Full wwPDB X-ray Structure Validation Report (i)

Dec 23, 2024 – 06:11 PM JST

PDB ID	:	9JOB
Title	:	PfDXR - Mn2+ - NADPH - MAMK89 quaternary complex
Authors	:	Takada, S.; Sakamoto, Y.; Tanaka, N.
Deposited on	:	2024-09-24
Resolution	:	1.39 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 (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:

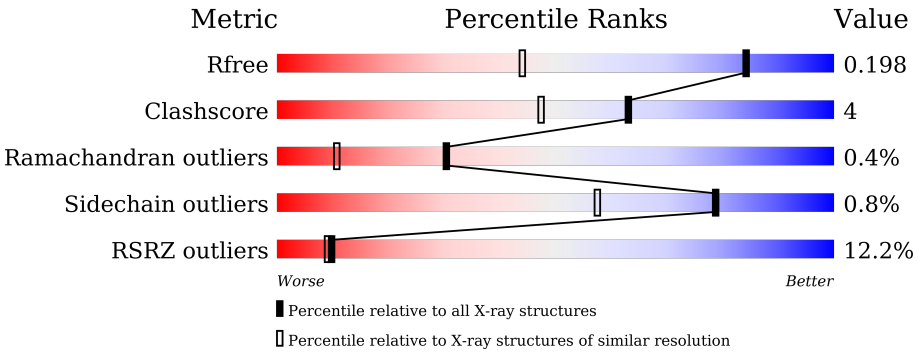
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 1.39 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	2247 (1.40-1.40)
Clashscore	180529	2446 (1.40-1.40)
Ramachandran outliers	177936	2398 (1.40-1.40)
Sidechain outliers	177891	2397 (1.40-1.40)
RSRZ outliers	164620	2246 (1.40-1.40)

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	488	14% 77% 7% • 16%
1	B	488	7% 77% 7% • 16%

2 Entry composition (i)

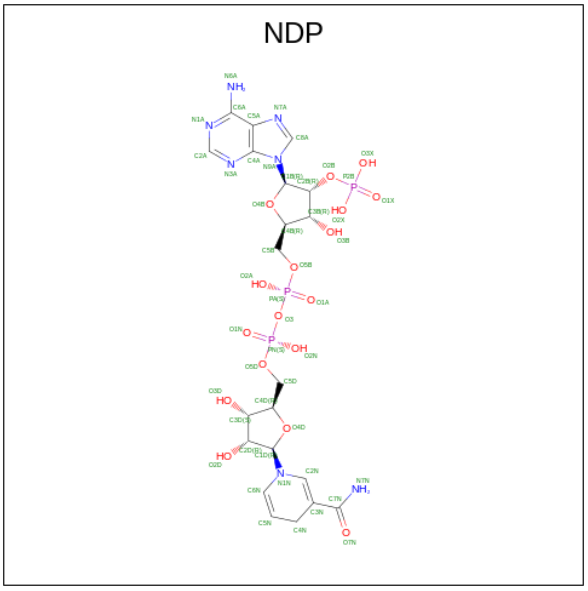
There are 6 unique types of molecules in this entry. The entry contains 7382 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 1-deoxy-D-xylulose 5-phosphate reductoisomerase, apicoplastic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	411	Total	C	N	O	S	0	0	0
			3285	2109	539	617	20			
1	B	411	Total	C	N	O	S	0	0	0
			3285	2109	539	617	20			

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).

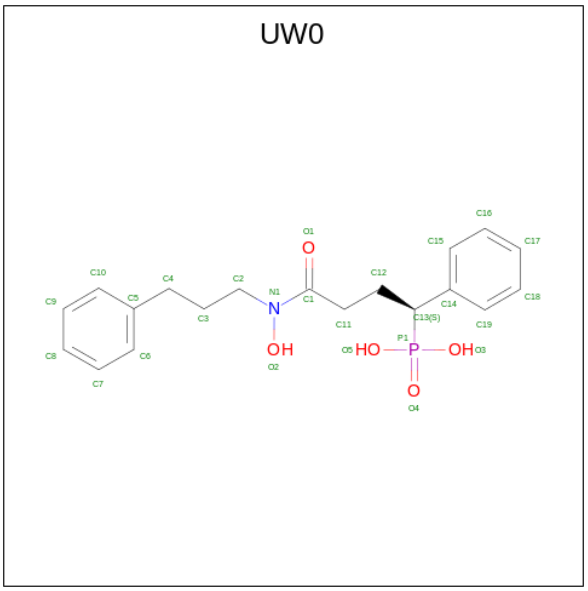


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
2	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 3 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mn 1 1	0	0
3	B	1	Total Mn 1 1	0	0

- Molecule 4 is [(1 {S})-4-oxidanylidene-4-[oxidanyl(3-phenylpropyl)amino]-1-phenyl-butyl]phosphonic acid (three-letter code: UW0) (formula: $C_{19}H_{24}NO_5P$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O P 26 19 1 5 1	0	0
4	B	1	Total C N O P 26 19 1 5 1	0	0

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	3	Total Ca 3 3	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	295	Total O 295 295	0	0

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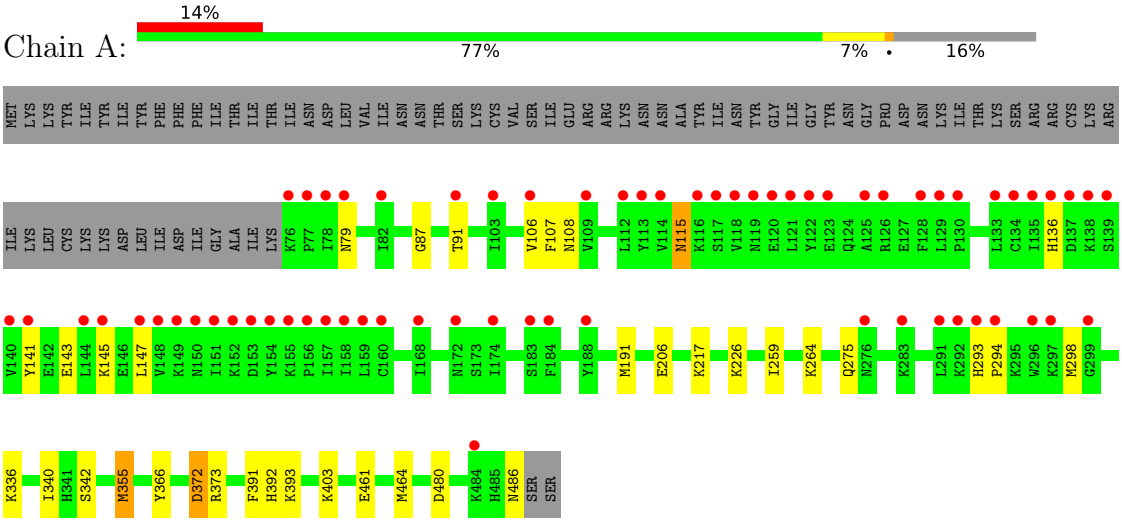
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	364	Total 364	O 364	0	0

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.

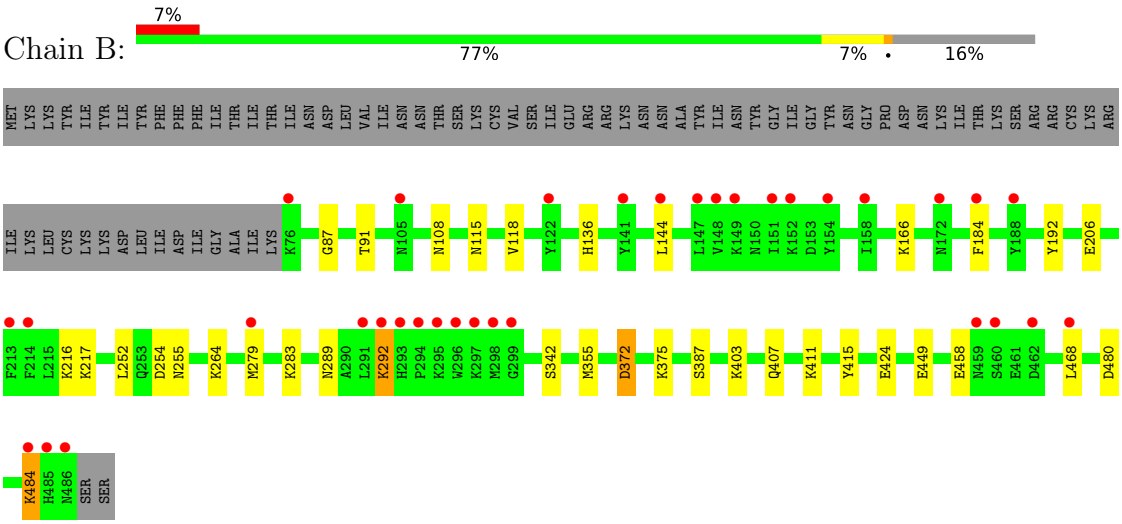
• Molecule 1: 1-deoxy-D-xylulose 5-phosphate reductoisomerase, apicoplastic

Chain A:



• Molecule 1: 1-deoxy-D-xylulose 5-phosphate reductoisomerase, apicoplastic

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	51.52Å 78.20Å 111.14Å 90.00° 92.64° 90.00°	Depositor
Resolution (Å)	63.93 – 1.39 63.93 – 1.39	Depositor EDS
% Data completeness (in resolution range)	92.6 (63.93-1.39) 92.7 (63.93-1.39)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.50 (at 1.39Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.165 , 0.189 0.173 , 0.198	Depositor DCC
R_{free} test set	8392 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å^2)	18.6	Xtriage
Anisotropy	0.157	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 32.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.021 for h,-k,-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	7382	wwPDB-VP
Average B, all atoms (Å^2)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.86% 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: CA, MN, UW0, NDP

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	0.58	0/3348	0.98	9/4521 (0.2%)
1	B	0.62	1/3348 (0.0%)	0.99	3/4521 (0.1%)
All	All	0.60	1/6696 (0.0%)	0.98	12/9042 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	424	GLU	CD-OE2	7.18	1.33	1.25

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	355	MET	CG-SD-CE	-9.22	85.44	100.20
1	A	373	ARG	NE-CZ-NH2	-7.95	116.33	120.30
1	A	464	MET	CG-SD-CE	-6.71	89.46	100.20
1	A	298	MET	CG-SD-CE	-6.32	90.08	100.20
1	B	372	ASP	CB-CG-OD1	5.57	123.31	118.30
1	A	461	GLU	OE1-CD-OE2	5.51	129.91	123.30
1	B	355	MET	CG-SD-CE	-5.47	91.45	100.20
1	A	366	TYR	CB-CG-CD2	5.38	124.23	121.00
1	A	206	GLU	OE1-CD-OE2	5.35	129.72	123.30
1	A	373	ARG	NE-CZ-NH1	5.33	122.96	120.30
1	A	372	ASP	CB-CG-OD1	5.31	123.08	118.30
1	B	206	GLU	OE1-CD-OE2	5.23	129.58	123.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3285	0	3334	28	0
1	B	3285	0	3334	25	0
2	A	48	0	26	0	0
2	B	48	0	26	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	26	0	0	0	0
4	B	26	0	0	0	0
5	B	3	0	0	0	0
6	A	295	0	0	18	0
6	B	364	0	0	11	0
All	All	7382	0	6720	53	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 (53) 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:468:LEU:HB2	6:B:893:HOH:O	1.64	0.97
1:B:449:GLU:HG3	6:B:904:HOH:O	1.66	0.94
1:B:108:ASN:HB3	6:B:890:HOH:O	1.64	0.94
1:A:392:HIS:HE1	6:A:818:HOH:O	1.60	0.84
1:A:143:GLU:O	1:A:147:LEU:HD23	1.79	0.82
1:A:480:ASP:HB2	6:A:609:HOH:O	1.83	0.78
6:A:788:HOH:O	1:B:372:ASP:HB3	1.85	0.77
1:B:184:PHE:HA	6:B:821:HOH:O	1.85	0.75
1:A:392:HIS:CE1	6:A:818:HOH:O	2.41	0.69
1:A:372:ASP:HB2	6:B:706:HOH:O	1.96	0.66
1:B:184:PHE:CA	6:B:821:HOH:O	2.45	0.64
1:A:106:VAL:HG23	1:A:107:PHE:CD2	2.34	0.63
1:A:336:LYS:HE3	6:A:809:HOH:O	1.99	0.62
1:B:403:LYS:HE3	1:B:407:GLN:NE2	2.15	0.61
1:A:486:ASN:C	6:A:645:HOH:O	2.38	0.61
1:A:480:ASP:CB	6:A:609:HOH:O	2.45	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:166:LYS:HE2	1:B:192:TYR:CZ	2.39	0.57
1:A:275:GLN:HB3	6:A:672:HOH:O	2.04	0.57
1:A:293:HIS:O	1:A:293:HIS:CG	2.59	0.55
6:A:788:HOH:O	1:B:372:ASP:CB	2.49	0.54
6:A:839:HOH:O	1:B:375:LYS:HE3	2.07	0.54
1:A:143:GLU:O	1:A:147:LEU:CD2	2.53	0.54
1:A:226:LYS:CE	6:A:806:HOH:O	2.56	0.53
1:B:87:GLY:O	1:B:91:THR:HG23	2.09	0.52
1:A:259:ILE:HD12	6:A:613:HOH:O	2.09	0.52
1:A:226:LYS:HE3	6:A:806:HOH:O	2.11	0.51
1:A:79:ASN:HD22	1:A:108:ASN:HB2	1.77	0.50
1:B:184:PHE:HA	6:B:602:HOH:O	2.10	0.50
1:A:217:LYS:HG3	6:A:601:HOH:O	2.12	0.49
1:B:254:ASP:O	1:B:255:ASN:HB2	2.13	0.49
1:B:217:LYS:NZ	1:B:458:GLU:O	2.39	0.48
1:A:393:LYS:HE2	6:B:646:HOH:O	2.13	0.47
1:A:87:GLY:O	1:A:91:THR:HG23	2.15	0.47
1:B:480:ASP:O	1:B:484:LYS:HD2	2.14	0.47
1:A:115:ASN:HD22	1:A:136:HIS:HB3	1.80	0.47
1:A:340:ILE:HG12	1:A:355:MET:HG2	1.97	0.46
1:B:108:ASN:CB	6:B:890:HOH:O	2.42	0.45
1:B:115:ASN:HD22	1:B:136:HIS:HB3	1.80	0.45
1:A:217:LYS:NZ	6:A:601:HOH:O	2.27	0.45
1:A:372:ASP:CB	6:B:706:HOH:O	2.57	0.44
1:B:449:GLU:CG	6:B:904:HOH:O	2.42	0.44
1:B:484:LYS:HA	1:B:484:LYS:HE2	2.00	0.44
1:B:118:VAL:HG23	1:B:144:LEU:HB2	2.01	0.43
1:A:294:PRO:HB3	6:A:844:HOH:O	2.18	0.42
1:A:217:LYS:CG	6:A:601:HOH:O	2.67	0.42
1:A:340:ILE:HD12	1:A:391:PHE:HZ	1.84	0.42
1:A:141:TYR:O	1:A:145:LYS:HG3	2.20	0.42
1:B:411:LYS:HE3	1:B:415:TYR:CE2	2.55	0.42
1:A:403:LYS:HG3	6:A:846:HOH:O	2.20	0.41
1:B:289:ASN:HD22	1:B:292:LYS:HZ3	1.68	0.41
1:B:216:LYS:NZ	1:B:252:LEU:O	2.46	0.41
1:B:279:MET:HG3	1:B:283:LYS:HE3	2.03	0.40
1:B:289:ASN:HD22	1:B:292:LYS:NZ	2.20	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	409/488 (84%)	396 (97%)	12 (3%)	1 (0%)	44 20
1	B	409/488 (84%)	394 (96%)	13 (3%)	2 (0%)	25 7
All	All	818/976 (84%)	790 (97%)	25 (3%)	3 (0%)	30 11

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	342	SER
1	B	292	LYS
1	B	342	SER

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	378/449 (84%)	375 (99%)	3 (1%)	79 57
1	B	378/449 (84%)	375 (99%)	3 (1%)	79 57
All	All	756/898 (84%)	750 (99%)	6 (1%)	79 57

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	115	ASN
1	A	191	MET
1	A	264	LYS

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Mol	Chain	Res	Type
1	B	264	LYS
1	B	387	SER
1	B	484	LYS

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

Mol	Chain	Res	Type
1	A	79	ASN
1	A	115	ASN
1	A	172	ASN
1	A	377	ASN
1	A	392	HIS
1	B	115	ASN
1	B	172	ASN
1	B	253	GLN
1	B	255	ASN
1	B	261	ASN
1	B	289	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 9 ligands modelled in this entry, 5 are monoatomic - leaving 4 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	$\#\|Z\| > 2$
2	NDP	B	501	-	45,52,52	1.37	6 (13%)	53,80,80	1.42	7 (13%)
4	UW0	A	503	3	26,27,27	2.09	8 (30%)	27,36,36	1.49	4 (14%)
4	UW0	B	503	3	26,27,27	1.64	6 (23%)	27,36,36	1.05	1 (3%)
2	NDP	A	501	-	45,52,52	1.17	2 (4%)	53,80,80	1.35	7 (13%)

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	NDP	B	501	-	-	2/30/77/77	0/5/5/5
4	UW0	A	503	3	-	2/25/25/25	0/2/2/2
4	UW0	B	503	3	-	2/25/25/25	0/2/2/2
2	NDP	A	501	-	-	4/30/77/77	0/5/5/5

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	503	UW0	O2-N1	7.22	1.45	1.40
2	A	501	NDP	P2B-O2B	4.88	1.68	1.59
4	B	503	UW0	P1-O5	-4.54	1.47	1.54
2	B	501	NDP	P2B-O2B	4.11	1.67	1.59
4	B	503	UW0	C18-C19	3.22	1.45	1.38
2	B	501	NDP	P2B-O2X	-3.18	1.42	1.54
2	B	501	NDP	P2B-O3X	-3.11	1.42	1.54
2	A	501	NDP	PN-O2N	-2.96	1.41	1.55
4	A	503	UW0	P1-O3	-2.92	1.50	1.54
4	A	503	UW0	C1-N1	-2.59	1.31	1.34
2	B	501	NDP	PN-O2N	-2.56	1.43	1.55
4	B	503	UW0	C1-N1	-2.47	1.31	1.34
2	B	501	NDP	PA-O5B	-2.45	1.49	1.59
4	A	503	UW0	C16-C15	2.30	1.43	1.38
4	B	503	UW0	C16-C15	2.28	1.43	1.38
4	A	503	UW0	P1-C13	2.25	1.85	1.82
4	B	503	UW0	P1-C13	2.24	1.85	1.82
4	A	503	UW0	C11-C1	2.22	1.56	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	NDP	P2B-O1X	2.21	1.57	1.50
4	A	503	UW0	P1-O4	2.17	1.53	1.49
4	A	503	UW0	C10-C5	2.14	1.43	1.38
4	B	503	UW0	P1-O4	2.01	1.53	1.49

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	501	NDP	O3X-P2B-O2X	4.33	124.20	107.64
4	A	503	UW0	C19-C14-C13	-4.23	114.00	120.82
2	A	501	NDP	O2N-PN-O1N	4.22	133.09	112.24
2	B	501	NDP	C3B-C2B-C1B	-3.77	95.80	102.89
2	A	501	NDP	O3X-P2B-O2X	3.69	121.75	107.64
2	B	501	NDP	O2N-PN-O1N	3.50	129.53	112.24
2	A	501	NDP	O2N-PN-O5D	-3.02	93.70	107.75
4	A	503	UW0	C15-C14-C13	2.98	125.62	120.82
4	A	503	UW0	C3-C2-N1	2.89	117.07	111.06
2	B	501	NDP	C1B-N9A-C4A	-2.84	121.64	126.64
2	A	501	NDP	C5A-C6A-N6A	2.64	124.36	120.35
2	B	501	NDP	PN-O3-PA	-2.52	124.18	132.83
2	B	501	NDP	C3N-C7N-N7N	2.34	121.82	117.67
4	A	503	UW0	C16-C15-C14	-2.17	117.96	120.65
4	B	503	UW0	C8-C7-C6	-2.15	116.92	120.19
2	A	501	NDP	C3B-C2B-C1B	-2.14	98.86	102.89
2	A	501	NDP	O7N-C7N-C3N	-2.13	116.88	120.90
2	B	501	NDP	C3N-C2N-N1N	-2.05	120.17	123.10
2	A	501	NDP	O3D-C3D-C4D	-2.05	105.13	111.05

There are no chirality outliers.

All (10) torsion outliers are listed below:

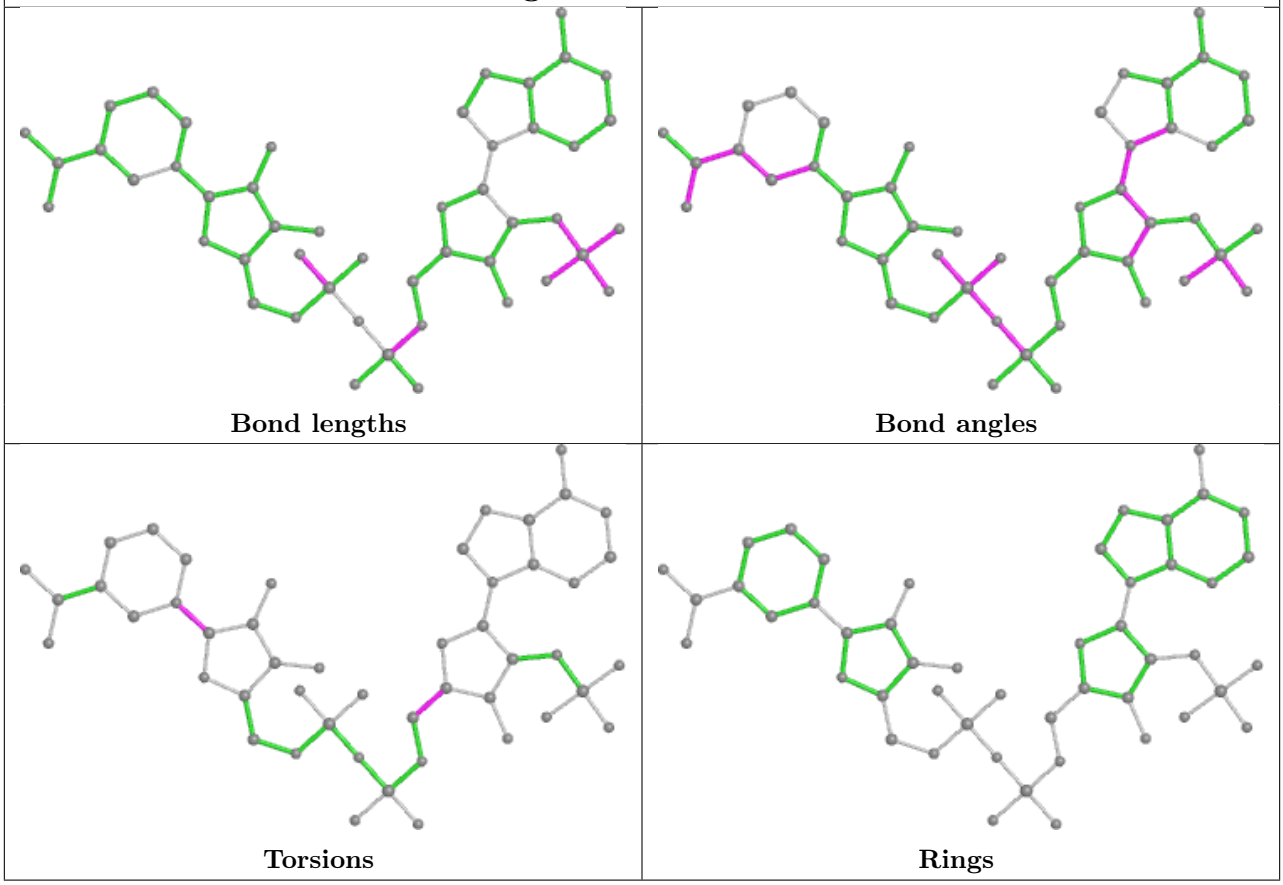
Mol	Chain	Res	Type	Atoms
4	A	503	UW0	N1-C1-C11-C12
4	B	503	UW0	N1-C1-C11-C12
2	B	501	NDP	O4D-C1D-N1N-C6N
2	A	501	NDP	O4D-C1D-N1N-C6N
2	A	501	NDP	PN-O3-PA-O1A
2	A	501	NDP	C1B-C2B-O2B-P2B
2	A	501	NDP	O4B-C4B-C5B-O5B
2	B	501	NDP	O4B-C4B-C5B-O5B
4	A	503	UW0	O1-C1-N1-O2
4	B	503	UW0	O1-C1-N1-O2

There are no ring outliers.

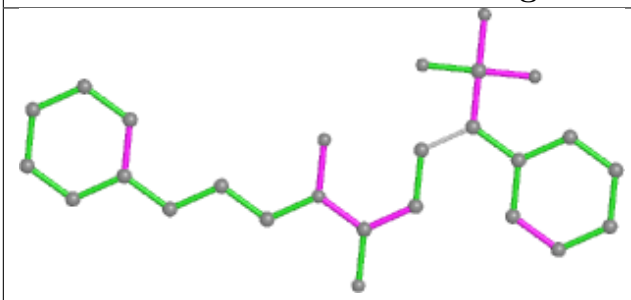
No monomer is involved in short contacts.

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.

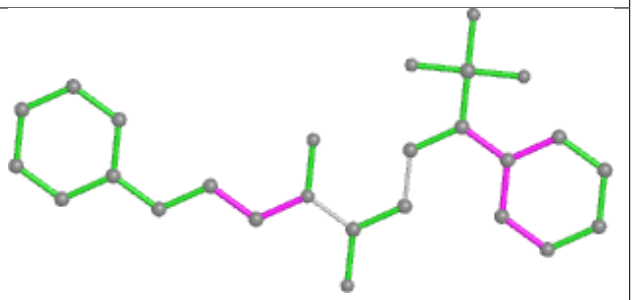
Ligand NDP B 501



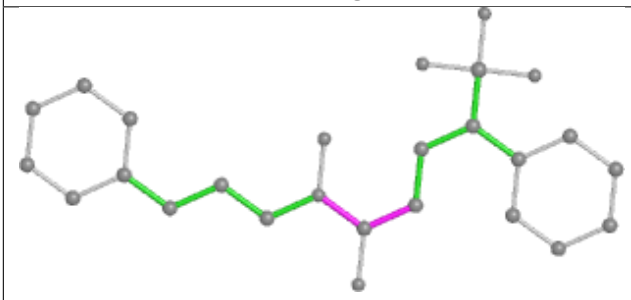
Ligand UW0 A 503



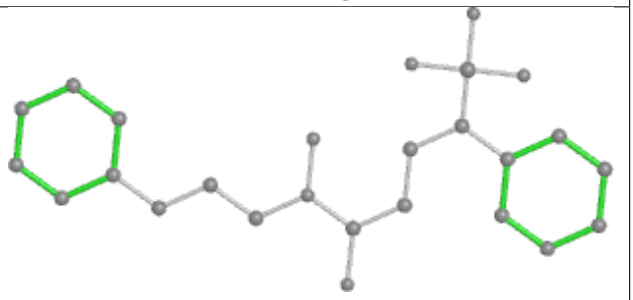
Bond lengths



Bond angles

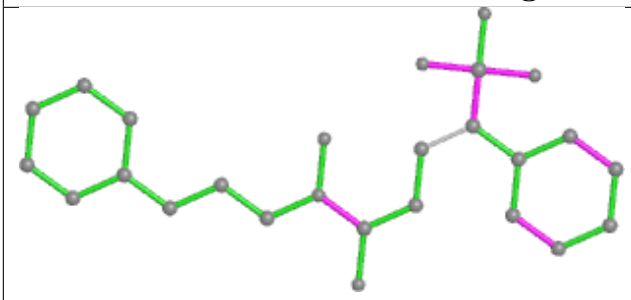


Torsions

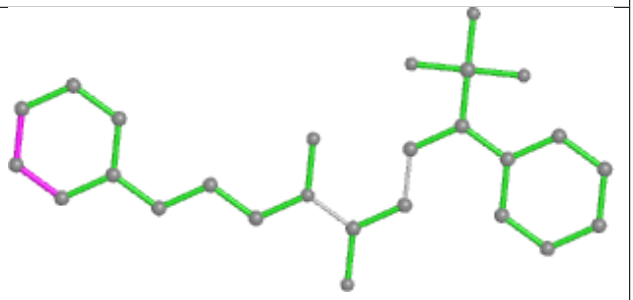


Rings

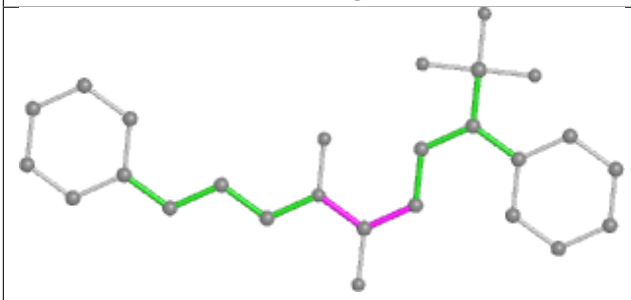
Ligand UW0 B 503



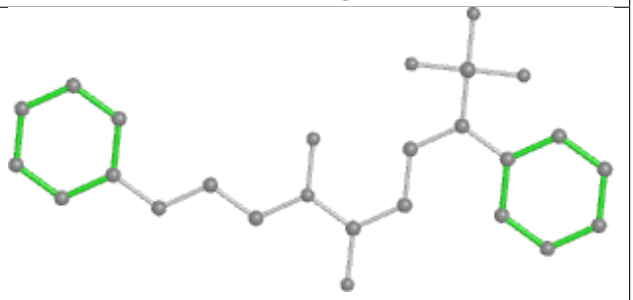
Bond lengths



Bond angles

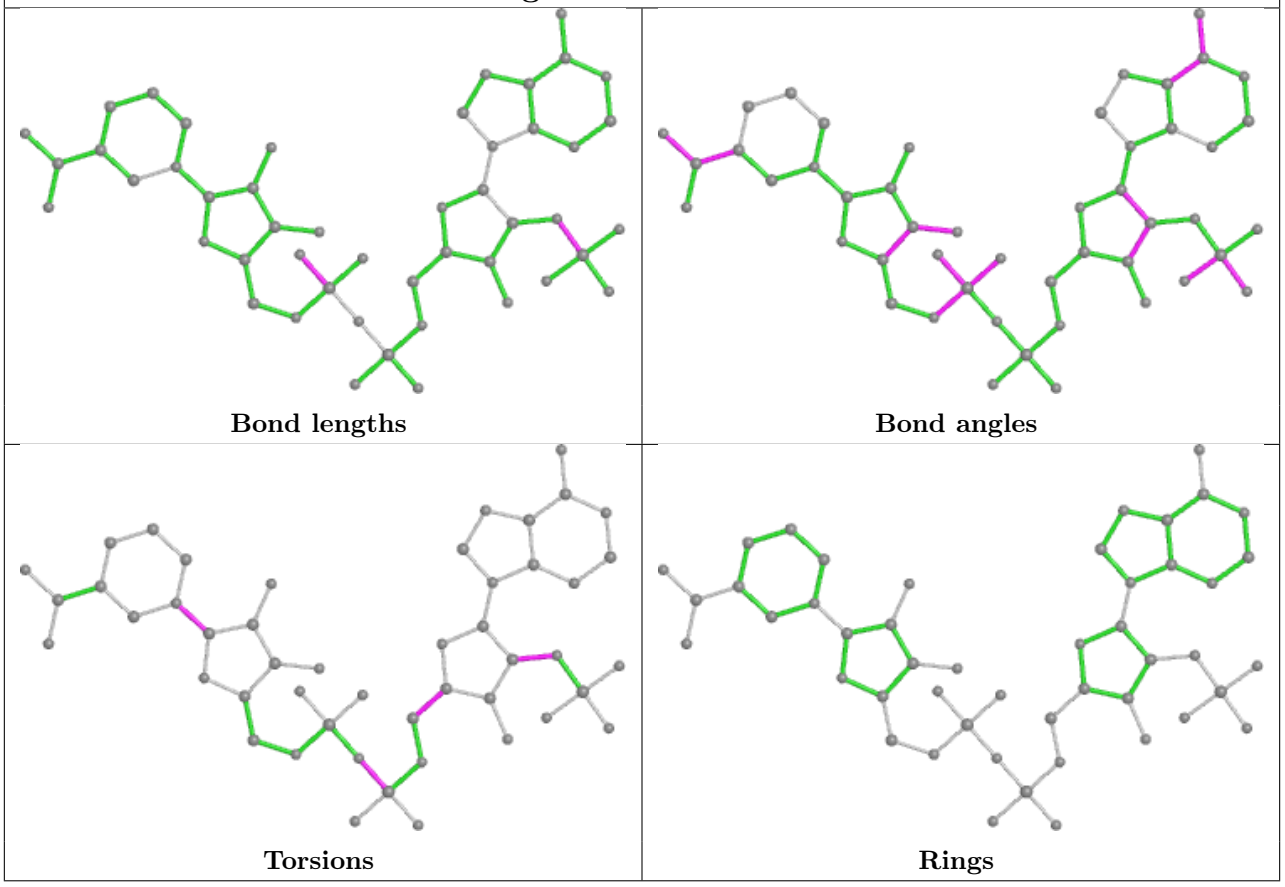


Torsions



Rings

Ligand NDP A 501



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	411/488 (84%)	0.86	66 (16%) 5 4	13, 23, 51, 110	0
1	B	411/488 (84%)	0.46	34 (8%) 19 18	12, 20, 43, 104	0
All	All	822/976 (84%)	0.66	100 (12%) 10 9	12, 21, 49, 110	0

All (100) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	296	TRP	6.2
1	B	294	PRO	5.8
1	B	296	TRP	5.7
1	A	294	PRO	5.5
1	A	122	TYR	5.4
1	A	158	ILE	5.2
1	A	291	LEU	4.8
1	A	292	LYS	4.7
1	A	147	LEU	4.6
1	A	133	LEU	4.6
1	A	293	HIS	4.6
1	B	293	HIS	4.5
1	A	151	ILE	4.5
1	A	121	LEU	4.4
1	B	188	TYR	4.4
1	A	154	TYR	4.2
1	A	77	PRO	4.2
1	A	118	VAL	4.2
1	A	140	VAL	4.0
1	A	135	ILE	4.0
1	A	148	VAL	3.9
1	A	184	PHE	3.9
1	A	129	LEU	3.8
1	B	76	LYS	3.8

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Mol	Chain	Res	Type	RSRZ
1	B	295	LYS	3.7
1	A	152	LYS	3.7
1	B	485	HIS	3.7
1	A	114	VAL	3.6
1	A	119	ASN	3.6
1	B	184	PHE	3.5
1	A	113	TYR	3.5
1	A	141	TYR	3.5
1	A	144	LEU	3.5
1	A	183	SER	3.4
1	A	76	LYS	3.4
1	A	299	GLY	3.4
1	B	292	LYS	3.4
1	A	297	LYS	3.2
1	A	134	CYS	3.0
1	B	172	ASN	3.0
1	B	297	LYS	3.0
1	B	486	ASN	3.0
1	A	109	VAL	2.8
1	A	82	ILE	2.8
1	B	468	LEU	2.8
1	B	151	ILE	2.8
1	A	126	ARG	2.7
1	A	106	VAL	2.7
1	B	213	PHE	2.7
1	A	117	SER	2.7
1	B	298	MET	2.7
1	A	128	PHE	2.6
1	A	130	PRO	2.6
1	A	103	ILE	2.6
1	A	145	LYS	2.6
1	A	125	ALA	2.6
1	A	172	ASN	2.6
1	A	112	LEU	2.5
1	A	160	CYS	2.5
1	A	188	TYR	2.5
1	B	147	LEU	2.5
1	A	155	LYS	2.5
1	B	149	LYS	2.5
1	A	139	SER	2.5
1	B	484	LYS	2.5
1	A	149	LYS	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	136	HIS	2.4
1	A	150	ASN	2.4
1	A	276	ASN	2.4
1	A	137	ASP	2.4
1	B	291	LEU	2.4
1	B	459	ASN	2.4
1	A	174	ILE	2.4
1	A	159	LEU	2.4
1	A	168	ILE	2.3
1	A	120	GLU	2.3
1	A	484	LYS	2.3
1	A	78	ILE	2.3
1	B	148	VAL	2.3
1	A	116	LYS	2.2
1	A	91	THR	2.2
1	A	156	PRO	2.2
1	A	138	LYS	2.2
1	A	157	ILE	2.2
1	B	158	ILE	2.2
1	A	79	ASN	2.2
1	A	123	GLU	2.2
1	B	462	ASP	2.2
1	B	214	PHE	2.2
1	B	122	TYR	2.2
1	A	283	LYS	2.1
1	A	153	ASP	2.1
1	B	152	LYS	2.1
1	B	141	TYR	2.1
1	B	299	GLY	2.1
1	B	105	ASN	2.1
1	B	154	TYR	2.1
1	B	144	LEU	2.0
1	B	279	MET	2.0
1	B	460	SER	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

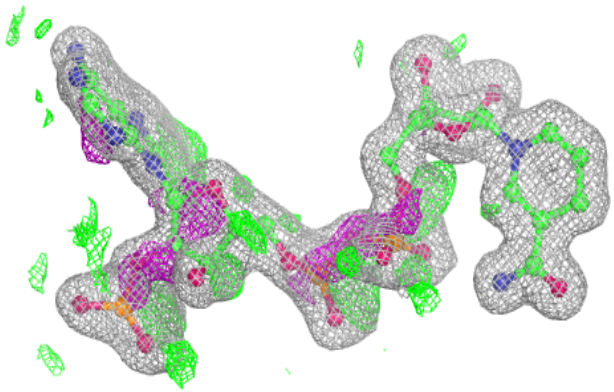
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

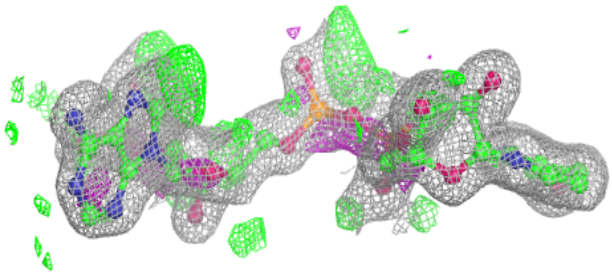
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NDP	A	501	48/48	0.91	0.10	18,25,30,32	0
5	CA	B	505	1/1	0.93	0.10	27,27,27,27	0
2	NDP	B	501	48/48	0.96	0.07	14,19,22,23	0
4	UW0	A	503	26/26	0.98	0.06	14,18,19,20	0
5	CA	B	506	1/1	0.98	0.11	25,25,25,25	0
4	UW0	B	503	26/26	0.99	0.05	12,14,17,17	0
5	CA	B	504	1/1	0.99	0.04	14,14,14,14	0
3	MN	B	502	1/1	0.99	0.03	12,12,12,12	0
3	MN	A	502	1/1	0.99	0.03	15,15,15,15	0

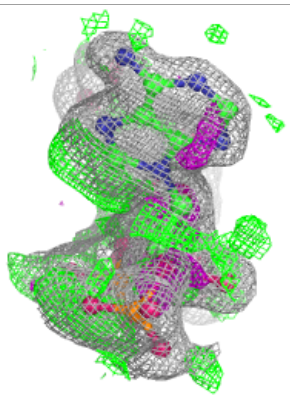
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NDP A 501:

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

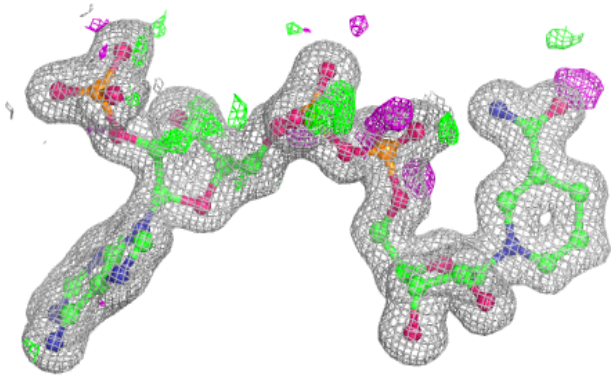


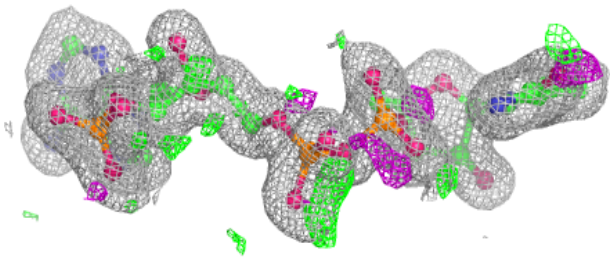


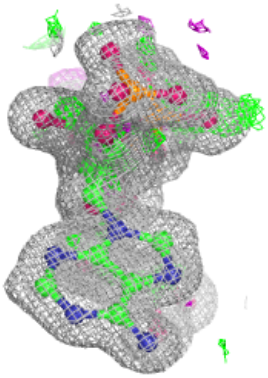


Electron density around NDP B 501:

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

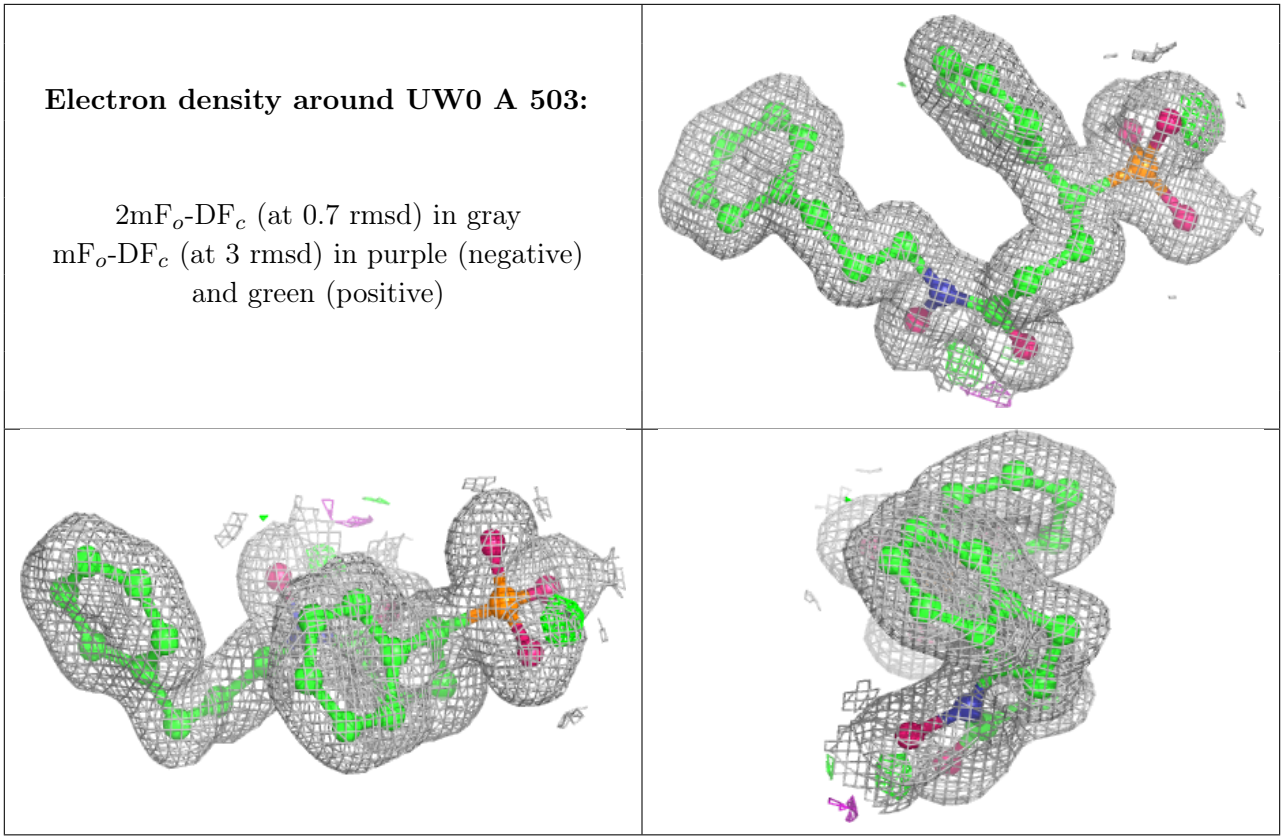






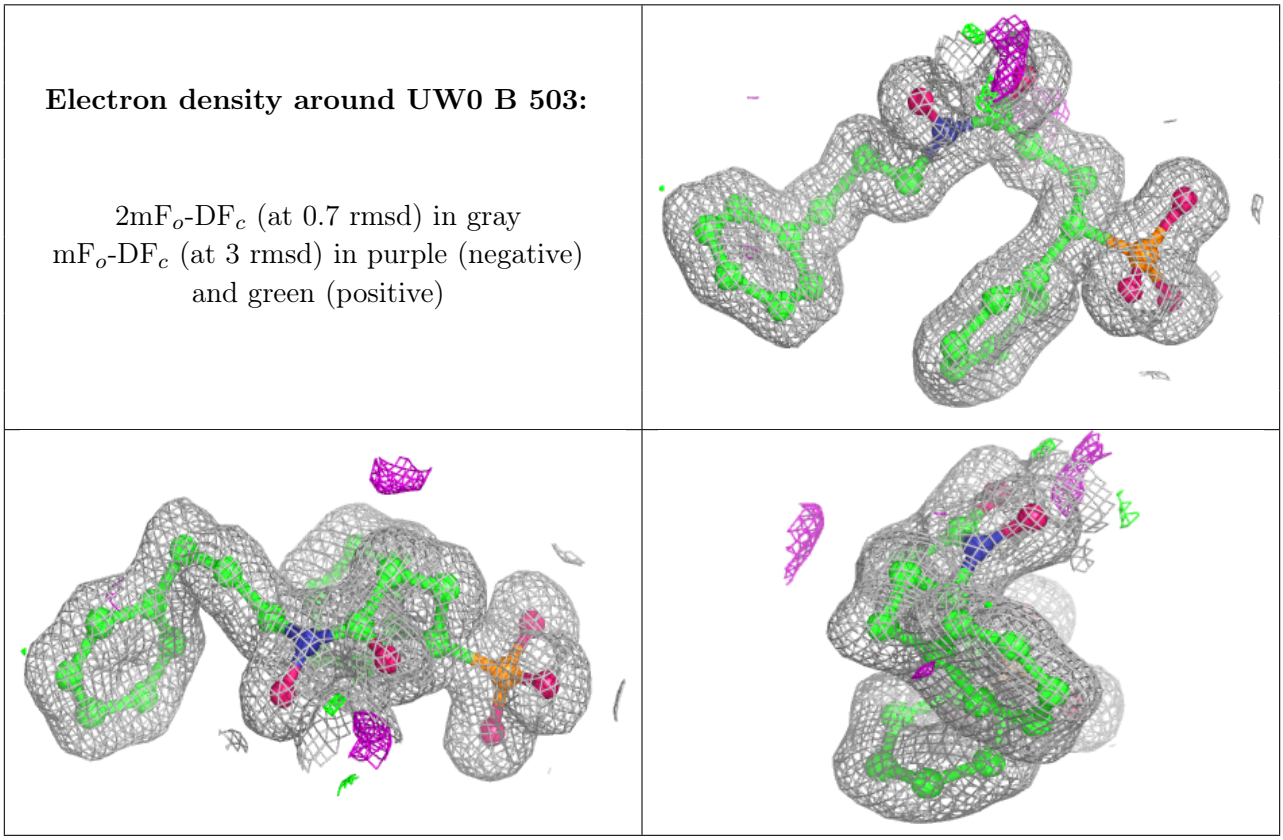
Electron density around UW0 A 503:

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



Electron density around UW0 B 503:

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



Electron density around MN B 502:

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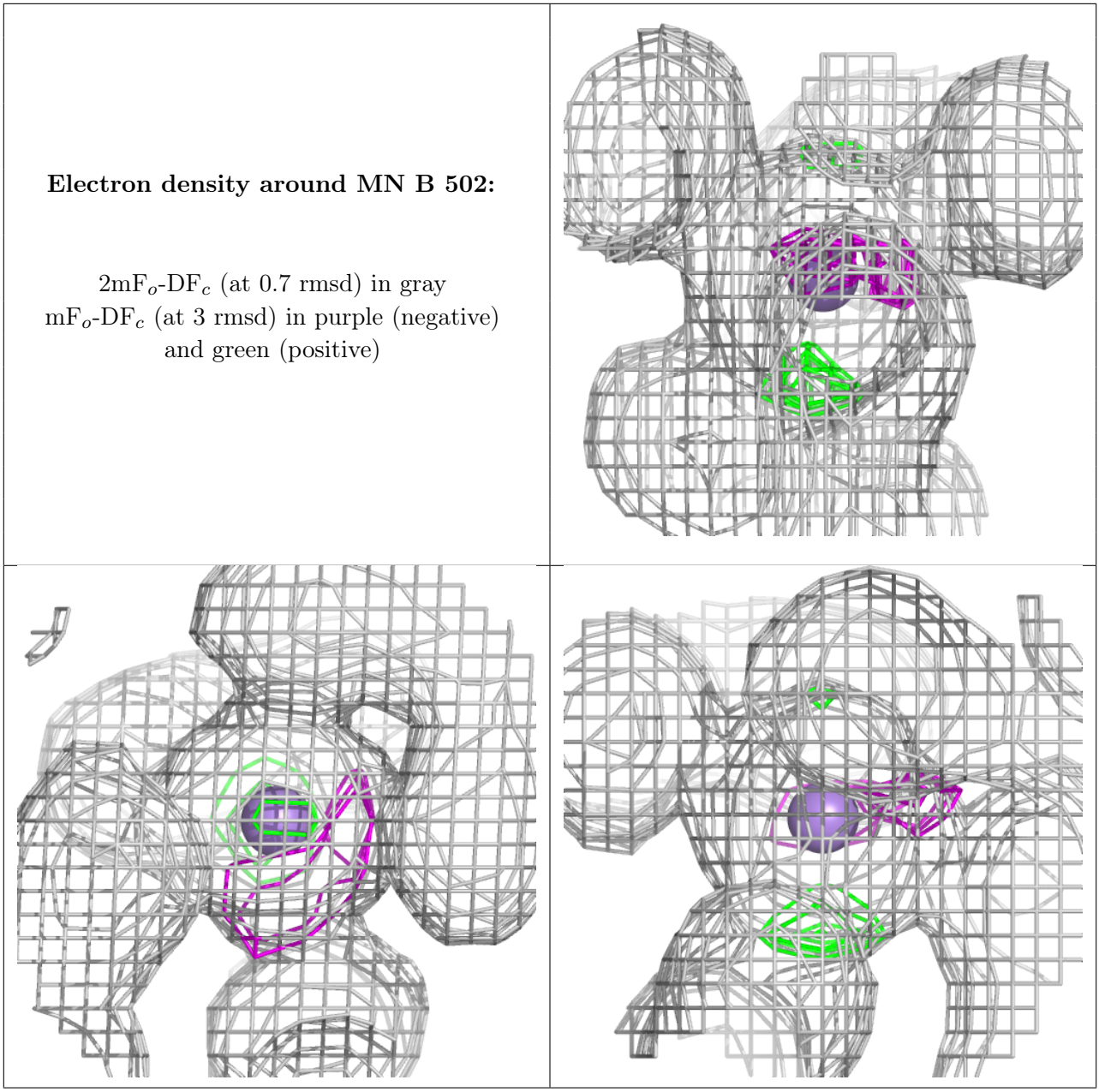
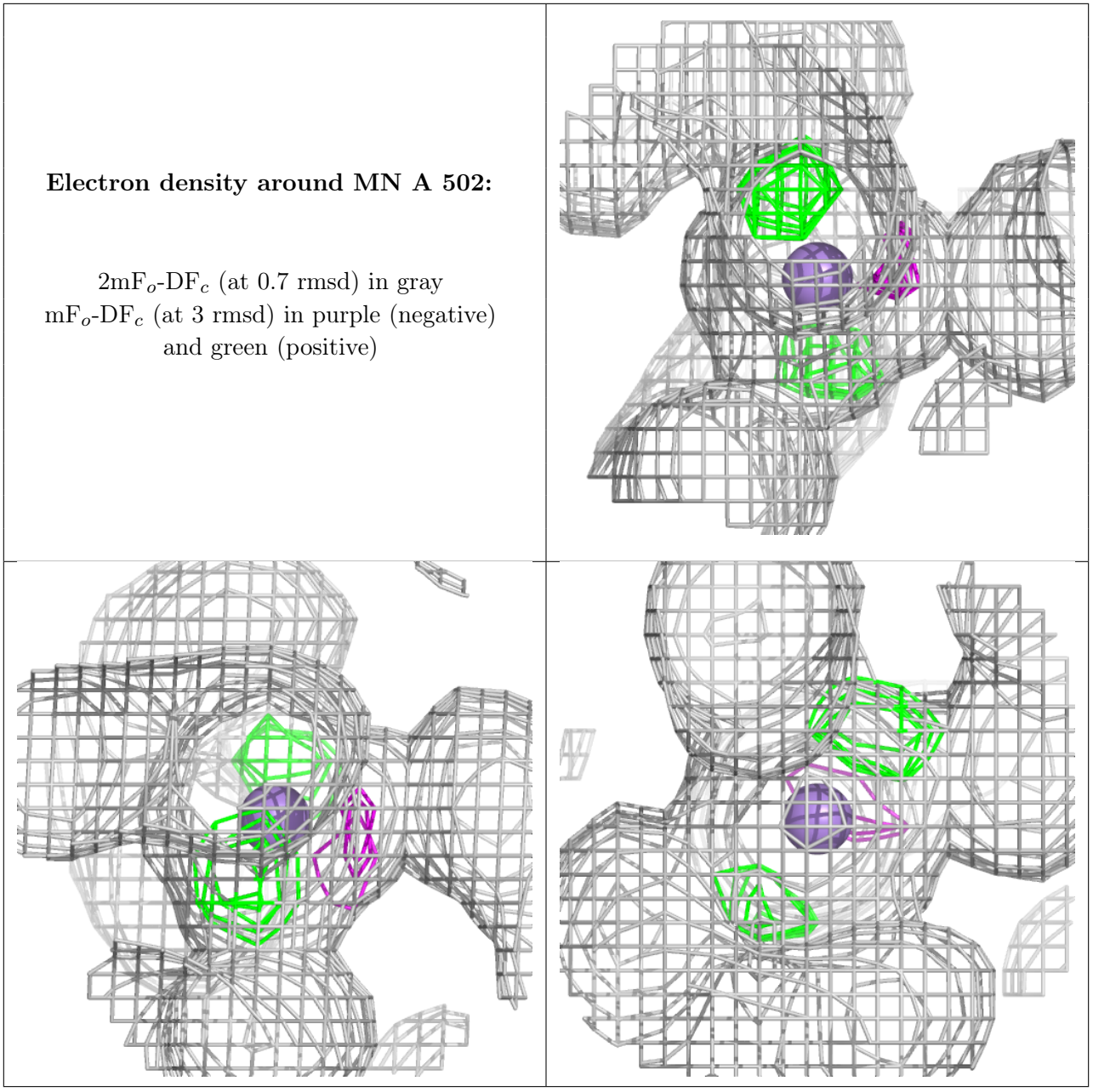
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



Electron density around MN A 502:

$2mF_o$-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.