



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 10:47 PM UTC

PDB ID : 6CAV / pdb_00006cav
Title : Aminoglycoside Phosphotransferase (2'')-Ia in complex with GMPPNP, Magnesium, and Dibekacin
Authors : Caldwell, S.J.; Berghuis, A.M.
Deposited on : 2018-02-01
Resolution : 2.60 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

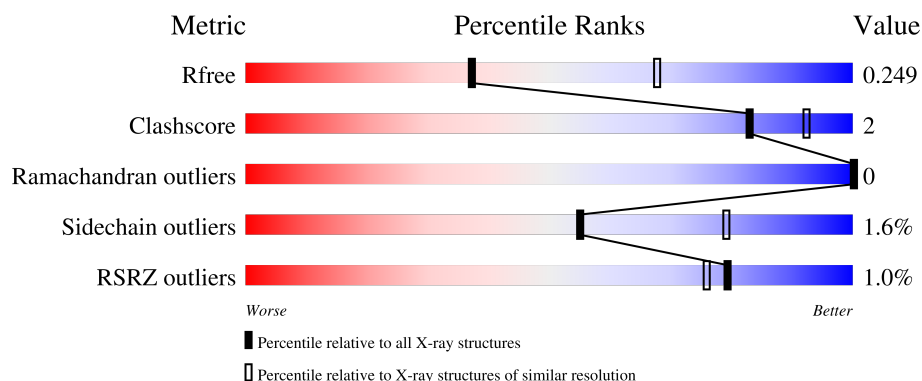
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	305	% 86% 9% 6%
1	B	305	% 90% 5% .
1	C	305	% 86% 7% 7%
1	D	305	% 88% 5% 7%

2 Entry composition [i](#)

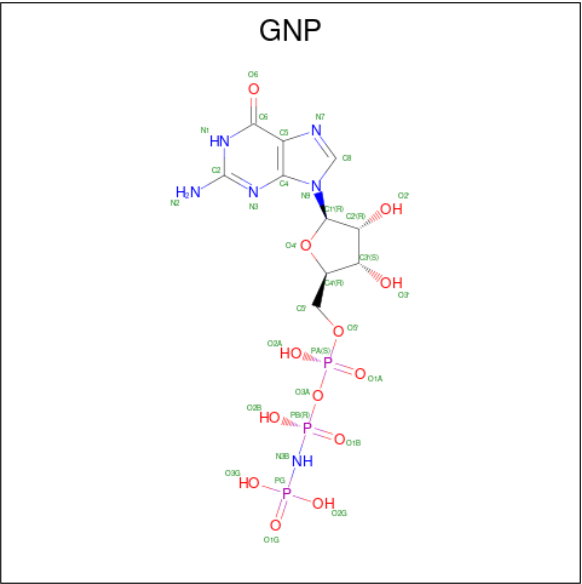
There are 6 unique types of molecules in this entry. The entry contains 10248 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Bifunctional AAC/APH.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	288	Total	C	N	O	S	0	0	0
			2383	1525	368	480	10			
1	B	292	Total	C	N	O	S	0	0	0
			2402	1536	372	484	10			
1	C	285	Total	C	N	O	S	0	0	0
			2363	1514	364	475	10			
1	D	284	Total	C	N	O	S	0	0	0
			2338	1497	361	470	10			

- Molecule 2 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (CCD ID: GNP) (formula: $C_{10}H_{17}N_6O_{13}P_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O P	0	0
			32	10	6	13 3		
2	B	1	Total	C	N	O P	0	0
			32	10	6	13 3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			32	10	6	13	3		
2	D	1	Total	C	N	O	P	0	0
			28	10	6	10	2		

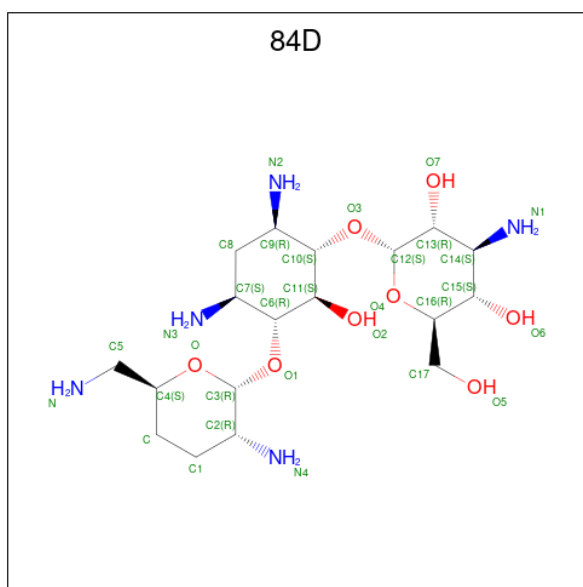
- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Mg	0	0
			2	2		
3	B	2	Total	Mg	0	0
			2	2		
3	C	2	Total	Mg	0	0
			2	2		
3	D	2	Total	Mg	0	0
			2	2		

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		
4	B	1	Total	Cl	0	0
			1	1		
4	C	1	Total	Cl	0	0
			1	1		

- Molecule 5 is Dibekacin (CCD ID: 84D) (formula: C₁₈H₃₇N₅O₈).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			31	18	5	8		
5	B	1	Total	C	N	O	0	0
			31	18	5	8		
5	C	1	Total	C	N	O	0	0
			31	18	5	8		
5	D	1	Total	C	N	O	0	0
			31	18	5	8		

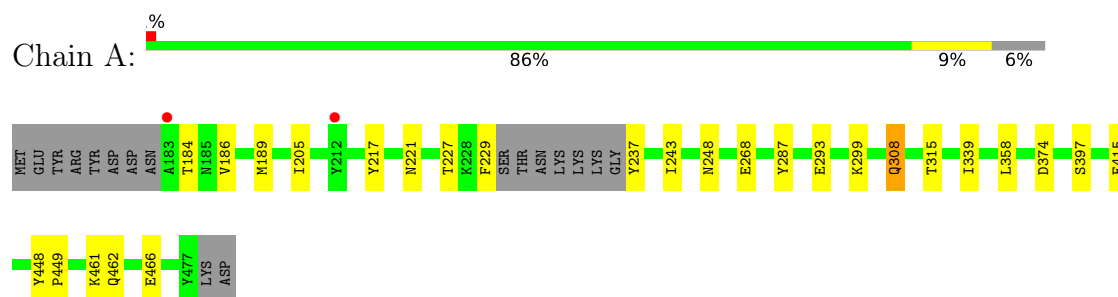
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	6	Total	O	0	0
			6	6		
6	A	135	Total	O	0	0
			135	135		
6	B	4	Total	O	0	0
			4	4		
6	B	144	Total	O	0	0
			144	144		
6	C	4	Total	O	0	0
			4	4		
6	C	107	Total	O	0	0
			107	107		
6	D	2	Total	O	0	0
			2	2		
6	D	101	Total	O	0	0
			101	101		

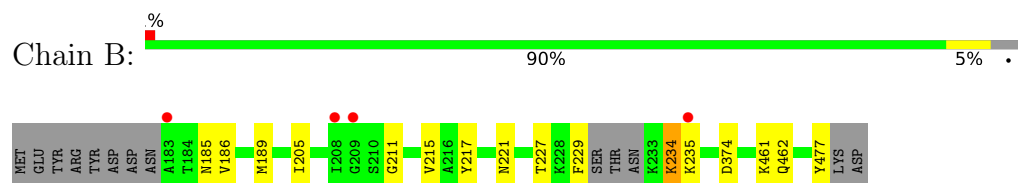
3 Residue-property plots [i](#)

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.

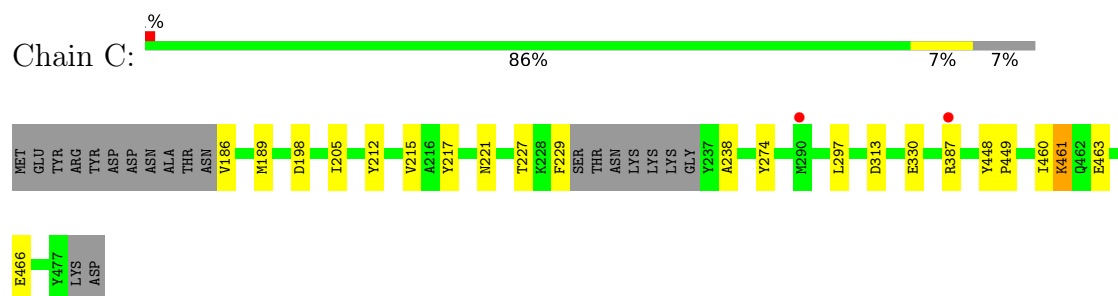
• Molecule 1: Bifunctional AAC/APH



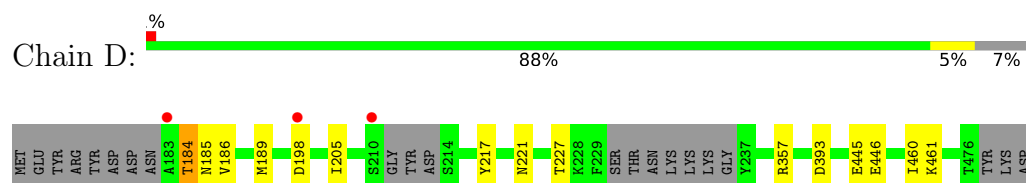
• Molecule 1: Bifunctional AAC/APH



• Molecule 1: Bifunctional AAC/APH



• Molecule 1: Bifunctional AAC/APH



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	89.99Å 98.34Å 93.22Å 90.00° 105.24° 90.00°	Depositor
Resolution (Å)	89.94 – 2.60 89.94 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.9 (89.94-2.60) 100.0 (89.94-2.60)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.24 (at 2.58Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.192 , 0.244 0.195 , 0.249	Depositor DCC
R_{free} test set	2438 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	53.2	Xtriage
Anisotropy	0.158	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 38.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.019 for l,-k,h	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	10248	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.90% 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: GNP, 84D, MG, CL

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	1.11	2/2426 (0.1%)	1.04	1/3272 (0.0%)
1	B	1.07	2/2445 (0.1%)	1.02	3/3298 (0.1%)
1	C	1.11	2/2406 (0.1%)	1.02	1/3244 (0.0%)
1	D	1.04	2/2378 (0.1%)	1.00	0/3206
All	All	1.08	8/9655 (0.1%)	1.02	5/13020 (0.0%)

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	B	0	1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	184	THR	C-O	6.52	1.31	1.24
1	C	229	PHE	C-O	-5.86	1.11	1.23
1	B	211	GLY	C-O	5.64	1.29	1.24
1	D	198	ASP	CA-CB	5.49	1.61	1.53
1	A	374	ASP	CA-CB	-5.33	1.47	1.53
1	B	229	PHE	C-O	-5.23	1.13	1.23
1	A	358	LEU	C-O	-5.20	1.18	1.24
1	C	330	GLU	C-O	-5.14	1.18	1.24

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	234	LYS	N-CA-C	-6.05	103.26	111.55

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	235	LYS	N-CA-C	-5.86	106.47	113.21
1	C	198	ASP	CB-CA-C	-5.39	101.85	110.79
1	B	211	GLY	N-CA-C	-5.33	104.98	112.60
1	A	339	ILE	N-CA-C	5.07	117.85	112.83

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	234	LYS	Peptide

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2383	0	2300	18	0
1	B	2402	0	2309	9	1
1	C	2363	0	2282	13	0
1	D	2338	0	2261	8	0
2	A	32	0	13	0	0
2	B	32	0	13	1	0
2	C	32	0	13	2	0
2	D	28	0	12	1	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	1	0	0	1	0
4	B	1	0	0	1	0
4	C	1	0	0	0	0
5	A	31	0	0	2	0
5	B	31	0	0	1	0
5	C	31	0	0	0	0
5	D	31	0	0	0	0
6	A	141	0	0	4	1
6	B	148	0	0	1	0
6	C	111	0	0	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	D	103	0	0	1	0
All	All	10248	0	9203	45	1

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 2.

All (45) 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)
5:A:600:84D:O7	6:A:904:HOH:O	2.01	0.77
2:C:500:GNP:O2A	6:C:900:HOH:O	2.10	0.69
2:B:500:GNP:O3G	6:B:921:HOH:O	2.16	0.61
1:D:445:GLU:HG3	6:D:1160:HOH:O	2.01	0.60
1:D:186:VAL:HG13	1:D:205:ILE:HG23	1.85	0.58
1:A:229:PHE:C	6:A:1443:HOH:O	2.46	0.58
1:A:184:THR:HB	1:B:185:ASN:OD1	2.05	0.57
1:A:315:THR:CG2	1:C:238:ALA:HB2	2.36	0.55
1:A:415:GLU:OE1	5:A:600:84D:N3	2.40	0.55
1:B:189:MET:HG2	1:B:217:TYR:CE1	2.41	0.55
1:A:189:MET:HG2	1:A:217:TYR:CE1	2.42	0.55
1:C:189:MET:HG2	1:C:217:TYR:CE1	2.42	0.55
1:D:189:MET:HG2	1:D:217:TYR:CE1	2.43	0.53
1:A:237:TYR:HA	6:A:1103:HOH:O	2.10	0.52
1:A:462:GLN:NE2	4:A:802:CL:CL	2.77	0.52
1:A:184:THR:HG21	1:B:215:VAL:HG21	1.93	0.49
1:D:189:MET:SD	1:D:227:THR:HG21	2.54	0.48
1:A:186:VAL:HG13	1:A:205:ILE:HG23	1.96	0.47
1:C:212:TYR:HB2	6:C:1577:HOH:O	2.15	0.47
1:B:189:MET:SD	1:B:227:THR:HG21	2.56	0.46
1:D:186:VAL:CG1	1:D:205:ILE:HG23	2.44	0.46
1:A:248:ASN:OD1	6:A:1144:HOH:O	2.20	0.46
1:A:315:THR:HG23	1:C:238:ALA:HB2	1.98	0.45
1:C:387:ARG:HA	6:C:1268:HOH:O	2.16	0.45
1:A:243:ILE:HD13	1:A:397:SER:HB2	1.99	0.45
1:B:462:GLN:NE2	4:B:802:CL:CL	2.87	0.45
1:C:215:VAL:HG21	1:D:184:THR:HG21	1.98	0.44
1:A:184:THR:CG2	1:B:215:VAL:HG21	2.48	0.43
1:A:189:MET:SD	1:A:227:THR:HG21	2.58	0.43
1:B:186:VAL:HG13	1:B:205:ILE:HG23	2.01	0.43
1:C:463:GLU:HB3	6:C:1001:HOH:O	2.18	0.43
1:A:308:GLN:HE21	1:A:308:GLN:HB2	1.72	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:186:VAL:CG1	1:B:205:ILE:HG23	2.49	0.42
1:A:186:VAL:CG1	1:A:205:ILE:HG23	2.49	0.42
1:C:189:MET:SD	1:C:227:THR:HG21	2.60	0.42
1:C:461:LYS:HG3	6:C:1001:HOH:O	2.20	0.41
1:C:186:VAL:HG13	1:C:205:ILE:HG23	2.02	0.41
1:A:287:TYR:OH	1:A:299:LYS:HE3	2.19	0.41
1:D:393:ASP:OD2	2:D:500:GNP:N3B	2.53	0.41
1:C:448:TYR:HB3	1:C:449:PRO:HD3	2.03	0.41
1:C:274:TYR:OH	2:C:500:GNP:N7	2.41	0.41
1:C:313:ASP:HA	6:C:1401:HOH:O	2.21	0.41
1:A:448:TYR:HB3	1:A:449:PRO:HD3	2.03	0.40
1:B:374:ASP:OD2	5:B:600:84D:N1	2.54	0.40
1:D:357:ARG:NH1	1:D:446:GLU:OE2	2.45	0.40

All (1) 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:B:477:TYR:O	6:A:1217:HOH:O[2_646]	1.94	0.26

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	284/305 (93%)	276 (97%)	8 (3%)	0	100	100
1	B	288/305 (94%)	277 (96%)	11 (4%)	0	100	100
1	C	281/305 (92%)	272 (97%)	9 (3%)	0	100	100
1	D	278/305 (91%)	267 (96%)	11 (4%)	0	100	100
All	All	1131/1220 (93%)	1092 (97%)	39 (3%)	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	265/281 (94%)	259 (98%)	6 (2%)	44	71
1	B	265/281 (94%)	263 (99%)	2 (1%)	73	88
1	C	263/281 (94%)	258 (98%)	5 (2%)	50	75
1	D	260/281 (92%)	256 (98%)	4 (2%)	57	80
All	All	1053/1124 (94%)	1036 (98%)	17 (2%)	55	79

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

Mol	Chain	Res	Type
1	A	221	ASN
1	A	268	GLU
1	A	293	GLU
1	A	308	GLN
1	A	461	LYS
1	A	466	GLU
1	B	221	ASN
1	B	461	LYS
1	C	221	ASN
1	C	297	LEU
1	C	460	ILE
1	C	461	LYS
1	C	466	GLU
1	D	185	ASN
1	D	221	ASN
1	D	460	ILE
1	D	461	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	248	ASN
1	A	250	ASN

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Mol	Chain	Res	Type
1	A	341	ASN
1	A	467	ASN
1	B	250	ASN
1	B	296	ASN
1	B	420	ASN
1	B	462	GLN
1	B	467	ASN
1	C	250	ASN
1	C	327	ASN
1	C	341	ASN
1	D	185	ASN
1	D	250	ASN
1	D	295	GLN
1	D	326	GLN
1	D	420	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 11 are monoatomic - leaving 8 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GNP	B	500	3	34,34,34	3.68	5 (14%)	47,54,54	1.84	8 (17%)
2	GNP	A	500	3	34,34,34	2.06	6 (17%)	47,54,54	1.06	3 (6%)
2	GNP	C	500	3	34,34,34	2.46	5 (14%)	47,54,54	1.11	2 (4%)
5	84D	A	600	-	32,33,33	0.52	0	40,48,48	2.04	11 (27%)
5	84D	C	600	-	32,33,33	0.44	0	40,48,48	1.35	7 (17%)
5	84D	B	600	-	32,33,33	0.98	1 (3%)	40,48,48	2.24	10 (25%)
5	84D	D	600	-	32,33,33	0.79	1 (3%)	40,48,48	2.68	11 (27%)
2	GNP	D	500	3	29,30,34	3.02	4 (13%)	42,47,54	1.24	4 (9%)

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	GNP	B	500	3	-	2/18/38/38	0/3/3/3
2	GNP	A	500	3	-	3/18/38/38	0/3/3/3
2	GNP	C	500	3	-	4/18/38/38	0/3/3/3
5	84D	A	600	-	-	4/12/65/65	0/3/3/3
5	84D	C	600	-	-	3/12/65/65	0/3/3/3
5	84D	B	600	-	-	3/12/65/65	0/3/3/3
5	84D	D	600	-	-	3/12/65/65	0/3/3/3
2	GNP	D	500	3	-	1/13/32/38	0/3/3/3

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	500	GNP	PG-O1G	17.85	1.73	1.46
2	D	500	GNP	PB-O1B	14.53	1.68	1.46
2	C	500	GNP	PG-O1G	9.07	1.59	1.46
2	B	500	GNP	PB-O3A	9.04	1.70	1.59
2	C	500	GNP	PB-O1B	8.39	1.58	1.46
2	A	500	GNP	PG-O1G	7.03	1.56	1.46
2	A	500	GNP	PB-O1B	4.87	1.53	1.46
2	D	500	GNP	PB-O3A	4.70	1.64	1.59
2	D	500	GNP	PB-O2B	-4.51	1.44	1.56
2	A	500	GNP	PB-O2B	-4.47	1.44	1.56
2	C	500	GNP	PB-O2B	-3.90	1.46	1.56
2	A	500	GNP	PG-O2G	-3.81	1.46	1.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	500	GNP	PG-O2G	-3.72	1.46	1.56
2	B	500	GNP	PA-O3A	3.72	1.63	1.59
5	B	600	84D	O7-C13	3.65	1.52	1.43
2	B	500	GNP	PG-O3G	-3.29	1.48	1.56
2	B	500	GNP	PB-O1B	2.97	1.50	1.46
2	A	500	GNP	PG-O3G	2.86	1.64	1.56
5	D	600	84D	O7-C13	2.84	1.50	1.43
2	C	500	GNP	PG-O3G	2.64	1.63	1.56
2	A	500	GNP	C5-C6	-2.51	1.35	1.44
2	D	500	GNP	C5-C6	2.29	1.53	1.44

All (56) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	600	84D	C3-O-C4	9.16	123.28	113.13
2	B	500	GNP	O1G-PG-N3B	-8.68	98.99	111.77
5	A	600	84D	C16-C15-C14	-6.38	103.61	110.67
5	D	600	84D	O7-C13-C12	5.93	124.20	110.08
5	B	600	84D	C12-C13-C14	-5.66	102.79	110.40
5	B	600	84D	O7-C13-C14	5.64	120.35	110.22
5	B	600	84D	O3-C12-O4	-5.58	96.01	110.69
5	D	600	84D	O3-C10-C11	5.48	121.15	107.23
5	D	600	84D	O3-C12-O4	-5.16	97.12	110.69
5	B	600	84D	O7-C13-C12	5.16	122.36	110.08
5	D	600	84D	C12-C13-C14	-4.84	103.90	110.40
5	D	600	84D	O1-C3-C2	4.49	115.27	108.10
2	C	500	GNP	O3A-PA-O1A	-4.36	97.59	110.70
5	A	600	84D	C3-O-C4	4.30	117.89	113.13
2	D	500	GNP	O2A-PA-O3A	4.25	118.75	107.27
5	A	600	84D	O3-C12-O4	-4.10	99.89	110.69
2	B	500	GNP	O3A-PB-N3B	-4.03	95.42	106.59
2	C	500	GNP	O1G-PG-N3B	-3.89	106.04	111.77
5	A	600	84D	O6-C15-C14	3.71	116.89	110.22
5	D	600	84D	O7-C13-C14	3.54	116.57	110.22
5	A	600	84D	O7-C13-C14	3.43	116.38	110.22
2	B	500	GNP	O2B-PB-O1B	-3.42	102.52	109.87
5	D	600	84D	O3-C12-C13	3.36	116.34	108.09
5	A	600	84D	C12-C13-C14	-3.23	106.06	110.40
5	A	600	84D	C-C1-C2	3.21	119.21	111.35
5	B	600	84D	O3-C12-C13	3.18	115.92	108.09
2	D	500	GNP	O3A-PA-O1A	-3.01	101.66	110.70
2	B	500	GNP	O3'-C3'-C4'	-3.00	102.46	111.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	600	84D	O1-C6-C11	3.00	114.85	107.23
2	B	500	GNP	O2B-PB-O3A	3.00	114.64	104.64
2	B	500	GNP	O3G-PG-O1G	2.96	120.87	113.45
5	C	600	84D	C3-O1-C6	2.96	124.98	117.98
5	C	600	84D	O6-C15-C16	-2.85	102.29	109.32
2	A	500	GNP	O2G-PG-O3G	2.81	115.15	107.59
5	C	600	84D	O2-C11-C6	2.80	117.10	109.94
5	B	600	84D	C-C1-C2	-2.77	104.56	111.35
5	A	600	84D	C13-C14-N1	2.68	116.55	111.05
5	C	600	84D	C12-C13-C14	-2.67	106.82	110.40
5	D	600	84D	C9-C8-C7	-2.64	106.50	111.02
5	C	600	84D	O7-C13-C14	2.53	114.76	110.22
2	A	500	GNP	O3A-PA-O1A	-2.50	103.19	110.70
2	A	500	GNP	O5'-PA-O1A	2.49	118.82	108.94
2	D	500	GNP	O3'-C3'-C4'	2.42	118.04	111.08
5	A	600	84D	O2-C11-C6	2.41	116.11	109.94
5	B	600	84D	C-C4-C5	-2.40	108.25	112.83
5	B	600	84D	O1-C6-C7	-2.33	103.62	109.18
5	C	600	84D	C3-O-C4	2.30	115.68	113.13
2	D	500	GNP	O2B-PB-O3A	-2.24	97.17	104.64
5	B	600	84D	C9-C8-C7	-2.24	107.18	111.02
5	A	600	84D	C3-O1-C6	2.21	123.21	117.98
5	B	600	84D	O3-C10-C9	-2.21	103.91	109.18
5	A	600	84D	C12-O4-C16	2.16	117.93	113.72
2	B	500	GNP	O2A-PA-O1A	2.14	122.42	112.44
5	C	600	84D	O6-C15-C14	2.13	114.05	110.22
5	D	600	84D	O1-C6-C7	-2.09	104.18	109.18
2	B	500	GNP	O2G-PG-O3G	2.02	113.03	107.59

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	500	GNP	PG-N3B-PB-O1B
2	B	500	GNP	PB-N3B-PG-O1G
2	C	500	GNP	PB-N3B-PG-O1G
2	C	500	GNP	PG-N3B-PB-O1B
5	A	600	84D	O4-C16-C17-O5
5	B	600	84D	C11-C6-O1-C3
5	A	600	84D	C15-C16-C17-O5
5	C	600	84D	O-C3-O1-C6
5	A	600	84D	C11-C6-O1-C3

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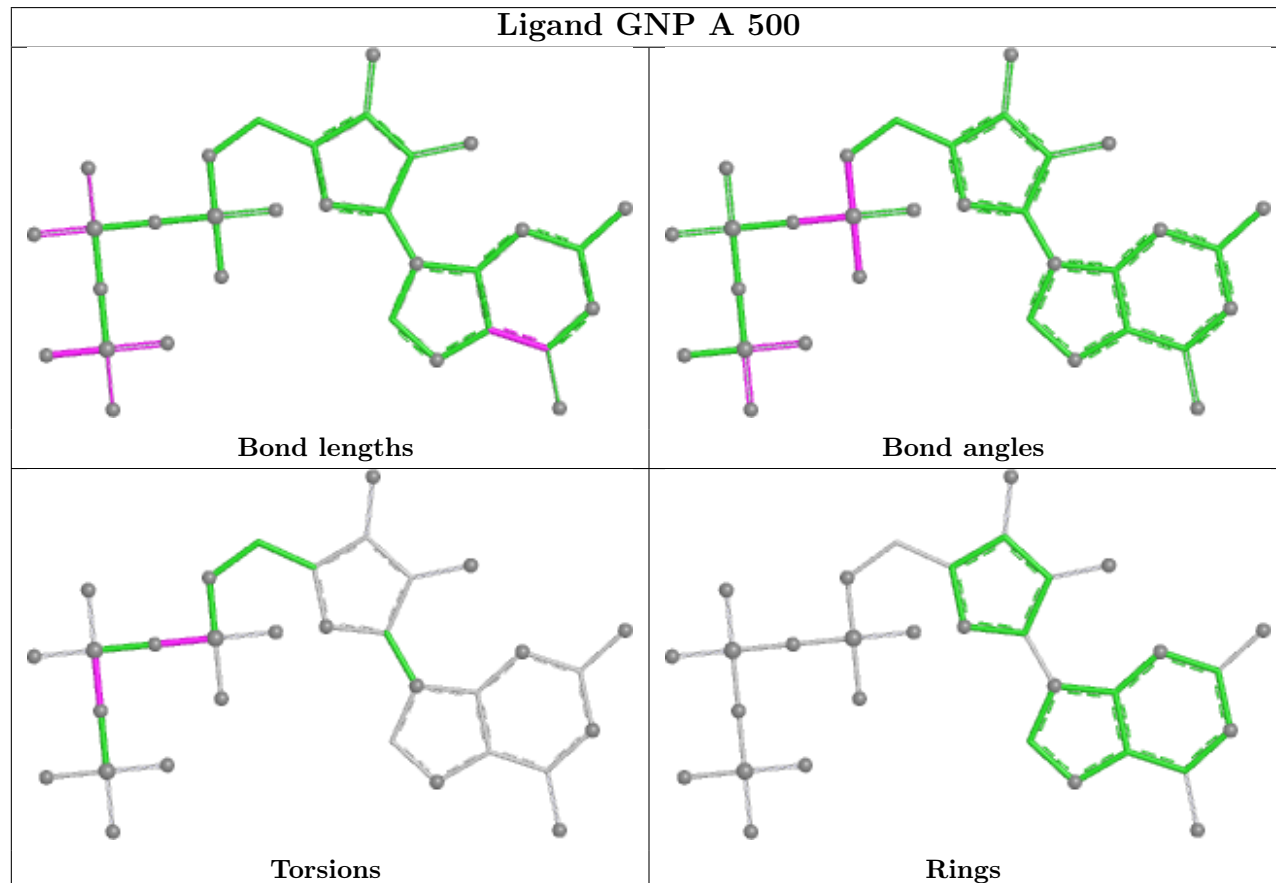
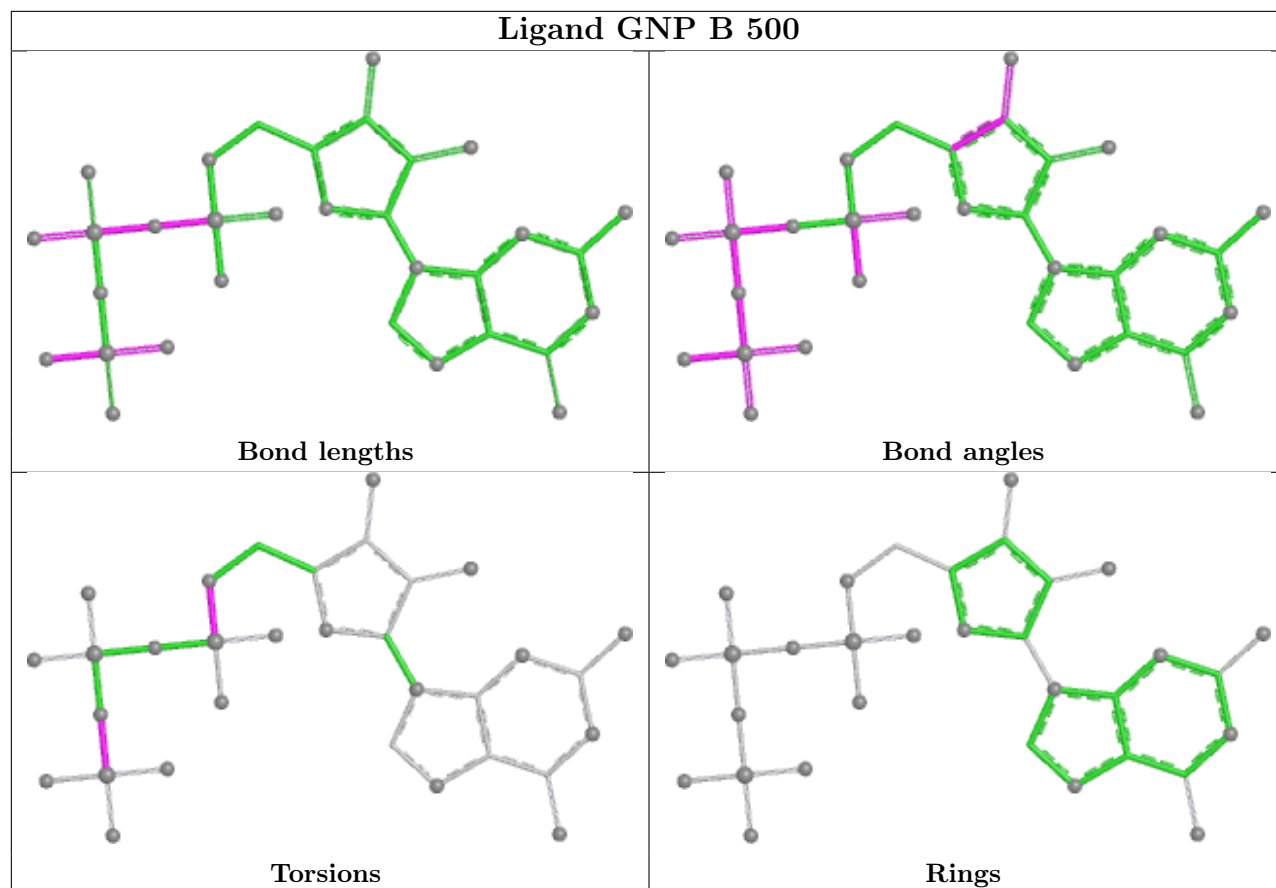
Mol	Chain	Res	Type	Atoms
5	D	600	84D	C11-C6-O1-C3
5	B	600	84D	O-C3-O1-C6
5	C	600	84D	C11-C6-O1-C3
5	A	600	84D	C7-C6-O1-C3
5	B	600	84D	C7-C6-O1-C3
2	C	500	GNP	PG-N3B-PB-O3A
2	B	500	GNP	C5'-O5'-PA-O1A
5	D	600	84D	O-C3-O1-C6
2	C	500	GNP	PB-O3A-PA-O1A
2	A	500	GNP	PB-O3A-PA-O2A
2	D	500	GNP	PB-O3A-PA-O2A
5	D	600	84D	C7-C6-O1-C3
5	C	600	84D	C11-C10-O3-C12
2	A	500	GNP	PB-O3A-PA-O1A

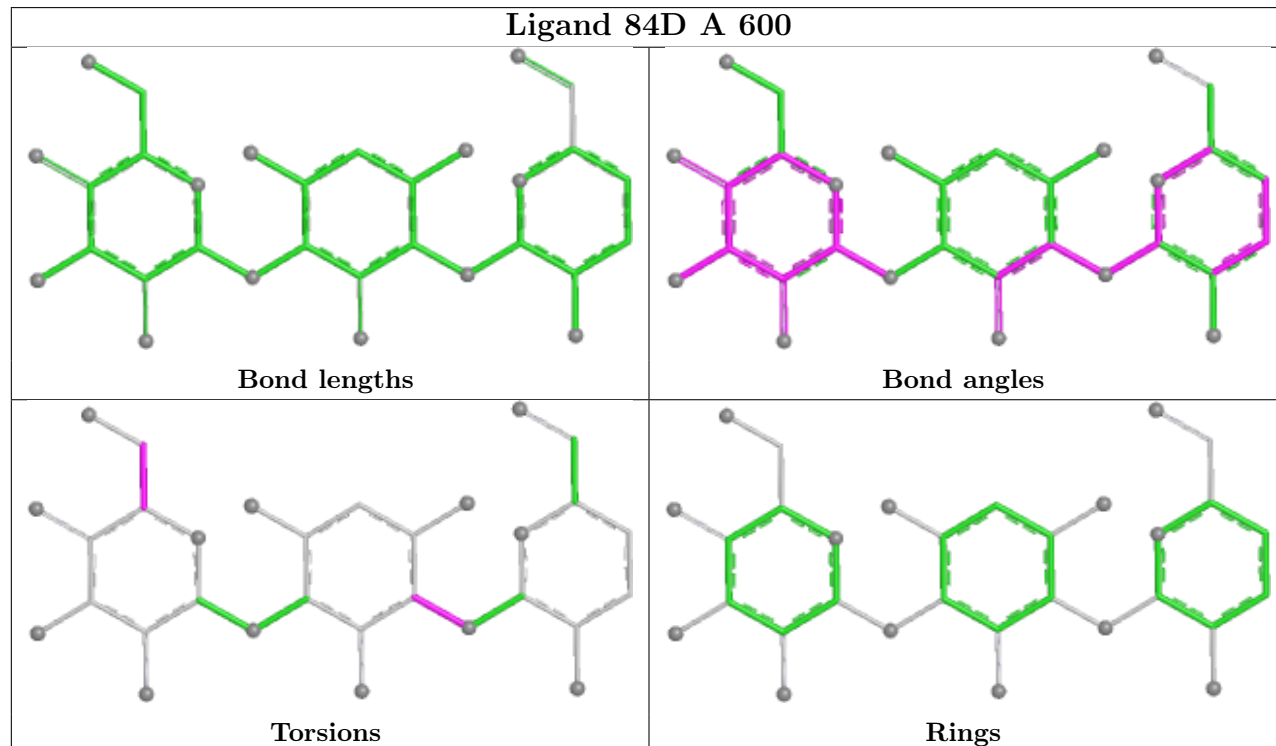
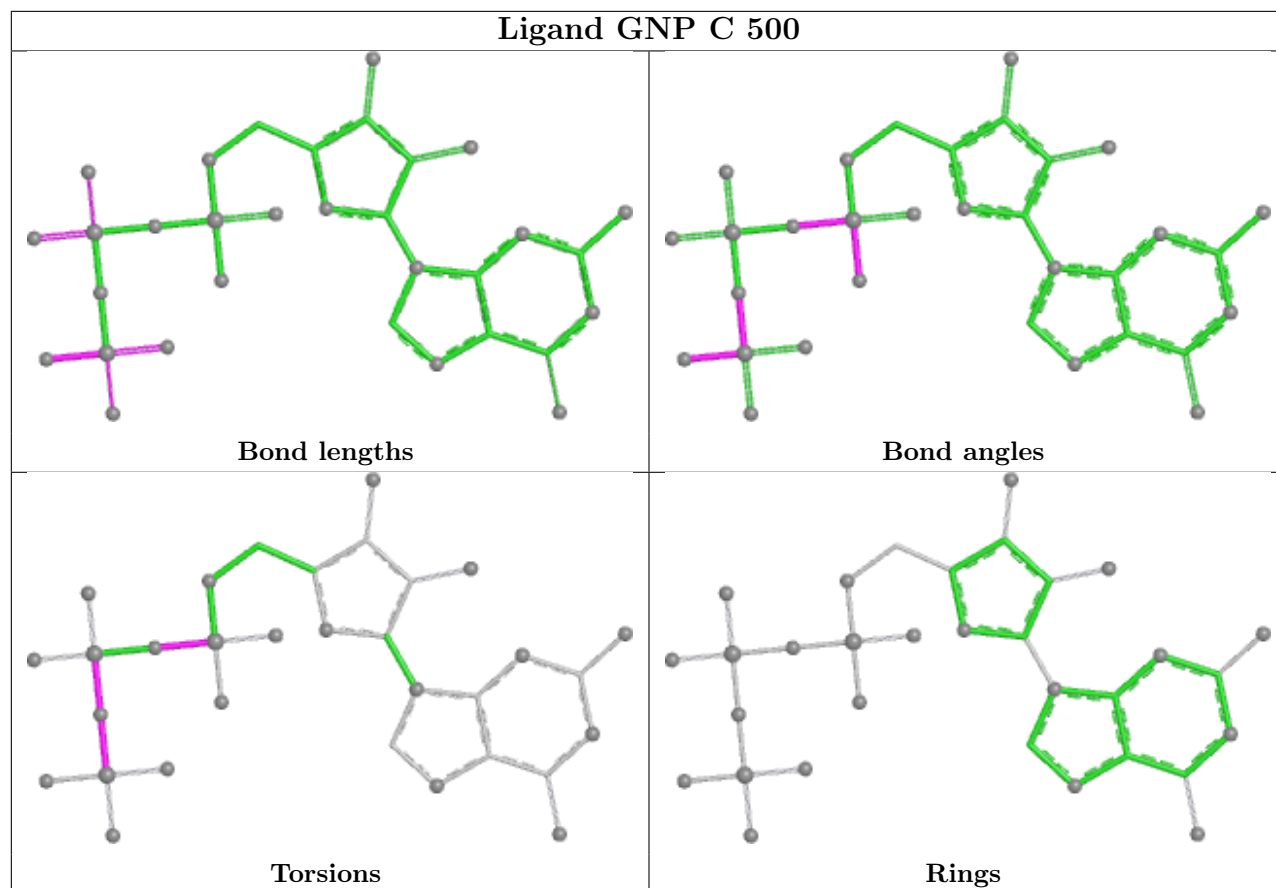
There are no ring outliers.

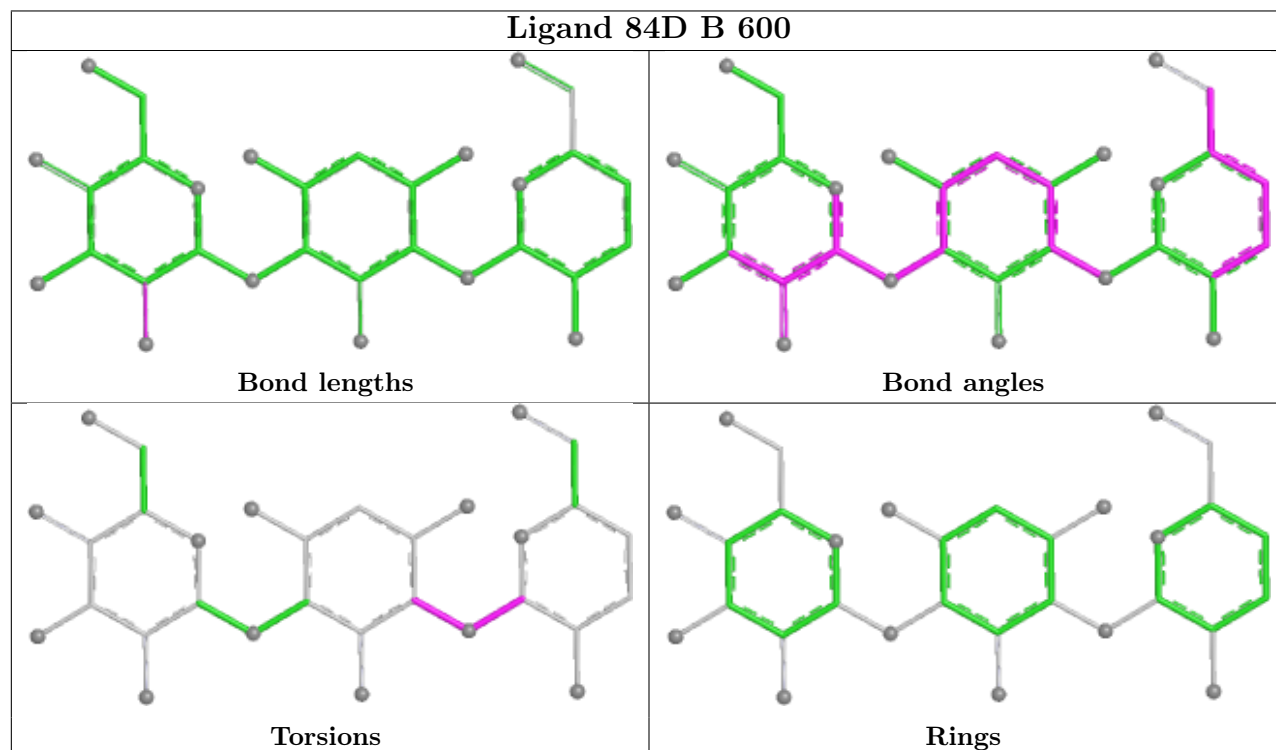
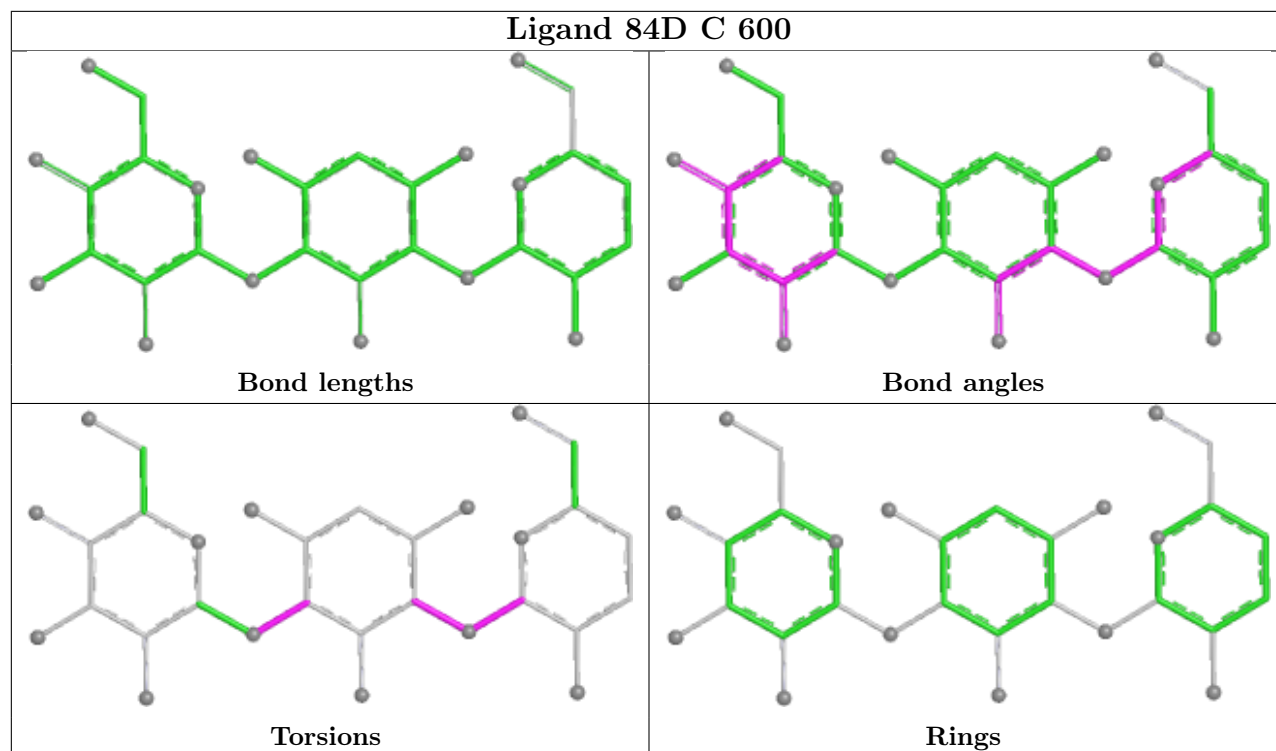
5 monomers are involved in 7 short contacts:

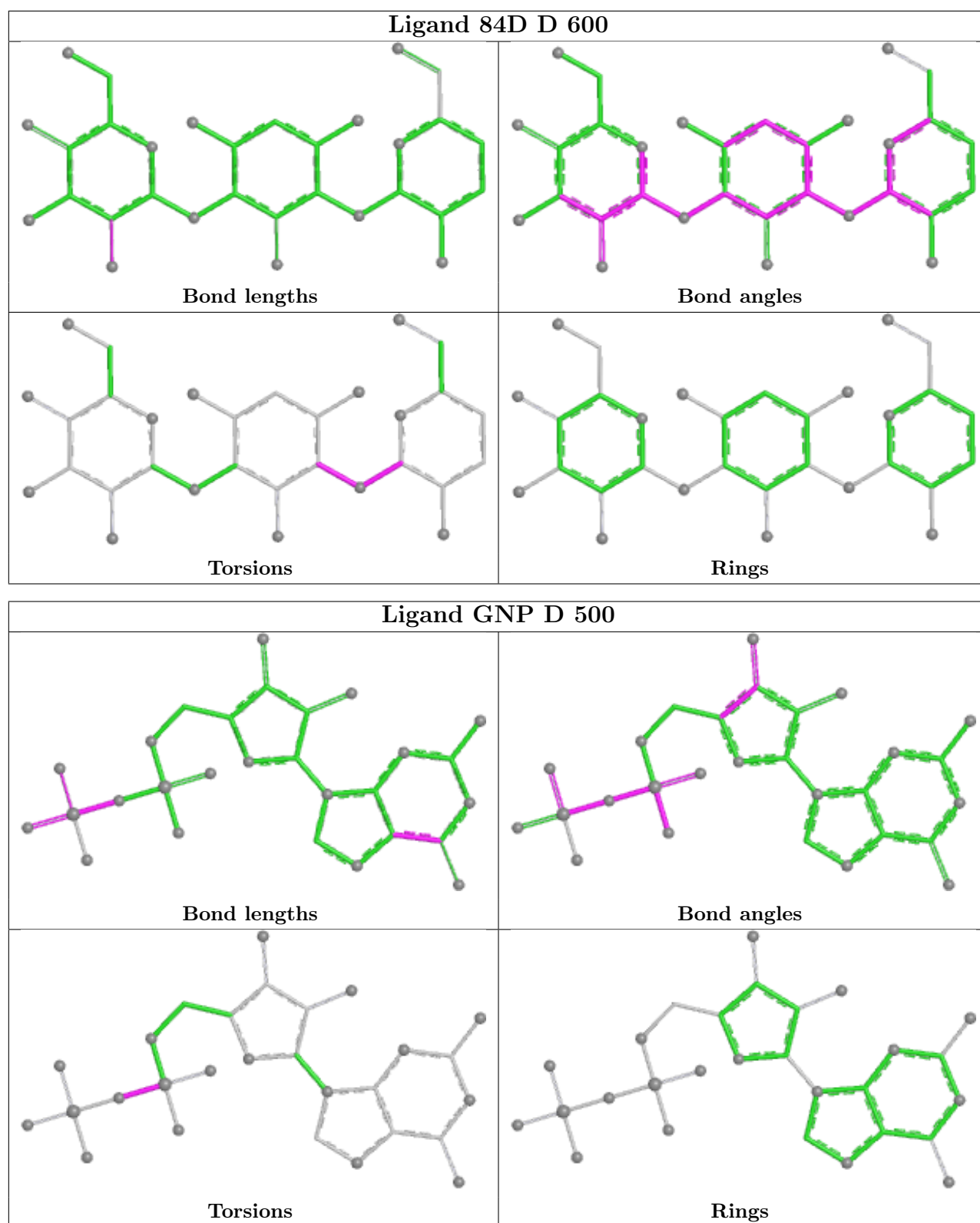
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	500	GNP	1	0
2	C	500	GNP	2	0
5	A	600	84D	2	0
5	B	600	84D	1	0
2	D	500	GNP	1	0

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









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	288/305 (94%)	-0.15	2 (0%) 84 82	40, 60, 84, 114	0
1	B	292/305 (95%)	-0.14	4 (1%) 73 69	39, 57, 85, 106	0
1	C	285/305 (93%)	-0.00	2 (0%) 84 82	36, 63, 98, 128	0
1	D	284/305 (93%)	-0.01	3 (1%) 78 74	49, 68, 94, 115	0
All	All	1149/1220 (94%)	-0.08	11 (0%) 79 76	36, 61, 92, 128	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	183	ALA	3.2
1	D	198	ASP	3.0
1	D	183	ALA	2.9
1	B	208	ILE	2.8
1	B	209	GLY	2.8
1	B	235	LYS	2.6
1	A	183	ALA	2.4
1	C	290	MET	2.2
1	D	210	SER	2.2
1	A	212	TYR	2.1
1	C	387	ARG	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 ⓘ

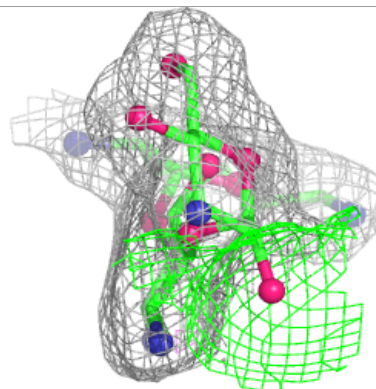
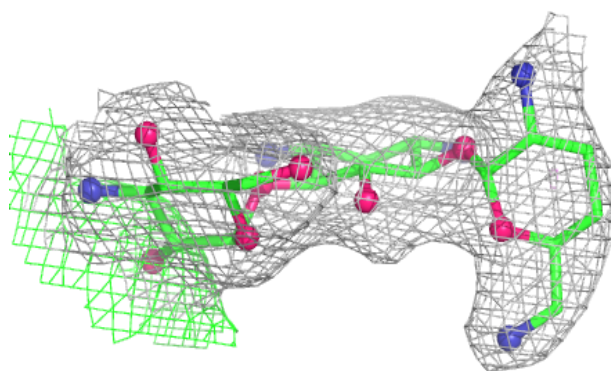
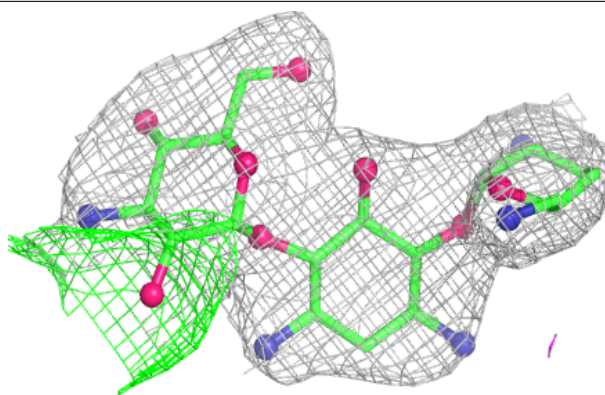
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	MG	D	702	1/1	0.77	0.25	59,59,59,59	0
3	MG	D	700	1/1	0.85	0.18	64,64,64,64	0
5	84D	D	600	31/31	0.85	0.08	47,55,62,62	0
5	84D	B	600	31/31	0.87	0.10	49,54,56,58	0
3	MG	B	702	1/1	0.89	0.07	69,69,69,69	0
5	84D	C	600	31/31	0.90	0.10	60,64,74,76	0
2	GNP	D	500	28/32	0.91	0.08	57,61,70,72	0
3	MG	B	700	1/1	0.93	0.17	52,52,52,52	0
3	MG	C	702	1/1	0.93	0.08	56,56,56,56	0
5	84D	A	600	31/31	0.93	0.08	52,57,65,66	0
3	MG	A	702	1/1	0.94	0.06	53,53,53,53	0
4	CL	B	802	1/1	0.94	0.08	85,85,85,85	0
3	MG	C	700	1/1	0.94	0.05	46,46,46,46	0
2	GNP	B	500	32/32	0.95	0.08	51,56,67,71	0
4	CL	C	802	1/1	0.95	0.07	69,69,69,69	0
2	GNP	A	500	32/32	0.96	0.07	45,51,58,59	0
4	CL	A	802	1/1	0.96	0.11	72,72,72,72	0
2	GNP	C	500	32/32	0.97	0.06	49,54,58,62	0
3	MG	A	700	1/1	1.00	0.02	48,48,48,48	0

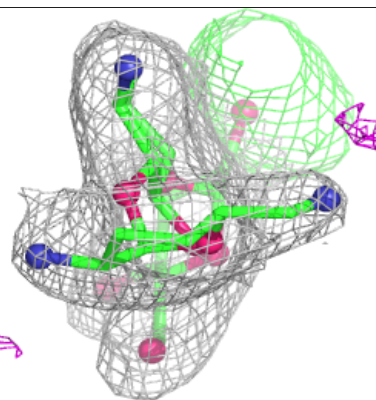
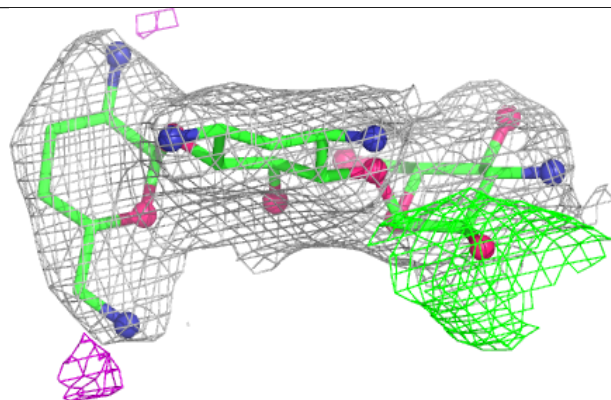
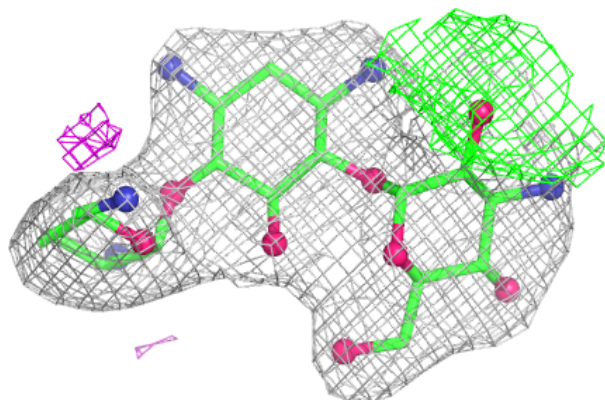
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 84D D 600:

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

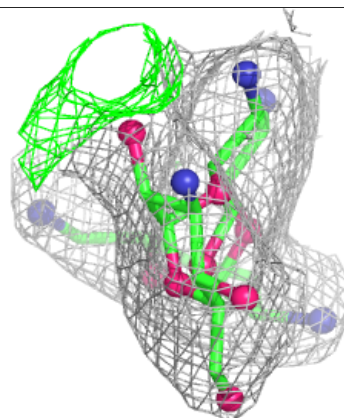
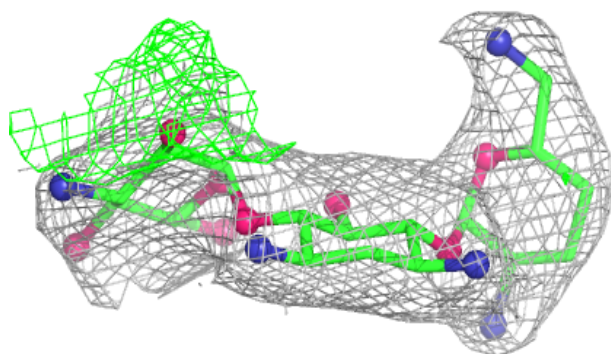
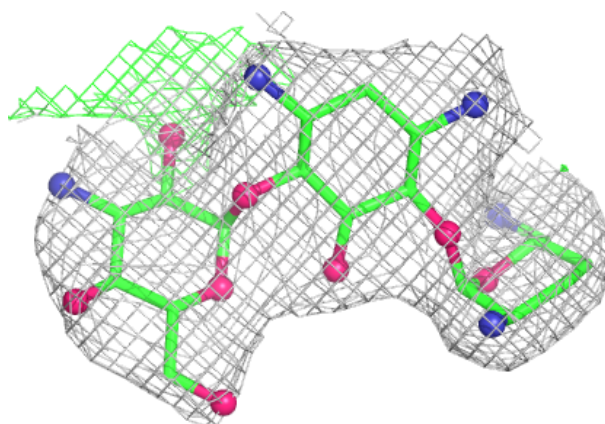
**Electron density around 84D B 600:**

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

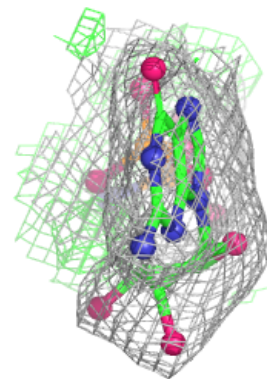
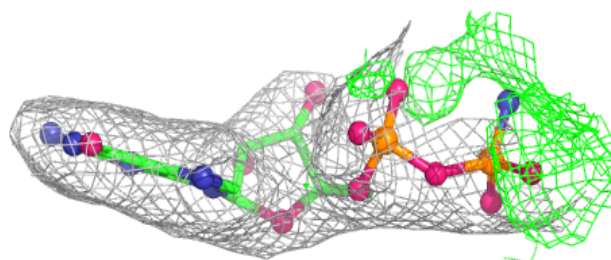
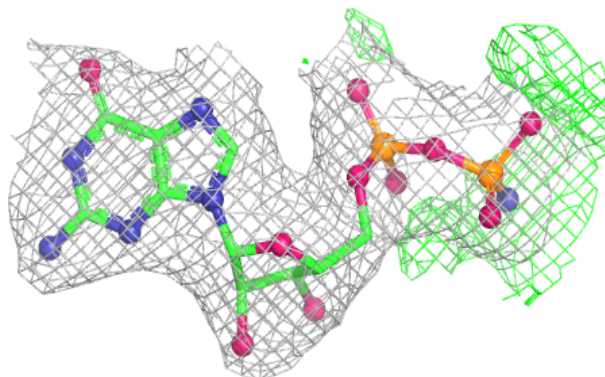


Electron density around 84D C 600:

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

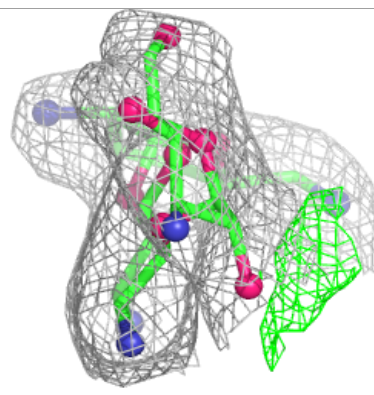
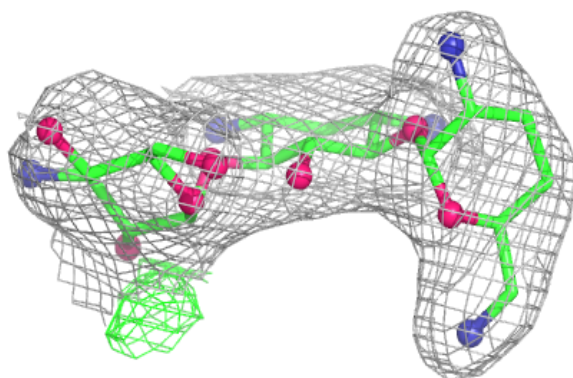
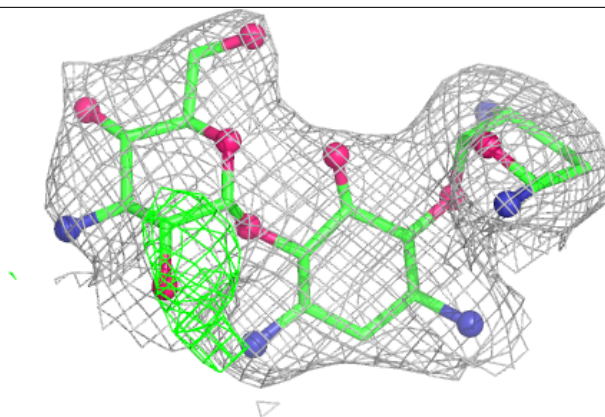
**Electron density around GNP D 500:**

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and green (positive)

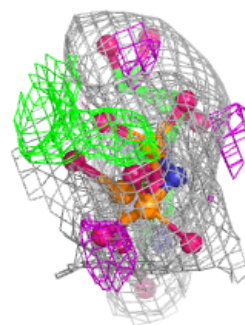
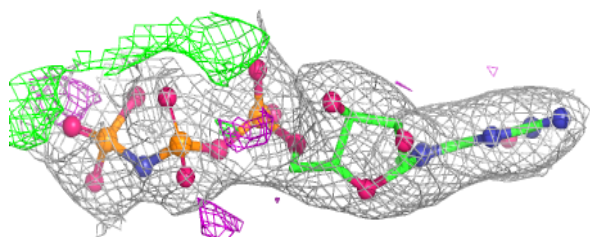
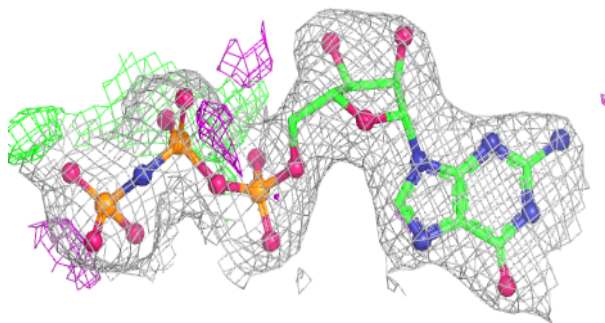


Electron density around 84D A 600:

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and green (positive)

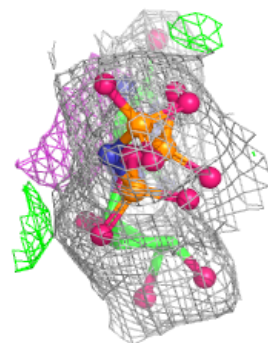
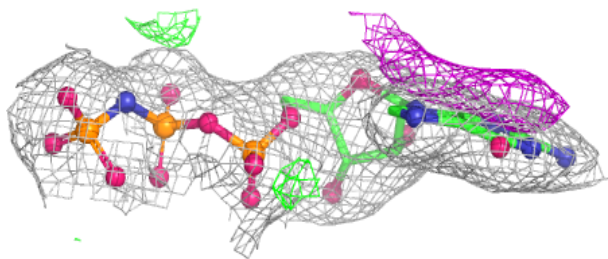
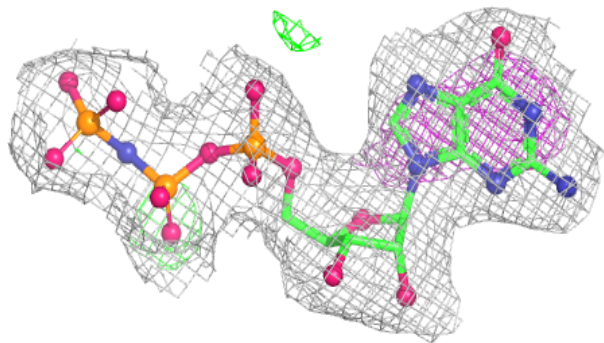
**Electron density around GNP B 500:**

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

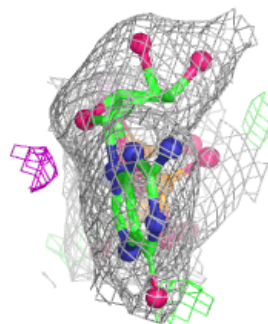
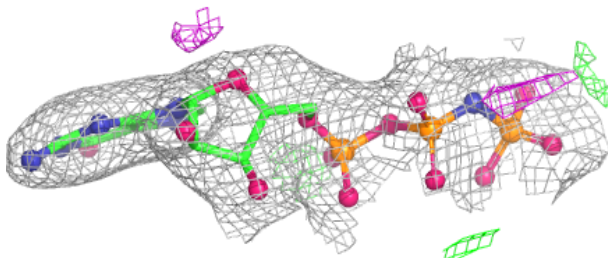
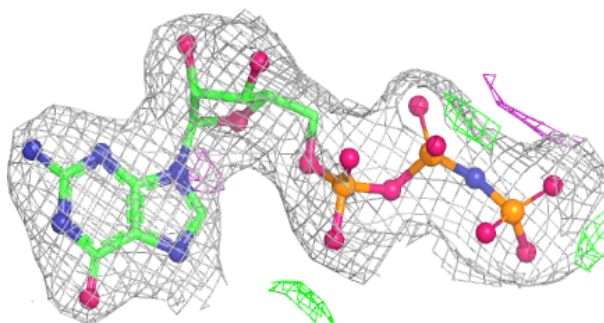


Electron density around GNP A 500:

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

**Electron density around GNP C 500:**

$2mF_o-DF_c$ (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.