



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 26, 2023 – 10:26 PM JST

PDB ID : 8HRP
Title : Crystal structure of glyceraldehyde-3-phosphate dehydrogenase from *Corynebacterium glutamicum* ATCC13032 in complex with NAD and G3P
Authors : Son, H.F.; Kim, K.J.
Deposited on : 2022-12-15
Resolution : 1.99 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

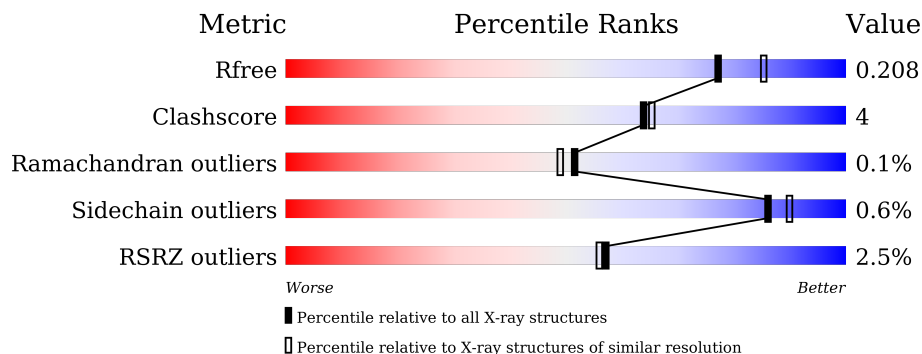
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.99 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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	342	 90% 7% ..
1	B	342	 91% 7% .
1	C	342	 89% 9% .
1	D	342	 2% 88% 10% .
1	E	342	 2% 90% 7% .
1	F	342	 5% 88% 9% .

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Mol	Chain	Length	Quality of chain
1	G	342	
1	H	342	

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
3	G3H	B	402	-	-	X	-
3	G3H	C	402	-	-	X	-
3	G3H	D	402	-	-	X	-
3	G3H	E	402	-	-	X	-
3	G3H	G	402	-	-	X	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 22219 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 Glyceraldehyde-3-phosphate dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	334	Total 2537	C 1590	N 439	O 502	S 6	0	0	0
1	B	334	Total 2537	C 1590	N 439	O 502	S 6	0	0	0
1	C	335	Total 2546	C 1595	N 440	O 505	S 6	0	0	0
1	D	334	Total 2537	C 1590	N 439	O 502	S 6	0	0	0
1	E	333	Total 2529	C 1584	N 438	O 501	S 6	0	0	0
1	F	333	Total 2529	C 1584	N 438	O 501	S 6	0	0	0
1	G	333	Total 2529	C 1584	N 438	O 501	S 6	0	0	0
1	H	333	Total 2529	C 1584	N 438	O 501	S 6	0	0	0

There are 64 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	335	LEU	-	expression tag	UNP Q01651
A	336	GLU	-	expression tag	UNP Q01651
A	337	HIS	-	expression tag	UNP Q01651
A	338	HIS	-	expression tag	UNP Q01651
A	339	HIS	-	expression tag	UNP Q01651
A	340	HIS	-	expression tag	UNP Q01651
A	341	HIS	-	expression tag	UNP Q01651
A	342	HIS	-	expression tag	UNP Q01651
B	335	LEU	-	expression tag	UNP Q01651
B	336	GLU	-	expression tag	UNP Q01651
B	337	HIS	-	expression tag	UNP Q01651
B	338	HIS	-	expression tag	UNP Q01651
B	339	HIS	-	expression tag	UNP Q01651

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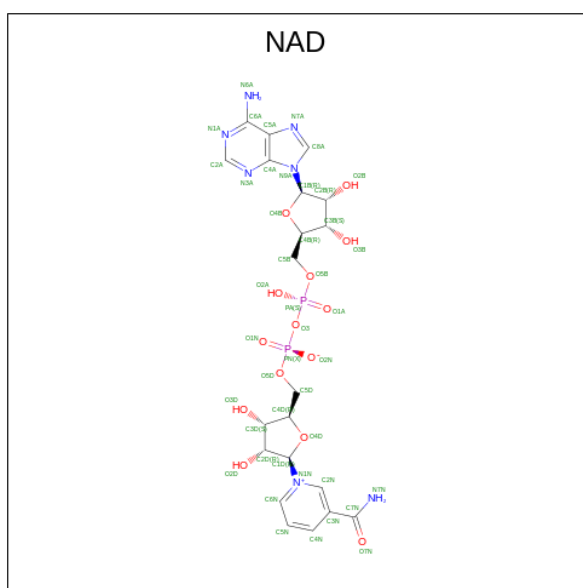
Chain	Residue	Modelled	Actual	Comment	Reference
B	340	HIS	-	expression tag	UNP Q01651
B	341	HIS	-	expression tag	UNP Q01651
B	342	HIS	-	expression tag	UNP Q01651
C	335	LEU	-	expression tag	UNP Q01651
C	336	GLU	-	expression tag	UNP Q01651
C	337	HIS	-	expression tag	UNP Q01651
C	338	HIS	-	expression tag	UNP Q01651
C	339	HIS	-	expression tag	UNP Q01651
C	340	HIS	-	expression tag	UNP Q01651
C	341	HIS	-	expression tag	UNP Q01651
C	342	HIS	-	expression tag	UNP Q01651
D	335	LEU	-	expression tag	UNP Q01651
D	336	GLU	-	expression tag	UNP Q01651
D	337	HIS	-	expression tag	UNP Q01651
D	338	HIS	-	expression tag	UNP Q01651
D	339	HIS	-	expression tag	UNP Q01651
D	340	HIS	-	expression tag	UNP Q01651
D	341	HIS	-	expression tag	UNP Q01651
D	342	HIS	-	expression tag	UNP Q01651
E	335	LEU	-	expression tag	UNP Q01651
E	336	GLU	-	expression tag	UNP Q01651
E	337	HIS	-	expression tag	UNP Q01651
E	338	HIS	-	expression tag	UNP Q01651
E	339	HIS	-	expression tag	UNP Q01651
E	340	HIS	-	expression tag	UNP Q01651
E	341	HIS	-	expression tag	UNP Q01651
E	342	HIS	-	expression tag	UNP Q01651
F	335	LEU	-	expression tag	UNP Q01651
F	336	GLU	-	expression tag	UNP Q01651
F	337	HIS	-	expression tag	UNP Q01651
F	338	HIS	-	expression tag	UNP Q01651
F	339	HIS	-	expression tag	UNP Q01651
F	340	HIS	-	expression tag	UNP Q01651
F	341	HIS	-	expression tag	UNP Q01651
F	342	HIS	-	expression tag	UNP Q01651
G	335	LEU	-	expression tag	UNP Q01651
G	336	GLU	-	expression tag	UNP Q01651
G	337	HIS	-	expression tag	UNP Q01651
G	338	HIS	-	expression tag	UNP Q01651
G	339	HIS	-	expression tag	UNP Q01651
G	340	HIS	-	expression tag	UNP Q01651
G	341	HIS	-	expression tag	UNP Q01651

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Chain	Residue	Modelled	Actual	Comment	Reference
G	342	HIS	-	expression tag	UNP Q01651
H	335	LEU	-	expression tag	UNP Q01651
H	336	GLU	-	expression tag	UNP Q01651
H	337	HIS	-	expression tag	UNP Q01651
H	338	HIS	-	expression tag	UNP Q01651
H	339	HIS	-	expression tag	UNP Q01651
H	340	HIS	-	expression tag	UNP Q01651
H	341	HIS	-	expression tag	UNP Q01651
H	342	HIS	-	expression tag	UNP Q01651

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula: C₂₁H₂₇N₇O₁₄P₂) (labeled as "Ligand of Interest" by depositor).



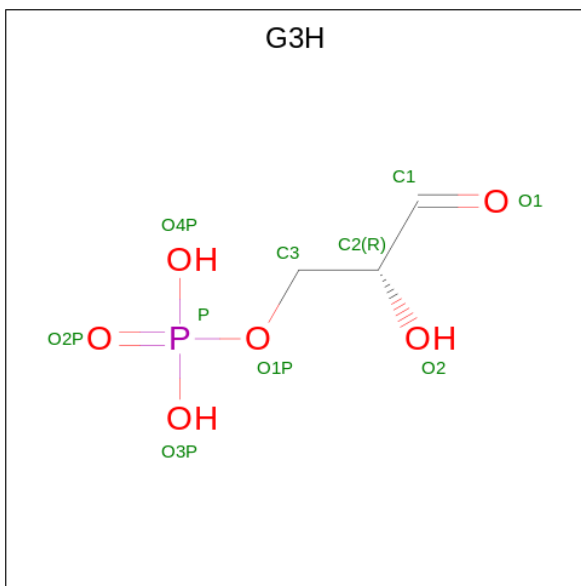
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	C	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	D	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	E	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	F	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

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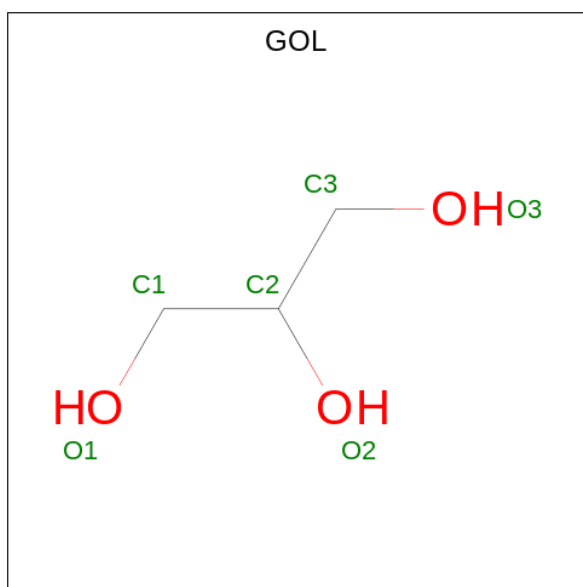
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
2	G	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	H	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

- Molecule 3 is GLYCERALDEHYDE-3-PHOSPHATE (three-letter code: G3H) (formula: $C_3H_7O_6P$) (labeled as "Ligand of Interest" by depositor).



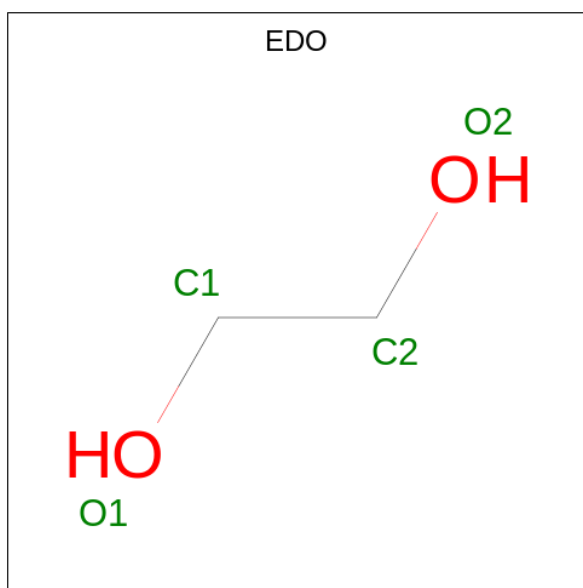
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	P	0	0
			10	3	6	1		
3	B	1	Total	C	O	P	0	0
			10	3	6	1		
3	C	1	Total	C	O	P	0	0
			10	3	6	1		
3	D	1	Total	C	O	P	0	0
			10	3	6	1		
3	E	1	Total	C	O	P	0	0
			10	3	6	1		
3	F	1	Total	C	O	P	0	0
			10	3	6	1		
3	G	1	Total	C	O	P	0	0
			10	3	6	1		
3	H	1	Total	C	O	P	0	0
			10	3	6	1		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



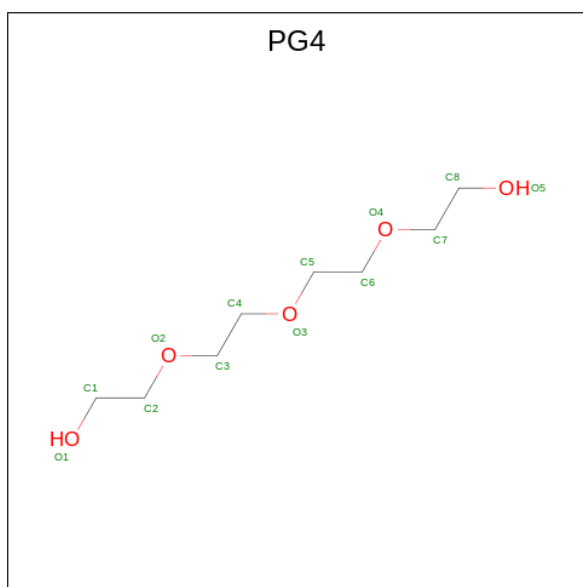
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	C	1	Total C O 6 3 3	0	0
4	C	1	Total C O 6 3 3	0	0
4	C	1	Total C O 6 3 3	0	0
4	C	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0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

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	C	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	F	1	Total C O 4 2 2	0	0
5	G	1	Total C O 4 2 2	0	0

- Molecule 6 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	1	Total	C O	0	0
			13	8 5		

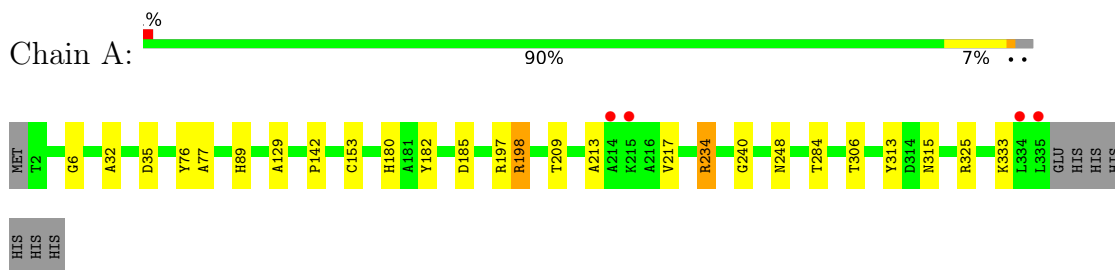
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	168	Total	O	0	0
			168	168		
7	B	196	Total	O	0	0
			196	196		
7	C	203	Total	O	0	0
			203	203		
7	D	224	Total	O	0	0
			224	224		
7	E	170	Total	O	0	0
			170	170		
7	F	161	Total	O	0	0
			161	161		
7	G	114	Total	O	0	0
			114	114		
7	H	157	Total	O	0	0
			157	157		

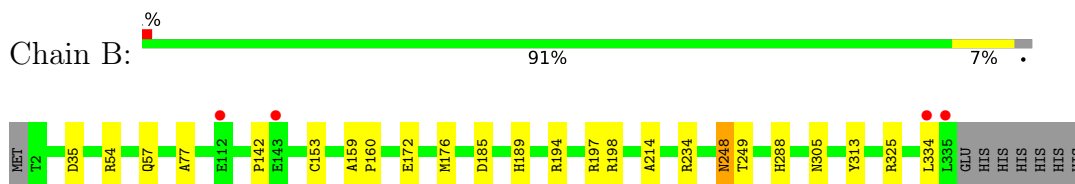
3 Residue-property plots

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

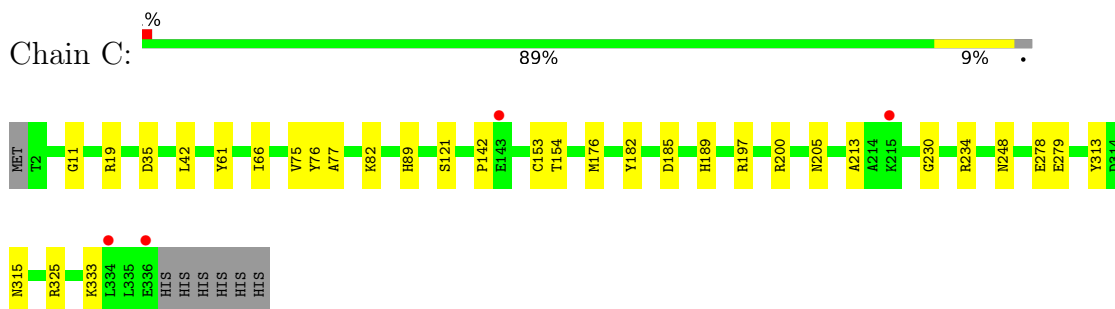
- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



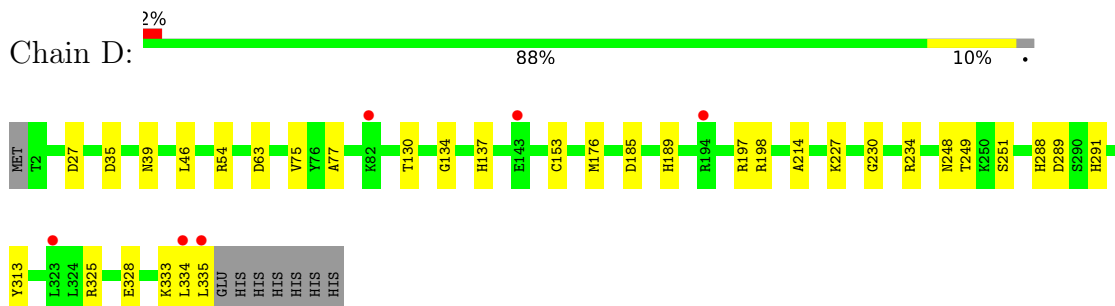
- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



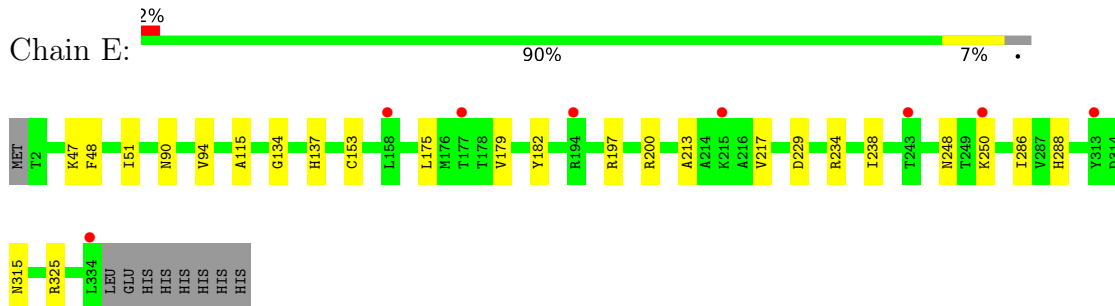
- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



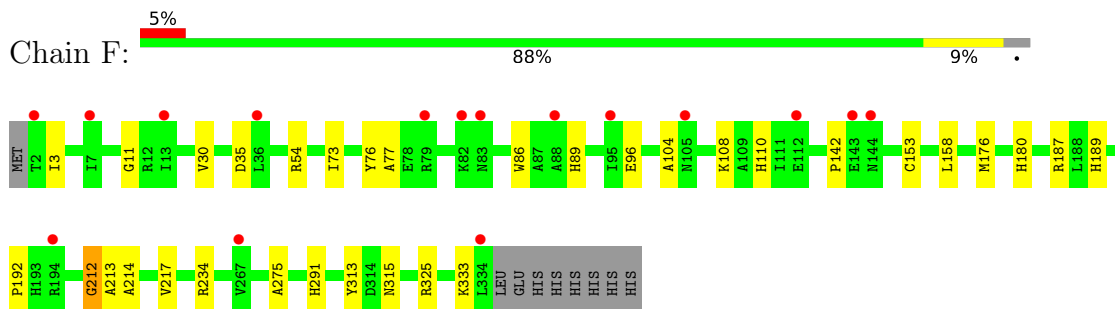
- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



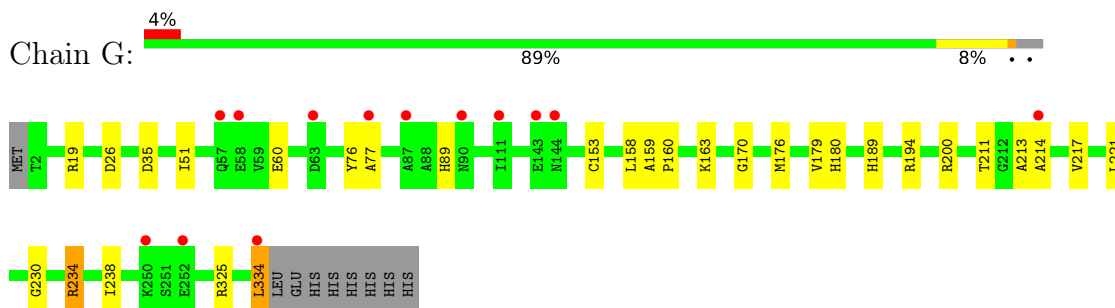
- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



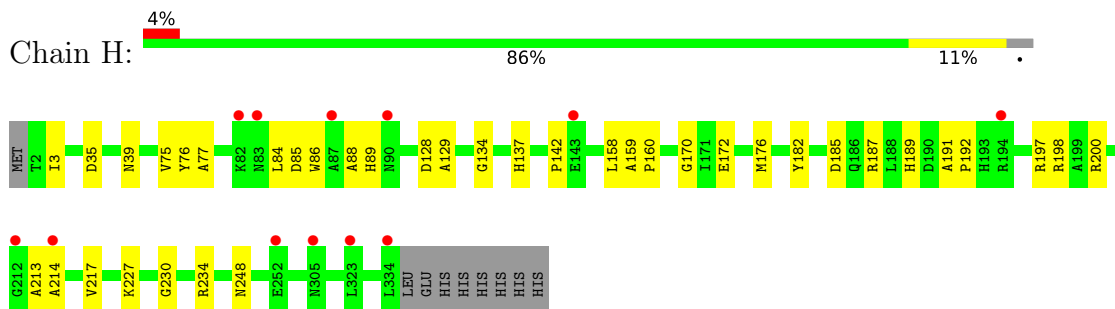
- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



- Molecule 1: Glyceraldehyde-3-phosphate dehydrogenase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	86.95Å 119.85Å 140.63Å 90.00° 91.27° 90.00°	Depositor
Resolution (Å)	32.86 – 1.99 32.84 – 1.99	Depositor EDS
% Data completeness (in resolution range)	94.5 (32.86-1.99) 94.6 (32.84-1.99)	Depositor EDS
R_{merge}	0.99	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.16 (at 2.00Å)	Xtrriage
Refinement program	REFMAC 5.8.0403	Depositor
R, R_{free}	0.164 , 0.201 0.175 , 0.208	Depositor DCC
R_{free} test set	9120 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å ²)	23.6	Xtrriage
Anisotropy	0.322	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 49.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.030 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	22219	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.57% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: G3H, NAD, GOL, EDO, PG4

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	0.47	0/2580	0.79	1/3508 (0.0%)
1	B	0.46	0/2580	0.82	1/3508 (0.0%)
1	C	0.49	1/2589 (0.0%)	0.82	2/3520 (0.1%)
1	D	0.50	0/2580	0.77	0/3508
1	E	0.41	0/2572	0.74	0/3497
1	F	0.43	0/2572	0.74	0/3497
1	G	0.40	0/2572	0.74	2/3497 (0.1%)
1	H	0.41	0/2572	0.73	0/3497
All	All	0.45	1/20617 (0.0%)	0.77	6/28032 (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	A	0	3
1	B	0	4
1	C	0	4
1	D	0	4
1	E	0	5
1	F	0	3
1	G	0	4
1	H	0	3
All	All	0	30

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	278	GLU	CD-OE1	-5.13	1.20	1.25

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	19	ARG	NE-CZ-NH2	-10.43	115.09	120.30
1	C	19	ARG	NE-CZ-NH1	10.16	125.38	120.30
1	B	248	ASN	CB-CA-C	-8.86	92.69	110.40
1	G	325	ARG	NE-CZ-NH2	-6.31	117.14	120.30
1	A	198	ARG	NE-CZ-NH2	-5.68	117.46	120.30
1	G	19	ARG	NE-CZ-NH2	-5.12	117.74	120.30

There are no chirality outliers.

All (30) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	197	ARG	Sidechain
1	A	234	ARG	Sidechain
1	A	325	ARG	Sidechain
1	B	197	ARG	Sidechain
1	B	234	ARG	Sidechain
1	B	325	ARG	Sidechain
1	B	54	ARG	Sidechain
1	C	197	ARG	Sidechain
1	C	200	ARG	Sidechain
1	C	234	ARG	Sidechain
1	C	325	ARG	Sidechain
1	D	197	ARG	Sidechain
1	D	234	ARG	Sidechain
1	D	325	ARG	Sidechain
1	D	54	ARG	Sidechain
1	E	179	VAL	Peptide
1	E	197	ARG	Sidechain
1	E	200	ARG	Sidechain
1	E	234	ARG	Sidechain
1	E	325	ARG	Sidechain
1	F	212	GLY	Peptide
1	F	325	ARG	Sidechain
1	F	54	ARG	Sidechain
1	G	179	VAL	Peptide
1	G	194	ARG	Sidechain
1	G	200	ARG	Sidechain
1	G	234	ARG	Sidechain
1	H	197	ARG	Sidechain
1	H	200	ARG	Sidechain
1	H	234	ARG	Sidechain

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	2537	0	2505	18	0
1	B	2537	0	2505	18	0
1	C	2546	0	2511	27	0
1	D	2537	0	2505	30	0
1	E	2529	0	2494	17	0
1	F	2529	0	2494	22	0
1	G	2529	0	2494	18	0
1	H	2529	0	2494	24	0
2	A	44	0	26	0	0
2	B	44	0	26	1	0
2	C	44	0	26	6	0
2	D	44	0	26	1	0
2	E	44	0	26	3	0
2	F	44	0	26	2	0
2	G	44	0	26	2	0
2	H	44	0	26	0	0
3	A	10	0	5	2	0
3	B	10	0	5	4	0
3	C	10	0	5	8	0
3	D	10	0	5	4	0
3	E	10	0	5	4	0
3	F	10	0	5	1	0
3	G	10	0	5	5	0
3	H	10	0	5	0	0
4	A	12	0	16	2	0
4	B	18	0	24	2	0
4	C	24	0	32	1	0
4	D	12	0	16	1	0
4	E	12	0	16	0	0
4	H	6	0	8	0	0
5	C	4	0	6	1	0
5	D	4	0	6	0	0
5	E	8	0	12	0	0
5	F	4	0	6	0	0
5	G	4	0	6	0	0
6	D	13	0	18	3	0
7	A	168	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	B	196	0	0	4	0
7	C	203	0	0	2	0
7	D	224	0	0	9	0
7	E	170	0	0	1	0
7	F	161	0	0	0	0
7	G	114	0	0	2	0
7	H	157	0	0	2	0
All	All	22219	0	20416	172	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (172) 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:153:CYS:SG	3:C:402:G3H:H2	1.55	1.44
1:B:153:CYS:SG	3:B:402:G3H:H2	1.72	1.27
1:E:153:CYS:SG	3:E:402:G3H:H2	1.91	1.10
1:G:153:CYS:SG	3:G:402:G3H:H2	1.93	1.08
1:C:153:CYS:SG	3:C:402:G3H:C2	2.45	1.05
1:E:248:ASN:HD21	1:H:248:ASN:HD21	1.08	1.00
1:B:153:CYS:SG	3:B:402:G3H:C2	2.55	0.93
1:D:153:CYS:SG	3:D:402:G3H:H2	2.12	0.89
1:D:227:LYS:HE3	7:D:523:HOH:O	1.74	0.87
1:C:153:CYS:HG	3:C:402:G3H:H2	1.37	0.83
1:A:153:CYS:SG	3:A:402:G3H:H2	2.20	0.82
1:F:158:LEU:HD23	1:F:217:VAL:HG21	1.63	0.81
1:E:248:ASN:HD21	1:H:248:ASN:ND2	1.80	0.77
2:C:401:NAD:C3N	3:C:402:G3H:H11	2.15	0.76
1:D:134:GLY:H	1:D:137:HIS:CD2	2.05	0.74
1:C:82:LYS:HE3	1:E:90:ASN:OD1	1.87	0.74
1:D:134:GLY:H	1:D:137:HIS:HD2	1.35	0.73
1:G:153:CYS:SG	3:G:402:G3H:C2	2.76	0.73
1:A:248:ASN:ND2	1:C:248:ASN:OD1	2.21	0.73
1:E:153:CYS:SG	3:E:402:G3H:C2	2.78	0.69
1:E:134:GLY:H	1:E:137:HIS:HD2	1.41	0.68
1:C:142:PRO:HG3	1:C:333:LYS:HE2	1.75	0.68
1:G:213:ALA:O	1:G:217:VAL:HG23	1.92	0.68
1:A:248:ASN:OD1	1:C:248:ASN:ND2	2.26	0.67
1:B:142:PRO:HB2	1:B:334:LEU:HG	1.76	0.65
1:H:76:TYR:OH	1:H:89:HIS:NE2	2.28	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:130:THR:H	6:D:406:PG4:H31	1.62	0.65
1:D:289:ASP:OD1	1:D:291:HIS:HD2	1.79	0.65
1:H:134:GLY:H	1:H:137:HIS:CD2	2.14	0.64
1:G:76:TYR:OH	1:G:89:HIS:NE2	2.24	0.64
1:H:185:ASP:OD2	1:H:198:ARG:NH1	2.31	0.64
1:B:176:MET:HE2	1:B:214:ALA:HB2	1.80	0.63
1:E:213:ALA:O	1:E:217:VAL:HG23	1.99	0.63
1:F:187:ARG:CZ	1:F:192:PRO:O	2.46	0.63
1:A:129:ALA:HA	4:A:404:GOL:H11	1.81	0.63
1:F:153:CYS:SG	3:F:402:G3H:O1	2.53	0.63
1:F:35:ASP:O	1:F:77:ALA:HA	2.00	0.62
1:B:172:GLU:HG3	7:B:665:HOH:O	1.98	0.62
1:F:104:ALA:O	1:F:108:LYS:CG	2.48	0.62
1:F:104:ALA:O	1:F:108:LYS:HG3	2.00	0.61
1:D:334:LEU:HD12	1:D:334:LEU:H	1.65	0.61
1:H:187:ARG:NH1	1:H:192:PRO:O	2.34	0.60
1:F:187:ARG:NH1	1:F:192:PRO:O	2.34	0.60
1:F:3:ILE:HD12	1:F:3:ILE:N	2.18	0.58
4:B:404:GOL:H11	7:B:618:HOH:O	2.03	0.58
1:H:134:GLY:H	1:H:137:HIS:HD2	1.52	0.57
1:E:51:ILE:HD11	1:E:238:ILE:HG12	1.88	0.56
1:E:315:ASN:HD22	2:E:401:NAD:H72N	1.53	0.56
4:B:404:GOL:C1	7:B:618:HOH:O	2.53	0.56
1:D:137:HIS:HE1	7:D:694:HOH:O	1.88	0.56
1:H:213:ALA:O	1:H:217:VAL:HG23	2.06	0.55
1:G:35:ASP:O	1:G:77:ALA:HA	2.06	0.55
2:E:401:NAD:C3N	3:E:402:G3H:H11	2.37	0.54
1:F:76:TYR:OH	1:F:89:HIS:NE2	2.27	0.54
1:H:3:ILE:HD12	1:H:3:ILE:N	2.23	0.54
1:G:60:GLU:HG3	7:G:592:HOH:O	2.07	0.54
1:H:85:ASP:OD2	1:H:88:ALA:HB2	2.08	0.54
1:D:63:ASP:HA	4:D:404:GOL:H31	1.90	0.54
1:E:47:LYS:HD2	1:E:48:PHE:CE2	2.43	0.53
1:H:176:MET:HG3	1:H:230:GLY:HA3	1.90	0.53
2:G:401:NAD:C3N	3:G:402:G3H:H11	2.38	0.53
1:D:39:ASN:OD1	1:D:75:VAL:HG11	2.09	0.53
1:H:39:ASN:OD1	1:H:75:VAL:HG11	2.09	0.53
1:A:76:TYR:OH	1:A:89:HIS:CD2	2.63	0.52
1:D:288:HIS:NE2	7:D:502:HOH:O	2.33	0.52
1:C:176:MET:HG3	1:C:230:GLY:HA3	1.92	0.52
1:A:129:ALA:HB1	4:A:404:GOL:H2	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:185:ASP:OD2	1:B:198:ARG:NH1	2.44	0.51
1:D:189:HIS:HD2	7:D:622:HOH:O	1.94	0.50
2:C:401:NAD:C3N	3:C:402:G3H:C1	2.89	0.50
1:G:176:MET:HG3	1:G:230:GLY:HA3	1.93	0.50
1:C:121:SER:O	2:C:401:NAD:H1D	2.11	0.49
1:D:198:ARG:HD2	7:D:595:HOH:O	2.12	0.49
1:E:134:GLY:H	1:E:137:HIS:CD2	2.25	0.49
1:A:198:ARG:HD2	1:A:209:THR:OG1	2.12	0.49
1:B:249:THR:O	1:B:305:ASN:HB3	2.13	0.49
2:E:401:NAD:C3N	3:E:402:G3H:C1	2.91	0.49
1:G:180:HIS:HB3	1:G:234:ARG:HD3	1.95	0.49
1:F:86:TRP:HE1	1:F:110:HIS:HD2	1.62	0.48
1:F:104:ALA:O	1:F:108:LYS:HG2	2.12	0.48
1:F:142:PRO:HG3	1:F:333:LYS:HD3	1.95	0.48
1:C:153:CYS:SG	3:C:402:G3H:C1	3.01	0.48
1:B:35:ASP:O	1:B:77:ALA:HA	2.13	0.48
1:D:291:HIS:HE1	7:D:656:HOH:O	1.96	0.48
1:B:153:CYS:SG	3:B:402:G3H:C1	3.01	0.47
1:B:248:ASN:HD21	1:D:248:ASN:ND2	2.12	0.47
1:B:194:ARG:NH1	1:B:194:ARG:HG2	2.29	0.47
2:D:401:NAD:C3N	3:D:402:G3H:C1	2.92	0.47
1:H:76:TYR:OH	1:H:89:HIS:CD2	2.67	0.47
1:D:176:MET:HG3	1:D:230:GLY:HA3	1.97	0.47
1:D:27:ASP:OD1	1:D:328:GLU:OE1	2.32	0.47
1:H:214:ALA:HB3	7:H:549:HOH:O	2.14	0.47
1:B:248:ASN:HD21	1:D:248:ASN:CG	2.17	0.47
1:D:130:THR:N	6:D:406:PG4:H12	2.30	0.47
1:G:211:THR:C	1:G:213:ALA:H	2.19	0.46
2:C:401:NAD:C4N	3:C:402:G3H:C1	2.93	0.46
1:F:96:GLU:OE1	1:F:110:HIS:HE1	1.99	0.46
1:G:158:LEU:HD23	1:G:217:VAL:HG21	1.96	0.46
1:A:185:ASP:CG	1:A:198:ARG:HH21	2.19	0.46
1:C:189:HIS:HD2	7:C:639:HOH:O	1.99	0.46
1:D:153:CYS:SG	3:D:402:G3H:C2	2.96	0.46
1:F:30:VAL:O	1:F:73:ILE:HD12	2.16	0.46
1:C:142:PRO:HG3	1:C:333:LYS:CE	2.45	0.46
1:E:248:ASN:ND2	1:H:248:ASN:ND2	2.55	0.46
1:H:158:LEU:HD23	1:H:217:VAL:HG21	1.98	0.46
1:H:159:ALA:HB3	1:H:160:PRO:HD3	1.97	0.45
1:B:189:HIS:HE1	1:C:182:TYR:O	2.00	0.45
1:A:153:CYS:SG	3:A:402:G3H:C2	2.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:180:HIS:HB3	1:A:234:ARG:HD3	1.99	0.45
1:C:35:ASP:O	1:C:77:ALA:HA	2.16	0.45
1:C:154:THR:HG22	1:C:213:ALA:HB2	1.98	0.45
1:D:35:ASP:O	1:D:77:ALA:HA	2.16	0.45
1:D:249:THR:HG23	1:D:251:SER:O	2.17	0.45
1:A:182:TYR:O	1:D:189:HIS:HE1	1.99	0.45
1:A:306:THR:OG1	1:C:248:ASN:OD1	2.35	0.44
1:D:289:ASP:OD1	1:D:291:HIS:CD2	2.64	0.44
1:D:176:MET:HG2	1:D:214:ALA:HB2	1.99	0.44
1:A:284:THR:HG23	1:C:205:ASN:ND2	2.33	0.44
1:H:128:ASP:O	1:H:129:ALA:HB2	2.17	0.44
1:C:185:ASP:HB2	4:C:404:GOL:H31	1.98	0.44
1:G:159:ALA:HB3	1:G:160:PRO:HD3	1.99	0.44
1:G:214:ALA:HB3	7:G:525:HOH:O	2.17	0.44
1:C:76:TYR:OH	1:C:89:HIS:CE1	2.71	0.44
1:G:334:LEU:O	1:G:334:LEU:HD23	2.18	0.44
1:C:11:GLY:HA3	2:C:401:NAD:O5B	2.18	0.43
1:F:86:TRP:HE1	1:F:110:HIS:CD2	2.37	0.43
1:C:76:TYR:HH	1:C:89:HIS:CE1	2.36	0.43
1:H:172:GLU:O	1:H:227:LYS:HE2	2.19	0.43
1:F:212:GLY:HA2	1:F:214:ALA:HB3	2.00	0.43
1:C:279:GLU:OE1	5:C:407:EDO:O2	2.29	0.43
1:B:159:ALA:N	1:B:160:PRO:CD	2.81	0.43
1:H:187:ARG:CD	1:H:191:ALA:HB3	2.49	0.43
1:E:175:LEU:HA	1:E:229:ASP:O	2.19	0.43
1:F:189:HIS:HE1	1:H:182:TYR:O	2.01	0.43
1:B:194:ARG:HG2	1:B:194:ARG:HH11	1.84	0.42
2:C:401:NAD:C7N	3:C:402:G3H:H11	2.49	0.42
1:D:130:THR:H	6:D:406:PG4:H12	1.84	0.42
1:A:213:ALA:O	1:A:217:VAL:HG23	2.19	0.42
1:D:249:THR:CG2	1:D:251:SER:O	2.67	0.42
1:F:11:GLY:HA3	2:F:401:NAD:O5B	2.20	0.42
1:B:176:MET:CE	1:B:214:ALA:HB2	2.47	0.42
2:B:401:NAD:C3N	3:B:402:G3H:H11	2.48	0.42
1:G:153:CYS:SG	3:G:402:G3H:C1	3.07	0.42
1:H:84:LEU:HD13	1:H:86:TRP:CZ2	2.54	0.42
1:A:35:ASP:O	1:A:77:ALA:HA	2.20	0.42
1:E:94:VAL:HG23	1:E:115:ALA:CB	2.50	0.42
1:F:315:ASN:O	2:F:401:NAD:H4N	2.20	0.42
1:A:142:PRO:HG3	1:A:333:LYS:HD3	2.02	0.41
1:C:42:LEU:HD23	1:C:42:LEU:HA	1.89	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:61:TYR:OH	7:C:501:HOH:O	2.20	0.41
1:E:286:ILE:C	1:E:286:ILE:HD12	2.40	0.41
2:G:401:NAD:C3N	3:G:402:G3H:C1	2.98	0.41
1:D:333:LYS:CG	7:D:681:HOH:O	2.68	0.41
1:H:35:ASP:O	1:H:77:ALA:HA	2.20	0.41
3:D:402:G3H:H11	7:D:690:HOH:O	2.20	0.41
1:A:240:GLY:H	1:A:315:ASN:ND2	2.18	0.41
1:F:213:ALA:O	1:F:217:VAL:HG23	2.21	0.41
1:G:76:TYR:HH	1:G:89:HIS:CE1	2.30	0.41
1:A:6:GLY:HA2	1:A:32:ALA:O	2.21	0.41
1:B:57:GLN:NE2	7:B:510:HOH:O	2.54	0.41
1:F:180:HIS:HB3	1:F:234:ARG:HD3	2.03	0.41
1:H:189:HIS:HD2	7:H:600:HOH:O	2.03	0.41
1:C:66:ILE:HD12	1:C:75:VAL:HG21	2.02	0.41
1:D:46:LEU:HD12	7:D:514:HOH:O	2.20	0.41
1:B:248:ASN:ND2	1:D:248:ASN:OD1	2.50	0.40
1:C:315:ASN:ND2	1:C:315:ASN:H	2.20	0.40
1:E:182:TYR:O	1:G:189:HIS:HE1	2.03	0.40
1:F:275:ALA:HB2	1:F:291:HIS:CD2	2.57	0.40
1:E:250:LYS:NZ	7:E:514:HOH:O	2.51	0.40
1:G:51:ILE:HD11	1:G:238:ILE:HG12	2.03	0.40
1:G:163:LYS:HB2	1:G:221:LEU:HD11	2.03	0.40
1:C:154:THR:HG22	1:C:213:ALA:CB	2.52	0.40

There are no symmetry-related clashes.

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	332/342 (97%)	321 (97%)	11 (3%)	0	100 100
1	B	332/342 (97%)	322 (97%)	10 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	333/342 (97%)	319 (96%)	14 (4%)	0	100	100
1	D	332/342 (97%)	321 (97%)	11 (3%)	0	100	100
1	E	331/342 (97%)	319 (96%)	12 (4%)	0	100	100
1	F	331/342 (97%)	318 (96%)	13 (4%)	0	100	100
1	G	331/342 (97%)	315 (95%)	15 (4%)	1 (0%)	41	37
1	H	331/342 (97%)	317 (96%)	13 (4%)	1 (0%)	41	37
All	All	2653/2736 (97%)	2552 (96%)	99 (4%)	2 (0%)	51	49

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	H	170	GLY
1	G	170	GLY

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	272/280 (97%)	271 (100%)	1 (0%)	91	93
1	B	272/280 (97%)	270 (99%)	2 (1%)	84	88
1	C	273/280 (98%)	272 (100%)	1 (0%)	91	93
1	D	272/280 (97%)	269 (99%)	3 (1%)	73	78
1	E	271/280 (97%)	270 (100%)	1 (0%)	91	93
1	F	271/280 (97%)	269 (99%)	2 (1%)	84	88
1	G	271/280 (97%)	269 (99%)	2 (1%)	84	88
1	H	271/280 (97%)	270 (100%)	1 (0%)	91	93
All	All	2173/2240 (97%)	2160 (99%)	13 (1%)	86	90

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	313	TYR
1	B	288	HIS
1	B	313	TYR
1	C	313	TYR
1	D	185	ASP
1	D	313	TYR
1	D	335	LEU
1	E	288	HIS
1	F	176	MET
1	F	313	TYR
1	G	26	ASP
1	G	334	LEU
1	H	142	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (35) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	83	ASN
1	A	89	HIS
1	A	189	HIS
1	A	305	ASN
1	B	126	ASN
1	B	146	ASN
1	B	189	HIS
1	C	105	ASN
1	C	146	ASN
1	C	189	HIS
1	C	205	ASN
1	C	315	ASN
1	D	137	HIS
1	D	146	ASN
1	D	173	ASN
1	D	189	HIS
1	D	291	HIS
1	D	305	ASN
1	E	137	HIS
1	E	144	ASN
1	E	146	ASN
1	E	189	HIS
1	F	90	ASN
1	F	110	HIS
1	F	146	ASN
1	F	189	HIS

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Mol	Chain	Res	Type
1	F	315	ASN
1	G	146	ASN
1	G	189	HIS
1	G	315	ASN
1	H	137	HIS
1	H	146	ASN
1	H	173	ASN
1	H	189	HIS
1	H	248	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

37 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	G3H	A	402	-	8,9,9	0.75	0	10,12,12	0.80	0
2	NAD	E	401	-	42,48,48	0.78	1 (2%)	50,73,73	0.81	1 (2%)
5	EDO	F	403	-	3,3,3	0.09	0	2,2,2	0.13	0
4	GOL	B	405	-	5,5,5	0.19	0	5,5,5	0.35	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	G3H	D	402	-	8,9,9	0.57	0	10,12,12	1.04	1 (10%)
4	GOL	C	403	-	5,5,5	0.13	0	5,5,5	0.48	0
4	GOL	A	404	-	5,5,5	0.23	0	5,5,5	0.49	0
4	GOL	E	404	-	5,5,5	0.18	0	5,5,5	0.33	0
3	G3H	G	402	-	8,9,9	0.59	0	10,12,12	1.43	1 (10%)
2	NAD	D	401	-	42,48,48	0.80	1 (2%)	50,73,73	0.86	2 (4%)
4	GOL	C	404	-	5,5,5	0.10	0	5,5,5	0.33	0
4	GOL	D	404	-	5,5,5	0.07	0	5,5,5	0.50	0
5	EDO	D	405	-	3,3,3	0.15	0	2,2,2	0.66	0
3	G3H	E	402	-	8,9,9	0.56	0	10,12,12	1.09	1 (10%)
4	GOL	H	403	-	5,5,5	0.20	0	5,5,5	0.34	0
6	PG4	D	406	-	12,12,12	0.21	0	11,11,11	0.19	0
3	G3H	C	402	-	8,9,9	0.25	0	10,12,12	1.89	2 (20%)
3	G3H	F	402	-	8,9,9	0.48	0	10,12,12	0.84	0
5	EDO	C	407	-	3,3,3	0.57	0	2,2,2	0.40	0
2	NAD	A	401	-	42,48,48	0.88	1 (2%)	50,73,73	0.79	1 (2%)
2	NAD	B	401	-	42,48,48	0.75	1 (2%)	50,73,73	0.89	1 (2%)
4	GOL	D	403	-	5,5,5	0.14	0	5,5,5	0.29	0
5	EDO	E	406	-	3,3,3	0.22	0	2,2,2	0.03	0
3	G3H	B	402	-	8,9,9	0.65	0	10,12,12	2.01	2 (20%)
2	NAD	C	401	-	42,48,48	0.95	2 (4%)	50,73,73	0.92	2 (4%)
2	NAD	F	401	-	42,48,48	0.79	1 (2%)	50,73,73	0.89	3 (6%)
2	NAD	H	401	-	42,48,48	0.82	1 (2%)	50,73,73	0.86	2 (4%)
5	EDO	G	403	-	3,3,3	0.22	0	2,2,2	0.13	0
3	G3H	H	402	-	8,9,9	0.62	0	10,12,12	0.96	1 (10%)
5	EDO	E	405	-	3,3,3	0.25	0	2,2,2	0.64	0
4	GOL	E	403	-	5,5,5	0.13	0	5,5,5	0.41	0
4	GOL	B	404	-	5,5,5	0.20	0	5,5,5	0.30	0
2	NAD	G	401	-	42,48,48	0.80	1 (2%)	50,73,73	0.83	1 (2%)
4	GOL	C	406	-	5,5,5	0.17	0	5,5,5	0.24	0
4	GOL	C	405	-	5,5,5	0.26	0	5,5,5	0.46	0
4	GOL	B	403	-	5,5,5	0.12	0	5,5,5	0.44	0
4	GOL	A	403	-	5,5,5	0.15	0	5,5,5	0.46	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
3	G3H	A	402	-	-	3/7/8/8	-
2	NAD	E	401	-	-	5/26/62/62	0/5/5/5
5	EDO	F	403	-	-	0/1/1/1	-
4	GOL	B	405	-	-	1/4/4/4	-
3	G3H	D	402	-	-	3/7/8/8	-
4	GOL	C	403	-	-	2/4/4/4	-
4	GOL	A	404	-	-	2/4/4/4	-
4	GOL	E	404	-	-	3/4/4/4	-
3	G3H	G	402	-	-	4/7/8/8	-
2	NAD	D	401	-	-	5/26/62/62	0/5/5/5
4	GOL	C	404	-	-	2/4/4/4	-
4	GOL	D	404	-	-	2/4/4/4	-
5	EDO	D	405	-	-	1/1/1/1	-
3	G3H	E	402	-	-	3/7/8/8	-
4	GOL	H	403	-	-	0/4/4/4	-
6	PG4	D	406	-	-	3/10/10/10	-
3	G3H	C	402	-	-	3/7/8/8	-
3	G3H	F	402	-	-	3/7/8/8	-
5	EDO	C	407	-	-	1/1/1/1	-
2	NAD	A	401	-	-	5/26/62/62	0/5/5/5
2	NAD	B	401	-	-	5/26/62/62	0/5/5/5
4	GOL	D	403	-	-	1/4/4/4	-
5	EDO	E	406	-	-	0/1/1/1	-
3	G3H	B	402	-	-	3/7/8/8	-
2	NAD	C	401	-	-	5/26/62/62	0/5/5/5
2	NAD	F	401	-	-	5/26/62/62	0/5/5/5
2	NAD	H	401	-	-	8/26/62/62	0/5/5/5
5	EDO	G	403	-	-	1/1/1/1	-
3	G3H	H	402	-	-	2/7/8/8	-
5	EDO	E	405	-	-	1/1/1/1	-
4	GOL	E	403	-	-	3/4/4/4	-
4	GOL	B	404	-	-	4/4/4/4	-
2	NAD	G	401	-	-	7/26/62/62	0/5/5/5
4	GOL	C	406	-	-	1/4/4/4	-
4	GOL	C	405	-	-	2/4/4/4	-
4	GOL	B	403	-	-	2/4/4/4	-
4	GOL	A	403	-	-	2/4/4/4	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	401	NAD	C2N-N1N	3.69	1.39	1.35
2	C	401	NAD	C2N-N1N	3.63	1.39	1.35
2	F	401	NAD	C2N-N1N	3.51	1.39	1.35
2	H	401	NAD	C2N-N1N	3.44	1.39	1.35
2	A	401	NAD	C2N-N1N	3.41	1.39	1.35
2	D	401	NAD	C2N-N1N	3.36	1.39	1.35
2	E	401	NAD	C2N-N1N	3.09	1.38	1.35
2	B	401	NAD	C2N-N1N	2.90	1.38	1.35
2	C	401	NAD	O4D-C1D	2.73	1.44	1.41

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	402	G3H	O1P-C3-C2	-4.64	96.02	108.33
3	C	402	G3H	O2-C2-C1	4.21	117.46	109.17
3	B	402	G3H	O2-C2-C1	3.26	115.58	109.17
3	G	402	G3H	O2-C2-C1	3.08	115.23	109.17
3	C	402	G3H	O1P-C3-C2	-2.95	100.49	108.33
2	G	401	NAD	C6N-N1N-C2N	-2.90	119.33	121.97
3	E	402	G3H	O2-C2-C1	2.75	114.58	109.17
2	F	401	NAD	C5A-C6A-N6A	2.60	124.31	120.35
3	D	402	G3H	O2-C2-C1	2.51	114.11	109.17
3	H	402	G3H	O2-C2-C1	2.51	114.10	109.17
2	B	401	NAD	C5A-C6A-N6A	2.42	124.02	120.35
2	D	401	NAD	C5A-C6A-N6A	2.34	123.91	120.35
2	C	401	NAD	C6N-N1N-C2N	-2.32	119.86	121.97
2	F	401	NAD	C6N-N1N-C2N	-2.25	119.92	121.97
2	H	401	NAD	C6N-N1N-C2N	-2.21	119.96	121.97
2	C	401	NAD	C2N-C3N-C7N	2.20	125.86	119.46
2	A	401	NAD	C6N-N1N-C2N	-2.16	120.00	121.97
2	F	401	NAD	O2N-PN-O1N	2.13	122.75	112.24
2	E	401	NAD	C5A-C6A-N6A	2.05	123.46	120.35
2	H	401	NAD	C5A-C6A-N6A	2.03	123.44	120.35
2	D	401	NAD	C6N-N1N-C2N	-2.02	120.14	121.97

There are no chirality outliers.

All (103) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	NAD	O4D-C1D-N1N-C2N
2	A	401	NAD	O4D-C1D-N1N-C6N

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Mol	Chain	Res	Type	Atoms
2	A	401	NAD	C2D-C1D-N1N-C2N
2	A	401	NAD	C2D-C1D-N1N-C6N
2	B	401	NAD	O4D-C1D-N1N-C2N
2	B	401	NAD	O4D-C1D-N1N-C6N
2	B	401	NAD	C2D-C1D-N1N-C2N
2	B	401	NAD	C2D-C1D-N1N-C6N
2	C	401	NAD	O4D-C1D-N1N-C2N
2	C	401	NAD	O4D-C1D-N1N-C6N
2	C	401	NAD	C2D-C1D-N1N-C6N
2	D	401	NAD	O4D-C1D-N1N-C2N
2	D	401	NAD	O4D-C1D-N1N-C6N
2	D	401	NAD	C2D-C1D-N1N-C2N
2	D	401	NAD	C2D-C1D-N1N-C6N
2	E	401	NAD	O4D-C1D-N1N-C2N
2	E	401	NAD	O4D-C1D-N1N-C6N
2	E	401	NAD	C2D-C1D-N1N-C2N
2	E	401	NAD	C2D-C1D-N1N-C6N
2	F	401	NAD	O4D-C1D-N1N-C2N
2	F	401	NAD	O4D-C1D-N1N-C6N
2	F	401	NAD	C2D-C1D-N1N-C2N
2	F	401	NAD	C2D-C1D-N1N-C6N
2	G	401	NAD	O4D-C1D-N1N-C2N
2	G	401	NAD	O4D-C1D-N1N-C6N
2	G	401	NAD	C2D-C1D-N1N-C2N
2	G	401	NAD	C2D-C1D-N1N-C6N
2	H	401	NAD	C5B-O5B-PA-O1A
2	H	401	NAD	O4D-C1D-N1N-C2N
2	H	401	NAD	O4D-C1D-N1N-C6N
2	H	401	NAD	C2D-C1D-N1N-C2N
2	H	401	NAD	C2D-C1D-N1N-C6N
3	A	402	G3H	C1-C2-C3-O1P
3	A	402	G3H	O2-C2-C3-O1P
3	B	402	G3H	C1-C2-C3-O1P
3	B	402	G3H	O2-C2-C3-O1P
3	C	402	G3H	C1-C2-C3-O1P
3	C	402	G3H	O2-C2-C3-O1P
3	D	402	G3H	C1-C2-C3-O1P
3	D	402	G3H	O2-C2-C3-O1P
3	E	402	G3H	C1-C2-C3-O1P
3	E	402	G3H	O2-C2-C3-O1P
3	F	402	G3H	C1-C2-C3-O1P
3	F	402	G3H	O2-C2-C3-O1P

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Mol	Chain	Res	Type	Atoms
3	G	402	G3H	O1-C1-C2-C3
3	G	402	G3H	C1-C2-C3-O1P
3	G	402	G3H	O2-C2-C3-O1P
4	A	404	GOL	O1-C1-C2-C3
4	B	403	GOL	C1-C2-C3-O3
4	B	404	GOL	C1-C2-C3-O3
4	C	404	GOL	O1-C1-C2-O2
4	C	404	GOL	O1-C1-C2-C3
4	D	404	GOL	O1-C1-C2-C3
4	E	403	GOL	O1-C1-C2-C3
6	D	406	PG4	O2-C3-C4-O3
4	A	404	GOL	O1-C1-C2-O2
4	B	404	GOL	O1-C1-C2-O2
4	B	404	GOL	O2-C2-C3-O3
6	D	406	PG4	O4-C7-C8-O5
3	A	402	G3H	C2-C3-O1P-P
4	A	403	GOL	O1-C1-C2-C3
4	B	404	GOL	O1-C1-C2-C3
4	C	403	GOL	O1-C1-C2-C3
4	E	403	GOL	C1-C2-C3-O3
4	E	404	GOL	C1-C2-C3-O3
4	B	403	GOL	O2-C2-C3-O3
4	D	404	GOL	O1-C1-C2-O2
4	E	403	GOL	O1-C1-C2-O2
4	E	404	GOL	O2-C2-C3-O3
5	C	407	EDO	O1-C1-C2-O2
5	D	405	EDO	O1-C1-C2-O2
5	G	403	EDO	O1-C1-C2-O2
2	H	401	NAD	O4B-C4B-C5B-O5B
6	D	406	PG4	O1-C1-C2-O2
4	E	404	GOL	O1-C1-C2-C3
4	A	403	GOL	O1-C1-C2-O2
3	B	402	G3H	C2-C3-O1P-P
3	C	402	G3H	C2-C3-O1P-P
3	D	402	G3H	C2-C3-O1P-P
3	H	402	G3H	C2-C3-O1P-P
2	G	401	NAD	O4B-C4B-C5B-O5B
3	G	402	G3H	C2-C3-O1P-P
4	C	406	GOL	C1-C2-C3-O3
3	E	402	G3H	C2-C3-O1P-P
2	G	401	NAD	C5B-O5B-PA-O1A
2	H	401	NAD	C3B-C4B-C5B-O5B

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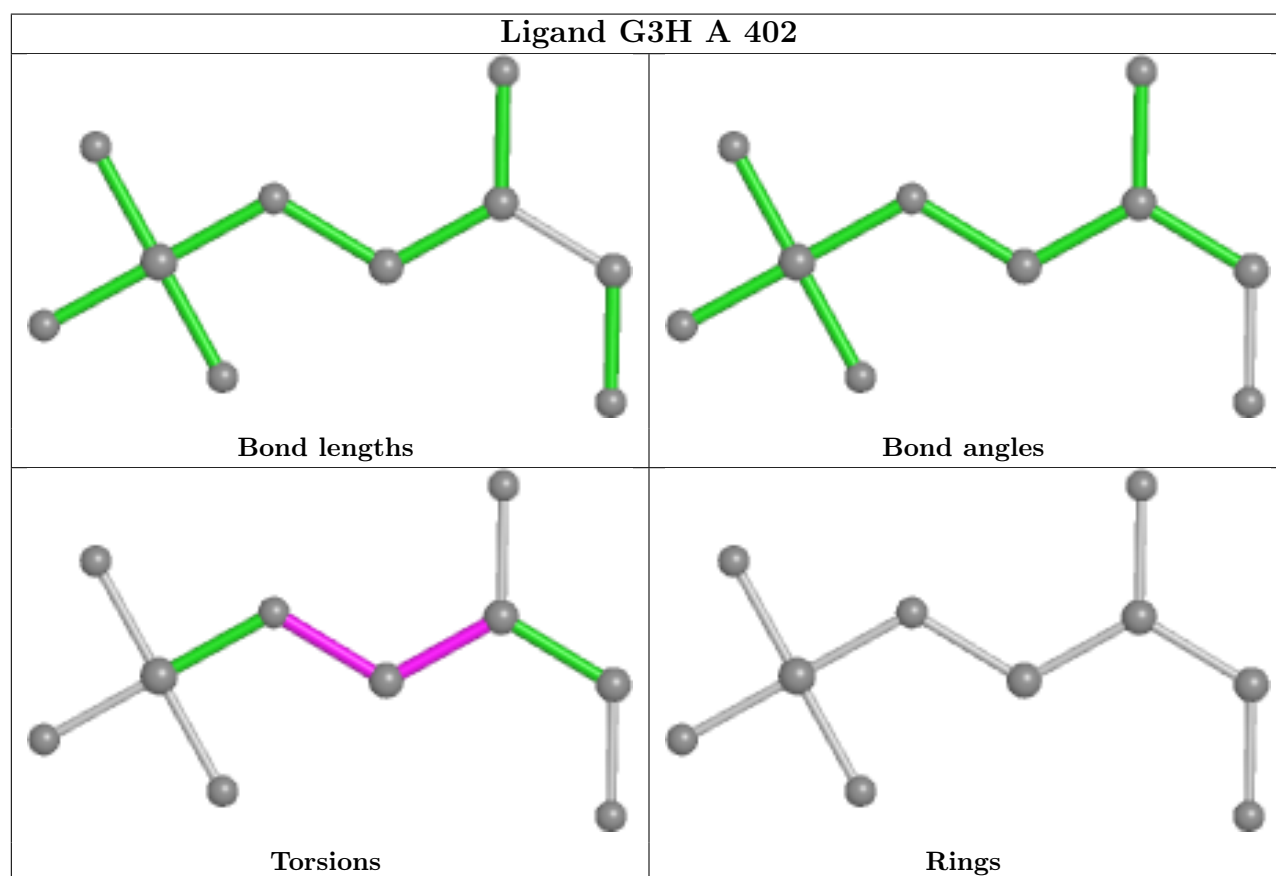
Mol	Chain	Res	Type	Atoms
3	H	402	G3H	O2-C2-C3-O1P
4	C	403	GOL	O1-C1-C2-O2
4	C	405	GOL	C1-C2-C3-O3
4	D	403	GOL	O1-C1-C2-C3
2	C	401	NAD	O4B-C4B-C5B-O5B
3	F	402	G3H	C3-O1P-P-O3P
5	E	405	EDO	O1-C1-C2-O2
2	C	401	NAD	C2D-C1D-N1N-C2N
2	G	401	NAD	C5B-O5B-PA-O3
2	H	401	NAD	C5B-O5B-PA-O3
4	C	405	GOL	O2-C2-C3-O3
4	B	405	GOL	O1-C1-C2-C3
2	A	401	NAD	O4B-C4B-C5B-O5B
2	B	401	NAD	O4B-C4B-C5B-O5B
2	D	401	NAD	O4B-C4B-C5B-O5B
2	E	401	NAD	O4B-C4B-C5B-O5B
2	F	401	NAD	O4B-C4B-C5B-O5B

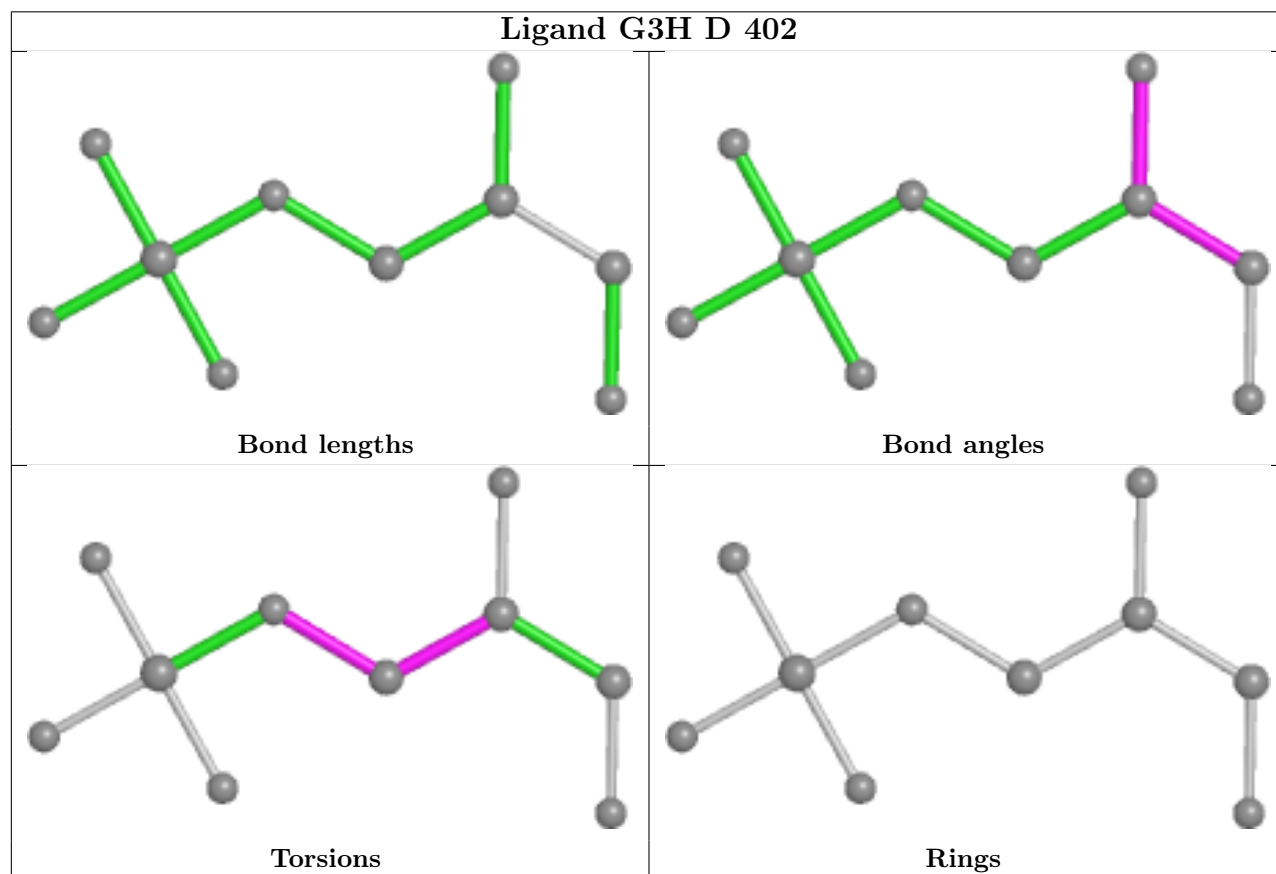
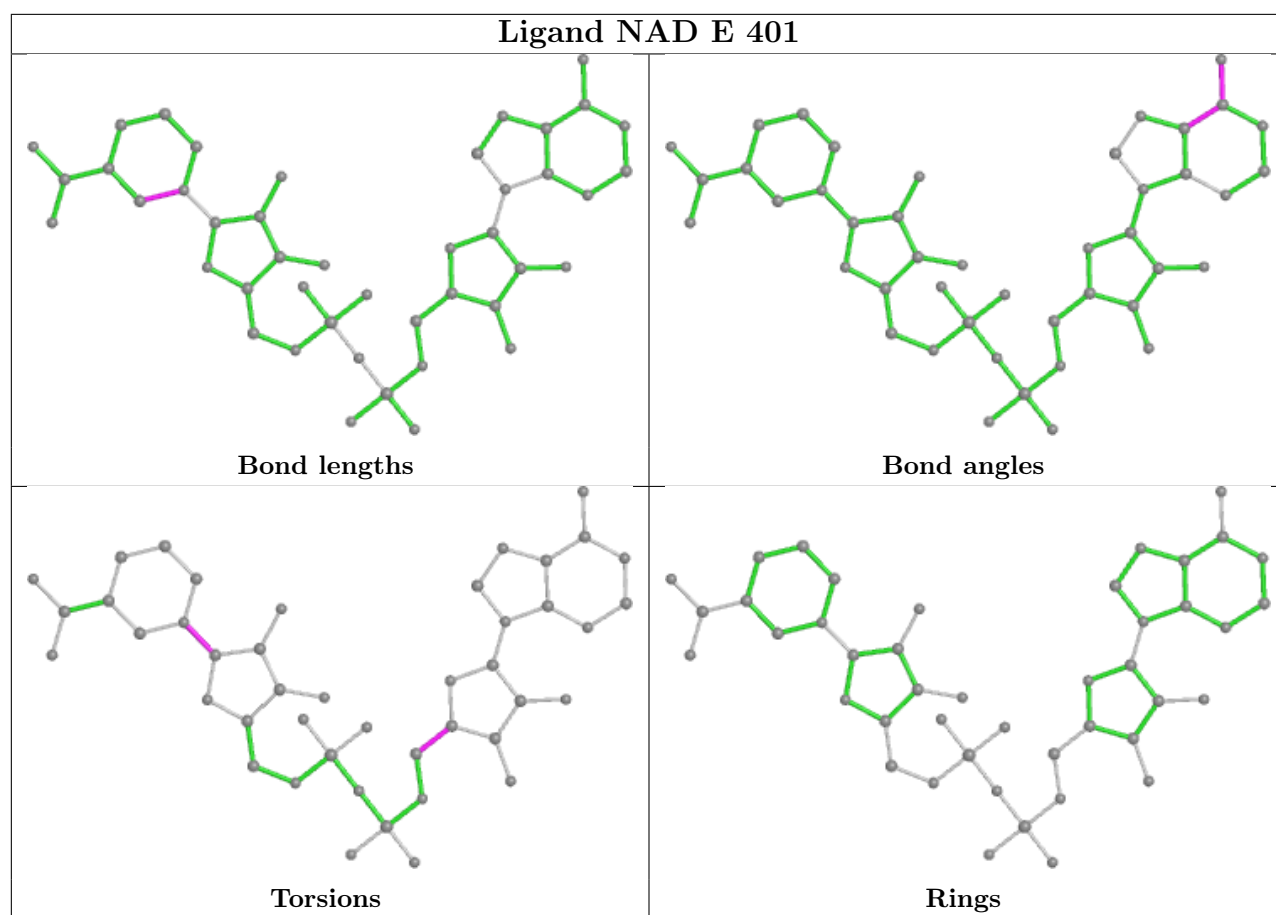
There are no ring outliers.

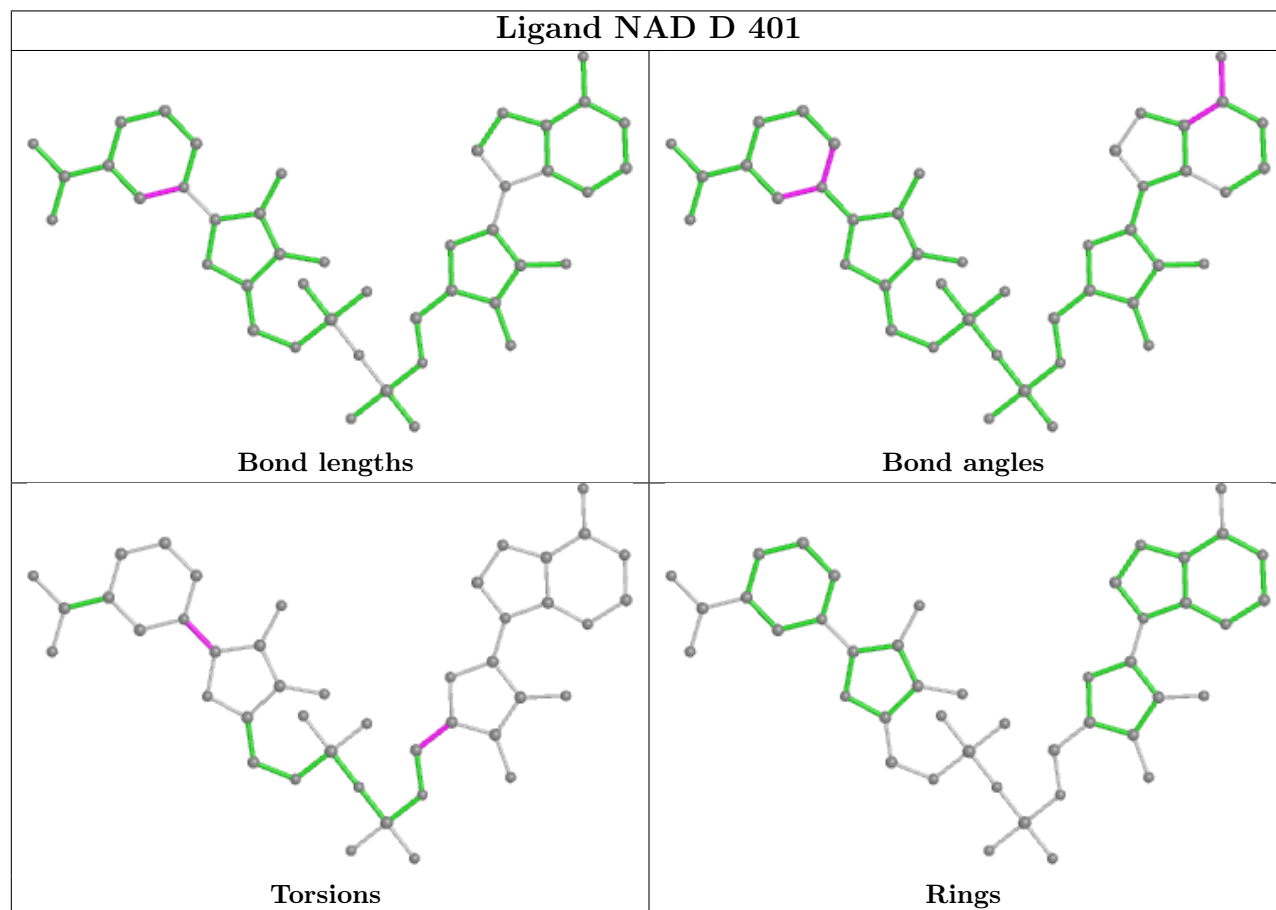
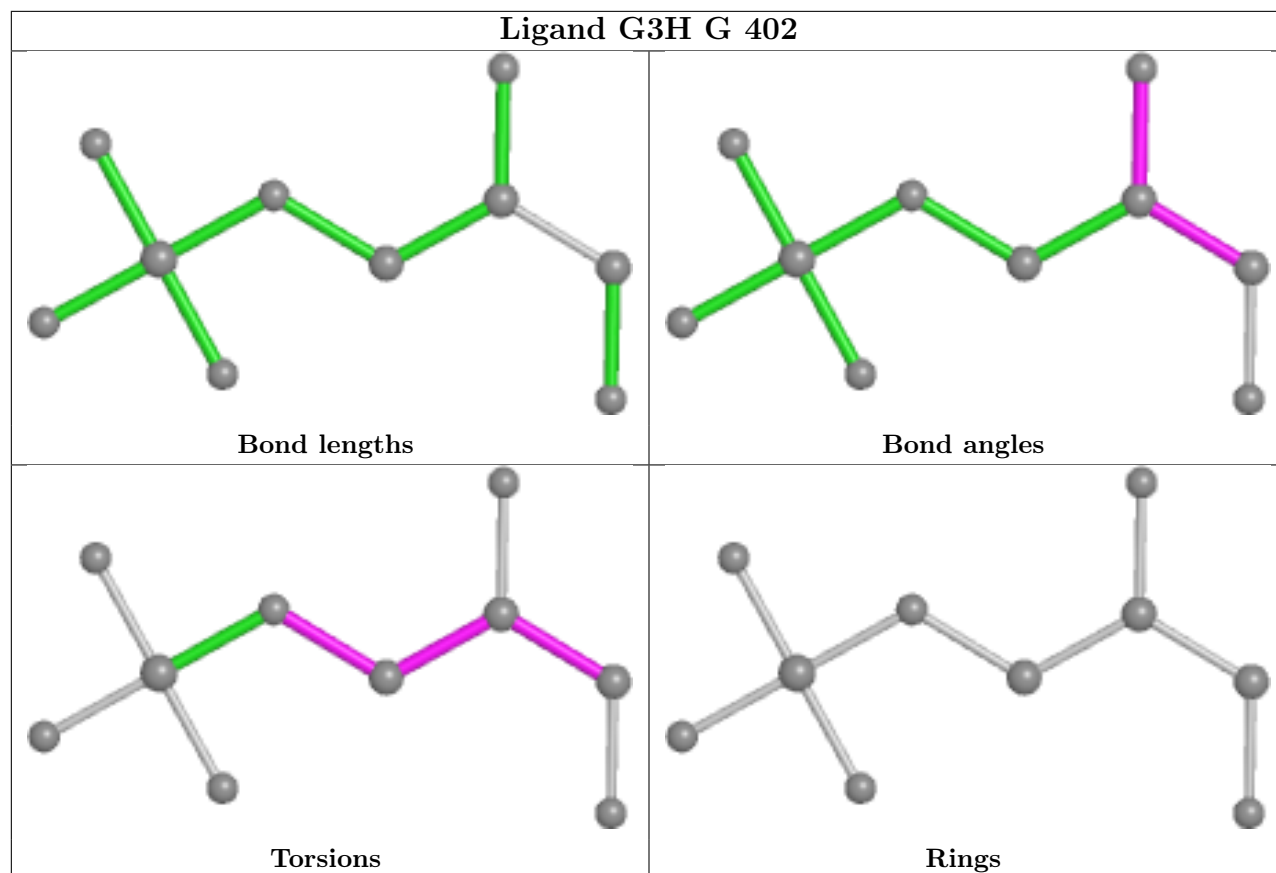
19 monomers are involved in 43 short contacts:

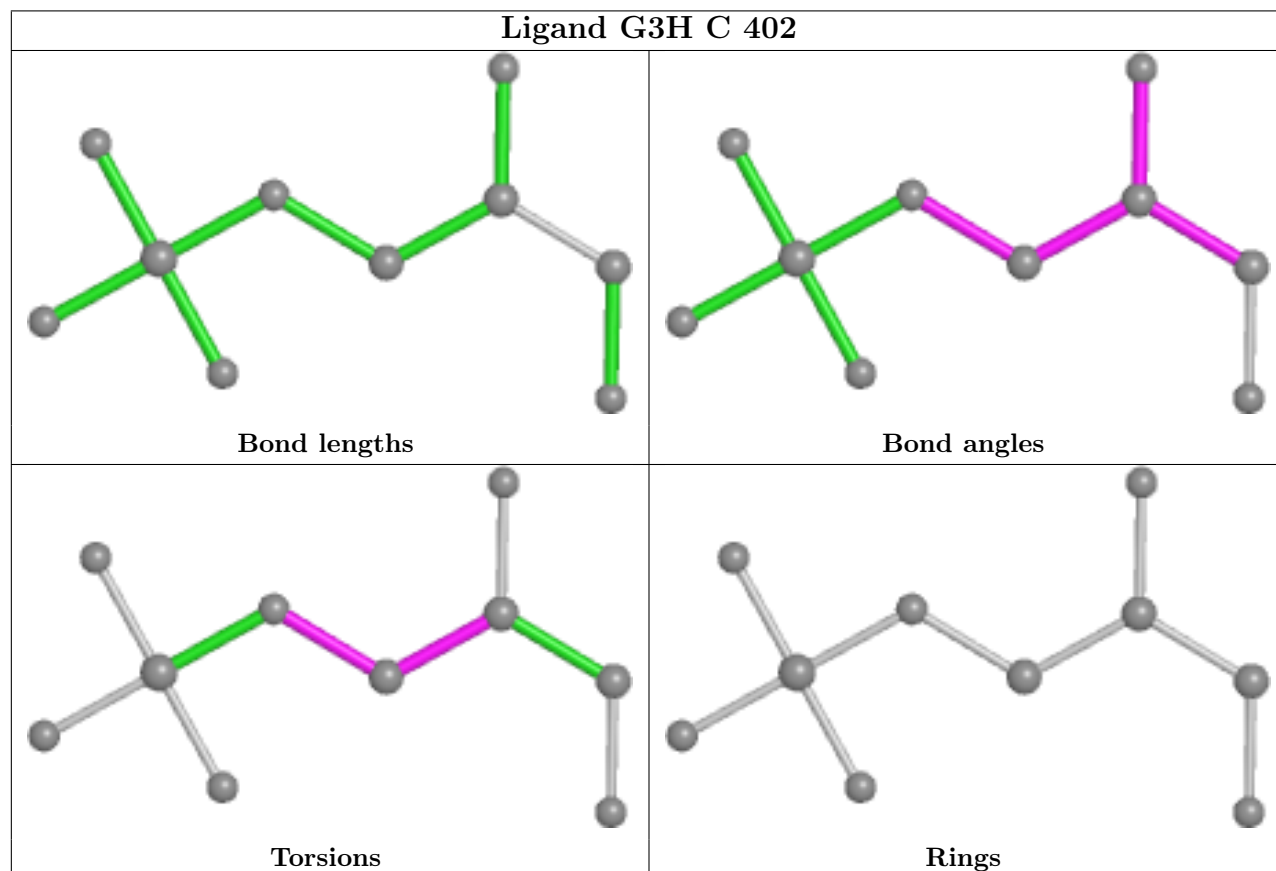
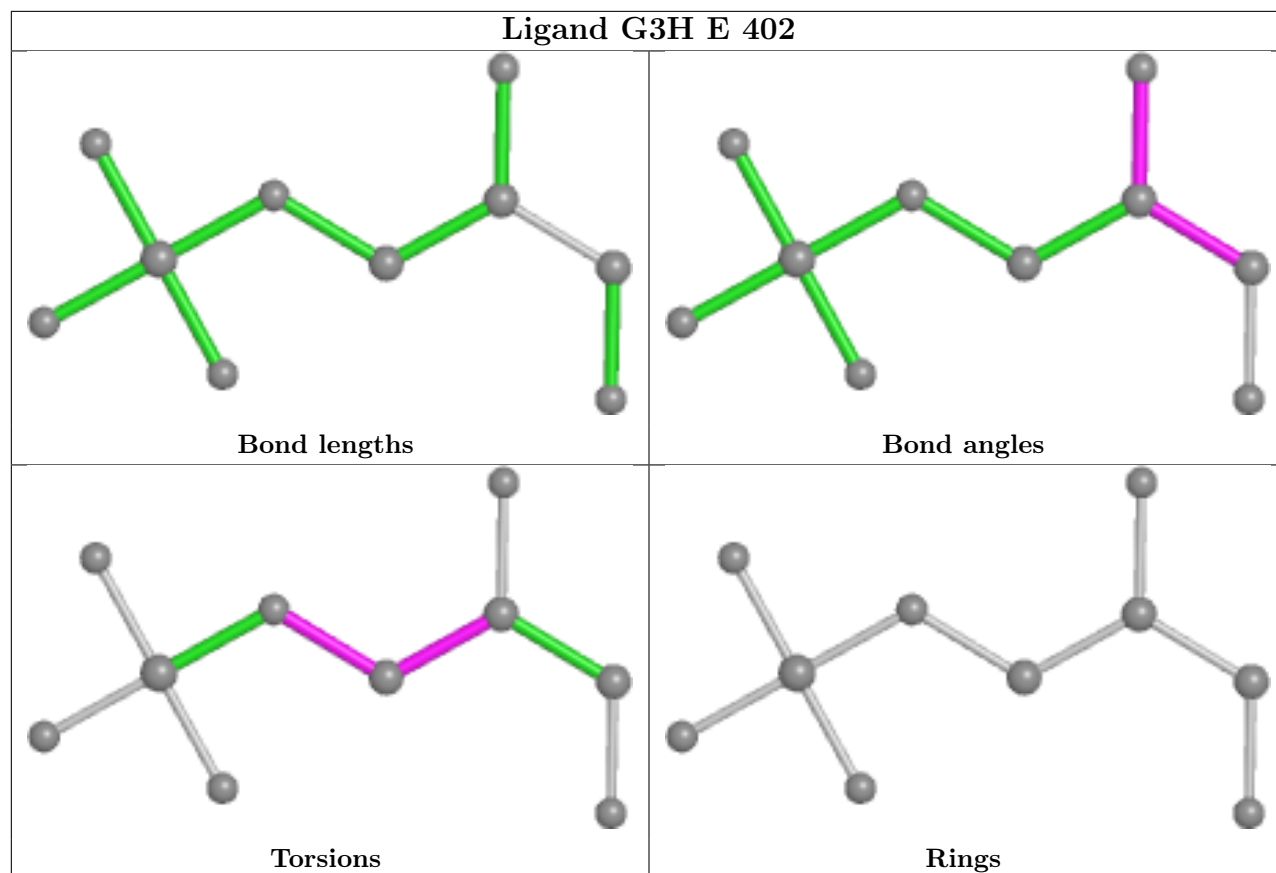
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	402	G3H	2	0
2	E	401	NAD	3	0
3	D	402	G3H	4	0
4	A	404	GOL	2	0
3	G	402	G3H	5	0
2	D	401	NAD	1	0
4	C	404	GOL	1	0
4	D	404	GOL	1	0
3	E	402	G3H	4	0
6	D	406	PG4	3	0
3	C	402	G3H	8	0
3	F	402	G3H	1	0
5	C	407	EDO	1	0
2	B	401	NAD	1	0
3	B	402	G3H	4	0
2	C	401	NAD	6	0
2	F	401	NAD	2	0
4	B	404	GOL	2	0
2	G	401	NAD	2	0

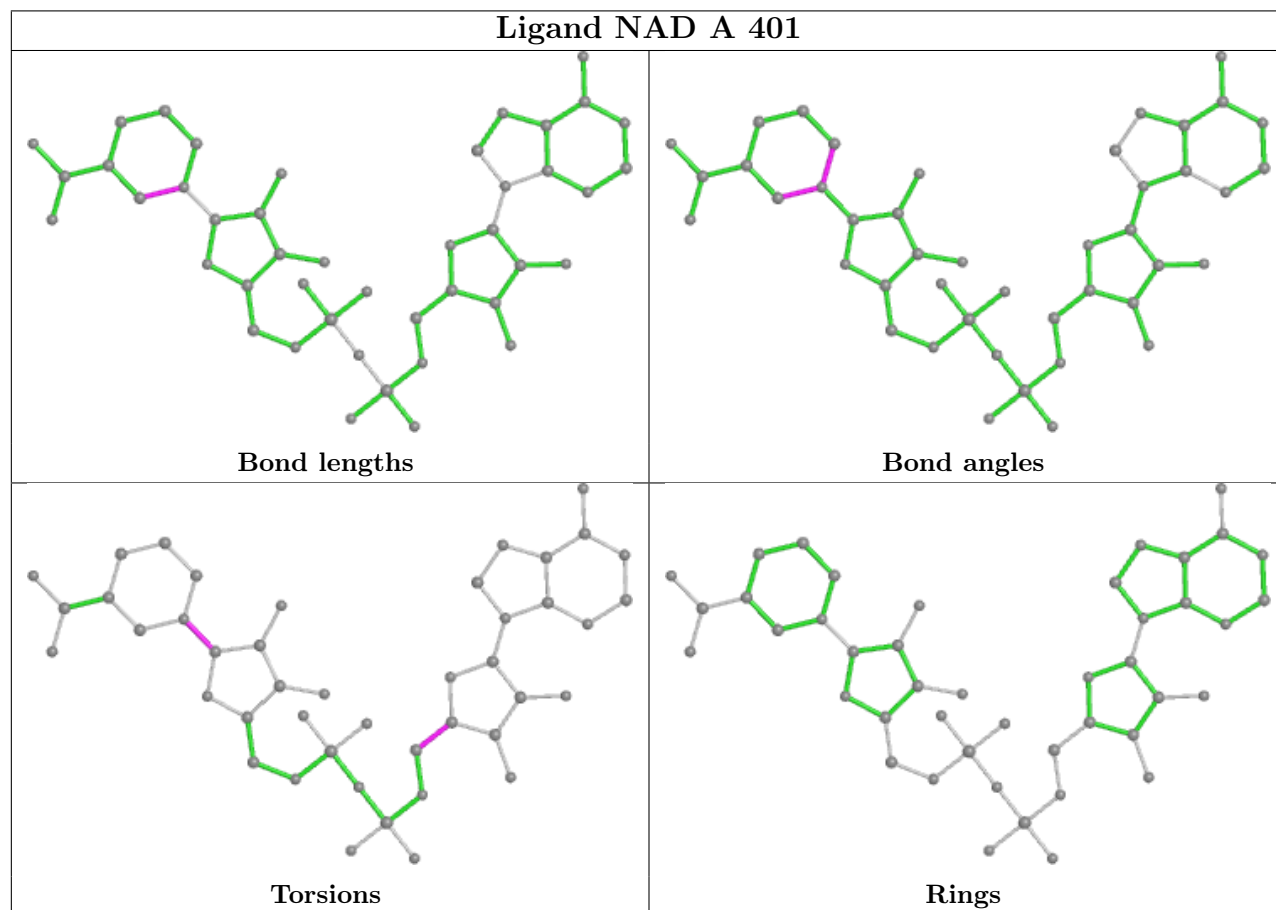
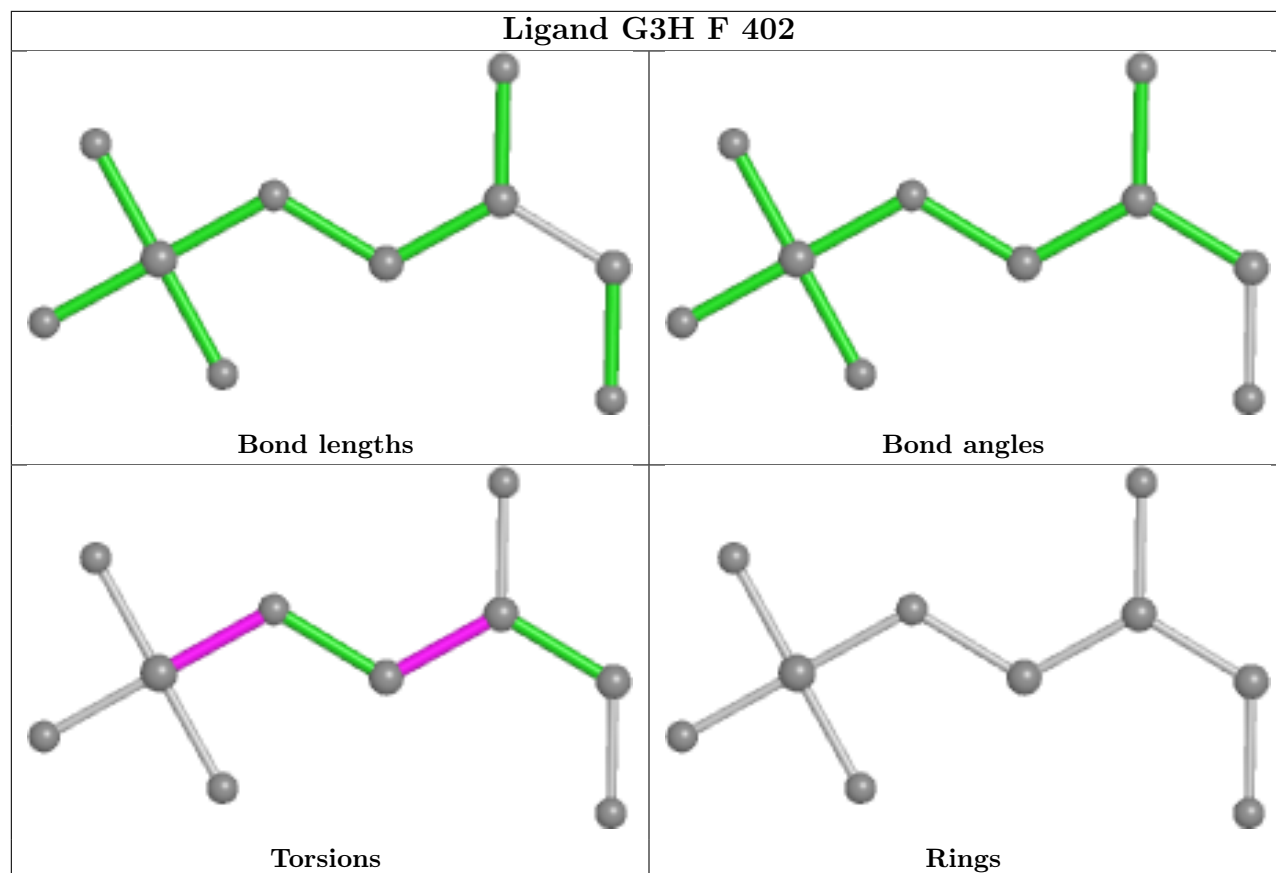
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

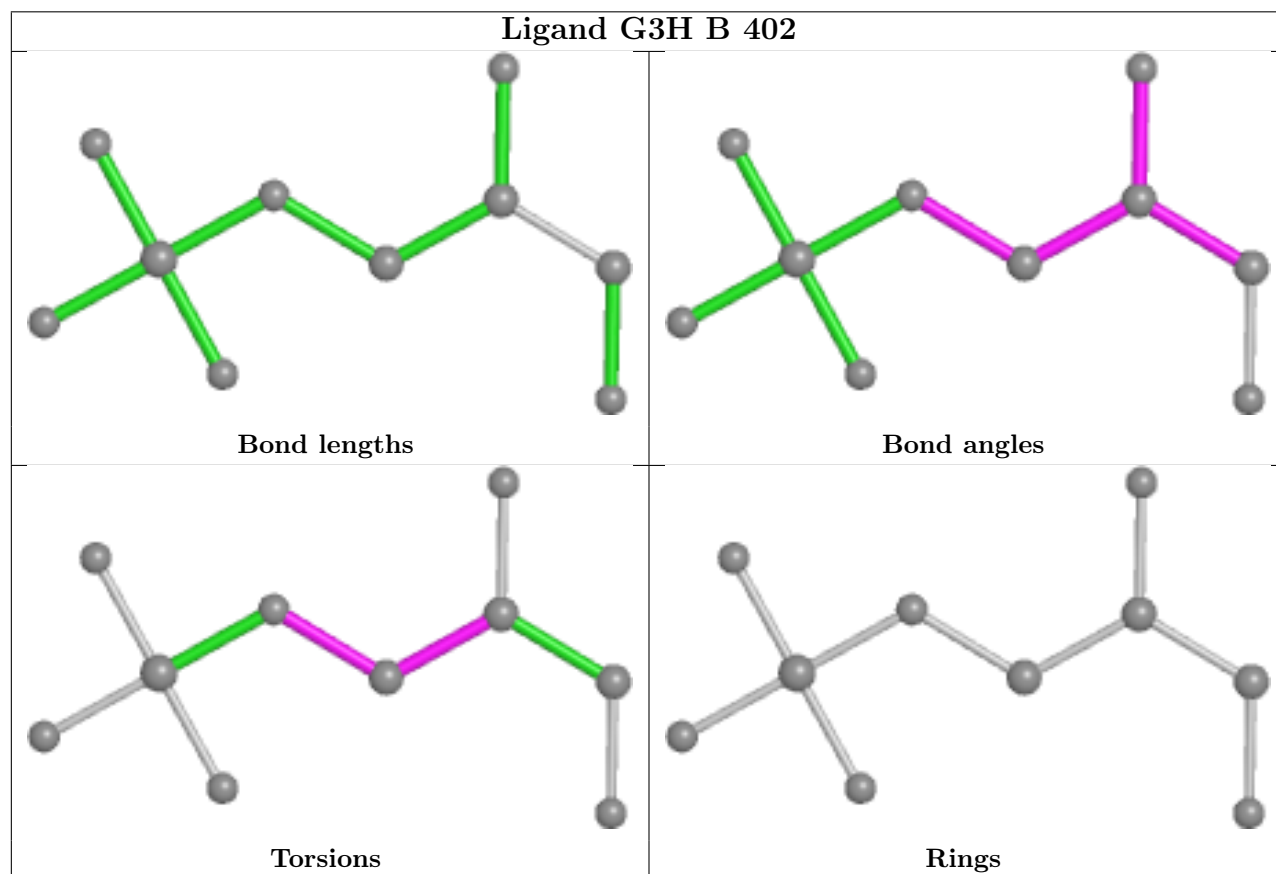
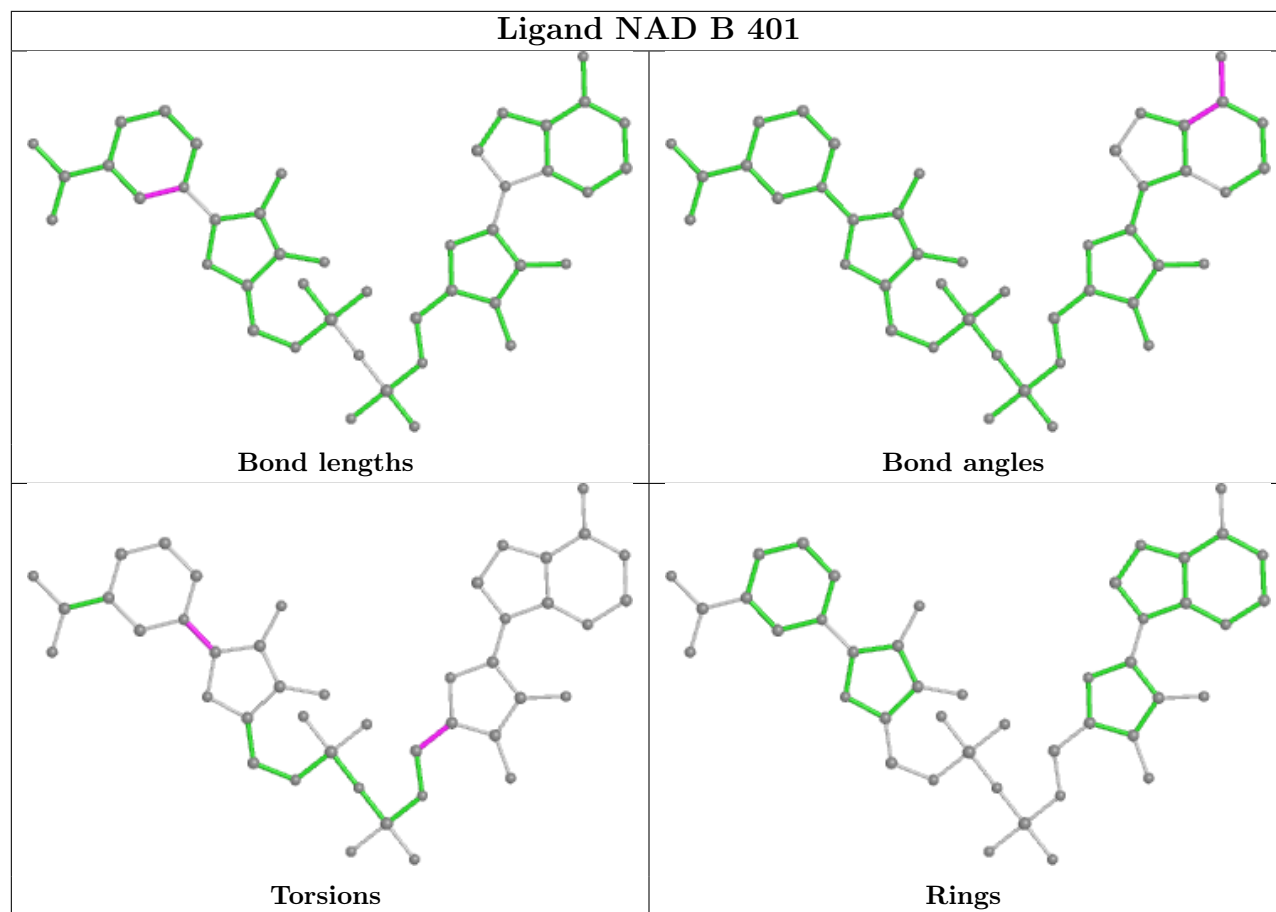


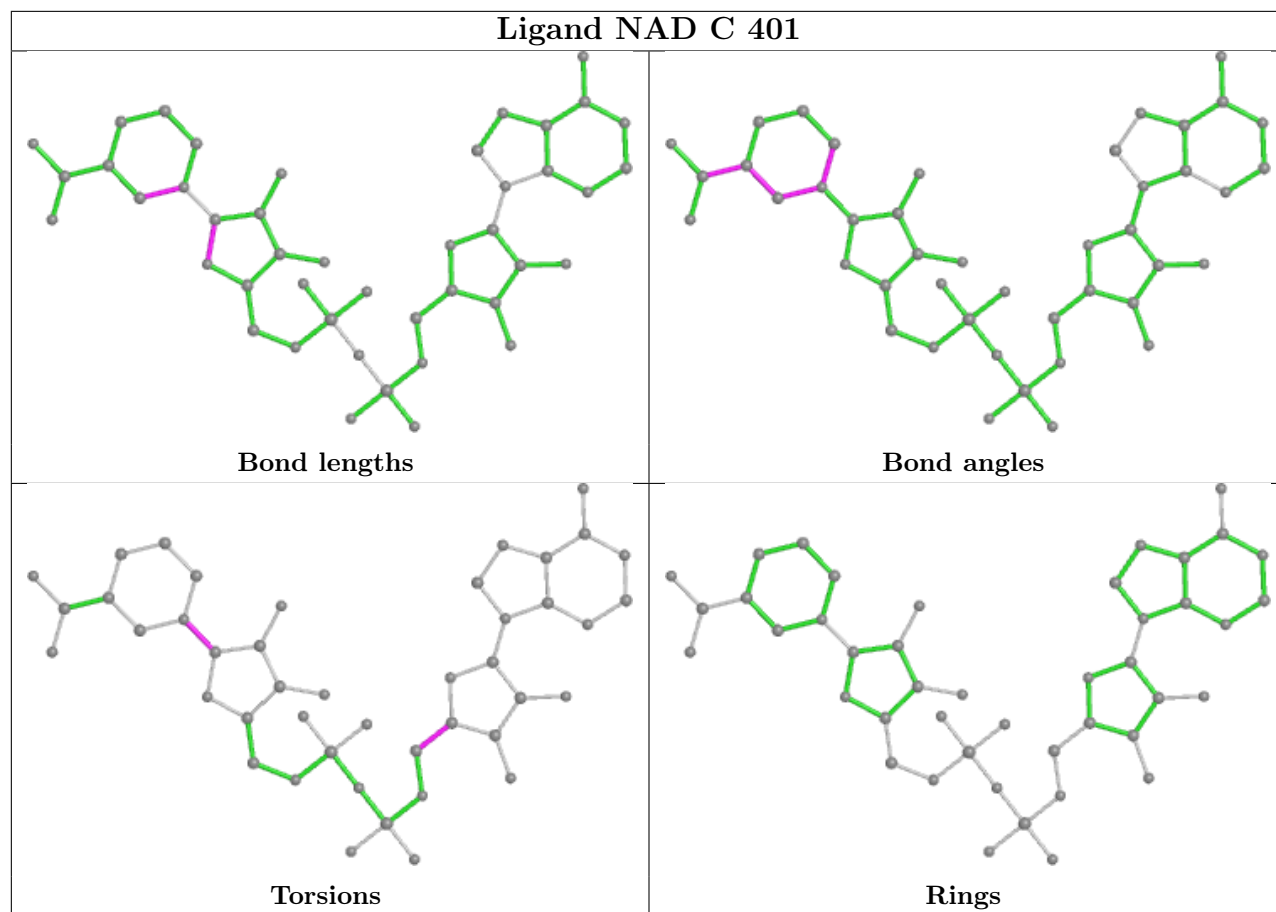


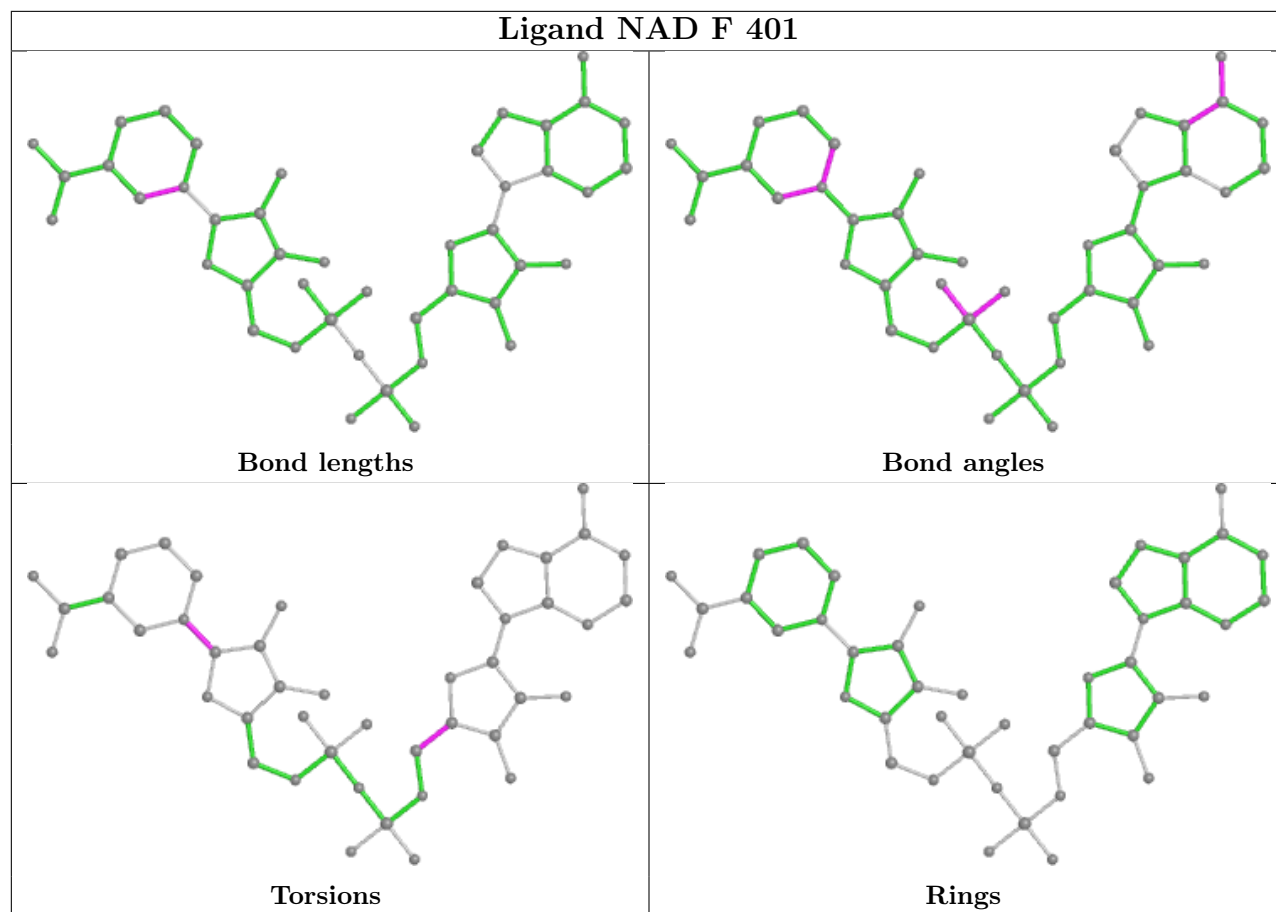


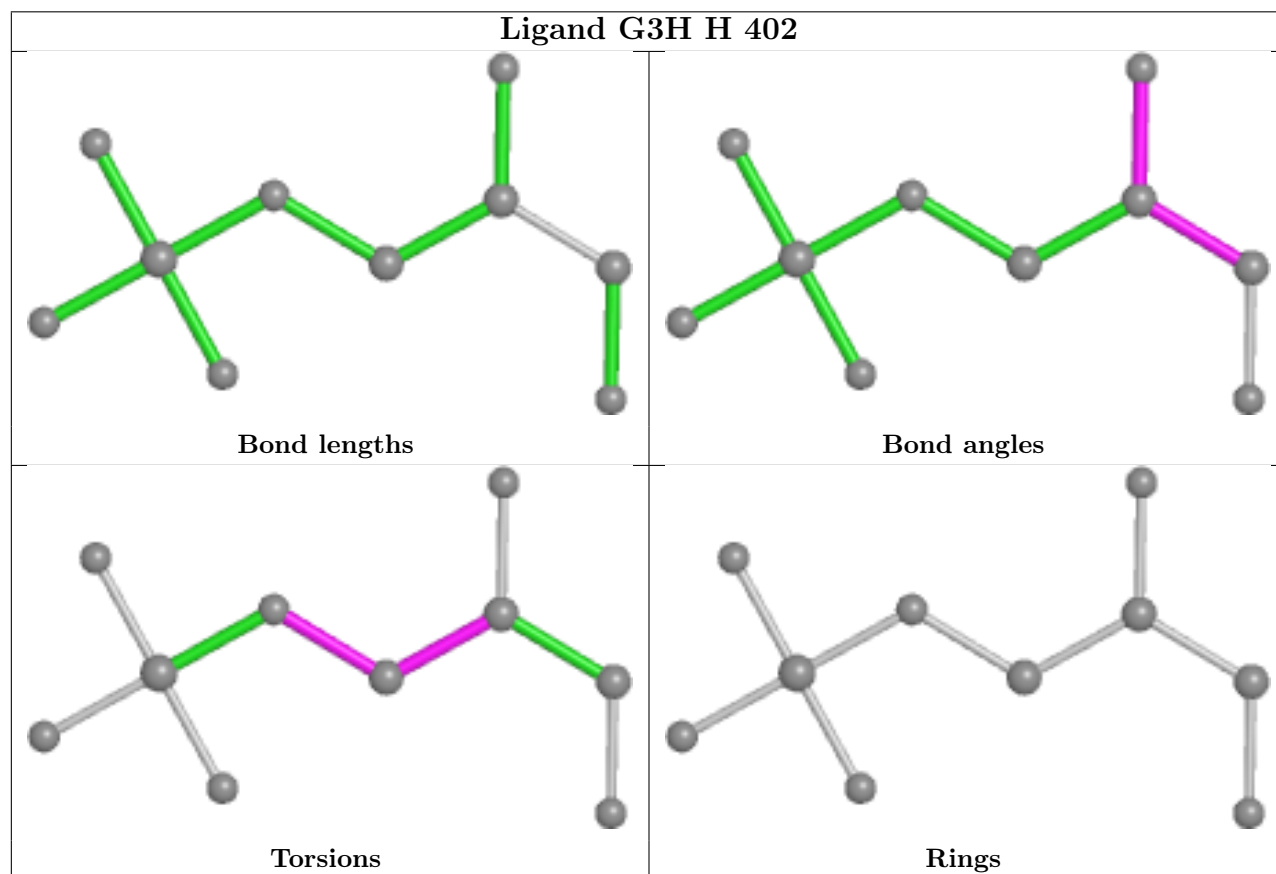
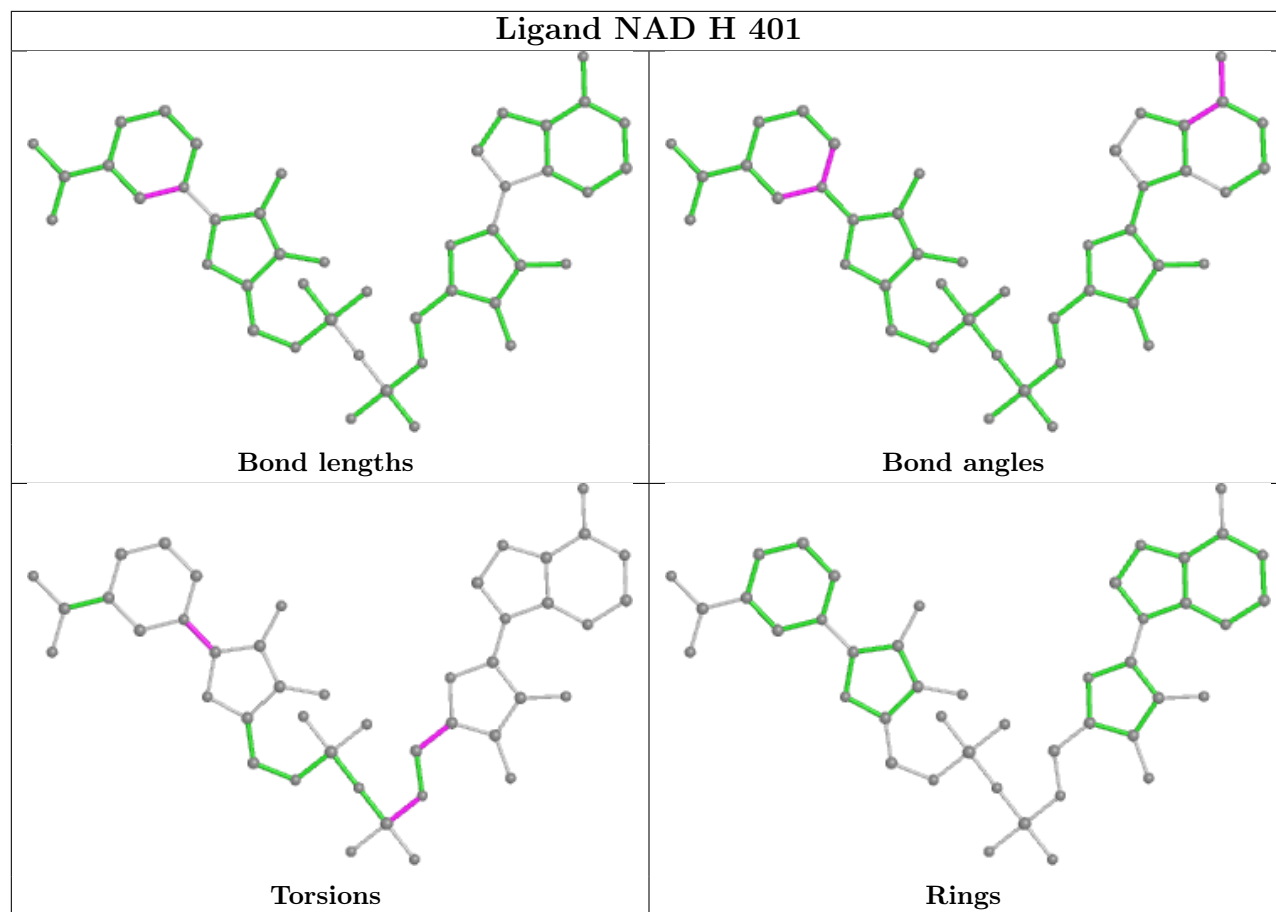


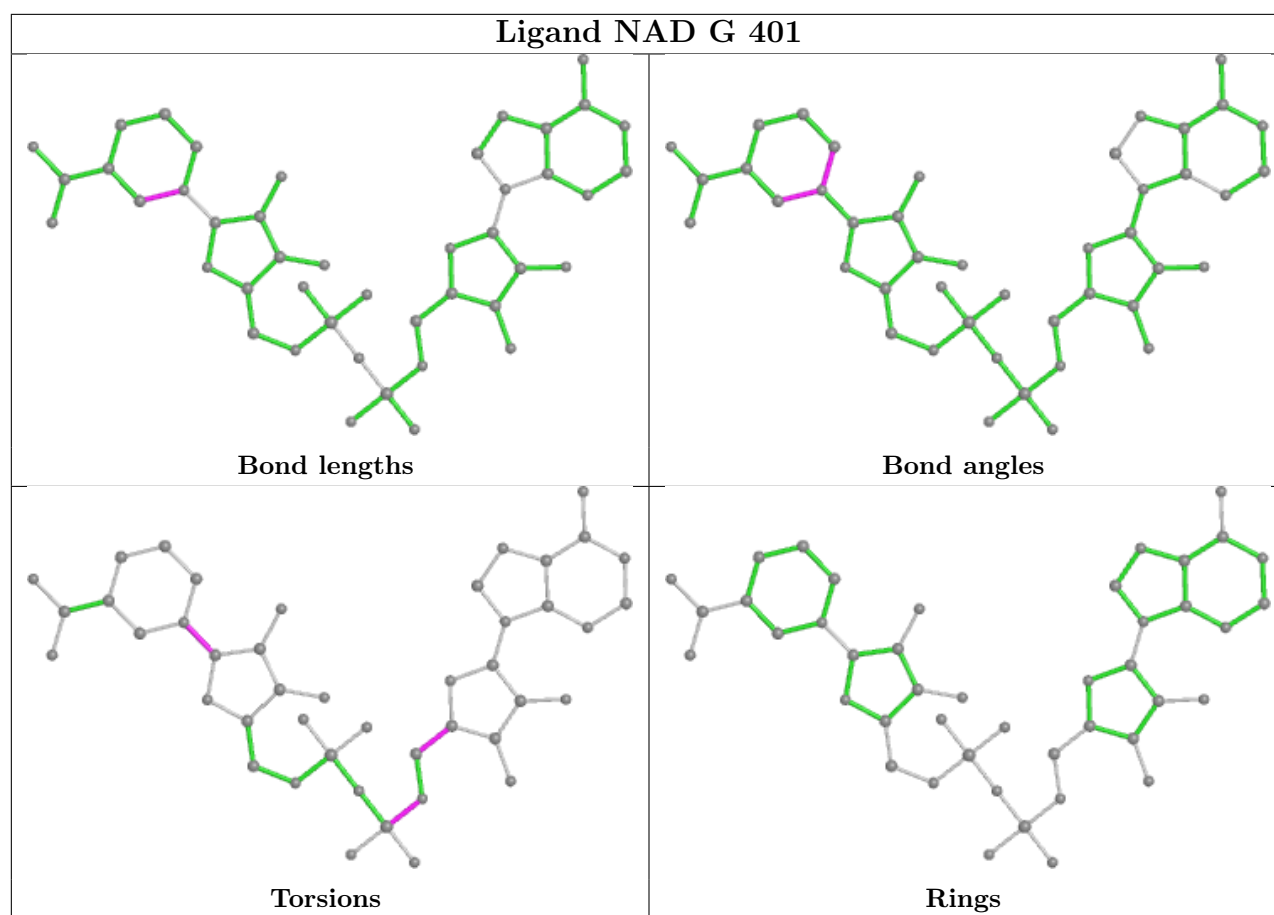












5.7 Other polymers [i](#)

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	334/342 (97%)	-0.01	4 (1%) 79 78	13, 20, 35, 67	0
1	B	334/342 (97%)	-0.01	4 (1%) 79 78	12, 22, 38, 59	0
1	C	335/342 (97%)	0.01	4 (1%) 79 78	12, 22, 40, 65	0
1	D	334/342 (97%)	0.04	6 (1%) 68 66	11, 21, 40, 61	0
1	E	333/342 (97%)	0.13	8 (2%) 59 57	18, 27, 43, 79	0
1	F	333/342 (97%)	0.23	16 (4%) 30 29	18, 28, 46, 70	0
1	G	333/342 (97%)	0.31	13 (3%) 39 38	18, 32, 54, 68	0
1	H	333/342 (97%)	0.28	12 (3%) 42 42	18, 29, 49, 67	0
All	All	2669/2736 (97%)	0.12	67 (2%) 57 56	11, 25, 46, 79	0

All (67) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	334	LEU	7.9
1	H	334	LEU	7.0
1	D	334	LEU	7.0
1	A	334	LEU	6.2
1	E	334	LEU	5.9
1	G	334	LEU	5.8
1	B	334	LEU	5.3
1	C	334	LEU	4.9
1	H	214	ALA	4.1
1	H	194	ARG	3.8
1	G	63	ASP	3.5
1	B	335	LEU	3.5
1	F	79	ARG	3.5
1	G	214	ALA	3.4
1	H	212	GLY	3.1
1	C	215	LYS	3.1

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Mol	Chain	Res	Type	RSRZ
1	F	82	LYS	3.1
1	F	194	ARG	2.9
1	F	112	GLU	2.9
1	H	87	ALA	2.9
1	E	250	LYS	2.9
1	B	143	GLU	2.8
1	D	194	ARG	2.8
1	C	336	GLU	2.7
1	E	158	LEU	2.7
1	F	13	ILE	2.7
1	G	250	LYS	2.7
1	F	88	ALA	2.7
1	H	143	GLU	2.7
1	F	267	VAL	2.7
1	D	335	LEU	2.6
1	G	87	ALA	2.6
1	F	105	ASN	2.6
1	G	143	GLU	2.6
1	E	194	ARG	2.6
1	D	143	GLU	2.6
1	H	83	ASN	2.6
1	A	335	LEU	2.5
1	F	36	LEU	2.5
1	A	214	ALA	2.5
1	H	90	ASN	2.5
1	F	7	ILE	2.4
1	D	82	LYS	2.4
1	G	58	GLU	2.4
1	F	95	ILE	2.4
1	G	144	ASN	2.4
1	E	313	TYR	2.4
1	F	2	THR	2.3
1	F	144	ASN	2.3
1	E	215	LYS	2.3
1	B	112	GLU	2.2
1	H	323	LEU	2.2
1	F	143	GLU	2.2
1	D	323	LEU	2.1
1	G	57	GLN	2.1
1	C	143	GLU	2.1
1	G	111	ILE	2.1
1	H	305	ASN	2.1

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Mol	Chain	Res	Type	RSRZ
1	H	252	GLU	2.1
1	G	77	ALA	2.1
1	F	83	ASN	2.1
1	E	177	THR	2.1
1	A	215	LYS	2.0
1	H	82	LYS	2.0
1	G	90	ASN	2.0
1	E	243	THR	2.0
1	G	252	GLU	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 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.

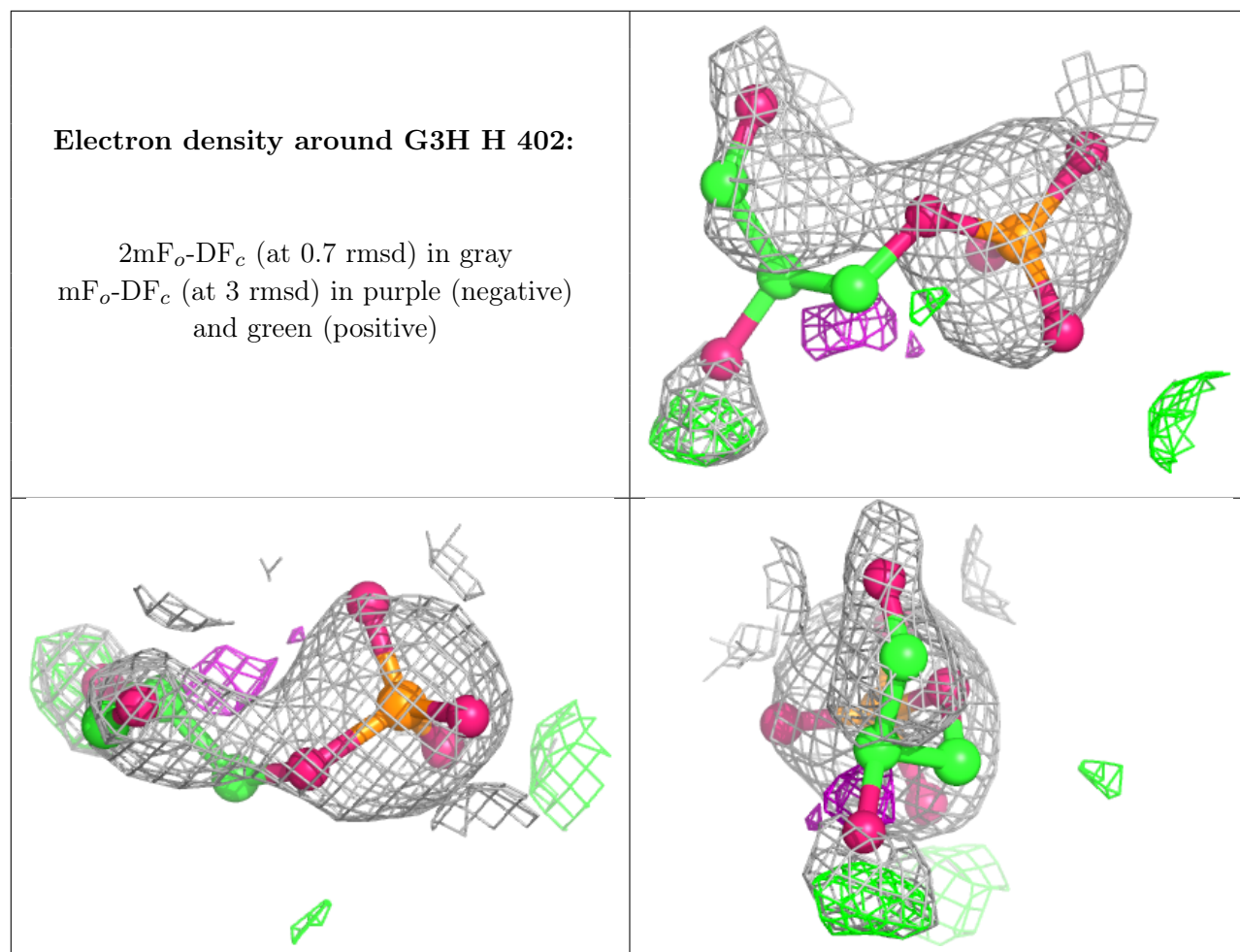
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	GOL	B	405	6/6	0.80	0.17	42,49,54,54	0
5	EDO	C	407	4/4	0.80	0.20	43,43,45,51	0
6	PG4	D	406	13/13	0.84	0.24	37,50,68,71	0
5	EDO	E	406	4/4	0.85	0.14	37,39,41,44	0
4	GOL	E	404	6/6	0.86	0.20	34,40,43,48	0
3	G3H	H	402	10/10	0.86	0.26	61,80,85,86	0
5	EDO	F	403	4/4	0.87	0.13	52,52,53,53	0
4	GOL	B	404	6/6	0.87	0.18	44,45,49,54	0
4	GOL	D	403	6/6	0.88	0.14	32,39,41,42	0
4	GOL	A	404	6/6	0.88	0.15	39,42,44,45	0
4	GOL	E	403	6/6	0.89	0.15	48,49,52,55	0
3	G3H	A	402	10/10	0.89	0.21	46,62,70,73	0
5	EDO	G	403	4/4	0.90	0.12	41,42,46,48	0
4	GOL	C	406	6/6	0.90	0.15	39,47,51,53	0

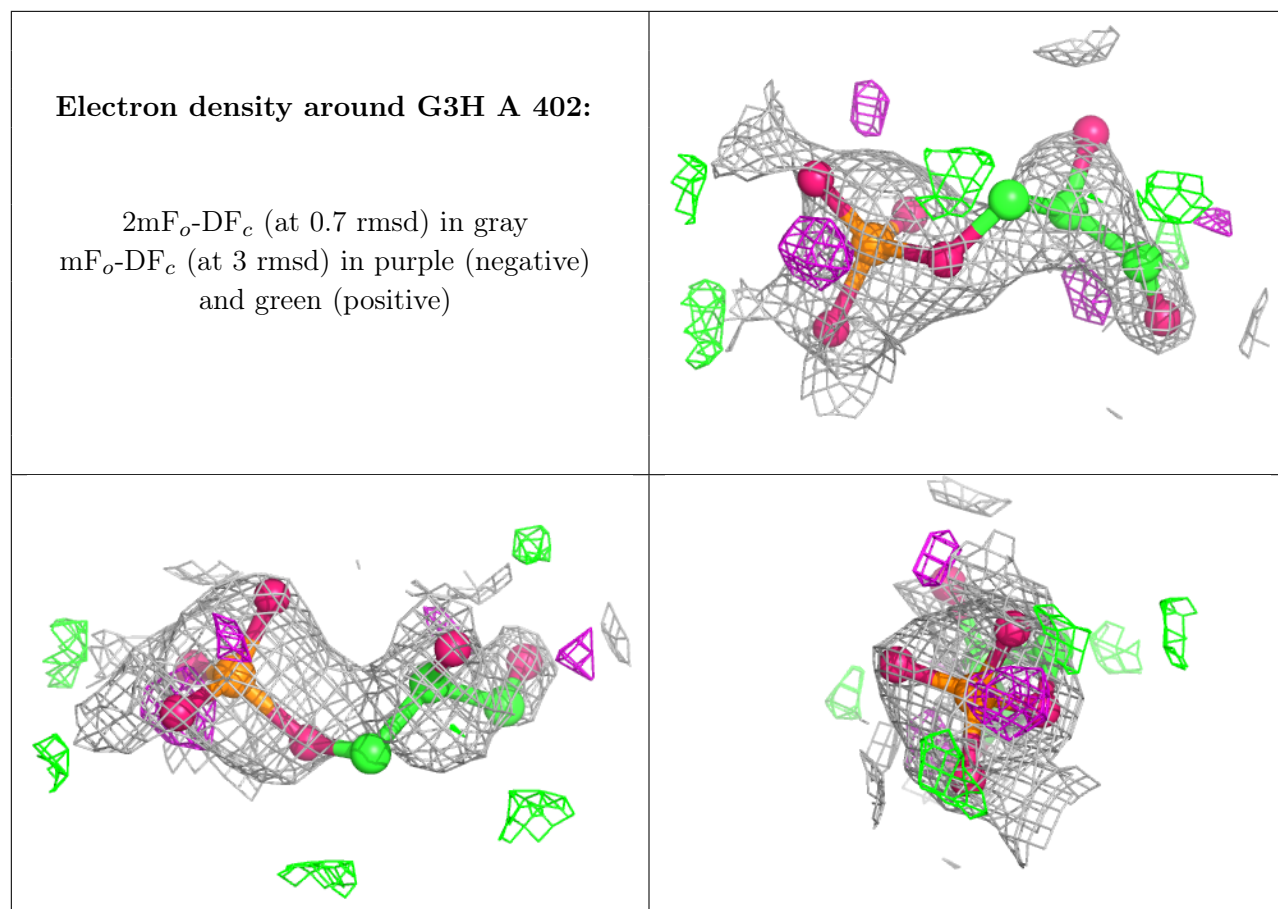
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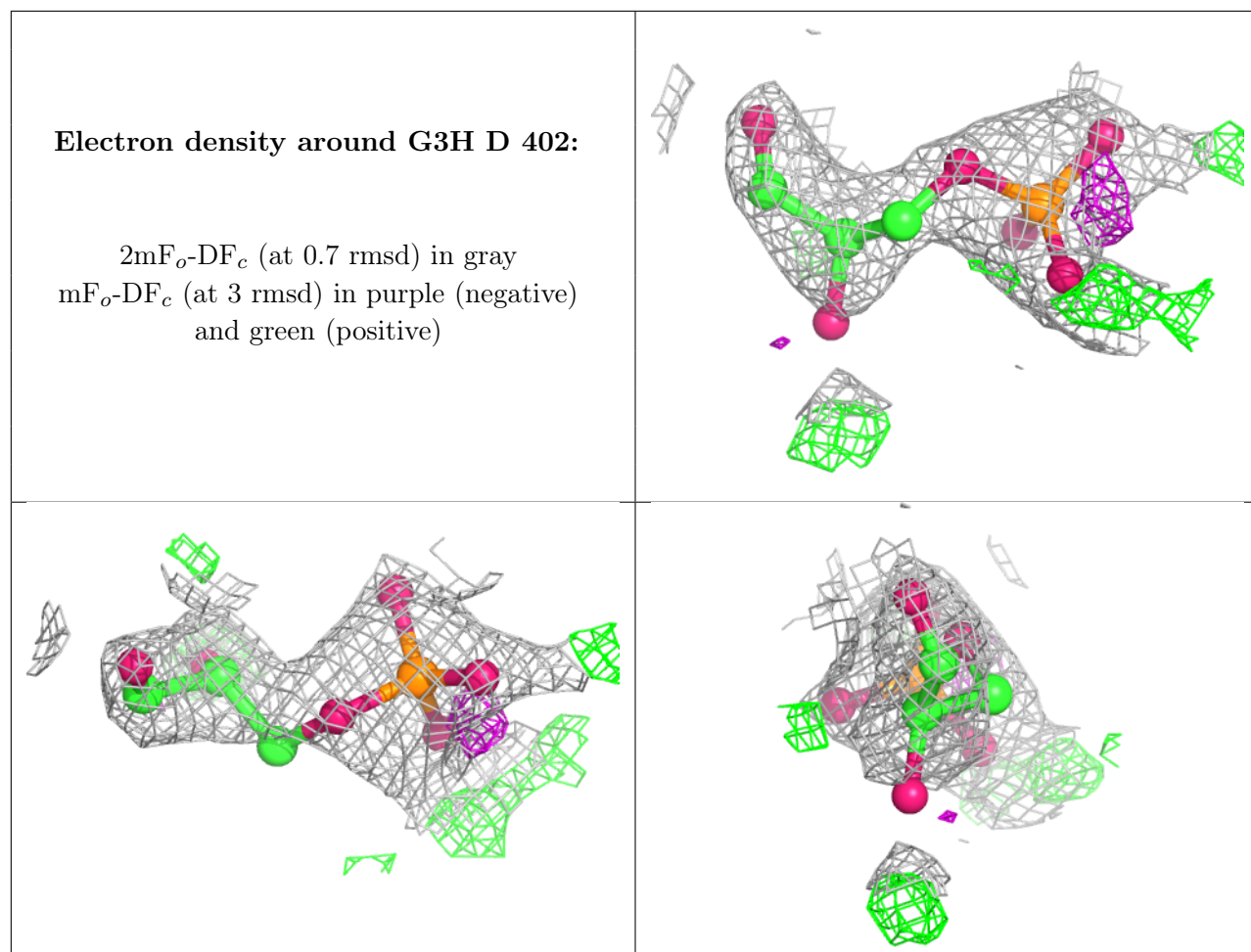
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	GOL	H	403	6/6	0.91	0.11	40,43,44,47	0
5	EDO	D	405	4/4	0.92	0.18	29,30,31,32	0
5	EDO	E	405	4/4	0.92	0.17	41,42,44,47	0
3	G3H	D	402	10/10	0.92	0.19	43,55,64,67	0
3	G3H	E	402	10/10	0.93	0.15	44,57,62,64	0
3	G3H	G	402	10/10	0.93	0.17	39,55,67,75	0
4	GOL	B	403	6/6	0.94	0.14	27,34,35,41	0
4	GOL	D	404	6/6	0.94	0.23	31,37,42,43	0
4	GOL	C	403	6/6	0.94	0.25	30,36,38,48	0
3	G3H	F	402	10/10	0.94	0.14	35,46,51,67	0
4	GOL	C	405	6/6	0.95	0.14	23,30,33,37	0
4	GOL	C	404	6/6	0.95	0.11	29,39,43,43	0
2	NAD	A	401	44/44	0.96	0.11	12,18,21,22	0
2	NAD	F	401	44/44	0.96	0.10	24,30,37,39	0
2	NAD	G	401	44/44	0.96	0.10	29,34,40,42	0
4	GOL	A	403	6/6	0.96	0.09	31,34,36,37	0
2	NAD	H	401	44/44	0.97	0.09	20,28,33,35	0
2	NAD	C	401	44/44	0.97	0.09	20,25,28,32	0
3	G3H	B	402	10/10	0.97	0.14	32,38,46,47	0
3	G3H	C	402	10/10	0.97	0.13	34,38,48,49	0
2	NAD	D	401	44/44	0.97	0.09	14,21,25,29	0
2	NAD	B	401	44/44	0.98	0.08	15,20,22,23	0
2	NAD	E	401	44/44	0.98	0.07	22,25,30,32	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.

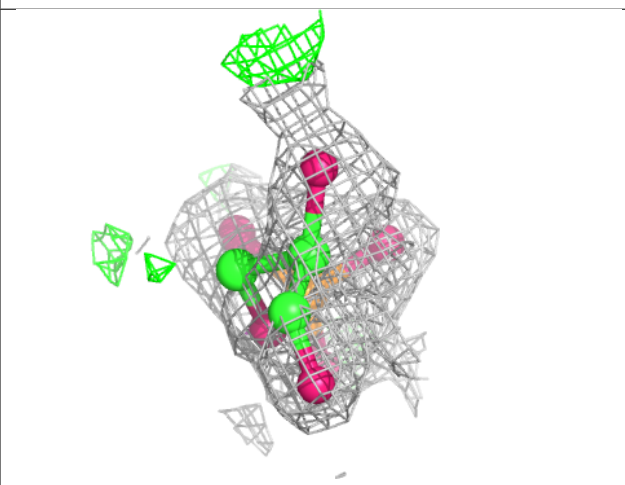
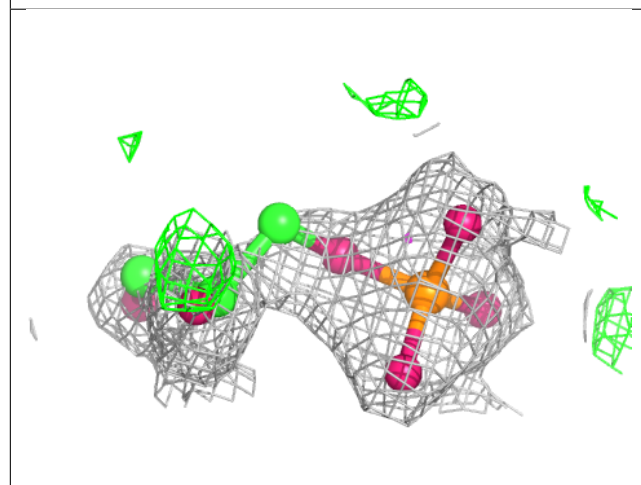
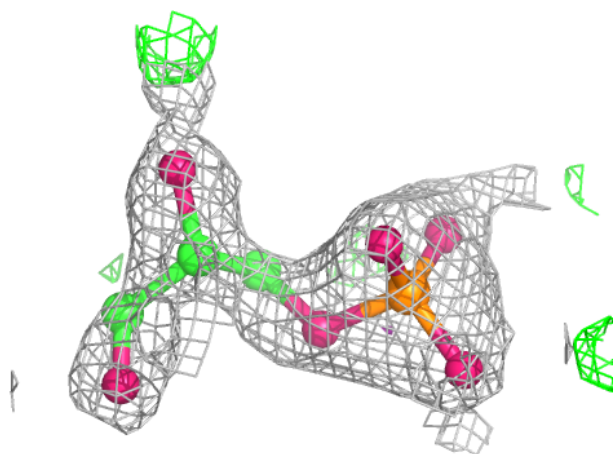


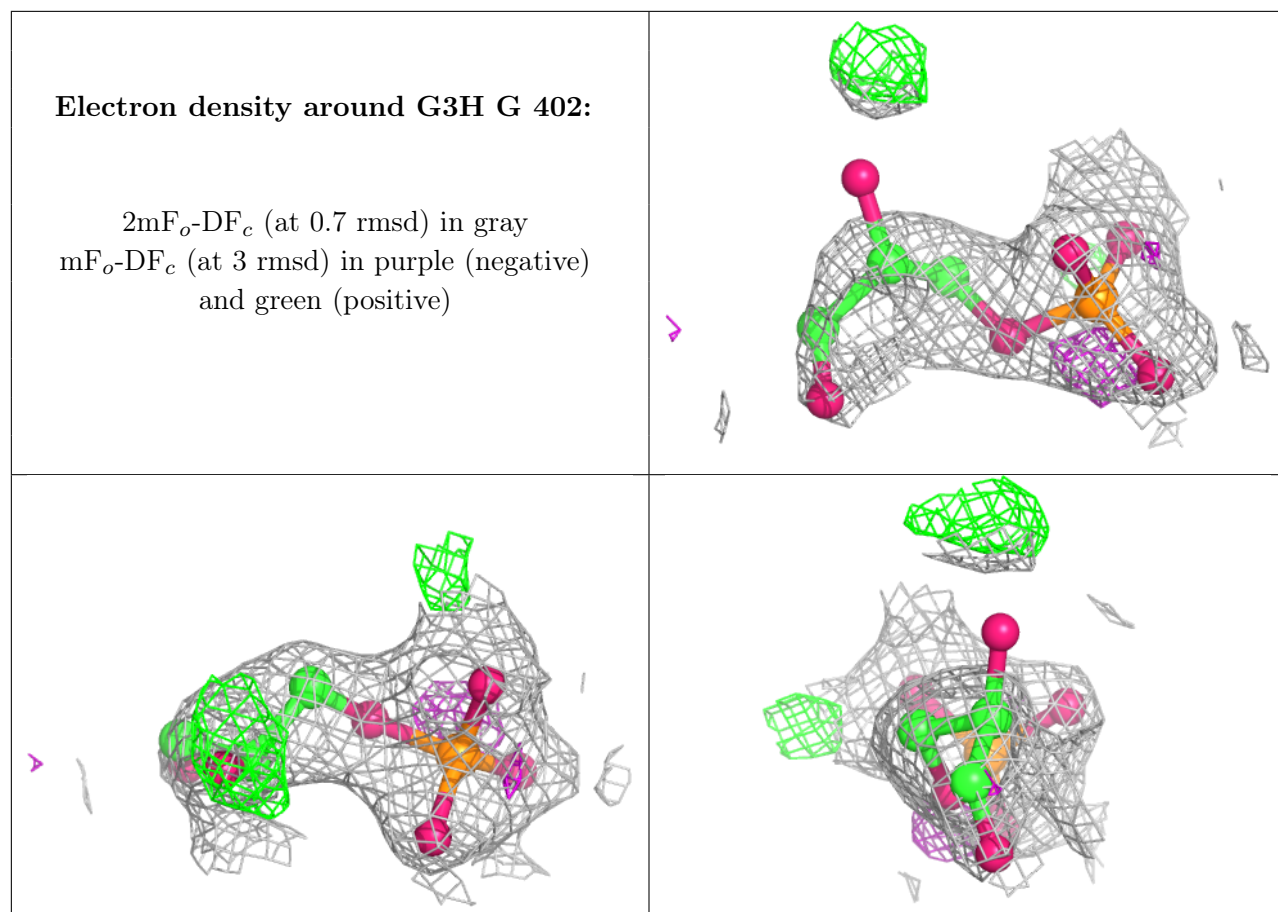




Electron density around G3H E 402:

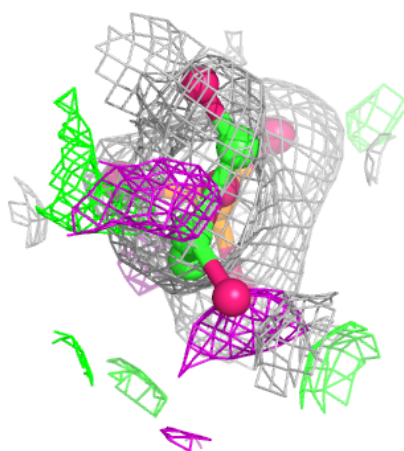
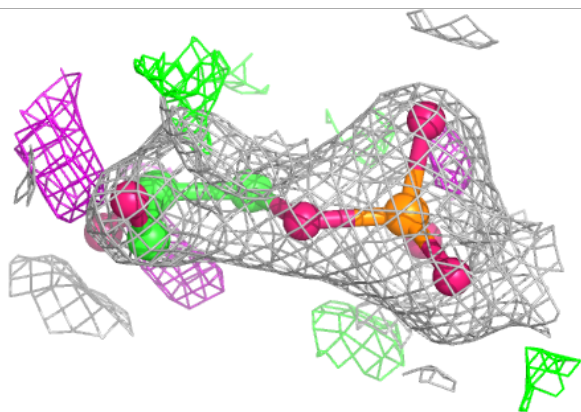
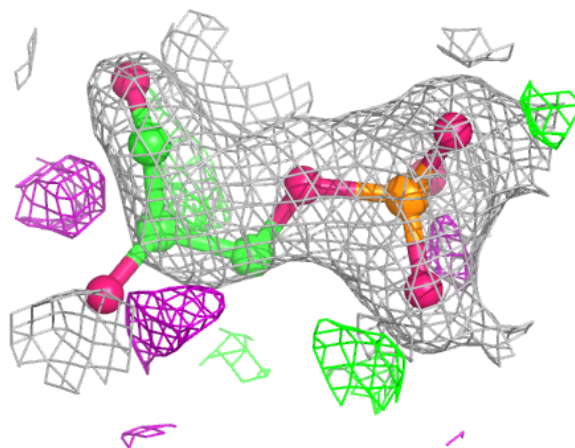
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





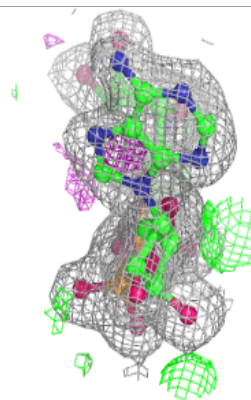
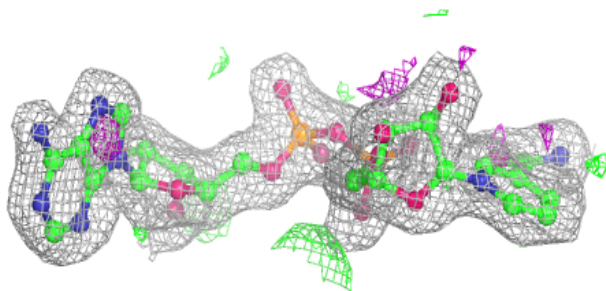
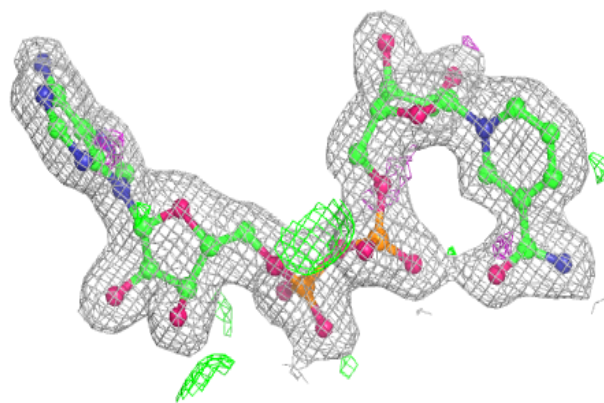
Electron density around G3H F 402:

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

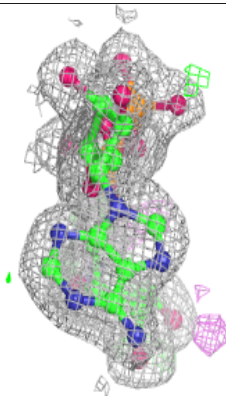
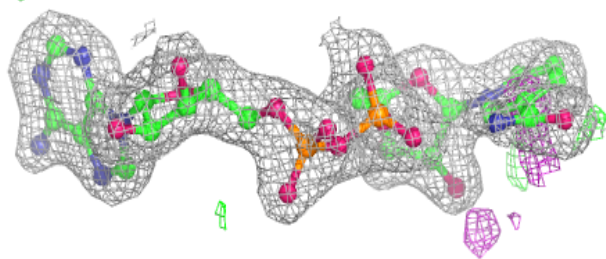
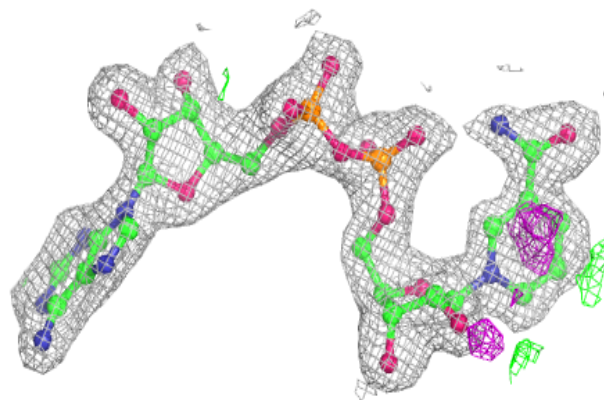


Electron density around NAD A 401:

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

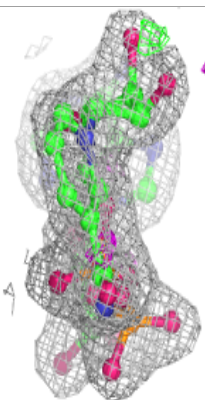
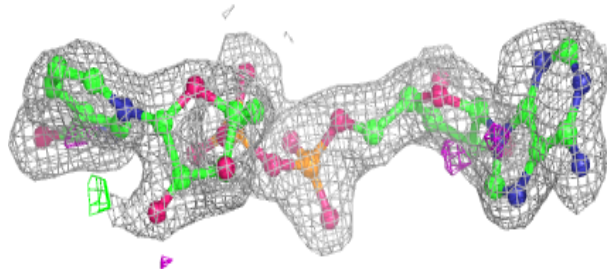
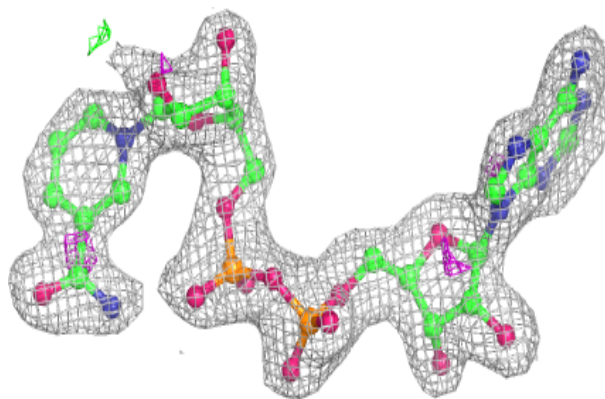
**Electron density around NAD F 401:**

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

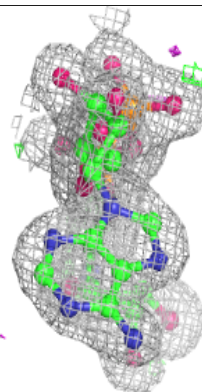
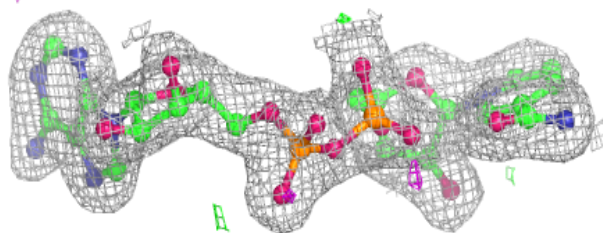
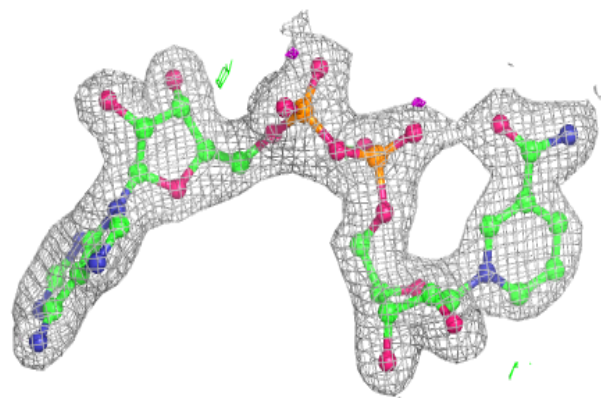


Electron density around NAD G 401:

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

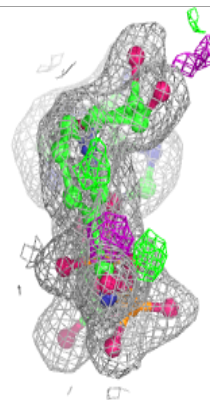
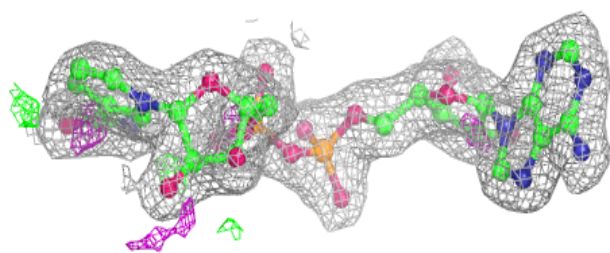
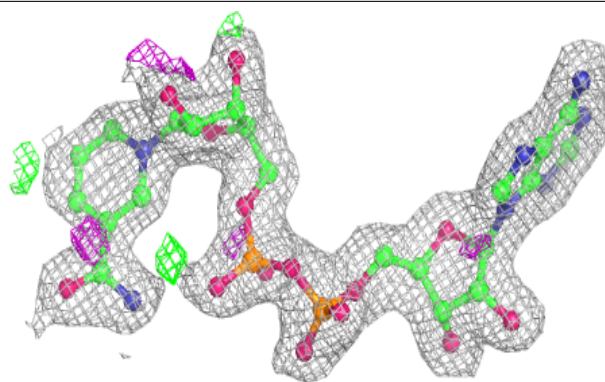
**Electron density around NAD H 401:**

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

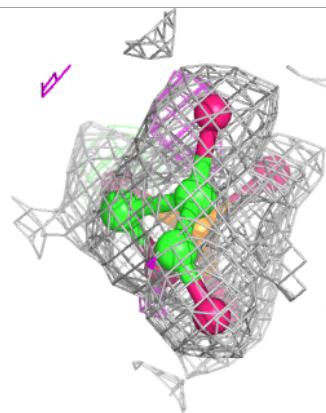
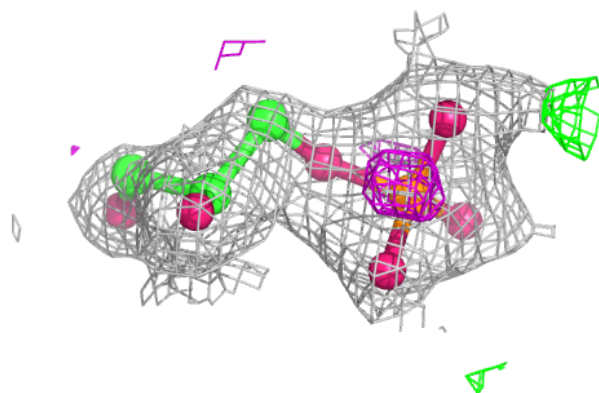
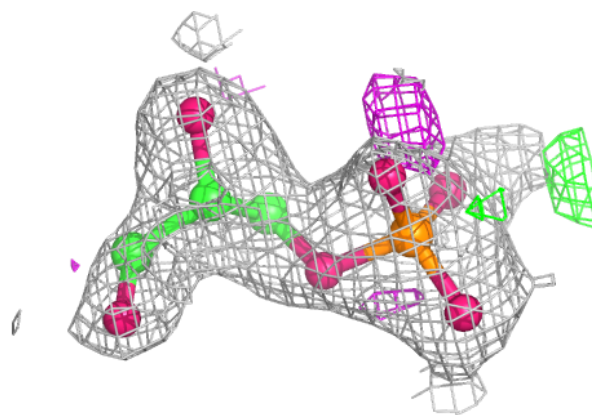


Electron density around NAD C 401:

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

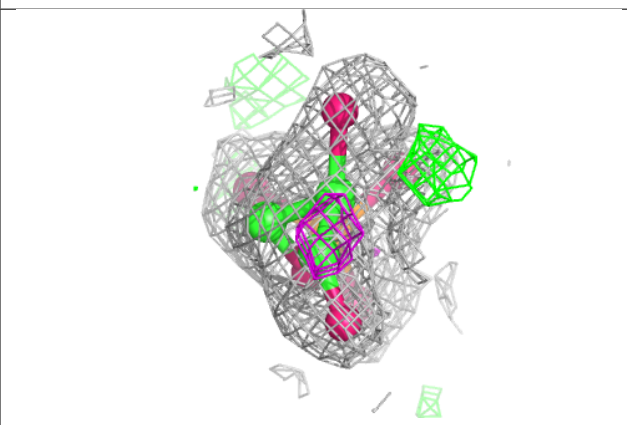
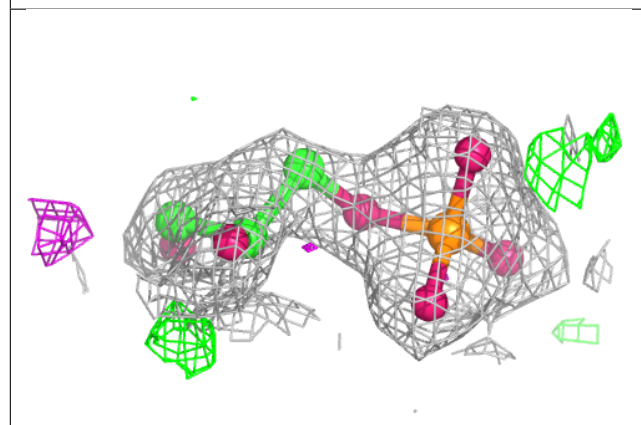
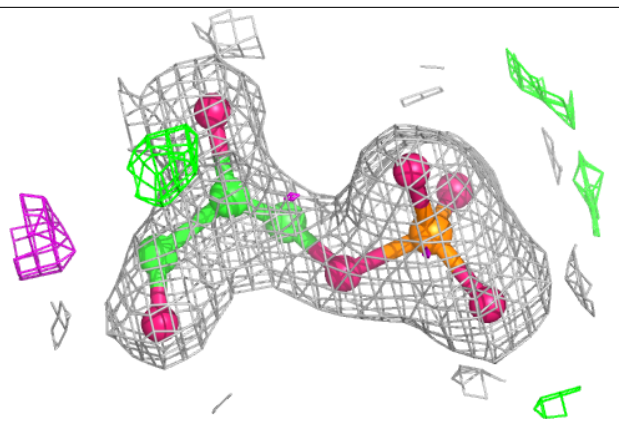
**Electron density around G3H B 402:**

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

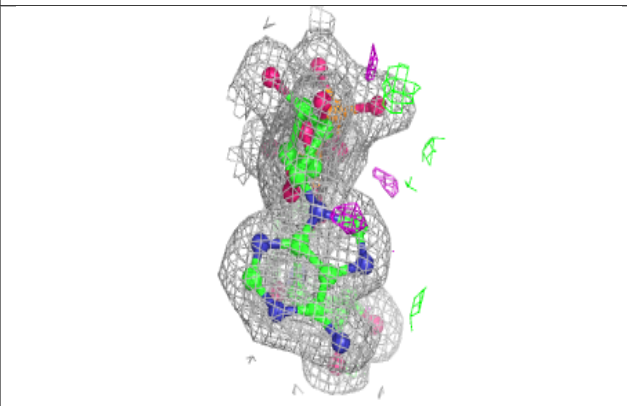
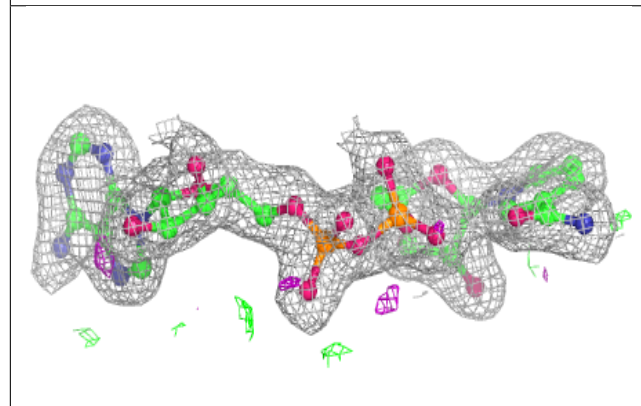
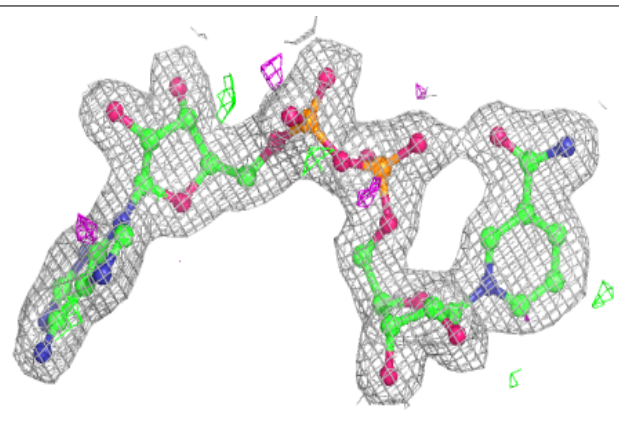


Electron density around G3H C 402:

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

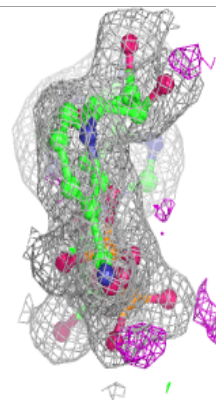
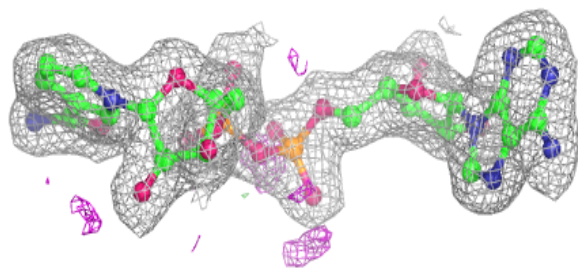
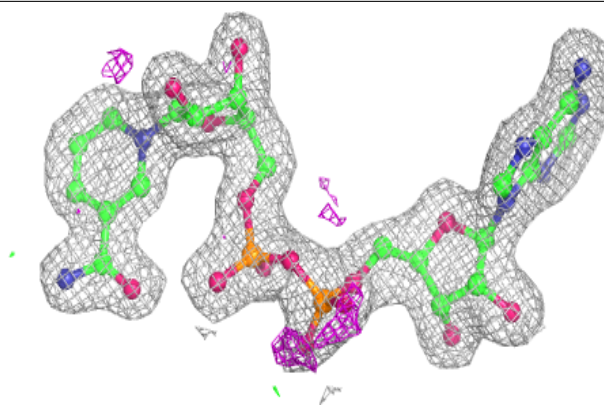
**Electron density around NAD D 401:**

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

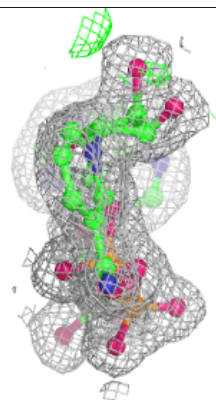
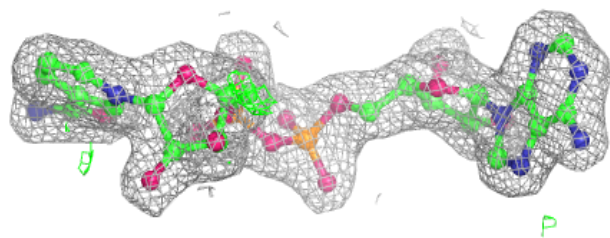
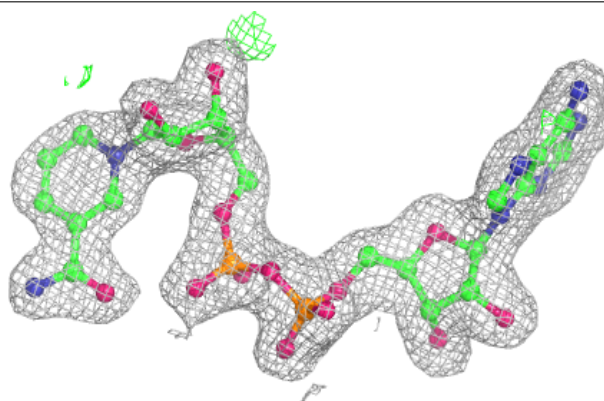


Electron density around NAD B 401:

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

**Electron density around NAD E 401:**

$2mF_o-DF_c$ (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.