



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 05:54 AM UTC

PDB ID : 1M78 / pdb_00001m78
Title : CANDIDA ALBICANS DIHYDROFOLATE REDUCTASE COMPLEXED
WITH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOS-
PHATE (NADPH) AND 5-CHLORYL-2,4,6-QUINAZOLINETRIAMINE
(GW1225)
Authors : Whitlow, M.; Howard, A.J.; Kuyper, L.F.
Deposited on : 2002-07-19
Resolution : 1.71 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](#) ①) 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

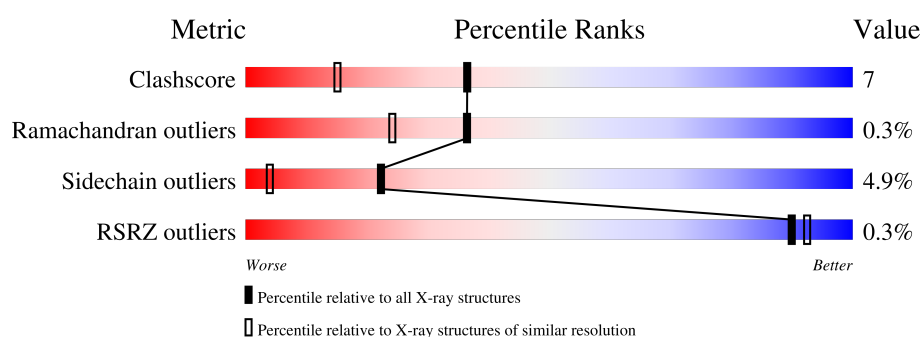
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.71 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))
Clashscore	190562	1049 (1.72-1.72)
Ramachandran outliers	187476	1041 (1.72-1.72)
Sidechain outliers	187428	1041 (1.72-1.72)
RSRZ outliers	180081	1039 (1.72-1.72)

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	192	60% 33% 6%
1	B	192	68% 23% 8%

2 Entry composition [i](#)

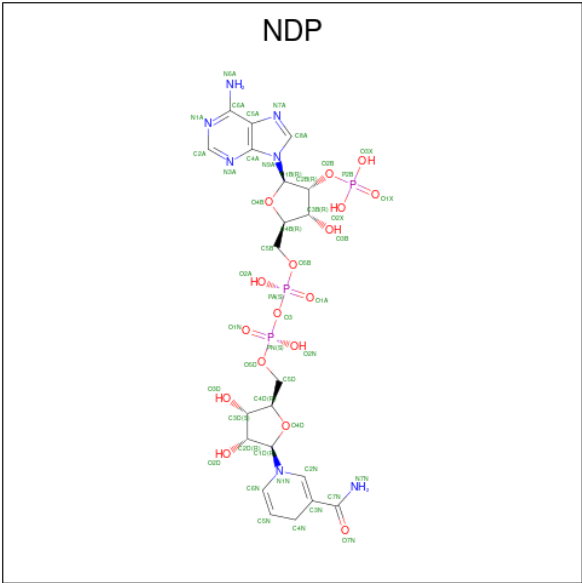
There are 4 unique types of molecules in this entry. The entry contains 3654 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 DIHYDROFOLATE REDUCTASE.

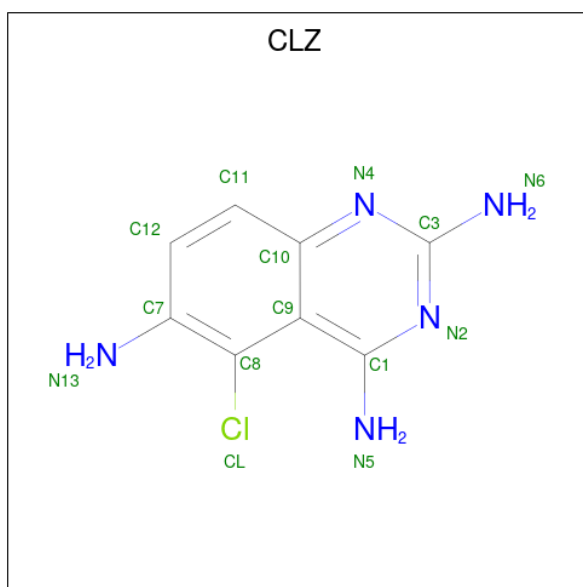
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	192	1594	1023	271	296	4	0	12	0
			Total	C	N	O	S			
1	B	192	1588	1020	264	300	4	0	10	0
			Total	C	N	O	S			

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula: C₂₁H₃₀N₇O₁₇P₃).



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

- Molecule 3 is 5-CHLORYL-2,4,6-QUINAZOLINETRIAMINE (CCD ID: CLZ) (formula: C₈H₈ClN₅).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	Cl	N	0	0
			14	8	1	5		
3	B	1	Total	C	Cl	N	0	0
			14	8	1	5		

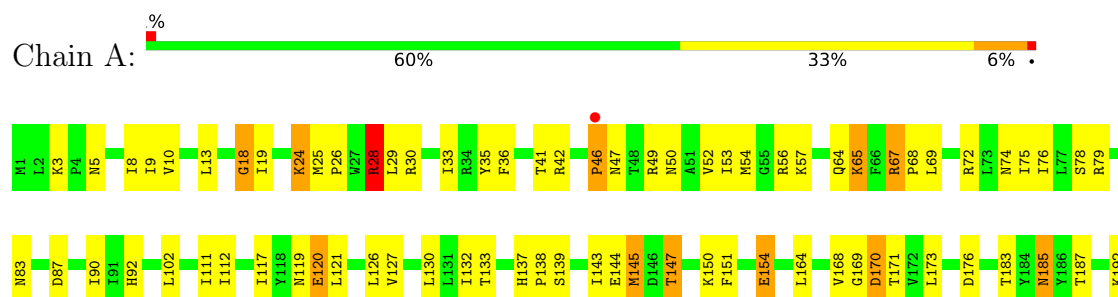
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	162	Total	O	0	7
			169	169		
4	B	175	Total	O	0	4
			179	179		

3 Residue-property plots

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

• Molecule 1: DIHYDROFOLATE REDUCTASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	76.91Å 67.28Å 38.49Å 90.00° 93.07° 90.00°	Depositor
Resolution (Å)	10.00 – 1.71 10.00 – 1.72	Depositor EDS
% Data completeness (in resolution range)	91.5 (10.00-1.71) 83.4 (10.00-1.72)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.67 (at 1.72Å)	Xtriage
Refinement program	PROFFT	Depositor
R, R_{free}	0.156 , (Not available) 0.156 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	14.2	Xtriage
Anisotropy	0.349	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 67.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	3654	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.10% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NDP, CLZ

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	1.56	11/1690 (0.7%)	1.98	52/2290 (2.3%)
1	B	1.57	16/1675 (1.0%)	1.88	42/2267 (1.9%)
All	All	1.56	27/3365 (0.8%)	1.93	94/4557 (2.1%)

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	9	ILE	N-CA	8.64	1.56	1.46
1	B	113	GLY	N-CA	8.59	1.52	1.45
1	A	36	PHE	N-CA	8.34	1.56	1.46
1	A	3	LYS	C-O	8.00	1.27	1.23
1	A	133	THR	N-CA	7.40	1.55	1.46
1	B	134	GLU	N-CA	7.18	1.55	1.46
1	B	112	ILE	CA-CB	6.15	1.62	1.54
1	B	145	MET	CA-CB	-6.11	1.43	1.53
1	B	12	ALA	N-CA	6.03	1.53	1.45
1	A	8	ILE	CA-C	5.99	1.59	1.52
1	B	85	ILE	CA-CB	5.96	1.60	1.53
1	B	49	ARG	N-CA	5.88	1.52	1.46
1	A	69	LEU	N-CA	5.67	1.55	1.46
1	B	108	ARG	N-CA	5.63	1.52	1.45
1	A	127	VAL	N-CA	5.60	1.52	1.46
1	A	183	THR	CA-C	5.55	1.59	1.52
1	B	11	ALA	CA-C	5.47	1.59	1.52
1	A	185	ASN	CA-C	5.44	1.59	1.52
1	B	180	GLY	N-CA	5.42	1.54	1.45
1	B	3	LYS	N-CA	5.29	1.51	1.45
1	B	158	LYS	N-CA	5.26	1.52	1.46
1	A	78	SER	CA-C	5.23	1.59	1.52
1	B	40	THR	N-CA	5.23	1.53	1.46
1	B	49	ARG	CA-C	5.18	1.58	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	73	LEU	CA-C	5.15	1.59	1.52
1	B	133	THR	CA-C	5.15	1.59	1.52
1	A	92	HIS	N-CA	5.13	1.52	1.46

All (94) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	151	PHE	CA-CB-CG	11.27	125.07	113.80
1	A	28	ARG	CD-NE-CZ	10.60	139.24	124.40
1	A	154	GLU	CB-CG-CD	10.53	130.51	112.60
1	A	56	ARG	CD-NE-CZ	10.32	138.84	124.40
1	B	56	ARG	CD-NE-CZ	10.12	138.57	124.40
1	A	132	ILE	O-C-N	9.30	133.98	123.10
1	A	185	ASN	O-C-N	8.78	133.45	123.27
1	B	145	MET	CA-CB-CG	8.49	131.08	114.10
1	A	151	PHE	CA-CB-CG	8.44	122.24	113.80
1	A	185	ASN	OD1-CG-ND2	8.13	130.73	122.60
1	A	154	GLU	CA-CB-CG	7.79	129.68	114.10
1	A	90	ILE	O-C-N	7.56	131.37	123.20
1	B	49	ARG	O-C-N	7.56	131.20	123.26
1	A	35	TYR	O-C-N	7.32	129.60	122.07
1	B	87	ASP	CA-CB-CG	7.21	119.81	112.60
1	A	10	VAL	O-C-N	6.97	130.41	122.82
1	B	86[A]	ILE	O-C-N	6.88	129.30	121.94
1	B	86[B]	ILE	O-C-N	6.88	129.30	121.94
1	A	139	SER	N-CA-CB	-6.70	102.08	110.79
1	B	153	LEU	CB-CA-C	6.64	123.34	110.46
1	A	8	ILE	O-C-N	6.64	129.96	122.93
1	A	49	ARG	NE-CZ-NH2	-6.61	113.25	119.20
1	B	67	ARG	CD-NE-CZ	6.54	133.56	124.40
1	B	138	PRO	CA-C-N	6.50	128.00	122.28
1	B	138	PRO	C-N-CA	6.50	128.00	122.28
1	A	87	ASP	CA-CB-CG	6.47	119.07	112.60
1	A	54	MET	O-C-N	6.47	130.62	123.25
1	A	170	ASP	N-CA-C	6.44	119.29	111.82
1	B	112	ILE	CA-C-N	-6.34	114.14	122.63
1	B	112	ILE	C-N-CA	-6.34	114.14	122.63
1	B	74	ASN	CA-CB-CG	6.33	118.93	112.60
1	B	137	HIS	O-C-N	6.31	126.27	121.85
1	B	97	GLU	CB-CG-CD	6.30	123.32	112.60
1	A	144	GLU	CB-CG-CD	6.30	123.31	112.60
1	A	132	ILE	CA-C-N	-6.29	113.81	122.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	132	ILE	C-N-CA	-6.29	113.81	122.30
1	B	157	THR	O-C-N	6.19	130.67	123.30
1	A	54	MET	CA-C-O	-6.16	114.67	121.33
1	A	130	LEU	O-C-N	6.14	130.39	123.27
1	A	169	GLY	CA-C-N	6.13	129.63	120.31
1	A	169	GLY	C-N-CA	6.13	129.63	120.31
1	A	83	ASN	CB-CA-C	6.08	119.91	110.67
1	A	10	VAL	CA-C-O	-6.07	115.38	121.45
1	B	30	ARG	CD-NE-CZ	5.95	132.73	124.40
1	A	147	THR	CA-CB-CG2	5.87	120.47	110.50
1	A	126	LEU	O-C-N	5.84	129.46	122.27
1	B	67	ARG	CB-CA-C	5.82	117.63	108.84
1	A	46	PRO	N-CA-C	5.78	124.38	112.47
1	B	149	LEU	O-C-N	5.77	129.52	123.06
1	A	83	ASN	OD1-CG-ND2	-5.72	116.88	122.60
1	B	133	THR	O-C-N	5.71	129.78	122.93
1	A	183	THR	O-C-N	5.71	129.99	123.31
1	A	72	ARG	O-C-N	5.68	129.87	123.27
1	A	76	ILE	O-C-N	5.65	129.11	123.18
1	B	73	LEU	O-C-N	5.61	129.61	123.04
1	B	141[A]	GLU	CB-CG-CD	5.48	121.92	112.60
1	B	141[B]	GLU	CB-CG-CD	5.48	121.92	112.60
1	A	112	ILE	N-CA-C	5.46	118.23	112.83
1	B	73	LEU	CA-C-O	-5.44	114.49	120.69
1	A	50	ASN	OD1-CG-ND2	5.41	128.01	122.60
1	B	172	VAL	O-C-N	5.39	128.79	122.81
1	B	179	GLU	N-CA-CB	5.38	120.26	110.95
1	A	67	ARG	CB-CA-C	5.35	117.16	108.87
1	A	52	VAL	O-C-N	5.33	129.02	123.26
1	B	113	GLY	O-C-N	-5.32	118.16	123.48
1	A	78	SER	O-C-N	5.31	129.63	123.41
1	B	93	ALA	O-C-N	5.29	129.73	123.27
1	A	47	ASN	CB-CA-C	5.28	118.22	111.40
1	A	28	ARG	NE-CZ-NH2	5.27	123.95	119.20
1	B	185	ASN	O-C-N	5.26	129.37	123.27
1	B	56	ARG	NE-CZ-NH2	5.25	123.93	119.20
1	A	171	THR	CA-CB-OG1	-5.22	101.77	109.60
1	A	5	ASN	CB-CA-C	5.22	118.35	109.53
1	A	18	GLY	CA-C-O	-5.21	116.89	121.58
1	A	111	ILE	O-C-N	5.19	129.28	122.94
1	B	105[A]	ASP	CA-CB-CG	5.19	117.79	112.60
1	B	105[B]	ASP	CA-CB-CG	5.19	117.79	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	24	LYS	CA-CB-CG	5.18	124.47	114.10
1	A	56	ARG	NE-CZ-NH2	5.18	123.86	119.20
1	B	50	ASN	OD1-CG-ND2	5.16	127.76	122.60
1	A	147	THR	CA-CB-OG1	-5.15	101.87	109.60
1	A	5	ASN	N-CA-C	-5.15	102.06	110.20
1	B	157	THR	CA-C-O	-5.15	114.80	120.36
1	A	30[A]	ARG	N-CA-C	5.13	116.56	111.07
1	A	30[B]	ARG	N-CA-C	5.13	116.56	111.07
1	B	147	THR	CA-CB-CG2	5.10	119.17	110.50
1	B	97	GLU	O-C-N	5.08	127.50	122.12
1	B	116	GLU	CB-CG-CD	5.08	121.23	112.60
1	B	135	ILE	O-C-N	5.07	128.30	122.93
1	A	187	THR	O-C-N	5.06	129.29	123.17
1	B	45	LYS	CA-CB-CG	5.05	124.19	114.10
1	B	119	ASN	CB-CA-C	5.03	120.34	110.67
1	A	192	LYS	CA-CB-CG	5.03	124.16	114.10
1	B	3	LYS	O-C-N	5.01	126.11	121.80

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	1594	0	1620	25	0
1	B	1588	0	1613	23	0
2	A	48	0	26	1	0
2	B	48	0	26	1	0
3	A	14	0	8	0	0
3	B	14	0	8	0	0
4	A	169	0	0	3	0
4	B	179	0	0	1	0
All	All	3654	0	3301	48	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 7.

All (48) 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:28:ARG:HH11	1:B:30:ARG:HG2	1.41	0.82
1:B:124:ASN:HD22	1:B:126:LEU:H	1.25	0.82
1:A:79[A]:ARG:NH1	4:A:492:HOH:O	2.03	0.78
1:A:13:LEU:HD23	1:A:145:MET:HE1	1.65	0.77
1:A:176:ASP:H	1:A:185:ASN:HD21	1.38	0.70
1:B:176:ASP:H	1:B:185:ASN:HD21	1.40	0.69
1:A:119:ASN:HB3	1:A:150:LYS:HE2	1.76	0.67
1:B:176:ASP:H	1:B:185:ASN:ND2	1.94	0.65
1:B:83:ASN:ND2	1:B:94:SER:H	1.96	0.64
1:B:137:HIS:HD2	1:B:139:SER:H	1.45	0.64
1:A:28:ARG:HH21	1:A:28:ARG:HB3	1.67	0.60
1:B:137:HIS:CD2	1:B:139:SER:H	2.21	0.59
1:A:18:GLY:HA3	1:A:145:MET:HE3	1.89	0.54
1:A:64:GLN:HG2	1:A:65:LYS:HE3	1.92	0.52
1:A:176:ASP:H	1:A:185:ASN:ND2	2.07	0.52
1:B:151:PHE:HB2	1:B:153:LEU:HD13	1.91	0.51
1:B:20:GLY:O	1:B:145:MET:HB2	2.11	0.50
1:B:5:ASN:ND2	4:B:297:HOH:O	2.45	0.50
1:B:124:ASN:ND2	1:B:126:LEU:H	2.01	0.49
1:A:65:LYS:HD2	1:A:65:LYS:H	1.77	0.49
1:B:13:LEU:HD23	1:B:145:MET:HE1	1.93	0.49
1:A:65:LYS:H	1:A:65:LYS:CD	2.25	0.48
1:A:19:ILE:HG13	1:A:147:THR:HG22	1.96	0.47
1:B:67:ARG:HA	1:B:68:PRO:C	2.39	0.47
1:A:53[B]:ILE:HG22	1:A:75:ILE:HD12	1.96	0.47
1:A:137:HIS:CD2	1:A:143:ILE:HD11	2.51	0.46
1:B:149:LEU:HD22	1:B:151:PHE:CZ	2.51	0.46
1:A:42[A]:ARG:HH11	1:A:170:ASP:HB2	1.82	0.45
1:A:67:ARG:HA	1:A:68:PRO:C	2.42	0.44
1:B:111[A]:ILE:HD12	1:B:121:LEU:HD13	1.98	0.44
1:A:57:LYS:NZ	2:A:193:NDP:O3B	2.51	0.44
1:B:115:ALA:HB2	1:B:147:THR:HG23	1.99	0.44
1:B:78:SER:HB3	1:B:81:TYR:CD2	2.53	0.44
1:A:120:GLU:HB3	1:A:121[B]:LEU:HD12	1.99	0.43
1:B:83:ASN:HD22	1:B:93:ALA:HA	1.83	0.43
1:B:83:ASN:HD21	1:B:94:SER:H	1.65	0.43
1:B:18:GLY:HA3	1:B:145:MET:SD	2.59	0.43
1:A:117:ILE:HG23	1:A:121[A]:LEU:HD12	2.00	0.42
1:A:164:LEU:HB2	4:A:222[B]:HOH:O	2.20	0.42
1:B:19:ILE:O	2:B:195:NDP:H2N	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:137:HIS:CG	1:A:138:PRO:HD2	2.55	0.41
1:B:115:ALA:HB2	1:B:147:THR:CG2	2.50	0.41
1:A:168:VAL:HG21	1:A:173:LEU:HD21	2.00	0.41
1:A:25:MET:HA	1:A:26:PRO:HD3	1.77	0.41
1:A:28:ARG:HB3	1:A:28:ARG:NH2	2.35	0.41
1:A:41[B]:THR:HG21	4:A:446:HOH:O	2.19	0.41
1:A:29:LEU:O	1:A:33[A]:ILE:HG12	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	202/192 (105%)	198 (98%)	3 (2%)	1 (0%)	24	11
1	B	200/192 (104%)	198 (99%)	2 (1%)	0	100	100
All	All	402/384 (105%)	396 (98%)	5 (1%)	1 (0%)	36	31

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	46	PRO

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	186/177 (105%)	178 (96%)	8 (4%)	26	6
1	B	185/177 (104%)	173 (94%)	12 (6%)	15	2
All	All	371/354 (105%)	351 (95%)	20 (5%)	22	3

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24	LYS
1	A	28	ARG
1	A	65	LYS
1	A	74	ASN
1	A	102	LEU
1	A	120	GLU
1	A	145	MET
1	A	154	GLU
1	B	5	ASN
1	B	28	ARG
1	B	65[A]	LYS
1	B	65[B]	LYS
1	B	74	ASN
1	B	124	ASN
1	B	141[A]	GLU
1	B	141[B]	GLU
1	B	153	LEU
1	B	166	LYS
1	B	173[A]	LEU
1	B	173[B]	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	47	ASN
1	A	185	ASN
1	B	5	ASN
1	B	83	ASN
1	B	101	ASN
1	B	124	ASN
1	B	137	HIS
1	B	185	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 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	CLZ	A	194	-	15,15,15	1.23	2 (13%)	20,22,22	1.70	4 (20%)
2	NDP	A	193	-	51,52,52	1.90	7 (13%)	71,80,80	1.60	12 (16%)
2	NDP	B	195	-	51,52,52	1.52	11 (21%)	71,80,80	1.30	9 (12%)
3	CLZ	B	196	-	15,15,15	1.15	2 (13%)	20,22,22	1.61	4 (20%)

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
3	CLZ	A	194	-	-	-	0/2/2/2
2	NDP	A	193	-	-	2/34/77/77	0/5/5/5
2	NDP	B	195	-	-	1/34/77/77	0/5/5/5
3	CLZ	B	196	-	-	-	0/2/2/2

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	193	NDP	PA-O3	-6.20	1.52	1.59
2	A	193	NDP	P2B-O2B	5.95	1.70	1.59
2	A	193	NDP	C7N-C3N	4.81	1.59	1.48
2	A	193	NDP	C4N-C3N	-4.13	1.42	1.50
2	B	195	NDP	C4N-C3N	-3.62	1.43	1.50
2	B	195	NDP	PA-O3	3.39	1.63	1.59
2	B	195	NDP	C4N-C5N	-3.30	1.40	1.49
2	A	193	NDP	C3B-C2B	3.16	1.59	1.53
2	B	195	NDP	C7N-C3N	3.07	1.55	1.48
2	B	195	NDP	P2B-O2B	2.98	1.64	1.59
2	B	195	NDP	P2B-O2X	-2.90	1.44	1.54
2	B	195	NDP	PA-O2A	-2.77	1.42	1.55
2	A	193	NDP	C5A-C4A	-2.60	1.34	1.39
3	A	194	CLZ	C3-N2	2.54	1.39	1.35
3	B	196	CLZ	C10-N4	2.52	1.41	1.37
2	B	195	NDP	O4B-C1B	-2.49	1.36	1.42
2	B	195	NDP	C2A-N1A	2.47	1.38	1.33
3	A	194	CLZ	C12-C7	2.37	1.45	1.40
2	A	193	NDP	P2B-O2X	-2.29	1.46	1.54
3	B	196	CLZ	C3-N2	2.23	1.39	1.35
2	B	195	NDP	C5A-C4A	-2.17	1.35	1.39
2	B	195	NDP	C3B-C2B	2.14	1.57	1.53

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	193	NDP	C1D-N1N-C2N	-5.34	112.34	121.14
2	A	193	NDP	C3N-C2N-N1N	-4.75	116.22	123.20
3	A	194	CLZ	N4-C3-N2	-4.71	121.22	127.21
3	B	196	CLZ	N4-C3-N2	-4.30	121.75	127.21
2	B	195	NDP	C1D-N1N-C2N	-3.71	115.02	121.14
2	B	195	NDP	C6N-N1N-C2N	3.42	122.98	119.32
3	A	194	CLZ	C7-C8-CL	-3.35	112.44	120.28
2	A	193	NDP	N6A-C6A-N1A	3.30	125.74	118.38
2	A	193	NDP	O2N-PN-O3	3.19	115.90	107.27
2	B	195	NDP	O2N-PN-O3	3.00	115.38	107.27
2	A	193	NDP	P2B-O2B-C2B	-2.99	115.44	123.43
2	A	193	NDP	O2B-P2B-O1X	-2.96	98.78	109.33
2	A	193	NDP	C4A-C5A-N7A	2.67	113.64	110.58
2	A	193	NDP	C1D-N1N-C6N	2.60	126.28	120.77
3	B	196	CLZ	C11-C12-C7	2.51	123.39	121.36
3	A	194	CLZ	C8-C7-N13	2.46	124.69	122.18

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	196	CLZ	C12-C11-C10	-2.38	117.96	120.80
2	B	195	NDP	C3N-C2N-N1N	-2.35	119.75	123.20
2	B	195	NDP	O7N-C7N-C3N	-2.29	116.58	120.90
2	B	195	NDP	C3B-C2B-C1B	-2.28	98.44	102.81
2	A	193	NDP	O2X-P2B-O1X	2.24	119.56	110.83
3	A	194	CLZ	N6-C3-N2	2.18	120.49	117.22
2	B	195	NDP	O2B-C2B-C3B	2.11	119.25	111.68
2	A	193	NDP	C4A-N9A-C8A	2.09	107.93	105.74
2	B	195	NDP	C2B-C3B-C4B	-2.08	97.52	101.99
2	A	193	NDP	C5A-C4A-N3A	2.06	129.54	126.72
2	B	195	NDP	O2A-PA-O1A	2.04	121.95	112.44
2	A	193	NDP	O3X-P2B-O2X	2.04	115.45	107.80
3	B	196	CLZ	C7-C8-CL	-2.04	115.50	120.28

There are no chirality outliers.

All (3) torsion outliers are listed below:

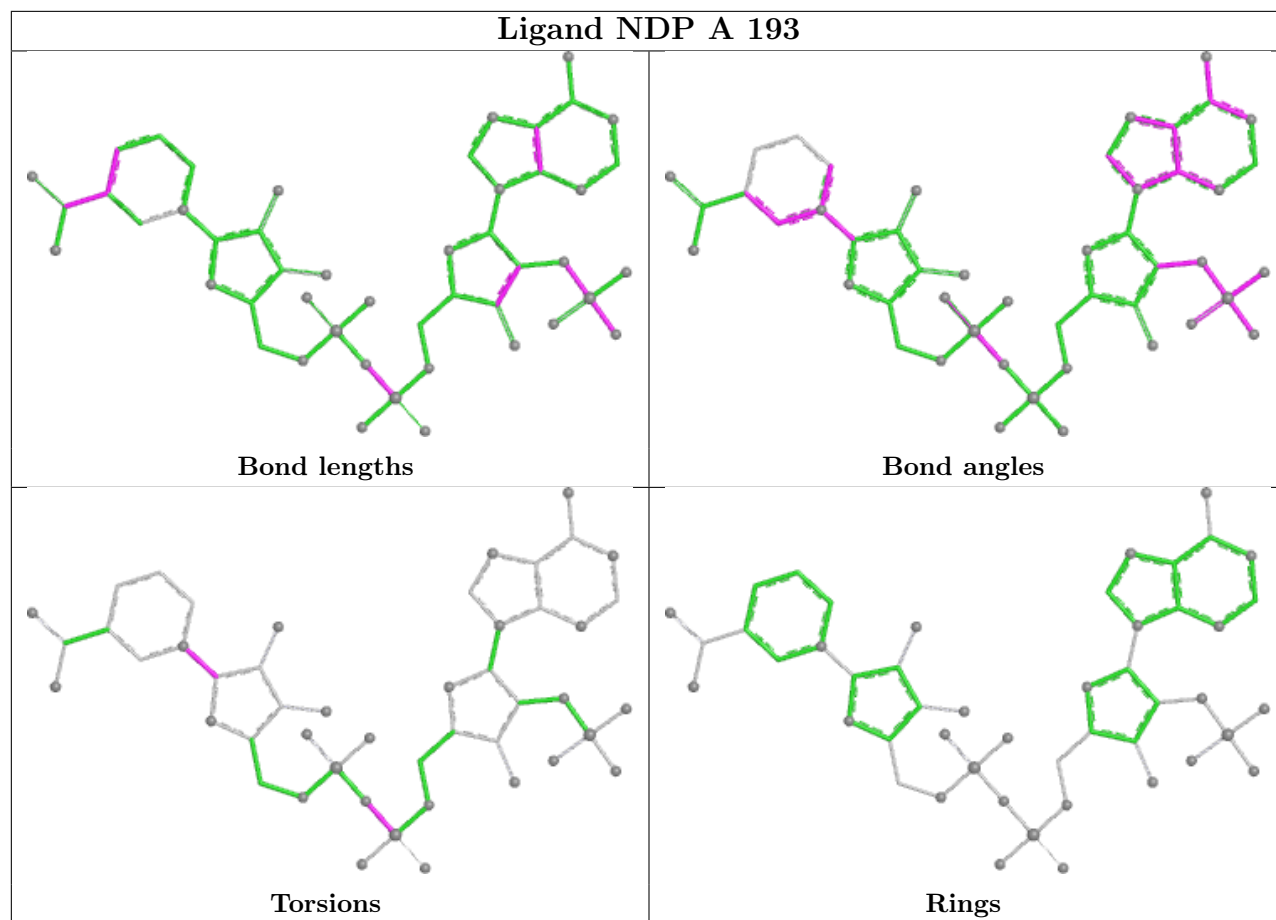
Mol	Chain	Res	Type	Atoms
2	A	193	NDP	O4D-C1D-N1N-C2N
2	A	193	NDP	PN-O3-PA-O2A
2	B	195	NDP	O4D-C1D-N1N-C2N

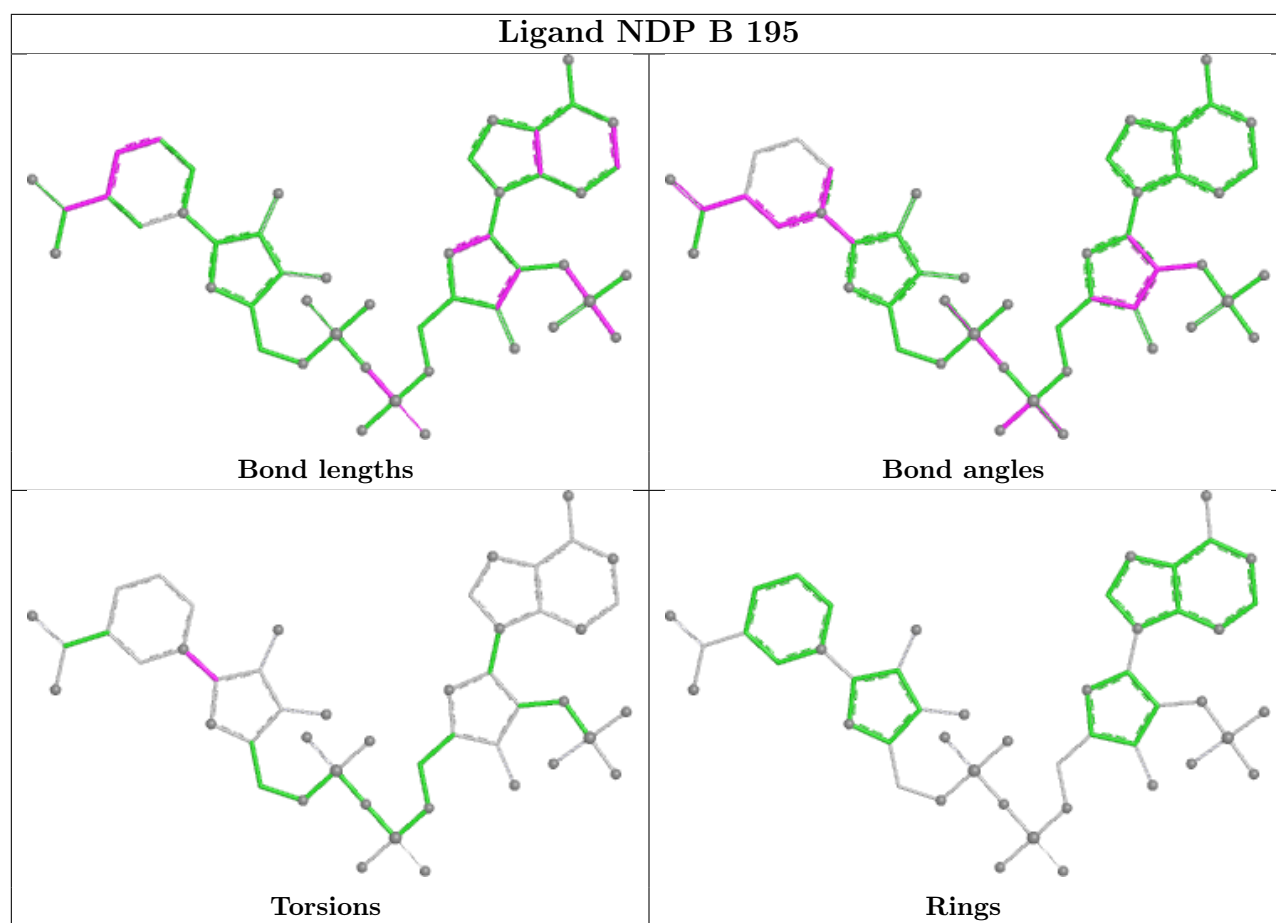
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	193	NDP	1	0
2	B	195	NDP	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	192/192 (100%)	-0.62	1 (0%) 87 90	7, 16, 33, 46	17 (8%)
1	B	192/192 (100%)	-0.70	0 100 100	6, 14, 29, 43	18 (9%)
All	All	384/384 (100%)	-0.66	1 (0%) 90 92	6, 15, 31, 46	35 (9%)

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	46	PRO	2.7

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](#)

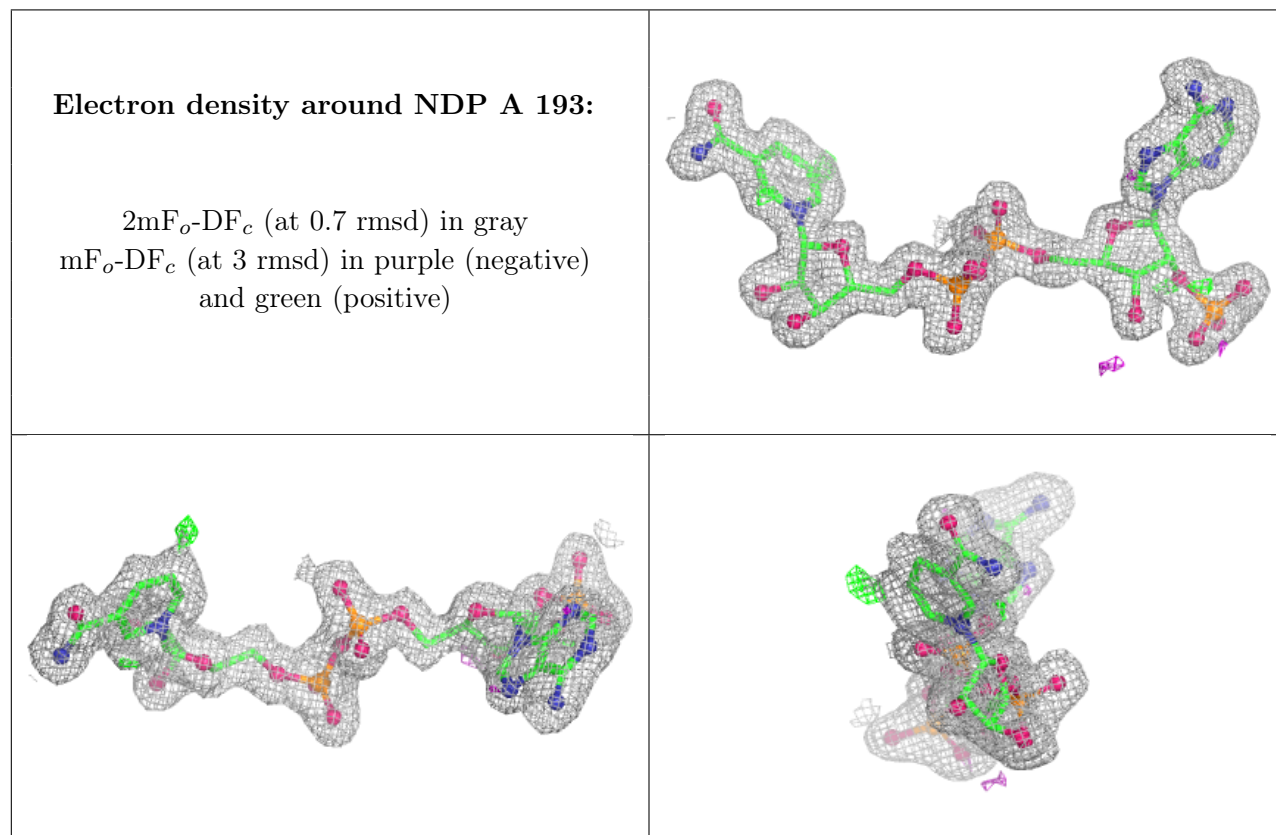
There are no oligosaccharides in this entry.

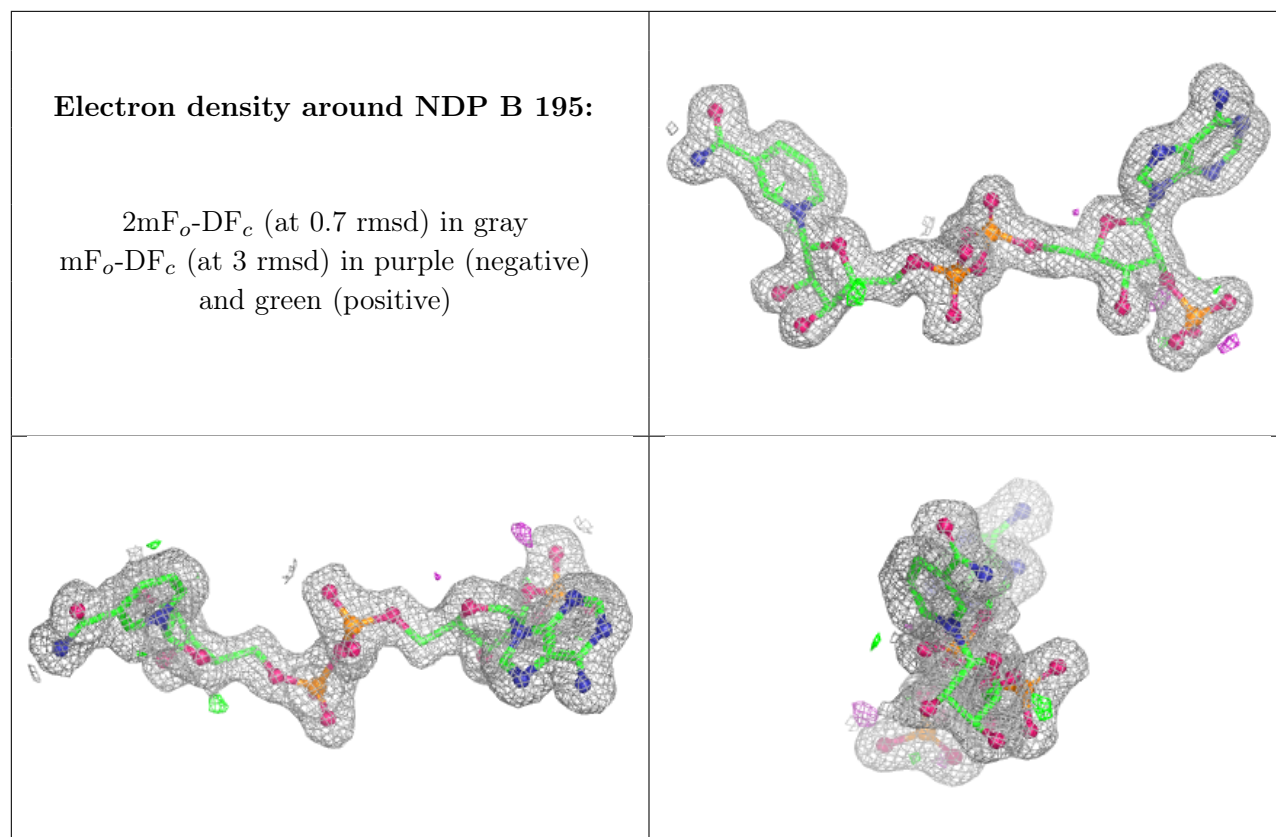
6.4 Ligands [i](#)

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(Å ²)	Q<0.9
2	NDP	A	193	48/48	0.98	0.04	6,14,23,25	0
2	NDP	B	195	48/48	0.98	0.04	7,12,19,21	0
3	CLZ	B	196	14/14	0.98	0.04	7,11,16,17	0
3	CLZ	A	194	14/14	0.99	0.04	8,10,15,16	0

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





6.5 Other polymers [i](#)

There are no such residues in this entry.