



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:08 PM UTC

PDB ID : 1XG5 / pdb_00001xg5
Title : Structure of human putative dehydrogenase MGC4172 in complex with NADP
Authors : Kavanagh, K.; Ng, S.; Sharma, S.; Vedadi, M.; von Delft, F.; Walker, J.R.;
dhe Paganon, S.; Bray, J.; Oppermann, U.; Edwards, A.; Arrowsmith, C.;
Sundstrom, M.; Structural Genomics Consortium (SGC)
Deposited on : 2004-09-16
Resolution : 1.53 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

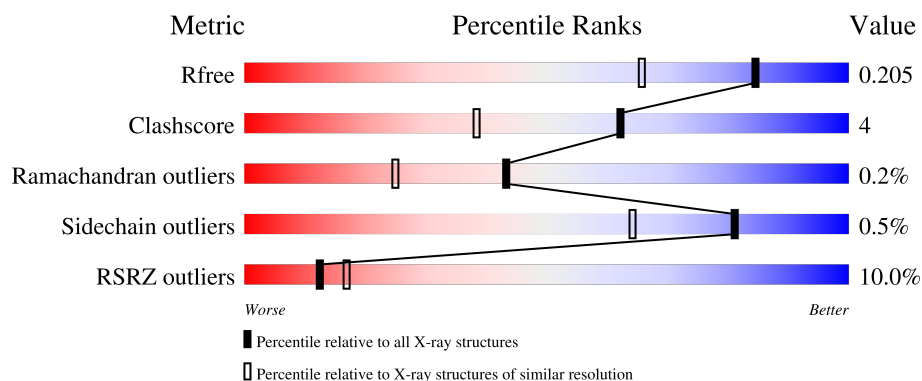
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.53 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}	180053	1003 (1.54-1.54)
Clashscore	190562	1025 (1.54-1.54)
Ramachandran outliers	187476	1007 (1.54-1.54)
Sidechain outliers	187428	1007 (1.54-1.54)
RSRZ outliers	180081	1002 (1.54-1.54)

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	17% 84% 6% 9%
1	B	279	7% 80% 7% 13%
1	C	279	4% 87% 5% 8%
1	D	279	8% 86% 6% 8%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 8763 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 ARPG836.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	254	Total	C	N	O	S	0	6	0
			1898	1186	332	366	14			
1	B	244	Total	C	N	O	S	0	10	0
			1866	1164	331	355	16			
1	C	257	Total	C	N	O	S	0	8	0
			1955	1216	346	377	16			
1	D	257	Total	C	N	O	S	0	14	0
			1979	1234	350	380	15			

There are 92 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	GLY	-	expression tag	UNP Q6UWP2
A	-19	SER	-	expression tag	UNP Q6UWP2
A	-18	SER	-	expression tag	UNP Q6UWP2
A	-17	HIS	-	expression tag	UNP Q6UWP2
A	-16	HIS	-	expression tag	UNP Q6UWP2
A	-15	HIS	-	expression tag	UNP Q6UWP2
A	-14	HIS	-	expression tag	UNP Q6UWP2
A	-13	HIS	-	expression tag	UNP Q6UWP2
A	-12	HIS	-	expression tag	UNP Q6UWP2
A	-11	SER	-	expression tag	UNP Q6UWP2
A	-10	SER	-	expression tag	UNP Q6UWP2
A	-9	GLY	-	expression tag	UNP Q6UWP2
A	-8	ARG	-	expression tag	UNP Q6UWP2
A	-7	GLU	-	expression tag	UNP Q6UWP2
A	-6	ASN	-	expression tag	UNP Q6UWP2
A	-5	LEU	-	expression tag	UNP Q6UWP2
A	-4	TYR	-	expression tag	UNP Q6UWP2
A	-3	PHE	-	expression tag	UNP Q6UWP2
A	-2	GLN	-	expression tag	UNP Q6UWP2
A	-1	GLY	-	expression tag	UNP Q6UWP2
A	0	HIS	-	expression tag	UNP Q6UWP2

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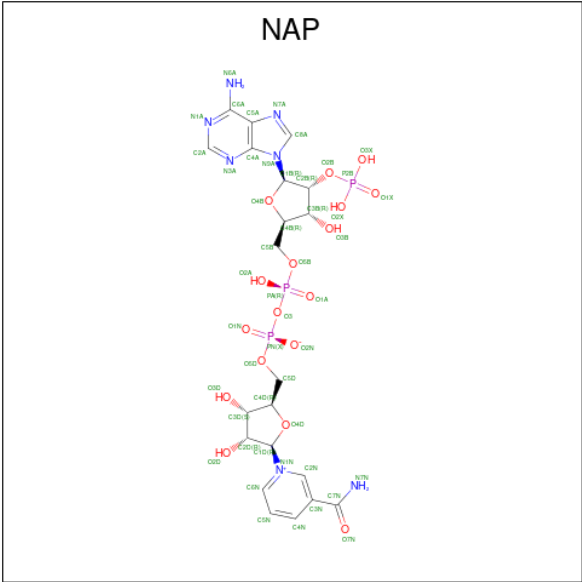
Chain	Residue	Modelled	Actual	Comment	Reference
A	257	GLY	-	cloning artifact	UNP Q6UWP2
A	258	SER	-	cloning artifact	UNP Q6UWP2
B	-20	GLY	-	expression tag	UNP Q6UWP2
B	-19	SER	-	expression tag	UNP Q6UWP2
B	-18	SER	-	expression tag	UNP Q6UWP2
B	-17	HIS	-	expression tag	UNP Q6UWP2
B	-16	HIS	-	expression tag	UNP Q6UWP2
B	-15	HIS	-	expression tag	UNP Q6UWP2
B	-14	HIS	-	expression tag	UNP Q6UWP2
B	-13	HIS	-	expression tag	UNP Q6UWP2
B	-12	HIS	-	expression tag	UNP Q6UWP2
B	-11	SER	-	expression tag	UNP Q6UWP2
B	-10	SER	-	expression tag	UNP Q6UWP2
B	-9	GLY	-	expression tag	UNP Q6UWP2
B	-8	ARG	-	expression tag	UNP Q6UWP2
B	-7	GLU	-	expression tag	UNP Q6UWP2
B	-6	ASN	-	expression tag	UNP Q6UWP2
B	-5	LEU	-	expression tag	UNP Q6UWP2
B	-4	TYR	-	expression tag	UNP Q6UWP2
B	-3	PHE	-	expression tag	UNP Q6UWP2
B	-2	GLN	-	expression tag	UNP Q6UWP2
B	-1	GLY	-	expression tag	UNP Q6UWP2
B	0	HIS	-	expression tag	UNP Q6UWP2
B	257	GLY	-	cloning artifact	UNP Q6UWP2
B	258	SER	-	cloning artifact	UNP Q6UWP2
C	-20	GLY	-	expression tag	UNP Q6UWP2
C	-19	SER	-	expression tag	UNP Q6UWP2
C	-18	SER	-	expression tag	UNP Q6UWP2
C	-17	HIS	-	expression tag	UNP Q6UWP2
C	-16	HIS	-	expression tag	UNP Q6UWP2
C	-15	HIS	-	expression tag	UNP Q6UWP2
C	-14	HIS	-	expression tag	UNP Q6UWP2
C	-13	HIS	-	expression tag	UNP Q6UWP2
C	-12	HIS	-	expression tag	UNP Q6UWP2
C	-11	SER	-	expression tag	UNP Q6UWP2
C	-10	SER	-	expression tag	UNP Q6UWP2
C	-9	GLY	-	expression tag	UNP Q6UWP2
C	-8	ARG	-	expression tag	UNP Q6UWP2
C	-7	GLU	-	expression tag	UNP Q6UWP2
C	-6	ASN	-	expression tag	UNP Q6UWP2
C	-5	LEU	-	expression tag	UNP Q6UWP2
C	-4	TYR	-	expression tag	UNP Q6UWP2

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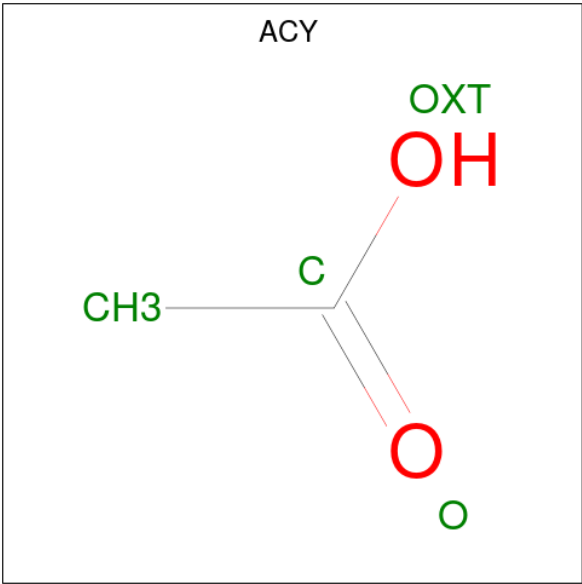
Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	PHE	-	expression tag	UNP Q6UWP2
C	-2	GLN	-	expression tag	UNP Q6UWP2
C	-1	GLY	-	expression tag	UNP Q6UWP2
C	0	HIS	-	expression tag	UNP Q6UWP2
C	257	GLY	-	cloning artifact	UNP Q6UWP2
C	258	SER	-	cloning artifact	UNP Q6UWP2
D	-20	GLY	-	expression tag	UNP Q6UWP2
D	-19	SER	-	expression tag	UNP Q6UWP2
D	-18	SER	-	expression tag	UNP Q6UWP2
D	-17	HIS	-	expression tag	UNP Q6UWP2
D	-16	HIS	-	expression tag	UNP Q6UWP2
D	-15	HIS	-	expression tag	UNP Q6UWP2
D	-14	HIS	-	expression tag	UNP Q6UWP2
D	-13	HIS	-	expression tag	UNP Q6UWP2
D	-12	HIS	-	expression tag	UNP Q6UWP2
D	-11	SER	-	expression tag	UNP Q6UWP2
D	-10	SER	-	expression tag	UNP Q6UWP2
D	-9	GLY	-	expression tag	UNP Q6UWP2
D	-8	ARG	-	expression tag	UNP Q6UWP2
D	-7	GLU	-	expression tag	UNP Q6UWP2
D	-6	ASN	-	expression tag	UNP Q6UWP2
D	-5	LEU	-	expression tag	UNP Q6UWP2
D	-4	TYR	-	expression tag	UNP Q6UWP2
D	-3	PHE	-	expression tag	UNP Q6UWP2
D	-2	GLN	-	expression tag	UNP Q6UWP2
D	-1	GLY	-	expression tag	UNP Q6UWP2
D	0	HIS	-	expression tag	UNP Q6UWP2
D	257	GLY	-	cloning artifact	UNP Q6UWP2
D	258	SER	-	cloning artifact	UNP Q6UWP2

- Molecule 2 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$).



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

- Molecule 3 is ACETIC ACID (CCD ID: ACY) (formula: C₂H₄O₂).



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

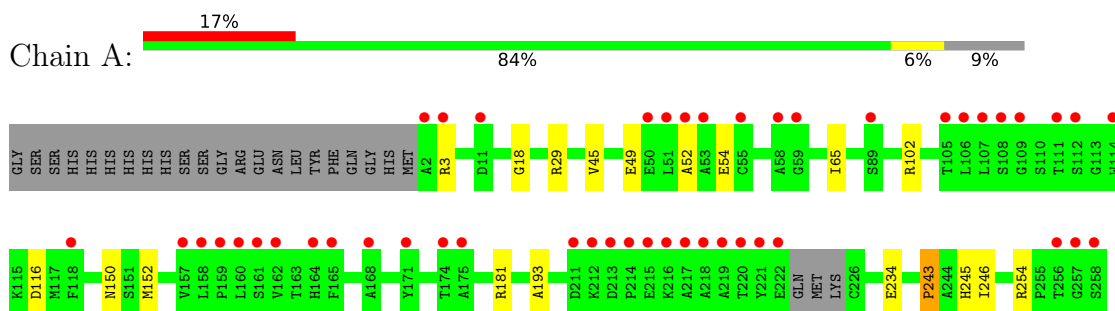
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	185	Total O 185 185	0	0
4	B	199	Total O 199 199	0	0
4	C	227	Total O 228 228	0	1
4	D	248	Total O 249 249	0	1

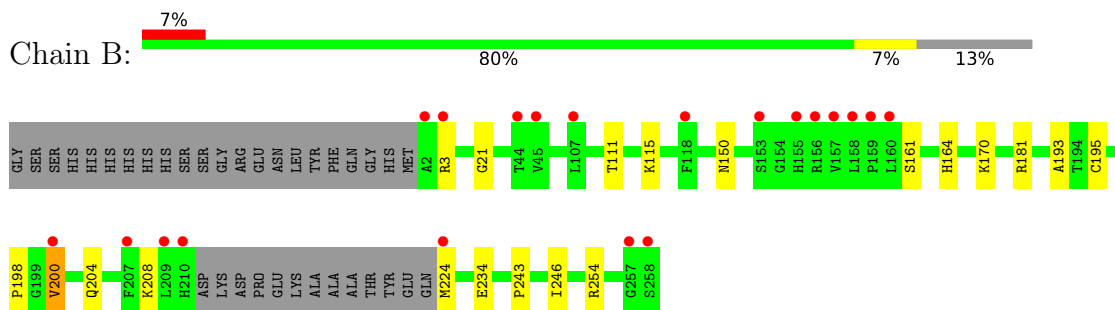
3 Residue-property plots [i](#)

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.

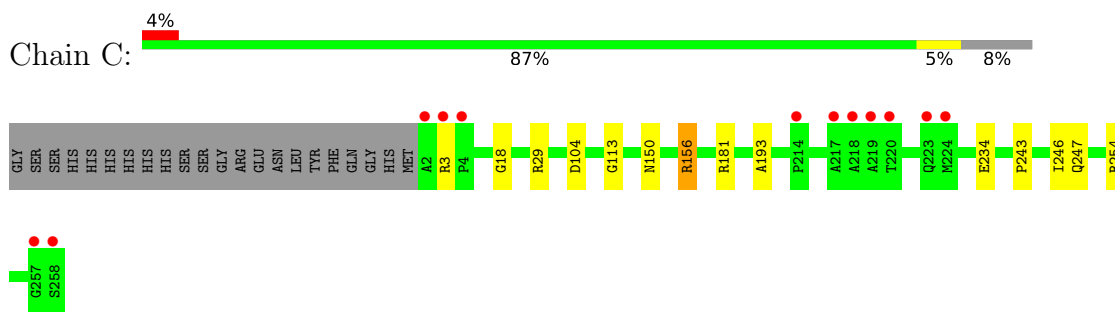
• Molecule 1: ARPG836



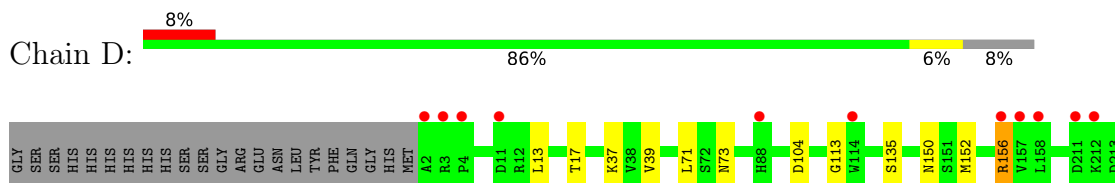
• Molecule 1: ARPG836

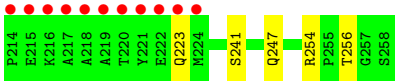


• Molecule 1: ARPG836



• Molecule 1: ARPG836





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	54.71Å 124.67Å 75.13Å 90.00° 97.23° 90.00°	Depositor
Resolution (Å)	41.56 – 1.53 41.56 – 1.53	Depositor EDS
% Data completeness (in resolution range)	97.0 (41.56-1.53) 97.0 (41.56-1.53)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.84 (at 1.53Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.162 , 0.206 0.164 , 0.205	Depositor DCC
R_{free} test set	1920 reflections (1.28%)	wwPDB-VP
Wilson B-factor (Å ²)	13.5	Xtriage
Anisotropy	0.516	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 39.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8763	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.24% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ACY, 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	0.89	1/1951 (0.1%)	0.94	3/2650 (0.1%)
1	B	0.89	1/1920 (0.1%)	0.93	2/2597 (0.1%)
1	C	0.91	0/2017	0.93	0/2733
1	D	0.90	0/2063	0.97	2/2798 (0.1%)
All	All	0.90	2/7951 (0.0%)	0.94	7/10778 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	52	ALA	N-CA	5.50	1.53	1.46
1	B	161	SER	C-O	5.27	1.30	1.24

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	65	ILE	CA-C-N	-8.68	111.08	119.85
1	A	65	ILE	C-N-CA	-8.68	111.08	119.85
1	D	39	VAL	CA-C-N	-6.53	116.66	122.73
1	D	39	VAL	C-N-CA	-6.53	116.66	122.73
1	B	200	VAL	N-CA-C	5.46	120.70	109.34
1	B	164	HIS	N-CA-C	5.40	117.17	111.28
1	A	52	ALA	N-CA-C	5.30	117.06	111.28

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	1898	0	1859	11	0
1	B	1866	0	1859	18	0
1	C	1955	0	1927	17	0
1	D	1979	0	1960	20	0
2	A	48	0	25	2	0
2	B	48	0	25	2	0
2	C	48	0	25	2	0
2	D	48	0	25	1	0
3	A	4	0	3	0	0
3	C	4	0	3	0	0
3	D	4	0	3	0	0
4	A	185	0	0	0	0
4	B	199	0	0	7	0
4	C	228	0	0	3	0
4	D	249	0	0	8	0
All	All	8763	0	7714	64	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 (64) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:150:ASN:HA	4:B:1401:HOH:O	1.60	1.01
1:D:73[A]:ASN:ND2	4:D:1650:HOH:O	1.81	0.92
1:A:102[B]:ARG:NH1	1:A:116:ASP:OD2	2.01	0.92
1:D:156:ARG:HE	1:D:254[B]:ARG:HH22	1.18	0.92
1:B:150:ASN:HB2	1:B:195[A]:CYS:SG	2.13	0.88
1:A:3:ARG:NH2	1:A:234:GLU:OE1	2.07	0.88
1:D:156:ARG:HH21	1:D:254[B]:ARG:HH12	1.25	0.83
1:B:204:GLN:HG3	4:B:1496:HOH:O	1.82	0.78
1:D:156:ARG:NE	1:D:254[B]:ARG:HH22	1.81	0.78
1:C:156:ARG:HH11	1:C:156:ARG:CG	2.00	0.75
1:D:241[A]:SER:OG	4:D:1651:HOH:O	2.05	0.69
1:D:156:ARG:CG	1:D:156:ARG:HH11	2.05	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:29:ARG:NH1	4:C:1627:HOH:O	2.22	0.69
1:D:152:MET:HE3	4:D:1513:HOH:O	1.94	0.67
1:D:156:ARG:HH11	1:D:156:ARG:HG2	1.61	0.66
1:D:135:SER:HB3	4:D:1507:HOH:O	1.94	0.65
1:D:247:GLN:OE1	4:D:1519:HOH:O	2.14	0.65
1:B:150:ASN:CB	1:B:195[A]:CYS:SG	2.84	0.65
1:B:150:ASN:O	2:B:1302:NAP:H6N	1.97	0.64
1:B:243:PRO:HD2	1:B:246:ILE:HD12	1.82	0.62
1:D:247:GLN:NE2	4:D:1522:HOH:O	2.33	0.62
1:D:156:ARG:HD3	4:D:1513:HOH:O	2.00	0.61
1:C:3:ARG:NH2	1:C:234:GLU:OE1	2.25	0.60
1:D:254[A]:ARG:NH1	4:D:1523:HOH:O	2.34	0.60
1:B:181[B]:ARG:HG3	1:B:193:ALA:HB3	1.84	0.60
1:A:245:HIS:HB2	1:B:224:MET:HB2	1.83	0.59
1:B:170:LYS:HD3	4:B:1401:HOH:O	2.03	0.58
1:C:181[B]:ARG:CG	1:C:193:ALA:HB3	2.34	0.57
1:B:3:ARG:NH2	1:B:234:GLU:OE1	2.29	0.56
1:C:181[B]:ARG:HG3	1:C:193:ALA:HB3	1.87	0.56
1:C:247:GLN:HE21	1:D:256:THR:HA	1.70	0.55
1:B:181[B]:ARG:CG	1:B:193:ALA:HB3	2.37	0.54
1:C:156:ARG:HH11	1:C:156:ARG:HG2	1.71	0.54
1:C:156:ARG:HH11	1:C:156:ARG:HG3	1.70	0.54
1:D:13[B]:LEU:HD12	1:D:37:LYS:HB3	1.88	0.53
1:A:181:ARG:HG2	1:A:193:ALA:HB3	1.93	0.51
1:C:254:ARG:NH1	4:C:1517:HOH:O	2.43	0.50
1:B:254:ARG:NH1	4:B:1359:HOH:O	2.43	0.50
1:C:243:PRO:HD2	1:C:246:ILE:HD12	1.94	0.50
1:D:156:ARG:CG	1:D:156:ARG:NH1	2.74	0.50
1:B:150:ASN:ND2	1:B:195[A]:CYS:SG	2.82	0.49
1:A:29:ARG:NH2	1:A:54:GLU:OE1	2.46	0.48
1:B:181[B]:ARG:NH2	4:B:1402:HOH:O	2.31	0.47
1:D:156:ARG:NH2	1:D:254[B]:ARG:HH12	2.03	0.47
1:A:45:VAL:O	1:A:49:GLU:HG3	2.15	0.46
1:B:111:THR:HG22	1:B:115:LYS:HE2	1.99	0.45
1:B:198:PRO:O	2:B:1302:NAP:H5N	2.17	0.45
1:C:156:ARG:HG3	1:C:156:ARG:NH1	2.32	0.45
1:D:17:THR:HB	1:D:71[A]:LEU:HD11	1.99	0.44
1:C:181[B]:ARG:HG2	1:C:193:ALA:HB3	1.99	0.44
1:B:150:ASN:CG	4:B:1401:HOH:O	2.61	0.43
1:C:150:ASN:O	2:C:1303:NAP:H6N	2.18	0.43
1:D:150:ASN:O	2:D:1304:NAP:H6N	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:18:GLY:HA2	2:A:1301:NAP:H1B	2.01	0.42
1:B:208:LYS:HE2	4:B:1347:HOH:O	2.19	0.42
1:A:243:PRO:HD2	1:A:246:ILE:HD12	2.00	0.42
1:C:156:ARG:CG	1:C:156:ARG:NH1	2.68	0.42
1:C:104:ASP:OD2	1:C:113:GLY:HA3	2.20	0.42
1:A:150:ASN:O	2:A:1301:NAP:H6N	2.19	0.42
1:C:3:ARG:NH2	4:C:1504:HOH:O	2.53	0.42
1:C:18:GLY:HA2	2:C:1303:NAP:H1B	2.01	0.41
1:A:152:MET:HE2	1:A:254:ARG:CZ	2.51	0.41
1:A:181:ARG:CG	1:A:193:ALA:HB3	2.50	0.40
1:D:104:ASP:OD2	1:D:113:GLY:HA3	2.21	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	256/279 (92%)	250 (98%)	6 (2%)	0	100	100
1	B	250/279 (90%)	244 (98%)	3 (1%)	3 (1%)	10	1
1	C	263/279 (94%)	256 (97%)	7 (3%)	0	100	100
1	D	269/279 (96%)	263 (98%)	6 (2%)	0	100	100
All	All	1038/1116 (93%)	1013 (98%)	22 (2%)	3 (0%)	43	19

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	200	VAL
1	B	21[A]	GLY
1	B	21[B]	GLY

5.3.2 Protein sidechains ⓘ

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	199/228 (87%)	198 (100%)	1 (0%)	81	64
1	B	200/228 (88%)	200 (100%)	0	100	100
1	C	210/228 (92%)	209 (100%)	1 (0%)	81	64
1	D	215/228 (94%)	213 (99%)	2 (1%)	70	46
All	All	824/912 (90%)	820 (100%)	4 (0%)	81	64

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

Mol	Chain	Res	Type
1	A	243	PRO
1	C	156	ARG
1	D	156	ARG
1	D	223	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	140	ASN
1	C	247	GLN
1	D	210	HIS

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 [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

7 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
3	ACY	D	1403	-	3,3,3	0.63	0	3,3,3	1.13	0
3	ACY	A	1401	-	3,3,3	0.96	0	3,3,3	0.77	0
2	NAP	B	1302	-	50,52,52	1.89	8 (16%)	71,80,80	1.59	14 (19%)
2	NAP	A	1301	-	50,52,52	1.51	8 (16%)	71,80,80	1.78	15 (21%)
2	NAP	C	1303	-	50,52,52	1.36	5 (10%)	71,80,80	1.80	15 (21%)
2	NAP	D	1304	-	50,52,52	1.46	5 (10%)	71,80,80	1.74	14 (19%)
3	ACY	C	1402	-	3,3,3	0.76	0	3,3,3	0.98	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	NAP	B	1302	-	-	7/35/67/67	0/5/5/5
2	NAP	A	1301	-	-	9/35/67/67	0/5/5/5
2	NAP	C	1303	-	-	9/35/67/67	0/5/5/5
2	NAP	D	1304	-	-	6/35/67/67	0/5/5/5

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1302	NAP	O7N-C7N	9.57	1.41	1.24
2	A	1301	NAP	O7N-C7N	7.20	1.37	1.24
2	D	1304	NAP	O7N-C7N	6.90	1.37	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1303	NAP	O7N-C7N	6.43	1.36	1.24
2	B	1302	NAP	PN-O3	4.08	1.63	1.59
2	B	1302	NAP	C2N-N1N	3.68	1.39	1.35
2	D	1304	NAP	C8A-N7A	3.12	1.37	1.31
2	C	1303	NAP	C4N-C3N	2.87	1.43	1.39
2	A	1301	NAP	C2A-N3A	2.70	1.38	1.33
2	A	1301	NAP	C8A-N7A	2.64	1.36	1.31
2	B	1302	NAP	C8A-N7A	2.58	1.36	1.31
2	D	1304	NAP	C4N-C3N	2.58	1.43	1.39
2	B	1302	NAP	PA-O3	2.56	1.62	1.59
2	C	1303	NAP	C2A-N1A	2.55	1.38	1.33
2	C	1303	NAP	C8A-N7A	2.43	1.36	1.31
2	B	1302	NAP	C2A-N3A	2.39	1.38	1.33
2	A	1301	NAP	C2A-N1A	2.37	1.38	1.33
2	A	1301	NAP	P2B-O2B	2.28	1.63	1.59
2	C	1303	NAP	C6N-N1N	2.27	1.40	1.35
2	B	1302	NAP	C7N-N7N	2.15	1.36	1.33
2	A	1301	NAP	PN-O3	2.15	1.61	1.59
2	B	1302	NAP	C2A-N1A	2.14	1.37	1.33
2	A	1301	NAP	C6N-N1N	2.08	1.40	1.35
2	A	1301	NAP	C4N-C3N	2.08	1.42	1.39
2	D	1304	NAP	C2A-N3A	2.07	1.37	1.33
2	D	1304	NAP	PA-O2A	-2.01	1.46	1.55

All (58) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1302	NAP	N3A-C2A-N1A	-5.94	119.59	128.58
2	D	1304	NAP	N3A-C2A-N1A	-5.89	119.66	128.58
2	A	1301	NAP	N3A-C2A-N1A	-5.63	120.05	128.58
2	D	1304	NAP	C3N-C7N-N7N	5.56	124.59	117.74
2	C	1303	NAP	N3A-C2A-N1A	-5.53	120.21	128.58
2	A	1301	NAP	C3N-C7N-N7N	4.96	123.85	117.74
2	C	1303	NAP	N9A-C8A-N7A	-4.60	107.42	113.94
2	A	1301	NAP	O7N-C7N-C3N	-4.44	114.17	119.60
2	B	1302	NAP	O7N-C7N-C3N	-4.43	114.18	119.60
2	C	1303	NAP	C2B-C1B-N9A	-4.37	106.56	113.75
2	D	1304	NAP	O7N-C7N-C3N	-4.21	114.45	119.60
2	D	1304	NAP	N9A-C8A-N7A	-3.97	108.30	113.94
2	C	1303	NAP	O7N-C7N-C3N	-3.96	114.75	119.60
2	B	1302	NAP	C3N-C7N-N7N	3.91	122.56	117.74
2	C	1303	NAP	C5A-N7A-C8A	3.79	109.40	103.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1302	NAP	N9A-C8A-N7A	-3.46	109.03	113.94
2	C	1303	NAP	C4A-C5A-N7A	-3.36	106.74	110.58
2	C	1303	NAP	C5A-C4A-N3A	-3.34	122.11	126.72
2	C	1303	NAP	C4D-O4D-C1D	-3.33	106.88	109.92
2	A	1301	NAP	C2N-C3N-C4N	3.32	122.11	118.26
2	A	1301	NAP	C5A-C4A-N3A	-3.25	122.25	126.72
2	D	1304	NAP	C5A-C4A-N3A	-3.22	122.29	126.72
2	A	1301	NAP	C2B-C1B-N9A	-3.20	108.48	113.75
2	A	1301	NAP	N9A-C8A-N7A	-3.11	109.53	113.94
2	C	1303	NAP	C3N-C7N-N7N	3.07	121.53	117.74
2	D	1304	NAP	C2B-C1B-N9A	-2.96	108.88	113.75
2	B	1302	NAP	C2A-N1A-C6A	2.94	123.56	118.73
2	C	1303	NAP	C2A-N3A-C4A	2.87	118.85	111.83
2	D	1304	NAP	C2A-N3A-C4A	2.87	118.85	111.83
2	B	1302	NAP	O3-PN-O1N	-2.87	102.06	110.70
2	D	1304	NAP	C5A-N7A-C8A	2.79	107.84	103.45
2	A	1301	NAP	O4B-C1B-N9A	2.76	113.38	108.09
2	B	1302	NAP	C5A-N7A-C8A	2.66	107.62	103.45
2	A	1301	NAP	C2A-N3A-C4A	2.64	118.28	111.83
2	A	1301	NAP	C5A-N7A-C8A	2.59	107.52	103.45
2	C	1303	NAP	C2N-C3N-C4N	2.56	121.24	118.26
2	D	1304	NAP	C5A-C4A-N9A	2.49	108.53	105.81
2	A	1301	NAP	O2B-C2B-C1B	2.47	118.75	110.05
2	B	1302	NAP	O3-PA-O1A	-2.45	103.34	110.70
2	B	1302	NAP	C2A-N3A-C4A	2.44	117.78	111.83
2	A	1301	NAP	O2N-PN-O3	2.43	113.83	107.27
2	B	1302	NAP	C4A-N9A-C8A	2.34	108.19	105.74
2	C	1303	NAP	C4A-N9A-C8A	2.33	108.19	105.74
2	D	1304	NAP	C4D-O4D-C1D	-2.33	107.79	109.92
2	D	1304	NAP	O3-PN-O1N	-2.27	103.88	110.70
2	A	1301	NAP	C5N-C4N-C3N	-2.24	118.16	120.36
2	D	1304	NAP	C4A-N9A-C1B	-2.23	121.41	126.63
2	C	1303	NAP	O3-PN-O1N	-2.19	104.13	110.70
2	D	1304	NAP	C2A-N1A-C6A	2.18	122.31	118.73
2	D	1304	NAP	O2A-PA-O3	2.16	113.11	107.27
2	B	1302	NAP	C4A-N9A-C1B	-2.15	121.61	126.63
2	B	1302	NAP	O2N-PN-O3	2.12	113.02	107.27
2	B	1302	NAP	C5A-C4A-N3A	-2.12	123.80	126.72
2	A	1301	NAP	O3-PN-O1N	-2.08	104.44	110.70
2	C	1303	NAP	C5A-C4A-N9A	2.07	108.07	105.81
2	B	1302	NAP	C4A-C5A-N7A	-2.06	108.23	110.58
2	A	1301	NAP	C2A-N1A-C6A	2.04	122.08	118.73

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1303	NAP	C5N-C4N-C3N	-2.01	118.39	120.36

There are no chirality outliers.

All (31) torsion outliers are listed below:

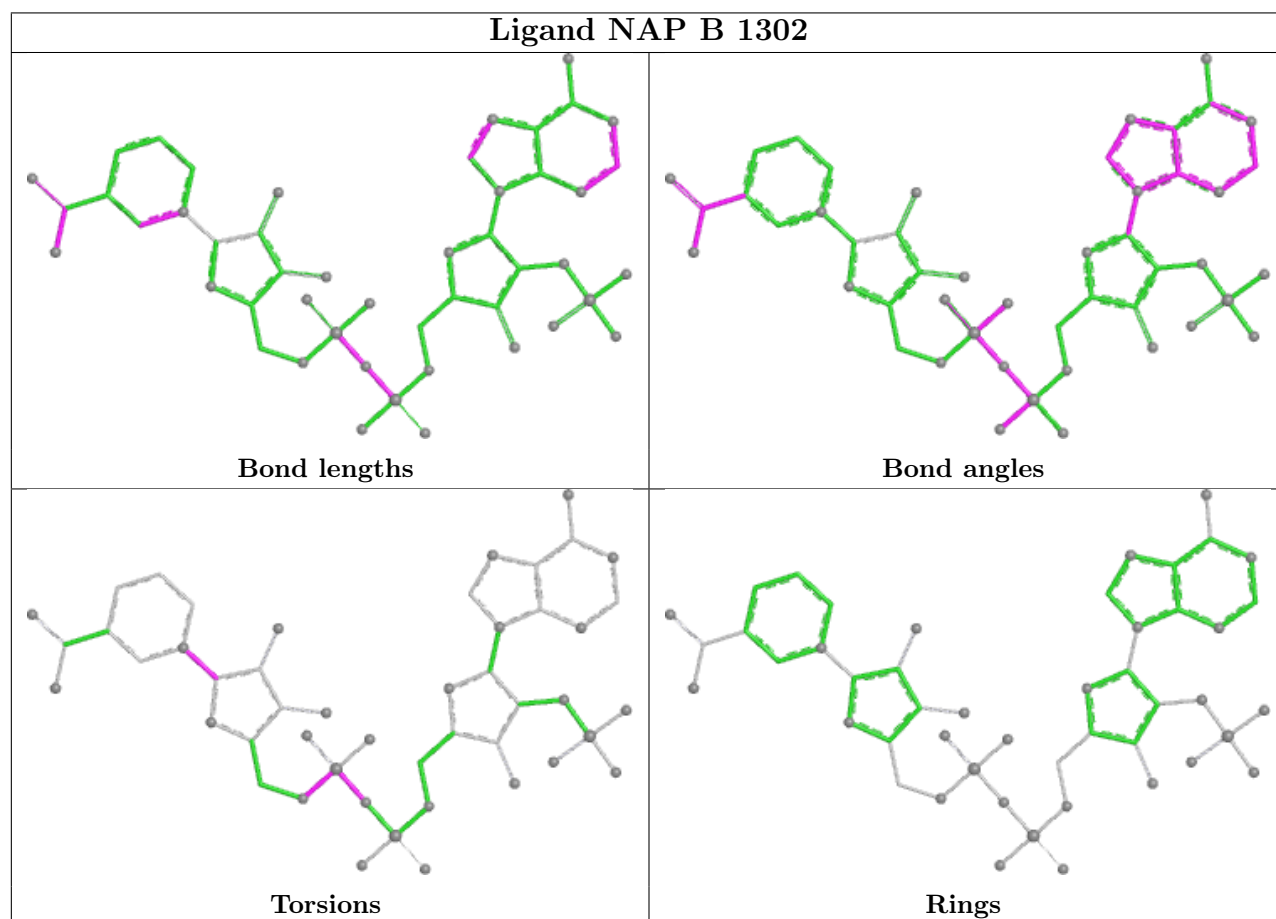
Mol	Chain	Res	Type	Atoms
2	A	1301	NAP	C5D-O5D-PN-O3
2	A	1301	NAP	C5D-O5D-PN-O1N
2	A	1301	NAP	C5D-O5D-PN-O2N
2	A	1301	NAP	O4D-C1D-N1N-C2N
2	B	1302	NAP	C5D-O5D-PN-O3
2	B	1302	NAP	C5D-O5D-PN-O1N
2	B	1302	NAP	C5D-O5D-PN-O2N
2	B	1302	NAP	O4D-C1D-N1N-C2N
2	C	1303	NAP	C5D-O5D-PN-O3
2	C	1303	NAP	C5D-O5D-PN-O1N
2	C	1303	NAP	C5D-O5D-PN-O2N
2	C	1303	NAP	O4D-C1D-N1N-C2N
2	D	1304	NAP	C5D-O5D-PN-O3
2	B	1302	NAP	PA-O3-PN-O2N
2	C	1303	NAP	PA-O3-PN-O2N
2	D	1304	NAP	PA-O3-PN-O2N
2	D	1304	NAP	C5D-O5D-PN-O1N
2	A	1301	NAP	PA-O3-PN-O2N
2	A	1301	NAP	C2B-O2B-P2B-O3X
2	A	1301	NAP	O4D-C1D-N1N-C6N
2	B	1302	NAP	O4D-C1D-N1N-C6N
2	C	1303	NAP	O4D-C1D-N1N-C6N
2	D	1304	NAP	O4D-C1D-N1N-C6N
2	A	1301	NAP	O4B-C4B-C5B-O5B
2	D	1304	NAP	O4B-C4B-C5B-O5B
2	A	1301	NAP	PA-O3-PN-O1N
2	B	1302	NAP	PA-O3-PN-O1N
2	C	1303	NAP	PA-O3-PN-O1N
2	D	1304	NAP	PA-O3-PN-O1N
2	C	1303	NAP	C2B-O2B-P2B-O2X
2	C	1303	NAP	O4B-C4B-C5B-O5B

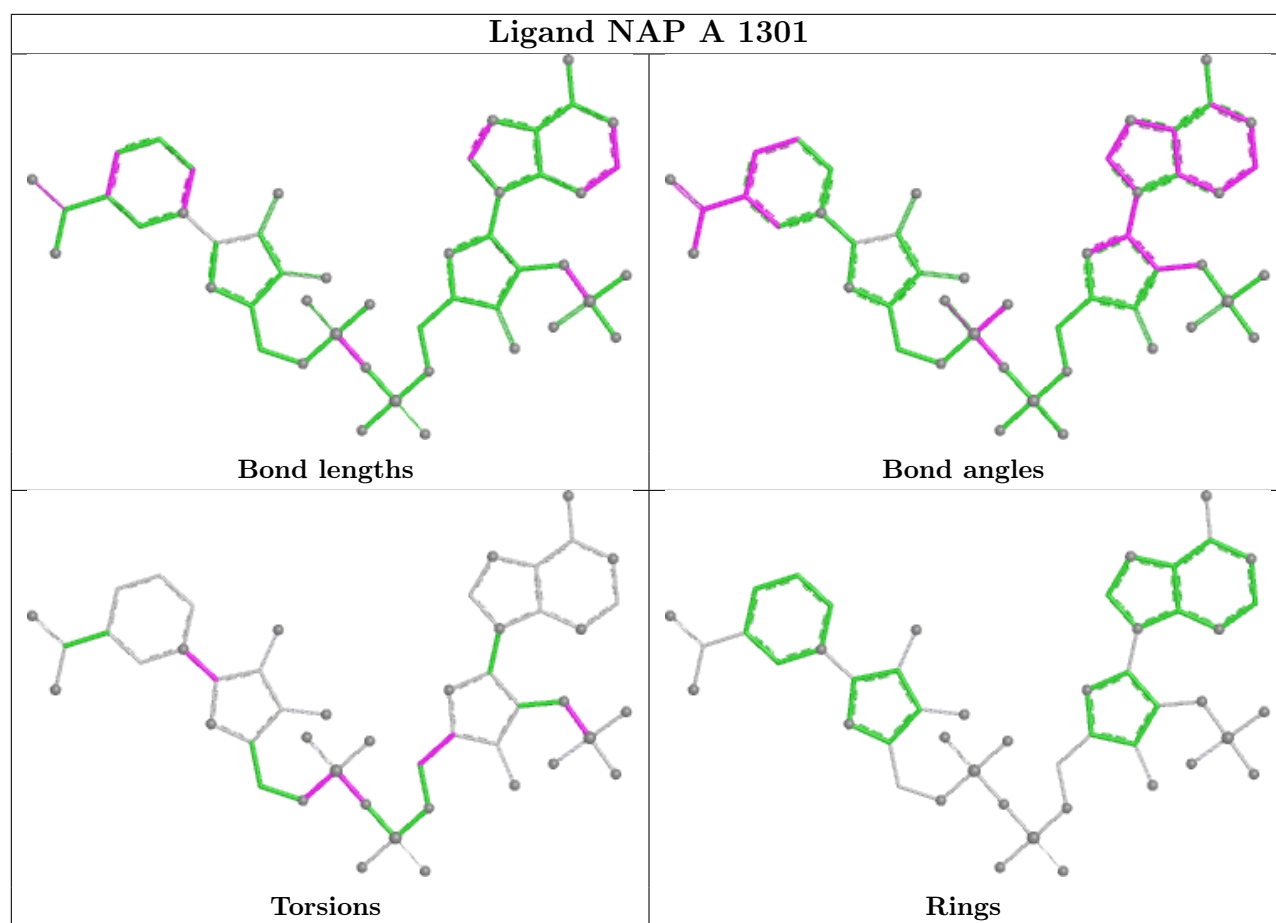
There are no ring outliers.

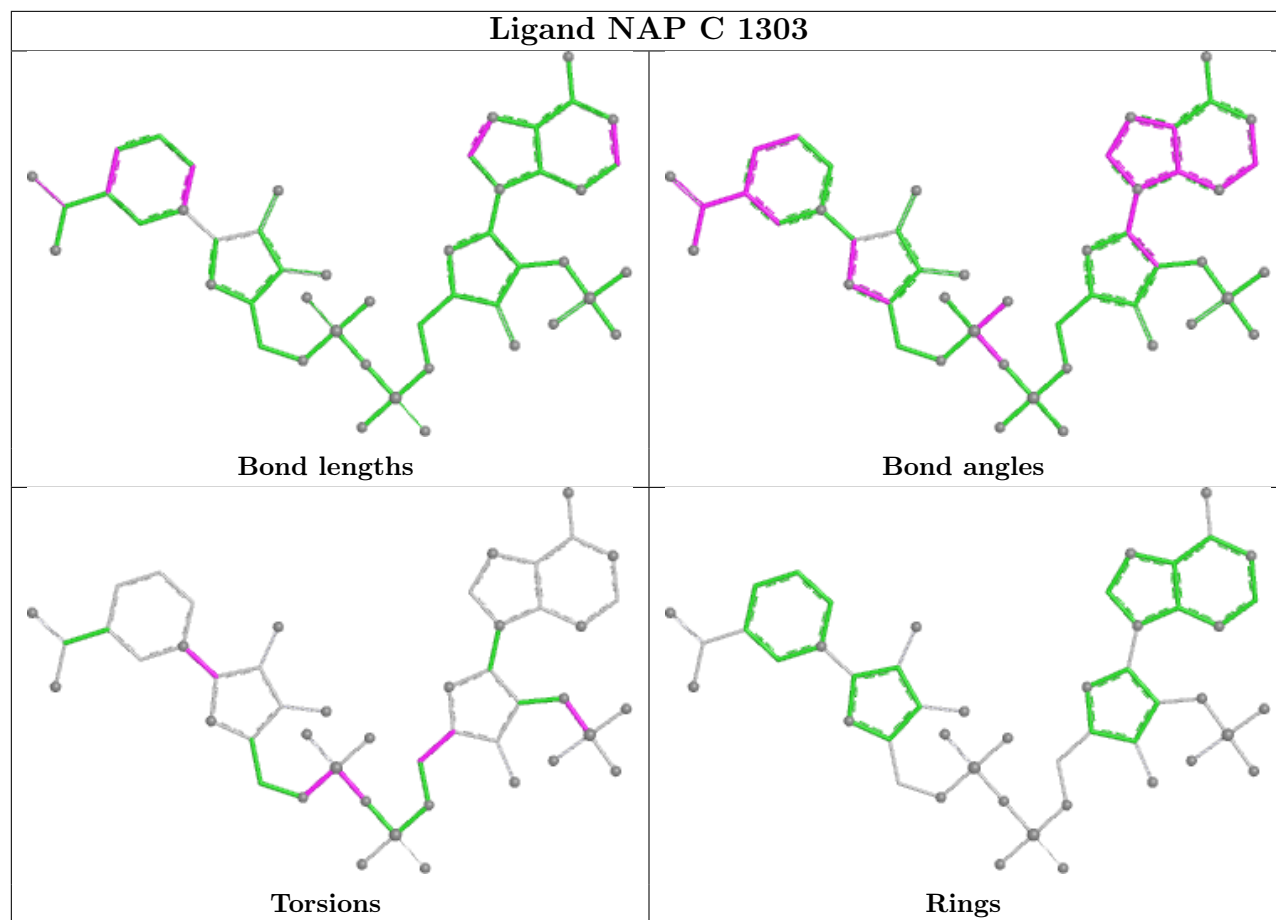
4 monomers are involved in 7 short contacts:

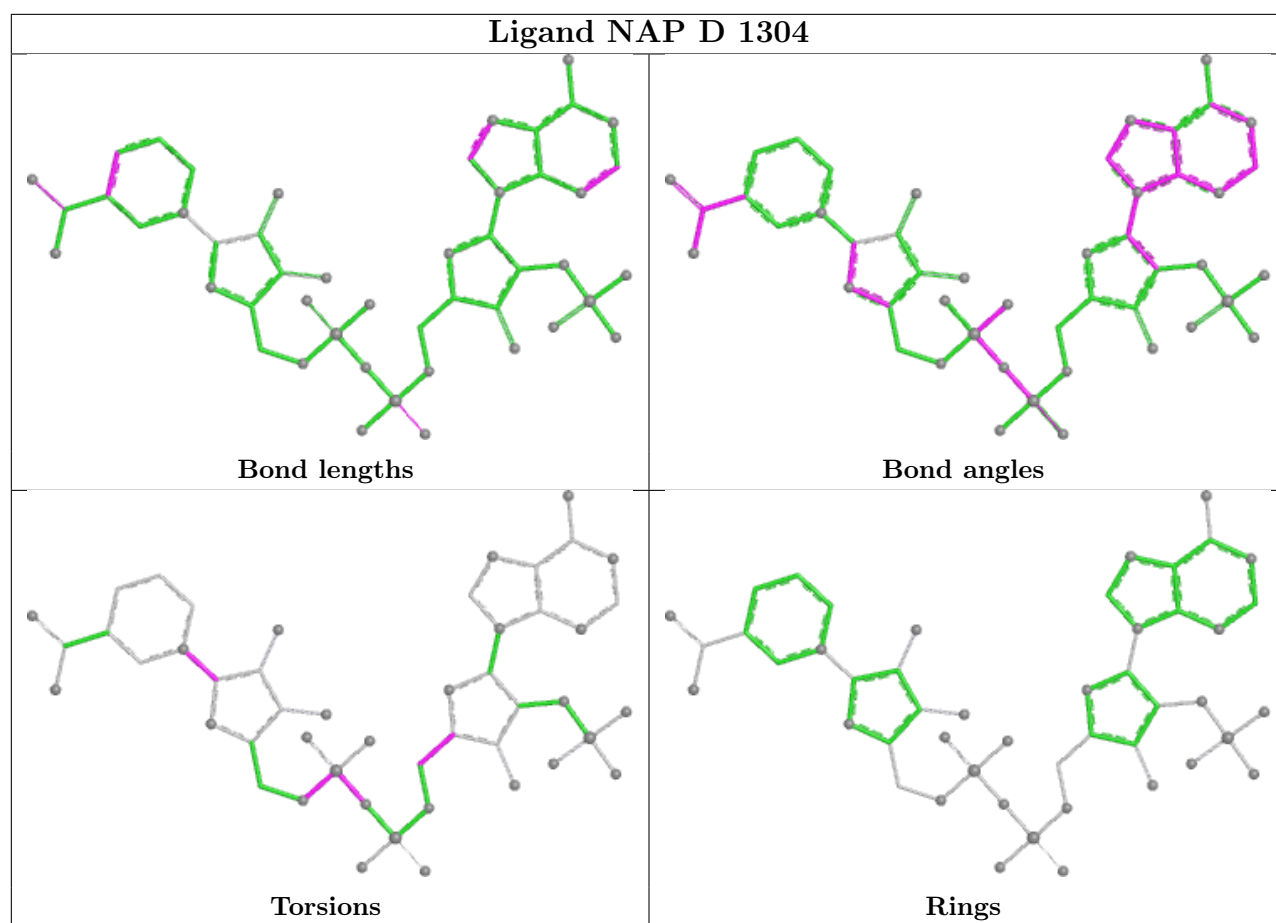
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1302	NAP	2	0
2	A	1301	NAP	2	0
2	C	1303	NAP	2	0
2	D	1304	NAP	1	0

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 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	254/279 (91%)	1.03	47 (18%) 3 5	11, 17, 28, 45	6 (2%)
1	B	244/279 (87%)	0.68	20 (8%) 17 22	8, 17, 25, 39	10 (4%)
1	C	257/279 (92%)	0.46	12 (4%) 36 44	10, 17, 33, 44	8 (3%)
1	D	257/279 (92%)	0.63	22 (8%) 16 21	9, 17, 31, 41	14 (5%)
All	All	1012/1116 (90%)	0.70	101 (9%) 12 17	8, 17, 30, 45	38 (3%)

All (101) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	2	ALA	5.8
1	A	218	ALA	5.6
1	B	2	ALA	5.0
1	B	257	GLY	4.9
1	A	217	ALA	4.8
1	D	2	ALA	4.6
1	D	218	ALA	4.4
1	A	59	GLY	4.4
1	D	220	THR	4.3
1	D	219	ALA	4.0
1	B	157	VAL	4.0
1	A	219	ALA	3.9
1	B	224	MET	3.9
1	A	52	ALA	3.9
1	A	220	THR	3.9
1	A	258	SER	3.8
1	A	107	LEU	3.8
1	C	218	ALA	3.7
1	A	157	VAL	3.7
1	A	106	LEU	3.6
1	C	3	ARG	3.6

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Mol	Chain	Res	Type	RSRZ
1	A	212	LYS	3.5
1	A	257	GLY	3.4
1	C	4	PRO	3.4
1	B	160	LEU	3.4
1	B	158	LEU	3.3
1	A	162	VAL	3.3
1	A	214	PRO	3.3
1	A	58	ALA	3.3
1	C	217	ALA	3.3
1	D	214	PRO	3.2
1	D	217	ALA	3.2
1	A	109	GLY	3.1
1	C	258	SER	3.1
1	D	222	GLU	3.1
1	C	220	THR	2.9
1	A	114	TRP	2.9
1	A	168	ALA	2.8
1	A	2	ALA	2.7
1	A	53	ALA	2.7
1	A	175	ALA	2.7
1	C	219	ALA	2.7
1	C	214	PRO	2.7
1	B	258	SER	2.7
1	C	223	GLN	2.7
1	D	156	ARG	2.7
1	B	207	PHE	2.6
1	D	221	TYR	2.6
1	A	165	PHE	2.5
1	B	107	LEU	2.5
1	D	4	PRO	2.5
1	A	105	THR	2.5
1	A	111	THR	2.5
1	B	44	THR	2.5
1	A	216	LYS	2.5
1	D	212	LYS	2.5
1	B	3	ARG	2.5
1	A	256	THR	2.5
1	B	200	VAL	2.5
1	A	11	ASP	2.5
1	D	215	GLU	2.4
1	A	51	LEU	2.4
1	A	160	LEU	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	209	LEU	2.4
1	D	3	ARG	2.4
1	A	211	ASP	2.4
1	A	50	GLU	2.4
1	A	222	GLU	2.4
1	A	161	SER	2.3
1	A	164	HIS	2.3
1	B	210	HIS	2.3
1	B	118	PHE	2.3
1	A	3	ARG	2.3
1	A	89	SER	2.3
1	A	215	GLU	2.3
1	A	221	TYR	2.3
1	D	224	MET	2.2
1	D	158	LEU	2.2
1	A	213	ASP	2.2
1	A	55	CYS	2.2
1	D	88	HIS	2.2
1	D	216	LYS	2.2
1	D	157	VAL	2.2
1	A	158	LEU	2.2
1	A	171	TYR	2.2
1	B	159	PRO	2.2
1	A	174	THR	2.2
1	A	118	PHE	2.2
1	C	224	MET	2.2
1	D	114	TRP	2.1
1	D	11	ASP	2.1
1	B	153	SER	2.1
1	C	257	GLY	2.1
1	B	156	ARG	2.1
1	A	108	SER	2.1
1	A	159	PRO	2.1
1	A	112	SER	2.0
1	B	155	HIS	2.0
1	D	223	GLN	2.0
1	B	45	VAL	2.0
1	D	211	ASP	2.0

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 [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

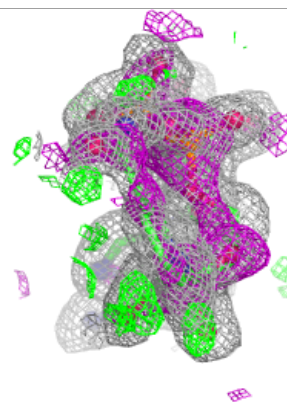
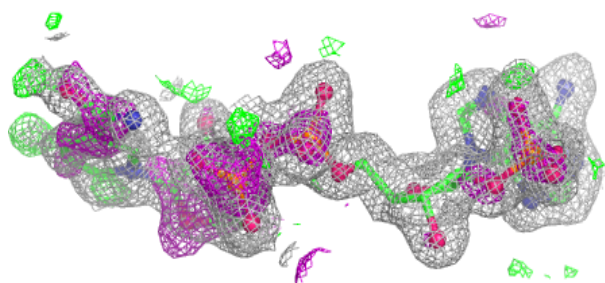
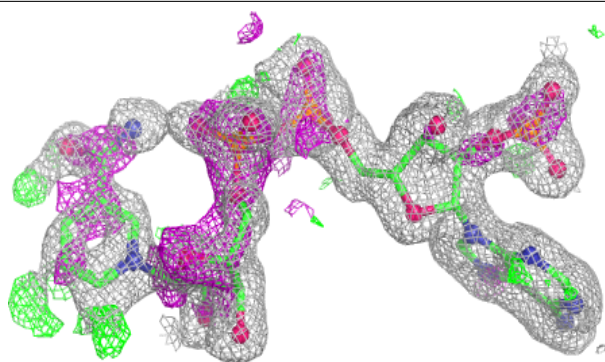
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	NAP	B	1302	48/48	0.91	0.12	19,25,31,32	0
3	ACY	A	1401	4/4	0.96	0.16	13,15,15,17	0
2	NAP	A	1301	48/48	0.97	0.07	14,16,18,19	0
3	ACY	D	1403	4/4	0.97	0.16	12,13,14,15	0
2	NAP	C	1303	48/48	0.98	0.05	14,16,18,19	0
3	ACY	C	1402	4/4	0.98	0.16	12,13,14,16	0
2	NAP	D	1304	48/48	0.98	0.05	14,16,17,18	0

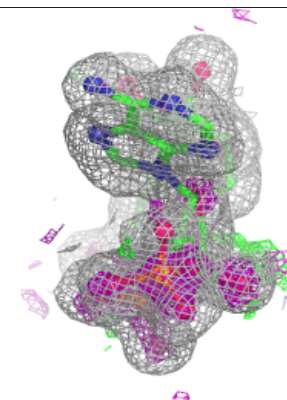
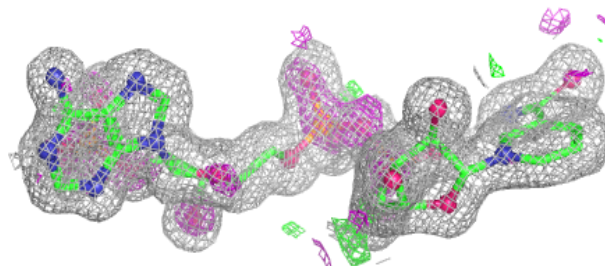
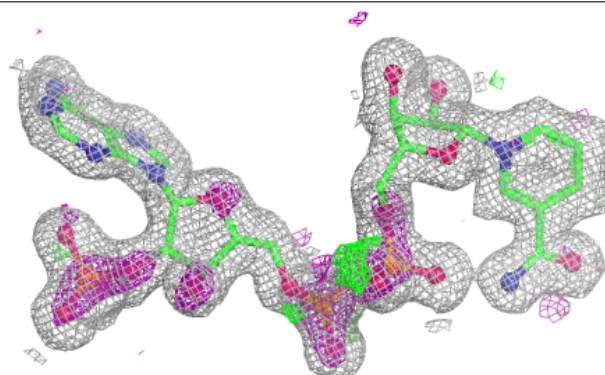
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NAP B 1302:

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

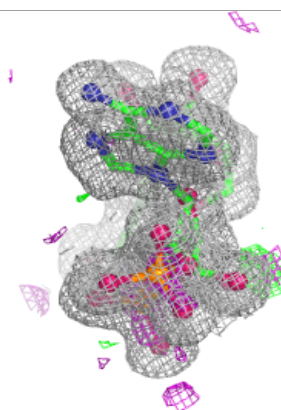
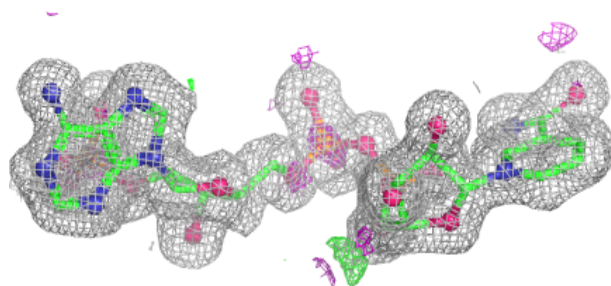
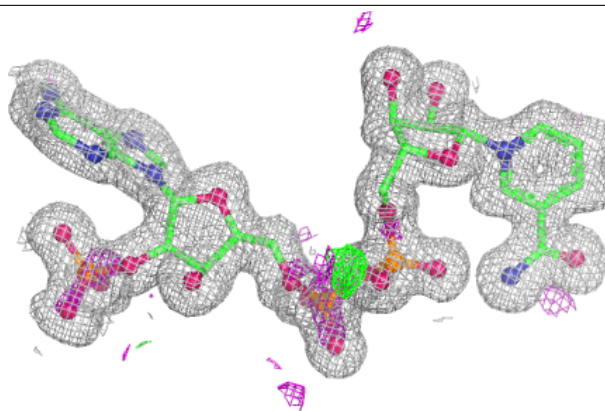
**Electron density around NAP A 1301:**

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

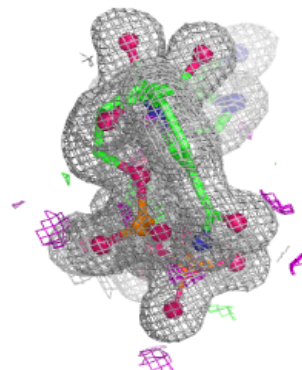
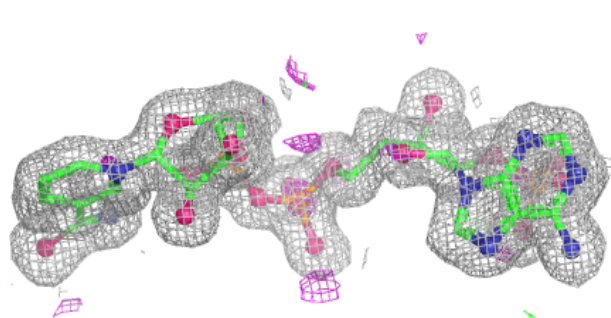
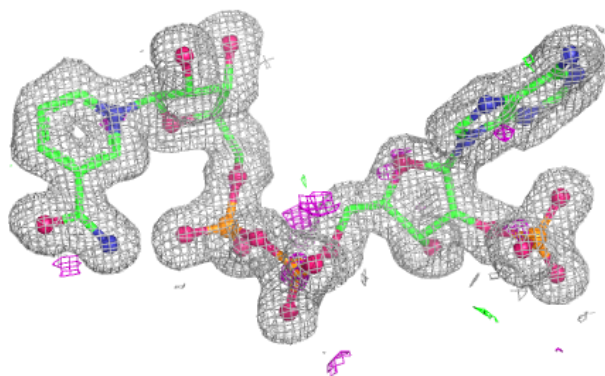


Electron density around NAP C 1303:

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

**Electron density around NAP D 1304:**

$2mF_o-DF_c$ (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.