wwPDB X-ray Structure Validation Summary Report (i)

Aug 16, 2023 – 05:34 AM EDT

PDB ID	:	1Z6Z
Title	:	Crystal Structure of Human Sepiapterin Reductase in complex with NADP+
Authors	:	Ugochukwu, E.; Kavanagh, K.; Ng, S.; Arrowsmith, C.; Edwards, A.; Sundstrom, M.; von Delft, F.; Oppermann, U.; Structural Genomics Consortium (SGC)
Deposited on	:	2005-03-23
Resolution	:	2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

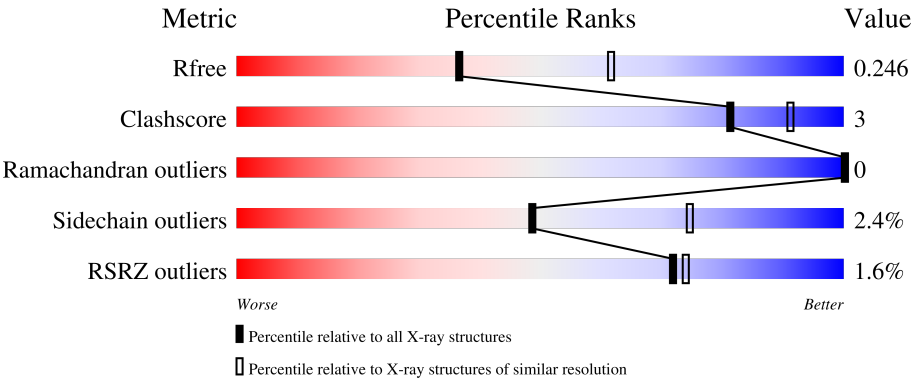
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 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 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	282	84% 9% • 6%
1	B	282	% 86% 6% • 7%
1	C	282	87% 6% • 6%
1	D	282	2% 85% 6% • 9%

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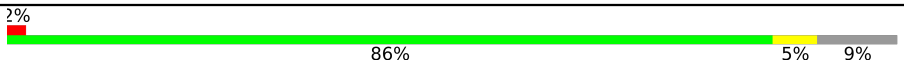
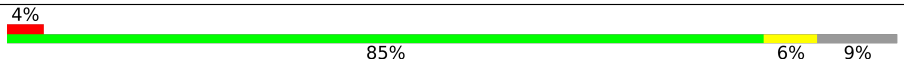
Mol	Chain	Length	Quality of chain
1	E	282	
1	F	282	

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 12116 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 Sepiapterin reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	264	Total	C	N	O	S	0	0	0
			1971	1252	343	366	10			
1	B	261	Total	C	N	O	S	0	0	0
			1948	1239	336	363	10			
1	C	264	Total	C	N	O	S	0	0	0
			1983	1257	347	369	10			
1	D	258	Total	C	N	O	S	0	0	0
			1910	1220	330	350	10			
1	E	257	Total	C	N	O	S	0	0	0
			1873	1197	315	352	9			
1	F	258	Total	C	N	O	S	0	0	0
			1886	1203	325	349	9			

There are 150 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-21	MET	-	cloning artifact	UNP P35270
A	-20	GLY	-	cloning artifact	UNP P35270
A	-19	SER	-	cloning artifact	UNP P35270
A	-18	SER	-	cloning artifact	UNP P35270
A	-17	HIS	-	cloning artifact	UNP P35270
A	-16	HIS	-	cloning artifact	UNP P35270
A	-15	HIS	-	cloning artifact	UNP P35270
A	-14	HIS	-	cloning artifact	UNP P35270
A	-13	HIS	-	cloning artifact	UNP P35270
A	-12	HIS	-	cloning artifact	UNP P35270
A	-11	SER	-	cloning artifact	UNP P35270
A	-10	SER	-	cloning artifact	UNP P35270
A	-9	GLY	-	cloning artifact	UNP P35270
A	-8	ARG	-	cloning artifact	UNP P35270
A	-7	GLU	-	cloning artifact	UNP P35270
A	-6	ASN	-	cloning artifact	UNP P35270
A	-5	LEU	-	cloning artifact	UNP P35270

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	TYR	-	cloning artifact	UNP P35270
A	-3	PHE	-	cloning artifact	UNP P35270
A	-2	GLN	-	cloning artifact	UNP P35270
A	-1	GLY	-	cloning artifact	UNP P35270
A	0	HIS	-	cloning artifact	UNP P35270
A	1	MET	-	cloning artifact	UNP P35270
A	259	GLY	-	cloning artifact	UNP P35270
A	260	SER	-	cloning artifact	UNP P35270
B	-21	MET	-	cloning artifact	UNP P35270
B	-20	GLY	-	cloning artifact	UNP P35270
B	-19	SER	-	cloning artifact	UNP P35270
B	-18	SER	-	cloning artifact	UNP P35270
B	-17	HIS	-	cloning artifact	UNP P35270
B	-16	HIS	-	cloning artifact	UNP P35270
B	-15	HIS	-	cloning artifact	UNP P35270
B	-14	HIS	-	cloning artifact	UNP P35270
B	-13	HIS	-	cloning artifact	UNP P35270
B	-12	HIS	-	cloning artifact	UNP P35270
B	-11	SER	-	cloning artifact	UNP P35270
B	-10	SER	-	cloning artifact	UNP P35270
B	-9	GLY	-	cloning artifact	UNP P35270
B	-8	ARG	-	cloning artifact	UNP P35270
B	-7	GLU	-	cloning artifact	UNP P35270
B	-6	ASN	-	cloning artifact	UNP P35270
B	-5	LEU	-	cloning artifact	UNP P35270
B	-4	TYR	-	cloning artifact	UNP P35270
B	-3	PHE	-	cloning artifact	UNP P35270
B	-2	GLN	-	cloning artifact	UNP P35270
B	-1	GLY	-	cloning artifact	UNP P35270
B	0	HIS	-	cloning artifact	UNP P35270
B	1	MET	-	cloning artifact	UNP P35270
B	259	GLY	-	cloning artifact	UNP P35270
B	260	SER	-	cloning artifact	UNP P35270
C	-21	MET	-	cloning artifact	UNP P35270
C	-20	GLY	-	cloning artifact	UNP P35270
C	-19	SER	-	cloning artifact	UNP P35270
C	-18	SER	-	cloning artifact	UNP P35270
C	-17	HIS	-	cloning artifact	UNP P35270
C	-16	HIS	-	cloning artifact	UNP P35270
C	-15	HIS	-	cloning artifact	UNP P35270
C	-14	HIS	-	cloning artifact	UNP P35270
C	-13	HIS	-	cloning artifact	UNP P35270

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-12	HIS	-	cloning artifact	UNP P35270
C	-11	SER	-	cloning artifact	UNP P35270
C	-10	SER	-	cloning artifact	UNP P35270
C	-9	GLY	-	cloning artifact	UNP P35270
C	-8	ARG	-	cloning artifact	UNP P35270
C	-7	GLU	-	cloning artifact	UNP P35270
C	-6	ASN	-	cloning artifact	UNP P35270
C	-5	LEU	-	cloning artifact	UNP P35270
C	-4	TYR	-	cloning artifact	UNP P35270
C	-3	PHE	-	cloning artifact	UNP P35270
C	-2	GLN	-	cloning artifact	UNP P35270
C	-1	GLY	-	cloning artifact	UNP P35270
C	0	HIS	-	cloning artifact	UNP P35270
C	1	MET	-	cloning artifact	UNP P35270
C	259	GLY	-	cloning artifact	UNP P35270
C	260	SER	-	cloning artifact	UNP P35270
D	-21	MET	-	cloning artifact	UNP P35270
D	-20	GLY	-	cloning artifact	UNP P35270
D	-19	SER	-	cloning artifact	UNP P35270
D	-18	SER	-	cloning artifact	UNP P35270
D	-17	HIS	-	cloning artifact	UNP P35270
D	-16	HIS	-	cloning artifact	UNP P35270
D	-15	HIS	-	cloning artifact	UNP P35270
D	-14	HIS	-	cloning artifact	UNP P35270
D	-13	HIS	-	cloning artifact	UNP P35270
D	-12	HIS	-	cloning artifact	UNP P35270
D	-11	SER	-	cloning artifact	UNP P35270
D	-10	SER	-	cloning artifact	UNP P35270
D	-9	GLY	-	cloning artifact	UNP P35270
D	-8	ARG	-	cloning artifact	UNP P35270
D	-7	GLU	-	cloning artifact	UNP P35270
D	-6	ASN	-	cloning artifact	UNP P35270
D	-5	LEU	-	cloning artifact	UNP P35270
D	-4	TYR	-	cloning artifact	UNP P35270
D	-3	PHE	-	cloning artifact	UNP P35270
D	-2	GLN	-	cloning artifact	UNP P35270
D	-1	GLY	-	cloning artifact	UNP P35270
D	0	HIS	-	cloning artifact	UNP P35270
D	1	MET	-	cloning artifact	UNP P35270
D	259	GLY	-	cloning artifact	UNP P35270
D	260	SER	-	cloning artifact	UNP P35270
E	-21	MET	-	cloning artifact	UNP P35270

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-20	GLY	-	cloning artifact	UNP P35270
E	-19	SER	-	cloning artifact	UNP P35270
E	-18	SER	-	cloning artifact	UNP P35270
E	-17	HIS	-	cloning artifact	UNP P35270
E	-16	HIS	-	cloning artifact	UNP P35270
E	-15	HIS	-	cloning artifact	UNP P35270
E	-14	HIS	-	cloning artifact	UNP P35270
E	-13	HIS	-	cloning artifact	UNP P35270
E	-12	HIS	-	cloning artifact	UNP P35270
E	-11	SER	-	cloning artifact	UNP P35270
E	-10	SER	-	cloning artifact	UNP P35270
E	-9	GLY	-	cloning artifact	UNP P35270
E	-8	ARG	-	cloning artifact	UNP P35270
E	-7	GLU	-	cloning artifact	UNP P35270
E	-6	ASN	-	cloning artifact	UNP P35270
E	-5	LEU	-	cloning artifact	UNP P35270
E	-4	TYR	-	cloning artifact	UNP P35270
E	-3	PHE	-	cloning artifact	UNP P35270
E	-2	GLN	-	cloning artifact	UNP P35270
E	-1	GLY	-	cloning artifact	UNP P35270
E	0	HIS	-	cloning artifact	UNP P35270
E	1	MET	-	cloning artifact	UNP P35270
E	259	GLY	-	cloning artifact	UNP P35270
E	260	SER	-	cloning artifact	UNP P35270
F	-21	MET	-	cloning artifact	UNP P35270
F	-20	GLY	-	cloning artifact	UNP P35270
F	-19	SER	-	cloning artifact	UNP P35270
F	-18	SER	-	cloning artifact	UNP P35270
F	-17	HIS	-	cloning artifact	UNP P35270
F	-16	HIS	-	cloning artifact	UNP P35270
F	-15	HIS	-	cloning artifact	UNP P35270
F	-14	HIS	-	cloning artifact	UNP P35270
F	-13	HIS	-	cloning artifact	UNP P35270
F	-12	HIS	-	cloning artifact	UNP P35270
F	-11	SER	-	cloning artifact	UNP P35270
F	-10	SER	-	cloning artifact	UNP P35270
F	-9	GLY	-	cloning artifact	UNP P35270
F	-8	ARG	-	cloning artifact	UNP P35270
F	-7	GLU	-	cloning artifact	UNP P35270
F	-6	ASN	-	cloning artifact	UNP P35270
F	-5	LEU	-	cloning artifact	UNP P35270
F	-4	TYR	-	cloning artifact	UNP P35270

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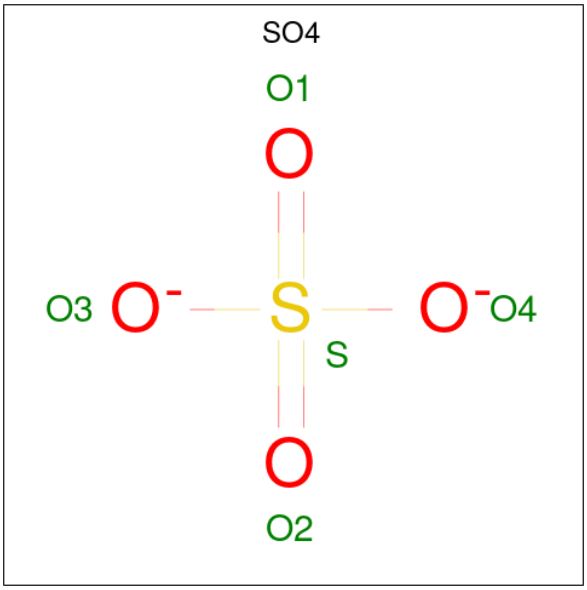
Chain	Residue	Modelled	Actual	Comment	Reference
F	-3	PHE	-	cloning artifact	UNP P35270
F	-2	GLN	-	cloning artifact	UNP P35270
F	-1	GLY	-	cloning artifact	UNP P35270
F	0	HIS	-	cloning artifact	UNP P35270
F	1	MET	-	cloning artifact	UNP P35270
F	259	GLY	-	cloning artifact	UNP P35270
F	260	SER	-	cloning artifact	UNP P35270

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O S 5 4 1	0	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total Cl 2 2	0	0
3	B	1	Total Cl 1 1	0	0
3	C	3	Total Cl 3 3	0	0
3	D	2	Total Cl 2 2	0	0

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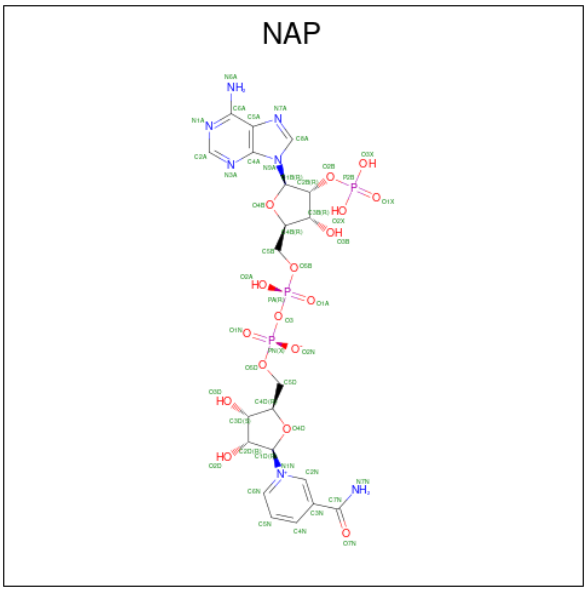
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	E	2	Total Cl 2 2	0	0
3	F	1	Total Cl 1 1	0	0

- Molecule 4 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
4	A	1	Total C N O P 48 21 7 17 3	0	0
4	B	1	Total C N O P 48 21 7 17 3	0	0
4	C	1	Total C N O P 48 21 7 17 3	0	0
4	D	1	Total C N O P 48 21 7 17 3	0	0
4	E	1	Total C N O P 48 21 7 17 3	0	0
4	F	1	Total C N O P 48 21 7 17 3	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	71	Total O 71 71	0	0

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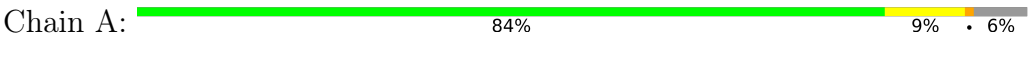
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	42	Total O 42 42	0	0
5	C	62	Total O 62 62	0	0
5	D	33	Total O 33 33	0	0
5	E	17	Total O 17 17	0	0
5	F	16	Total O 16 16	0	0

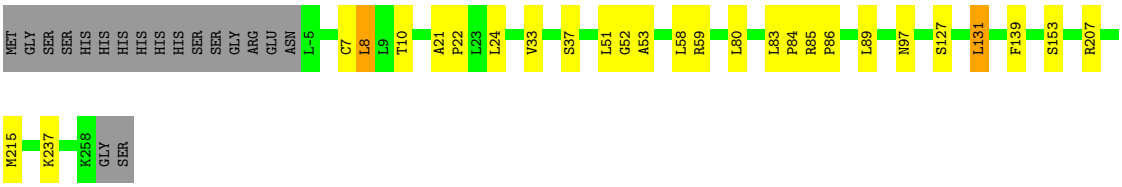
3 Residue-property plots (i)

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: Sepiapterin reductase

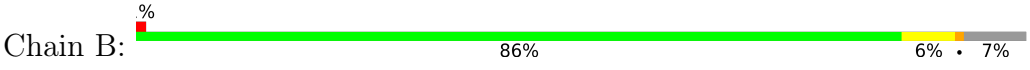
Chain A:

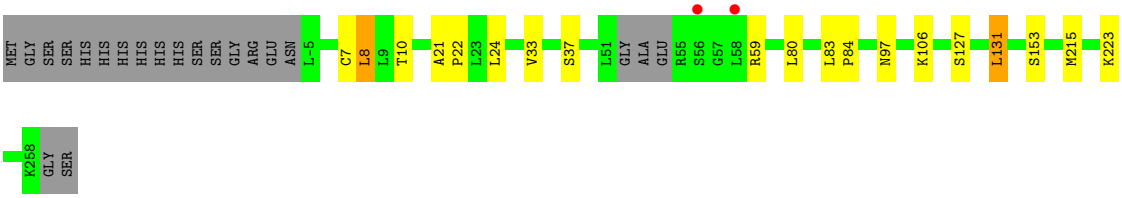




• Molecule 1: Sepiapterin reductase

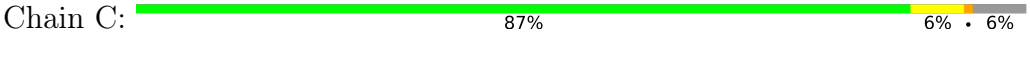
Chain B:





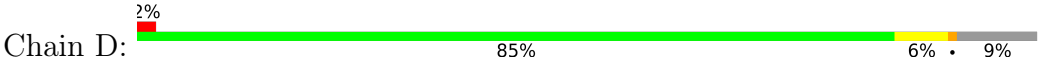
• Molecule 1: Sepiapterin reductase

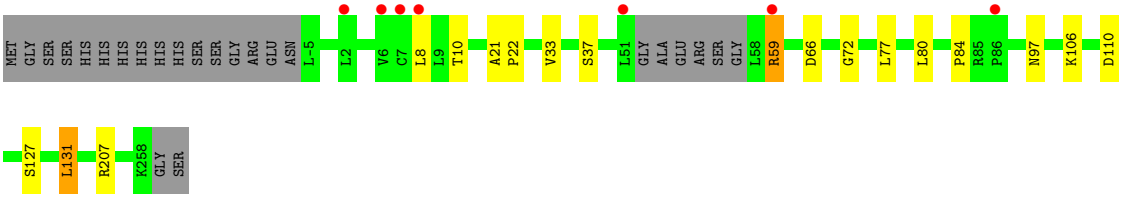
Chain C:



• Molecule 1: Sepiapterin reductase

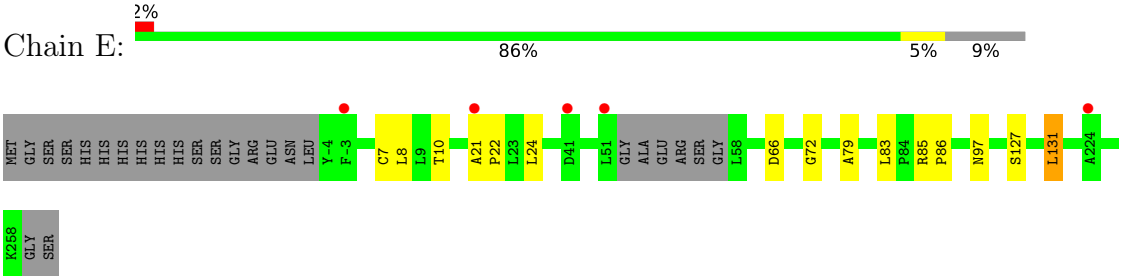
Chain D:





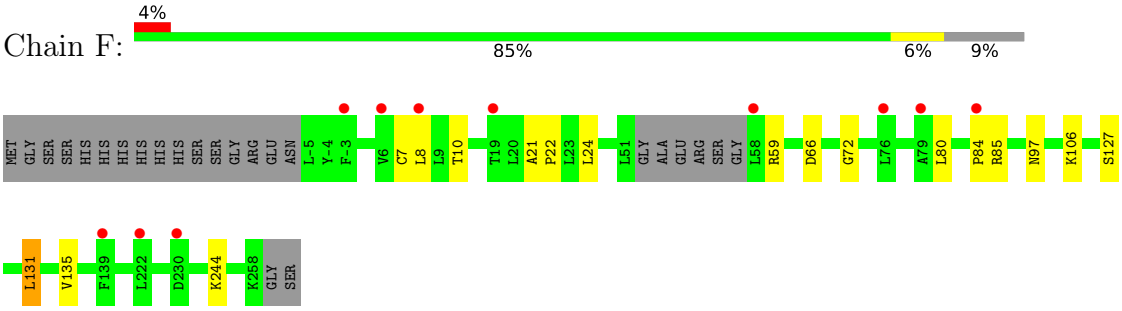
• Molecule 1: Sepiapterin reductase

Chain E:



• Molecule 1: Sepiapterin reductase

Chain F:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	55.27Å 95.00Å 162.82Å 90.00° 90.57° 90.00°	Depositor
Resolution (Å)	47.10 – 2.50 47.12 – 2.50	Depositor EDS
% Data completeness (in resolution range)	89.4 (47.10-2.50) 89.4 (47.12-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.00 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.205 , 0.245 0.206 , 0.246	Depositor DCC
R_{free} test set	2622 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	34.8	Xtriage
Anisotropy	0.192	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 49.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.46$, $< L^2 > = 0.29$	Xtriage
Estimated twinning fraction	0.039 for h,-k,-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	12116	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 17.85% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: NAP, CL, SO4

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	0.46	0/2001	0.57	0/2712
1	B	0.44	0/1977	0.54	0/2680
1	C	0.46	0/2012	0.58	0/2724
1	D	0.42	0/1939	0.54	0/2630
1	E	0.38	0/1902	0.53	0/2586
1	F	0.39	0/1915	0.52	0/2603
All	All	0.43	0/11746	0.55	0/15935

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	1971	0	1999	15	0
1	B	1948	0	1968	9	0
1	C	1983	0	2029	10	0
1	D	1910	0	1927	14	0
1	E	1873	0	1845	7	0
1	F	1886	0	1879	8	0
2	A	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	2	0	0	0	0
3	B	1	0	0	0	0
3	C	3	0	0	0	0
3	D	2	0	0	0	0
3	E	2	0	0	0	0
3	F	1	0	0	0	0
4	A	48	0	25	1	0
4	B	48	0	25	1	0
4	C	48	0	25	1	0
4	D	48	0	25	0	0
4	E	48	0	25	0	0
4	F	48	0	25	0	0
5	A	71	0	0	2	0
5	B	42	0	0	0	0
5	C	62	0	0	4	0
5	D	33	0	0	1	0
5	E	17	0	0	0	0
5	F	16	0	0	0	0
All	All	12116	0	11797	61	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.

The worst 5 of 61 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:59:ARG:CG	1:D:59:ARG:HH11	1.78	0.95
1:D:59:ARG:HG3	1:D:59:ARG:NH1	1.86	0.86
1:D:59:ARG:NE	1:F:85:ARG:O	2.11	0.83
1:D:59:ARG:HH11	1:D:59:ARG:HG3	1.40	0.82
1:D:59:ARG:HH11	1:D:59:ARG:HG2	1.56	0.70

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	262/282 (93%)	259 (99%)	3 (1%)	0	100	100
1	B	257/282 (91%)	253 (98%)	4 (2%)	0	100	100
1	C	262/282 (93%)	257 (98%)	5 (2%)	0	100	100
1	D	254/282 (90%)	251 (99%)	3 (1%)	0	100	100
1	E	253/282 (90%)	250 (99%)	3 (1%)	0	100	100
1	F	254/282 (90%)	251 (99%)	3 (1%)	0	100	100
All	All	1542/1692 (91%)	1521 (99%)	21 (1%)	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	204/231 (88%)	200 (98%)	4 (2%)	55	79
1	B	202/231 (87%)	196 (97%)	6 (3%)	41	68
1	C	209/231 (90%)	202 (97%)	7 (3%)	38	64
1	D	195/231 (84%)	191 (98%)	4 (2%)	53	78
1	E	189/231 (82%)	187 (99%)	2 (1%)	73	89
1	F	191/231 (83%)	186 (97%)	5 (3%)	46	72
All	All	1190/1386 (86%)	1162 (98%)	28 (2%)	49	74

5 of 28 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	131	LEU
1	F	244	LYS
1	D	8	LEU
1	F	59	ARG
1	C	227	LYS

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

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 18 ligands modelled in this entry, 11 are monoatomic - leaving 7 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	$\#\|Z\| > 2$
4	NAP	D	804	-	45,52,52	1.67	4 (8%)	56,80,80	1.15	2 (3%)
4	NAP	B	802	-	45,52,52	1.75	4 (8%)	56,80,80	1.13	3 (5%)
2	SO4	A	301	-	4,4,4	0.14	0	6,6,6	0.46	0
4	NAP	E	805	-	45,52,52	1.66	3 (6%)	56,80,80	1.18	4 (7%)
4	NAP	C	803	-	45,52,52	1.70	4 (8%)	56,80,80	1.15	4 (7%)
4	NAP	F	806	-	45,52,52	1.75	4 (8%)	56,80,80	1.08	2 (3%)
4	NAP	A	801	-	45,52,52	1.57	3 (6%)	56,80,80	1.27	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	NAP	D	804	-	-	5/31/67/67	0/5/5/5
4	NAP	B	802	-	-	7/31/67/67	0/5/5/5
4	NAP	E	805	-	-	7/31/67/67	0/5/5/5
4	NAP	C	803	-	-	7/31/67/67	0/5/5/5
4	NAP	F	806	-	-	7/31/67/67	0/5/5/5
4	NAP	A	801	-	-	7/31/67/67	0/5/5/5

The worst 5 of 22 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	F	806	NAP	O7N-C7N	9.05	1.41	1.24
4	B	802	NAP	O7N-C7N	9.01	1.41	1.24
4	C	803	NAP	O7N-C7N	8.95	1.41	1.24
4	E	805	NAP	O7N-C7N	8.78	1.41	1.24
4	D	804	NAP	O7N-C7N	8.70	1.40	1.24

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	801	NAP	N3A-C2A-N1A	-5.93	119.41	128.68
4	D	804	NAP	N3A-C2A-N1A	-5.77	119.66	128.68
4	E	805	NAP	N3A-C2A-N1A	-5.76	119.68	128.68
4	B	802	NAP	N3A-C2A-N1A	-5.64	119.86	128.68
4	F	806	NAP	N3A-C2A-N1A	-5.52	120.05	128.68

There are no chirality outliers.

5 of 40 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	801	NAP	C2B-O2B-P2B-O2X
4	A	801	NAP	C5D-O5D-PN-O2N
4	A	801	NAP	O4D-C1D-N1N-C2N
4	B	802	NAP	C2B-O2B-P2B-O2X
4	B	802	NAP	C5D-O5D-PN-O2N

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	802	NAP	1	0

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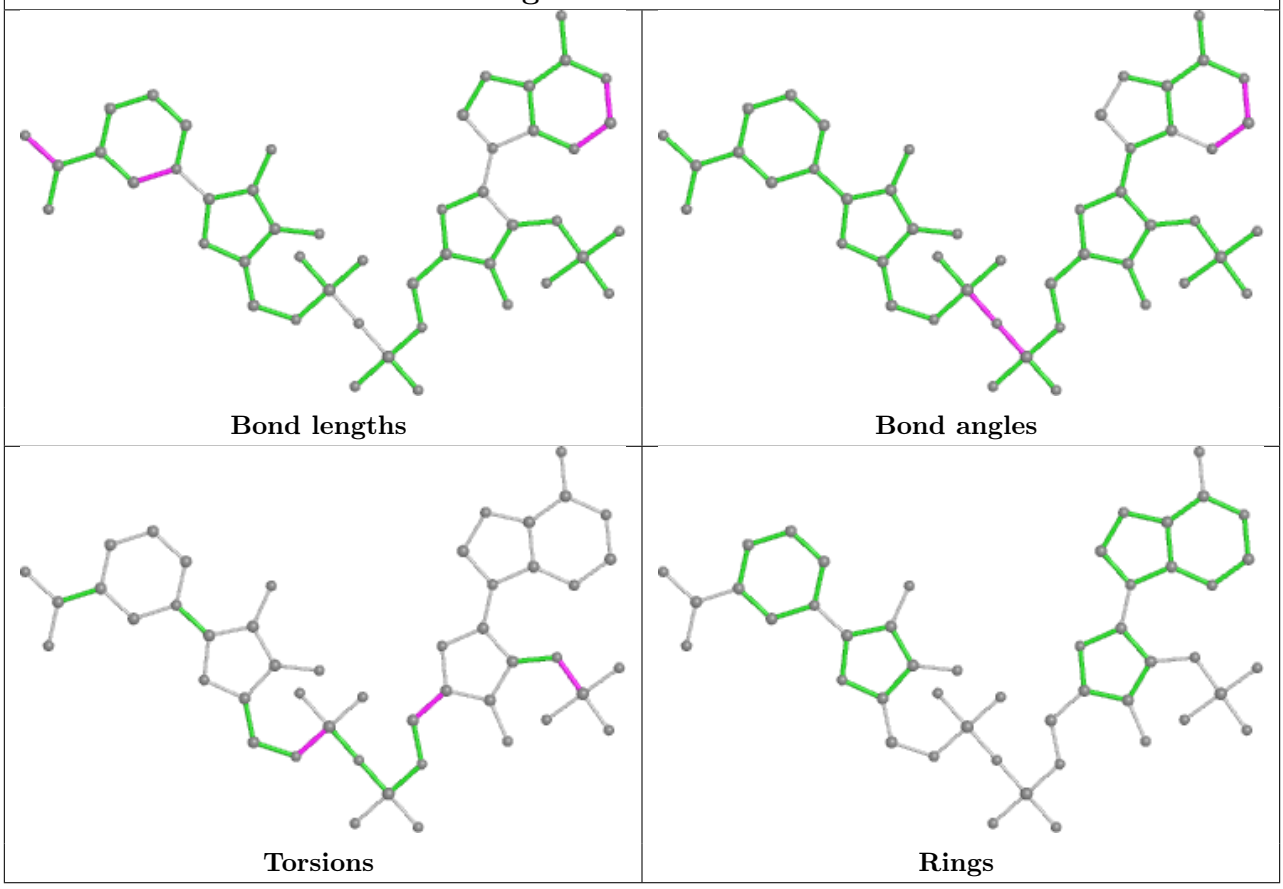
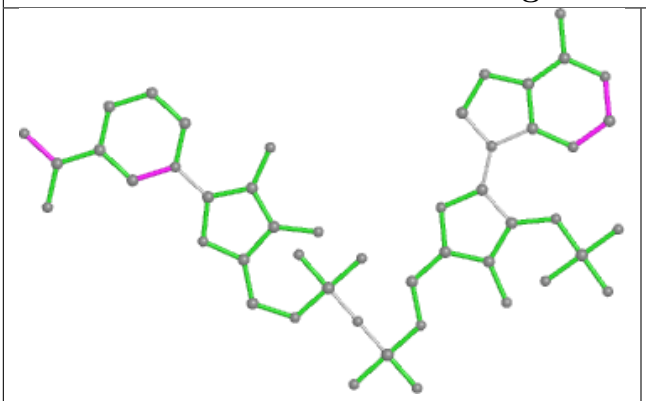
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	803	NAP	1	0
4	A	801	NAP	1	0

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.

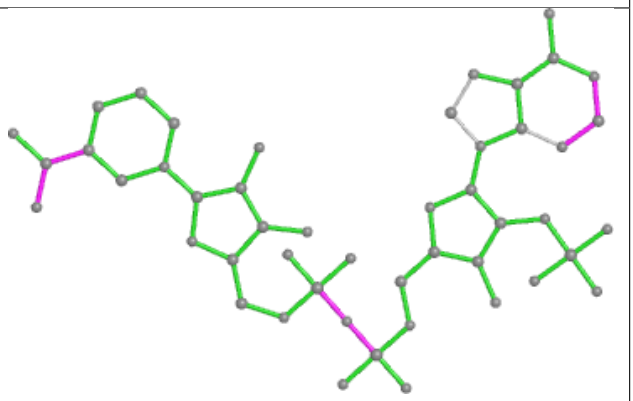
Ligand NAP D 804



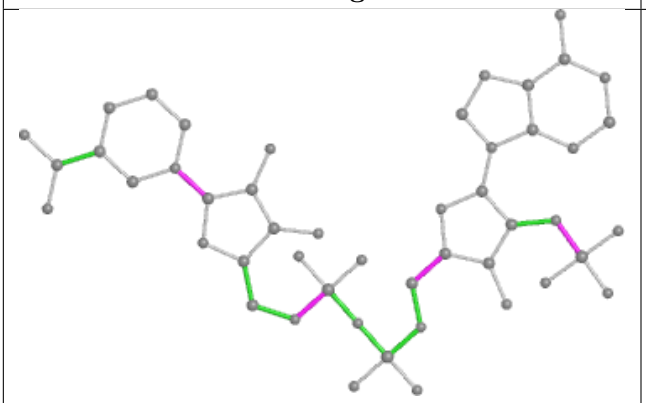
Ligand NAP B 802



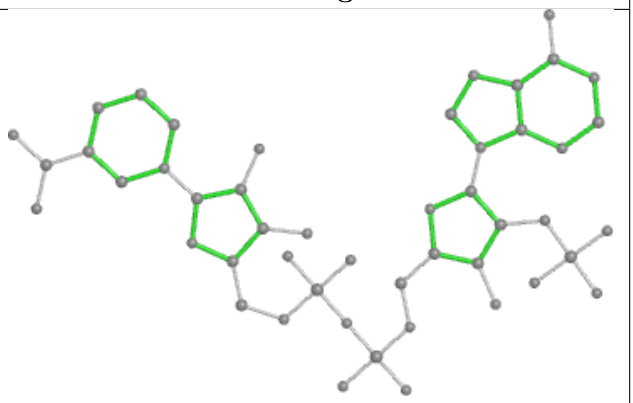
Bond lengths



Bond angles

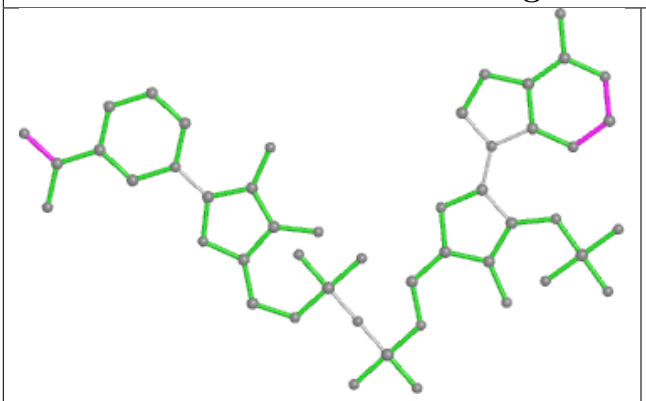


Torsions



Rings

Ligand NAP E 805



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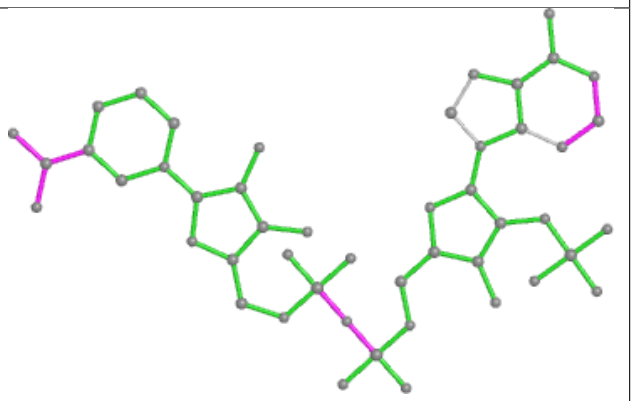

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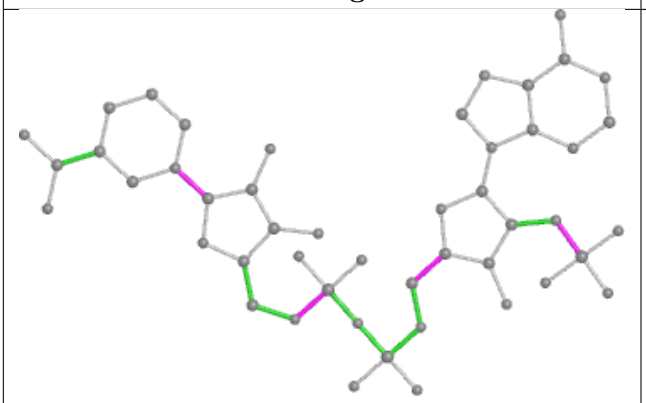
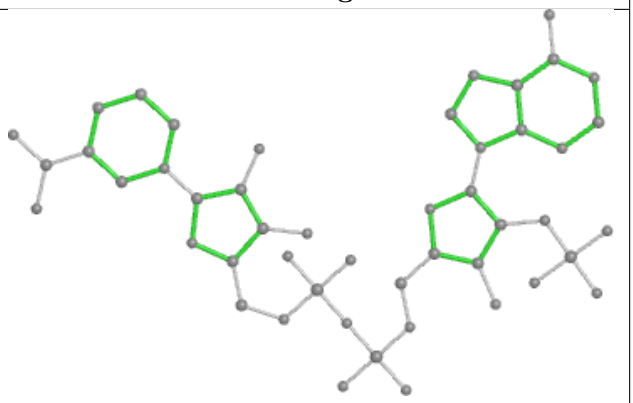
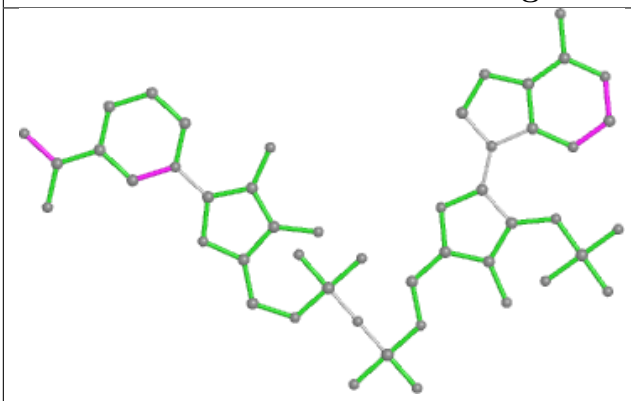


Torsions

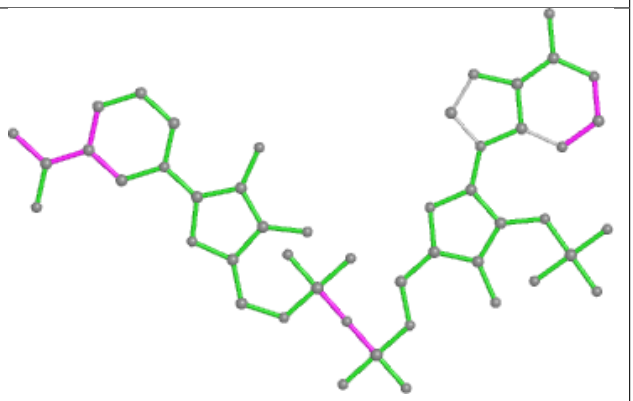


Rings

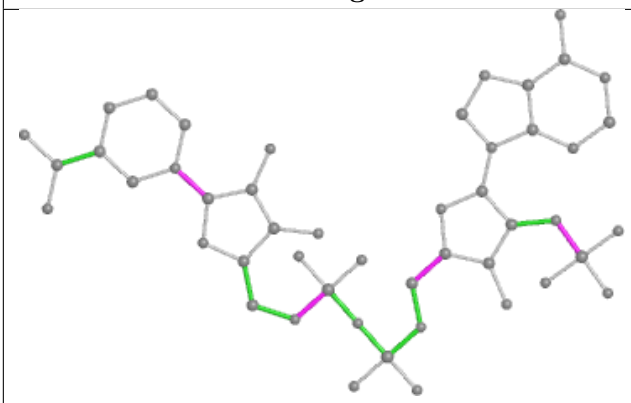
Ligand NAP C 803



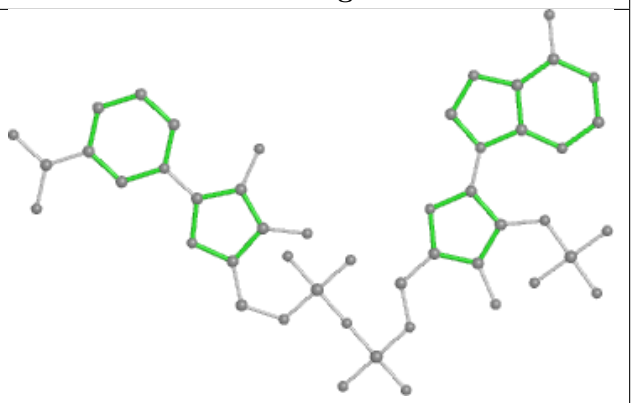
Bond lengths



Bond angles

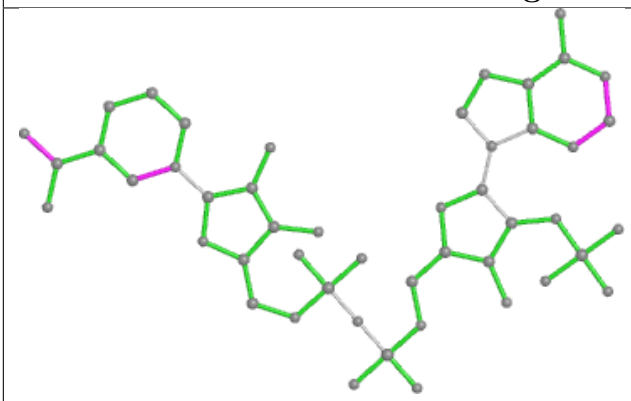


Torsions

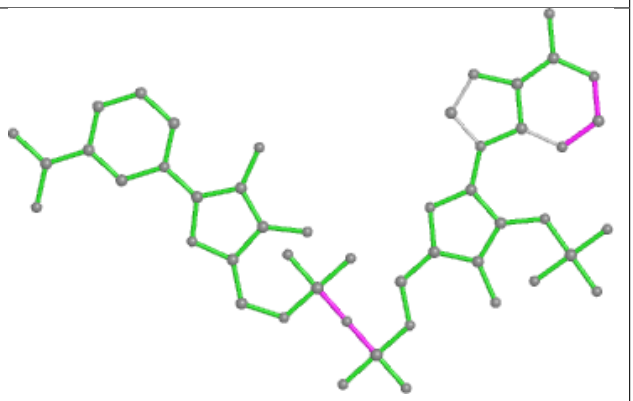


Rings

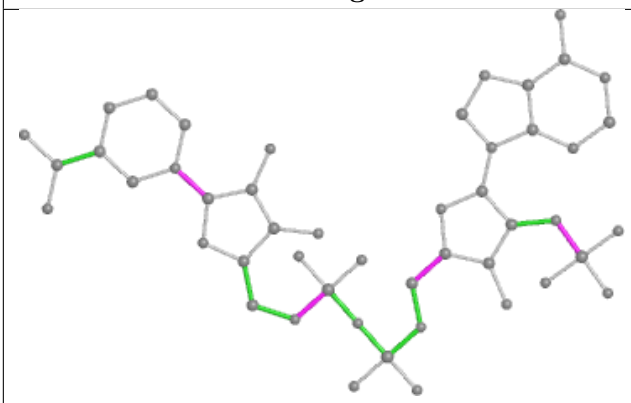
Ligand NAP F 806



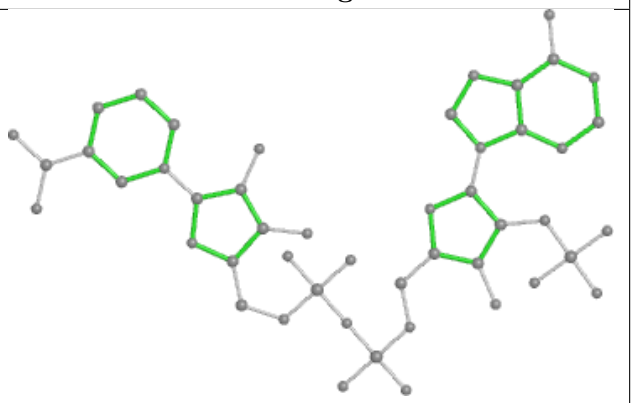
Bond lengths



Bond angles

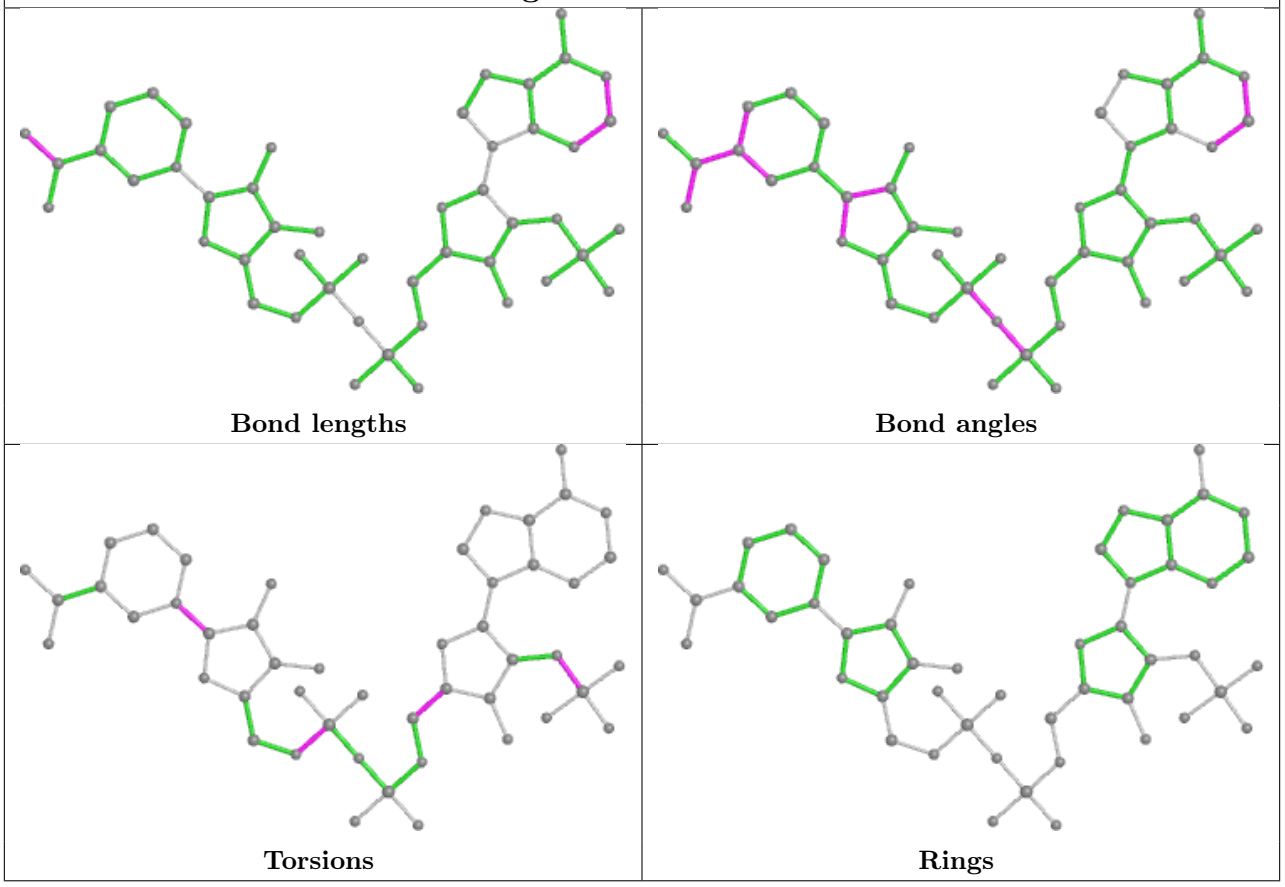


Torsions



Rings

Ligand NAP A 801



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	264/282 (93%)	-0.08	0 100 100	20, 28, 35, 42	0
1	B	261/282 (92%)	0.10	2 (0%) 86 87	20, 28, 37, 46	0
1	C	264/282 (93%)	0.02	0 100 100	21, 28, 36, 39	0
1	D	258/282 (91%)	0.24	7 (2%) 54 58	22, 29, 36, 42	0
1	E	257/282 (91%)	0.18	5 (1%) 66 69	23, 29, 35, 41	0
1	F	258/282 (91%)	0.32	11 (4%) 35 38	21, 29, 36, 40	0
All	All	1562/1692 (92%)	0.13	25 (1%) 72 74	20, 29, 36, 46	0

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	41	ASP	4.1
1	D	2	LEU	3.4
1	D	51	LEU	3.2
1	F	79	ALA	3.1
1	B	56	SER	2.9

6.2 Non-standard residues in protein, DNA, RNA chains

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

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands (i)

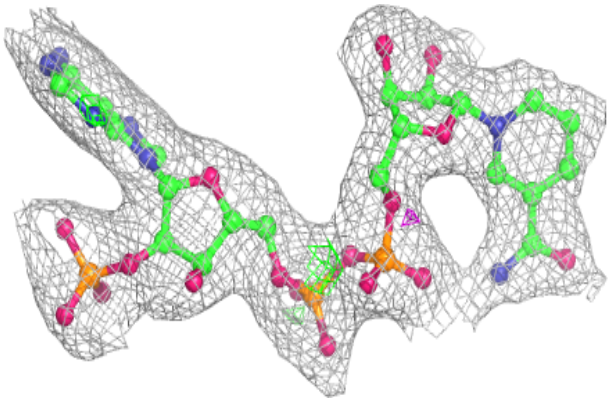
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

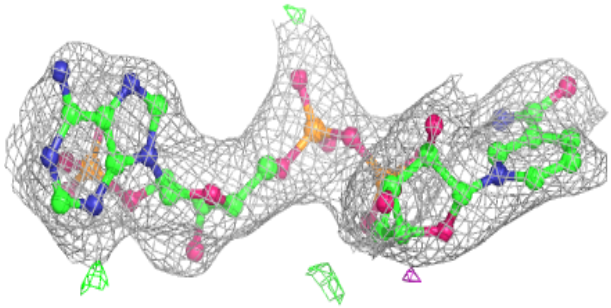
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	CL	C	405	1/1	0.90	0.12	54,54,54,54	0
3	CL	A	401	1/1	0.91	0.08	51,51,51,51	0
3	CL	D	409	1/1	0.91	0.17	61,61,61,61	0
3	CL	C	402	1/1	0.92	0.09	55,55,55,55	0
3	CL	F	411	1/1	0.93	0.08	45,45,45,45	0
4	NAP	F	806	48/48	0.95	0.13	24,27,32,32	0
4	NAP	B	802	48/48	0.96	0.14	23,27,30,30	0
4	NAP	E	805	48/48	0.96	0.14	23,28,30,31	0
3	CL	B	408	1/1	0.96	0.07	45,45,45,45	0
3	CL	D	403	1/1	0.97	0.09	45,45,45,45	0
4	NAP	A	801	48/48	0.97	0.15	19,28,30,31	0
2	SO4	A	301	5/5	0.97	0.16	34,34,35,35	0
4	NAP	C	803	48/48	0.97	0.15	20,25,29,31	0
4	NAP	D	804	48/48	0.97	0.14	21,28,30,31	0
3	CL	E	404	1/1	0.97	0.08	56,56,56,56	0
3	CL	E	410	1/1	0.97	0.13	42,42,42,42	0
3	CL	C	406	1/1	0.98	0.06	35,35,35,35	0
3	CL	A	407	1/1	0.98	0.06	24,24,24,24	0

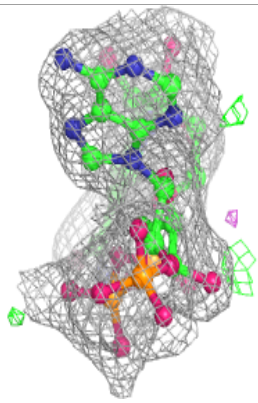
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NAP F 806:

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

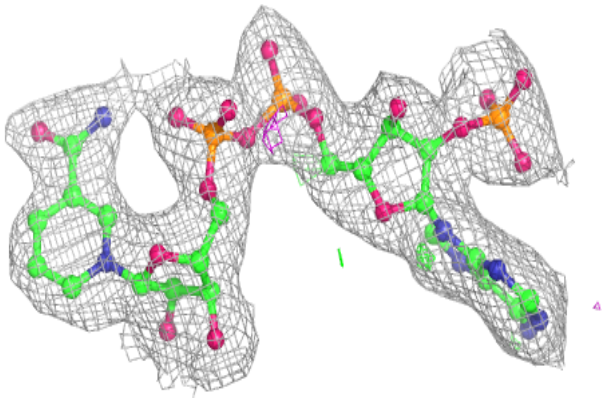


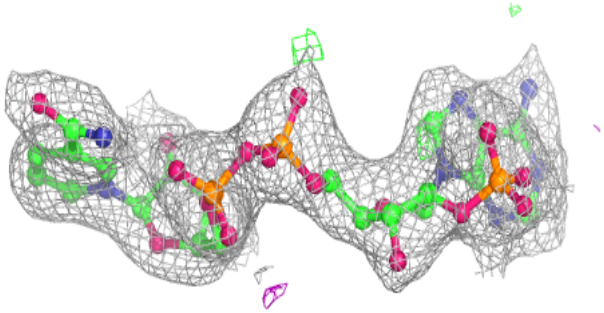


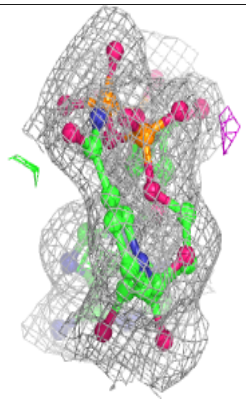


Electron density around NAP B 802:

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

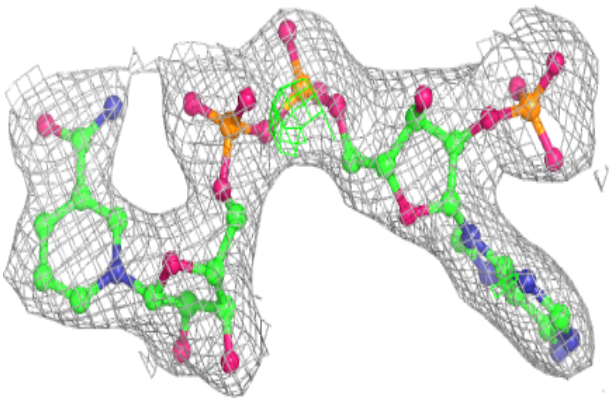


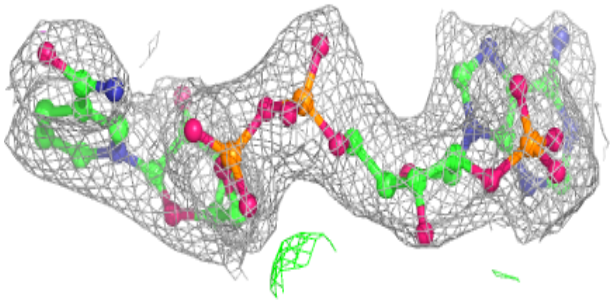


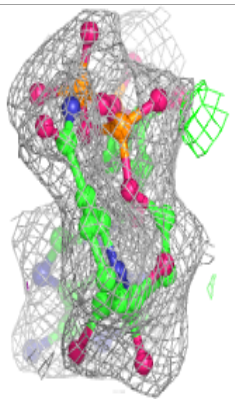


Electron density around NAP E 805:

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

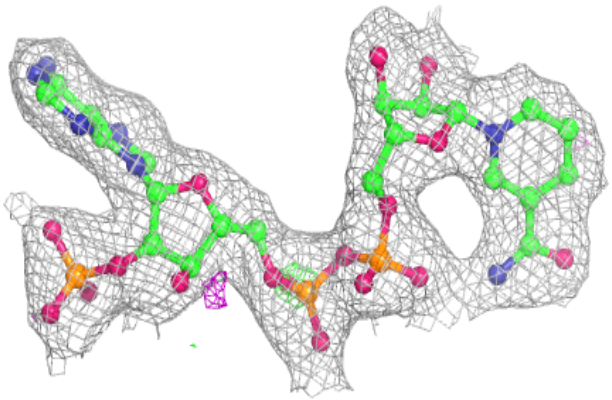


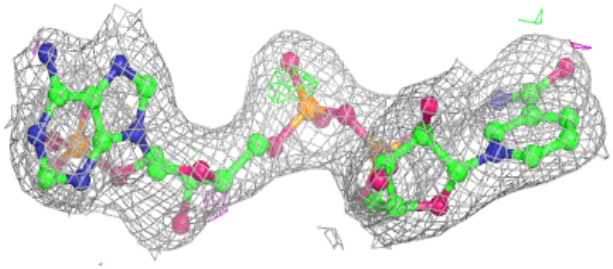


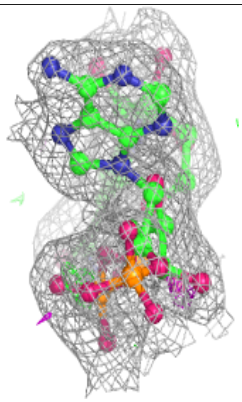


Electron density around NAP A 801:

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

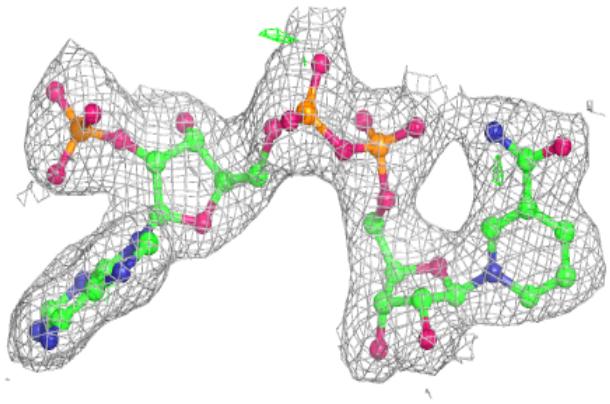


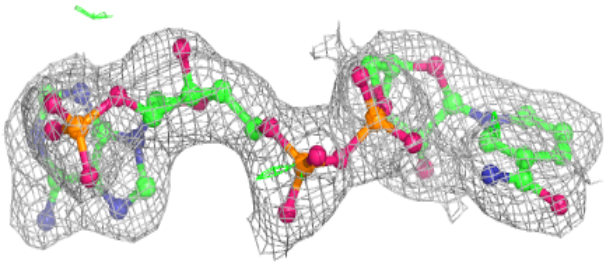


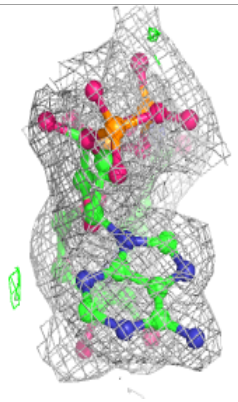


Electron density around NAP C 803:

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

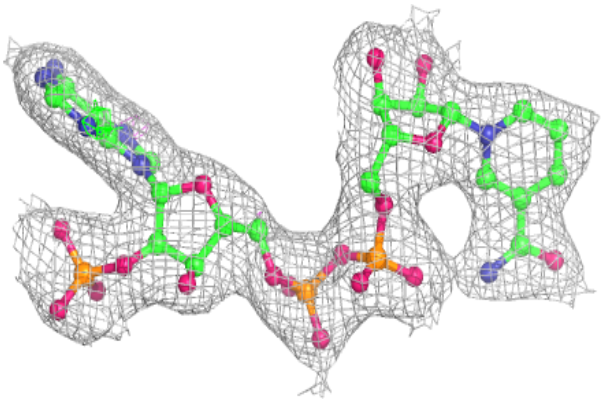


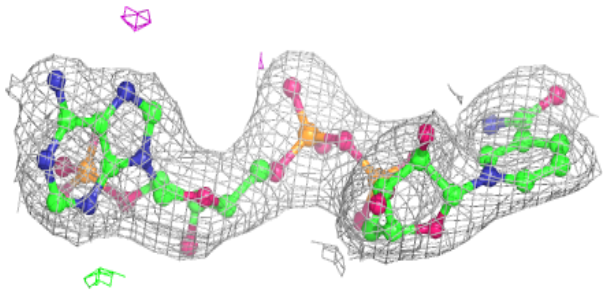


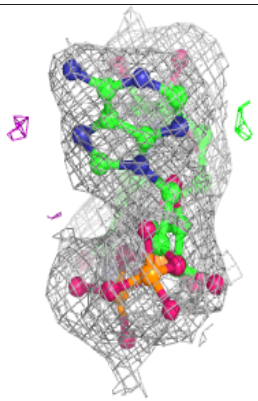


Electron density around NAP D 804:

$2mF_o$-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.