Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 09:48 pm GMT

PDB ID	:	9QDK / pdb_00009qdk
Title	:	Trypanosoma brucei PTR1 in complex with fragment L330 and compound F46
Authors	:	Landi, G.; Mangani, S.; Pozzi, C.
Deposited on	:	2025-03-06
Resolution	:	1.90 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

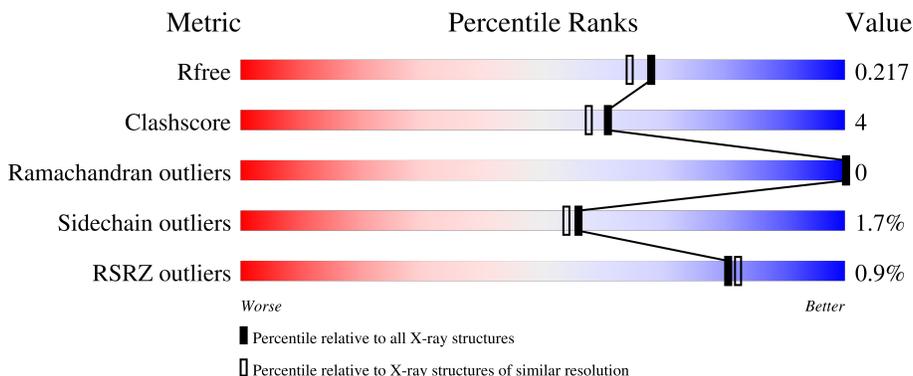|		
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

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 1.90 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	Percentile Ranks	Value
Rfree		0.217
Clashscore		4
Ramachandran outliers		0
Sidechain outliers		1.7%
RSRZ outliers		0.9%

Worse — *Better*

▌ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	7293 (1.90-1.90)
Clashscore	180529	8090 (1.90-1.90)
Ramachandran outliers	177936	8022 (1.90-1.90)
Sidechain outliers	177891	8022 (1.90-1.90)
RSRZ outliers	164620	7292 (1.90-1.90)

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	288	77% 9% 14%
1	B	288	.% 77% 9% 14%
1	C	288	.% 73% 10% 17%
1	D	288	.% 78% 7% • 14%

2   Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 8336 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 Pteridine reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	249	Total	C	N	O	S	0	2	0
			1840	1159	322	348	11			
1	B	248	Total	C	N	O	S	0	7	0
			1887	1184	332	359	12			
1	C	239	Total	C	N	O	S	0	6	0
			1795	1132	314	339	10			
1	D	249	Total	C	N	O	S	0	7	0
			1855	1171	321	351	12			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP O76290
A	-18	GLY	-	expression tag	UNP O76290
A	-17	SER	-	expression tag	UNP O76290
A	-16	SER	-	expression tag	UNP O76290
A	-15	HIS	-	expression tag	UNP O76290
A	-14	HIS	-	expression tag	UNP O76290
A	-13	HIS	-	expression tag	UNP O76290
A	-12	HIS	-	expression tag	UNP O76290
A	-11	HIS	-	expression tag	UNP O76290
A	-10	HIS	-	expression tag	UNP O76290
A	-9	SER	-	expression tag	UNP O76290
A	-8	SER	-	expression tag	UNP O76290
A	-7	GLY	-	expression tag	UNP O76290
A	-6	LEU	-	expression tag	UNP O76290
A	-5	VAL	-	expression tag	UNP O76290
A	-4	PRO	-	expression tag	UNP O76290
A	-3	ARG	-	expression tag	UNP O76290
A	-2	GLY	-	expression tag	UNP O76290
A	-1	SER	-	expression tag	UNP O76290
A	0	HIS	-	expression tag	UNP O76290
B	-19	MET	-	initiating methionine	UNP O76290

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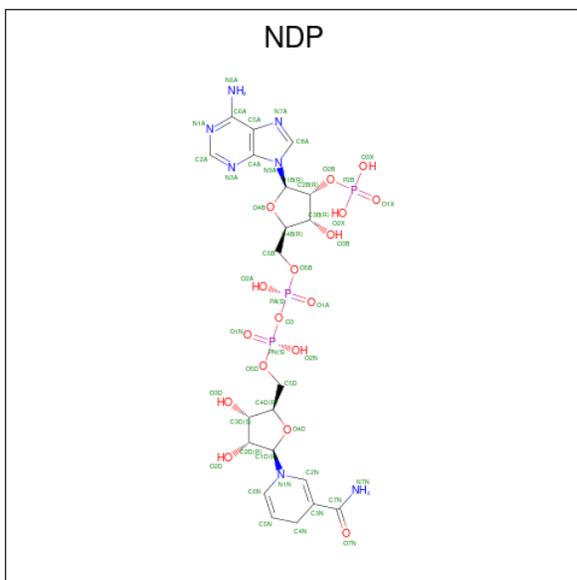
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	expression tag	UNP O76290
B	-17	SER	-	expression tag	UNP O76290
B	-16	SER	-	expression tag	UNP O76290
B	-15	HIS	-	expression tag	UNP O76290
B	-14	HIS	-	expression tag	UNP O76290
B	-13	HIS	-	expression tag	UNP O76290
B	-12	HIS	-	expression tag	UNP O76290
B	-11	HIS	-	expression tag	UNP O76290
B	-10	HIS	-	expression tag	UNP O76290
B	-9	SER	-	expression tag	UNP O76290
B	-8	SER	-	expression tag	UNP O76290
B	-7	GLY	-	expression tag	UNP O76290
B	-6	LEU	-	expression tag	UNP O76290
B	-5	VAL	-	expression tag	UNP O76290
B	-4	PRO	-	expression tag	UNP O76290
B	-3	ARG	-	expression tag	UNP O76290
B	-2	GLY	-	expression tag	UNP O76290
B	-1	SER	-	expression tag	UNP O76290
B	0	HIS	-	expression tag	UNP O76290
C	-19	MET	-	initiating methionine	UNP O76290
C	-18	GLY	-	expression tag	UNP O76290
C	-17	SER	-	expression tag	UNP O76290
C	-16	SER	-	expression tag	UNP O76290
C	-15	HIS	-	expression tag	UNP O76290
C	-14	HIS	-	expression tag	UNP O76290
C	-13	HIS	-	expression tag	UNP O76290
C	-12	HIS	-	expression tag	UNP O76290
C	-11	HIS	-	expression tag	UNP O76290
C	-10	HIS	-	expression tag	UNP O76290
C	-9	SER	-	expression tag	UNP O76290
C	-8	SER	-	expression tag	UNP O76290
C	-7	GLY	-	expression tag	UNP O76290
C	-6	LEU	-	expression tag	UNP O76290
C	-5	VAL	-	expression tag	UNP O76290
C	-4	PRO	-	expression tag	UNP O76290
C	-3	ARG	-	expression tag	UNP O76290
C	-2	GLY	-	expression tag	UNP O76290
C	-1	SER	-	expression tag	UNP O76290
C	0	HIS	-	expression tag	UNP O76290
D	-19	MET	-	initiating methionine	UNP O76290
D	-18	GLY	-	expression tag	UNP O76290
D	-17	SER	-	expression tag	UNP O76290

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-16	SER	-	expression tag	UNP O76290
D	-15	HIS	-	expression tag	UNP O76290
D	-14	HIS	-	expression tag	UNP O76290
D	-13	HIS	-	expression tag	UNP O76290
D	-12	HIS	-	expression tag	UNP O76290
D	-11	HIS	-	expression tag	UNP O76290
D	-10	HIS	-	expression tag	UNP O76290
D	-9	SER	-	expression tag	UNP O76290
D	-8	SER	-	expression tag	UNP O76290
D	-7	GLY	-	expression tag	UNP O76290
D	-6	LEU	-	expression tag	UNP O76290
D	-5	VAL	-	expression tag	UNP O76290
D	-4	PRO	-	expression tag	UNP O76290
D	-3	ARG	-	expression tag	UNP O76290
D	-2	GLY	-	expression tag	UNP O76290
D	-1	SER	-	expression tag	UNP O76290
D	0	HIS	-	expression tag	UNP O76290

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$).

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

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

- Molecule 3 is 2-amino-3H,4H,7H-pyrrolo[2,3-d]pyrimidin-4-one (CCD ID: QY8) (formula: $C_6H_6N_4O$) (labeled as "Ligand of Interest" by depositor).
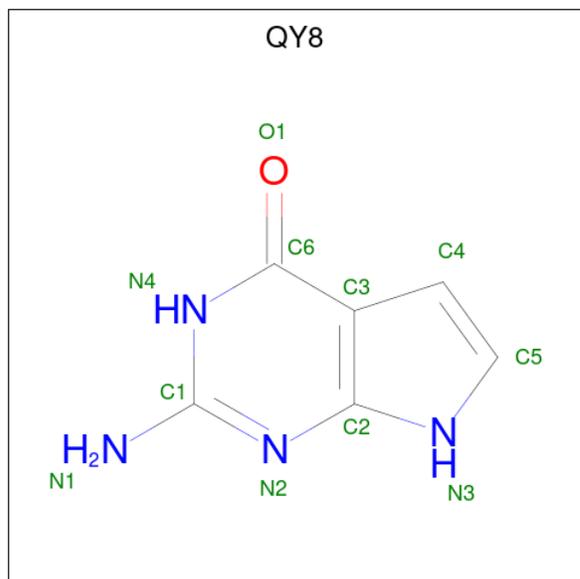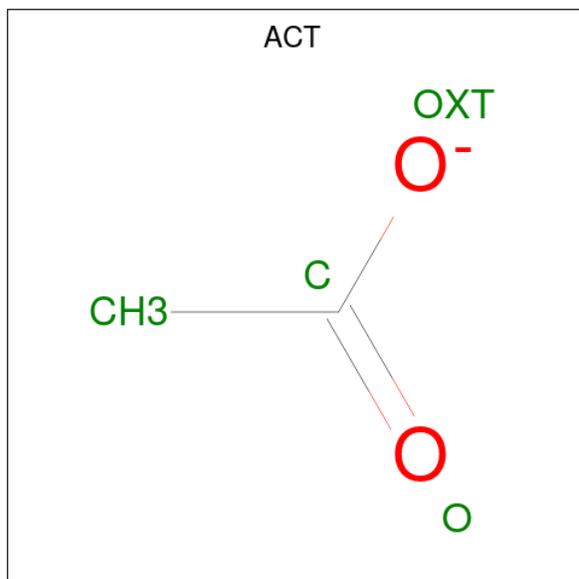

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			11	6	4	1		
3	B	1	Total	C	N	O	0	0
			11	6	4	1		
3	C	1	Total	C	N	O	0	0
			11	6	4	1		
3	D	1	Total	C	N	O	0	0
			11	6	4	1		

- Molecule 4 is 1-(3,4-dichlorobenzyl)-1H-benzimidazol-2-amine (CCD ID: AX8) (formula: $C_{14}H_{11}Cl_2N_3$).
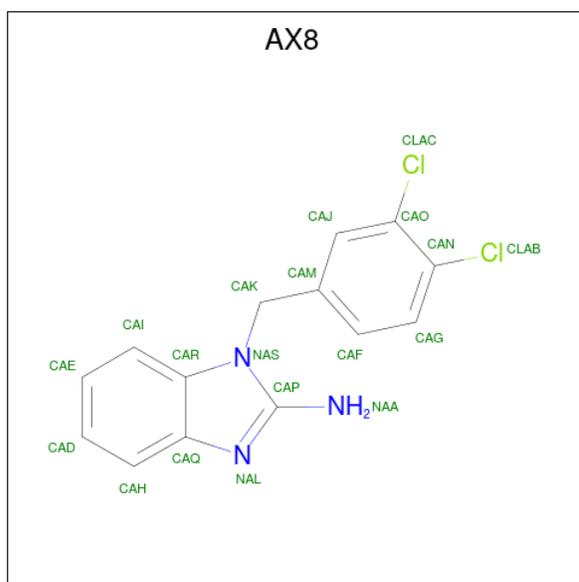
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	0	0
			19	14	2	3		
4	B	1	Total	C	Cl	N	0	0
			19	14	2	3		
4	C	1	Total	C	Cl	N	0	0
			19	14	2	3		
4	D	1	Total	C	Cl	N	0	0
			19	14	2	3		

- Molecule 5 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).

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

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).

GOL
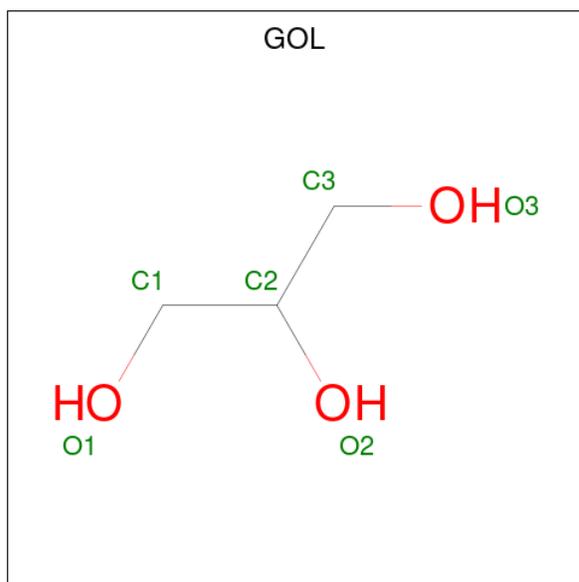
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total C O 6 3 3			0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	148	Total O 151 151		0	3
7	B	182	Total O 182 182		0	1
7	C	138	Total O 140 140		0	5
7	D	159	Total O 160 160		0	1

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: Pteridine reductase

Chain A:
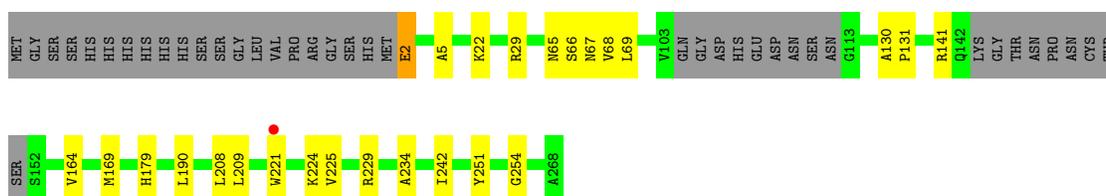
• Molecule 1: Pteridine reductase

Chain B:
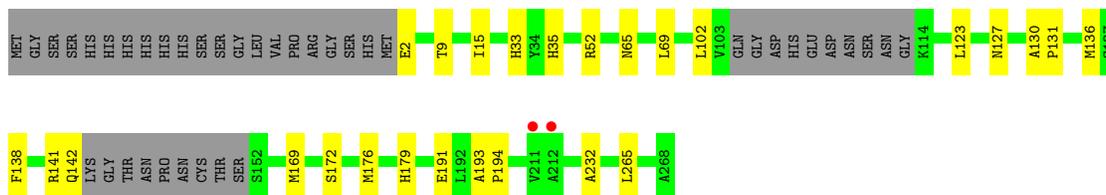
• Molecule 1: Pteridine reductase

Chain C:
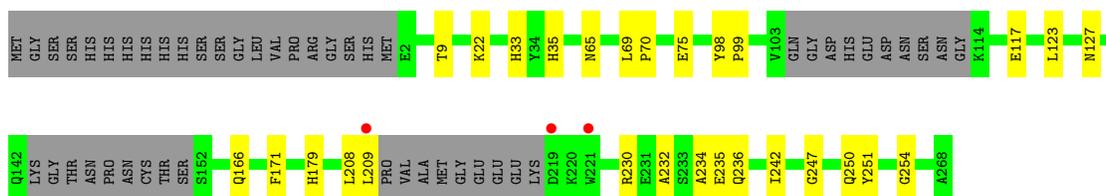
• Molecule 1: Pteridine reductase

Chain D:
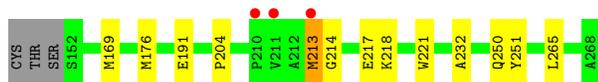
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	74.50Å 89.30Å 82.63Å 90.00° 115.65° 90.00°	Depositor
Resolution (Å)	41.74 – 1.90 41.74 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.3 (41.74-1.90) 99.3 (41.74-1.90)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.20 (at 1.89Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.171 , 0.217 0.171 , 0.217	Depositor DCC
R_{free} test set	3895 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	19.1	Xtriage
Anisotropy	0.120	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 55.6	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.017 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	8336	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 29.33 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.5780e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, AX8, ACT, NDP, QY8

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	0.61	0/1870	1.00	0/2541
1	B	0.61	0/1926	1.01	1/2613 (0.0%)
1	C	0.63	0/1838	1.04	1/2497 (0.0%)
1	D	0.58	0/1900	1.01	0/2582
All	All	0.61	0/7534	1.02	2/10233 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	75	GLU	CB-CG-CD	5.25	121.52	112.60
1	B	52	ARG	CB-CA-C	-5.20	102.65	110.24

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	1840	0	1843	16	0
1	B	1887	0	1903	16	0
1	C	1795	0	1817	18	0
1	D	1855	0	1860	21	0
2	A	48	0	26	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	48	0	26	3	0
2	C	48	0	26	2	0
2	D	48	0	26	1	0
3	A	11	0	0	0	0
3	B	11	0	0	1	0
3	C	11	0	0	1	0
3	D	11	0	0	0	0
4	A	19	0	11	1	0
4	B	19	0	11	0	0
4	C	19	0	11	1	0
4	D	19	0	11	2	0
5	A	4	0	3	0	0
5	B	4	0	3	0	0
6	B	6	0	8	0	0
7	A	151	0	0	0	0
7	B	182	0	0	0	0
7	C	140	0	0	0	0
7	D	160	0	0	1	0
All	All	8336	0	7585	63	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 (63) 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:C:230:ARG:HH12	1:C:236:GLN:HE22	1.28	0.82
2:C:301[A]:NDP:H41N	3:C:302:QY8:C5	2.14	0.77
1:C:22:LYS:HE3	1:C:235[B]:GLU:HG3	1.68	0.74
2:B:301:NDP:H41N	3:B:302:QY8:C5	2.18	0.73
1:C:232:ALA:HB2	1:D:251:TYR:CE2	2.37	0.60
1:D:65:ASN:HA	1:D:69:LEU:HD22	1.84	0.59
1:D:221:TRP:HE3	4:D:303:AX8:CLAC	2.23	0.58
1:C:65:ASN:HA	1:C:69:LEU:HD22	1.83	0.58
1:C:123:LEU:O	1:C:127[A]:ASN:HB2	2.04	0.57
1:A:164:VAL:HG22	1:A:179:HIS:CD2	2.41	0.54
1:B:2[A]:GLU:HA	1:B:2[A]:GLU:OE1	2.06	0.54
1:A:225:VAL:O	1:A:229:ARG:HD3	2.09	0.53
1:B:193:ALA:N	1:B:194:PRO:CD	2.71	0.53
1:A:65:ASN:HA	1:A:69:LEU:HD22	1.90	0.52
1:B:172:SER:O	1:B:176:MET:HG3	2.10	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:254:GLY:HA3	1:B:265:LEU:HD11	1.94	0.50
1:D:115:THR:OG1	1:D:117[A]:GLU:HG2	2.12	0.50
1:A:130:ALA:HB3	1:A:131:PRO:HD3	1.94	0.49
1:B:35:HIS:HB2	2:B:301:NDP:C2A	2.43	0.48
1:C:22:LYS:CE	1:C:235[B]:GLU:HG3	2.43	0.47
1:B:169:MET:SD	1:D:191:GLU:HA	2.55	0.47
1:D:213:MET:HE1	1:D:221:TRP:HE1	1.82	0.46
1:B:65:ASN:HA	1:B:69:LEU:HD22	1.99	0.45
1:A:251:TYR:CE2	1:B:232:ALA:HB2	2.52	0.45
1:C:22:LYS:HG2	1:C:242:ILE:HG13	1.98	0.45
1:D:213:MET:HB2	1:D:218:LYS:HE3	1.97	0.45
1:C:251:TYR:CE2	1:D:232:ALA:HB2	2.52	0.45
1:D:213:MET:HE2	1:D:217:GLU:CB	2.47	0.45
1:B:123:LEU:O	1:B:127:ASN:HB2	2.18	0.44
1:D:138:PHE:O	1:D:142:GLN:HG2	2.17	0.44
1:B:138:PHE:O	1:B:142:GLN:HG2	2.16	0.44
1:A:5:ALA:HA	1:A:29:ARG:O	2.18	0.44
1:A:208:LEU:HD11	1:A:234:ALA:HB2	1.99	0.44
1:C:9:THR:HA	1:C:33:HIS:HB3	1.99	0.44
1:D:221:TRP:CE3	4:D:303:AX8:CLAC	3.07	0.44
1:C:247:GLY:HA2	1:C:250:GLN:HG3	1.99	0.44
1:D:214:GLY:O	1:D:218:LYS:HG3	2.17	0.44
1:B:130:ALA:HB3	1:B:131:PRO:HD3	2.00	0.43
1:C:69:LEU:HB3	1:C:70:PRO:HD3	2.00	0.43
1:C:35:HIS:HB2	2:C:301[A]:NDP:C2A	2.48	0.43
1:A:2:GLU:HG3	1:A:29:ARG:NH2	2.33	0.43
1:A:221:TRP:HB3	4:A:303:AX8:CLAC	2.56	0.43
1:D:204:PRO:HB2	2:D:301:NDP:H42N	1.99	0.43
1:C:254:GLY:HA3	1:D:265:LEU:HD11	2.01	0.42
1:D:218:LYS:HD2	7:D:501:HOH:O	2.19	0.42
1:B:102:LEU:O	1:D:136[B]:MET:HG3	2.20	0.42
1:A:221:TRP:CZ3	1:A:224:LYS:HE3	2.54	0.42
1:A:67:ASN:HA	1:C:117:GLU:HG3	2.02	0.42
1:B:9:THR:HA	1:B:33:HIS:HB3	2.02	0.42
1:C:232:ALA:HB2	1:D:251:TYR:CD2	2.54	0.42
1:C:171:PHE:CG	4:C:303:AX8:HAD	2.56	0.41
1:C:98:TYR:HB2	1:C:99:PRO:HD2	2.02	0.41
1:A:22:LYS:HG2	1:A:242:ILE:HG13	2.03	0.41
1:C:208:LEU:HD11	1:C:234:ALA:HB2	2.03	0.41
1:A:66:SER:OG	1:A:68[A]:VAL:HG12	2.20	0.40
1:A:169:MET:HE2	1:A:169:MET:HB2	1.95	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:242:ILE:HD13	1:A:242:ILE:HA	1.89	0.40
1:B:15:ILE:HB	2:B:301:NDP:H51N	2.04	0.40
1:D:169:MET:HE2	1:D:169:MET:HB2	1.97	0.40
1:B:136[B]:MET:HE3	1:B:136[B]:MET:HB2	1.76	0.40
1:B:191:GLU:HA	1:D:169:MET:SD	2.62	0.40
1:D:9:THR:HA	1:D:33:HIS:HB3	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	244/288 (85%)	236 (97%)	8 (3%)	0	100	100
1	B	248/288 (86%)	238 (96%)	10 (4%)	0	100	100
1	C	237/288 (82%)	229 (97%)	8 (3%)	0	100	100
1	D	250/288 (87%)	240 (96%)	10 (4%)	0	100	100
All	All	979/1152 (85%)	943 (96%)	36 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	192/231 (83%)	188 (98%)	4 (2%)	48	45
1	B	202/231 (87%)	200 (99%)	2 (1%)	73	74
1	C	192/231 (83%)	189 (98%)	3 (2%)	58	56
1	D	194/231 (84%)	188 (97%)	6 (3%)	35	29
All	All	780/924 (84%)	765 (98%)	15 (2%)	56	49

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	GLU
1	A	141	ARG
1	A	190	LEU
1	A	209	LEU
1	B	141	ARG
1	B	179	HIS
1	C	166	GLN
1	C	179	HIS
1	C	209	LEU
1	D	53[A]	SER
1	D	53[B]	SER
1	D	117[A]	GLU
1	D	117[B]	GLU
1	D	213	MET
1	D	250	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	92	ASN
1	A	179	HIS
1	B	65	ASN
1	B	92	ASN
1	B	175	ASN
1	B	179	HIS
1	B	250	GLN
1	C	35	HIS
1	C	65	ASN
1	C	92	ASN
1	C	140	GLN
1	D	92	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 ⓘ

15 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	$\#|Z| > 2$
4	AX8	A	303	-	19,21,21	2.16	6 (31%)	24,30,30	1.48	3 (12%)
2	NDP	A	301[A]	-	45,52,52	0.77	1 (2%)	53,80,80	0.83	2 (3%)
3	QY8	B	302	-	11,12,12	2.72	3 (27%)	8,17,17	2.46	4 (50%)
3	QY8	C	302	-	11,12,12	2.88	4 (36%)	8,17,17	2.64	4 (50%)
3	QY8	A	302	-	11,12,12	2.60	4 (36%)	8,17,17	2.94	4 (50%)
4	AX8	B	303	-	19,21,21	1.99	4 (21%)	24,30,30	1.34	4 (16%)
2	NDP	B	301	-	45,52,52	0.70	1 (2%)	53,80,80	0.84	1 (1%)
4	AX8	D	303	-	19,21,21	1.64	3 (15%)	24,30,30	1.34	2 (8%)
2	NDP	C	301[A]	-	45,52,52	0.64	0	53,80,80	0.89	1 (1%)
6	GOL	B	305	-	5,5,5	0.11	0	5,5,5	0.36	0
5	ACT	A	304	-	3,3,3	0.84	0	3,3,3	0.80	0
5	ACT	B	304	-	3,3,3	1.00	0	3,3,3	0.83	0
4	AX8	C	303	-	19,21,21	1.93	5 (26%)	24,30,30	1.32	1 (4%)
2	NDP	D	301	-	45,52,52	0.67	1 (2%)	53,80,80	0.83	1 (1%)
3	QY8	D	302	-	11,12,12	2.68	4 (36%)	8,17,17	2.69	4 (50%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	AX8	A	303	-	-	2/4/4/4	0/3/3/3
2	NDP	A	301[A]	-	-	1/30/77/77	0/5/5/5
4	AX8	B	303	-	-	2/4/4/4	0/3/3/3
4	AX8	D	303	-	-	2/4/4/4	0/3/3/3
3	QY8	A	302	-	-	-	0/2/2/2
3	QY8	B	302	-	-	-	0/2/2/2
2	NDP	B	301	-	-	1/30/77/77	0/5/5/5
3	QY8	C	302	-	-	-	0/2/2/2
2	NDP	C	301[A]	-	-	1/30/77/77	0/5/5/5
6	GOL	B	305	-	-	2/4/4/4	-
4	AX8	C	303	-	-	2/4/4/4	0/3/3/3
2	NDP	D	301	-	-	2/30/77/77	0/5/5/5
3	QY8	D	302	-	-	-	0/2/2/2

All (36) bond length outliers are listed below:

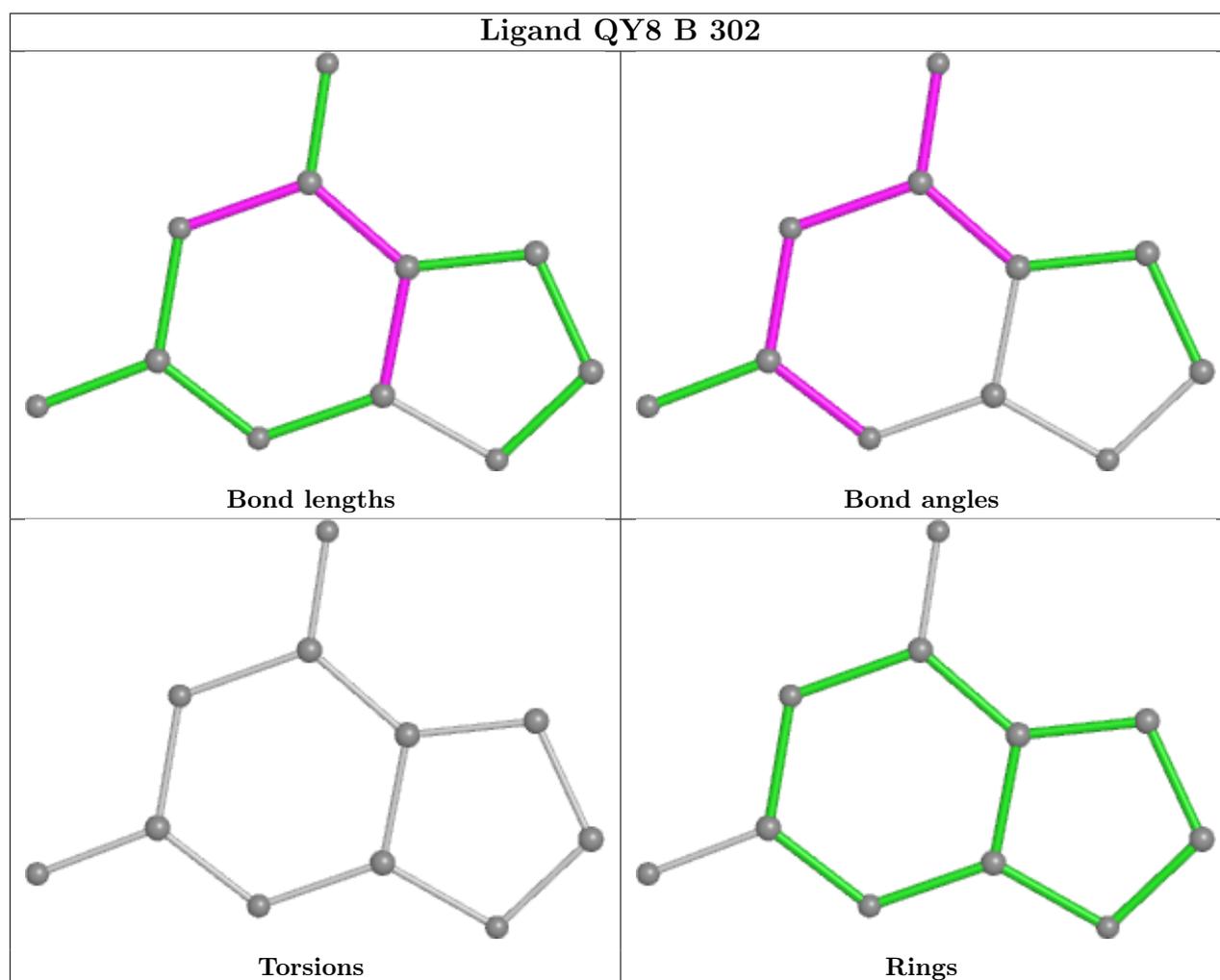| Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	302	QY8	C3-C6	-7.24	1.35	1.47
3	B	302	QY8	C3-C6	-6.45	1.36	1.47
3	A	302	QY8	C3-C6	-6.22	1.37	1.47
3	D	302	QY8	C3-C6	-6.02	1.37	1.47
4	A	303	AX8	CAN-CLAB	4.85	1.85	1.73
3	A	302	QY8	C3-C2	-4.61	1.35	1.42
3	B	302	QY8	C6-N4	4.56	1.44	1.37
3	C	302	QY8	C3-C2	-4.06	1.36	1.42
3	D	302	QY8	C3-C2	-3.88	1.36	1.42
4	A	303	AX8	CAK-CAM	-3.86	1.42	1.51
4	B	303	AX8	CAH-CAQ	-3.73	1.35	1.41
4	A	303	AX8	CAO-CLAC	3.71	1.82	1.73
4	C	303	AX8	CAH-CAQ	-3.67	1.35	1.41
4	B	303	AX8	CAO-CLAC	3.55	1.82	1.73
3	D	302	QY8	C6-N4	3.42	1.43	1.37
3	B	302	QY8	C3-C2	-3.31	1.37	1.42
4	A	303	AX8	CAH-CAQ	-3.27	1.36	1.41
3	C	302	QY8	C6-N4	3.25	1.42	1.37
2	A	301[A]	NDP	P2B-O2B	3.17	1.65	1.59
4	D	303	AX8	CAK-CAM	-3.17	1.43	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	303	AX8	CAH-CAQ	-3.10	1.36	1.41
4	C	303	AX8	CAN-CLAB	3.00	1.80	1.73
4	C	303	AX8	CAI-CAR	-2.99	1.35	1.41
4	B	303	AX8	CAK-CAM	-2.92	1.44	1.51
4	B	303	AX8	CAE-CAI	2.84	1.43	1.36
4	C	303	AX8	CAK-CAM	-2.78	1.44	1.51
3	D	302	QY8	C4-C5	-2.69	1.34	1.38
3	C	302	QY8	C4-C5	-2.60	1.34	1.38
4	A	303	AX8	CAR-CAQ	-2.34	1.35	1.40
4	A	303	AX8	CAI-CAR	-2.21	1.36	1.41
3	A	302	QY8	C4-C5	-2.13	1.35	1.38
4	D	303	AX8	CAI-CAR	-2.12	1.36	1.41
2	B	301	NDP	P2B-O2B	2.11	1.63	1.59
3	A	302	QY8	C1-N4	2.08	1.42	1.37
4	C	303	AX8	CAJ-CAO	2.06	1.42	1.38
2	D	301	NDP	P2B-O2B	2.02	1.63	1.59

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	302	QY8	C3-C6-N4	5.93	120.85	114.86
3	C	302	QY8	C3-C6-N4	5.42	120.33	114.86
3	D	302	QY8	C3-C6-N4	4.96	119.87	114.86
3	B	302	QY8	C3-C6-N4	4.57	119.47	114.86
4	A	303	AX8	CAM-CAK-NAS	-4.24	106.04	112.63
4	C	303	AX8	CAM-CAK-NAS	-4.18	106.14	112.63
4	A	303	AX8	CAK-NAS-CAP	3.66	131.50	125.02
3	C	302	QY8	C1-N4-C6	-3.63	118.41	125.10
3	A	302	QY8	C1-N4-C6	-3.51	118.64	125.10
4	D	303	AX8	CAM-CAK-NAS	-3.50	107.18	112.63
4	B	303	AX8	CAK-NAS-CAP	3.44	131.12	125.02
3	D	302	QY8	N4-C1-N2	-3.40	116.96	123.32
4	B	303	AX8	NAA-CAP-NAL	3.31	127.59	123.28
3	B	302	QY8	C1-N4-C6	-3.21	119.18	125.10
3	A	302	QY8	N4-C1-N2	-2.95	117.81	123.32
3	B	302	QY8	N4-C1-N2	-2.85	117.99	123.32
3	D	302	QY8	C1-N4-C6	-2.84	119.86	125.10
3	D	302	QY8	O1-C6-N4	-2.84	117.29	120.65
4	D	303	AX8	CAK-NAS-CAP	2.83	130.03	125.02
2	C	301[A]	NDP	C5A-C6A-N6A	2.72	124.49	120.35
3	A	302	QY8	O1-C6-N4	-2.56	117.63	120.65
2	D	301	NDP	C5A-C6A-N6A	2.53	124.20	120.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301[A]	NDP	O2B-P2B-O1X	-2.51	99.72	109.39
4	B	303	AX8	CAM-CAK-NAS	-2.50	108.74	112.63
2	B	301	NDP	C5A-C6A-N6A	2.40	124.00	120.35
2	A	301[A]	NDP	C5A-C6A-N6A	2.29	123.84	120.35
4	A	303	AX8	CAO-CAJ-CAM	2.29	122.01	120.46
3	C	302	QY8	N4-C1-N2	-2.28	119.06	123.32
3	C	302	QY8	O1-C6-N4	-2.10	118.17	120.65
3	B	302	QY8	O1-C6-N4	-2.09	118.18	120.65
4	B	303	AX8	CAD-CAE-CAI	-2.03	117.59	120.44

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	305	GOL	C1-C2-C3-O3
2	C	301[A]	NDP	O4D-C1D-N1N-C6N
6	B	305	GOL	O2-C2-C3-O3
2	B	301	NDP	O4D-C1D-N1N-C6N
2	D	301	NDP	O4D-C1D-N1N-C6N
4	C	303	AX8	NAS-CAK-CAM-CAF
4	D	303	AX8	NAS-CAK-CAM-CAF
4	C	303	AX8	NAS-CAK-CAM-CAJ
2	A	301[A]	NDP	O4D-C1D-N1N-C6N
4	A	303	AX8	NAS-CAK-CAM-CAF
4	D	303	AX8	NAS-CAK-CAM-CAJ
4	A	303	AX8	NAS-CAK-CAM-CAJ
4	B	303	AX8	NAS-CAK-CAM-CAF
4	B	303	AX8	NAS-CAK-CAM-CAJ
2	D	301	NDP	C2N-C3N-C7N-N7N

There are no ring outliers.

8 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	303	AX8	1	0
3	B	302	QY8	1	0
3	C	302	QY8	1	0
2	B	301	NDP	3	0
4	D	303	AX8	2	0
2	C	301[A]	NDP	2	0
4	C	303	AX8	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	301	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 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 AX8 A 303

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP A 301 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand QY8 B 302

Bond lengths

Bond angles

Torsions

Rings

Ligand QY8 C 302

Bond lengths

Bond angles

Torsions

Rings

Ligand QY8 A 302

Bond lengths

Bond angles

Torsions

Rings

Ligand AX8 B 303

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP B 301

Bond lengths

Bond angles

Torsions

Rings

Ligand AX8 D 303

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP C 301 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand AX8 C 303

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP D 301

Bond lengths

Bond angles

Torsions

Rings

Full wwPDB X-ray Structure Validation Report

Ligand QY8 D 302

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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(Å²)	Q<0.9
1	A	249/288 (86%)	-0.41	1 (0%)	89	90	12, 20, 36, 55	14 (5%)
1	B	248/288 (86%)	-0.53	2 (0%)	82	84	9, 17, 28, 52	22 (8%)
1	C	239/288 (82%)	-0.33	3 (1%)	74	76	11, 21, 36, 43	20 (8%)
1	D	249/288 (86%)	-0.36	3 (1%)	76	78	10, 19, 40, 75	18 (7%)
All	All	985/1152 (85%)	-0.41	9 (0%)	81	82	9, 19, 35, 75	74 (7%)

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	221	TRP	3.8
1	C	209	LEU	3.2
1	D	210	PRO	3.0
1	D	211	VAL	2.9
1	B	211	VAL	2.7
1	B	212	ALA	2.6
1	D	213	MET	2.5
1	A	221	TRP	2.2
1	C	219	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 ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

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
3	QY8	D	302	11/11	0.79	0.13	26,31,34,36	11
3	QY8	C	302	11/11	0.83	0.12	35,37,39,40	11
6	GOL	B	305	6/6	0.84	0.13	34,39,41,43	0
4	AX8	A	303	19/19	0.89	0.11	19,26,33,34	19
3	QY8	A	302	11/11	0.89	0.09	23,30,33,36	0
3	QY8	B	302	11/11	0.90	0.09	22,25,28,28	0
4	AX8	B	303	19/19	0.91	0.10	18,24,30,33	0
4	AX8	D	303	19/19	0.91	0.10	16,22,30,34	19
2	NDP	C	301[A]	48/48	0.91	0.10	24,31,40,41	48
5	ACT	A	304	4/4	0.93	0.10	31,32,36,39	0
4	AX8	C	303	19/19	0.93	0.09	20,25,31,31	19
2	NDP	B	301	48/48	0.96	0.07	16,21,26,27	0
5	ACT	B	304	4/4	0.96	0.06	23,23,23,25	0
2	NDP	A	301[A]	48/48	0.96	0.07	19,23,26,28	0
2	NDP	D	301	48/48	0.97	0.06	16,23,28,29	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 QY8 D 302:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
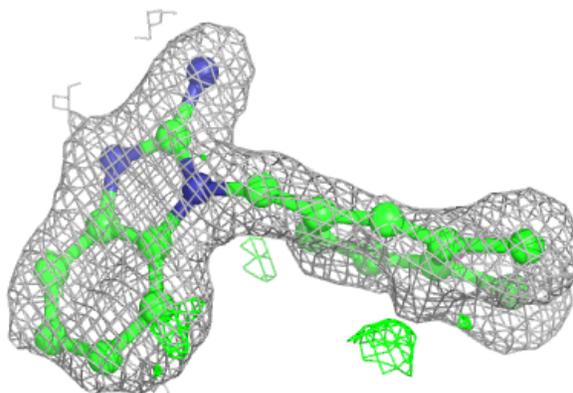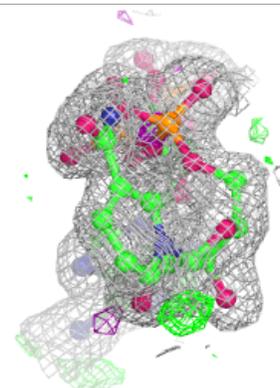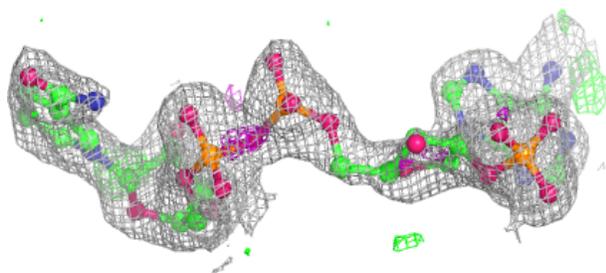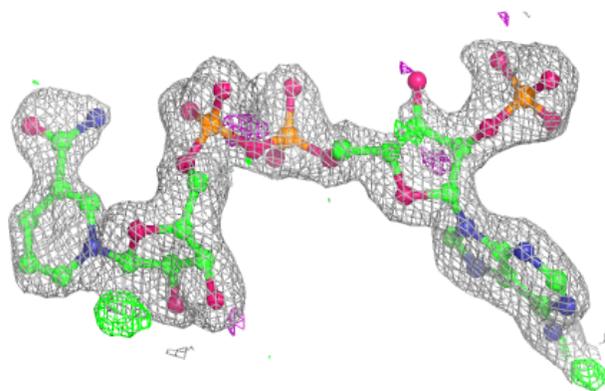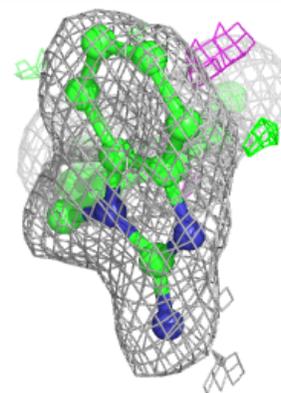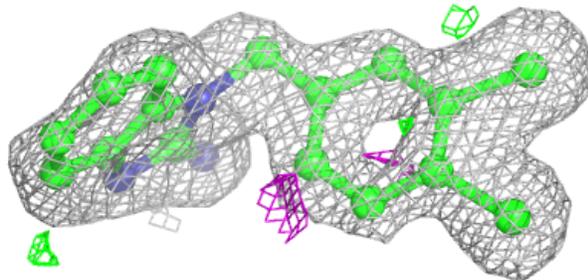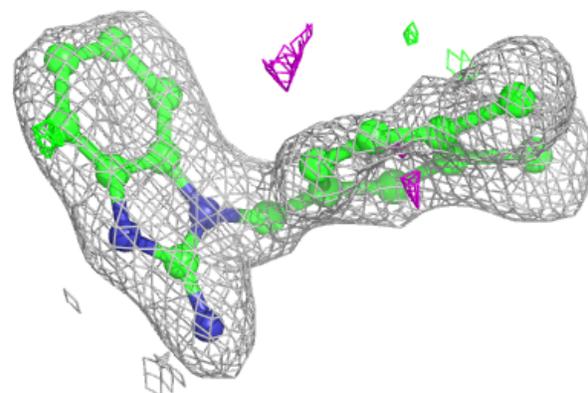$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
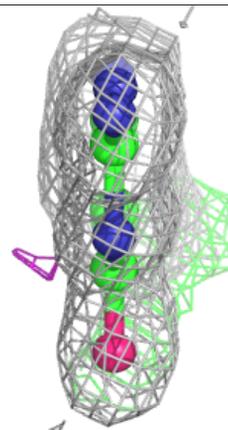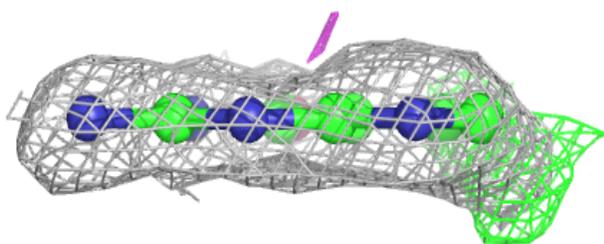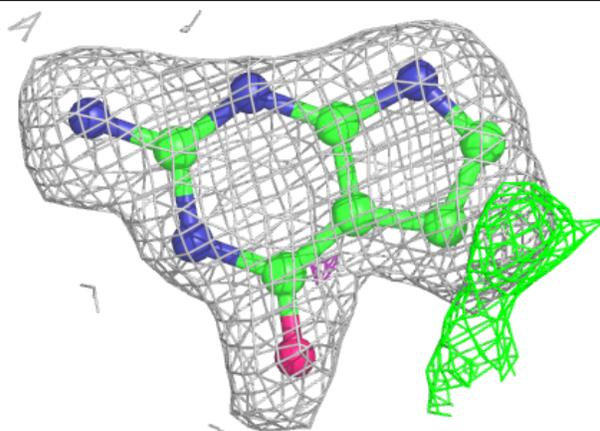
Electron density around QY8 C 302:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
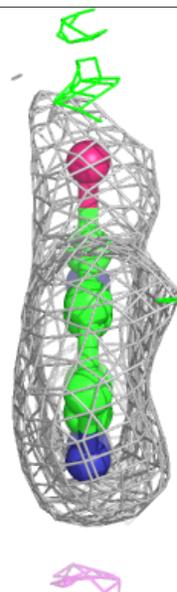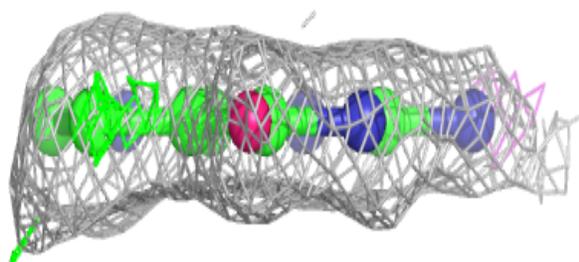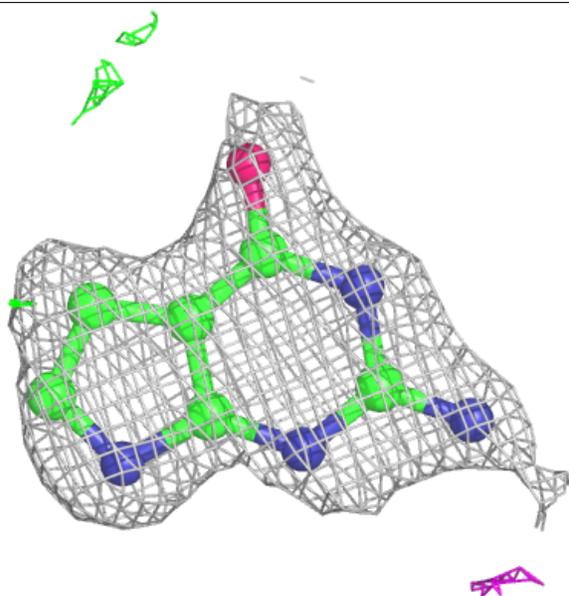
Electron density around AX8 A 303:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
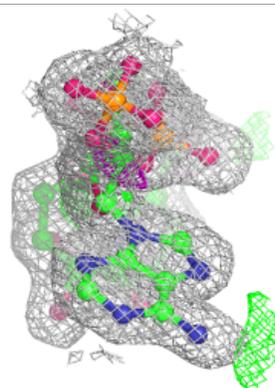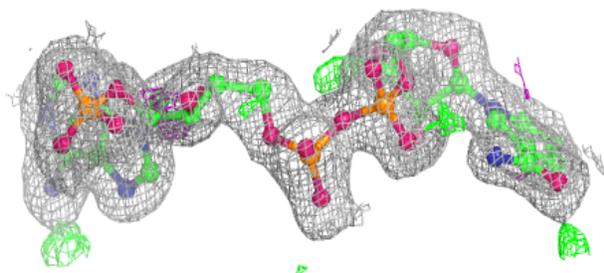$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
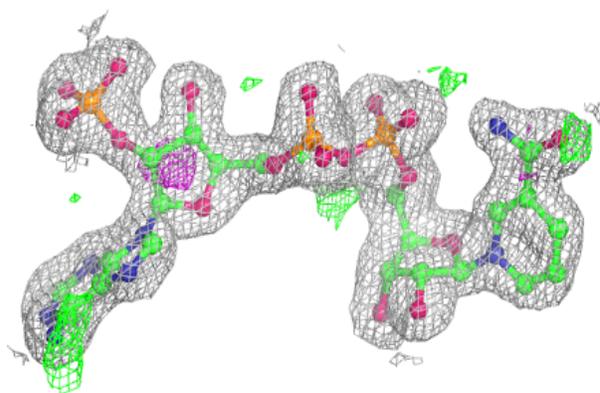and green (positive)
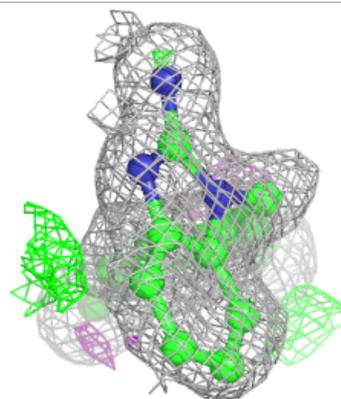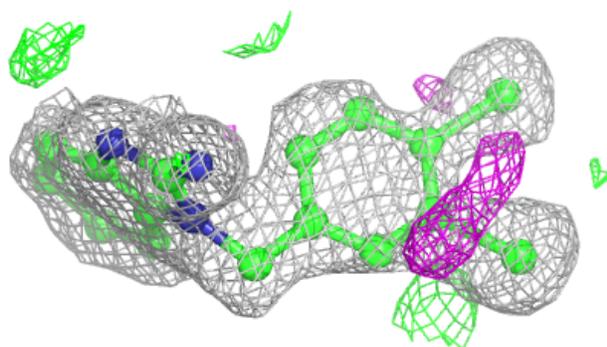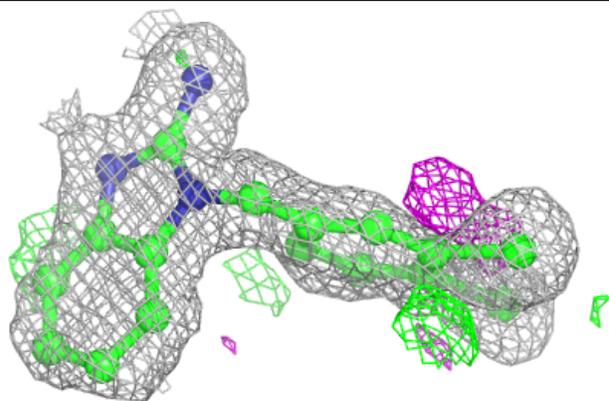
Electron density around QY8 A 302:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
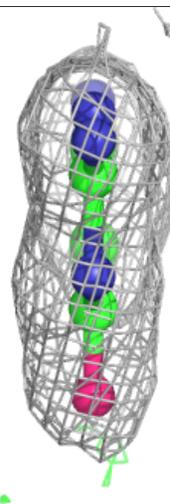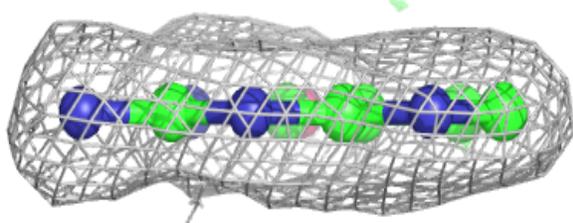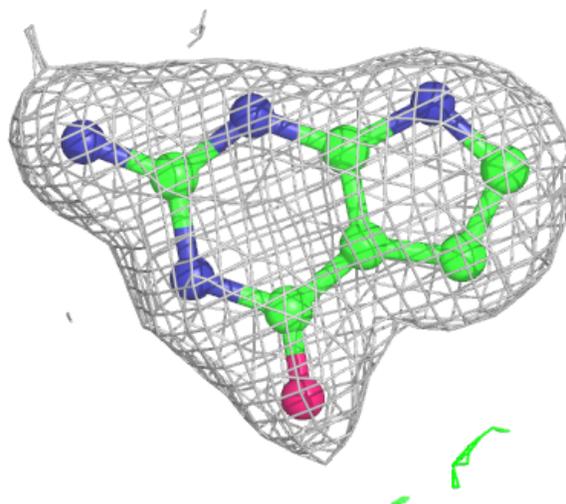
Electron density around QY8 B 302:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
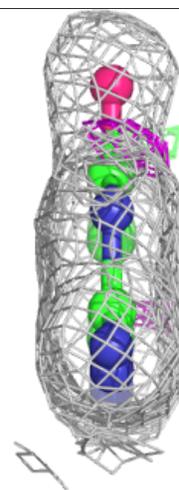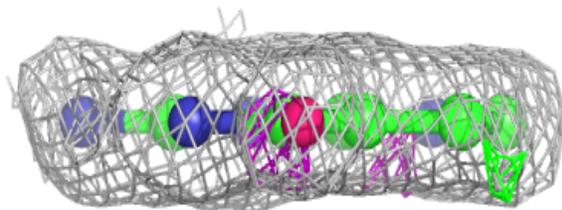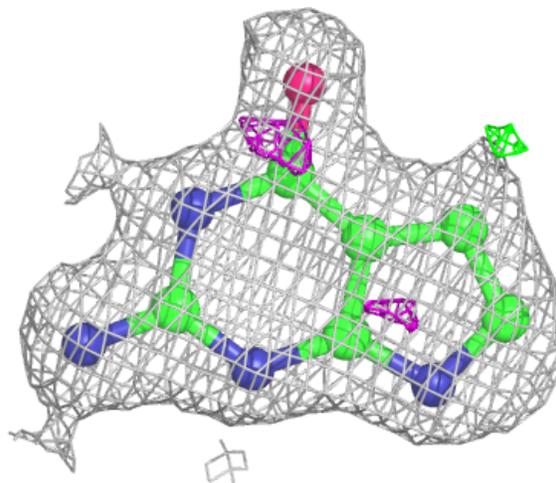
Electron density around AX8 B 303:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
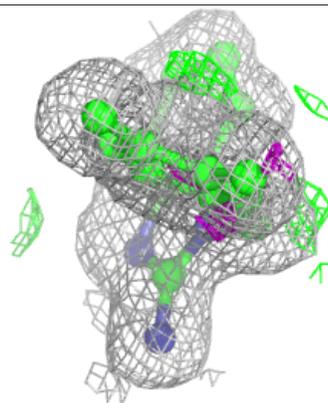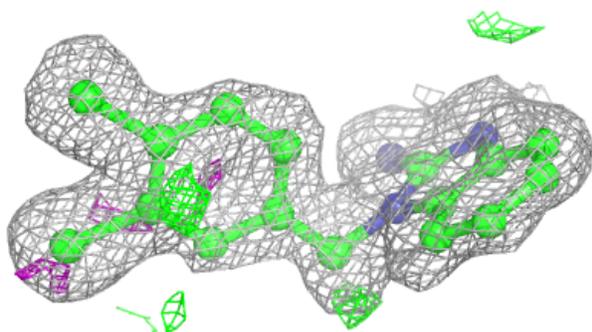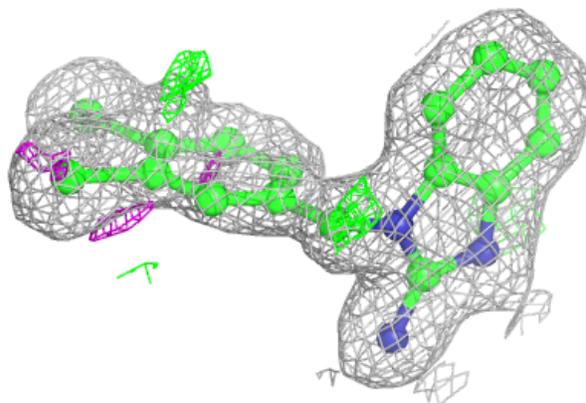
Electron density around AX8 D 303:

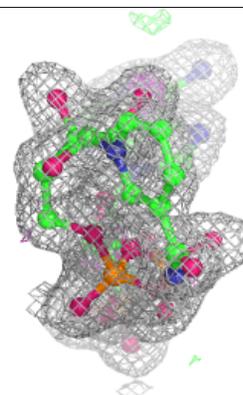2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
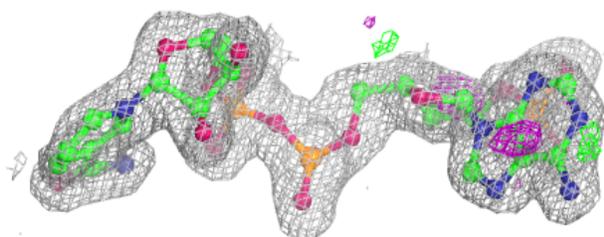mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
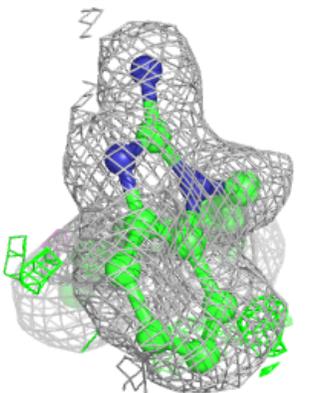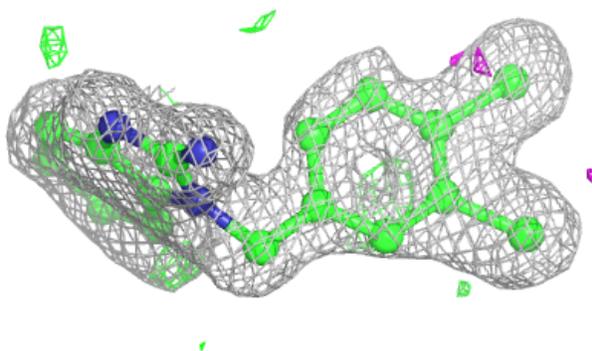
Electron density around NDP C 301 (A):

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

Electron density around AX8 C 303:

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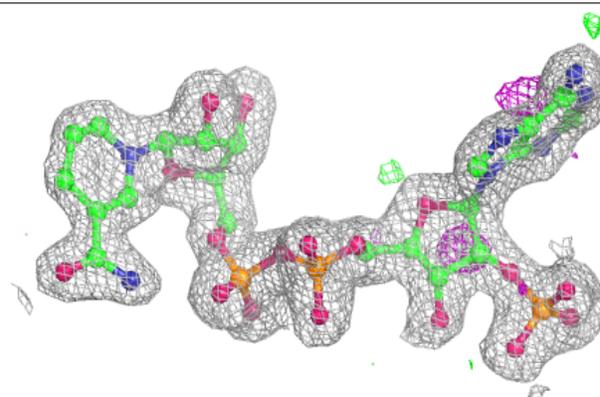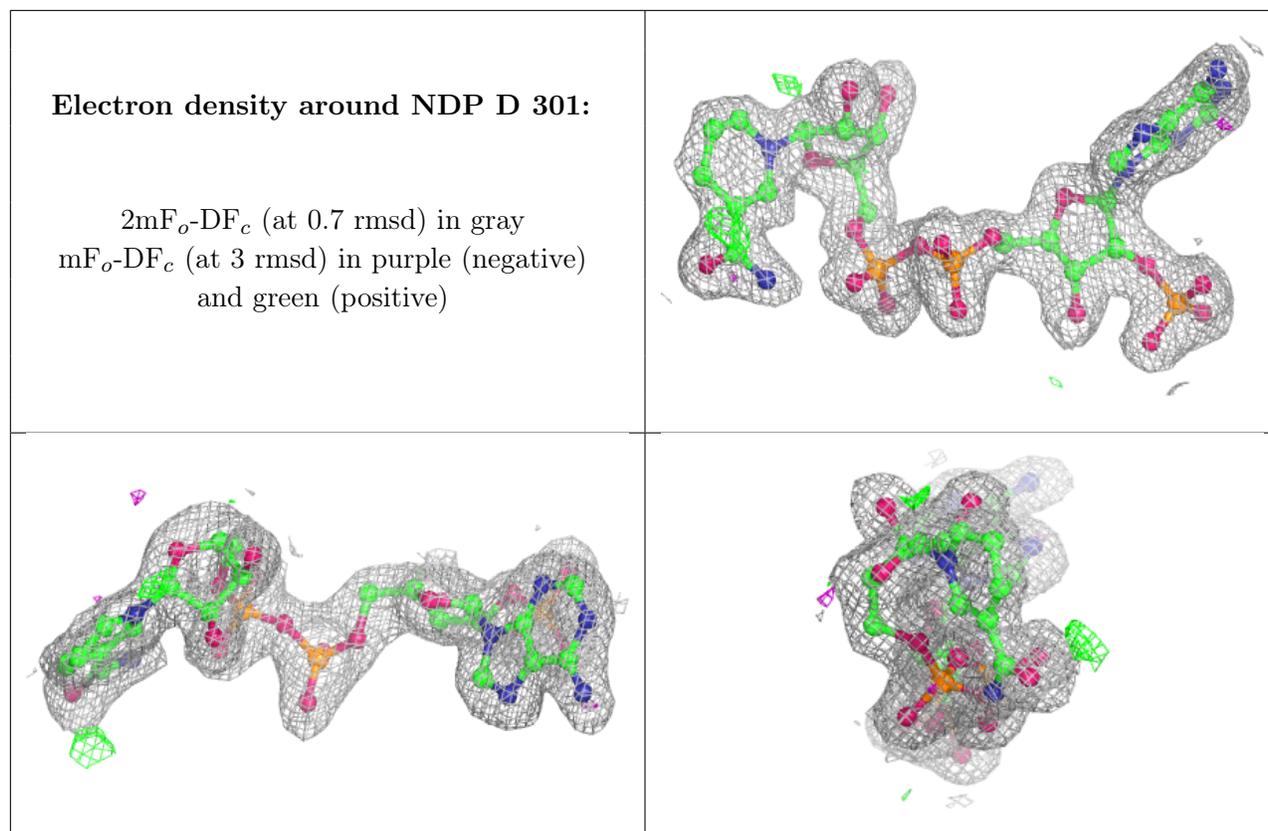and green (positive)

Electron density around NDP B 301:

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

Electron density around NDP A 301 (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 NDP D 301:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.