%)
4	GOL	A	304	-	5,5,5	0.10	0	5,5,5	0.50	0
3	NAP	D	302	-	45,52,52	1.89	14 (31%)	56,80,80	1.24	6 (10%)
3	NAP	C	302	-	45,52,52	3.28	16 (35%)	56,80,80	1.68	14 (25%)
3	NAP	B	302	-	45,52,52	1.89	12 (26%)	56,80,80	1.28	8 (14%)
4	GOL	D	303	-	5,5,5	0.16	0	5,5,5	0.55	0
3	NAP	A	302	-	45,52,52	1.92	14 (31%)	56,80,80	1.13	5 (8%)
4	GOL	B	303	-	5,5,5	0.23	0	5,5,5	0.58	0
4	GOL	A	303	-	5,5,5	0.24	0	5,5,5	0.57	0
2	EMO	B	301	-	22,22,22	1.80	8 (36%)	34,34,34	1.76	7 (20%)
2	EMO	D	301	-	22,22,22	1.44	6 (27%)	34,34,34	1.37	6 (17%)
2	EMO	C	301	-	22,22,22	1.71	5 (22%)	34,34,34	1.23	5 (14%)

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	EMO	A	301	-	-	-	0/3/3/3
4	GOL	A	304	-	-	2/4/4/4	-
3	NAP	D	302	-	-	5/31/67/67	0/5/5/5
3	NAP	C	302	-	-	5/31/67/67	0/5/5/5
3	NAP	B	302	-	-	5/31/67/67	0/5/5/5
4	GOL	D	303	-	-	0/4/4/4	-
3	NAP	A	302	-	-	4/31/67/67	0/5/5/5
4	GOL	B	303	-	-	2/4/4/4	-
4	GOL	A	303	-	-	2/4/4/4	-
2	EMO	B	301	-	-	-	0/3/3/3
2	EMO	D	301	-	-	-	0/3/3/3
2	EMO	C	301	-	-	-	0/3/3/3

All (84) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	302	NAP	O4B-C1B	9.93	1.54	1.41
3	C	302	NAP	O4D-C1D	9.90	1.54	1.41
3	C	302	NAP	C2D-C1D	-9.44	1.39	1.53
3	C	302	NAP	O4B-C4B	-5.14	1.33	1.45
3	C	302	NAP	O4D-C4D	-4.43	1.35	1.45
3	C	302	NAP	P2B-O2B	4.43	1.67	1.59
3	C	302	NAP	C7N-N7N	4.13	1.40	1.33
3	B	302	NAP	PA-O1A	-4.10	1.36	1.50
3	D	302	NAP	O7N-C7N	-3.97	1.16	1.24
3	C	302	NAP	C2A-N3A	3.95	1.38	1.32
3	D	302	NAP	PN-O1N	-3.92	1.37	1.50
3	B	302	NAP	O7N-C7N	-3.90	1.16	1.24
3	B	302	NAP	P2B-O2X	-3.81	1.40	1.54
3	B	302	NAP	PN-O1N	-3.81	1.37	1.50
3	A	302	NAP	P2B-O2X	-3.81	1.40	1.54
3	B	302	NAP	P2B-O3X	-3.80	1.40	1.54
3	D	302	NAP	C4A-N3A	-3.80	1.30	1.35
2	B	301	EMO	C5-C6	3.79	1.56	1.48
3	A	302	NAP	P2B-O1X	-3.75	1.38	1.50
3	B	302	NAP	PN-O2N	-3.72	1.37	1.55
2	A	301	EMO	C18-C19	3.65	1.56	1.47
2	C	301	EMO	C7-C6	3.62	1.56	1.48
3	D	302	NAP	P2B-O2X	-3.61	1.40	1.54
3	A	302	NAP	C4A-N3A	-3.55	1.30	1.35
3	C	302	NAP	C2N-C3N	-3.54	1.33	1.39
3	A	302	NAP	P2B-O3X	-3.52	1.41	1.54
2	A	301	EMO	C20-C19	3.49	1.56	1.47
3	A	302	NAP	PN-O1N	-3.41	1.38	1.50
3	A	302	NAP	O7N-C7N	-3.40	1.17	1.24
2	A	301	EMO	O17-C17	3.34	1.43	1.36
2	B	301	EMO	C7-C6	3.19	1.55	1.48
3	D	302	NAP	PA-O1A	-3.18	1.39	1.50
2	A	301	EMO	O1-C1	3.16	1.42	1.36
2	A	301	EMO	C5-C6	3.16	1.55	1.48
3	A	302	NAP	PN-O2N	-3.16	1.40	1.55
3	A	302	NAP	PA-O2A	-3.13	1.40	1.55
3	A	302	NAP	PA-O1A	-3.12	1.39	1.50
2	C	301	EMO	C20-C19	3.11	1.55	1.47
3	C	302	NAP	O7N-C7N	-3.11	1.18	1.24
3	C	302	NAP	C2N-N1N	3.04	1.38	1.35
3	D	302	NAP	PN-O2N	-2.99	1.41	1.55
2	C	301	EMO	C5-C6	2.97	1.54	1.48

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	302	NAP	P2B-O3X	-2.97	1.43	1.54
2	B	301	EMO	O17-C17	2.95	1.42	1.36
2	A	301	EMO	C7-C6	2.93	1.54	1.48
2	D	301	EMO	C20-C19	2.91	1.54	1.47
3	D	302	NAP	PA-O2A	-2.90	1.41	1.55
3	B	302	NAP	PA-O2A	-2.87	1.41	1.55
3	D	302	NAP	P2B-O1X	-2.78	1.41	1.50
2	B	301	EMO	C20-C19	2.76	1.54	1.47
2	A	301	EMO	C16-C17	2.74	1.42	1.38
3	D	302	NAP	C5A-N7A	-2.74	1.29	1.39
2	B	301	EMO	C18-C19	2.73	1.54	1.47
3	A	302	NAP	O4B-C4B	-2.73	1.38	1.45
3	C	302	NAP	C5A-C4A	-2.71	1.33	1.40
2	C	301	EMO	O17-C17	2.70	1.41	1.36
3	B	302	NAP	C4A-N3A	-2.64	1.32	1.35
3	C	302	NAP	C6A-N6A	2.62	1.43	1.34
2	C	301	EMO	C18-C19	2.48	1.53	1.47
2	B	301	EMO	O1-C1	2.47	1.41	1.36
3	D	302	NAP	O4D-C1D	-2.45	1.37	1.41
3	C	302	NAP	O3B-C3B	-2.45	1.37	1.43
3	C	302	NAP	C5D-C4D	2.45	1.59	1.51
3	B	302	NAP	P2B-O1X	-2.40	1.42	1.50
3	A	302	NAP	C5A-N7A	-2.39	1.31	1.39
3	C	302	NAP	O2D-C2D	2.36	1.48	1.43
2	D	301	EMO	C7-C6	2.33	1.53	1.48
2	D	301	EMO	O17-C17	2.31	1.41	1.36
2	D	301	EMO	C2-C1	2.27	1.42	1.38
3	D	302	NAP	C2D-C1D	-2.24	1.50	1.53
2	D	301	EMO	C5-C6	2.20	1.53	1.48
3	B	302	NAP	C6N-N1N	-2.19	1.30	1.35
3	A	302	NAP	C5A-C4A	2.18	1.46	1.40
3	B	302	NAP	C7N-N7N	-2.18	1.28	1.33
2	B	301	EMO	C2-C3	2.12	1.42	1.39
2	A	301	EMO	C16-C9	2.11	1.42	1.39
2	B	301	EMO	O3-C3	2.10	1.41	1.37
3	D	302	NAP	O4D-C4D	-2.10	1.40	1.45
3	D	302	NAP	C2A-N1A	-2.10	1.30	1.33
3	A	302	NAP	C2N-N1N	-2.06	1.32	1.35
3	B	302	NAP	C5A-N7A	-2.04	1.32	1.39
2	A	301	EMO	O6-C6	-2.03	1.19	1.22
2	D	301	EMO	C18-C19	2.01	1.52	1.47
3	A	302	NAP	O4D-C4D	-2.00	1.40	1.45

All (55) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	EMO	C5-C20-C1	4.61	122.70	118.41
3	C	302	NAP	C1B-N9A-C4A	-4.20	119.26	126.64
3	C	302	NAP	C5A-C6A-N6A	4.14	126.64	120.35
3	D	302	NAP	N3A-C2A-N1A	-4.07	122.32	128.68
3	C	302	NAP	C6N-N1N-C2N	-3.83	118.48	121.97
2	B	301	EMO	C7-C18-C17	3.74	121.89	118.41
3	C	302	NAP	N6A-C6A-N1A	-3.54	111.23	118.57
2	B	301	EMO	C17-C18-C19	-3.40	115.36	120.59
3	B	302	NAP	N3A-C2A-N1A	-3.38	123.39	128.68
2	D	301	EMO	C1-C20-C19	-3.37	115.41	120.59
3	A	302	NAP	N3A-C2A-N1A	-3.20	123.68	128.68
3	B	302	NAP	C3N-C7N-N7N	3.08	121.44	117.75
3	B	302	NAP	N6A-C6A-N1A	3.07	124.94	118.57
2	D	301	EMO	C5-C20-C1	3.06	121.25	118.41
2	A	301	EMO	C5-C20-C1	3.04	121.24	118.41
3	C	302	NAP	C2N-C3N-C4N	2.88	121.52	118.26
2	B	301	EMO	C1-C20-C19	-2.81	116.26	120.59
3	C	302	NAP	N3A-C2A-N1A	-2.75	124.39	128.68
3	D	302	NAP	N6A-C6A-N1A	2.73	124.24	118.57
2	C	301	EMO	C17-C18-C19	-2.71	116.43	120.59
2	C	301	EMO	C5-C20-C1	2.69	120.92	118.41
2	B	301	EMO	C16-C9-C8	2.69	121.29	118.09
3	B	302	NAP	O7N-C7N-N7N	-2.60	118.88	122.58
3	D	302	NAP	C3N-C7N-N7N	2.48	120.72	117.75
3	B	302	NAP	C2A-N1A-C6A	2.47	122.98	118.75
3	C	302	NAP	O3D-C3D-C2D	2.43	119.68	111.82
2	D	301	EMO	O19-C19-C18	2.40	125.32	121.43
3	C	302	NAP	O2D-C2D-C3D	-2.34	104.24	111.82
3	C	302	NAP	C3N-C7N-N7N	2.29	120.50	117.75
3	B	302	NAP	O2B-P2B-O1X	-2.29	100.57	109.39
2	A	301	EMO	C16-C9-C8	2.27	120.80	118.09
3	C	302	NAP	O4D-C1D-C2D	-2.26	103.62	106.93
3	D	302	NAP	C2A-N1A-C6A	2.25	122.61	118.75
3	D	302	NAP	O3X-P2B-O2X	2.24	116.21	107.64
2	B	301	EMO	O1-C1-C20	2.24	125.33	121.14
3	A	302	NAP	N6A-C6A-N1A	2.24	123.21	118.57
2	D	301	EMO	C5-C20-C19	2.22	123.33	119.88
3	C	302	NAP	C2A-N1A-C6A	-2.20	115.00	118.75
3	A	302	NAP	O7N-C7N-N7N	-2.20	119.46	122.58
2	D	301	EMO	C20-C19-C18	-2.18	114.38	118.12
2	C	301	EMO	C7-C18-C17	2.15	120.41	118.41
2	D	301	EMO	C1-C2-C3	-2.14	117.76	119.70

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	301	EMO	C1-C20-C19	-2.13	117.32	120.59
2	C	301	EMO	C7-C18-C19	2.11	123.15	119.88
3	D	302	NAP	C4A-C5A-N7A	-2.09	107.22	109.40
2	A	301	EMO	C4-C3-C2	2.08	123.30	120.43
2	A	301	EMO	C7-C18-C17	2.08	120.34	118.41
3	C	302	NAP	PN-O3-PA	-2.07	125.71	132.83
3	C	302	NAP	O4B-C1B-C2B	-2.07	103.00	106.59
3	A	302	NAP	C2A-N1A-C6A	2.05	122.26	118.75
3	A	302	NAP	O2B-P2B-O1X	-2.04	101.50	109.39
3	B	302	NAP	O2A-PA-O1A	2.04	122.34	112.24
3	C	302	NAP	O2N-PN-O1N	2.04	122.32	112.24
3	B	302	NAP	O3X-P2B-O1X	2.04	118.65	110.68
2	B	301	EMO	C2-C1-C20	-2.03	118.58	120.93

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	302	NAP	C5D-O5D-PN-O1N
3	B	302	NAP	C5D-O5D-PN-O2N
3	B	302	NAP	O4D-C1D-N1N-C2N
3	C	302	NAP	C5D-O5D-PN-O2N
3	C	302	NAP	O4D-C1D-N1N-C2N
3	D	302	NAP	C5D-O5D-PN-O2N
3	D	302	NAP	O4D-C1D-N1N-C2N
4	A	303	GOL	C1-C2-C3-O3
4	A	304	GOL	O1-C1-C2-O2
4	A	304	GOL	O1-C1-C2-C3
4	A	303	GOL	O2-C2-C3-O3
4	B	303	GOL	C1-C2-C3-O3
4	B	303	GOL	O2-C2-C3-O3
3	A	302	NAP	C5D-O5D-PN-O3
3	B	302	NAP	C5D-O5D-PN-O3
3	C	302	NAP	C5D-O5D-PN-O3
3	D	302	NAP	C5D-O5D-PN-O3
3	A	302	NAP	C5D-O5D-PN-O2N
3	B	302	NAP	C5D-O5D-PN-O1N
3	C	302	NAP	C5D-O5D-PN-O1N
3	D	302	NAP	C5D-O5D-PN-O1N
3	C	302	NAP	O4B-C4B-C5B-O5B
3	A	302	NAP	O4B-C4B-C5B-O5B
3	B	302	NAP	O4B-C4B-C5B-O5B

Continued on next page...

Continued from previous page...

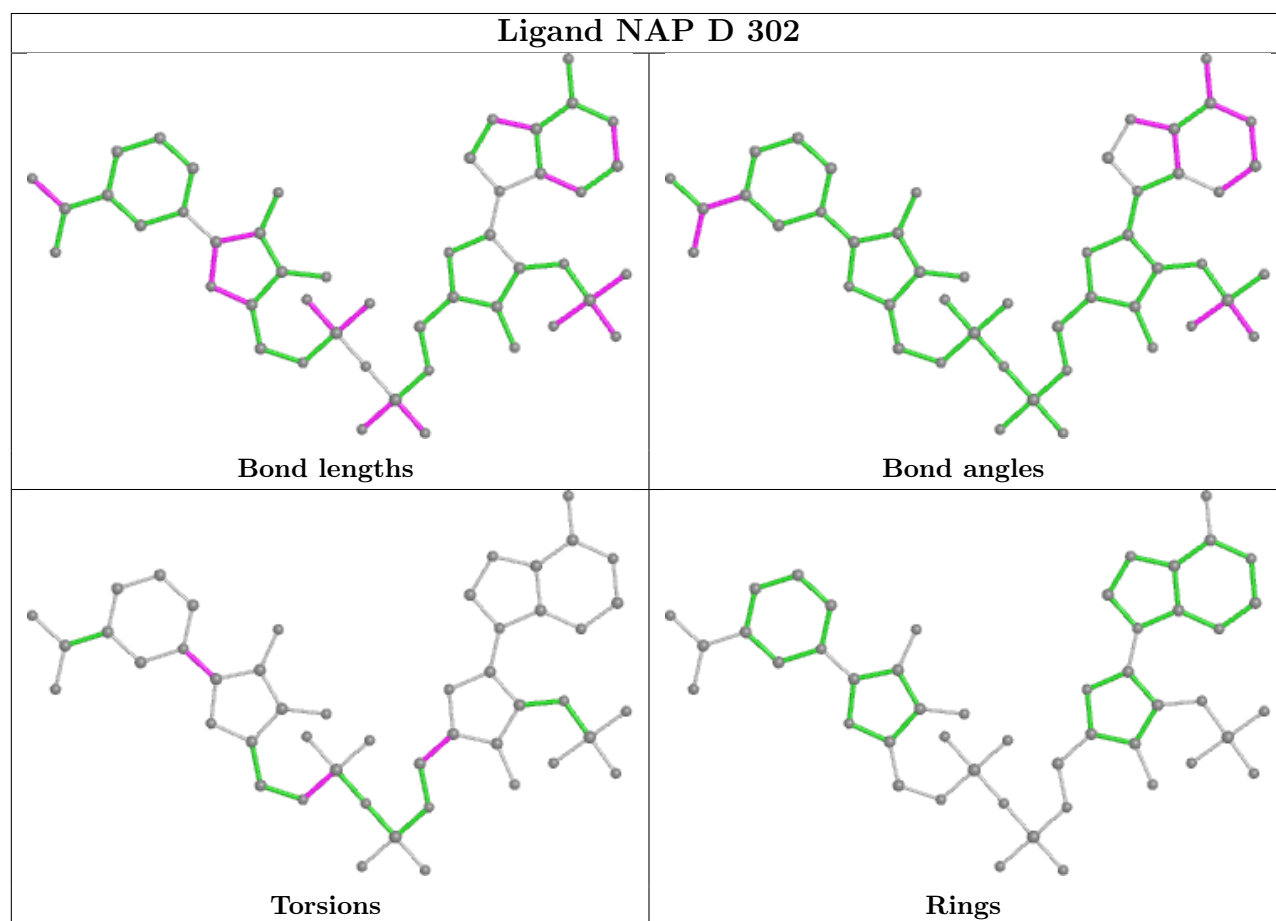
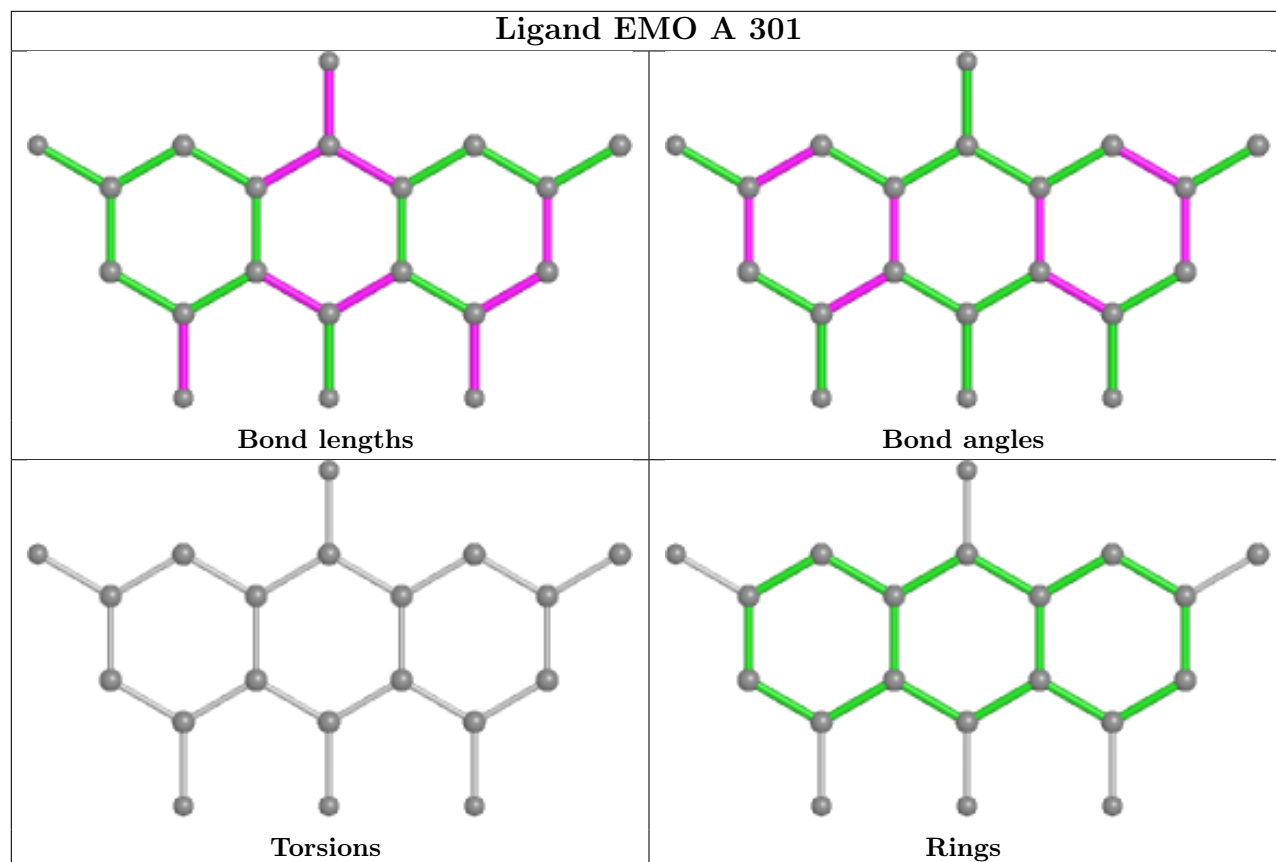
Mol	Chain	Res	Type	Atoms
3	D	302	NAP	O4B-C4B-C5B-O5B

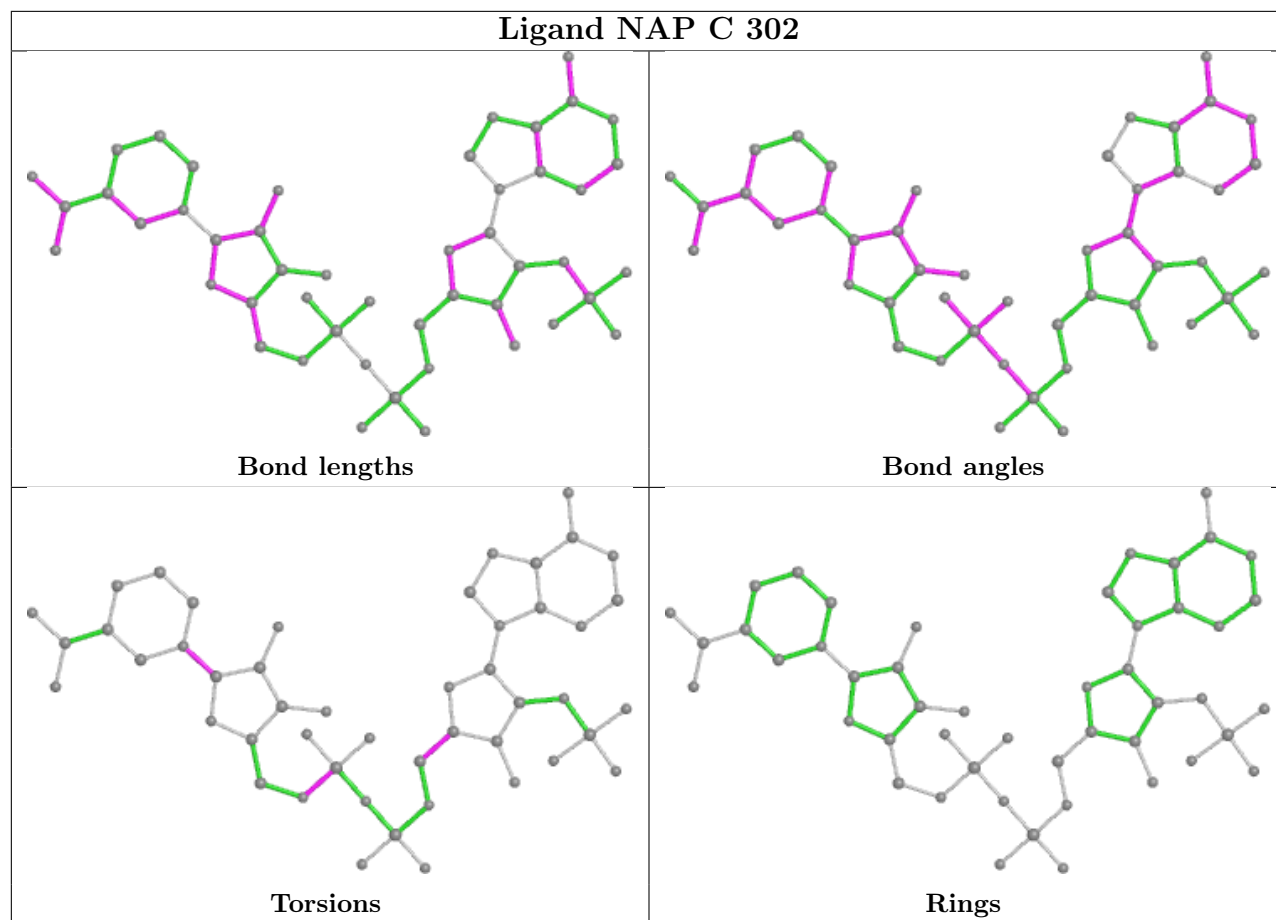
There are no ring outliers.

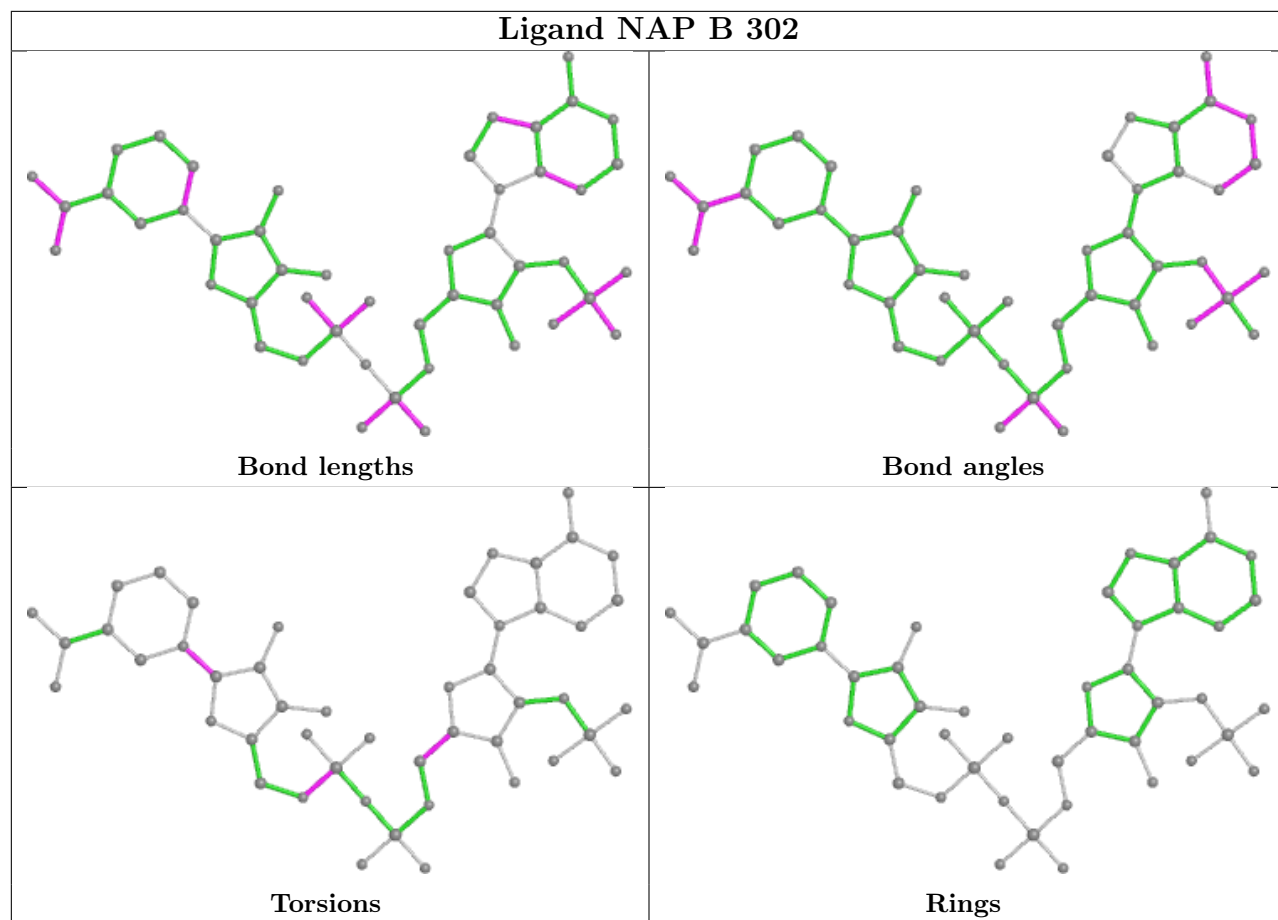
9 monomers are involved in 13 short contacts:

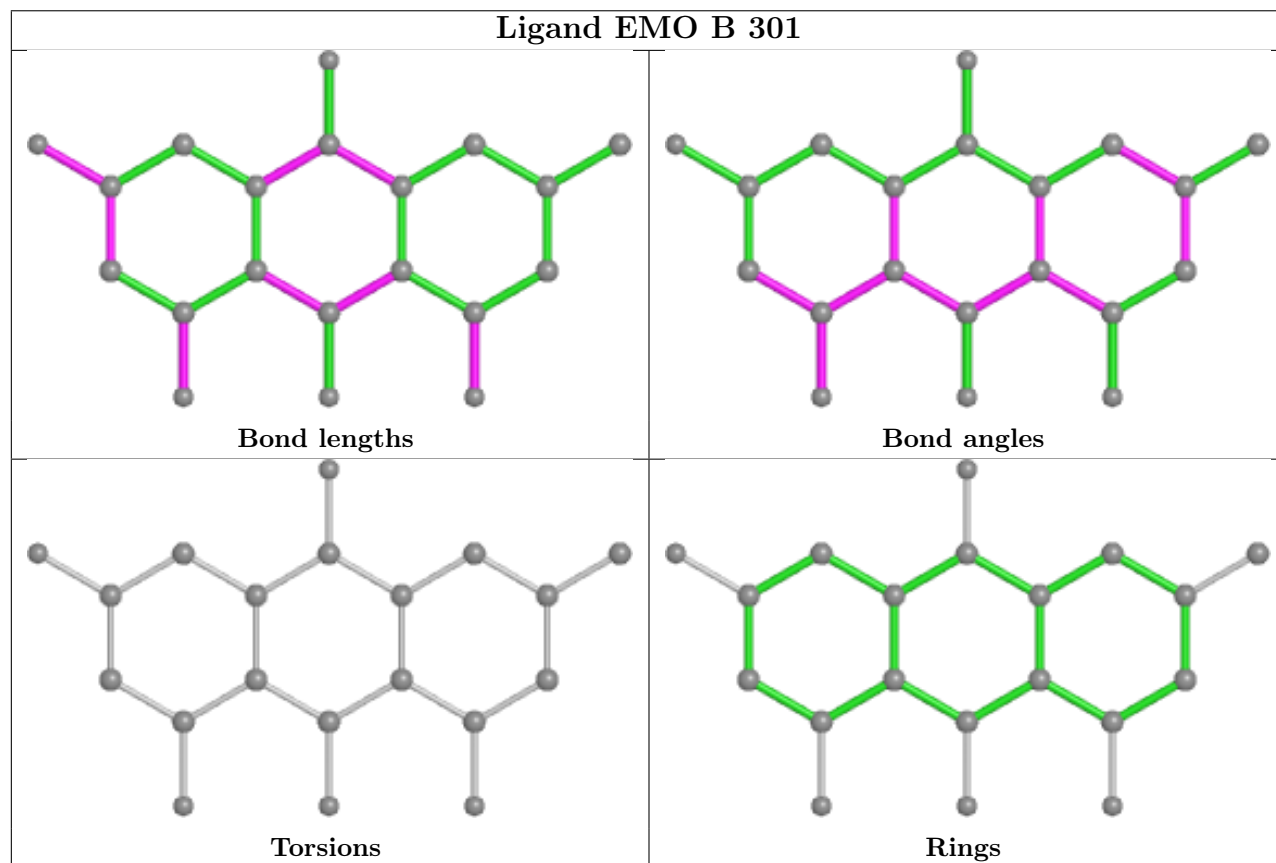
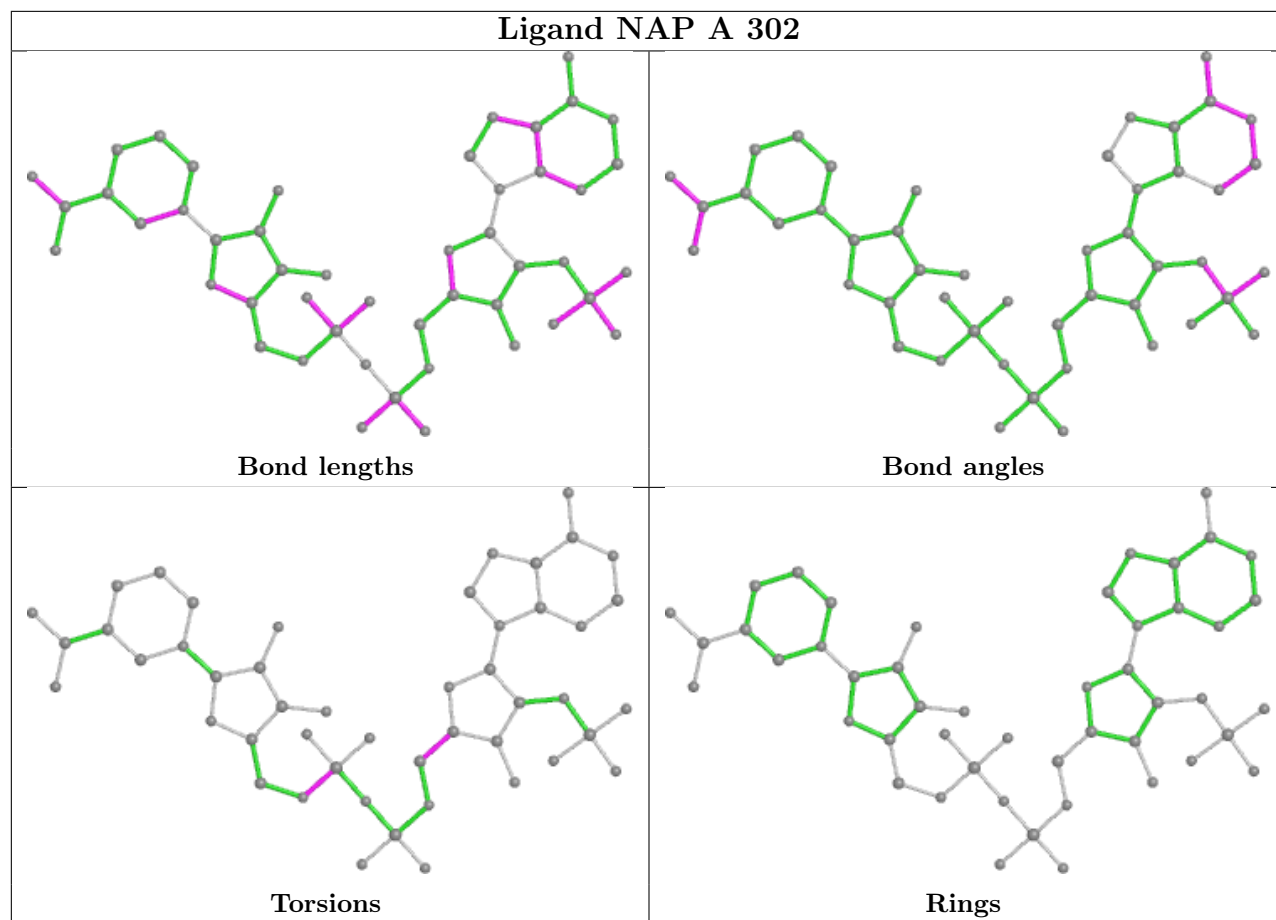
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	EMO	2	0
4	A	304	GOL	2	0
3	D	302	NAP	3	0
3	C	302	NAP	2	0
3	B	302	NAP	3	0
3	A	302	NAP	3	0
2	B	301	EMO	3	0
2	D	301	EMO	3	0
2	C	301	EMO	2	0

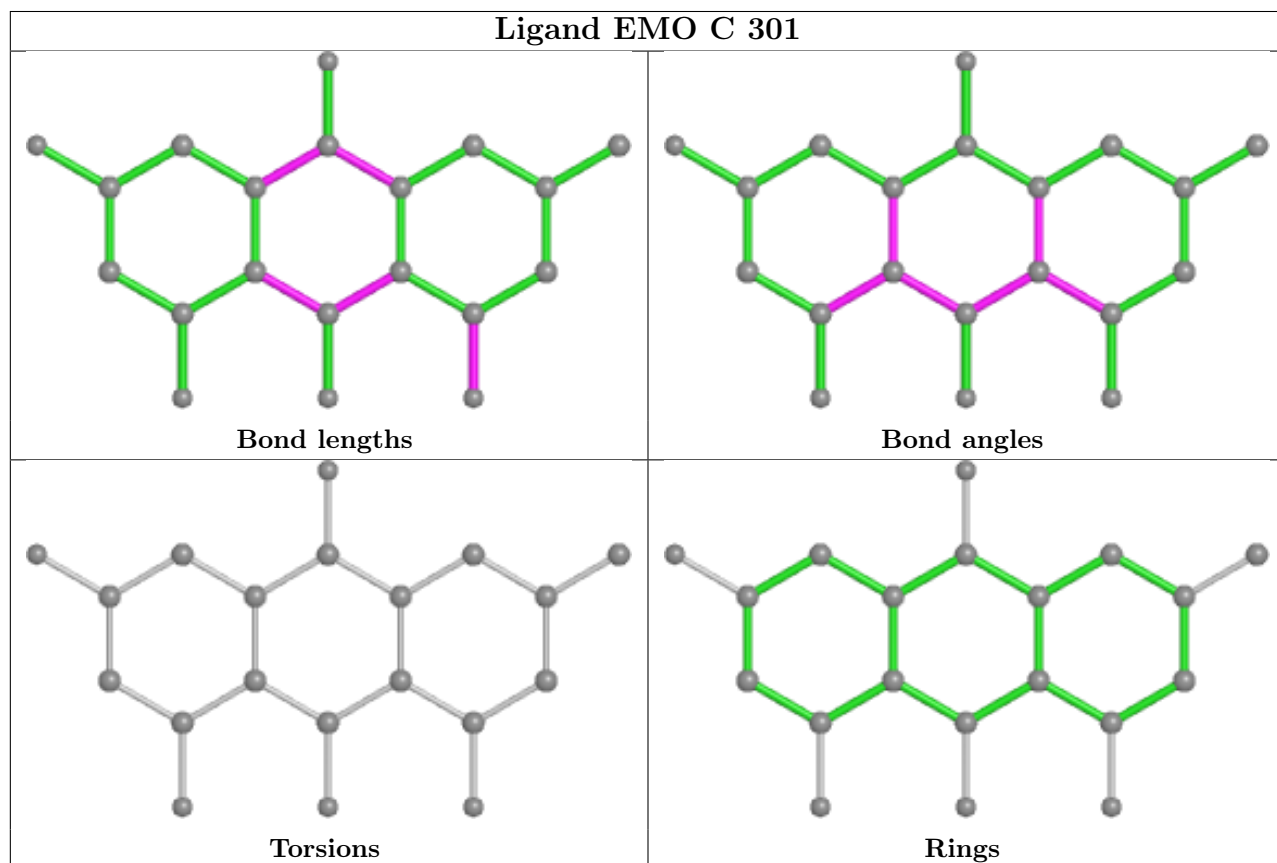
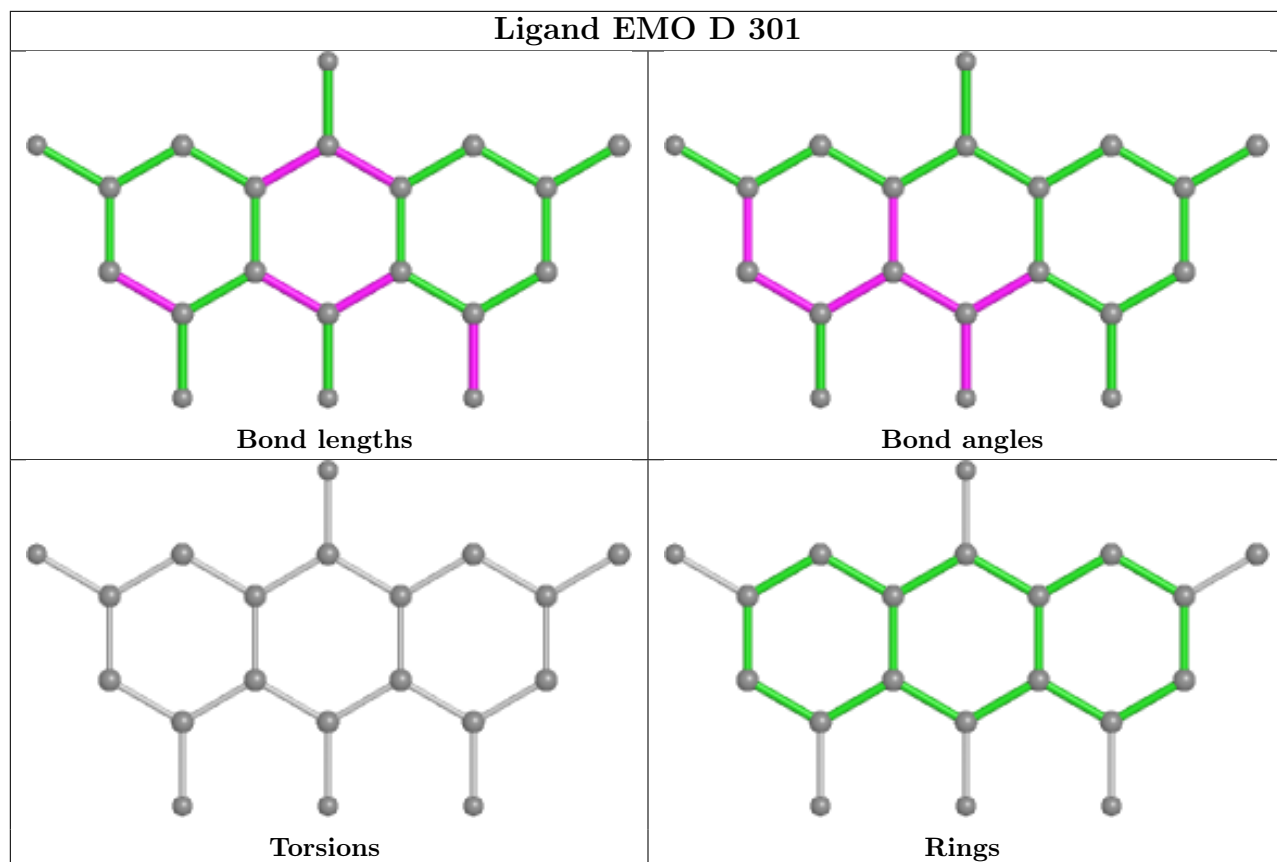
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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	260/279 (93%)	-0.23	7 (2%) 54 53	10, 17, 43, 73	0
1	B	260/279 (93%)	-0.25	9 (3%) 44 41	10, 17, 42, 63	0
1	C	261/279 (93%)	-0.12	8 (3%) 49 47	10, 19, 39, 60	0
1	D	264/279 (94%)	-0.13	10 (3%) 40 38	11, 19, 41, 61	0
All	All	1045/1116 (93%)	-0.18	34 (3%) 46 44	10, 18, 41, 73	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	216	THR	7.2
1	C	213	ASN	5.5
1	C	212	PRO	5.0
1	C	216	THR	4.9
1	B	217	TYR	4.8
1	A	213	ASN	4.5
1	D	215	GLU	4.4
1	C	217	TYR	4.4
1	A	216	THR	4.2
1	D	212	PRO	4.1
1	B	9	HIS	3.9
1	D	213	ASN	3.7
1	D	216	THR	3.6
1	B	215	GLU	3.5
1	D	217	TYR	3.5
1	A	212	PRO	3.3
1	C	215	GLU	3.1
1	B	213	ASN	3.1
1	C	8	LEU	3.0
1	B	268	ALA	2.8
1	C	10	ILE	2.7

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	D	218	THR	2.5
1	B	63	GLN	2.4
1	A	10	ILE	2.4
1	C	211	ILE	2.4
1	B	221	GLU	2.3
1	A	157	PHE	2.3
1	D	5	THR	2.3
1	A	217	TYR	2.2
1	D	63	GLN	2.2
1	A	63	GLN	2.2
1	B	218	THR	2.1
1	D	99	VAL	2.1
1	D	147	ILE	2.1

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.

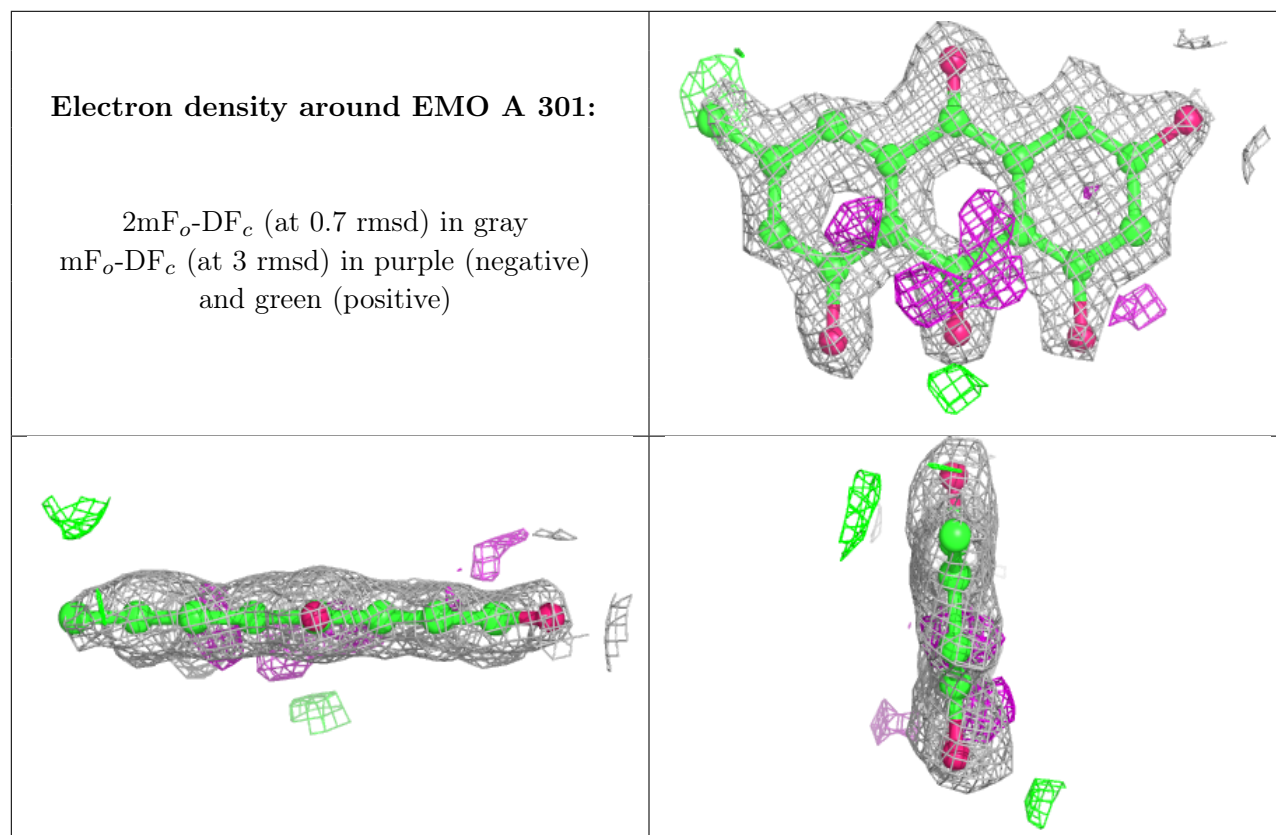
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	EMO	A	301	20/20	0.85	0.23	33,36,39,40	0
2	EMO	B	301	20/20	0.88	0.18	27,31,32,34	0
4	GOL	A	304	6/6	0.88	0.17	27,40,44,44	0
4	GOL	D	303	6/6	0.90	0.13	27,29,34,44	0
2	EMO	D	301	20/20	0.91	0.13	24,28,30,31	0
4	GOL	A	303	6/6	0.93	0.18	25,34,35,36	0
2	EMO	C	301	20/20	0.94	0.11	25,28,30,31	0
4	GOL	B	303	6/6	0.96	0.10	23,25,31,32	0
3	NAP	C	302	48/48	0.97	0.07	13,16,18,21	0
3	NAP	D	302	48/48	0.97	0.07	14,15,17,22	0

Continued on next page...

Continued from previous page...

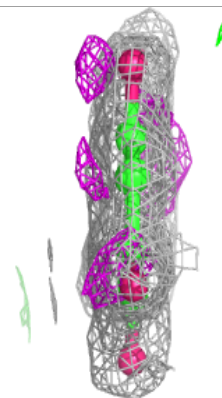
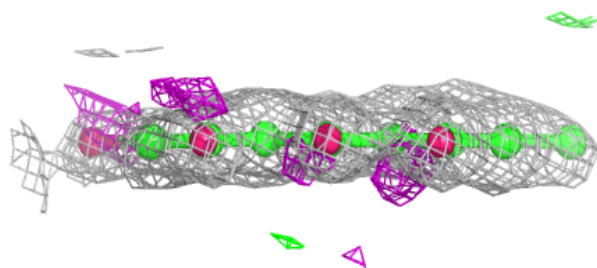
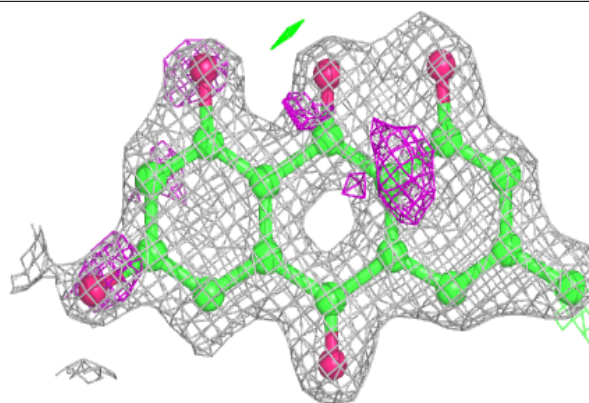
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	NAP	A	302	48/48	0.98	0.06	12,13,15,16	0
3	NAP	B	302	48/48	0.98	0.07	12,13,16,16	0

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.

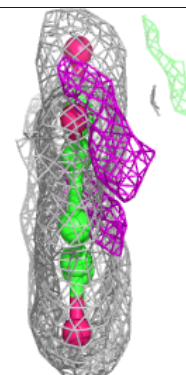
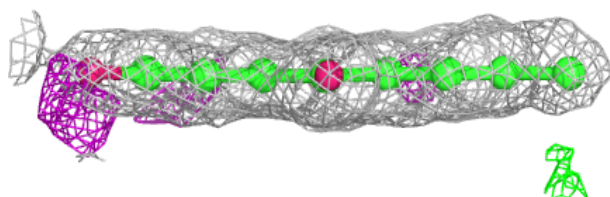
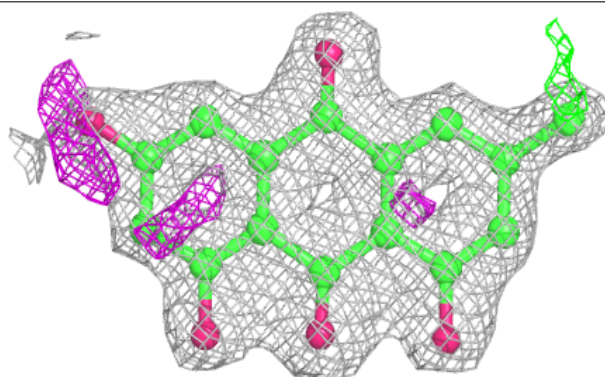


Electron density around EMO B 301:

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

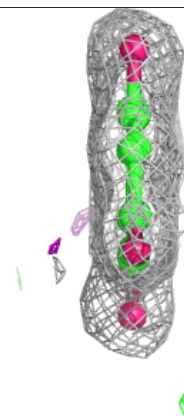
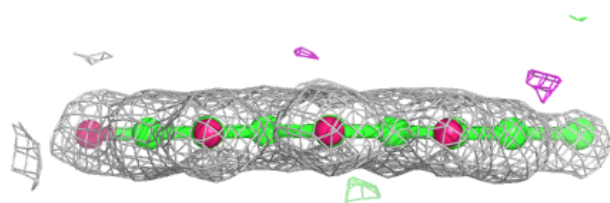
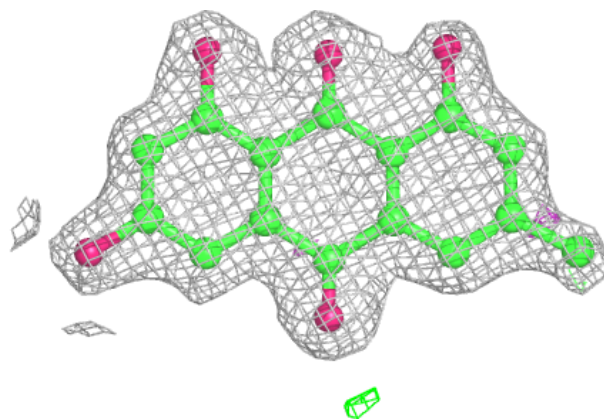
**Electron density around EMO D 301:**

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

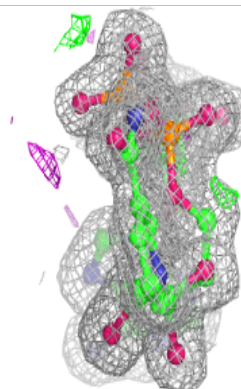
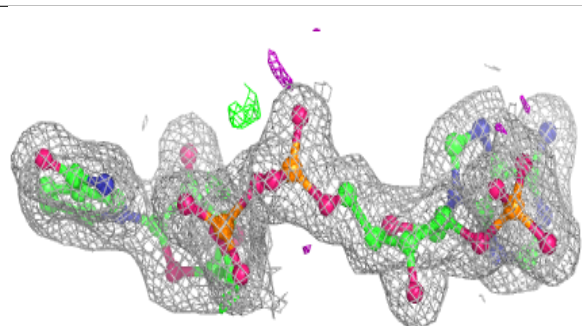
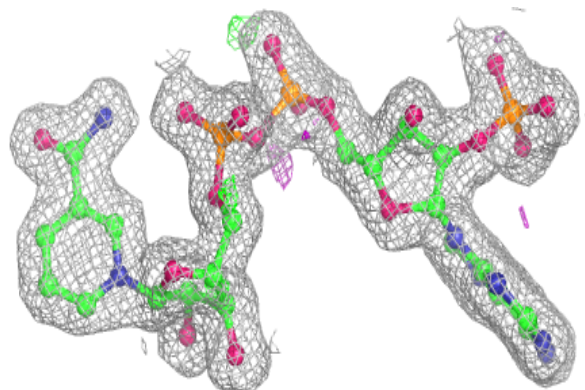


Electron density around EMO C 301:

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

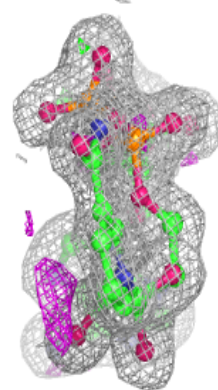
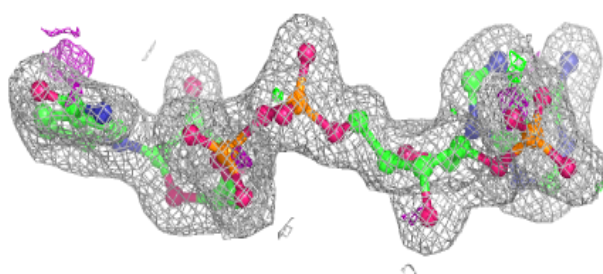
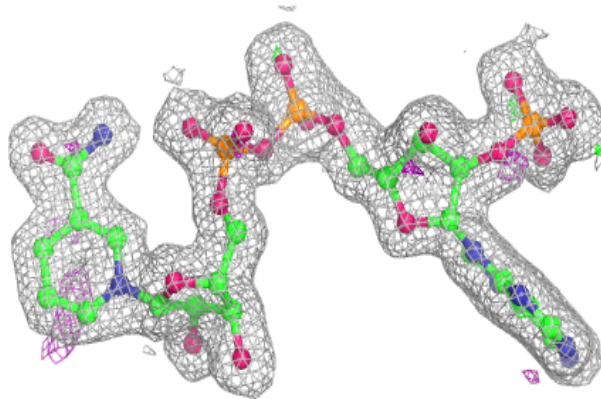
**Electron density around NAP C 302:**

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

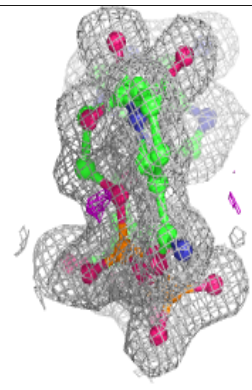
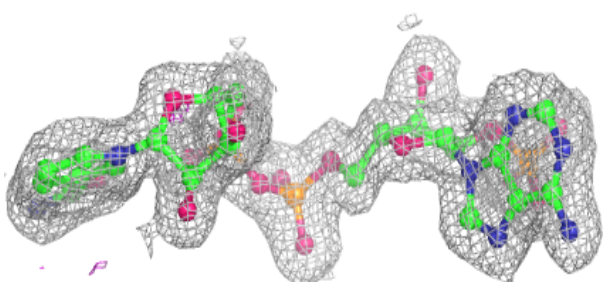
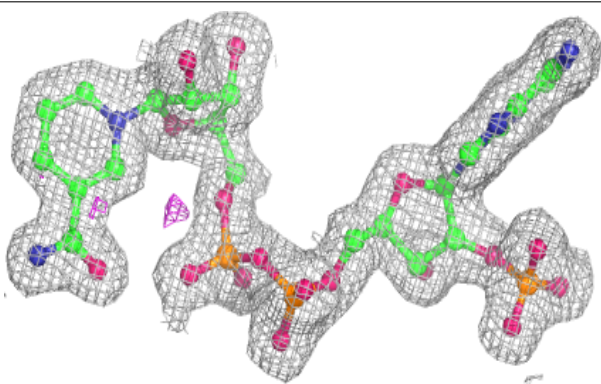


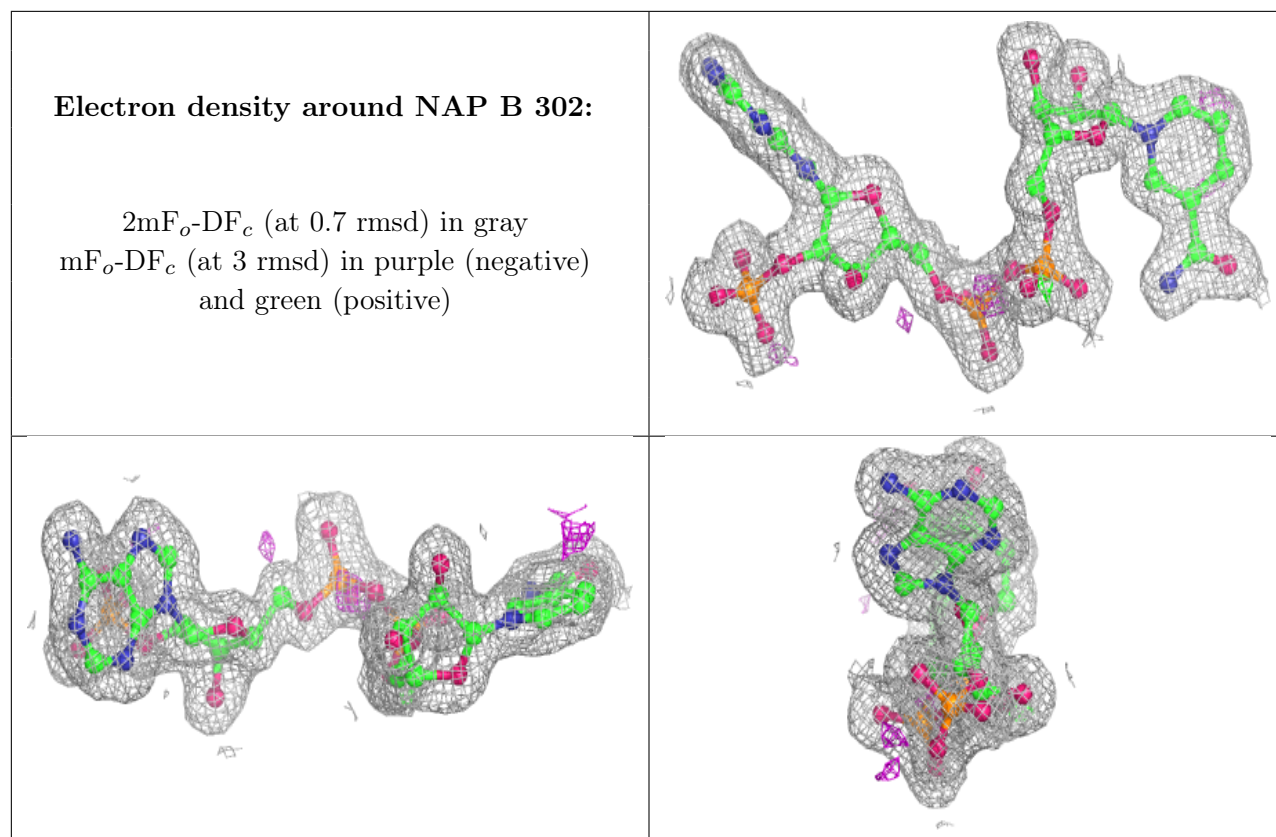
Electron density around NAP D 302:

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

**Electron density around NAP A 302:**

$2mF_o-DF_c$ (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.