



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 31, 2022 – 01:20 pm BST

PDB ID : 7PXX
Title : The crystal structure of Leishmania major Pteridine Reductase 1 in complex with substrate folic acid
Authors : Di Pisa, F.; Dello Iacono, L.; Mangani, S.
Deposited on : 2021-10-08
Resolution : 1.81 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.27
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0267
CCP4 : 7.1.010 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.27

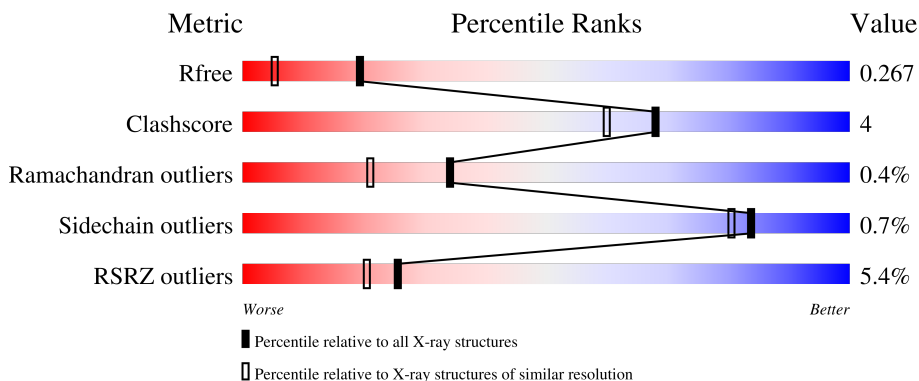
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.81 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}	130704	7484 (1.84-1.80)
Clashscore	141614	8401 (1.84-1.80)
Ramachandran outliers	138981	8290 (1.84-1.80)
Sidechain outliers	138945	8290 (1.84-1.80)
RSRZ outliers	127900	7371 (1.84-1.80)

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	288	
2	B	288	
2	C	288	
2	D	288	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
7	PEG	B	307	-	-	X	-

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 8645 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 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	264	1987	1263	351	363	10	8	8	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	162	VAL	PHE	conflict	UNP Q01782

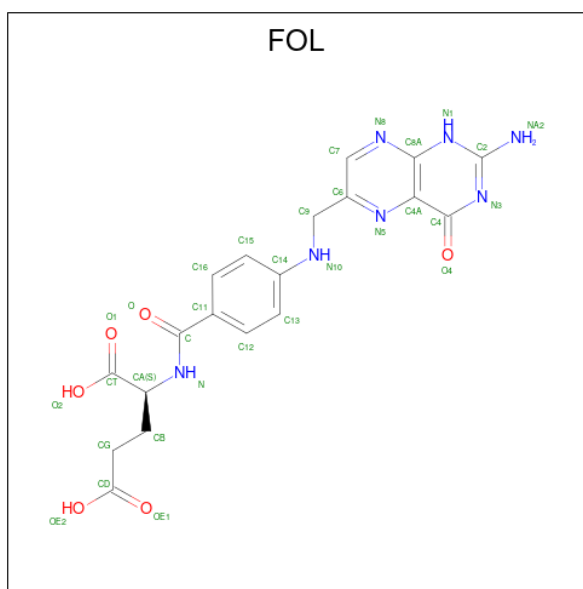
- Molecule 2 is a protein called Pteridine reductase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	265	1954	1237	345	360	12	5	4	0
2	C	253	1862	1177	329	347	9	0	2	0
2	D	252	1849	1166	327	347	9	0	1	0

There are 3 discrepancies between the modelled and reference sequences:

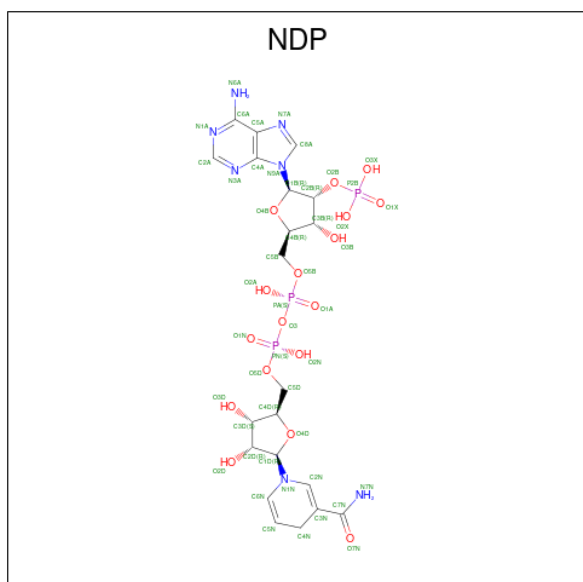
Chain	Residue	Modelled	Actual	Comment	Reference
B	162	VAL	PHE	conflict	UNP Q01782
C	162	VAL	PHE	conflict	UNP Q01782
D	162	VAL	PHE	conflict	UNP Q01782

- Molecule 3 is FOLIC ACID (three-letter code: FOL) (formula: $C_{19}H_{19}N_7O_6$) (labeled as "Ligand of Interest" by depositor).



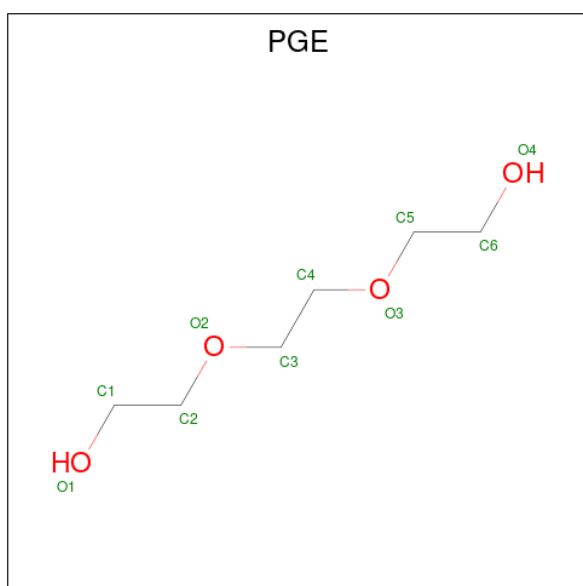
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
3	A	1	Total	C	N	O	0	0
			32	19	7	6		
3	B	1	Total	C	N	O	0	0
			32	19	7	6		
3	C	1	Total	C	N	O	0	0
			32	19	7	6		
3	D	1	Total	C	N	O	0	0
			32	19	7	6		

- Molecule 4 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 5 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: C₆H₁₄O₄).



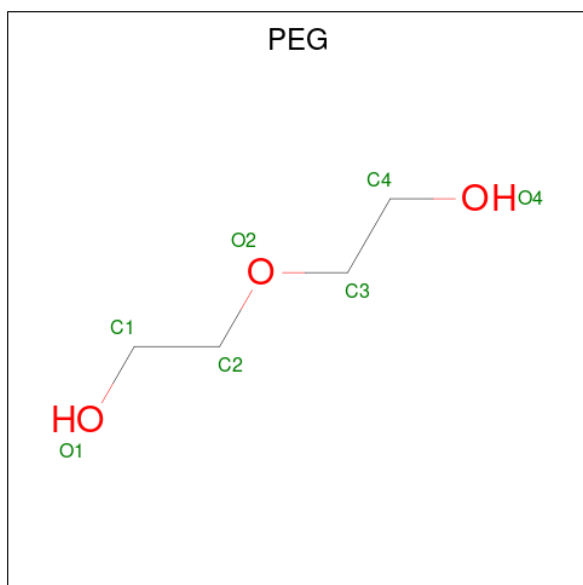
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	A	1	10	6	4	0	0
5	B	1	10	6	4	0	0

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 7 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	C	O	0	0
			7	4	3		

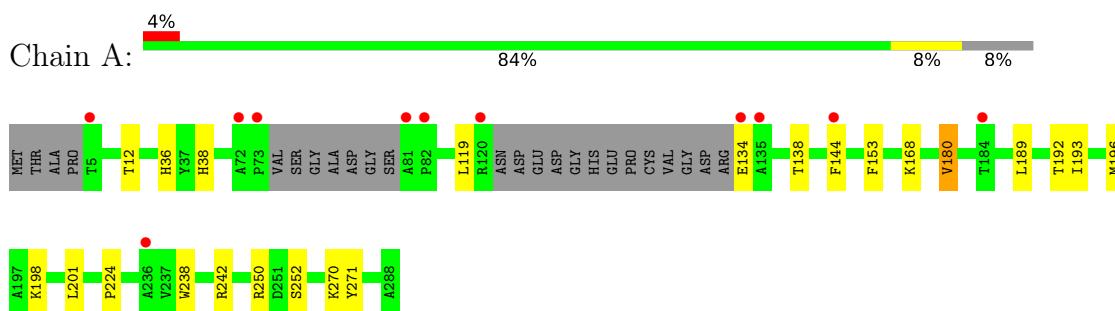
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	200	Total	O	0	0
			200	200		
8	B	152	Total	O	0	0
			152	152		
8	C	157	Total	O	0	0
			157	157		
8	D	113	Total	O	0	0
			113	113		

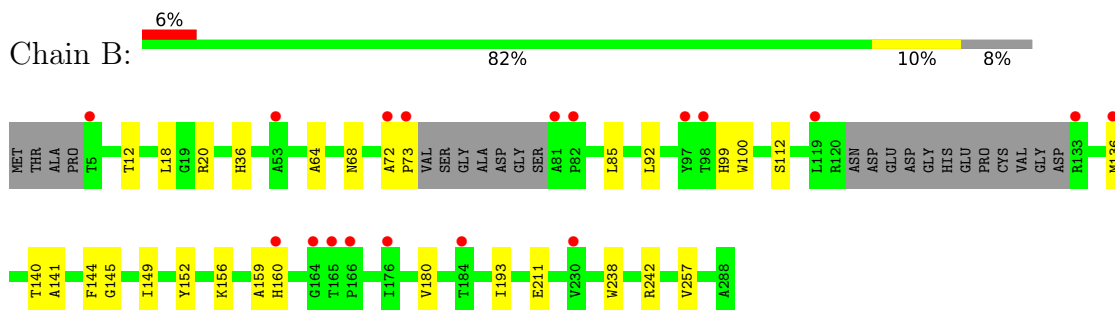
3 Residue-property plots [i](#)

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

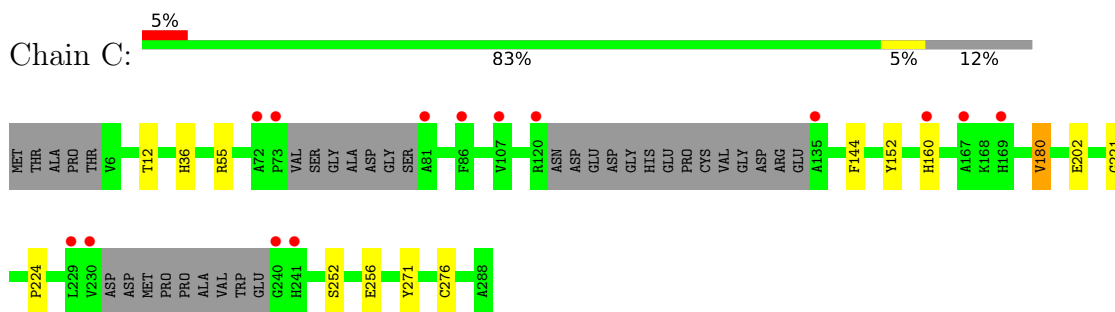
- Molecule 1: Pteridine reductase 1



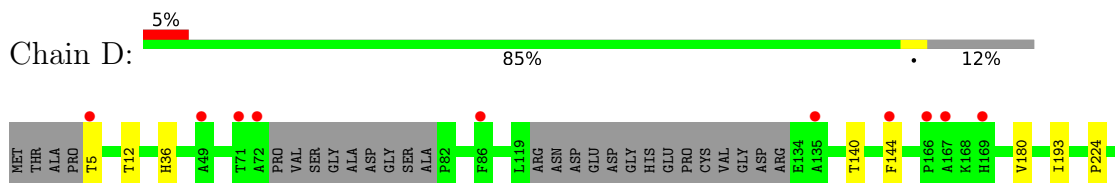
- Molecule 2: Pteridine reductase 1



- Molecule 2: Pteridine reductase 1



- Molecule 2: Pteridine reductase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	94.90Å 103.75Å 136.79Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.49 – 1.81 32.49 – 1.81	Depositor EDS
% Data completeness (in resolution range)	99.8 (32.49-1.81) 99.9 (32.49-1.81)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.34 (at 1.80Å)	Xtrriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.227 , 0.267 0.227 , 0.267	Depositor DCC
R_{free} test set	6126 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	18.2	Xtrriage
Anisotropy	0.129	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	8645	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 32.98 % 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 8.6085e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: FOL, PEG, GOL, CSX, PGE, NDP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.41	0/2042	0.57	0/2782
2	B	0.36	0/1997	0.54	0/2723
2	C	0.36	0/1892	0.54	0/2575
2	D	0.34	0/1875	0.53	0/2550
All	All	0.37	0/7806	0.55	0/10630

There are no bond length outliers.

There are no bond angle outliers.

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	1987	0	2020	20	0
2	B	1954	0	1944	27	0
2	C	1862	0	1862	9	0
2	D	1849	0	1846	5	0
3	A	32	0	17	1	0
3	B	32	0	17	2	0
3	C	32	0	17	1	0
3	D	32	0	17	1	0
4	A	48	0	26	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	48	0	26	3	0
4	C	48	0	26	2	0
4	D	48	0	26	3	0
5	A	10	0	14	2	0
5	B	10	0	14	2	0
6	B	18	0	24	4	0
6	D	6	0	8	0	0
7	B	7	0	10	5	0
8	A	200	0	0	2	3
8	B	152	0	0	4	3
8	C	157	0	0	1	0
8	D	113	0	0	1	0
All	All	8645	0	7914	61	3

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 (61) 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:B:72:ALA:H	6:B:304:GOL:H2	1.42	0.83
2:B:144:PHE:HB2	7:B:307:PEG:H11	1.68	0.75
1:A:250:ARG:HH21	5:A:303:PGE:H3	1.55	0.71
2:D:5:THR:N	8:D:401:HOH:O	2.25	0.69
2:B:12:THR:HA	2:B:36:HIS:HB3	1.72	0.69
3:B:301:FOL:C7	4:B:302:NDP:H41N	2.25	0.67
3:C:301:FOL:C7	4:C:302:NDP:H41N	2.28	0.63
2:C:12:THR:HA	2:C:36:HIS:HB3	1.79	0.63
2:B:72:ALA:N	6:B:304:GOL:H2	2.12	0.61
3:A:301:FOL:C7	4:A:302:NDP:H41N	2.31	0.61
2:B:156:LYS:HZ1	6:B:306:GOL:H31	1.66	0.60
1:A:198[B]:LYS:HZ1	1:A:201:LEU:HD23	1.68	0.58
5:A:303:PGE:H6	8:A:566:HOH:O	2.04	0.58
2:B:156:LYS:NZ	8:B:405:HOH:O	2.38	0.57
2:C:55:ARG:NH1	8:C:401:HOH:O	2.36	0.57
3:D:301:FOL:C7	4:D:302:NDP:H41N	2.34	0.57
1:A:189:LEU:HD11	5:B:303:PGE:H22	1.88	0.56
1:A:180:VAL:HA	1:A:198[B]:LYS:HZ1	1.70	0.55
1:A:180:VAL:HA	1:A:198[B]:LYS:NZ	2.22	0.54
1:A:198[B]:LYS:NZ	1:A:201:LEU:HD23	2.23	0.54
2:B:99:HIS:HD2	2:B:100:TRP:CE2	2.26	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:224:PRO:HB2	4:D:302:NDP:H42N	1.91	0.53
1:A:168:LYS:HG3	8:A:558:HOH:O	2.11	0.51
2:B:20:ARG:NH1	8:B:406:HOH:O	2.39	0.51
1:A:192:THR:O	1:A:196:MET:HG3	2.11	0.50
1:A:270:LYS:NZ	2:C:256:GLU:OE2	2.37	0.49
1:A:193:ILE:HD11	2:B:152:TYR:CE2	2.47	0.49
2:B:36:HIS:CD2	2:B:92:LEU:HD21	2.48	0.48
2:B:18:LEU:HD13	2:B:257:VAL:HG11	1.96	0.48
1:A:224:PRO:HB2	4:A:302:NDP:H42N	1.94	0.48
1:A:134:GLU:O	1:A:138:THR:HG23	2.15	0.47
1:A:271:TYR:CE2	2:C:252:SER:HB3	2.50	0.47
2:B:72:ALA:HB1	2:B:73:PRO:HD2	1.98	0.46
2:B:238:TRP:O	2:B:242:ARG:HG3	2.16	0.46
2:D:12:THR:HA	2:D:36:HIS:HB3	1.97	0.46
2:D:140:THR:O	2:D:144:PHE:HB2	2.16	0.46
2:B:141:ALA:HA	7:B:307:PEG:H32	1.98	0.45
2:B:112[B]:SER:OG	8:B:401:HOH:O	2.11	0.45
2:B:144:PHE:CE2	2:B:193:ILE:HG23	2.51	0.45
1:A:153:PHE:HE1	2:B:136:MET:HE2	1.82	0.44
2:B:211:GLU:HG3	5:B:303:PGE:H3	2.00	0.44
4:B:302:NDP:O5D	4:B:302:NDP:H2N	2.19	0.43
1:A:12:THR:HA	1:A:36:HIS:HB3	2.00	0.42
4:D:302:NDP:H2N	4:D:302:NDP:O5D	2.19	0.42
1:A:38:HIS:HB3	4:A:302:NDP:O2X	2.19	0.42
2:B:68:ASN:HB3	7:B:307:PEG:H32	2.01	0.42
2:B:145:GLY:HA2	2:B:149:ILE:HB	2.02	0.42
2:B:72:ALA:HB3	6:B:304:GOL:O2	2.19	0.41
1:A:193:ILE:HD11	2:B:152:TYR:CD2	2.55	0.41
2:B:141:ALA:HB2	7:B:307:PEG:H42	2.01	0.41
2:C:224:PRO:HB2	4:C:302:NDP:H42N	2.02	0.41
1:A:119:LEU:HD21	2:B:159:ALA:HB1	2.02	0.41
2:C:180:VAL:HG11	2:C:202:GLU:HG2	2.02	0.41
2:B:140:THR:HG22	7:B:307:PEG:O1	2.20	0.41
1:A:252:SER:HB3	2:C:271:TYR:CE2	2.56	0.41
3:B:301:FOL:C6	4:B:302:NDP:H41N	2.51	0.41
2:C:152:TYR:CD2	2:D:193:ILE:HD11	2.56	0.41
1:A:238:TRP:CZ2	1:A:242:ARG:HD2	2.55	0.40
2:B:156:LYS:NZ	8:B:411:HOH:O	2.45	0.40
2:B:64:ALA:HB2	2:B:92:LEU:HD11	2.02	0.40
2:C:221:GLY:HA3	2:C:276:CSX:OD	2.21	0.40

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:A:469:HOH:O	8:B:524:HOH:O[4_455]	2.15	0.05
8:A:535:HOH:O	8:B:431:HOH:O[4_455]	2.15	0.05
8:A:488:HOH:O	8:B:456:HOH:O[4_455]	2.17	0.03

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	265/288 (92%)	253 (96%)	11 (4%)	1 (0%)	34	21
2	B	262/288 (91%)	245 (94%)	16 (6%)	1 (0%)	34	21
2	C	246/288 (85%)	235 (96%)	10 (4%)	1 (0%)	34	21
2	D	244/288 (85%)	232 (95%)	11 (4%)	1 (0%)	34	21
All	All	1017/1152 (88%)	965 (95%)	48 (5%)	4 (0%)	34	21

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	180	VAL
2	B	180	VAL
2	C	180	VAL
2	D	180	VAL

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	206/222 (93%)	205 (100%)	1 (0%)	88	87
2	B	197/222 (89%)	195 (99%)	2 (1%)	76	70
2	C	188/222 (85%)	186 (99%)	2 (1%)	73	67
2	D	187/222 (84%)	187 (100%)	0	100	100
All	All	778/888 (88%)	773 (99%)	5 (1%)	84	83

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	144	PHE
2	B	85	LEU
2	B	160	HIS
2	C	144	PHE
2	C	160	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues 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	CSX	D	276	2	3,6,7	0.73	0	1,6,8	0.49	0
2	CSX	C	276	2	3,6,7	0.84	0	1,6,8	0.12	0
1	CSX	A	34	1	3,6,7	1.19	0	1,6,8	0.18	0
2	CSX	B	276	2	3,6,7	0.71	0	1,6,8	0.96	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	CSX	D	276	2	-	0/1/5/7	-
2	CSX	C	276	2	-	0/1/5/7	-
1	CSX	A	34	1	-	0/1/5/7	-
2	CSX	B	276	2	-	0/1/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	276	CSX	1	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

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
3	FOL	A	301	-	28,34,34	1.29	3 (10%)	36,47,47	2.02	8 (22%)
5	PGE	B	303	-	9,9,9	0.34	0	8,8,8	0.45	0
4	NDP	A	302	-	45,52,52	2.09	6 (13%)	53,80,80	1.48	10 (18%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	FOL	B	301	-	28,34,34	1.26	3 (10%)	36,47,47	2.19	9 (25%)
6	GOL	B	304	-	5,5,5	0.88	0	5,5,5	0.91	0
6	GOL	B	306	-	5,5,5	0.79	0	5,5,5	0.89	0
4	NDP	B	302	-	45,52,52	2.28	7 (15%)	53,80,80	1.47	9 (16%)
3	FOL	C	301	-	28,34,34	1.27	3 (10%)	36,47,47	2.17	8 (22%)
4	NDP	C	302	-	45,52,52	2.06	5 (11%)	53,80,80	1.48	9 (16%)
3	FOL	D	301	-	28,34,34	1.38	3 (10%)	36,47,47	2.08	9 (25%)
6	GOL	B	305	-	5,5,5	0.92	0	5,5,5	0.96	0
5	PGE	A	303	-	9,9,9	0.33	0	8,8,8	0.27	0
6	GOL	D	303	-	5,5,5	0.84	0	5,5,5	0.98	0
7	PEG	B	307	-	6,6,6	0.43	0	5,5,5	0.40	0
4	NDP	D	302	-	45,52,52	2.35	6 (13%)	53,80,80	1.55	10 (18%)

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	FOL	A	301	-	-	4/16/22/22	0/3/3/3
5	PGE	B	303	-	-	4/7/7/7	-
4	NDP	A	302	-	-	3/30/77/77	0/5/5/5
3	FOL	B	301	-	-	4/16/22/22	0/3/3/3
6	GOL	B	304	-	-	2/4/4/4	-
6	GOL	B	306	-	-	0/4/4/4	-
4	NDP	B	302	-	-	4/30/77/77	0/5/5/5
3	FOL	C	301	-	-	3/16/22/22	0/3/3/3
4	NDP	C	302	-	-	4/30/77/77	0/5/5/5
3	FOL	D	301	-	-	4/16/22/22	0/3/3/3
6	GOL	B	305	-	-	2/4/4/4	-
5	PGE	A	303	-	-	4/7/7/7	-
6	GOL	D	303	-	-	1/4/4/4	-
7	PEG	B	307	-	-	4/4/4/4	-
4	NDP	D	302	-	-	4/30/77/77	0/5/5/5

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	302	NDP	P2B-O2B	13.31	1.84	1.59
4	B	302	NDP	P2B-O2B	12.17	1.82	1.59
4	A	302	NDP	P2B-O2B	11.06	1.80	1.59
4	C	302	NDP	P2B-O2B	10.69	1.79	1.59
4	B	302	NDP	PN-O5D	4.63	1.78	1.59
3	D	301	FOL	C4A-C4	4.35	1.48	1.41
4	C	302	NDP	PN-O5D	4.22	1.76	1.59
4	D	302	NDP	PN-O5D	4.10	1.75	1.59
3	D	301	FOL	C4A-C8A	4.04	1.48	1.40
3	A	301	FOL	C4A-C4	3.90	1.48	1.41
3	B	301	FOL	C4A-C4	3.79	1.47	1.41
3	B	301	FOL	C4A-C8A	3.71	1.47	1.40
3	A	301	FOL	C4A-C8A	3.71	1.47	1.40
4	A	302	NDP	C3B-C2B	3.65	1.61	1.52
3	C	301	FOL	C4A-C8A	3.46	1.47	1.40
3	C	301	FOL	C4A-C4	3.46	1.47	1.41
4	A	302	NDP	O2B-C2B	-3.05	1.33	1.44
4	A	302	NDP	PN-O5D	2.90	1.71	1.59
4	C	302	NDP	O2B-C2B	-2.69	1.34	1.44
4	D	302	NDP	C7N-N7N	2.62	1.40	1.33
4	D	302	NDP	O2B-C2B	-2.61	1.34	1.44
4	B	302	NDP	O2B-C2B	-2.60	1.34	1.44
4	B	302	NDP	C7N-N7N	2.38	1.39	1.33
4	A	302	NDP	C2A-N1A	2.38	1.38	1.33
4	C	302	NDP	O4B-C1B	2.35	1.44	1.41
4	B	302	NDP	O2D-C2D	-2.35	1.37	1.43
4	B	302	NDP	O5B-C5B	-2.27	1.36	1.44
4	D	302	NDP	O4B-C1B	2.27	1.44	1.41
4	B	302	NDP	C4A-N3A	2.27	1.38	1.35
3	B	301	FOL	C7-N8	2.26	1.35	1.31
4	C	302	NDP	C7N-N7N	2.25	1.39	1.33
3	C	301	FOL	C7-N8	2.24	1.35	1.31
4	A	302	NDP	C7N-N7N	2.24	1.39	1.33
4	D	302	NDP	C3B-C2B	2.18	1.57	1.52
3	D	301	FOL	C6-N5	2.17	1.36	1.32
3	A	301	FOL	C7-N8	2.01	1.35	1.31

All (72) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	301	FOL	N8-C8A-N1	6.95	123.75	115.82
3	C	301	FOL	N8-C8A-N1	6.46	123.20	115.82
3	C	301	FOL	C2-N1-C8A	5.97	122.18	115.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	301	FOL	N8-C8A-N1	5.88	122.53	115.82
3	D	301	FOL	N8-C8A-N1	5.45	122.04	115.82
4	D	302	NDP	PN-O3-PA	-5.40	114.30	132.83
3	B	301	FOL	C2-N1-C8A	5.38	121.50	115.36
3	D	301	FOL	C2-N1-C8A	5.08	121.16	115.36
3	A	301	FOL	C2-N1-C8A	4.59	120.60	115.36
3	D	301	FOL	C4A-C4-N3	-4.57	117.18	123.43
4	A	302	NDP	PN-O3-PA	-4.56	117.19	132.83
4	C	302	NDP	PN-O3-PA	-4.30	118.06	132.83
3	A	301	FOL	C4A-C4-N3	-4.22	117.66	123.43
4	B	302	NDP	PN-O3-PA	-4.16	118.55	132.83
3	B	301	FOL	C4A-C4-N3	-4.13	117.78	123.43
3	A	301	FOL	C8A-C4A-C4	-4.06	117.27	119.95
3	C	301	FOL	N1-C2-N3	-3.98	121.91	127.22
3	B	301	FOL	C2-N3-C4	3.89	122.11	115.93
3	D	301	FOL	C2-N3-C4	3.89	122.10	115.93
4	C	302	NDP	O2B-P2B-O1X	-3.83	94.60	109.39
3	C	301	FOL	C8A-C4A-C4	-3.81	117.43	119.95
3	A	301	FOL	C2-N3-C4	3.79	121.96	115.93
3	C	301	FOL	C4A-C4-N3	-3.72	118.34	123.43
3	D	301	FOL	C8A-C4A-C4	-3.71	117.50	119.95
3	B	301	FOL	C8A-C4A-C4	-3.70	117.50	119.95
4	B	302	NDP	O2B-P2B-O1X	-3.59	95.54	109.39
3	B	301	FOL	N1-C2-N3	-3.57	122.46	127.22
3	C	301	FOL	C2-N3-C4	3.57	121.60	115.93
3	D	301	FOL	C4-C4A-N5	3.49	122.58	118.60
4	A	302	NDP	O2B-P2B-O1X	-3.45	96.08	109.39
4	D	302	NDP	O2B-P2B-O1X	-3.26	96.83	109.39
3	D	301	FOL	N1-C2-N3	-3.02	123.19	127.22
3	A	301	FOL	N1-C2-N3	-3.00	123.22	127.22
4	D	302	NDP	PN-O5D-C5D	-2.99	104.15	121.68
3	B	301	FOL	C7-N8-C8A	2.79	119.50	116.69
4	A	302	NDP	O5D-PN-O1N	-2.75	98.32	109.07
3	C	301	FOL	C7-N8-C8A	2.73	119.44	116.69
3	C	301	FOL	C4-C4A-N5	2.71	121.70	118.60
4	B	302	NDP	PN-O5D-C5D	-2.68	105.96	121.68
4	C	302	NDP	PA-O5B-C5B	-2.67	106.03	121.68
4	D	302	NDP	O3X-P2B-O2X	2.57	117.44	107.64
3	B	301	FOL	C4-C4A-N5	2.55	121.52	118.60
3	A	301	FOL	C4-C4A-N5	2.55	121.51	118.60
3	D	301	FOL	C7-N8-C8A	2.52	119.22	116.69
3	A	301	FOL	C7-N8-C8A	2.49	119.20	116.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	302	NDP	O3X-P2B-O2X	2.49	117.16	107.64
4	D	302	NDP	PA-O5B-C5B	-2.49	107.08	121.68
4	B	302	NDP	PA-O5B-C5B	-2.43	107.45	121.68
4	C	302	NDP	O3X-P2B-O2X	2.42	116.90	107.64
4	A	302	NDP	C2D-C1D-N1N	-2.42	107.25	113.30
4	A	302	NDP	O2N-PN-O1N	2.38	123.98	112.24
4	B	302	NDP	C2A-N1A-C6A	-2.36	114.72	118.75
4	A	302	NDP	PA-O5B-C5B	-2.35	107.89	121.68
4	A	302	NDP	O7N-C7N-N7N	-2.34	117.40	122.88
4	A	302	NDP	C2A-N1A-C6A	-2.33	114.77	118.75
4	B	302	NDP	C2D-C1D-N1N	-2.31	107.53	113.30
4	C	302	NDP	C3N-C2N-N1N	-2.30	119.81	123.10
4	A	302	NDP	O3X-P2B-O2X	2.30	116.42	107.64
4	A	302	NDP	PN-O5D-C5D	-2.28	108.32	121.68
4	C	302	NDP	O5D-PN-O1N	-2.27	100.19	109.07
4	C	302	NDP	C2A-N1A-C6A	-2.23	114.93	118.75
4	C	302	NDP	C1B-N9A-C4A	-2.23	122.73	126.64
4	D	302	NDP	O3X-P2B-O2B	-2.20	96.12	105.99
4	B	302	NDP	O7N-C7N-N7N	-2.19	117.76	122.88
4	C	302	NDP	PN-O5D-C5D	-2.17	108.97	121.68
4	D	302	NDP	C3N-C2N-N1N	-2.15	120.03	123.10
3	D	301	FOL	C8A-C4A-N5	-2.13	119.92	122.33
4	D	302	NDP	O5D-PN-O1N	-2.08	100.92	109.07
4	B	302	NDP	C3N-C2N-N1N	-2.01	120.22	123.10
4	D	302	NDP	C2A-N1A-C6A	-2.00	115.33	118.75
4	D	302	NDP	C5D-C4D-C3D	-2.00	107.67	115.18
3	B	301	FOL	C7-C6-N5	-2.00	119.54	120.85

There are no chirality outliers.

All (47) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	301	FOL	CA-CB-CG-CD
3	B	301	FOL	N-CA-CB-CG
3	B	301	FOL	CT-CA-CB-CG
3	D	301	FOL	N-CA-CB-CG
6	B	304	GOL	C1-C2-C3-O3
6	B	305	GOL	C1-C2-C3-O3
4	D	302	NDP	O4D-C4D-C5D-O5D
4	D	302	NDP	C3D-C4D-C5D-O5D
5	A	303	PGE	O2-C3-C4-O3
5	B	303	PGE	O2-C3-C4-O3

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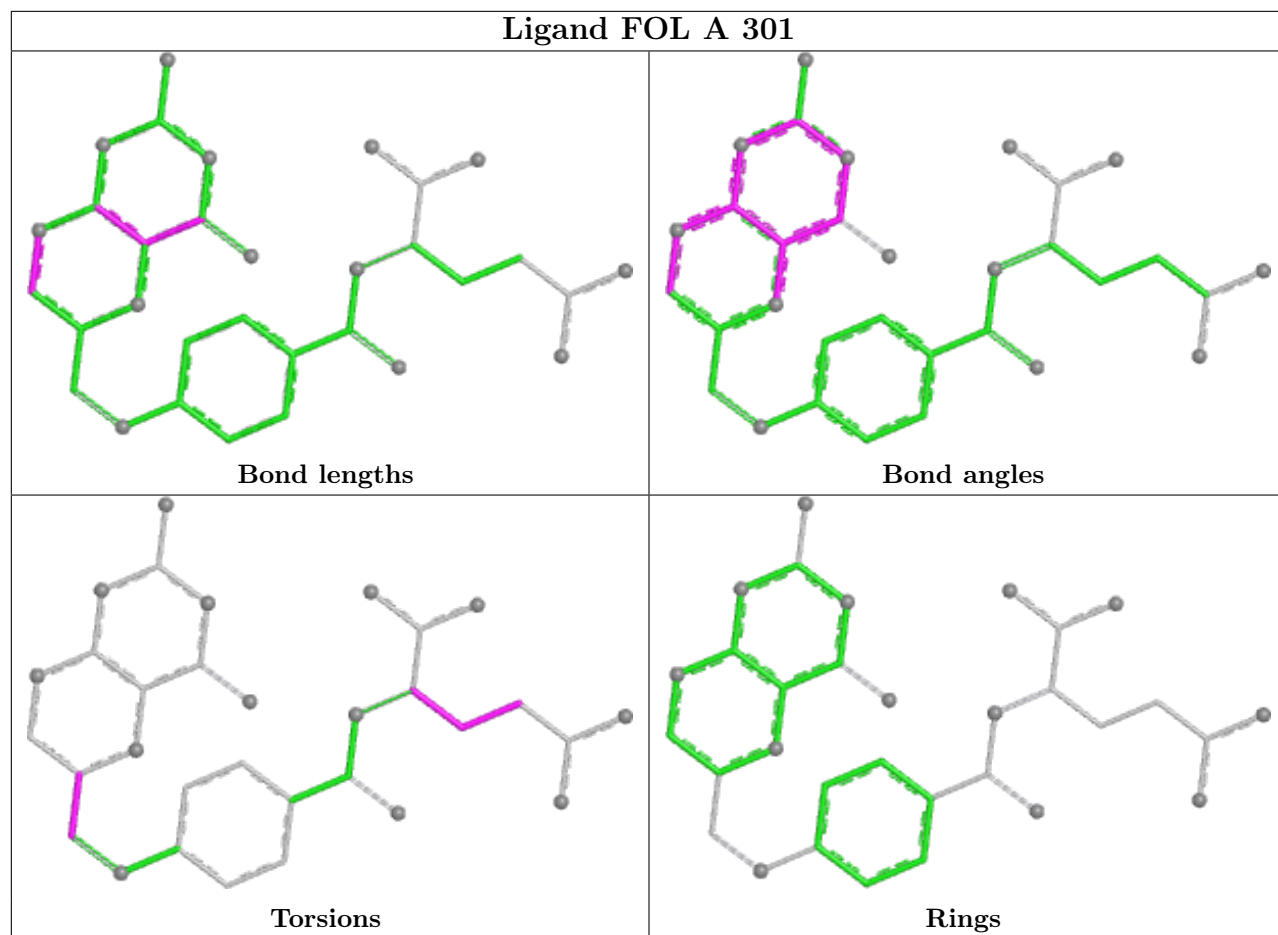
Mol	Chain	Res	Type	Atoms
4	A	302	NDP	O4D-C1D-N1N-C6N
4	B	302	NDP	O4D-C1D-N1N-C6N
4	C	302	NDP	O4D-C1D-N1N-C6N
4	D	302	NDP	O4D-C1D-N1N-C6N
6	B	304	GOL	O2-C2-C3-O3
5	B	303	PGE	O3-C5-C6-O4
3	C	301	FOL	CA-CB-CG-CD
5	A	303	PGE	C4-C3-O2-C2
6	B	305	GOL	O2-C2-C3-O3
4	C	302	NDP	O4D-C4D-C5D-O5D
5	B	303	PGE	O1-C1-C2-O2
3	A	301	FOL	N-CA-CB-CG
4	B	302	NDP	O4D-C4D-C5D-O5D
3	D	301	FOL	CA-CB-CG-CD
7	B	307	PEG	C4-C3-O2-C2
5	A	303	PGE	C3-C4-O3-C5
7	B	307	PEG	O1-C1-C2-O2
5	B	303	PGE	C6-C5-O3-C4
7	B	307	PEG	C1-C2-O2-C3
7	B	307	PEG	O2-C3-C4-O4
3	A	301	FOL	N5-C6-C9-N10
3	C	301	FOL	N5-C6-C9-N10
3	B	301	FOL	N5-C6-C9-N10
5	A	303	PGE	C6-C5-O3-C4
3	B	301	FOL	C7-C6-C9-N10
3	C	301	FOL	C7-C6-C9-N10
3	A	301	FOL	C7-C6-C9-N10
3	D	301	FOL	C7-C6-C9-N10
4	B	302	NDP	C3D-C4D-C5D-O5D
4	A	302	NDP	O4D-C4D-C5D-O5D
4	C	302	NDP	C3D-C4D-C5D-O5D
3	D	301	FOL	N5-C6-C9-N10
4	A	302	NDP	C2N-C3N-C7N-N7N
4	B	302	NDP	C2N-C3N-C7N-N7N
4	C	302	NDP	C2N-C3N-C7N-N7N
4	D	302	NDP	C2N-C3N-C7N-N7N
6	D	303	GOL	O1-C1-C2-O2

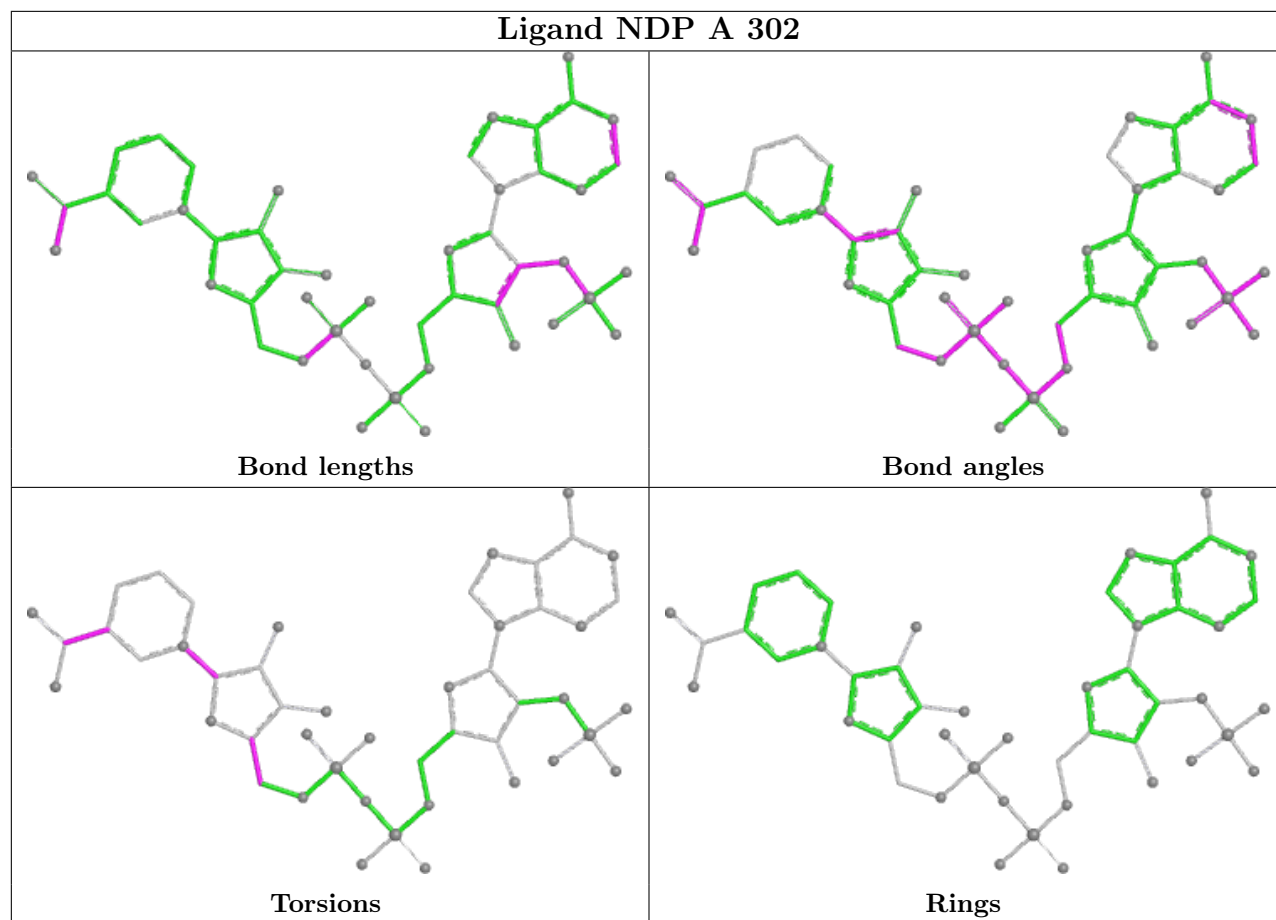
There are no ring outliers.

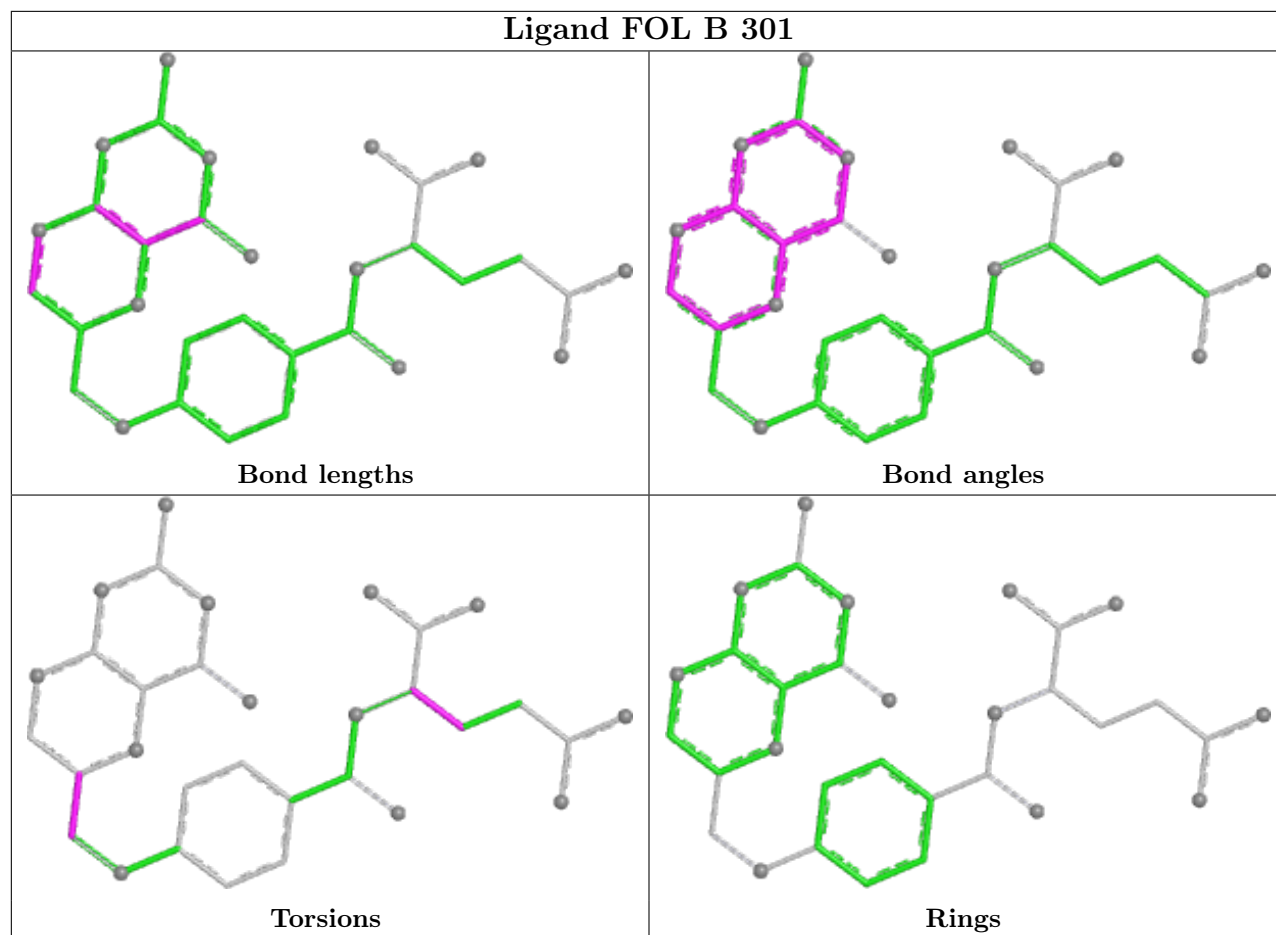
13 monomers are involved in 24 short contacts:

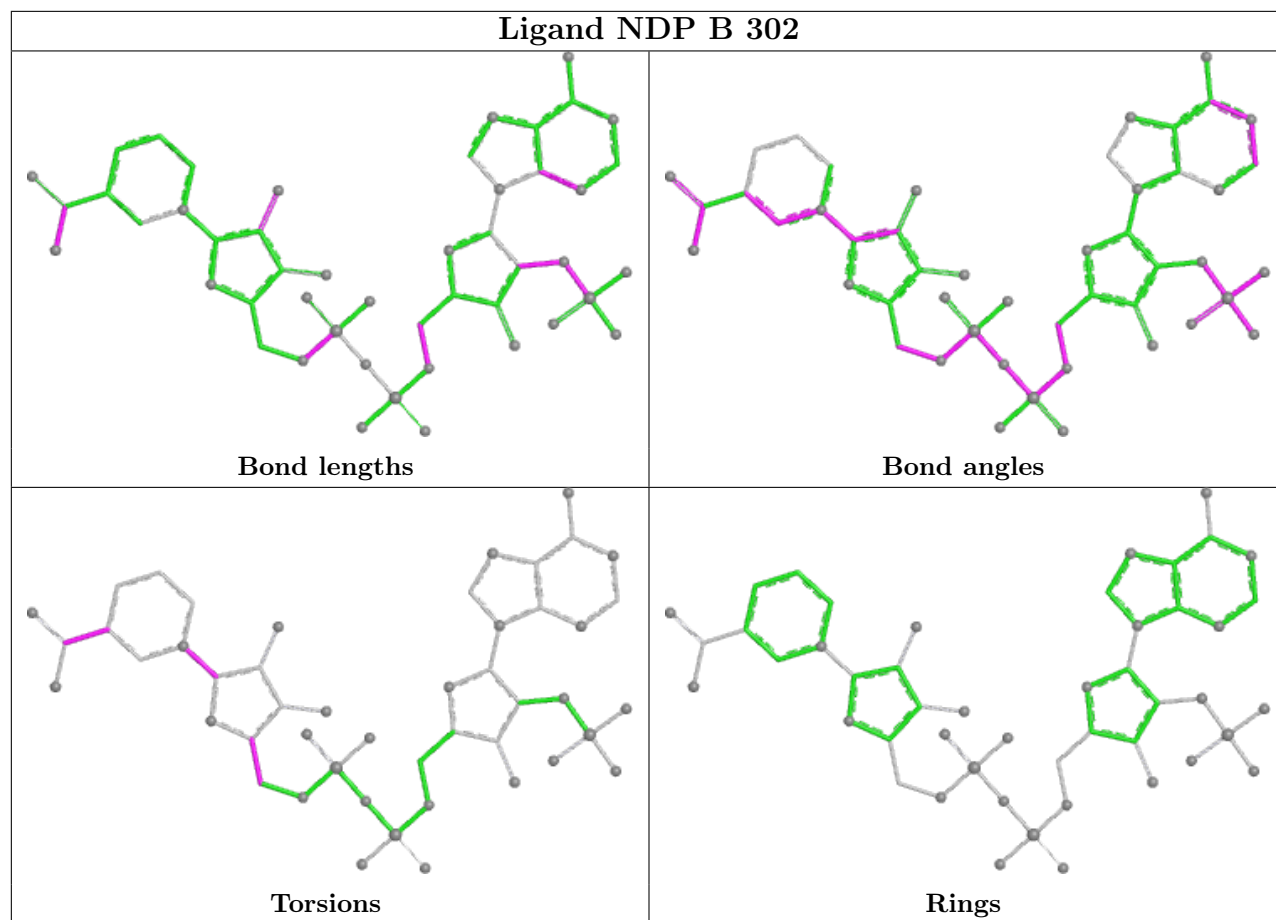
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	301	FOL	1	0
5	B	303	PGE	2	0
4	A	302	NDP	3	0
3	B	301	FOL	2	0
6	B	304	GOL	3	0
6	B	306	GOL	1	0
4	B	302	NDP	3	0
3	C	301	FOL	1	0
4	C	302	NDP	2	0
3	D	301	FOL	1	0
5	A	303	PGE	2	0
7	B	307	PEG	5	0
4	D	302	NDP	3	0

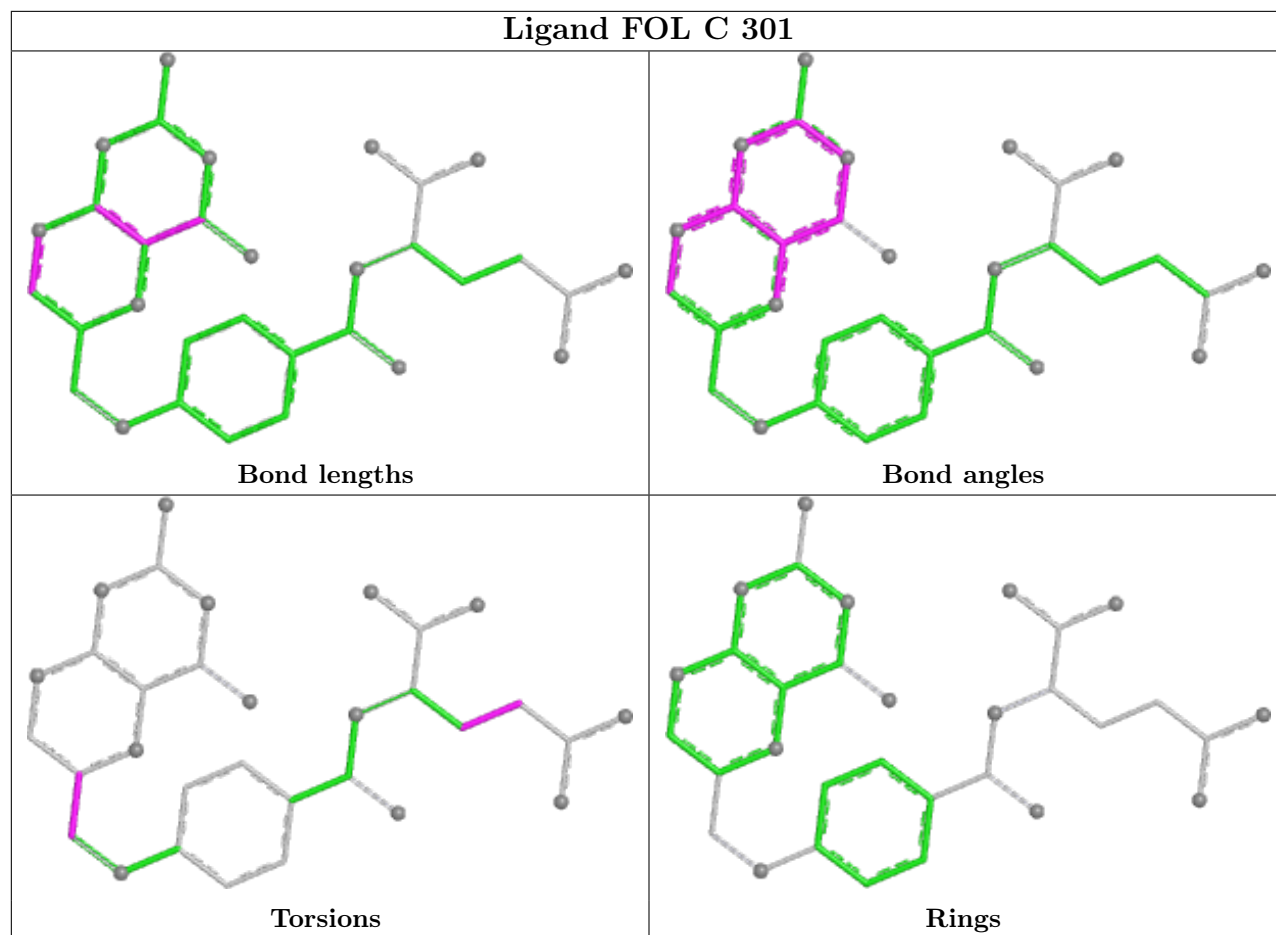
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

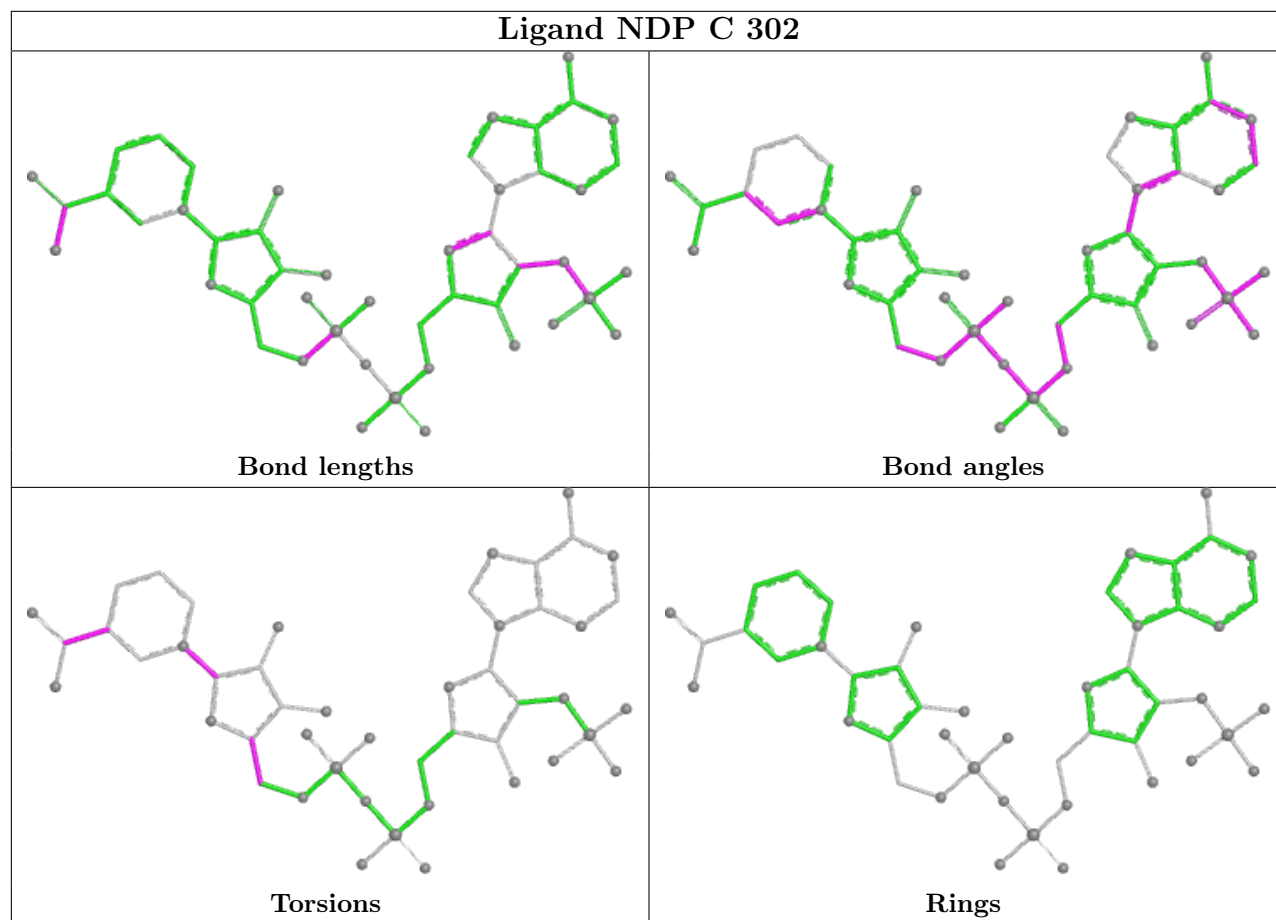


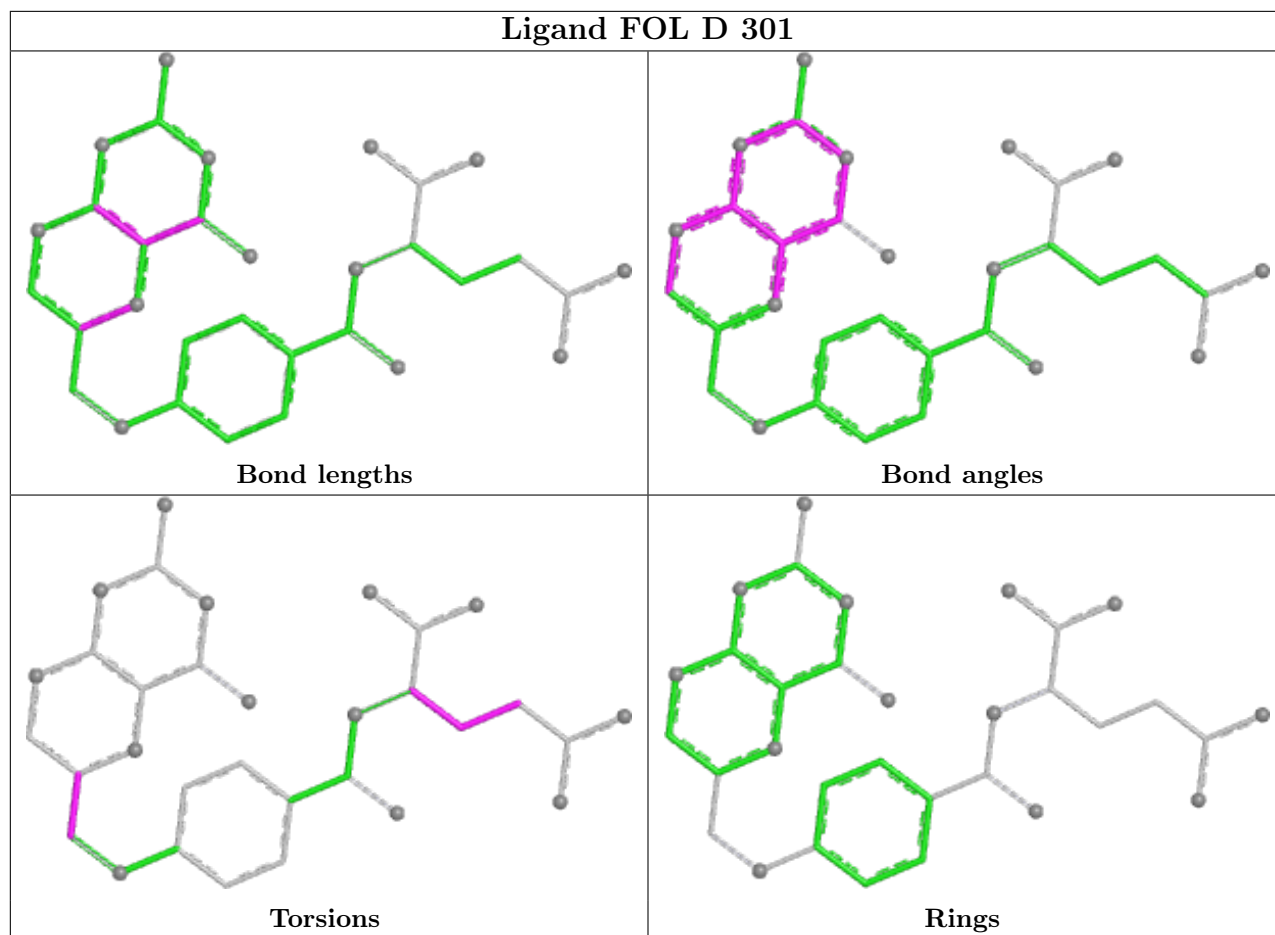


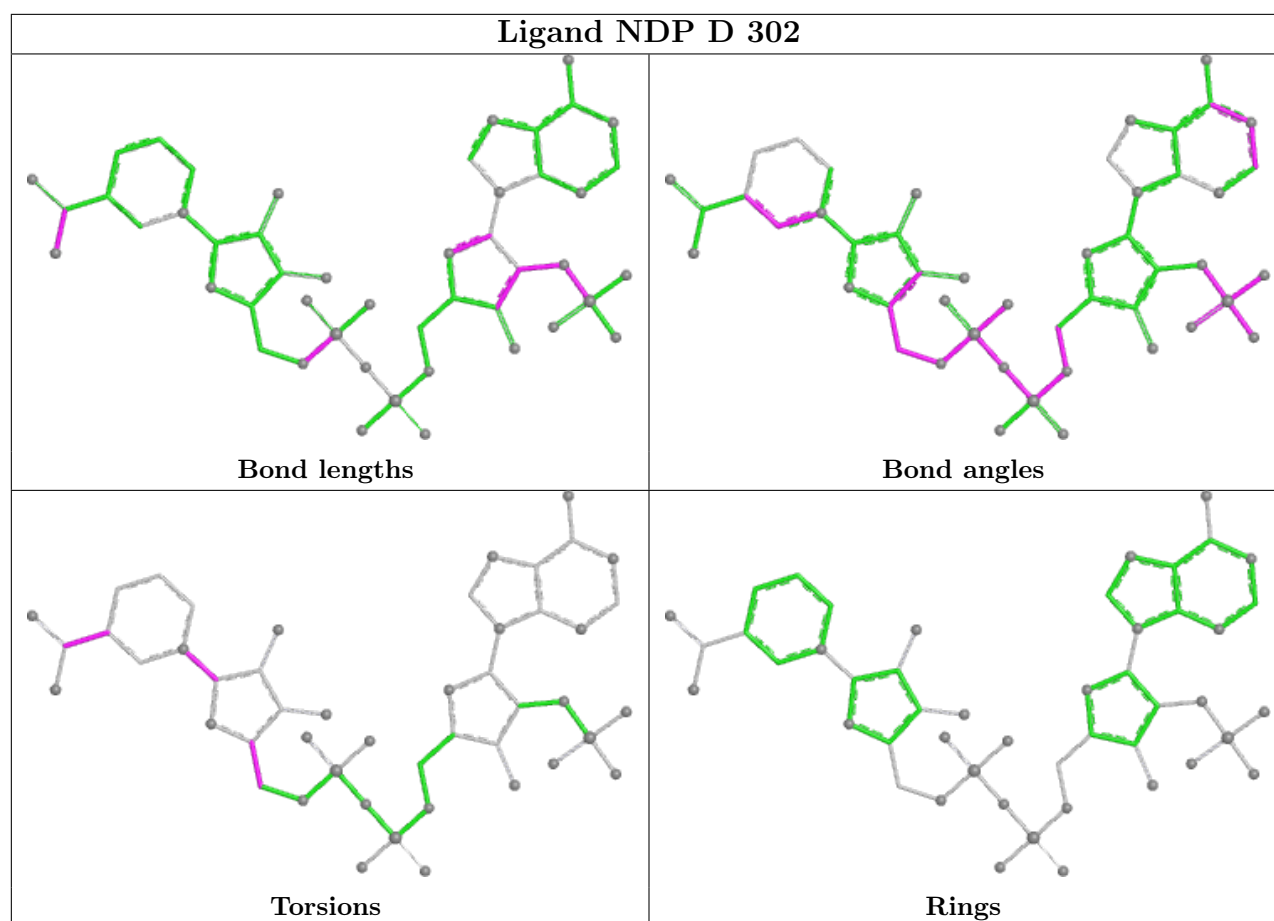












5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [\(i\)](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	263/288 (91%)	0.17	11 (4%) 36 30	11, 17, 31, 59	0
2	B	264/288 (91%)	0.52	18 (6%) 17 13	12, 24, 40, 62	0
2	C	252/288 (87%)	0.11	14 (5%) 24 19	12, 18, 40, 63	0
2	D	251/288 (87%)	0.26	13 (5%) 27 22	14, 24, 39, 74	0
All	All	1030/1152 (89%)	0.27	56 (5%) 25 20	11, 20, 40, 74	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	81	ALA	6.3
2	C	72	ALA	5.2
2	D	72	ALA	5.0
2	B	5	THR	4.5
2	B	81	ALA	4.4
2	D	167	ALA	4.1
2	D	241	HIS	4.0
2	C	120	ARG	4.0
2	B	72	ALA	3.6
1	A	81	ALA	3.6
2	D	135	ALA	3.6
1	A	135	ALA	3.5
2	B	73	PRO	3.5
1	A	120	ARG	3.5
2	B	164	GLY	3.3
2	B	230	VAL	3.3
2	C	169	HIS	3.2
2	D	5	THR	3.2
2	B	82	PRO	3.2
2	B	176	ILE	3.2
2	B	184	THR	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	82	PRO	3.0
2	B	136	MET	2.8
2	C	73	PRO	2.7
2	C	230	VAL	2.7
1	A	72	ALA	2.6
2	C	241	HIS	2.6
1	A	73	PRO	2.6
2	C	240	GLY	2.6
2	B	97	TYR	2.6
2	B	160	HIS	2.6
2	D	71	THR	2.5
2	D	144	PHE	2.5
2	C	107	VAL	2.5
2	D	166	PRO	2.5
2	C	86	PHE	2.5
2	D	229	LEU	2.4
2	B	166	PRO	2.4
2	B	165	THR	2.3
2	D	86	PHE	2.3
2	D	169	HIS	2.2
1	A	5	THR	2.2
2	D	240	GLY	2.2
2	D	49	ALA	2.2
1	A	144	PHE	2.1
2	C	135	ALA	2.1
2	C	167	ALA	2.1
2	B	53	ALA	2.1
2	C	229	LEU	2.1
2	B	98[A]	THR	2.0
1	A	134	GLU	2.0
1	A	236	ALA	2.0
1	A	184	THR	2.0
2	C	160	HIS	2.0
2	B	133	ARG	2.0
2	B	119	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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(\AA^2)	Q<0.9
2	CSX	C	276	7/8	0.87	0.15	16,20,28,35	0
2	CSX	D	276	7/8	0.90	0.14	19,25,28,33	0
2	CSX	B	276	7/8	0.92	0.12	19,23,27,32	0
1	CSX	A	34	7/8	0.95	0.10	13,16,20,27	0

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

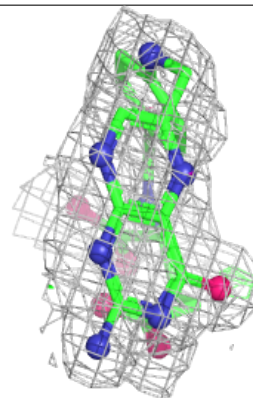
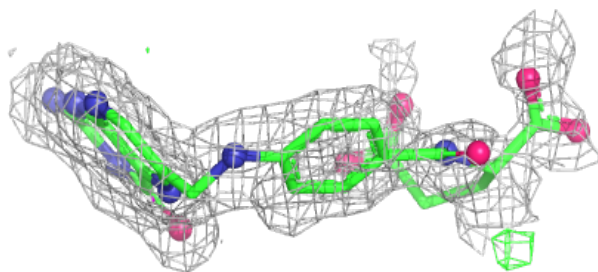
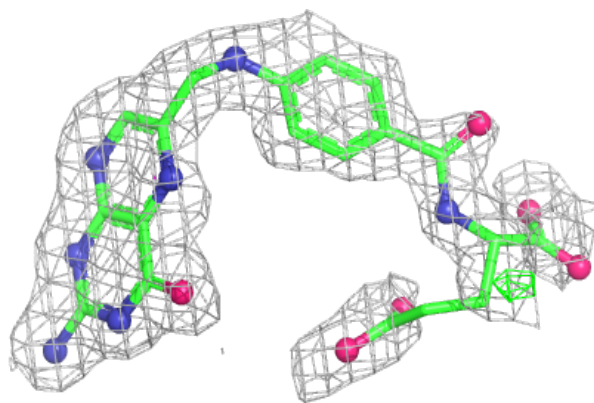
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	PGE	B	303	10/10	0.57	0.33	46,50,52,52	0
6	GOL	B	304	6/6	0.57	0.36	39,41,43,46	0
6	GOL	B	305	6/6	0.65	0.24	37,37,38,39	0
6	GOL	B	306	6/6	0.71	0.32	46,46,47,47	0
5	PGE	A	303	10/10	0.73	0.18	41,44,46,46	0
7	PEG	B	307	7/7	0.75	0.33	26,31,36,37	0
6	GOL	D	303	6/6	0.76	0.21	43,45,47,49	0
3	FOL	D	301	32/32	0.78	0.20	20,46,72,72	0
3	FOL	C	301	32/32	0.86	0.22	18,46,71,72	0
3	FOL	B	301	32/32	0.87	0.16	19,34,54,54	0
3	FOL	A	301	32/32	0.87	0.18	18,30,69,70	0
4	NDP	D	302	48/48	0.94	0.11	15,23,26,27	0
4	NDP	B	302	48/48	0.94	0.11	13,19,23,24	0
4	NDP	A	302	48/48	0.95	0.11	10,16,20,21	0
4	NDP	C	302	48/48	0.96	0.09	12,18,20,22	0

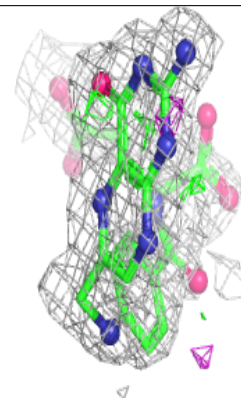
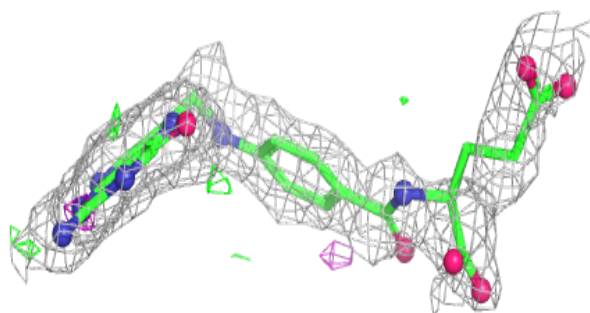
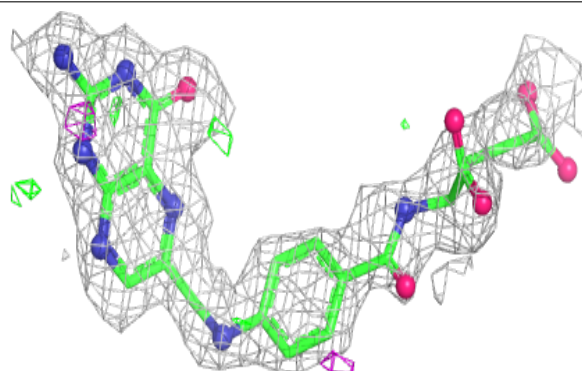
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around FOL D 301:

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

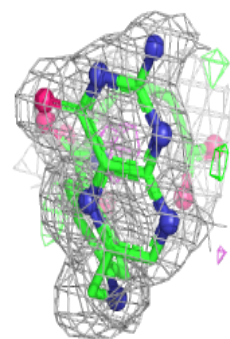
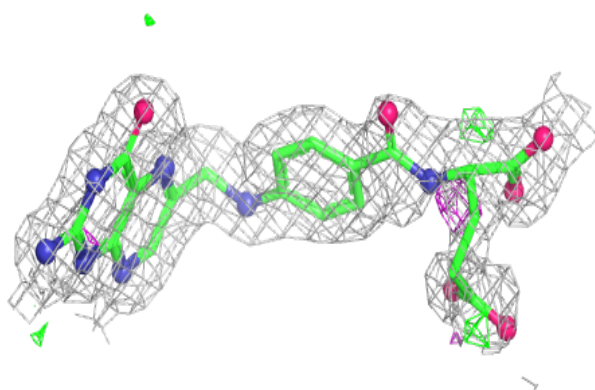
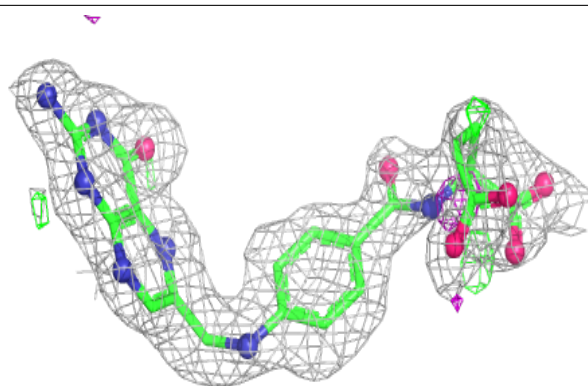
**Electron density around FOL C 301:**

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

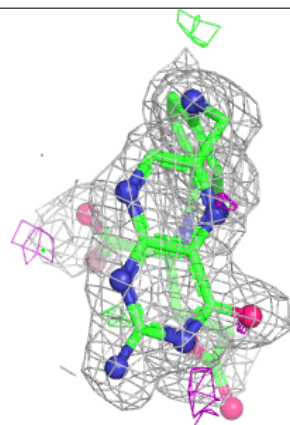
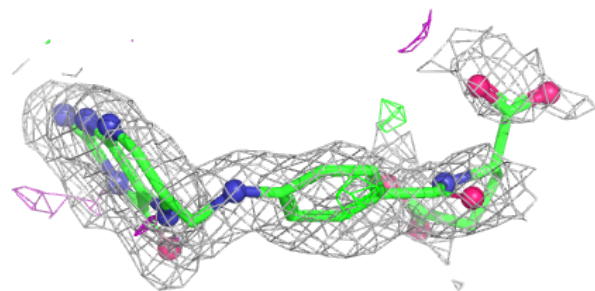
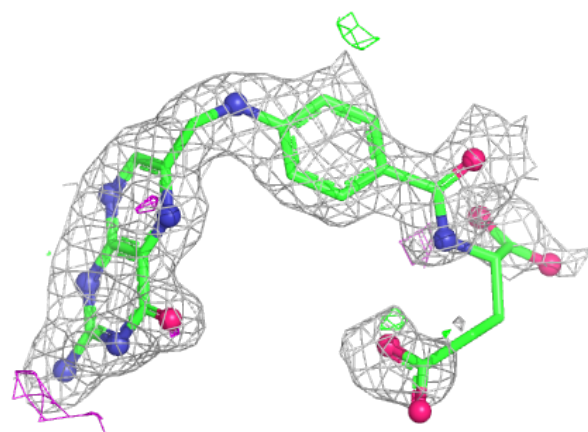


Electron density around FOL B 301:

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

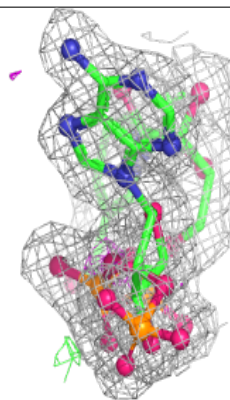
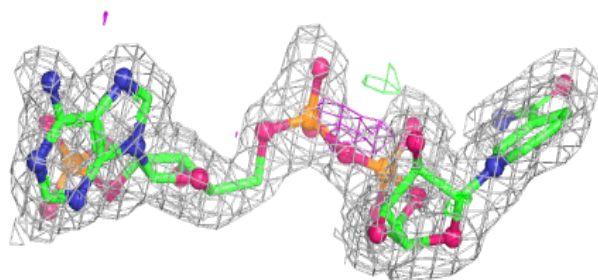
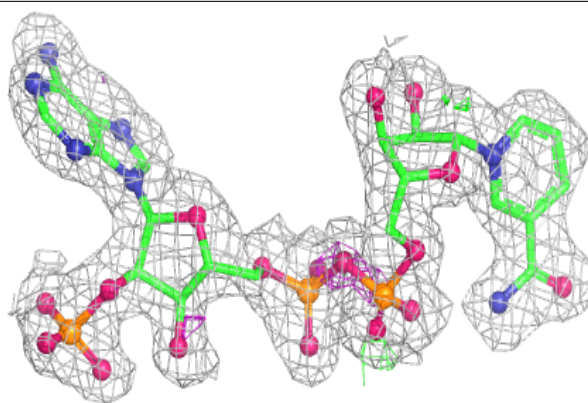
**Electron density around FOL A 301:**

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

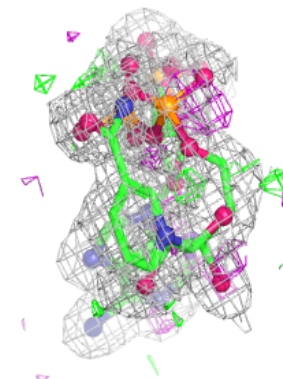
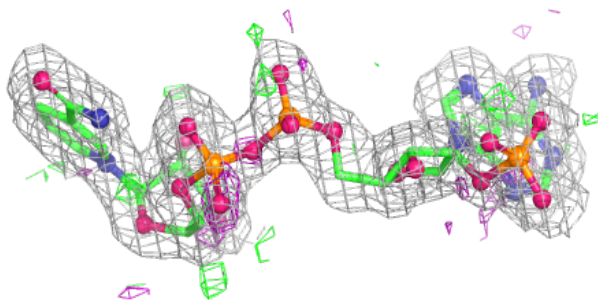
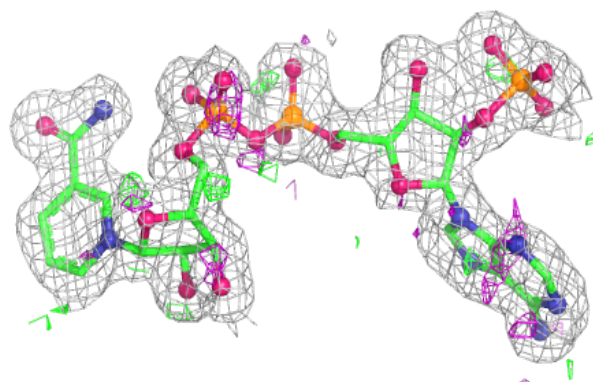


Electron density around NDP D 302:

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

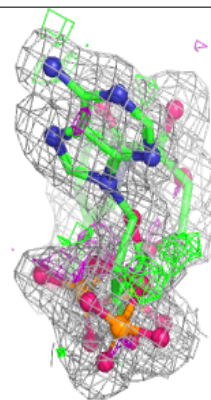
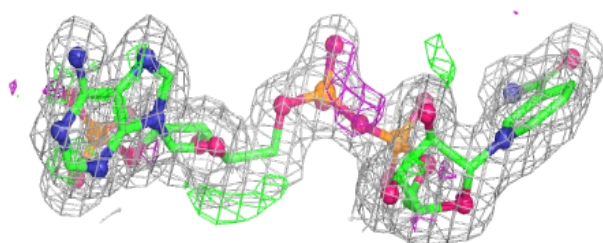
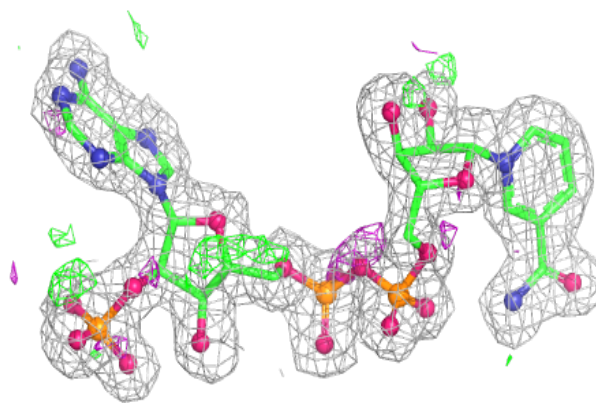
**Electron density around NDP B 302:**

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

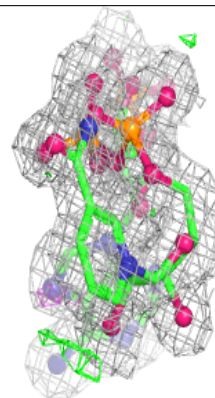
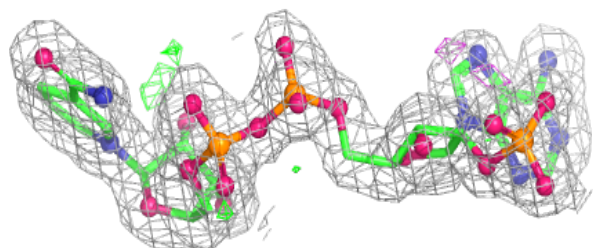
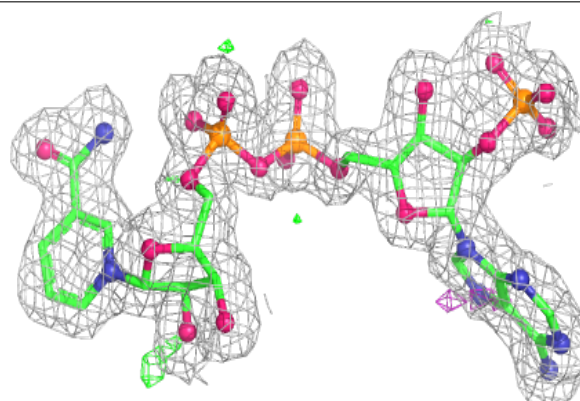


Electron density around NDP A 302:

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

**Electron density around NDP C 302:**

$2mF_o-DF_c$ (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.