Full wwPDB X-ray Structure Validation Report ⓘ

Jun 26, 2024 – 02:08 AM EDT

PDB ID	:	6TBX
Title	:	Trypanosoma brucei PTR1 (TbPTR1) in complex with a tricyclic-based inhibitor
Authors	:	Landi, G.; Tassone, G.; Pozzi, C.; Mangani, S.
Deposited on	:	2019-11-04
Resolution	:	1.30 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:

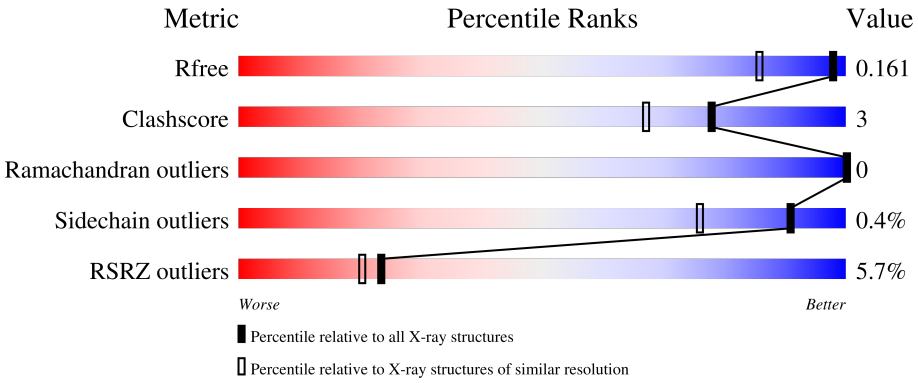
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.30 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	1058 (1.30-1.30)
Clashscore	141614	1101 (1.30-1.30)
Ramachandran outliers	138981	1058 (1.30-1.30)
Sidechain outliers	138945	1058 (1.30-1.30)
RSRZ outliers	127900	1029 (1.30-1.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	288	7% 81% 6% 14%
1	B	288	3% 80% 7% 14%
1	D	288	5% 83% • 14%
2	C	288	4% 73% 10% 17%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 8551 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 Pteridine reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	249	Total	C	N	O	S	0	15	0
			1896	1203	328	352	13			
1	B	249	Total	C	N	O	S	0	10	0
			1893	1201	330	349	13			
1	D	249	Total	C	N	O	S	0	12	0
			1902	1205	329	355	13			

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP O76290
A	-18	GLY	-	expression tag	UNP O76290
A	-17	SER	-	expression tag	UNP O76290
A	-16	SER	-	expression tag	UNP O76290
A	-15	HIS	-	expression tag	UNP O76290
A	-14	HIS	-	expression tag	UNP O76290
A	-13	HIS	-	expression tag	UNP O76290
A	-12	HIS	-	expression tag	UNP O76290
A	-11	HIS	-	expression tag	UNP O76290
A	-10	HIS	-	expression tag	UNP O76290
A	-9	SER	-	expression tag	UNP O76290
A	-8	SER	-	expression tag	UNP O76290
A	-7	GLY	-	expression tag	UNP O76290
A	-6	LEU	-	expression tag	UNP O76290
A	-5	VAL	-	expression tag	UNP O76290
A	-4	PRO	-	expression tag	UNP O76290
A	-3	ARG	-	expression tag	UNP O76290
A	-2	GLY	-	expression tag	UNP O76290
A	-1	SER	-	expression tag	UNP O76290
A	0	HIS	-	expression tag	UNP O76290
B	-19	MET	-	initiating methionine	UNP O76290
B	-18	GLY	-	expression tag	UNP O76290
B	-17	SER	-	expression tag	UNP O76290

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-16	SER	-	expression tag	UNP O76290
B	-15	HIS	-	expression tag	UNP O76290
B	-14	HIS	-	expression tag	UNP O76290
B	-13	HIS	-	expression tag	UNP O76290
B	-12	HIS	-	expression tag	UNP O76290
B	-11	HIS	-	expression tag	UNP O76290
B	-10	HIS	-	expression tag	UNP O76290
B	-9	SER	-	expression tag	UNP O76290
B	-8	SER	-	expression tag	UNP O76290
B	-7	GLY	-	expression tag	UNP O76290
B	-6	LEU	-	expression tag	UNP O76290
B	-5	VAL	-	expression tag	UNP O76290
B	-4	PRO	-	expression tag	UNP O76290
B	-3	ARG	-	expression tag	UNP O76290
B	-2	GLY	-	expression tag	UNP O76290
B	-1	SER	-	expression tag	UNP O76290
B	0	HIS	-	expression tag	UNP O76290
D	-19	MET	-	initiating methionine	UNP O76290
D	-18	GLY	-	expression tag	UNP O76290
D	-17	SER	-	expression tag	UNP O76290
D	-16	SER	-	expression tag	UNP O76290
D	-15	HIS	-	expression tag	UNP O76290
D	-14	HIS	-	expression tag	UNP O76290
D	-13	HIS	-	expression tag	UNP O76290
D	-12	HIS	-	expression tag	UNP O76290
D	-11	HIS	-	expression tag	UNP O76290
D	-10	HIS	-	expression tag	UNP O76290
D	-9	SER	-	expression tag	UNP O76290
D	-8	SER	-	expression tag	UNP O76290
D	-7	GLY	-	expression tag	UNP O76290
D	-6	LEU	-	expression tag	UNP O76290
D	-5	VAL	-	expression tag	UNP O76290
D	-4	PRO	-	expression tag	UNP O76290
D	-3	ARG	-	expression tag	UNP O76290
D	-2	GLY	-	expression tag	UNP O76290
D	-1	SER	-	expression tag	UNP O76290
D	0	HIS	-	expression tag	UNP O76290

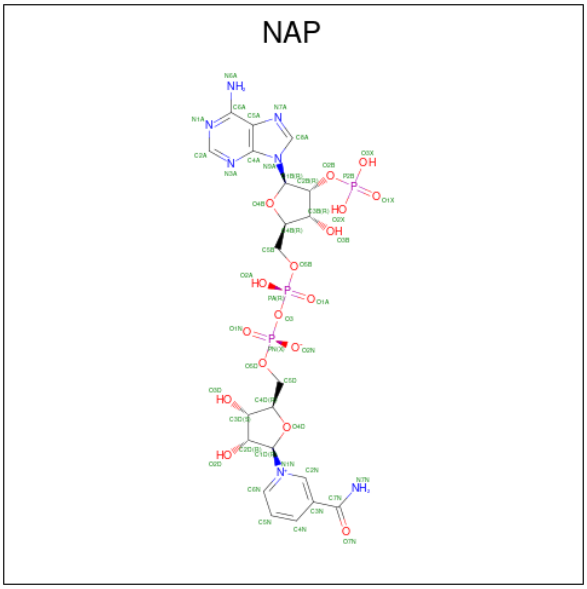
- Molecule 2 is a protein called Pteridine reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	239	Total	C	N	O	S	0	19	0
			1841	1165	317	348	11			

There are 20 discrepancies between the modelled and reference sequences:

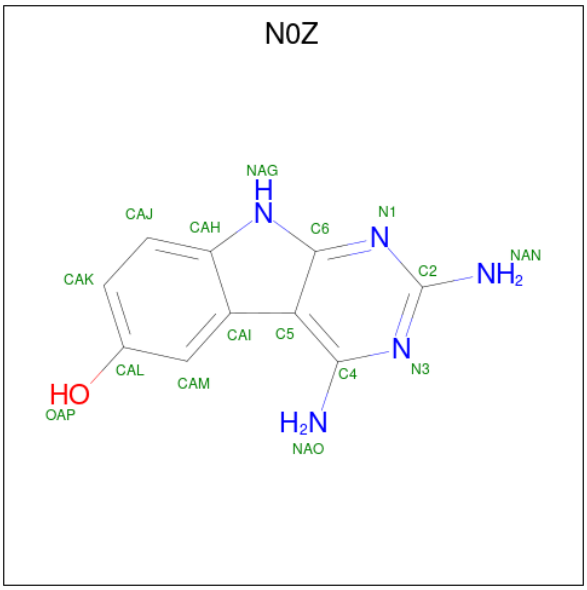
Chain	Residue	Modelled	Actual	Comment	Reference
C	-19	MET	-	initiating methionine	UNP O76290
C	-18	GLY	-	expression tag	UNP O76290
C	-17	SER	-	expression tag	UNP O76290
C	-16	SER	-	expression tag	UNP O76290
C	-15	HIS	-	expression tag	UNP O76290
C	-14	HIS	-	expression tag	UNP O76290
C	-13	HIS	-	expression tag	UNP O76290
C	-12	HIS	-	expression tag	UNP O76290
C	-11	HIS	-	expression tag	UNP O76290
C	-10	HIS	-	expression tag	UNP O76290
C	-9	SER	-	expression tag	UNP O76290
C	-8	SER	-	expression tag	UNP O76290
C	-7	GLY	-	expression tag	UNP O76290
C	-6	LEU	-	expression tag	UNP O76290
C	-5	VAL	-	expression tag	UNP O76290
C	-4	PRO	-	expression tag	UNP O76290
C	-3	ARG	-	expression tag	UNP O76290
C	-2	GLY	-	expression tag	UNP O76290
C	-1	SER	-	expression tag	UNP O76290
C	0	HIS	-	expression tag	UNP O76290

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$).



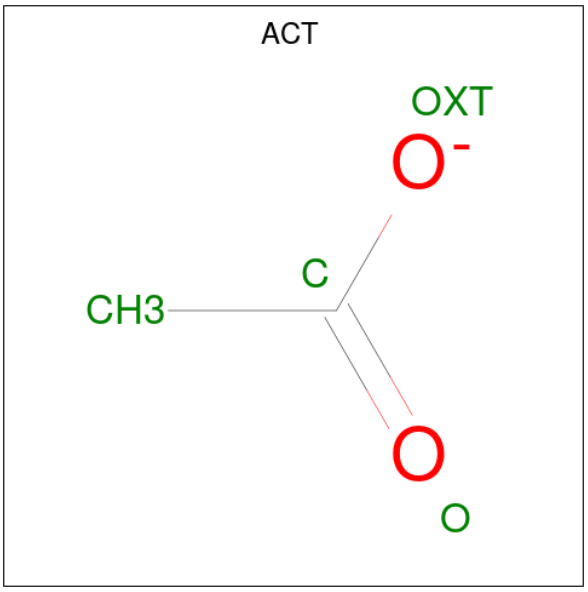
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	C	1	Total	C	N	O	P	0	1
			48	21	7	17	3		
3	D	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 4 is 2,4-bis(azanyl)-9 {H}-pyrimido[4,5-b]indol-6-ol (three-letter code: N0Z) (formula: $C_{10}H_9N_5O$) (labeled as "Ligand of Interest" by depositor).



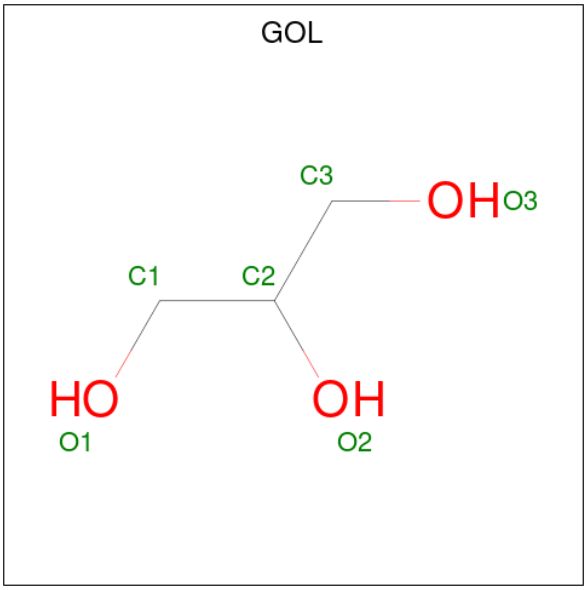
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			16	10	5	1		
4	B	1	Total	C	N	O	0	0
			16	10	5	1		
4	C	1	Total	C	N	O	0	1
			16	10	5	1		
4	D	1	Total	C	N	O	0	0
			16	10	5	1		

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



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

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	C	O	0	1
			6	3	3		

- Molecule 7 is water.

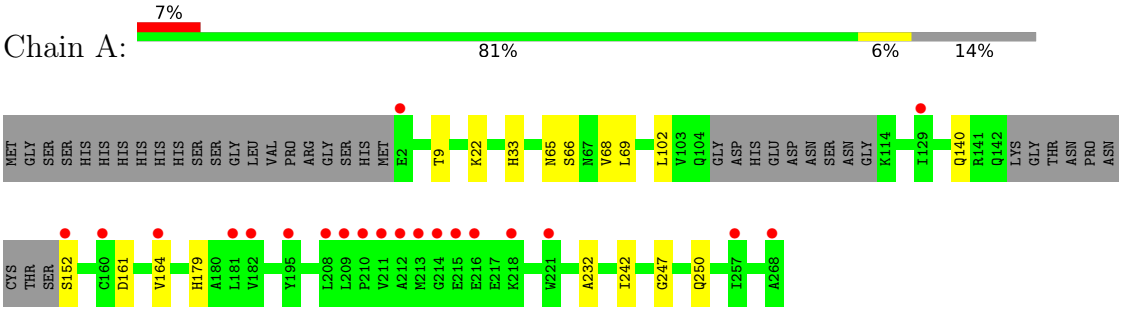
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	191	Total O 192 192	0	4
7	B	187	Total O 189 189	0	3
7	C	160	Total O 163 163	0	7
7	D	202	Total O 205 205	0	6

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

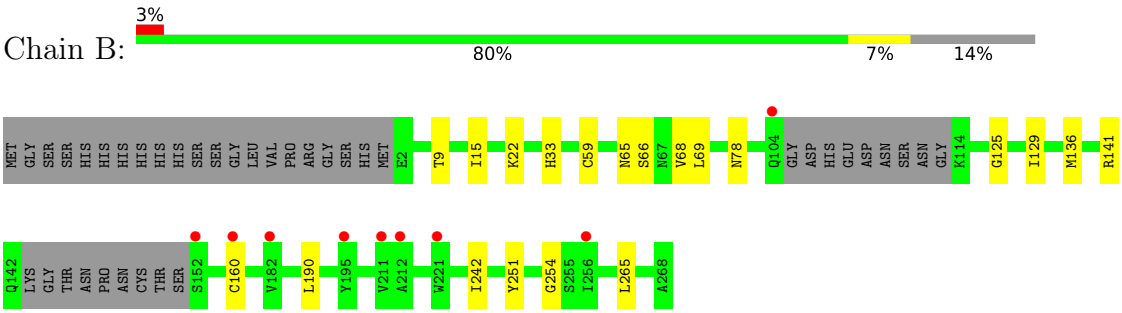
• Molecule 1: Pteridine reductase

Chain A:



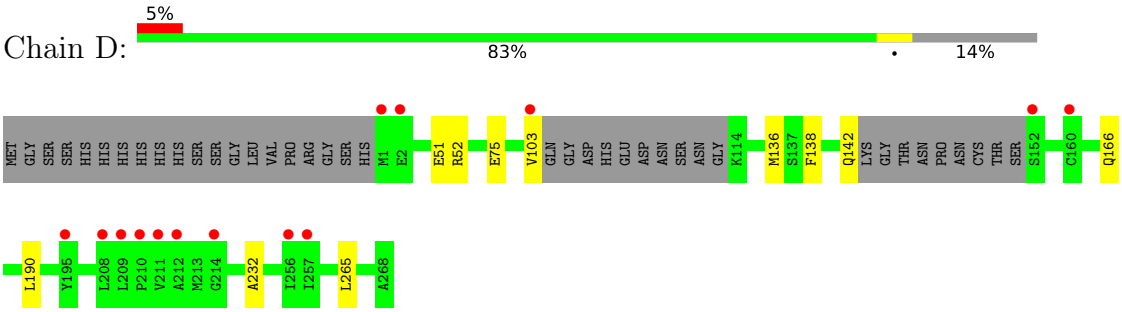
• Molecule 1: Pteridine reductase

Chain B:



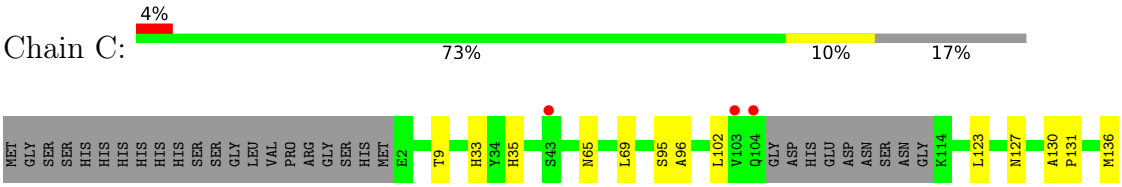
• Molecule 1: Pteridine reductase

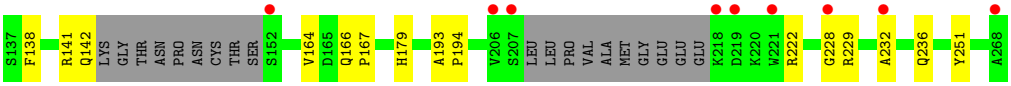
Chain D:



• Molecule 2: Pteridine reductase

Chain C:




S137
F138
R141
Q142
LYS
GLY
THR
ASN
PRO
ASN
CYS
THR
SER
S152
V164
D165
Q166
P167
H179
A193
P194
V206
S207
LEU
LEU
PRO
VAL
ALA
MET
GLY
GLU
GLU
GLU
K218
D219
K220
W221
R222
G228
R229
A232
Q236
Y251
A268

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	74.68Å 90.78Å 82.81Å 90.00° 115.65° 90.00°	Depositor
Resolution (Å)	41.83 – 1.30 41.80 – 1.30	Depositor EDS
% Data completeness (in resolution range)	96.0 (41.83-1.30) 96.0 (41.80-1.30)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.39 (at 1.30Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.126 , 0.159 0.127 , 0.161	Depositor DCC
R_{free} test set	11767 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	10.0	Xtriage
Anisotropy	1.420	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 52.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.014 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.98	EDS
Total number of atoms	8551	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 32.25 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 9.6899e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, NAP, N0Z, ACT, CSX

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	0.73	0/1953	0.83	0/2656
1	B	0.72	0/1950	0.82	0/2648
1	D	0.71	0/1965	0.85	0/2669
2	C	0.71	0/1879	0.81	0/2554
All	All	0.71	0/7747	0.83	0/10527

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

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	1896	0	1920	11	0
1	B	1893	0	1945	15	0
1	D	1902	0	1941	8	0
2	C	1841	0	1832	19	0
3	A	48	0	25	0	0
3	B	48	0	25	1	0
3	C	48	0	25	1	0
3	D	48	0	25	0	0
4	A	16	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	16	0	0	0	0
4	C	16	0	0	0	0
4	D	16	0	0	0	0
5	B	4	0	3	0	0
5	D	4	0	3	0	0
6	C	6	0	8	0	0
7	A	192	0	0	0	0
7	B	189	0	0	2	0
7	C	163	0	0	3	0
7	D	205	0	0	1	0
All	All	8551	0	7752	45	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 (45) 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:D:51:GLU:OE1	1:D:52[A]:ARG:HG3	1.79	0.83
1:A:164[A]:VAL:HG22	1:A:179:HIS:CD2	2.15	0.81
2:C:95[B]:SER:HB2	2:C:127[B]:ASN:HD21	1.56	0.71
1:B:160:CYS:HB3	7:B:539:HOH:O	1.93	0.67
1:A:140:GLN:OE1	1:D:103:VAL:HG12	1.96	0.66
2:C:164:VAL:HG22	2:C:179:HIS:CD2	2.34	0.63
1:B:22:LYS:HG2	1:B:242:ILE:HG13	1.83	0.60
1:A:66:SER:OG	1:A:68[B]:VAL:HG12	2.02	0.59
1:D:75[B]:GLU:HG2	7:D:513:HOH:O	2.09	0.53
2:C:9:THR:HA	2:C:33:HIS:HB3	1.92	0.51
2:C:65:ASN:HA	2:C:69:LEU:HD22	1.92	0.51
1:B:265:LEU:O	1:D:190[B]:LEU:HD11	2.10	0.50
1:B:66:SER:OG	1:B:68[A]:VAL:HG12	2.11	0.50
1:A:164[A]:VAL:HG22	1:A:179:HIS:NE2	2.27	0.49
2:C:136[B]:MET:HG2	7:C:547:HOH:O	2.13	0.49
1:B:190[B]:LEU:HD12	2:C:167:PRO:HG2	1.94	0.48
2:C:228[B]:GLY:N	7:C:401:HOH:O	2.24	0.48
2:C:35:HIS:HB2	3:C:301[A]:NAP:C2A	2.46	0.46
2:C:141:ARG:HG2	7:C:520:HOH:O	2.16	0.45
1:B:136[B]:MET:HG2	7:B:570:HOH:O	2.16	0.45
2:C:95[B]:SER:HB2	2:C:127[B]:ASN:ND2	2.28	0.44
2:C:138:PHE:O	2:C:142:GLN:HG2	2.17	0.44
2:C:232[B]:ALA:HA	2:C:236:GLN:OE1	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:9:THR:HA	1:A:33:HIS:HB3	2.00	0.44
1:A:161:ASP:HB3	1:A:164[B]:VAL:HG13	2.00	0.43
1:B:78:ASN:OD1	1:B:141:ARG:NH1	2.46	0.43
1:B:125:GLY:HA2	1:B:129[B]:ILE:HB	2.01	0.43
1:A:65:ASN:HA	1:A:69:LEU:HD22	2.01	0.42
2:C:164:VAL:HG22	2:C:179:HIS:NE2	2.34	0.42
1:A:102:LEU:O	1:D:136[B]:MET:HG3	2.19	0.42
1:A:22:LYS:HG2	1:A:242:ILE:HG13	2.02	0.42
1:B:9:THR:HA	1:B:33:HIS:HB3	2.02	0.42
1:B:33:HIS:HA	1:B:59:CYS:O	2.20	0.42
1:B:251:TYR:CE2	1:D:232:ALA:HB2	2.55	0.42
1:B:136[B]:MET:HG3	2:C:102:LEU:O	2.20	0.41
1:B:65:ASN:HA	1:B:69:LEU:HD22	2.01	0.41
2:C:222:ARG:O	2:C:229[B]:ARG:HA	2.20	0.41
2:C:193:ALA:N	2:C:194:PRO:CD	2.83	0.41
1:B:254:GLY:HA3	1:D:265:LEU:HD11	2.02	0.41
1:A:232:ALA:HB2	2:C:251:TYR:CE2	2.56	0.40
2:C:96:ALA:HB3	2:C:123[B]:LEU:HD23	2.03	0.40
1:A:247:GLY:HA2	1:A:250[A]:GLN:HG3	2.03	0.40
1:B:15:ILE:HB	3:B:301:NAP:H51N	2.02	0.40
1:D:138:PHE:O	1:D:142:GLN:HG2	2.21	0.40
2:C:130:ALA:HB3	2:C:131:PRO:HD3	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	258/288 (90%)	248 (96%)	10 (4%)	0	100	100
1	B	254/288 (88%)	245 (96%)	9 (4%)	0	100	100
1	D	256/288 (89%)	248 (97%)	8 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	C	249/288 (86%)	243 (98%)	6 (2%)	0	100	100
All	All	1017/1152 (88%)	984 (97%)	33 (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	201/231 (87%)	200 (100%)	1 (0%)	88	69
1	B	203/231 (88%)	203 (100%)	0	100	100
1	D	203/231 (88%)	201 (99%)	2 (1%)	76	48
2	C	189/230 (82%)	188 (100%)	1 (0%)	88	69
All	All	796/923 (86%)	792 (100%)	4 (0%)	91	69

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

Mol	Chain	Res	Type
1	A	152	SER
2	C	166	GLN
1	D	166[A]	GLN
1	D	166[B]	GLN

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)

1 non-standard protein/DNA/RNA residue is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	CSX	C	168	2	3,6,7	0.70	0	1,6,8	0.39	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	CSX	C	168	2	-	0/1/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

11 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	$\#\|Z\|>2$
4	N0Z	B	302	-	17,18,18	1.60	2 (11%)	20,27,27	1.69	2 (10%)
3	NAP	A	301	-	45,52,52	0.80	1 (2%)	56,80,80	1.34	6 (10%)
4	N0Z	C	303[A]	-	17,18,18	1.98	5 (29%)	20,27,27	1.94	5 (25%)
3	NAP	B	301	-	45,52,52	0.91	2 (4%)	56,80,80	1.04	2 (3%)
5	ACT	D	303	-	3,3,3	0.94	0	3,3,3	0.98	0
6	GOL	C	302[A]	-	5,5,5	0.10	0	5,5,5	0.27	0
3	NAP	D	301	-	45,52,52	1.57	6 (13%)	56,80,80	1.43	7 (12%)
4	N0Z	D	302	-	17,18,18	1.82	3 (17%)	20,27,27	1.74	4 (20%)
5	ACT	B	303	-	3,3,3	1.01	0	3,3,3	0.62	0
4	N0Z	A	302	-	17,18,18	1.61	3 (17%)	20,27,27	1.71	3 (15%)
3	NAP	C	301[A]	-	45,52,52	0.98	3 (6%)	56,80,80	1.17	5 (8%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	N0Z	B	302	-	-	-	0/3/3/3
3	NAP	A	301	-	-	1/31/67/67	0/5/5/5
4	N0Z	C	303[A]	-	-	-	0/3/3/3
3	NAP	B	301	-	-	0/31/67/67	0/5/5/5
6	GOL	C	302[A]	-	-	3/4/4/4	-
3	NAP	D	301	-	-	0/31/67/67	0/5/5/5
4	N0Z	D	302	-	-	-	0/3/3/3
4	N0Z	A	302	-	-	-	0/3/3/3
3	NAP	C	301[A]	-	-	1/31/67/67	0/5/5/5

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	301	NAP	O4D-C1D	5.41	1.48	1.41
4	C	303[A]	N0Z	CAJ-CAH	-4.76	1.33	1.41
4	D	302	N0Z	CAM-CAI	-4.39	1.33	1.41
4	D	302	N0Z	CAJ-CAH	-4.11	1.34	1.41
4	A	302	N0Z	CAJ-CAH	-3.87	1.35	1.41
4	B	302	N0Z	CAM-CAI	-3.43	1.34	1.41
4	B	302	N0Z	CAJ-CAH	-3.43	1.35	1.41
4	C	303[A]	N0Z	C5-C6	-3.30	1.34	1.43
4	C	303[A]	N0Z	CAM-CAI	-3.22	1.35	1.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	301	NAP	PN-O1N	-3.13	1.39	1.50
3	D	301	NAP	C5A-C4A	2.96	1.48	1.40
4	A	302	N0Z	CAM-CAI	-2.96	1.35	1.41
4	C	303[A]	N0Z	CAI-CAH	-2.91	1.34	1.42
3	B	301	NAP	O4D-C1D	2.79	1.45	1.41
3	C	301[A]	NAP	O4D-C1D	2.70	1.44	1.41
3	C	301[A]	NAP	C5A-C4A	2.61	1.47	1.40
3	D	301	NAP	O2D-C2D	2.46	1.48	1.43
3	C	301[A]	NAP	C2A-N3A	2.34	1.35	1.32
4	C	303[A]	N0Z	CAM-CAL	2.31	1.41	1.37
4	A	302	N0Z	CAM-CAL	2.26	1.41	1.37
3	A	301	NAP	O4D-C4D	2.19	1.49	1.45
3	D	301	NAP	O3D-C3D	-2.14	1.37	1.43
3	B	301	NAP	P2B-O2B	2.10	1.63	1.59
3	D	301	NAP	C2A-N3A	2.06	1.35	1.32
4	D	302	N0Z	C5-C6	-2.05	1.37	1.43

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	C	303[A]	N0Z	N1-C2-N3	-5.64	119.69	127.22
4	D	302	N0Z	N1-C2-N3	-5.40	120.01	127.22
4	B	302	N0Z	N1-C2-N3	-5.27	120.19	127.22
4	A	302	N0Z	N1-C2-N3	-5.22	120.26	127.22
3	A	301	NAP	C1B-N9A-C4A	-4.95	117.95	126.64
3	D	301	NAP	C1B-N9A-C4A	-4.57	118.61	126.64
3	B	301	NAP	C1B-N9A-C4A	-4.31	119.06	126.64
3	D	301	NAP	N3A-C2A-N1A	-4.05	122.34	128.68
4	C	303[A]	N0Z	C2-N1-C6	3.63	119.51	115.36
3	A	301	NAP	C5A-C6A-N6A	-3.53	114.99	120.35
3	C	301[A]	NAP	C1B-N9A-C4A	-3.43	120.61	126.64
3	C	301[A]	NAP	N3A-C2A-N1A	-3.26	123.58	128.68
4	C	303[A]	N0Z	NAN-C2-N3	3.20	122.22	117.25
3	A	301	NAP	O7N-C7N-C3N	-3.03	116.01	119.63
3	D	301	NAP	O4D-C1D-C2D	-2.97	102.59	106.93
3	D	301	NAP	O7N-C7N-N7N	-2.89	118.47	122.58
3	A	301	NAP	N3A-C2A-N1A	-2.82	124.28	128.68
3	A	301	NAP	C3N-C7N-N7N	2.78	121.09	117.75
3	C	301[A]	NAP	C2A-N1A-C6A	2.72	123.41	118.75
4	D	302	N0Z	NAN-C2-N1	2.59	122.01	117.79
4	A	302	N0Z	C2-N3-C4	2.49	123.82	116.72
4	B	302	N0Z	C2-N1-C6	2.43	118.13	115.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	C	303[A]	N0Z	C5-C4-NAO	-2.43	118.29	122.67
3	D	301	NAP	C3N-C2N-N1N	2.41	122.78	120.43
3	D	301	NAP	C3N-C7N-N7N	2.35	120.57	117.75
4	A	302	N0Z	C5-C4-N3	-2.25	116.89	122.73
4	D	302	N0Z	C2-N3-C4	2.19	122.98	116.72
3	D	301	NAP	C3D-C2D-C1D	2.19	104.27	100.98
3	C	301[A]	NAP	C4A-C5A-N7A	-2.17	107.14	109.40
3	B	301	NAP	N3A-C2A-N1A	-2.16	125.30	128.68
4	D	302	N0Z	CAK-CAJ-CAH	-2.12	118.17	120.84
3	C	301[A]	NAP	O3X-P2B-O1X	2.09	118.86	110.68
4	C	303[A]	N0Z	CAJ-CAK-CAL	-2.08	117.76	120.15
3	A	301	NAP	N6A-C6A-N1A	2.06	122.85	118.57

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	C	302[A]	GOL	O1-C1-C2-C3
6	C	302[A]	GOL	O1-C1-C2-O2
6	C	302[A]	GOL	C1-C2-C3-O3
3	A	301	NAP	C5B-O5B-PA-O1A
3	C	301[A]	NAP	C5B-O5B-PA-O1A

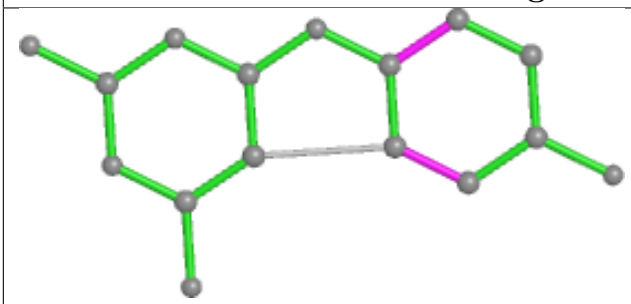
There are no ring outliers.

2 monomers are involved in 2 short contacts:

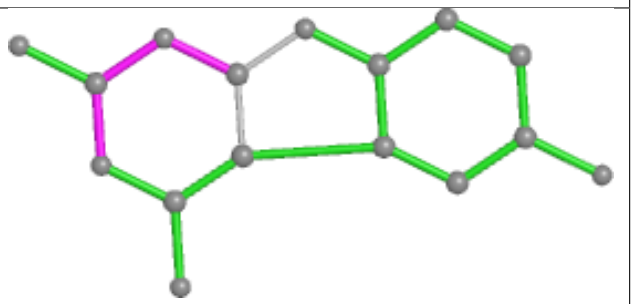
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	301	NAP	1	0
3	C	301[A]	NAP	1	0

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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

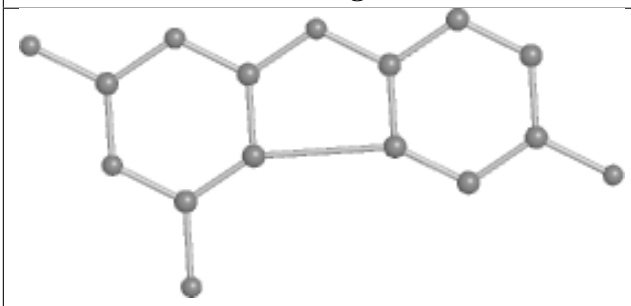
Ligand N0Z B 302



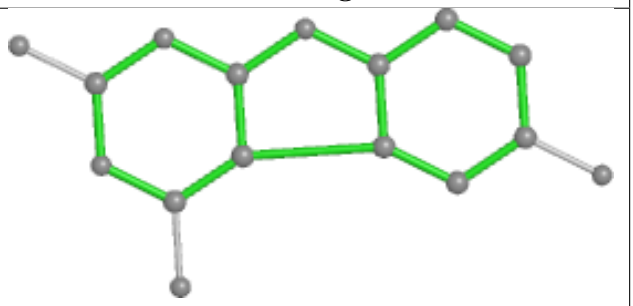
Bond lengths



Bond angles

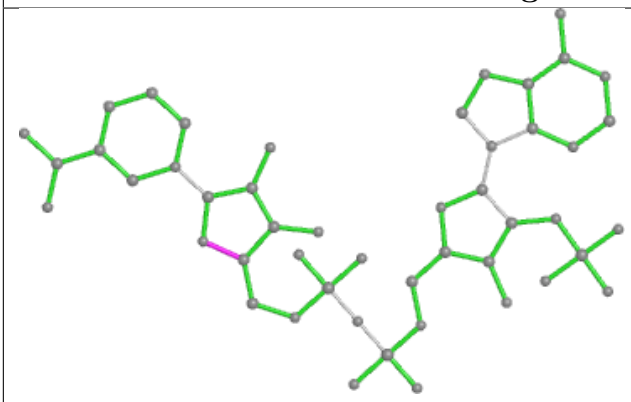


Torsions



Rings

Ligand NAP A 301



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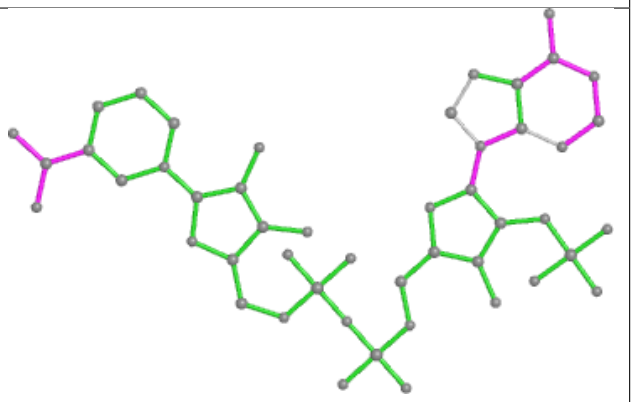

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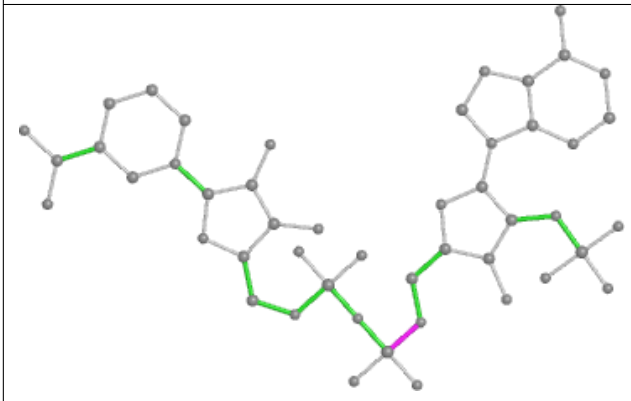

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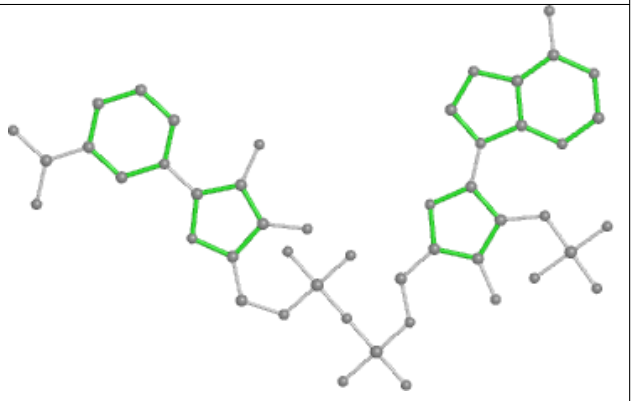
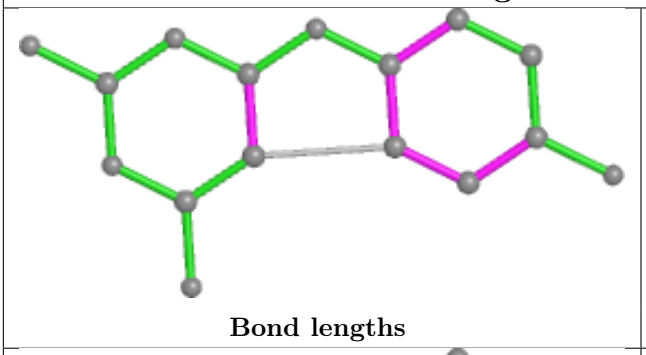


Rings

Ligand N0Z C 303 (A)



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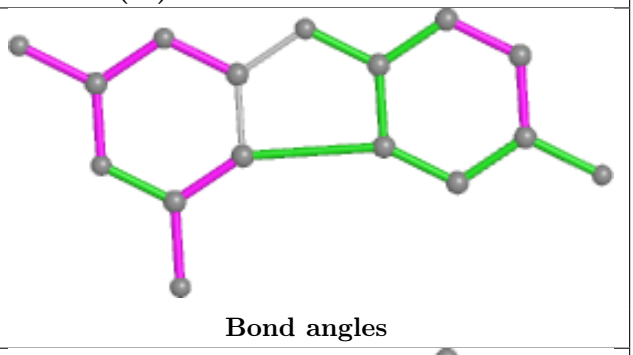

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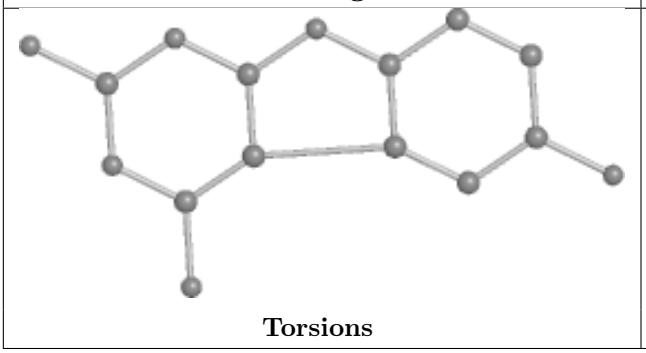

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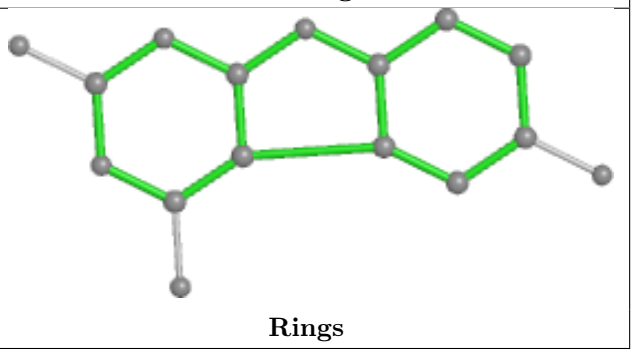
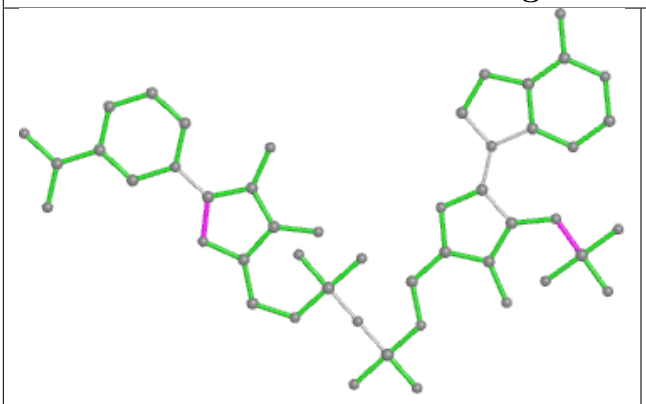


Rings

Ligand NAP B 301



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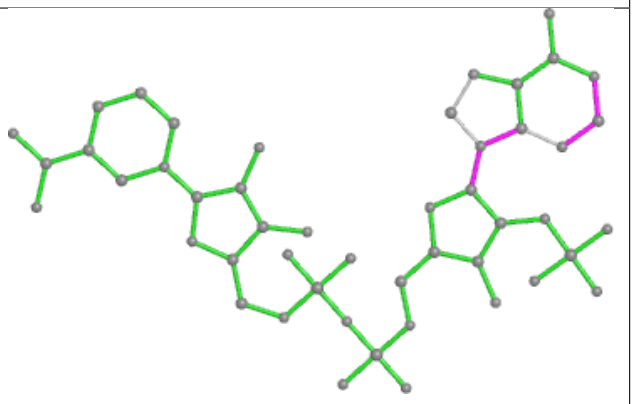

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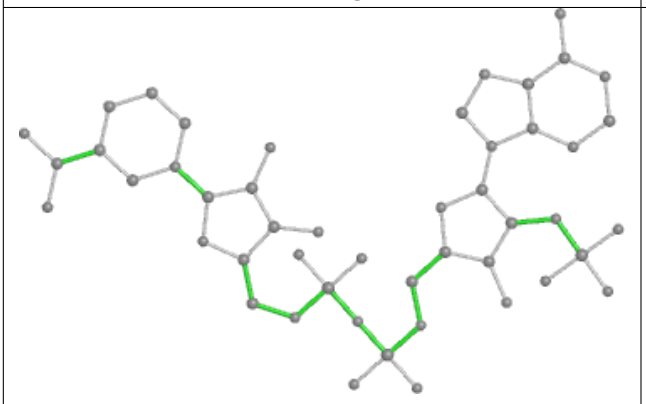

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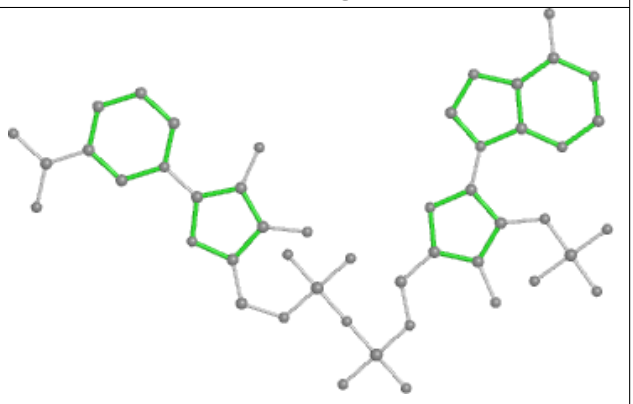
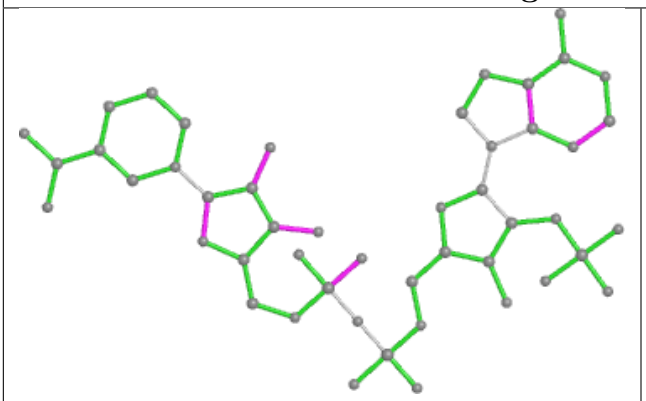


Rings

Ligand NAP D 301



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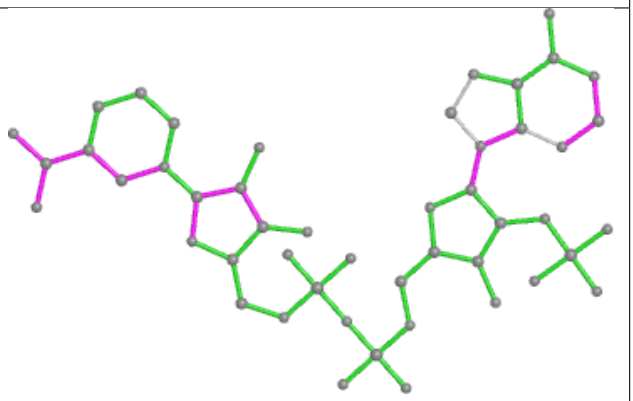

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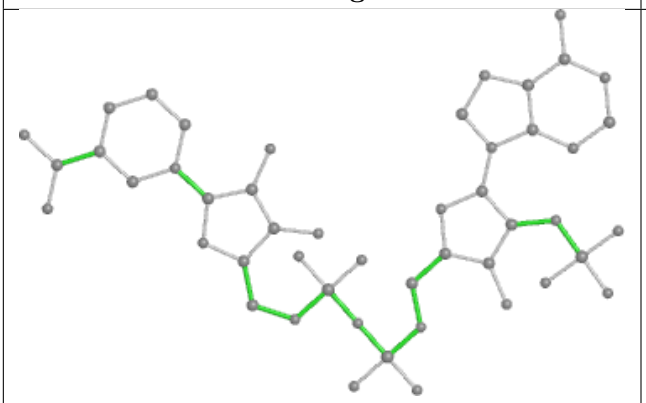

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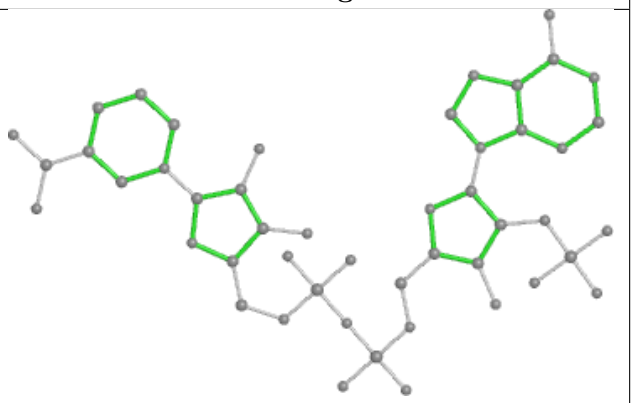
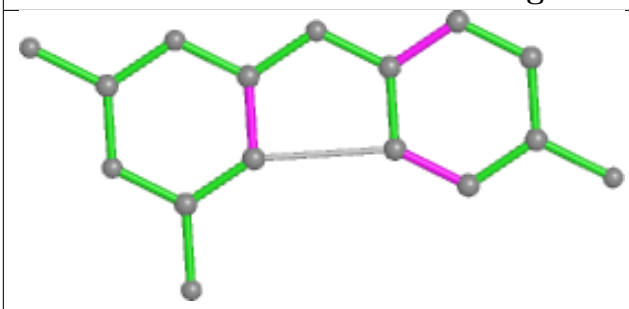


Rings

Ligand N0Z D 302



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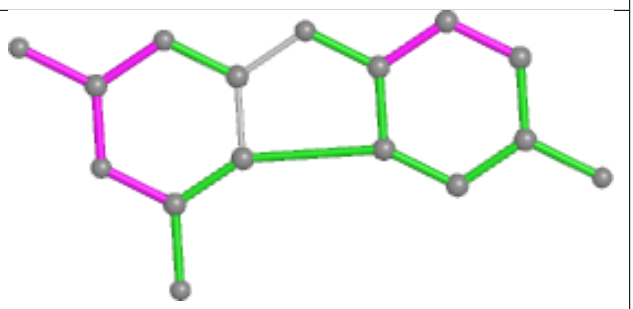
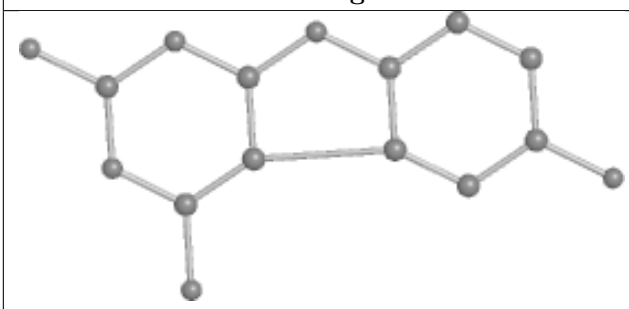


Bond angles



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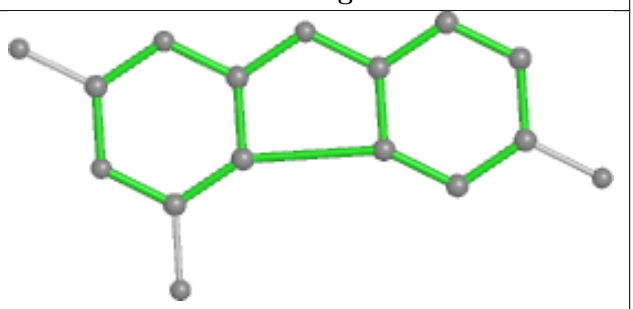
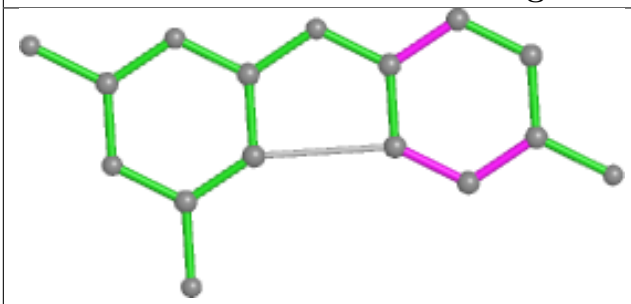
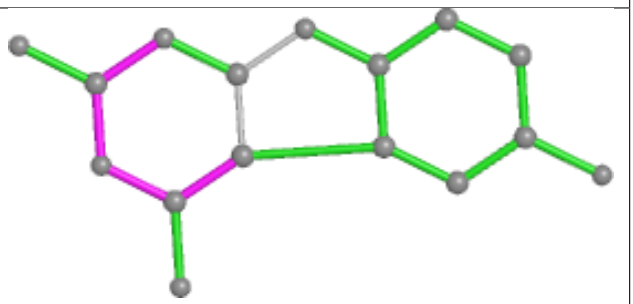


Rings

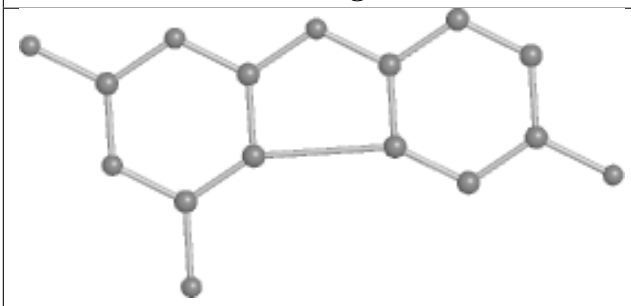
Ligand N0Z A 302



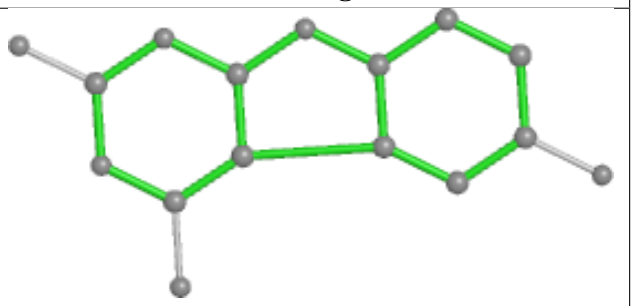
Bond lengths



Bond angles

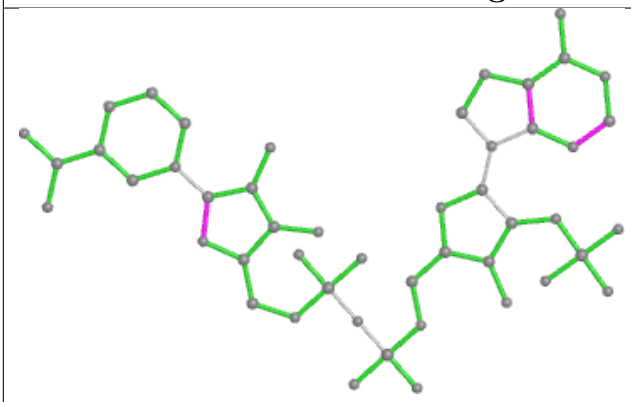


Torsions

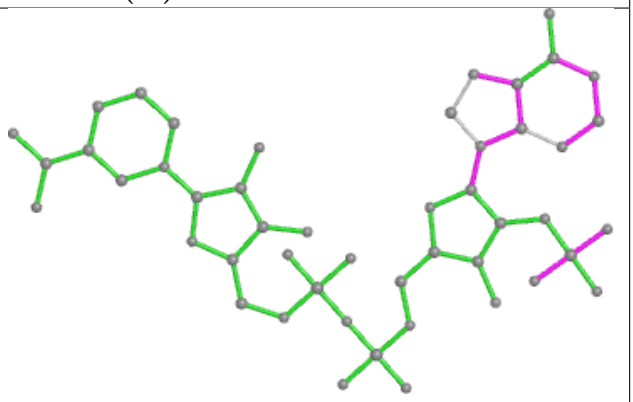


Rings

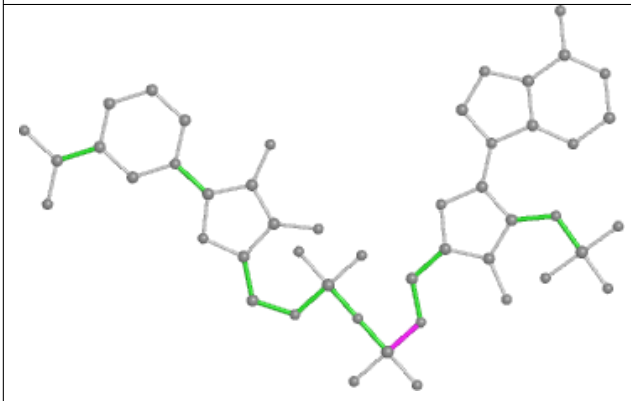
Ligand NAP C 301 (A)



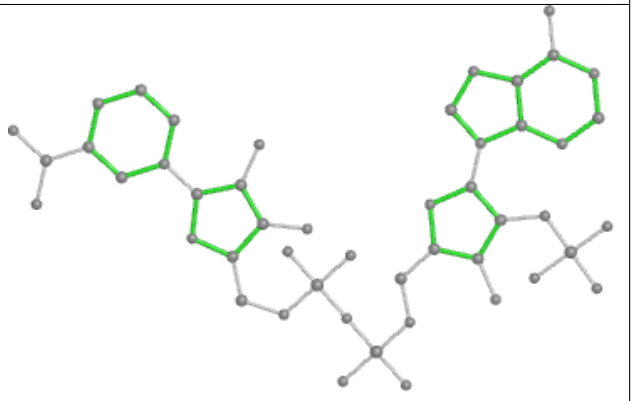
Bond lengths



Bond angles



Torsions



Rings

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, 95^{th} 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	249/288 (86%)	0.39	21 (8%)	11	7	10, 16, 33, 58	9 (3%)
1	B	249/288 (86%)	0.28	9 (3%)	42	39	10, 15, 32, 68	5 (2%)
1	D	249/288 (86%)	0.43	14 (5%)	24	21	9, 14, 28, 59	5 (2%)
2	C	238/288 (82%)	0.33	12 (5%)	28	26	10, 17, 33, 58	9 (3%)
All	All	985/1152 (85%)	0.36	56 (5%)	23	20	9, 16, 32, 68	28 (2%)

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	211	VAL	6.7
1	D	1	MET	5.9
1	D	103	VAL	5.8
1	B	212	ALA	5.5
2	C	221	TRP	5.4
1	D	211	VAL	5.3
1	A	212	ALA	5.3
2	C	206	VAL	5.2
1	D	212	ALA	4.8
1	B	160	CYS	4.8
1	A	213	MET	4.4
1	A	152	SER	4.2
1	A	210	PRO	4.2
2	C	152	SER	4.2
1	B	211	VAL	3.9
1	A	195	TYR	3.7
1	D	152	SER	3.7
2	C	268	ALA	3.6
1	A	208	LEU	3.6
1	A	209	LEU	3.6
1	D	210	PRO	3.6

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Mol	Chain	Res	Type	RSRZ
1	A	215	GLU	3.4
2	C	207	SER	3.3
2	C	103	VAL	3.3
1	A	164[A]	VAL	3.2
1	A	221	TRP	3.1
1	B	221	TRP	3.0
1	A	214	GLY	2.9
1	D	257	ILE	2.8
2	C	104	GLN	2.8
1	D	256	ILE	2.7
1	A	129[A]	ILE	2.7
1	D	160	CYS	2.7
1	B	104	GLN	2.6
1	D	208	LEU	2.6
1	D	195	TYR	2.6
1	D	209	LEU	2.6
2	C	232[A]	ALA	2.5
2	C	219	ASP	2.5
1	A	160	CYS	2.5
1	B	152	SER	2.5
1	A	181	LEU	2.4
1	B	195	TYR	2.4
1	D	214	GLY	2.4
1	A	2	GLU	2.4
1	B	182	VAL	2.4
2	C	218	LYS	2.3
1	A	182	VAL	2.3
1	A	268	ALA	2.3
1	A	218	LYS	2.2
1	A	257	ILE	2.2
2	C	43	SER	2.2
2	C	228[A]	GLY	2.1
1	A	216	GLU	2.1
1	B	256	ILE	2.1
1	D	2	GLU	2.1

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} 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	CSX	C	168	7/8	0.96	0.06	16,19,26,29	2

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

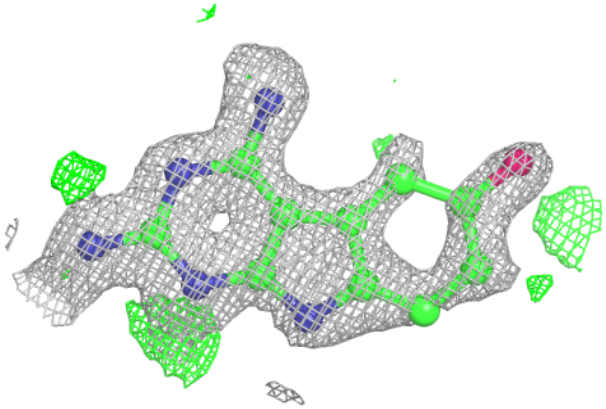
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

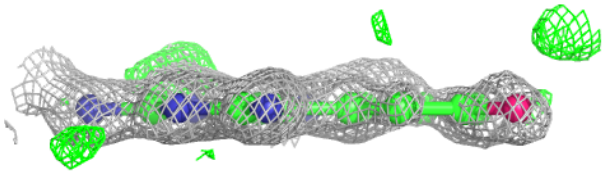
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	N0Z	C	303[A]	16/16	0.80	0.17	20,21,24,27	16
6	GOL	C	302[A]	6/6	0.82	0.21	21,24,25,28	6
5	ACT	D	303	4/4	0.84	0.14	20,21,25,25	0
3	NAP	C	301[A]	48/48	0.84	0.17	14,19,21,23	48
3	NAP	D	301	48/48	0.94	0.11	11,14,17,19	0
4	N0Z	A	302	16/16	0.95	0.19	16,18,29,34	0
4	N0Z	D	302	16/16	0.96	0.10	13,16,26,33	0
4	N0Z	B	302	16/16	0.97	0.13	14,16,26,33	0
5	ACT	B	303	4/4	0.97	0.22	22,22,23,26	0
3	NAP	B	301	48/48	0.98	0.09	11,15,17,23	0
3	NAP	A	301	48/48	0.98	0.10	13,16,19,24	0

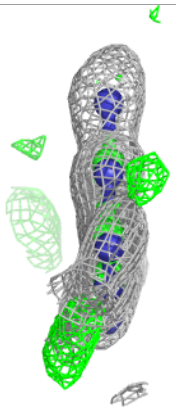
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around N0Z C 303 (A):

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

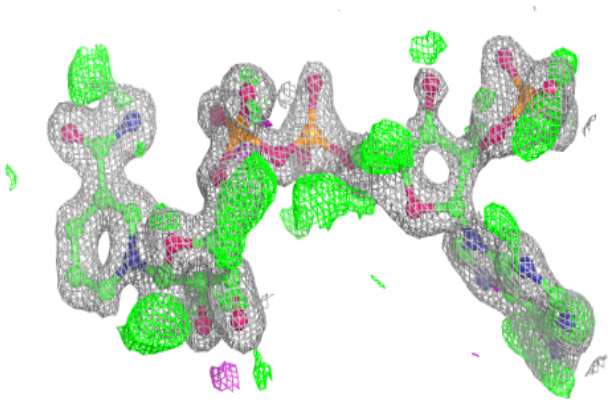


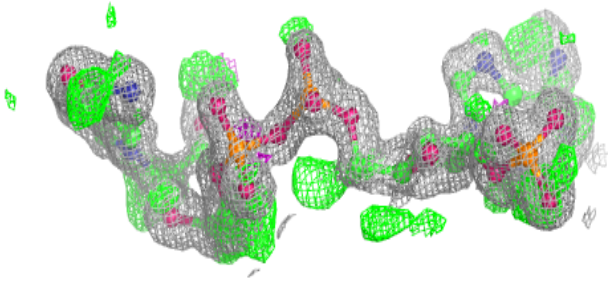


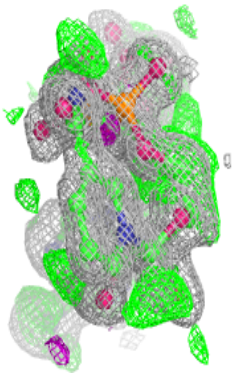


Electron density around NAP C 301 (A):

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

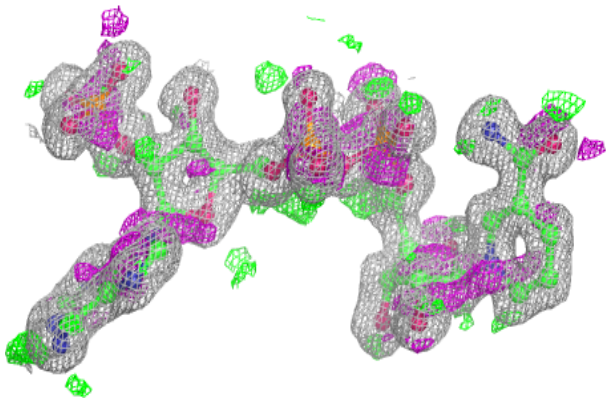


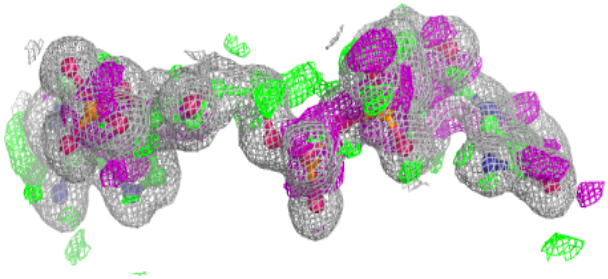


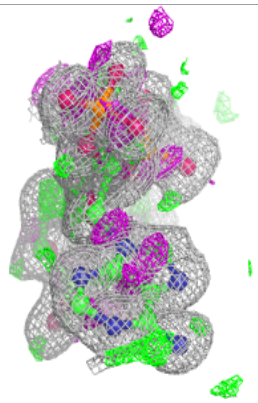


Electron density around NAP D 301:

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

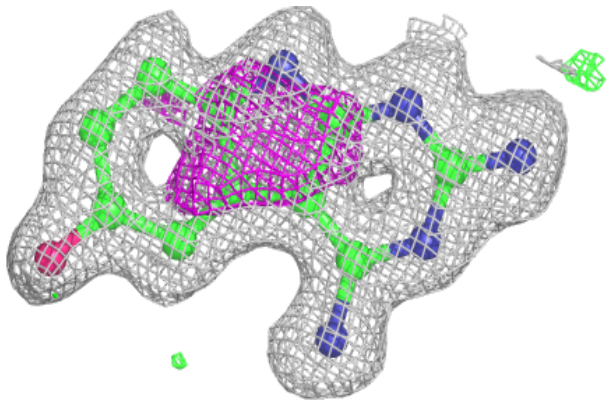


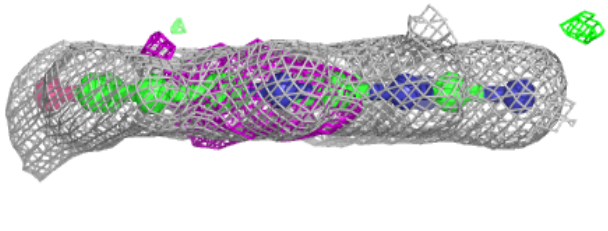


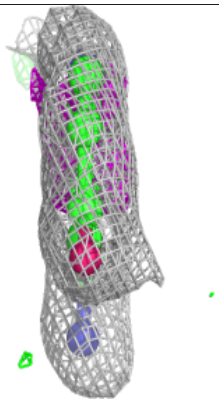


Electron density around N0Z A 302:

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

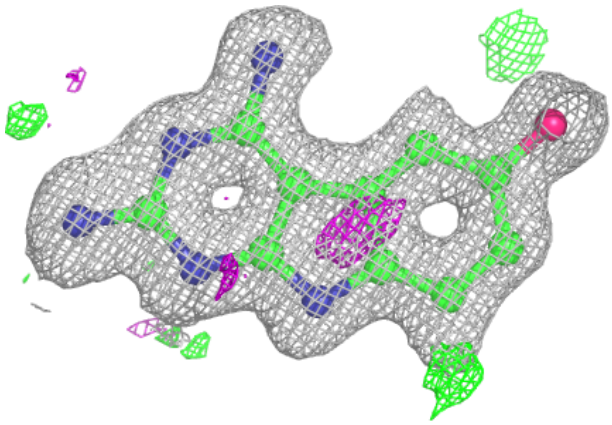


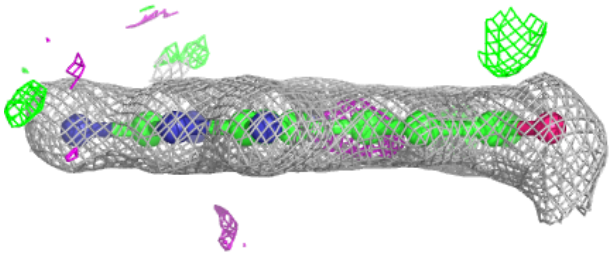


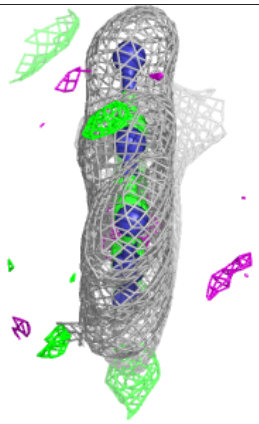


Electron density around N0Z D 302:

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

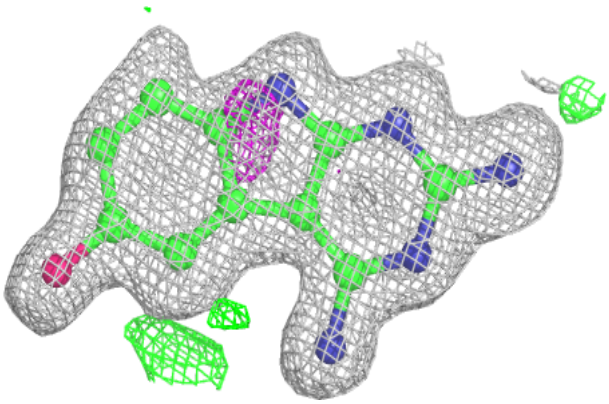


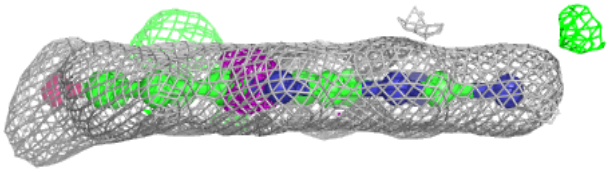


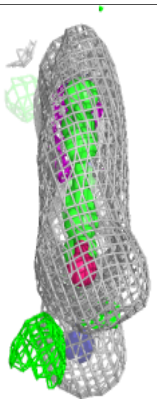


Electron density around N0Z B 302:

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

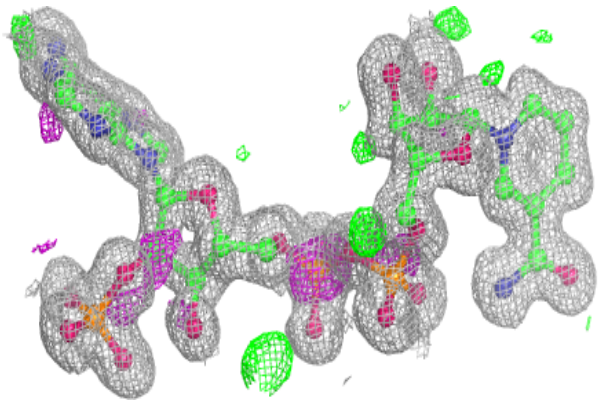


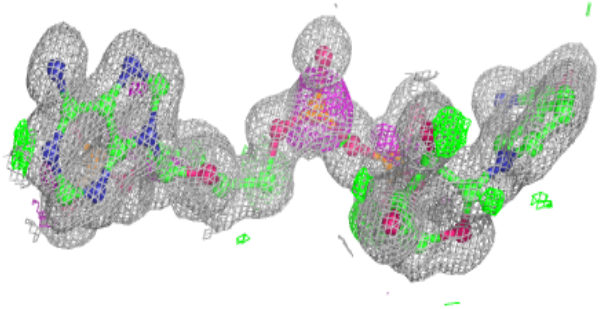


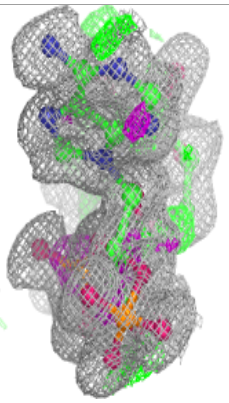


Electron density around NAP B 301:

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

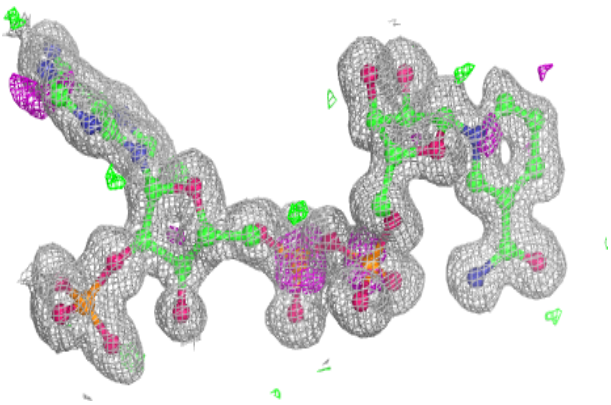


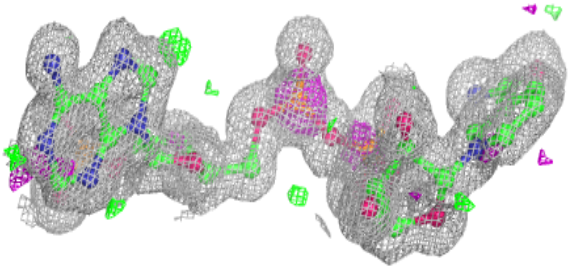


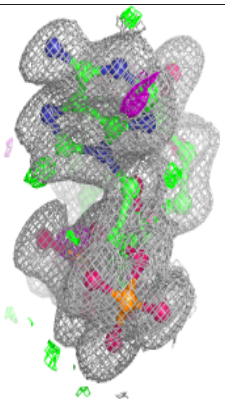


Electron density around NAP A 301:

$2mF_o$-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.