



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 08:50 PM UTC

PDB ID : 3NZB / pdb_00003nzb
Title : Structural Analysis of Pneumocystis carinii and Human DHFR Complexes with NADPH and a Series of Potent 5-(omega-carboxyl(alkyloxy)pyrido[2,-d]pyrimidine Derivatives
Authors : Cody, V.
Deposited on : 2010-07-16
Resolution : 1.45 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

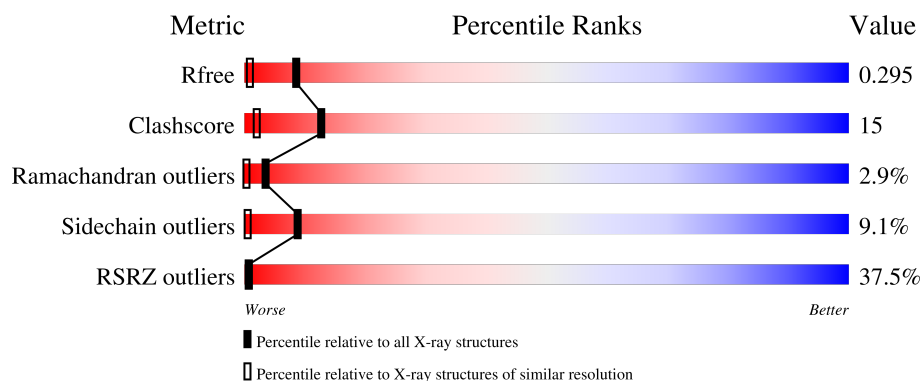
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.45 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	1756 (1.46-1.46)
Clashscore	190562	1795 (1.46-1.46)
Ramachandran outliers	187476	1776 (1.46-1.46)
Sidechain outliers	187428	1776 (1.46-1.46)
RSRZ outliers	180081	1756 (1.46-1.46)

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	X	206	35% 72% 24% ..

2 Entry composition [i](#)

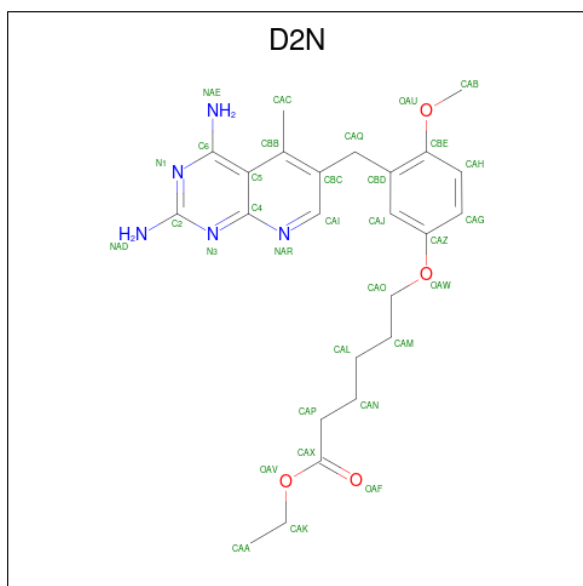
There are 4 unique types of molecules in this entry. The entry contains 1892 atoms, of which 0 are hydrogens and 0 are deuteriums.

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.

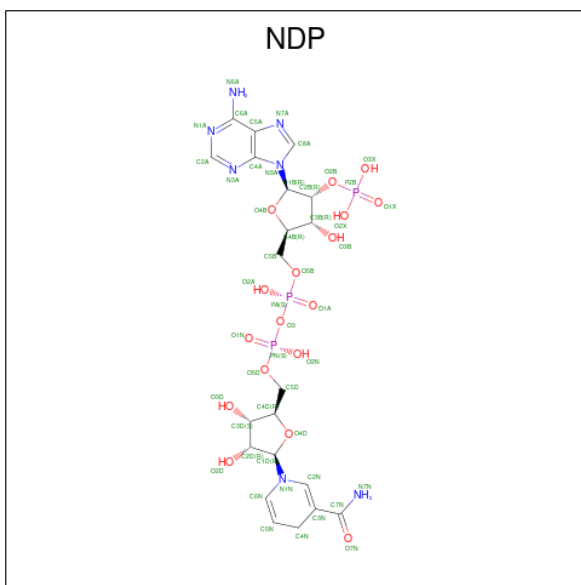
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	X	206	1705	1098	293	307	7	105	2	0

- Molecule 2 is ethyl 6-{3-[(2,4-diamino-5-methylpyrido[2,3-d]pyrimidin-6-yl)methyl]-4-methoxyphenoxy}hexanoate (CCD ID: D2N) (formula: C₂₄H₃₁N₅O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	X	1	33	24	5	4	0	1
2	X	1	33	24	5	4	0	1

- Molecule 3 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula: C₂₁H₃₀N₇O₁₇P₃).



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

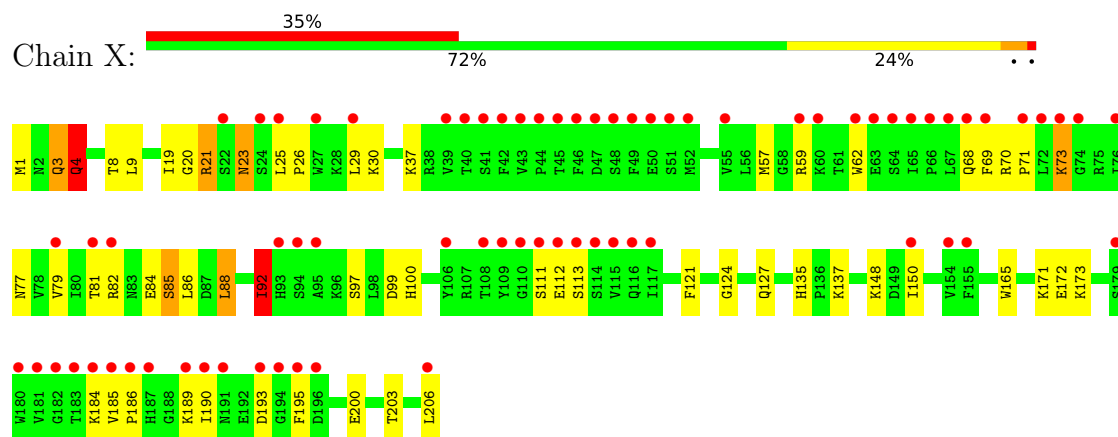
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	X	73	Total O 73 73	0	0

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	36.86Å 42.71Å 60.59Å 90.00° 94.62° 90.00°	Depositor
Resolution (Å)	24.66 – 1.45 24.66 – 1.45	Depositor EDS
% Data completeness (in resolution range)	94.8 (24.66-1.45) 94.8 (24.66-1.45)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.15 (at 1.45Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.241 , 0.295 0.239 , 0.295	Depositor DCC
R_{free} test set	1720 reflections (5.14%)	wwPDB-VP
Wilson B-factor (Å ²)	18.7	Xtriage
Anisotropy	0.089	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.43 , 55.7	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	0.93	EDS
Total number of atoms	1892	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.76% 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: D2N, 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	X	1.50	8/1747 (0.5%)	1.40	14/2355 (0.6%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	X	0	2

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	X	82	ARG	C-N	-16.83	1.11	1.33
1	X	92	ILE	C-N	-15.70	1.10	1.33
1	X	4	GLN	C-N	12.04	1.48	1.33
1	X	57	MET	SD-CE	-10.94	1.52	1.79
1	X	79	VAL	N-CA	-6.81	1.37	1.46
1	X	57	MET	C-O	5.83	1.30	1.23
1	X	9	LEU	CB-CG	-5.37	1.42	1.53
1	X	20	GLY	C-O	-5.03	1.18	1.24

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	X	25	LEU	CA-C-N	-12.25	104.52	119.84
1	X	25	LEU	C-N-CA	-12.25	104.52	119.84
1	X	92	ILE	O-C-N	-10.51	111.15	122.81
1	X	193	ASP	N-CA-C	9.05	123.61	111.30
1	X	73	LYS	N-CA-C	8.68	129.28	110.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	X	92	ILE	CA-C-N	8.66	136.88	122.07
1	X	92	ILE	C-N-CA	8.66	136.88	122.07
1	X	82	ARG	O-C-N	-7.70	110.99	122.39
1	X	4	GLN	CA-C-N	-7.66	106.93	121.63
1	X	4	GLN	C-N-CA	-7.66	106.93	121.63
1	X	92	ILE	N-CA-C	7.13	118.31	108.89
1	X	9	LEU	N-CA-CB	-6.52	99.76	110.52
1	X	124	GLY	CA-C-O	-5.97	116.82	122.13
1	X	23	ASN	N-CA-C	5.60	119.30	111.90

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	X	4	GLN	Peptide
1	X	92	ILE	Mainchain

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	X	1705	0	1713	32	8
2	X	66	0	62	25	0
3	X	48	0	26	2	0
4	X	73	0	0	4	0
All	All	1892	0	1801	52	8

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 15.

All (52) 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)
2:X:207[A]:D2N:HAQA	2:X:207[A]:D2N:CAB	1.47	1.43
2:X:207[A]:D2N:CAQ	2:X:207[A]:D2N:HABB	1.49	1.34

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:X:207[A]:D2N:CAB	2:X:207[A]:D2N:CAQ	2.10	1.24
2:X:207[A]:D2N:HABB	2:X:207[A]:D2N:CBC	1.80	1.12
1:X:37:LYS:HZ2	2:X:209[B]:D2N:HAP	1.12	1.10
2:X:207[A]:D2N:HAQA	2:X:207[A]:D2N:HABA	1.23	1.07
1:X:37:LYS:NZ	2:X:209[B]:D2N:HAP	1.71	1.06
1:X:21:ARG:HH11	1:X:21:ARG:HG3	1.21	1.04
2:X:207[A]:D2N:OAF	2:X:207[A]:D2N:HAAB	1.66	0.93
1:X:135:HIS:HD2	1:X:137:LYS:H	1.18	0.91
2:X:209[B]:D2N:HAMA	2:X:209[B]:D2N:HAG	1.55	0.89
2:X:207[A]:D2N:HAQA	2:X:207[A]:D2N:HABB	1.18	0.85
2:X:207[A]:D2N:HAM	4:X:266:HOH:O	1.79	0.82
1:X:173:LYS:HG3	4:X:234:HOH:O	1.79	0.82
1:X:148:LYS:HD3	1:X:195:PHE:CE2	2.16	0.81
1:X:148:LYS:HD3	1:X:195:PHE:CD2	2.15	0.80
2:X:209[B]:D2N:HAG	2:X:209[B]:D2N:CAM	2.12	0.79
1:X:21:ARG:HH11	1:X:21:ARG:CG	1.95	0.75
1:X:69:PHE:CE1	2:X:209[B]:D2N:HANA	2.24	0.73
1:X:21:ARG:HG3	1:X:21:ARG:NH1	2.02	0.72
2:X:209[B]:D2N:HNAB	2:X:209[B]:D2N:HAC	1.57	0.70
2:X:207[A]:D2N:HNAB	2:X:207[A]:D2N:HAC	1.56	0.69
1:X:135:HIS:CD2	1:X:137:LYS:H	2.07	0.67
1:X:97:SER:OG	1:X:100:HIS:HD2	1.78	0.66
1:X:21:ARG:HD2	4:X:277:HOH:O	1.95	0.65
1:X:21:ARG:CD	4:X:277:HOH:O	2.44	0.65
2:X:207[A]:D2N:OAF	2:X:207[A]:D2N:CAA	2.32	0.64
1:X:186:PRO:HB2	1:X:190:ILE:HD11	1.79	0.64
1:X:37:LYS:NZ	2:X:209[B]:D2N:CAP	2.57	0.63
2:X:209[B]:D2N:HAMA	2:X:209[B]:D2N:CAG	2.28	0.62
1:X:70:ARG:HA	1:X:71:PRO:C	2.24	0.62
1:X:148:LYS:CD	1:X:195:PHE:CD2	2.87	0.57
1:X:112:GLU:HG3	1:X:113:SER:N	2.20	0.56
2:X:207[A]:D2N:CAQ	2:X:207[A]:D2N:HABA	2.03	0.55
1:X:172:GLU:OE2	1:X:203:THR:OG1	2.23	0.54
1:X:21:ARG:CG	1:X:21:ARG:NH1	2.60	0.54
1:X:171:LYS:HE3	1:X:200:GLU:HG2	1.91	0.52
1:X:59:ARG:O	1:X:62:TRP:HB3	2.10	0.52
1:X:99:ASP:OD1	1:X:135:HIS:HE1	1.94	0.50
2:X:209[B]:D2N:CAM	2:X:209[B]:D2N:CAG	2.84	0.49
1:X:127:GLN:OE1	3:X:208:NDP:H3B	2.13	0.48
1:X:69:PHE:CD1	2:X:209[B]:D2N:HAM	2.49	0.47
1:X:19:ILE:O	3:X:208:NDP:H2N	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:X:173:LYS:HB3	1:X:173:LYS:HE3	1.66	0.45
2:X:209[B]:D2N:HNAB	2:X:209[B]:D2N:CAC	2.28	0.44
1:X:97:SER:OG	1:X:100:HIS:CD2	2.66	0.43
2:X:207[A]:D2N:HAG	2:X:207[A]:D2N:HAO	1.27	0.43
2:X:207[A]:D2N:HNAB	2:X:207[A]:D2N:CAC	2.28	0.42
1:X:8:THR:O	1:X:121:PHE:HA	2.20	0.41
1:X:185:VAL:O	1:X:186:PRO:C	2.62	0.41
2:X:209[B]:D2N:HABA	2:X:209[B]:D2N:HAH	1.42	0.40
1:X:148:LYS:HG2	1:X:150:ILE:HG13	2.04	0.40

All (8) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:X:3:GLN:OE1	1:X:165:TRP:CE2[2_556]	0.62	1.58
1:X:3:GLN:OE1	1:X:165:TRP:NE1[2_556]	0.89	1.31
1:X:3:GLN:CD	1:X:165:TRP:CE2[2_556]	1.69	0.51
1:X:3:GLN:OE1	1:X:165:TRP:CZ2[2_556]	1.76	0.44
1:X:3:GLN:OE1	1:X:165:TRP:CD2[2_556]	1.77	0.43
1:X:3:GLN:CD	1:X:165:TRP:NE1[2_556]	1.89	0.31
1:X:3:GLN:OE1	1:X:165:TRP:CD1[2_556]	1.95	0.25
1:X:3:GLN:CD	1:X:165:TRP:CZ2[2_556]	2.09	0.11

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	X	206/206 (100%)	194 (94%)	6 (3%)	6 (3%)	3 0

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	X	84	GLU
1	X	85	SER
1	X	88	LEU
1	X	73	LYS
1	X	111	SER
1	X	26	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	X	189/187 (101%)	172 (91%)	17 (9%)	9 0

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	X	1	MET
1	X	3	GLN
1	X	4	GLN
1	X	21	ARG
1	X	23	ASN
1	X	29	LEU
1	X	30	LYS
1	X	68	GLN
1	X	77	ASN
1	X	81	THR
1	X	85	SER
1	X	86	LEU
1	X	88	LEU
1	X	92	ILE
1	X	184	LYS
1	X	189	LYS
1	X	206	LEU

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

Mol	Chain	Res	Type
1	X	100	HIS
1	X	135	HIS
1	X	187	HIS

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](#)

3 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$
2	D2N	X	209[B]	-	34,35,35	0.82	0	46,47,47	2.54	13 (28%)
3	NDP	X	208	-	51,52,52	1.68	8 (15%)	71,80,80	1.99	20 (28%)
2	D2N	X	207[A]	-	34,35,35	0.91	1 (2%)	46,47,47	2.34	11 (23%)

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	D2N	X	209[B]	-	-	7/18/18/18	0/3/3/3
3	NDP	X	208	-	-	5/34/77/77	0/5/5/5
2	D2N	X	207[A]	-	-	11/18/18/18	0/3/3/3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	X	208	NDP	P2B-O2B	5.44	1.69	1.59
3	X	208	NDP	PN-O3	-4.20	1.55	1.59
3	X	208	NDP	PA-O1A	-3.23	1.39	1.50
3	X	208	NDP	C7N-C3N	3.16	1.55	1.48
3	X	208	NDP	P2B-O2X	2.91	1.65	1.54
3	X	208	NDP	C4N-C5N	-2.62	1.42	1.49
2	X	207[A]	D2N	CAQ-CBC	2.37	1.56	1.52
3	X	208	NDP	C6N-N1N	2.14	1.42	1.37
3	X	208	NDP	O4B-C1B	2.06	1.46	1.42

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	X	209[B]	D2N	CAB-OAU-CBE	-10.44	102.19	117.51
2	X	207[A]	D2N	CAB-OAU-CBE	-9.13	104.12	117.51
3	X	208	NDP	O2B-P2B-O1X	-6.48	86.22	109.33
2	X	207[A]	D2N	N3-C2-N1	-5.13	120.69	127.21
2	X	209[B]	D2N	N3-C2-N1	-5.03	120.81	127.21
2	X	207[A]	D2N	CAO-OAW-CAZ	-4.81	105.43	117.93
3	X	208	NDP	C3N-C2N-N1N	-4.69	116.31	123.20
2	X	209[B]	D2N	OAU-CBE-CAH	-4.53	116.66	124.30
2	X	207[A]	D2N	C2-N3-C4	4.49	120.32	115.48
2	X	209[B]	D2N	C2-N3-C4	4.38	120.21	115.48
2	X	209[B]	D2N	OAU-CBE-CBD	4.32	122.39	115.96
3	X	208	NDP	O2A-PA-O3	4.25	118.76	107.27
3	X	208	NDP	C5A-C4A-N3A	-4.03	121.17	126.72
3	X	208	NDP	O2X-P2B-O1X	3.84	125.81	110.83
2	X	207[A]	D2N	OAU-CBE-CAH	-3.63	118.18	124.30
2	X	207[A]	D2N	CAC-CBB-CBC	-3.62	116.69	120.81
3	X	208	NDP	O4B-C1B-N9A	3.62	115.03	108.09
3	X	208	NDP	N3A-C2A-N1A	-3.60	123.12	128.58
2	X	209[B]	D2N	CAQ-CBC-CAI	-3.50	116.59	122.20
3	X	208	NDP	C5B-C4B-C3B	-3.48	102.67	115.21
2	X	209[B]	D2N	CAC-CBB-CBC	-3.37	116.98	120.81
2	X	207[A]	D2N	OAV-CAX-CAP	3.26	121.78	111.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	X	209[B]	D2N	CAQ-CBD-CBE	3.24	124.98	121.20
3	X	208	NDP	O4D-C4D-C5D	-3.19	99.11	109.33
2	X	209[B]	D2N	CAO-OAW-CAZ	-3.19	109.64	117.93
2	X	207[A]	D2N	CAK-OAV-CAX	-3.16	107.70	116.67
2	X	209[B]	D2N	NAD-C2-N1	3.09	121.85	117.22
2	X	209[B]	D2N	OAV-CAX-CAP	2.98	120.93	111.83
3	X	208	NDP	N3A-C4A-N9A	2.96	132.20	127.17
2	X	207[A]	D2N	NAD-C2-N1	2.93	121.61	117.22
3	X	208	NDP	C3D-C2D-C1D	-2.88	96.01	101.46
3	X	208	NDP	N9A-C8A-N7A	-2.84	109.90	113.94
3	X	208	NDP	O2B-C2B-C1B	-2.75	100.39	110.05
2	X	209[B]	D2N	CAI-CBC-CBB	2.75	120.35	118.10
2	X	207[A]	D2N	OAU-CBE-CBD	2.72	120.01	115.96
3	X	208	NDP	C2A-N3A-C4A	2.67	118.35	111.83
3	X	208	NDP	O5B-PA-O1A	-2.46	99.19	108.94
3	X	208	NDP	O3D-C3D-C4D	-2.38	104.26	111.08
3	X	208	NDP	C5A-N7A-C8A	2.30	107.07	103.45
3	X	208	NDP	C1D-N1N-C2N	-2.30	117.35	121.14
3	X	208	NDP	O7N-C7N-C3N	-2.30	116.57	120.90
3	X	208	NDP	C2B-C1B-N9A	-2.11	110.28	113.75
2	X	207[A]	D2N	OAV-CAX-OAF	-2.11	118.35	123.63
2	X	209[B]	D2N	CAQ-CBD-CAJ	-2.04	117.23	120.25

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	X	207[A]	D2N	CBD-CBE-OAU-CAB
2	X	207[A]	D2N	CAH-CBE-OAU-CAB
2	X	207[A]	D2N	CAA-CAK-OAV-CAX
2	X	209[B]	D2N	CAL-CAN-CAP-CAX
2	X	207[A]	D2N	CAL-CAN-CAP-CAX
2	X	207[A]	D2N	CAN-CAL-CAM-CAO
2	X	207[A]	D2N	CAM-CAO-OAW-CAZ
2	X	207[A]	D2N	CAP-CAX-OAV-CAK
2	X	209[B]	D2N	CAM-CAL-CAN-CAP
2	X	209[B]	D2N	CAJ-CAZ-OAW-CAO
2	X	209[B]	D2N	CAN-CAL-CAM-CAO
2	X	209[B]	D2N	CAG-CAZ-OAW-CAO
2	X	209[B]	D2N	CAL-CAM-CAO-OAW
2	X	207[A]	D2N	OAF-CAX-OAV-CAK
3	X	208	NDP	O4D-C1D-N1N-C2N

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Mol	Chain	Res	Type	Atoms
2	X	207[A]	D2N	CAL-CAM-CAO-OAW
2	X	209[B]	D2N	CBD-CAQ-CBC-CAI
3	X	208	NDP	C2N-C3N-C7N-N7N
3	X	208	NDP	C2D-C1D-N1N-C2N
3	X	208	NDP	PN-O3-PA-O1A
3	X	208	NDP	PN-O3-PA-O2A
2	X	207[A]	D2N	CAN-CAP-CAX-OAV
2	X	207[A]	D2N	CAN-CAP-CAX-OAF

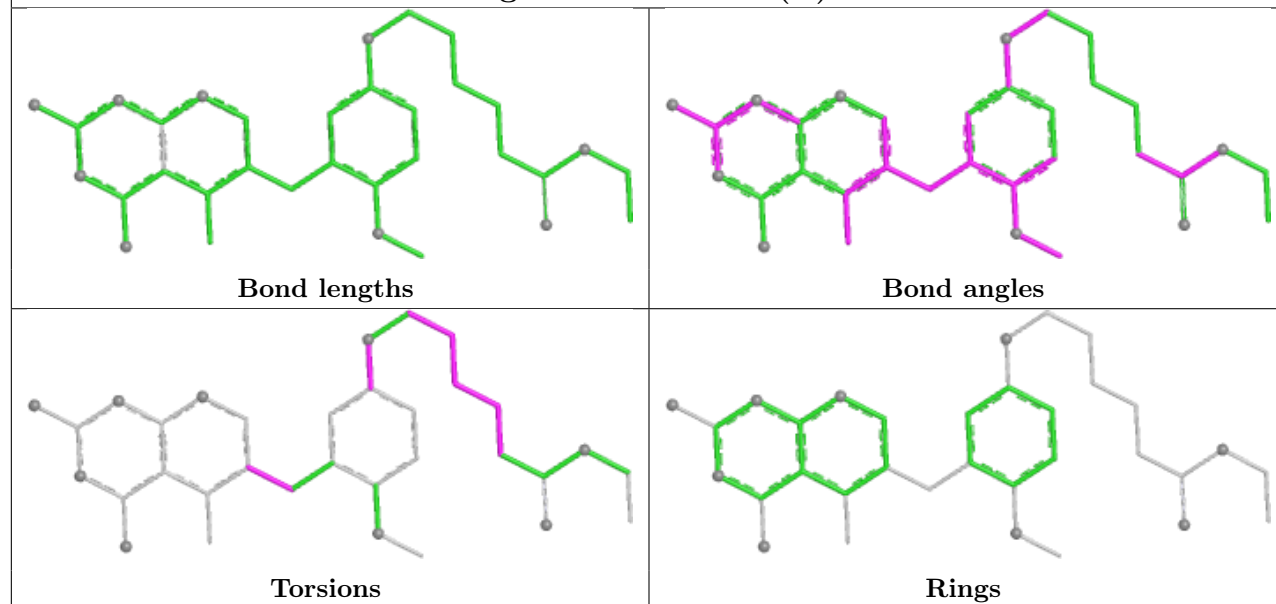
There are no ring outliers.

3 monomers are involved in 27 short contacts:

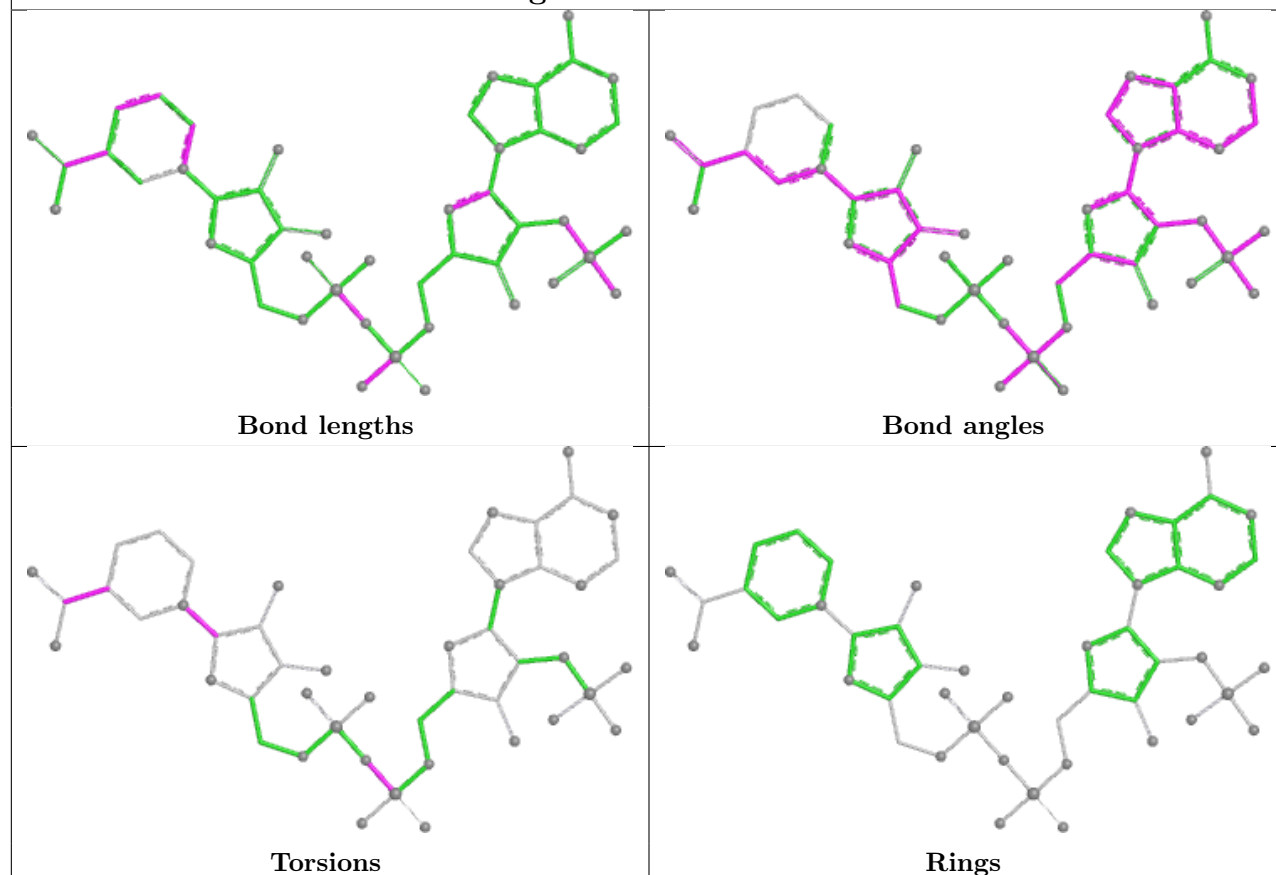
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	X	209[B]	D2N	12	0
3	X	208	NDP	2	0
2	X	207[A]	D2N	13	0

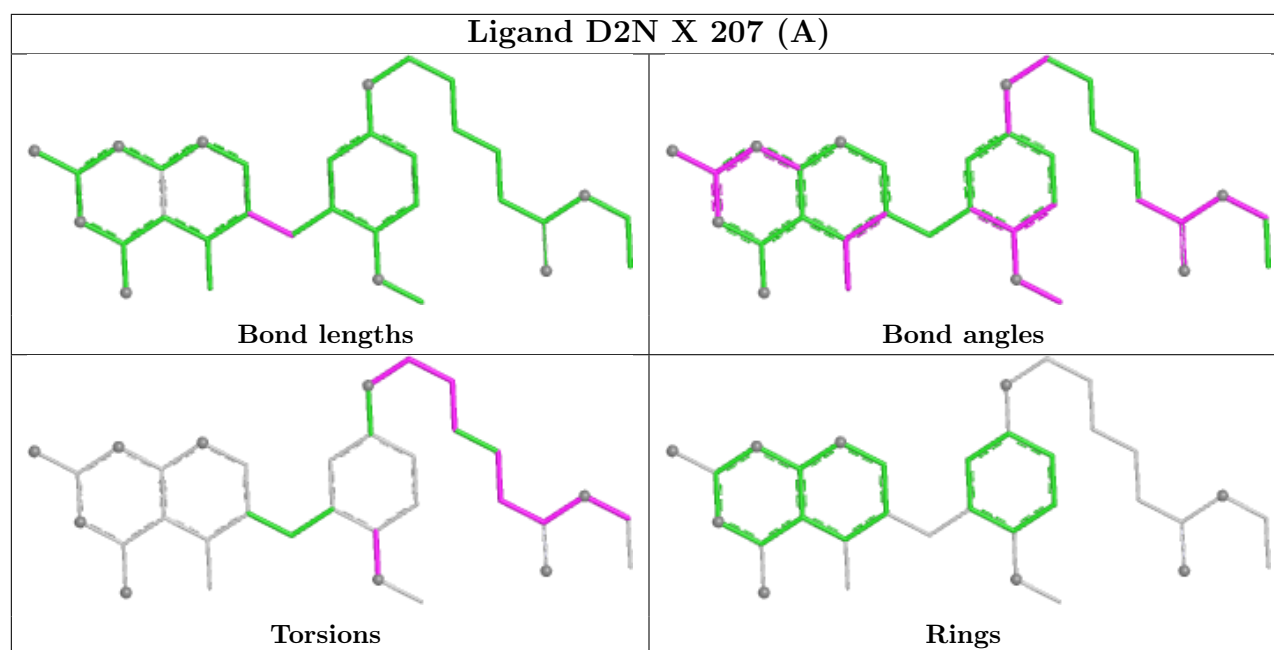
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

Ligand D2N X 209 (B)



Ligand NDP X 208





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	X	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	X	82:ARG	C	83:ASN	N	1.11
1	X	92:ILE	C	93:HIS	N	1.10

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	X	192/206 (93%)	1.59	72 (37%) 1 1	8, 24, 40, 46	2 (1%)

All (72) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	X	74	GLY	5.8
1	X	195	PHE	5.6
1	X	62	TRP	5.4
1	X	49	PHE	4.5
1	X	72	LEU	4.1
1	X	67	LEU	4.0
1	X	69	PHE	4.0
1	X	115	VAL	3.9
1	X	81	THR	3.9
1	X	64	SER	3.8
1	X	181	VAL	3.7
1	X	110	GLY	3.7
1	X	111	SER	3.5
1	X	43	VAL	3.5
1	X	185	VAL	3.5
1	X	182	GLY	3.4
1	X	73	LYS	3.3
1	X	25	LEU	3.3
1	X	113	SER	3.3
1	X	179	SER	3.2
1	X	117	ILE	3.2
1	X	114	SER	3.1
1	X	186	PRO	3.1
1	X	79	VAL	3.1
1	X	180	TRP	3.0
1	X	22	SER	2.9
1	X	42	PHE	2.9

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Mol	Chain	Res	Type	RSRZ
1	X	71	PRO	2.9
1	X	183	THR	2.8
1	X	109	TYR	2.8
1	X	191	ASN	2.8
1	X	65	ILE	2.8
1	X	44	PRO	2.8
1	X	48	SER	2.8
1	X	112	GLU	2.7
1	X	55	VAL	2.7
1	X	27	TRP	2.7
1	X	187	HIS	2.6
1	X	184	LYS	2.6
1	X	194	GLY	2.6
1	X	196	ASP	2.6
1	X	45	THR	2.6
1	X	60	LYS	2.6
1	X	106	TYR	2.5
1	X	193	ASP	2.5
1	X	76	ILE	2.5
1	X	47	ASP	2.5
1	X	108	THR	2.4
1	X	154	VAL	2.4
1	X	51	SER	2.4
1	X	82	ARG	2.4
1	X	150	ILE	2.4
1	X	190	ILE	2.4
1	X	94	SER	2.3
1	X	40	THR	2.3
1	X	29	LEU	2.3
1	X	68	GLN	2.3
1	X	39	VAL	2.3
1	X	52	MET	2.3
1	X	63	GLU	2.3
1	X	66	PRO	2.3
1	X	41	SER	2.3
1	X	46	PHE	2.2
1	X	155	PHE	2.2
1	X	206	LEU	2.1
1	X	95	ALA	2.1
1	X	116	GLN	2.1
1	X	93	HIS	2.1
1	X	59	ARG	2.1

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Mol	Chain	Res	Type	RSRZ
1	X	24	SER	2.1
1	X	50	GLU	2.1
1	X	189	LYS	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

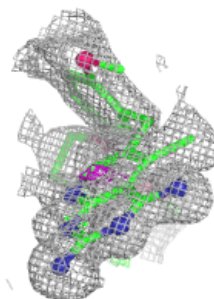
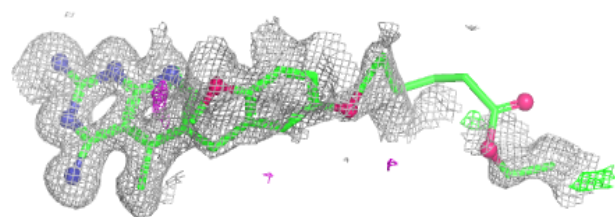
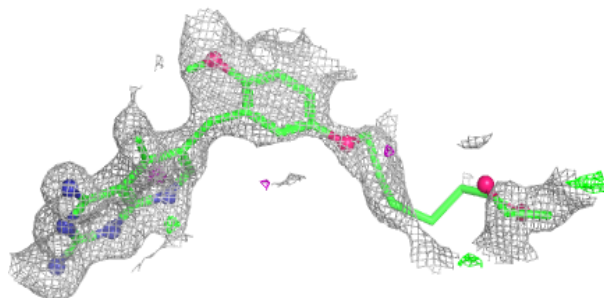
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	D2N	X	207[A]	33/33	0.84	0.14	16,27,32,35	33
2	D2N	X	209[B]	33/33	0.87	0.13	16,31,36,40	33
3	NDP	X	208	48/48	0.89	0.13	17,28,32,37	0

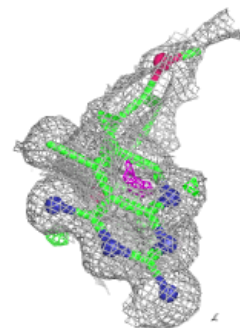
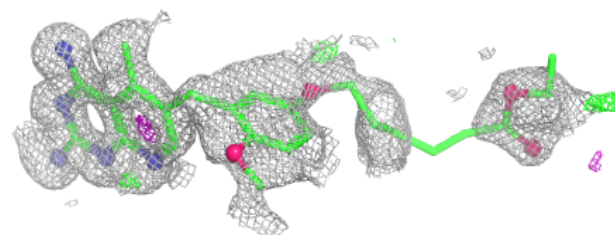
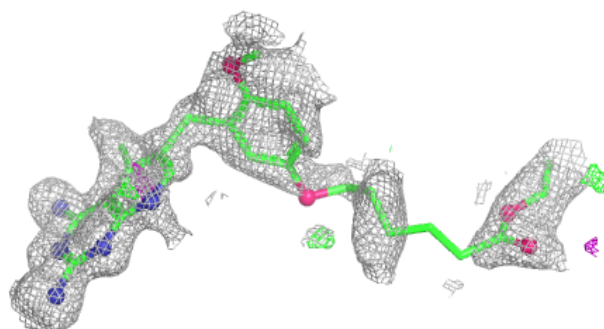
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

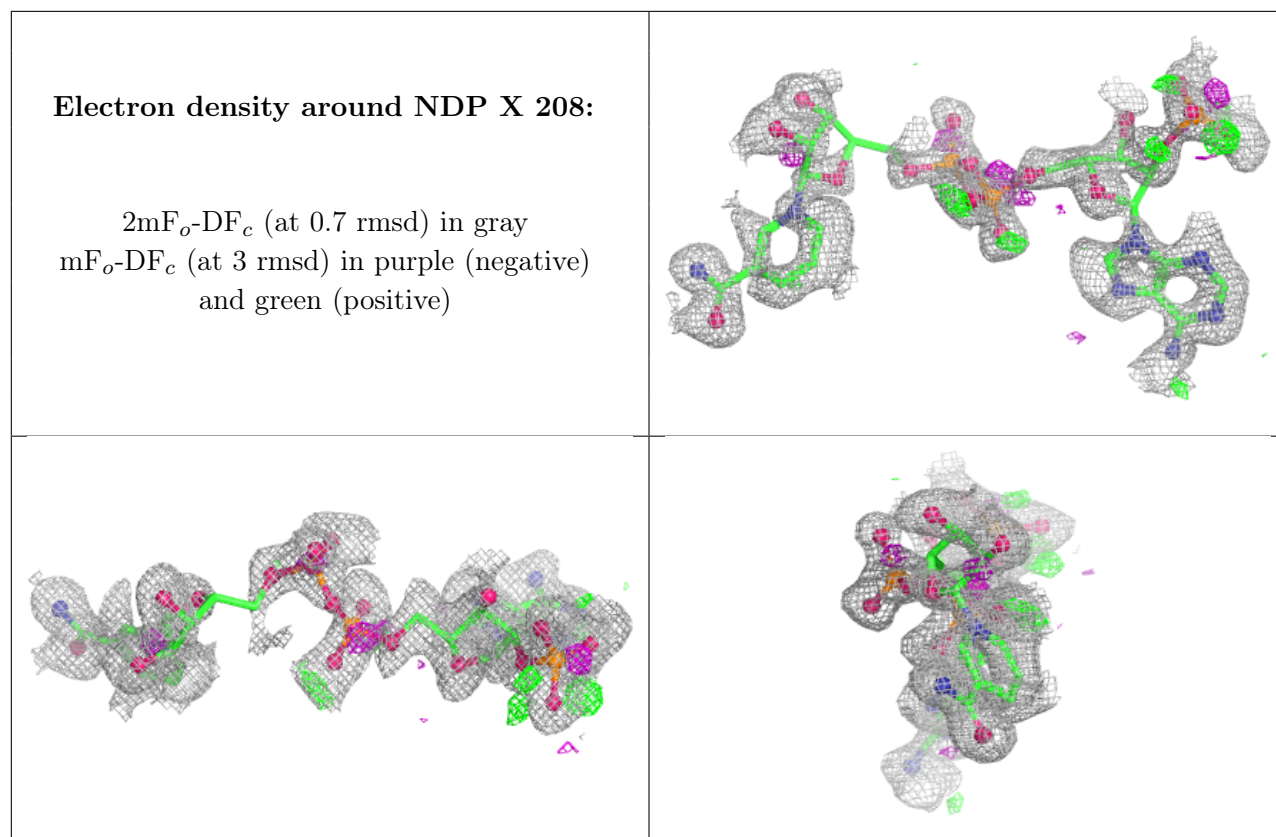
Electron density around D2N X 207 (A):

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

**Electron density around D2N X 209 (B):**

$2mF_o-DF_c$ (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.