



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 01:15 PM UTC

PDB ID : 6GPJ / pdb_00006gpj
Title : Crystal structure of human GDP-D-mannose 4,6-dehydratase in complex with GDP-4F-Man
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Deposited on : 2018-06-06
Resolution : 1.94 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

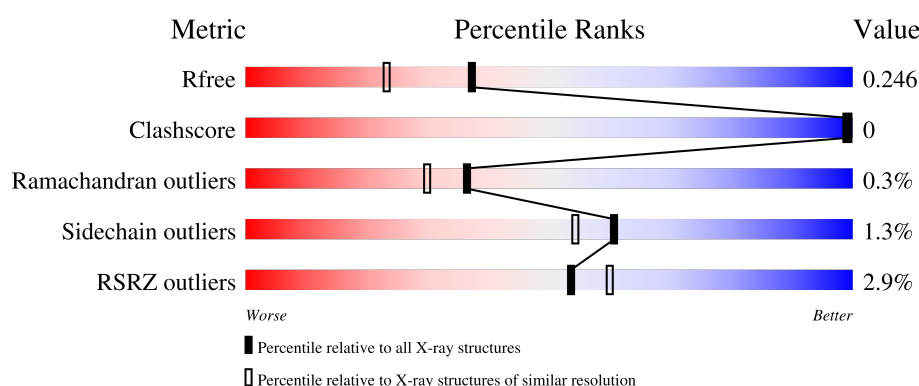
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.94 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	1452 (1.94-1.94)
Clashscore	190562	1494 (1.94-1.94)
Ramachandran outliers	187476	1479 (1.94-1.94)
Sidechain outliers	187428	1479 (1.94-1.94)
RSRZ outliers	180081	1453 (1.94-1.94)

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	352	3% 95% ..
1	B	352	2% 95% ..
1	C	352	4% 95% ..
1	D	352	3% 94% ..

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 11972 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.

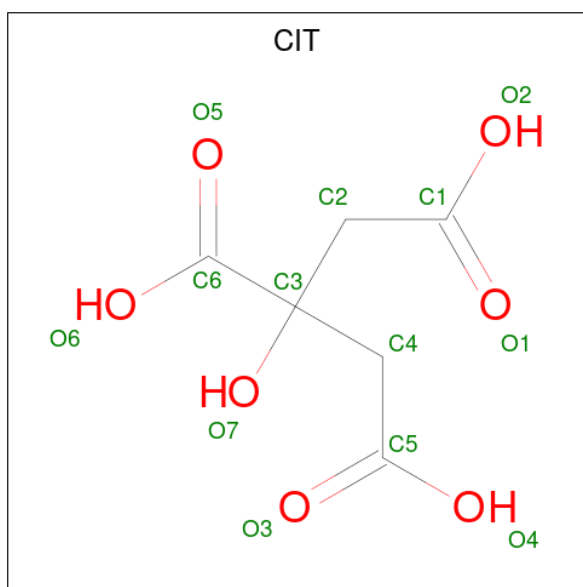
- Molecule 1 is a protein called GDP-mannose 4,6 dehydratase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	341	Total	C	N	O	S	0	0	0
			2703	1724	462	507	10			
1	D	342	Total	C	N	O	S	0	1	0
			2726	1742	466	508	10			
1	C	341	Total	C	N	O	S	0	1	0
			2714	1730	467	507	10			
1	B	341	Total	C	N	O	S	0	2	0
			2711	1729	464	507	11			

There are 8 discrepancies between the modelled and reference sequences:

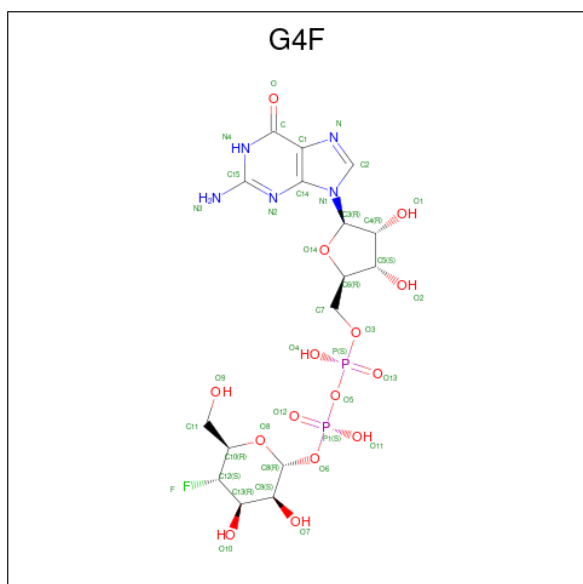
Chain	Residue	Modelled	Actual	Comment	Reference
A	21	SER	-	expression tag	UNP O60547
A	22	MET	-	expression tag	UNP O60547
D	21	SER	-	expression tag	UNP O60547
D	22	MET	-	expression tag	UNP O60547
C	21	SER	-	expression tag	UNP O60547
C	22	MET	-	expression tag	UNP O60547
B	21	SER	-	expression tag	UNP O60547
B	22	MET	-	expression tag	UNP O60547

- Molecule 2 is CITRIC ACID (CCD ID: CIT) (formula: C₆H₈O₇).



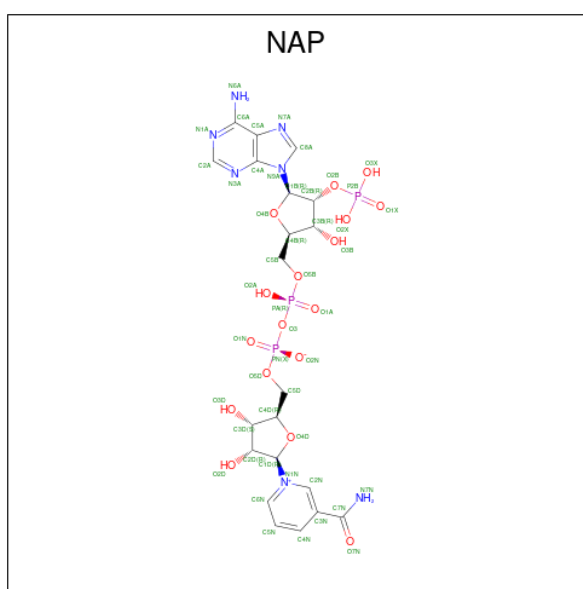
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			13	6	7		
2	B	1	Total	C	O	0	0
			13	6	7		

- Molecule 3 is [(2 {R},3 {S},4 {R},5 {R})-5-(2-azanyl-6-oxidanylidene-1 {H}-purin-9-yl)-3,4-bis(oxidanyl)oxolan-2-yl]methoxy-oxidanyl-phosphoryl [(2 {R},3 {S},4 {R},5 {S},6 {R})-5-fluoranyl-6-(hydroxymethyl)-3,4-bis(oxidanyl)oxan-2-yl] hydrogen phosphate (CCD ID: G4F) (formula: $C_{16}H_{24}FN_5O_{15}P_2$).



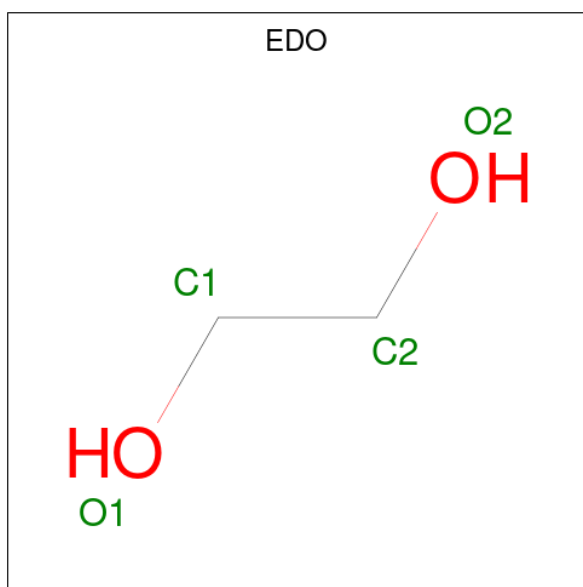
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total 39	C 16	F 1	N 5	O 15	P 2	0	0
3	D	1	Total 39	C 16	F 1	N 5	O 15	P 2	0	0
3	C	1	Total 39	C 16	F 1	N 5	O 15	P 2	0	0
3	B	1	Total 39	C 16	F 1	N 5	O 15	P 2	0	0

- Molecule 4 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$).



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

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



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

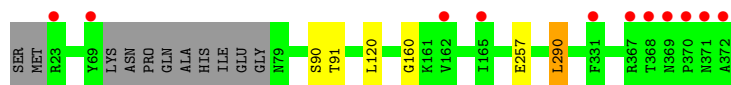
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	187	Total	O	0	0
			187	187		
6	D	173	Total	O	0	0
			173	173		
6	C	163	Total	O	0	0
			163	163		
6	B	213	Total	O	0	0
			213	213		

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: GDP-mannose 4,6 dehydratase



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4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	92.08Å 114.44Å 140.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	63.90 – 1.94 63.90 – 1.94	Depositor EDS
% Data completeness (in resolution range)	99.3 (63.90-1.94) 99.4 (63.90-1.94)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.70 (at 1.94Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.210 , 0.238 0.217 , 0.246	Depositor DCC
R_{free} test set	5309 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å ²)	22.3	Xtriage
Anisotropy	0.092	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 36.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11972	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 18.45% 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: CIT, EDO, G4F, NAP

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	0.74	1/2762 (0.0%)	0.84	0/3744
1	B	0.74	1/2777 (0.0%)	0.82	0/3763
1	C	0.71	1/2774 (0.0%)	0.83	0/3759
1	D	0.71	1/2786 (0.0%)	0.83	0/3773
All	All	0.73	4/11099 (0.0%)	0.83	0/15039

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	134	ARG	C-O	-7.21	1.15	1.24
1	C	145	ILE	CA-CB	5.43	1.61	1.54
1	A	290	LEU	C-O	-5.40	1.17	1.24
1	D	145	ILE	CA-CB	5.04	1.60	1.54

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2703	0	2625	4	0
1	B	2711	0	2640	1	0
1	C	2714	0	2644	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2726	0	2671	4	0
2	A	13	0	5	0	0
2	B	13	0	5	0	0
3	A	39	0	0	0	0
3	B	39	0	0	0	0
3	C	39	0	0	0	0
3	D	39	0	0	0	0
4	A	48	0	25	0	0
4	B	48	0	25	0	0
4	C	48	0	25	0	0
4	D	48	0	25	0	0
5	B	4	0	6	0	0
5	D	4	0	6	0	0
6	A	187	0	0	2	0
6	B	213	0	0	1	0
6	C	163	0	0	2	0
6	D	173	0	0	0	0
All	All	11972	0	10702	8	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 0.

All (8) 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:269:GLU:OE1	6:C:501:HOH:O	2.07	0.71
1:D:120:LEU:HD11	6:C:558:HOH:O	2.04	0.56
1:A:120:LEU:HD11	6:B:565:HOH:O	2.07	0.55
1:D:87:LEU:HD21	1:D:135[B]:LEU:HD11	1.92	0.52
6:A:522:HOH:O	1:B:120:LEU:HD21	2.11	0.50
1:A:90:SER:HB2	1:D:90:SER:HB2	1.99	0.45
1:A:91:THR:HG21	1:D:137:ASP:HB3	2.04	0.40
1:A:257:GLU:HB2	6:A:516:HOH:O	2.19	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	337/352 (96%)	331 (98%)	5 (2%)	1 (0%)	36	30
1	B	339/352 (96%)	335 (99%)	3 (1%)	1 (0%)	36	30
1	C	338/352 (96%)	332 (98%)	5 (2%)	1 (0%)	36	30
1	D	339/352 (96%)	333 (98%)	5 (2%)	1 (0%)	36	30
All	All	1353/1408 (96%)	1331 (98%)	18 (1%)	4 (0%)	36	30

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	160	GLY
1	A	160	GLY
1	B	160	GLY
1	C	160	GLY

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	286/304 (94%)	285 (100%)	1 (0%)	86	86
1	B	288/304 (95%)	283 (98%)	5 (2%)	53	44
1	C	288/304 (95%)	284 (99%)	4 (1%)	59	52
1	D	290/304 (95%)	285 (98%)	5 (2%)	53	44
All	All	1152/1216 (95%)	1137 (99%)	15 (1%)	61	54

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

Mol	Chain	Res	Type
1	A	290	LEU
1	D	66	GLU
1	D	111	GLN
1	D	145	ILE
1	D	290	LEU
1	D	364	GLU
1	C	111	GLN
1	C	120	LEU
1	C	145	ILE
1	C	267	GLU
1	B	111	GLN
1	B	120	LEU
1	B	290	LEU
1	B	291	HIS
1	B	352	ASP

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

Mol	Chain	Res	Type
1	A	234	GLN
1	D	192	ASN
1	B	146	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 ⓘ

12 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	NAP	D	403	-	50,52,52	1.30	6 (12%)	71,80,80	1.74	15 (21%)
5	EDO	D	401	-	3,3,3	0.93	0	2,2,2	0.61	0
4	NAP	C	402	-	50,52,52	1.32	7 (14%)	71,80,80	1.82	17 (23%)
3	G4F	D	402	-	41,42,42	0.71	1 (2%)	59,65,65	0.60	0
3	G4F	A	402	-	41,42,42	0.70	1 (2%)	59,65,65	0.59	0
4	NAP	B	404	-	50,52,52	1.41	8 (16%)	71,80,80	1.65	14 (19%)
3	G4F	B	403	-	41,42,42	0.61	1 (2%)	59,65,65	0.78	2 (3%)
4	NAP	A	403	-	50,52,52	1.06	2 (4%)	71,80,80	1.57	12 (16%)
5	EDO	B	401	-	3,3,3	0.89	0	2,2,2	0.55	0
2	CIT	B	402	-	12,12,12	1.08	0	17,17,17	1.59	3 (17%)
2	CIT	A	401	-	12,12,12	1.00	0	17,17,17	1.93	5 (29%)
3	G4F	C	401	-	41,42,42	0.75	1 (2%)	59,65,65	0.55	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
4	NAP	D	403	-	-	9/35/67/67	0/5/5/5
5	EDO	D	401	-	-	0/1/1/1	-
4	NAP	C	402	-	-	7/35/67/67	0/5/5/5
3	G4F	D	402	-	-	4/23/59/59	0/4/4/4
3	G4F	A	402	-	-	5/23/59/59	0/4/4/4
4	NAP	B	404	-	-	8/35/67/67	0/5/5/5
3	G4F	B	403	-	-	5/23/59/59	0/4/4/4
4	NAP	A	403	-	-	9/35/67/67	0/5/5/5
5	EDO	B	401	-	-	0/1/1/1	-
2	CIT	B	402	-	-	9/16/16/16	-
2	CIT	A	401	-	-	9/16/16/16	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	G4F	C	401	-	-	3/23/59/59	0/4/4/4

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	404	NAP	C5A-C4A	5.64	1.49	1.39
4	D	403	NAP	C5A-C4A	4.50	1.47	1.39
4	A	403	NAP	C5A-C4A	3.90	1.46	1.39
4	C	402	NAP	PN-O3	3.73	1.63	1.59
4	C	402	NAP	C5A-C4A	3.61	1.45	1.39
3	C	401	G4F	P1-O6	3.37	1.69	1.59
4	D	403	NAP	O4D-C1D	3.35	1.45	1.40
3	D	402	G4F	P1-O6	3.30	1.69	1.59
3	A	402	G4F	P1-O6	2.98	1.68	1.59
4	C	402	NAP	C4A-N9A	-2.83	1.31	1.37
4	B	404	NAP	PN-O3	2.82	1.62	1.59
4	C	402	NAP	O4D-C1D	2.81	1.44	1.40
4	B	404	NAP	C5A-N7A	-2.65	1.34	1.39
4	A	403	NAP	PN-O3	2.60	1.62	1.59
4	C	402	NAP	C5A-N7A	-2.53	1.34	1.39
4	D	403	NAP	C8A-N7A	2.52	1.36	1.31
4	D	403	NAP	P2B-O2B	2.52	1.63	1.59
4	C	402	NAP	C5A-C6A	2.47	1.47	1.41
4	D	403	NAP	C5A-N7A	-2.39	1.34	1.39
3	B	403	G4F	P1-O6	2.22	1.66	1.59
4	B	404	NAP	O4D-C1D	2.16	1.43	1.40
4	B	404	NAP	C4A-N9A	-2.11	1.33	1.37
4	B	404	NAP	P2B-O2B	2.10	1.63	1.59
4	B	404	NAP	C4A-N3A	2.09	1.38	1.34
4	B	404	NAP	C2A-N1A	2.04	1.37	1.33
4	D	403	NAP	PA-O3	2.01	1.61	1.59
4	C	402	NAP	PA-O3	2.00	1.61	1.59

All (68) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	403	NAP	C4A-N9A-C8A	5.13	111.12	105.74
4	B	404	NAP	N3A-C4A-N9A	5.02	135.70	127.17
4	D	403	NAP	N3A-C2A-N1A	-4.90	121.16	128.58
4	D	403	NAP	C5A-C4A-N3A	-4.85	120.04	126.72
4	A	403	NAP	N3A-C4A-N9A	4.85	135.41	127.17
4	B	404	NAP	C5A-C4A-N3A	-4.73	120.20	126.72

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	402	NAP	C4A-N9A-C8A	4.60	110.57	105.74
4	C	402	NAP	O4B-C1B-N9A	4.58	116.89	108.09
4	D	403	NAP	N3A-C4A-N9A	4.47	134.76	127.17
4	C	402	NAP	N3A-C2A-N1A	-4.41	121.91	128.58
4	C	402	NAP	N3A-C4A-N9A	4.40	134.65	127.17
2	A	401	CIT	C2-C3-C6	4.13	119.17	110.03
2	A	401	CIT	O7-C3-C6	-4.10	103.15	108.96
2	B	402	CIT	O6-C6-C3	3.97	120.76	113.14
4	C	402	NAP	C6N-N1N-C2N	-3.97	118.50	121.88
4	A	403	NAP	C5A-C4A-N3A	-3.94	121.29	126.72
4	B	404	NAP	C3N-C7N-N7N	3.83	122.46	117.74
4	C	402	NAP	C5N-C4N-C3N	-3.66	116.77	120.36
4	D	403	NAP	C4A-N9A-C8A	3.65	109.58	105.74
4	B	404	NAP	N3A-C2A-N1A	-3.63	123.08	128.58
4	C	402	NAP	C5A-C4A-N3A	-3.60	121.76	126.72
4	D	403	NAP	C2A-N3A-C4A	3.43	120.20	111.83
4	D	403	NAP	C2A-N1A-C6A	3.28	124.12	118.73
4	B	404	NAP	N6A-C6A-N1A	3.21	125.53	118.38
4	B	404	NAP	O7N-C7N-N7N	-3.10	118.13	122.62
4	C	402	NAP	C2A-N3A-C4A	3.07	119.34	111.83
4	C	402	NAP	C2A-N1A-C6A	3.05	123.75	118.73
4	A	403	NAP	C3B-C2B-C1B	-3.05	96.96	102.81
4	B	404	NAP	C2A-N3A-C4A	3.01	119.18	111.83
4	D	403	NAP	C3N-C7N-N7N	2.98	121.42	117.74
4	C	402	NAP	C3N-C7N-N7N	2.98	121.42	117.74
4	B	404	NAP	C4A-N9A-C8A	2.98	108.87	105.74
2	A	401	CIT	O6-C6-C3	2.94	118.78	113.14
4	C	402	NAP	O2B-P2B-O1X	-2.90	98.99	109.33
4	D	403	NAP	O7N-C7N-C3N	-2.87	116.08	119.60
4	C	402	NAP	N6A-C6A-N1A	2.81	124.63	118.38
3	B	403	G4F	O8-C10-C12	-2.77	104.22	108.83
4	B	404	NAP	O3X-P2B-O2X	2.76	118.15	107.80
4	D	403	NAP	O4B-C1B-N9A	2.75	113.36	108.09
4	D	403	NAP	C4A-C5A-N7A	-2.62	107.59	110.58
4	A	403	NAP	N3A-C2A-N1A	-2.60	124.64	128.58
4	B	404	NAP	C5A-C6A-N6A	-2.57	116.91	123.29
4	B	404	NAP	O4B-C1B-N9A	2.53	112.94	108.09
4	D	403	NAP	N6A-C6A-N1A	2.47	123.88	118.38
4	A	403	NAP	C2A-N3A-C4A	2.42	117.74	111.83
4	A	403	NAP	N9A-C8A-N7A	-2.42	110.51	113.94
4	D	403	NAP	N9A-C8A-N7A	-2.40	110.53	113.94
4	D	403	NAP	O2B-P2B-O1X	-2.38	100.86	109.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	403	NAP	O3D-C3D-C4D	-2.33	104.40	111.08
4	A	403	NAP	C5A-C4A-N9A	-2.31	103.29	105.81
4	D	403	NAP	C5A-N7A-C8A	2.30	107.06	103.45
3	B	403	G4F	O8-C8-O6	-2.29	108.38	111.36
4	B	404	NAP	C2A-N1A-C6A	2.28	122.48	118.73
4	A	403	NAP	O2N-PN-O3	2.25	113.35	107.27
4	D	403	NAP	O3D-C3D-C4D	-2.23	104.67	111.08
4	B	404	NAP	O2A-PA-O1A	2.22	122.78	112.44
2	A	401	CIT	O2-C1-C2	2.21	121.36	114.35
4	A	403	NAP	C2D-C3D-C4D	2.20	106.86	102.61
4	C	402	NAP	N9A-C8A-N7A	-2.13	110.92	113.94
4	A	403	NAP	O4B-C1B-N9A	2.09	112.11	108.09
4	B	404	NAP	C3B-C2B-C1B	-2.09	98.81	102.81
4	C	402	NAP	O4B-C1B-C2B	-2.08	103.01	106.59
2	B	402	CIT	C3-C2-C1	-2.06	108.29	113.92
2	A	401	CIT	C3-C4-C5	-2.05	108.31	113.92
4	C	402	NAP	C5A-C4A-N9A	-2.04	103.59	105.81
4	C	402	NAP	O3D-C3D-C4D	-2.03	105.24	111.08
2	B	402	CIT	O4-C5-C4	2.03	120.77	114.35
4	C	402	NAP	C5A-C6A-N6A	-2.02	118.29	123.29

There are no chirality outliers.

All (68) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	CIT	C2-C3-C6-O5
2	A	401	CIT	C2-C3-C6-O6
2	A	401	CIT	O7-C3-C6-O5
2	A	401	CIT	O7-C3-C6-O6
2	B	402	CIT	C2-C3-C4-C5
2	B	402	CIT	C6-C3-C4-C5
2	B	402	CIT	O7-C3-C6-O5
2	B	402	CIT	O7-C3-C6-O6
2	B	402	CIT	C4-C3-C6-O5
2	B	402	CIT	C4-C3-C6-O6
3	A	402	G4F	P1-O5-P-O3
3	A	402	G4F	C12-C10-C11-O9
3	D	402	G4F	C12-C10-C11-O9
3	C	401	G4F	C12-C10-C11-O9
3	B	403	G4F	C12-C10-C11-O9
4	A	403	NAP	O4D-C1D-N1N-C2N
4	A	403	NAP	O4D-C1D-N1N-C6N

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Mol	Chain	Res	Type	Atoms
4	A	403	NAP	C2D-C1D-N1N-C2N
4	A	403	NAP	C2D-C1D-N1N-C6N
4	D	403	NAP	C5D-O5D-PN-O2N
4	D	403	NAP	O4D-C1D-N1N-C2N
4	D	403	NAP	O4D-C1D-N1N-C6N
4	D	403	NAP	C2D-C1D-N1N-C6N
4	C	402	NAP	O4D-C1D-N1N-C2N
4	C	402	NAP	O4D-C1D-N1N-C6N
4	C	402	NAP	C2D-C1D-N1N-C2N
4	C	402	NAP	C2D-C1D-N1N-C6N
4	B	404	NAP	O4D-C1D-N1N-C2N
4	B	404	NAP	O4D-C1D-N1N-C6N
4	B	404	NAP	C2D-C1D-N1N-C2N
4	B	404	NAP	C2D-C1D-N1N-C6N
3	B	403	G4F	O8-C10-C11-O9
3	C	401	G4F	O8-C10-C11-O9
3	A	402	G4F	O8-C10-C11-O9
3	D	402	G4F	O8-C10-C11-O9
2	A	401	CIT	C1-C2-C3-O7
2	A	401	CIT	C1-C2-C3-C6
2	B	402	CIT	O7-C3-C4-C5
4	B	404	NAP	PN-O3-PA-O1A
2	A	401	CIT	C1-C2-C3-C4
3	D	402	G4F	P1-O5-P-O3
3	C	401	G4F	P1-O5-P-O3
3	B	403	G4F	P1-O5-P-O3
4	C	402	NAP	PN-O3-PA-O1A
3	B	403	G4F	C8-O6-P1-O5
4	A	403	NAP	C5D-O5D-PN-O3
4	A	403	NAP	PN-O3-PA-O1A
4	A	403	NAP	PN-O3-PA-O2A
4	D	403	NAP	PN-O3-PA-O1A
4	C	402	NAP	PN-O3-PA-O2A
4	B	404	NAP	PN-O3-PA-O2A
4	A	403	NAP	C2B-O2B-P2B-O3X
4	D	403	NAP	C2B-O2B-P2B-O3X
4	B	404	NAP	C2B-O2B-P2B-O3X
4	D	403	NAP	C2D-C1D-N1N-C2N
4	D	403	NAP	C2B-O2B-P2B-O1X
4	C	402	NAP	C2B-O2B-P2B-O1X
4	B	404	NAP	C2B-O2B-P2B-O1X
4	D	403	NAP	PN-O3-PA-O2A

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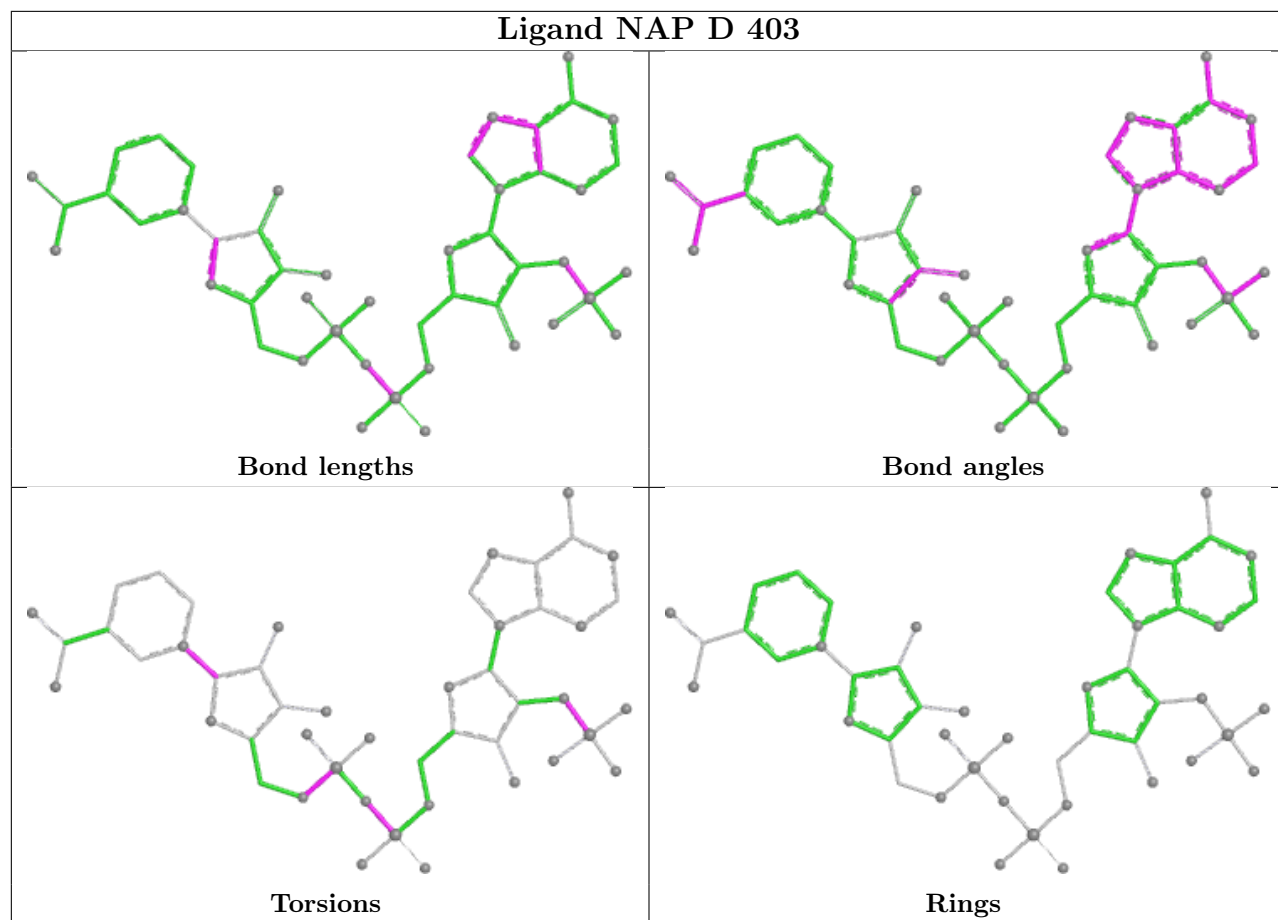
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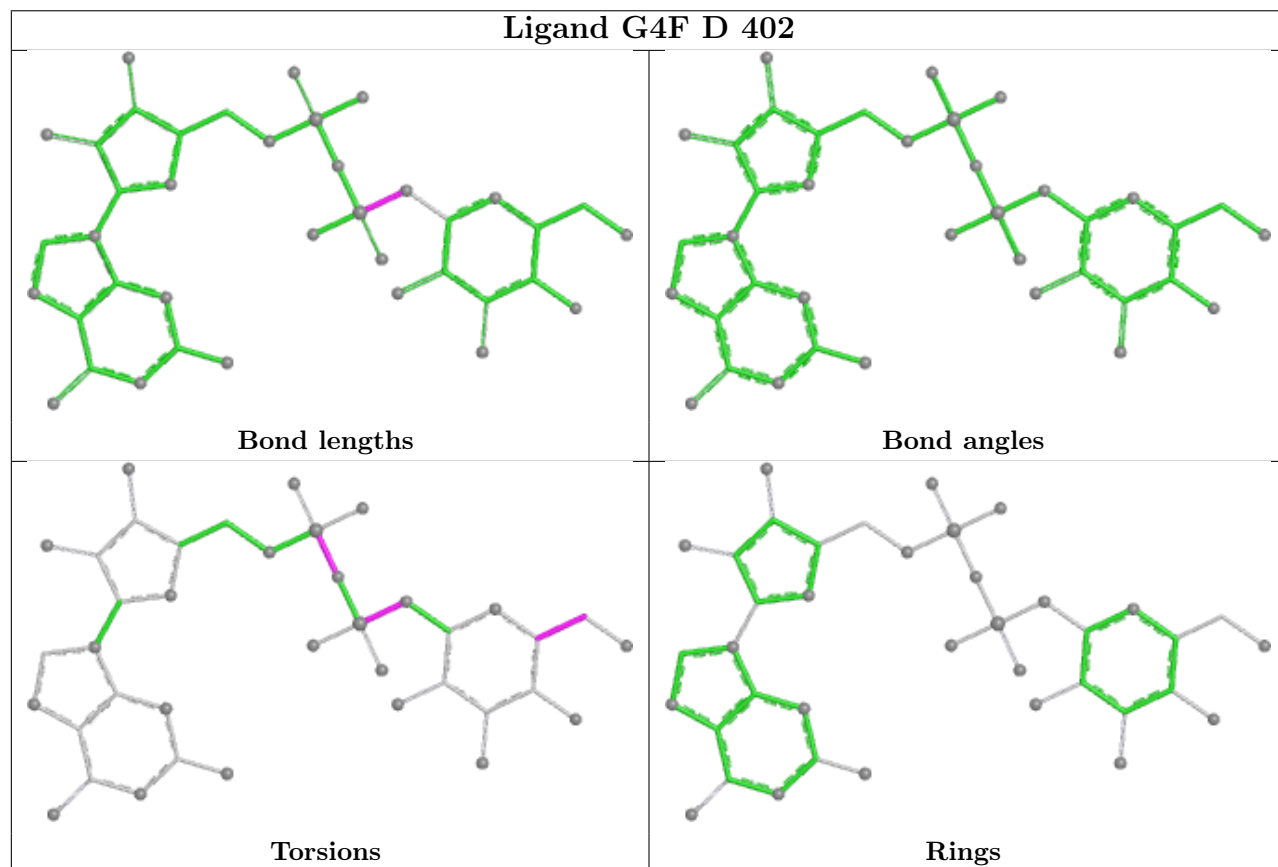
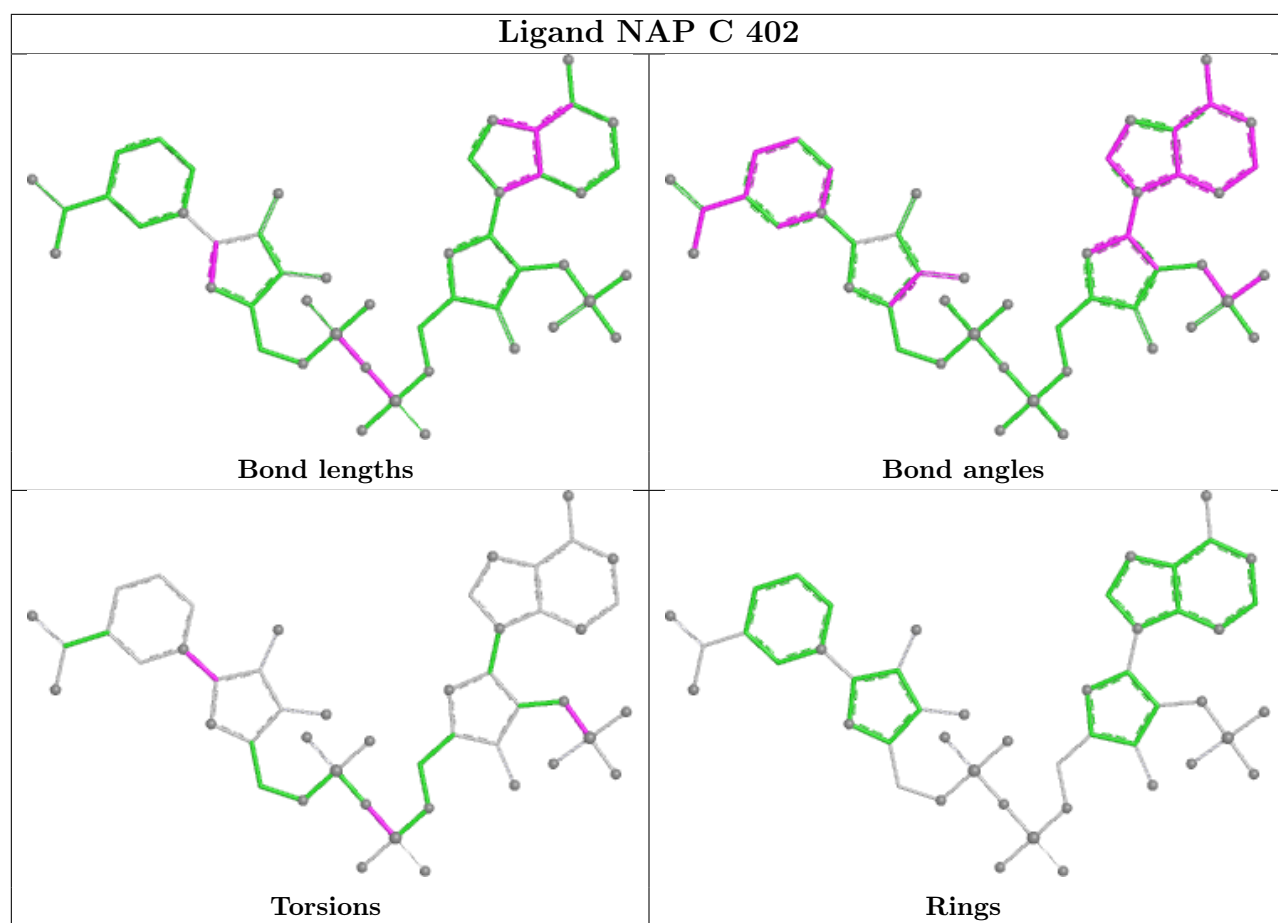
Mol	Chain	Res	Type	Atoms
2	B	402	CIT	C2-C3-C6-O5
3	D	402	G4F	C8-O6-P1-O11
3	B	403	G4F	C8-O6-P1-O11
2	A	401	CIT	O1-C1-C2-C3
3	A	402	G4F	P-O5-P1-O12
2	A	401	CIT	O2-C1-C2-C3
2	B	402	CIT	C2-C3-C6-O6
4	A	403	NAP	C2B-O2B-P2B-O1X
3	A	402	G4F	P-O5-P1-O11

There are no ring outliers.

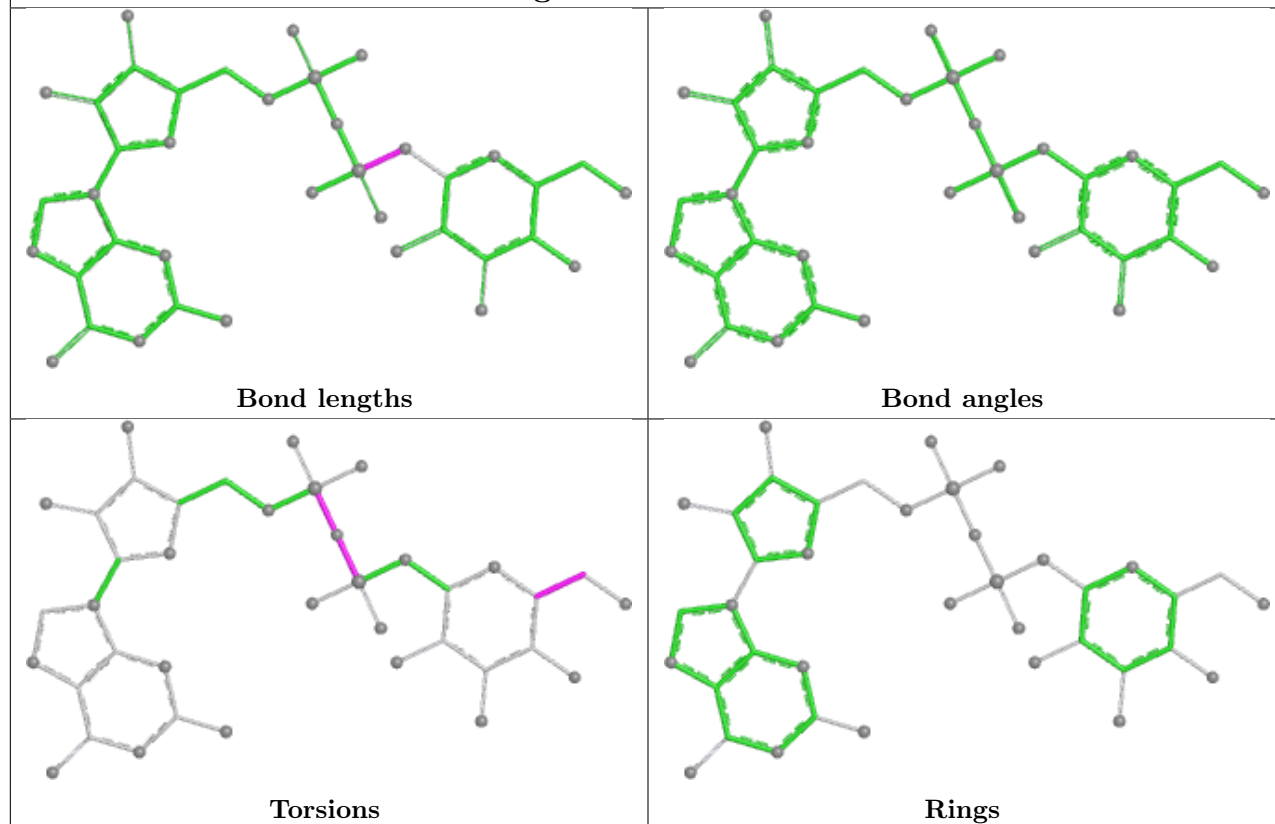
No monomer is involved in short contacts.

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

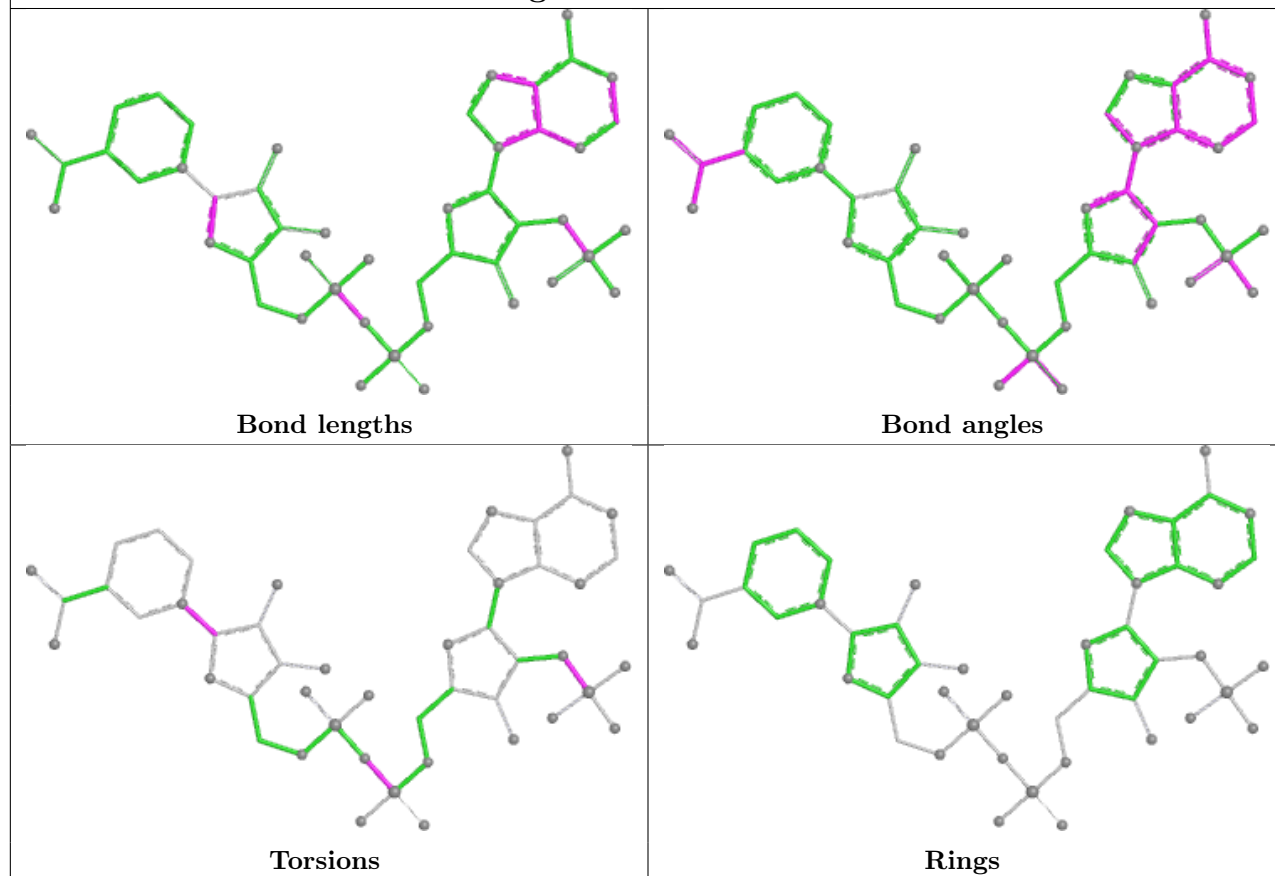




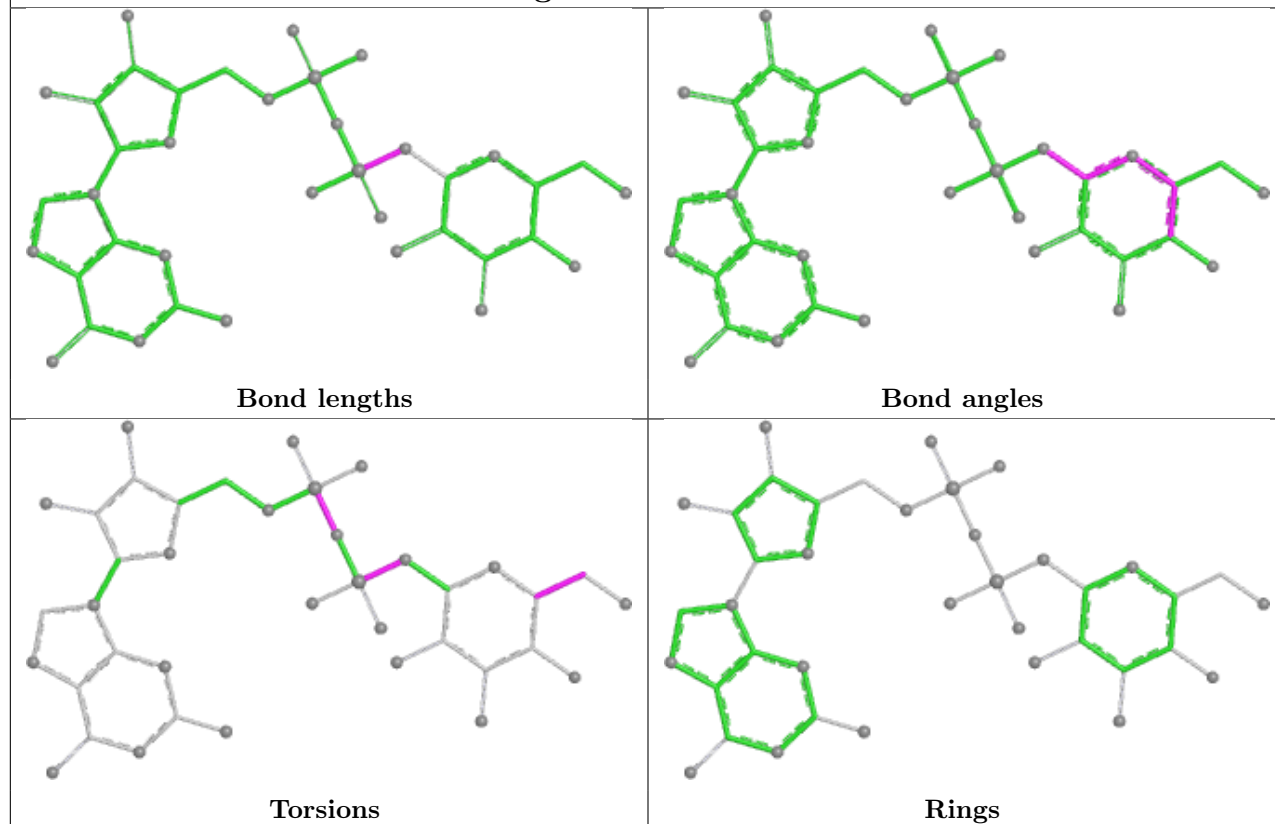
Ligand G4F A 402



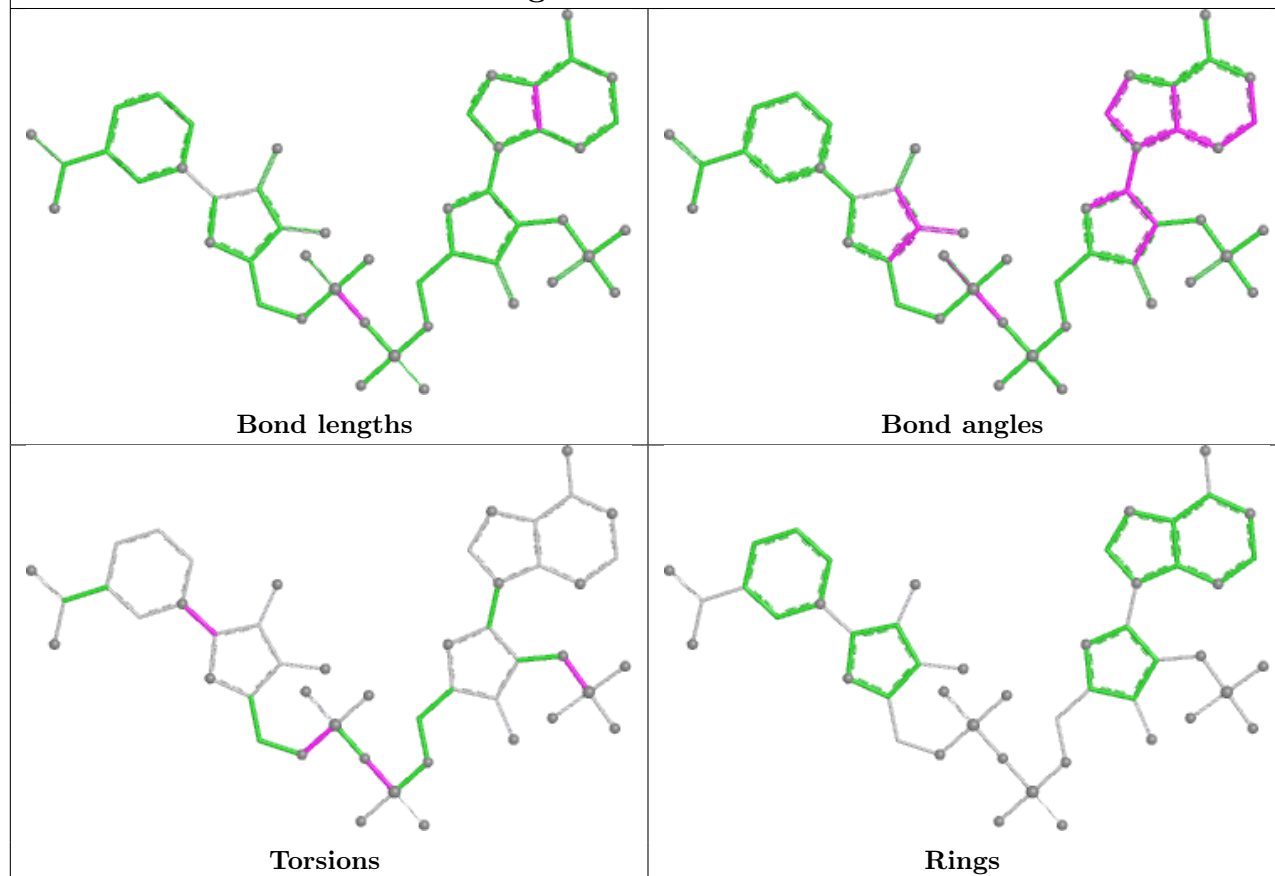
Ligand NAP B 404

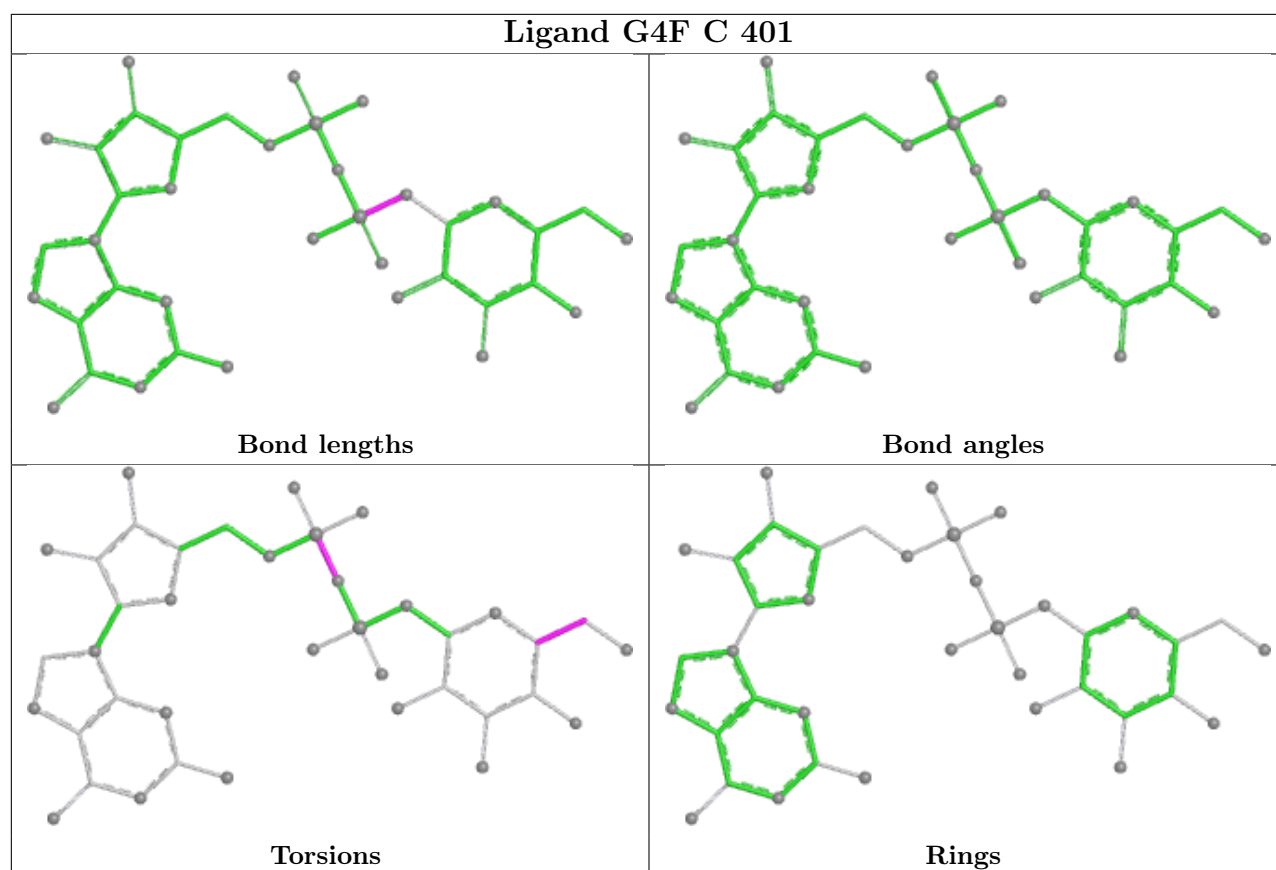


Ligand G4F B 403



Ligand NAP A 403





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	341/352 (96%)	0.25	11 (3%) 50 56	16, 25, 40, 68	0
1	B	341/352 (96%)	0.15	6 (1%) 67 74	15, 24, 41, 63	2 (0%)
1	C	341/352 (96%)	0.49	13 (3%) 44 49	16, 29, 49, 72	1 (0%)
1	D	342/352 (97%)	0.27	9 (2%) 57 64	10, 26, 43, 64	1 (0%)
All	All	1365/1408 (96%)	0.29	39 (2%) 53 60	10, 26, 45, 72	4 (0%)

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	372	ALA	6.0
1	A	368	THR	4.7
1	A	69	TYR	4.1
1	D	69	TYR	4.0
1	B	69	TYR	4.0
1	A	372	ALA	3.3
1	C	79	ASN	3.0
1	D	360	HIS	2.9
1	D	368	THR	2.9
1	D	91	THR	2.8
1	C	69	TYR	2.8
1	C	297	VAL	2.8
1	C	315	VAL	2.7
1	D	371	ASN	2.6
1	D	22	MET	2.6
1	C	312	THR	2.6
1	B	291	HIS	2.5
1	A	162	VAL	2.5
1	A	370	PRO	2.5
1	A	371	ASN	2.4
1	B	368	THR	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	372	ALA	2.3
1	D	370	PRO	2.3
1	A	369	ASN	2.2
1	C	232	LEU	2.2
1	A	165	ILE	2.2
1	D	79	ASN	2.2
1	C	370	PRO	2.2
1	A	23	ARG	2.2
1	A	331	PHE	2.1
1	B	355	VAL	2.1
1	B	266	ASP	2.1
1	C	351	PHE	2.0
1	C	235	LEU	2.0
1	A	367	ARG	2.0
1	C	348	ARG	2.0
1	B	348	ARG	2.0
1	C	368	THR	2.0
1	C	146	ASN	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	CIT	A	401	13/13	0.75	0.14	36,51,60,65	0
5	EDO	D	401	4/4	0.77	0.18	35,38,40,41	0
2	CIT	B	402	13/13	0.80	0.13	38,49,65,69	0
5	EDO	B	401	4/4	0.81	0.18	32,38,40,41	0
3	G4F	C	401	39/39	0.95	0.07	22,27,34,38	0

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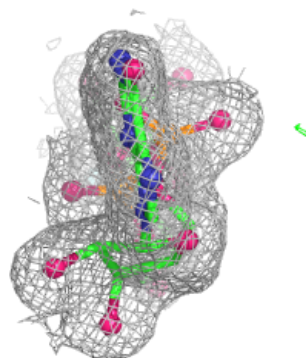
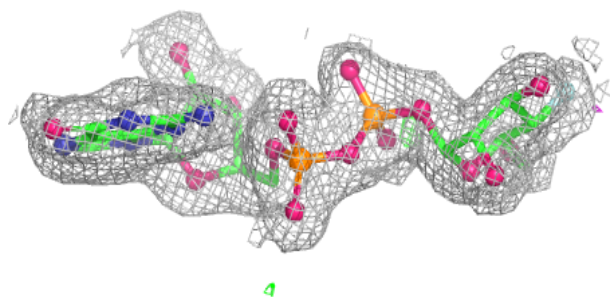
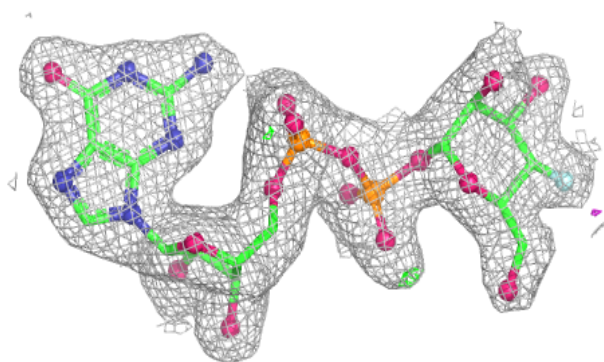
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	G4F	B	403	39/39	0.97	0.05	16,18,26,30	0
4	NAP	D	403	48/48	0.97	0.05	17,19,21,23	0
4	NAP	C	402	48/48	0.97	0.06	18,22,24,25	0
3	G4F	D	402	39/39	0.97	0.06	18,22,31,39	0
3	G4F	A	402	39/39	0.97	0.06	17,20,28,38	0
4	NAP	A	403	48/48	0.98	0.05	15,18,20,20	0
4	NAP	B	404	48/48	0.98	0.05	15,18,20,22	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.

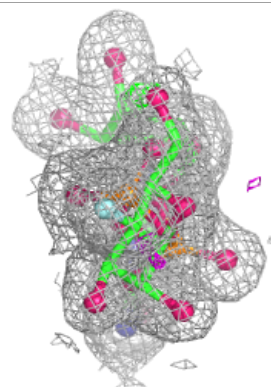
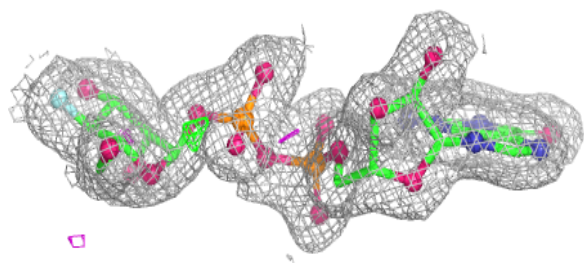
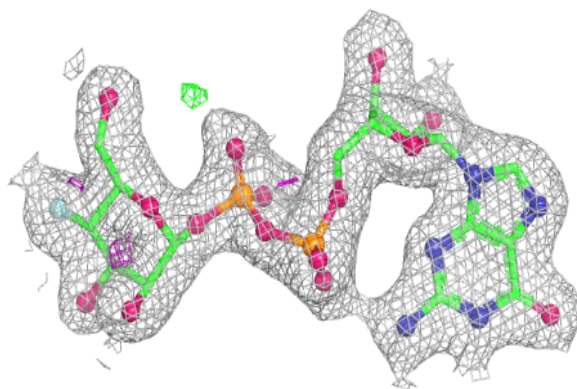
Electron density around G4F C 401:

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

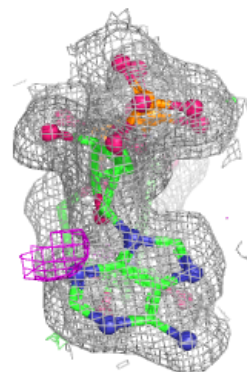
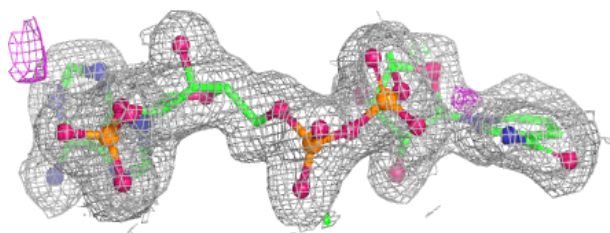
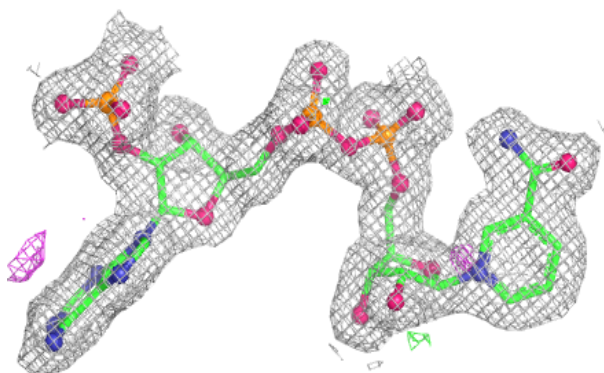


Electron density around G4F B 403:

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

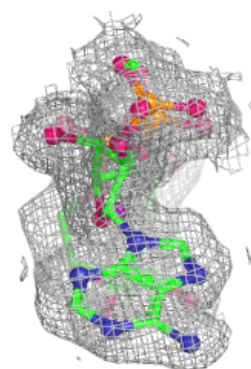
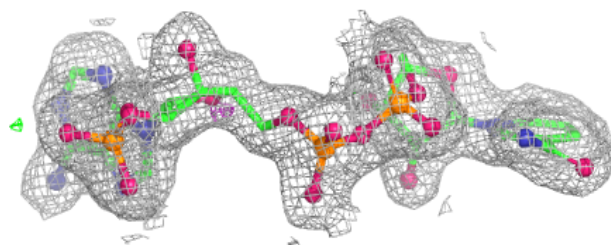
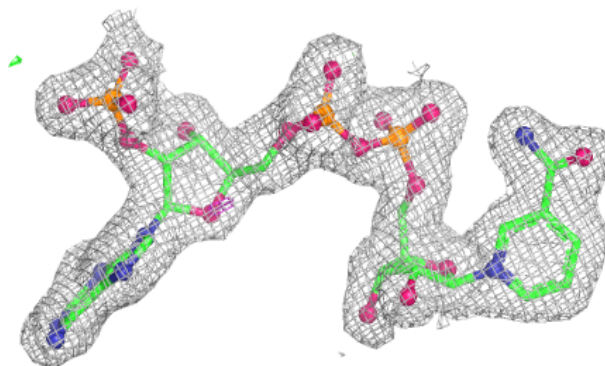
**Electron density around NAP D 403:**

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

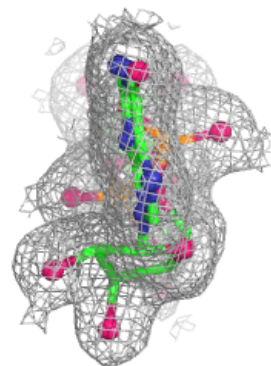
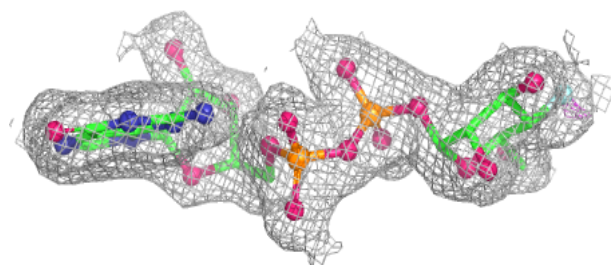
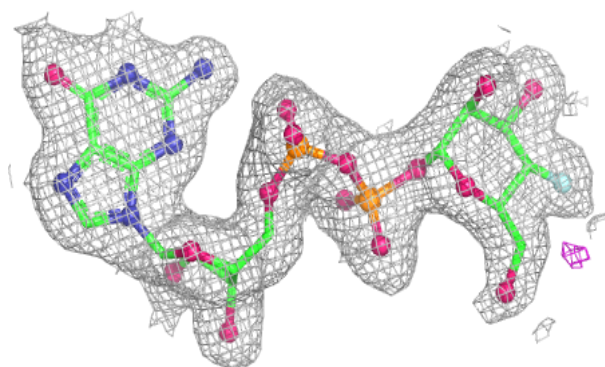


Electron density around NAP C 402:

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

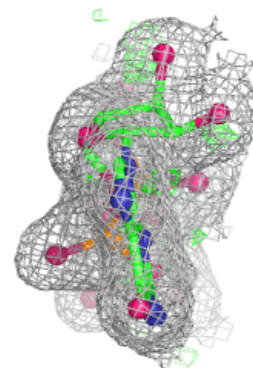
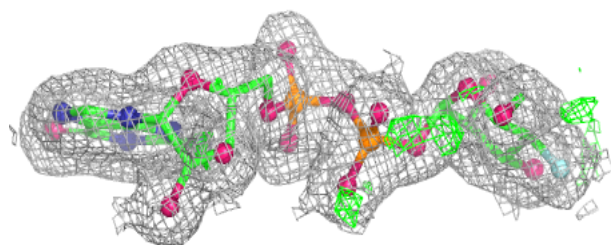
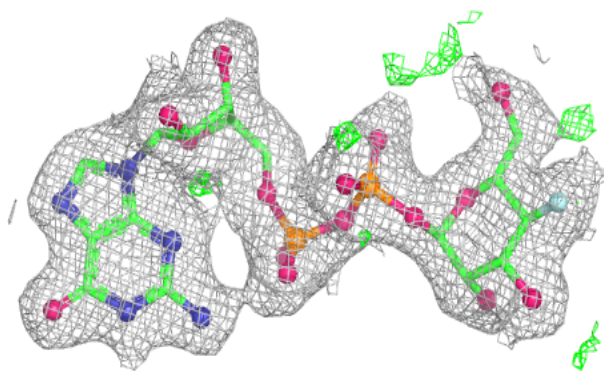
**Electron density around G4F D 402:**

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

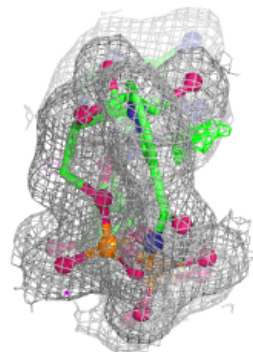
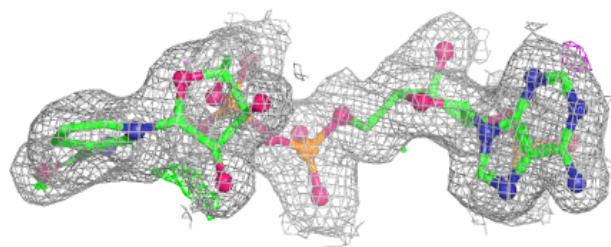
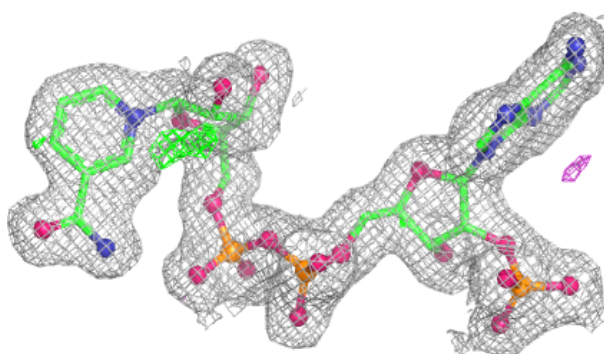


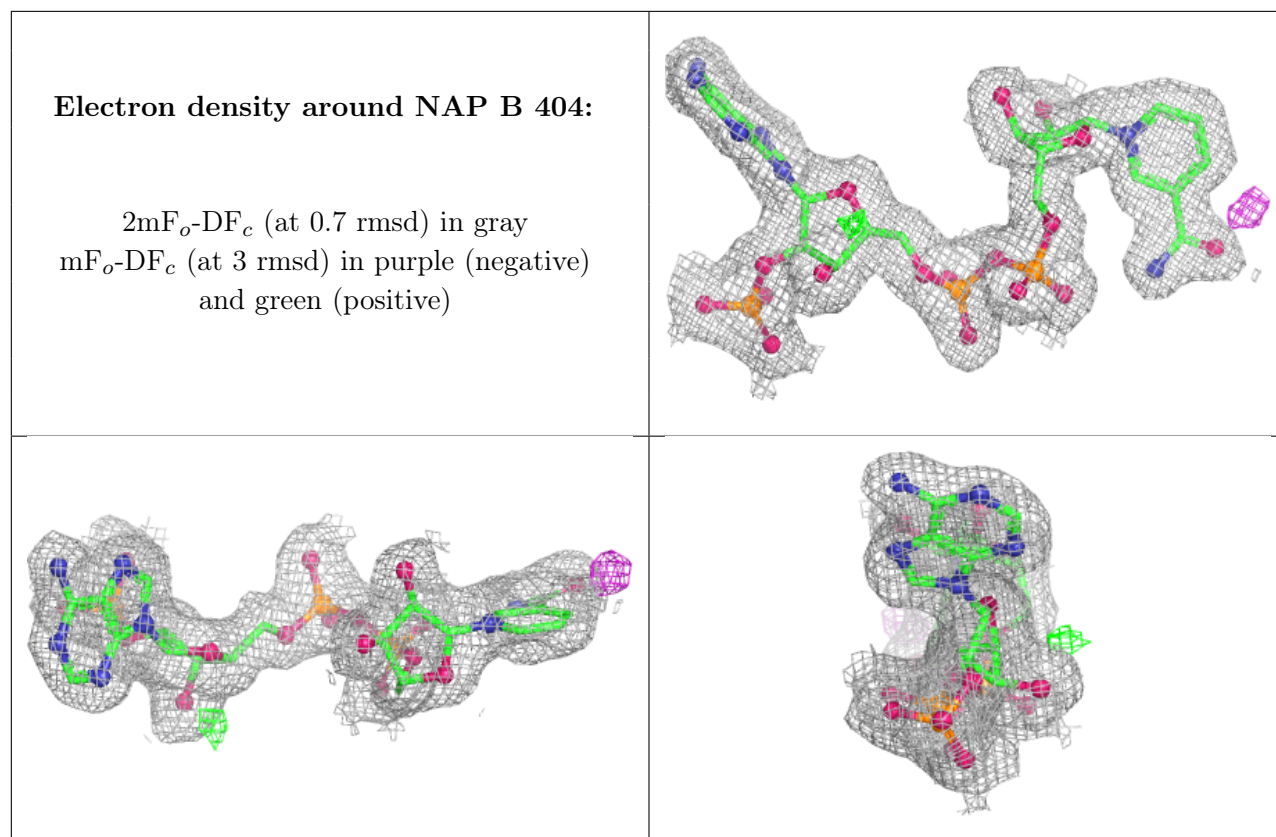
Electron density around G4F A 402:

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

**Electron density around NAP A 403:**

$2mF_o-DF_c$ (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.