



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 17, 2024 – 02:27 AM EDT

PDB ID : 5LNX
Title : Crystal structure of MmgC, an acyl-CoA dehydrogenase from bacillus subtilis.
Authors : Baker, G.E.; Race, P.R.
Deposited on : 2016-08-07
Resolution : 2.60 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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	:	2.37.1
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)	:	2.37.1

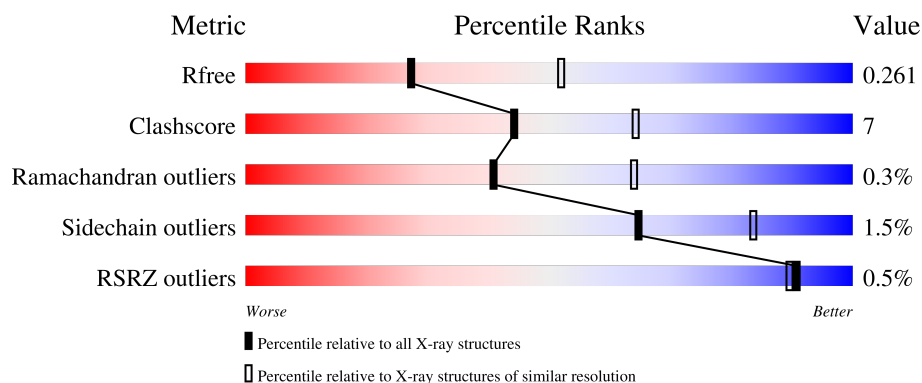
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	379	 82% 12% ...
1	B	379	 84% 12% ...
1	C	379	 83% 12% .. .
1	D	379	 85% 11% ..
1	E	379	 87% 8% . .

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Mol	Chain	Length	Quality of chain
1	F	379	<div><div></div><div>84%</div><div>11%<div><div></div><div></div><div></div></div></div></div>
1	G	379	<div>%<div><div></div><div>81%</div><div>13%<div><div></div><div></div><div></div></div></div></div></div>
1	H	379	<div><div></div><div>87%</div><div>11%<div><div></div><div></div><div></div></div></div></div>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 22225 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 Acyl-CoA dehydrogenase.

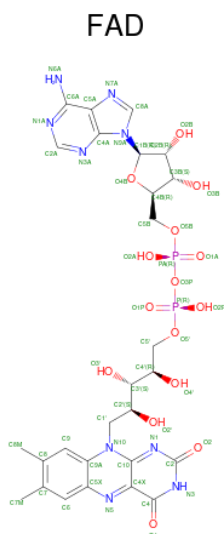
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	367	Total	C	N	O	S	0	0	0
			2713	1727	472	503	11			
1	B	372	Total	C	N	O	S	0	0	0
			2702	1715	466	511	10			
1	C	364	Total	C	N	O	S	0	0	0
			2627	1666	460	490	11			
1	D	374	Total	C	N	O	S	0	0	0
			2743	1736	479	517	11			
1	E	368	Total	C	N	O	S	0	0	0
			2623	1663	446	505	9			
1	F	372	Total	C	N	O	S	0	0	0
			2663	1682	464	506	11			
1	G	367	Total	C	N	O	S	0	0	0
			2621	1661	461	491	8			
1	H	374	Total	C	N	O	S	0	0	0
			2698	1712	469	508	9			

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		
2	D	1	Total	C	O	0	0
			6	3	3		
2	F	1	Total	C	O	0	0
			6	3	3		
2	G	1	Total	C	O	0	0
			6	3	3		
2	G	1	Total	C	O	0	0
			6	3	3		
2	H	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 53	C 27	N 9	O 15	P 2	0	0
3	B	1	Total 53	C 27	N 9	O 15	P 2	0	0
3	C	1	Total 53	C 27	N 9	O 15	P 2	0	0
3	D	1	Total 53	C 27	N 9	O 15	P 2	0	0
3	E	1	Total 53	C 27	N 9	O 15	P 2	0	0
3	F	1	Total 53	C 27	N 9	O 15	P 2	0	0
3	G	1	Total 53	C 27	N 9	O 15	P 2	0	0
3	H	1	Total 53	C 27	N 9	O 15	P 2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	43	Total O 43 43	0	0
4	B	54	Total O 54 54	0	0
4	C	26	Total O 26 26	0	0
4	D	52	Total O 52 52	0	0

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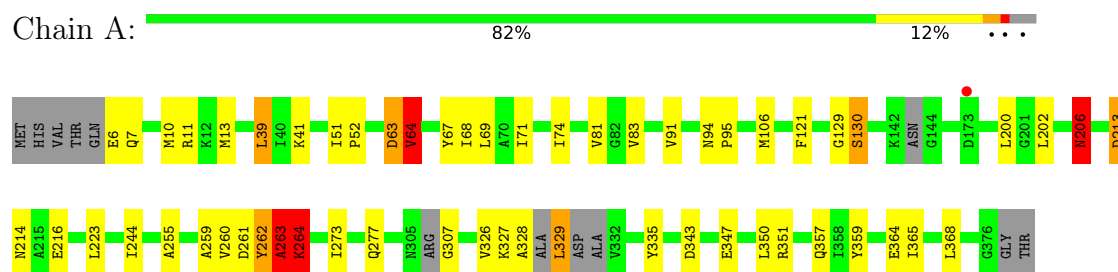
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	32	Total 32	O 32	0	0
4	F	50	Total 50	O 50	0	0
4	G	44	Total 44	O 44	0	0
4	H	44	Total 44	O 44	0	0

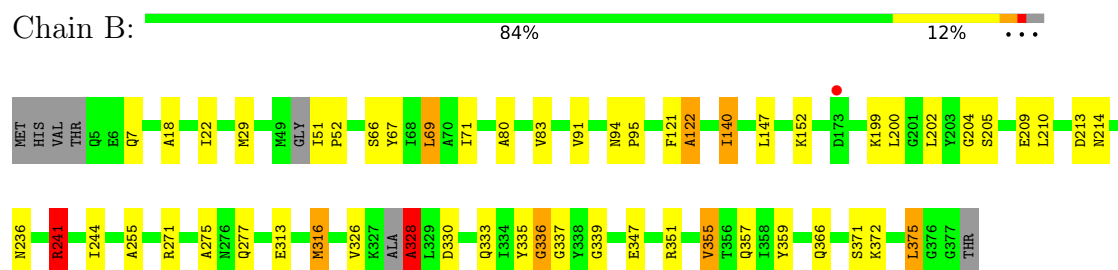
3 Residue-property plots

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.

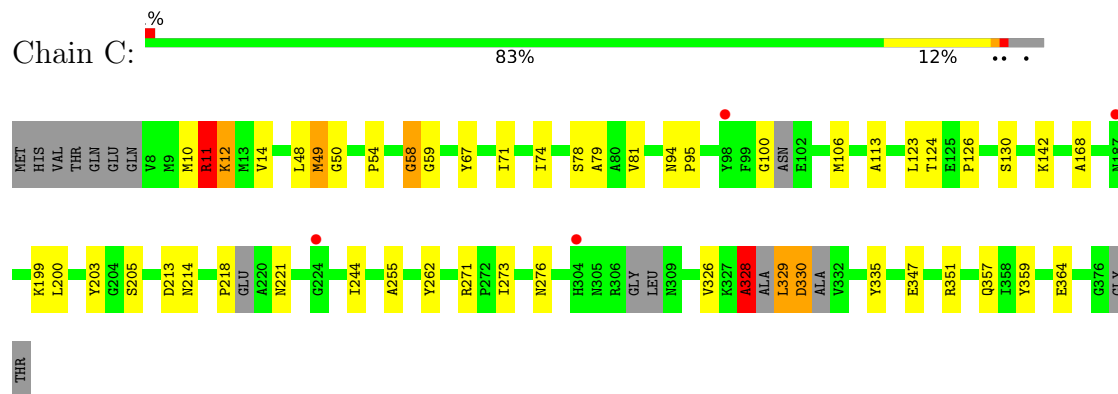
- Molecule 1: Acyl-CoA dehydrogenase



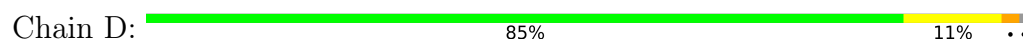
- Molecule 1: Acyl-CoA dehydrogenase

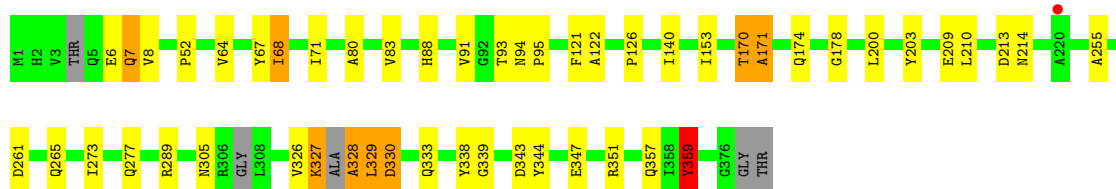


- Molecule 1: Acyl-CoA dehydrogenase

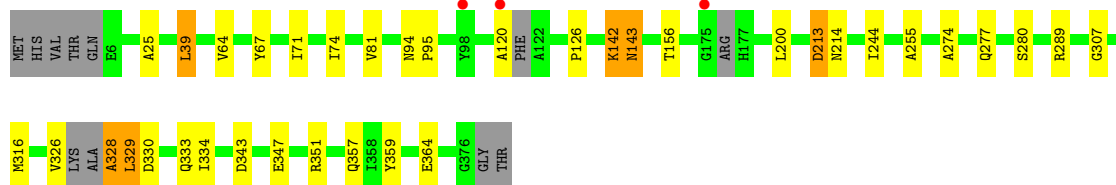
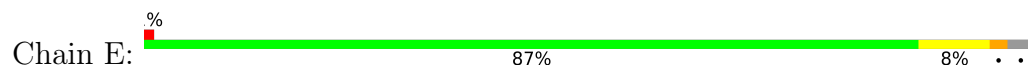


- Molecule 1: Acyl-CoA dehydrogenase

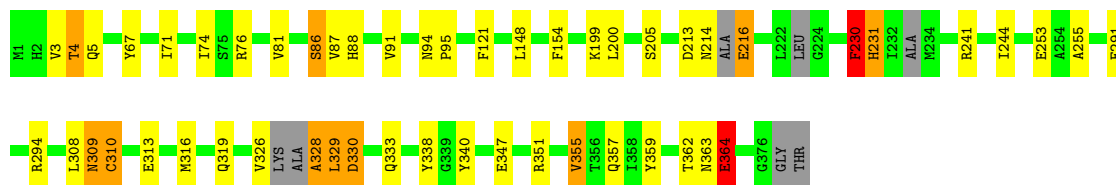
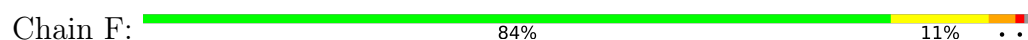




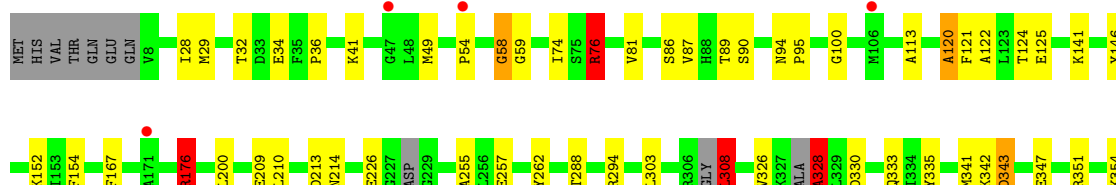
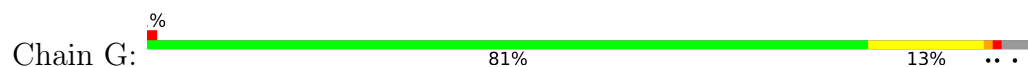
• Molecule 1: Acyl-CoA dehydrogenase



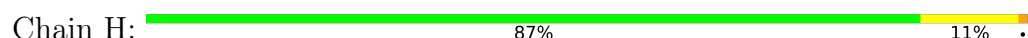
• Molecule 1: Acyl-CoA dehydrogenase

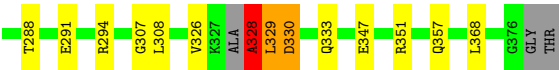


• Molecule 1: Acyl-CoA dehydrogenase



• Molecule 1: Acyl-CoA dehydrogenase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	78.17Å 279.27Å 78.19Å 90.00° 101.40° 90.00°	Depositor
Resolution (Å)	48.76 – 2.60 48.76 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.76-2.60) 99.9 (48.76-2.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.52 (at 2.61Å)	Xtriage
Refinement program	REFMAC 5.8.0103	Depositor
R, R_{free}	0.247 , 0.285 0.225 , 0.261	Depositor DCC
R_{free} test set	4985 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	31.3	Xtriage
Anisotropy	0.821	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 8.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	0.390 for l,-k,h	Xtriage
Reported twinning fraction	0.481 for H, K, L 0.519 for L, -K, H	Depositor
Outliers	0 of 100323 reflections	Xtriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	22225	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.04% 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: GOL, FAD

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z > 5$	RMSZ	# $ Z > 5$
1	A	0.61	0/2761	0.91	14/3725 (0.4%)
1	B	0.58	1/2751 (0.0%)	0.80	9/3728 (0.2%)
1	C	0.57	0/2672	0.91	15/3612 (0.4%)
1	D	0.58	2/2793 (0.1%)	0.89	17/3775 (0.5%)
1	E	0.56	0/2666	0.85	8/3617 (0.2%)
1	F	0.56	0/2706	0.86	13/3663 (0.4%)
1	G	0.57	0/2667	0.86	11/3616 (0.3%)
1	H	0.64	2/2747 (0.1%)	0.81	9/3721 (0.2%)
All	All	0.59	5/21763 (0.0%)	0.86	96/29457 (0.3%)

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	5
1	B	0	3
1	C	0	5
1	D	0	3
1	E	1	4
1	F	0	3
1	G	0	4
1	H	0	3
All	All	1	30

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	307	GLY	C-N	-13.88	1.02	1.34
1	H	308	LEU	C-N	10.40	1.57	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	327	LYS	C-N	-5.79	1.20	1.34
1	B	337	GLY	N-CA	5.31	1.54	1.46
1	D	170	THR	CA-C	5.01	1.66	1.52

The worst 5 of 96 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	142	LYS	CB-CA-C	-19.87	70.66	110.40
1	H	308	LEU	O-C-N	10.96	140.24	122.70
1	F	362	THR	N-CA-C	-10.67	82.18	111.00
1	C	100	GLY	N-CA-C	10.33	138.93	113.10
1	D	68	ILE	CG1-CB-CG2	-10.31	88.71	111.40

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	E	143	ASN	CA

5 of 30 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	206	ASN	Mainchain
1	A	223	LEU	Peptide
1	A	262	TYR	Peptide
1	A	263	ALA	Peptide
1	A	307	GLY	Peptide

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2713	0	2653	44	0
1	B	2702	0	2583	39	0
1	C	2627	0	2476	31	0
1	D	2743	0	2613	42	0
1	E	2623	0	2446	24	0
1	F	2663	0	2483	37	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	2621	0	2464	40	0
1	H	2698	0	2554	37	0
2	A	18	0	24	1	0
2	C	18	0	24	0	0
2	D	6	0	8	0	0
2	F	6	0	8	0	0
2	G	12	0	16	0	0
2	H	6	0	8	0	0
3	A	53	0	31	2	0
3	B	53	0	31	2	0
3	C	53	0	31	5	0
3	D	53	0	31	2	0
3	E	53	0	31	2	0
3	F	53	0	31	2	0
3	G	53	0	31	5	0
3	H	53	0	31	2	0
4	A	43	0	0	0	0
4	B	54	0	0	1	0
4	C	26	0	0	0	0
4	D	52	0	0	0	0
4	E	32	0	0	0	0
4	F	50	0	0	0	0
4	G	44	0	0	0	0
4	H	44	0	0	0	0
All	All	22225	0	20608	282	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 7.

The worst 5 of 282 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:H:7:GLN:HB3	1:H:10:MET:H	1.25	1.00
1:B:355:VAL:HG13	1:B:359:TYR:HE2	1.29	0.98
1:D:88:HIS:O	1:D:93:THR:HG23	1.67	0.94
1:G:176:ARG:HG3	1:G:176:ARG:HH11	1.34	0.93
1:B:66:SER:HA	1:B:69:LEU:HG	1.53	0.89

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	359/379 (95%)	340 (95%)	14 (4%)	5 (1%)	11	22
1	B	368/379 (97%)	355 (96%)	13 (4%)	0	100	100
1	C	354/379 (93%)	332 (94%)	22 (6%)	0	100	100
1	D	368/379 (97%)	345 (94%)	23 (6%)	0	100	100
1	E	360/379 (95%)	339 (94%)	21 (6%)	0	100	100
1	F	362/379 (96%)	343 (95%)	16 (4%)	3 (1%)	19	39
1	G	361/379 (95%)	340 (94%)	21 (6%)	0	100	100
1	H	372/379 (98%)	353 (95%)	19 (5%)	0	100	100
All	All	2904/3032 (96%)	2747 (95%)	149 (5%)	8 (0%)	41	64

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	39	LEU
1	A	64	VAL
1	A	130	SER
1	F	309	ASN
1	A	206	ASN

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	259/291 (89%)	255 (98%)	4 (2%)	65	83

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	252/291 (87%)	248 (98%)	4 (2%)	62	82
1	C	238/291 (82%)	236 (99%)	2 (1%)	81	92
1	D	259/291 (89%)	256 (99%)	3 (1%)	71	87
1	E	240/291 (82%)	238 (99%)	2 (1%)	81	92
1	F	242/291 (83%)	236 (98%)	6 (2%)	47	73
1	G	233/291 (80%)	227 (97%)	6 (3%)	46	72
1	H	247/291 (85%)	245 (99%)	2 (1%)	81	92
All	All	1970/2328 (85%)	1941 (98%)	29 (2%)	65	83

5 of 29 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	347	GLU
1	H	271	ARG
1	F	230	PHE
1	G	308	LEU
1	F	87	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	363	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 monosaccharides in this entry.

5.6 Ligand geometry

19 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	FAD	A	404	-	53,58,58	1.31	6 (11%)	68,89,89	1.77	21 (30%)
2	GOL	C	402	-	5,5,5	0.41	0	5,5,5	0.31	0
3	FAD	F	402	-	53,58,58	1.51	8 (15%)	68,89,89	1.42	11 (16%)
3	FAD	B	401	-	53,58,58	1.54	6 (11%)	68,89,89	1.85	19 (27%)
3	FAD	D	402	-	53,58,58	1.42	8 (15%)	68,89,89	1.65	16 (23%)
3	FAD	C	404	-	53,58,58	1.26	5 (9%)	68,89,89	1.41	12 (17%)
3	FAD	G	403	-	53,58,58	1.38	8 (15%)	68,89,89	1.97	22 (32%)
2	GOL	C	403	-	5,5,5	0.26	0	5,5,5	0.58	0
2	GOL	C	401	-	5,5,5	0.78	0	5,5,5	0.90	0
2	GOL	G	402	-	5,5,5	0.62	0	5,5,5	0.56	0
2	GOL	F	401	-	5,5,5	0.49	0	5,5,5	0.19	0
2	GOL	D	401	-	5,5,5	0.31	0	5,5,5	0.44	0
2	GOL	G	401	-	5,5,5	0.72	0	5,5,5	0.59	0
2	GOL	A	401	-	5,5,5	0.44	0	5,5,5	0.84	0
2	GOL	A	402	-	5,5,5	0.43	0	5,5,5	0.67	0
2	GOL	A	403	-	5,5,5	0.40	0	5,5,5	0.56	0
2	GOL	H	401	-	5,5,5	0.45	0	5,5,5	0.11	0
3	FAD	H	402	-	53,58,58	1.43	7 (13%)	68,89,89	1.68	12 (17%)
3	FAD	E	401	-	53,58,58	1.24	6 (11%)	68,89,89	1.73	15 (22%)

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	FAD	A	404	-	-	5/30/50/50	0/6/6/6
2	GOL	C	402	-	-	2/4/4/4	-
3	FAD	F	402	-	-	3/30/50/50	0/6/6/6

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	FAD	B	401	-	-	6/30/50/50	0/6/6/6
3	FAD	D	402	-	-	4/30/50/50	0/6/6/6
3	FAD	C	404	-	-	5/30/50/50	0/6/6/6
3	FAD	G	403	-	-	10/30/50/50	0/6/6/6
2	GOL	C	403	-	-	3/4/4/4	-
2	GOL	C	401	-	-	1/4/4/4	-
2	GOL	G	402	-	-	2/4/4/4	-
2	GOL	F	401	-	-	4/4/4/4	-
2	GOL	D	401	-	-	2/4/4/4	-
2	GOL	G	401	-	-	0/4/4/4	-
2	GOL	A	401	-	-	0/4/4/4	-
2	GOL	A	402	-	-	2/4/4/4	-
2	GOL	A	403	-	-	2/4/4/4	-
2	GOL	H	401	-	-	2/4/4/4	-
3	FAD	H	402	-	-	7/30/50/50	0/6/6/6
3	FAD	E	401	-	-	4/30/50/50	0/6/6/6

The worst 5 of 54 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	401	FAD	C1'-C2'	5.62	1.60	1.52
3	H	402	FAD	C9A-C5X	5.46	1.50	1.41
3	F	402	FAD	C9A-C5X	5.38	1.50	1.41
3	C	404	FAD	C9A-C5X	5.07	1.49	1.41
3	B	401	FAD	C9A-C5X	4.73	1.49	1.41

The worst 5 of 128 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	401	FAD	C1B-N9A-C4A	-5.33	117.28	126.64
3	D	402	FAD	N3A-C2A-N1A	-5.25	120.48	128.68
3	G	403	FAD	N3A-C2A-N1A	-5.17	120.60	128.68
3	E	401	FAD	N3A-C2A-N1A	-5.15	120.64	128.68
3	B	401	FAD	P-O3P-PA	-5.03	115.56	132.83

There are no chirality outliers.

5 of 64 torsion outliers are listed below:

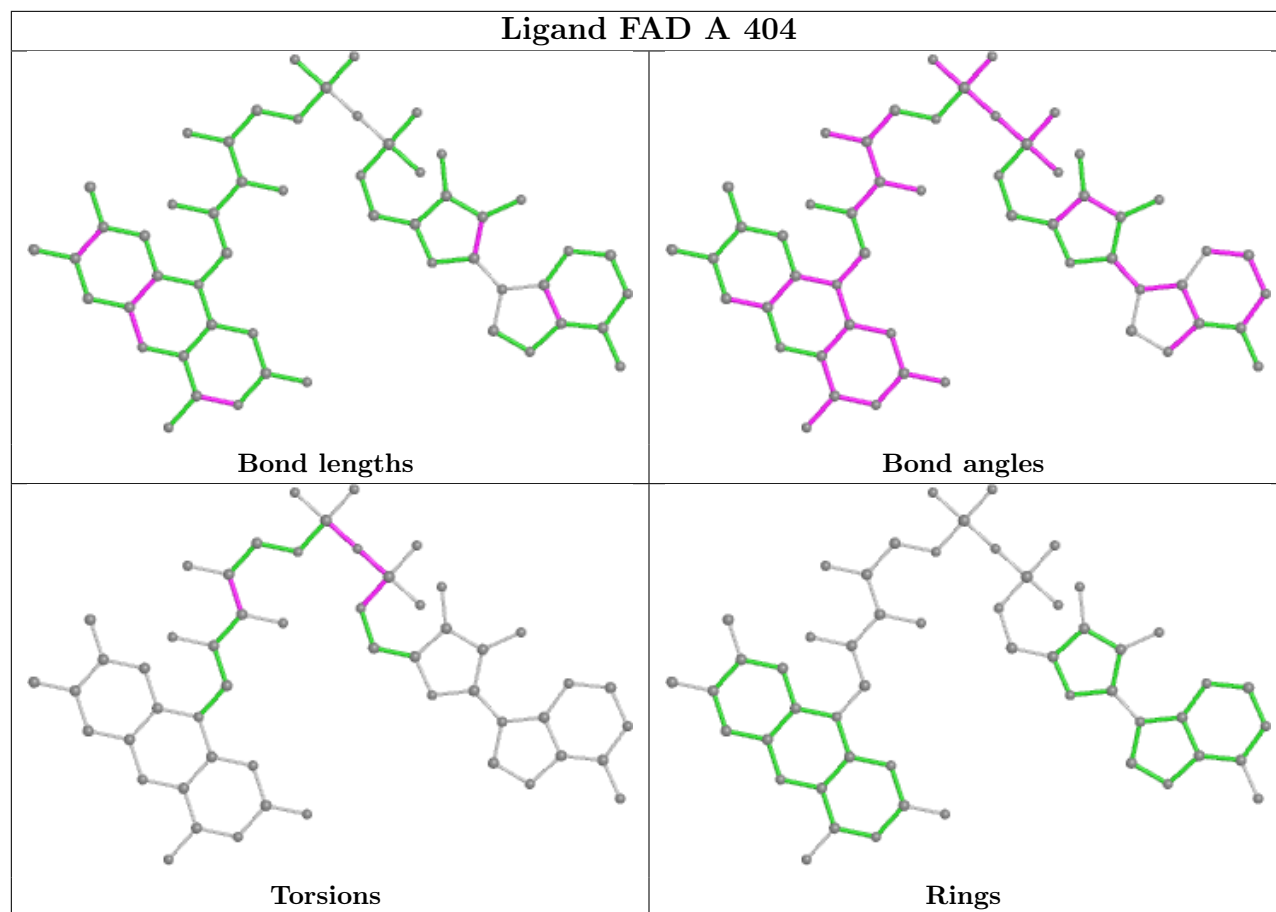
Mol	Chain	Res	Type	Atoms
2	A	403	GOL	O1-C1-C2-C3
2	D	401	GOL	C1-C2-C3-O3
2	F	401	GOL	C1-C2-C3-O3
2	G	402	GOL	O1-C1-C2-C3
2	H	401	GOL	O1-C1-C2-C3

There are no ring outliers.

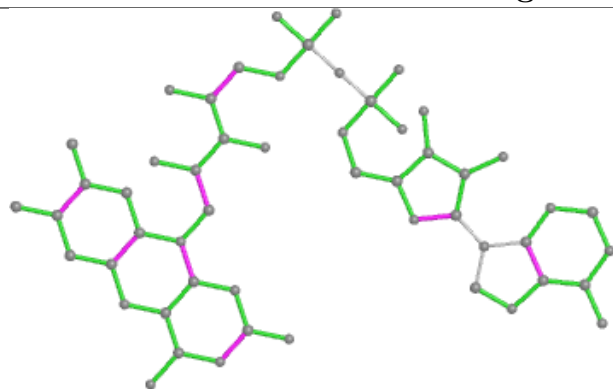
9 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	404	FAD	2	0
3	F	402	FAD	2	0
3	B	401	FAD	2	0
3	D	402	FAD	2	0
3	C	404	FAD	5	0
3	G	403	FAD	5	0
2	A	401	GOL	1	0
3	H	402	FAD	2	0
3	E	401	FAD	2	0

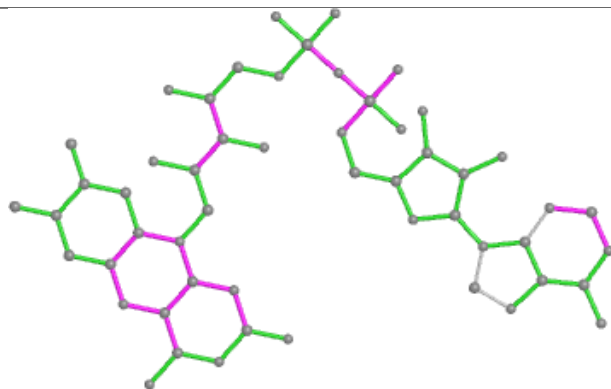
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



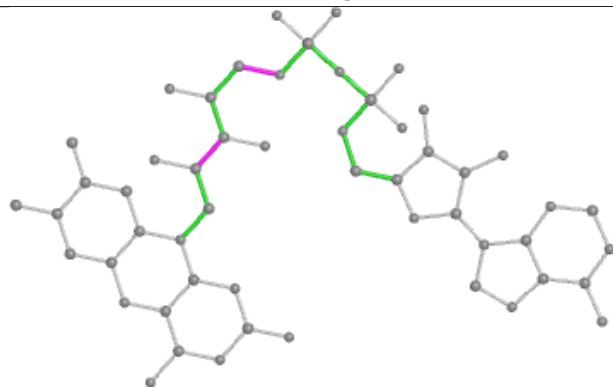
Ligand FAD F 402



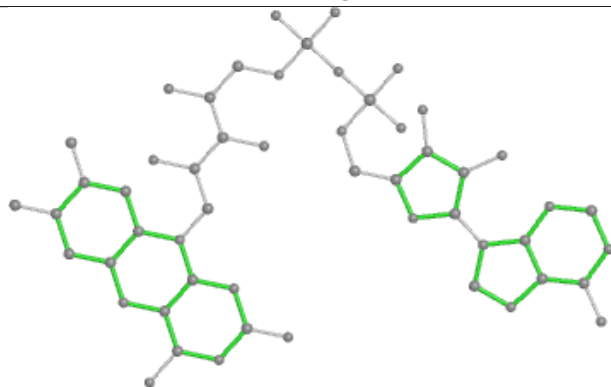
Bond lengths



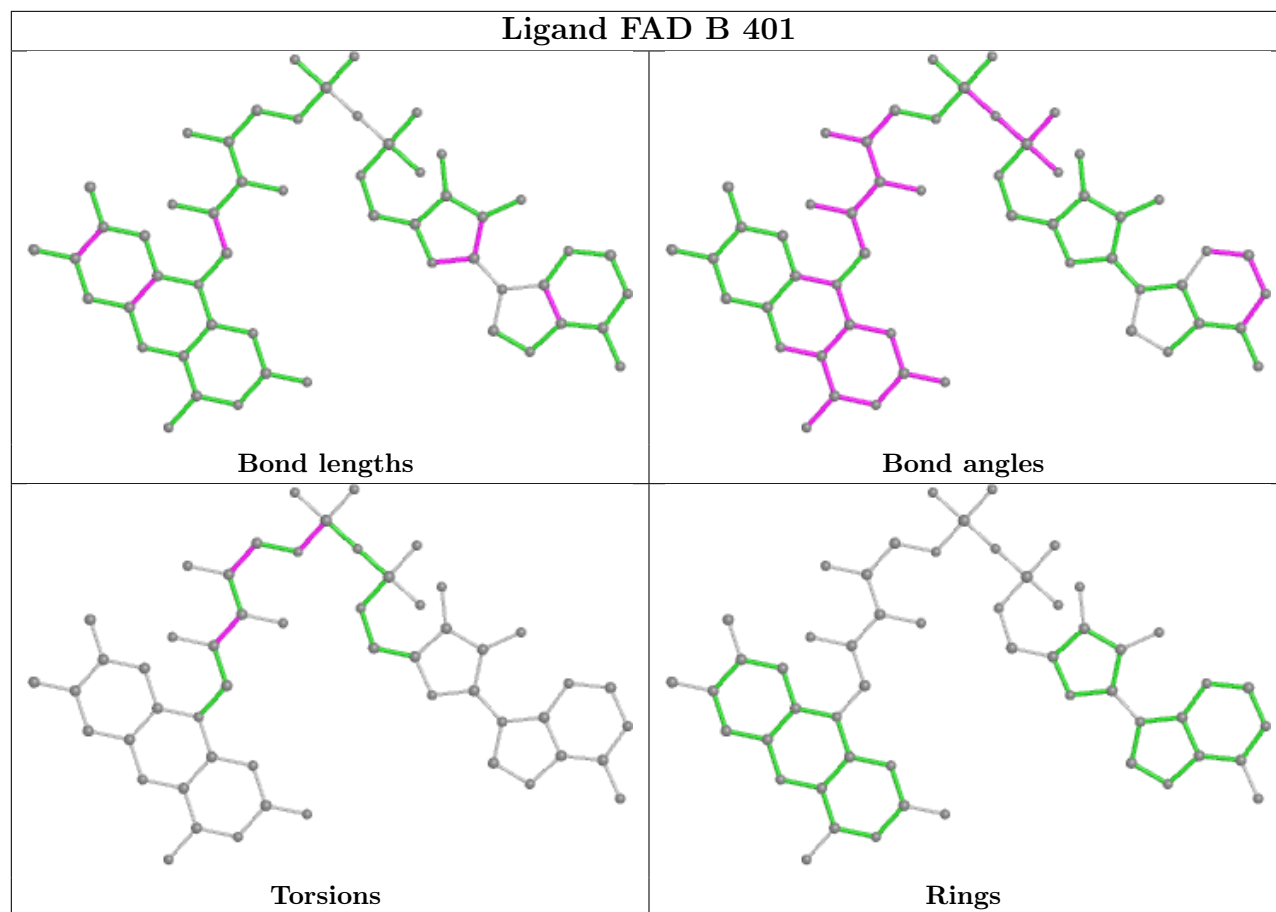
Bond angles

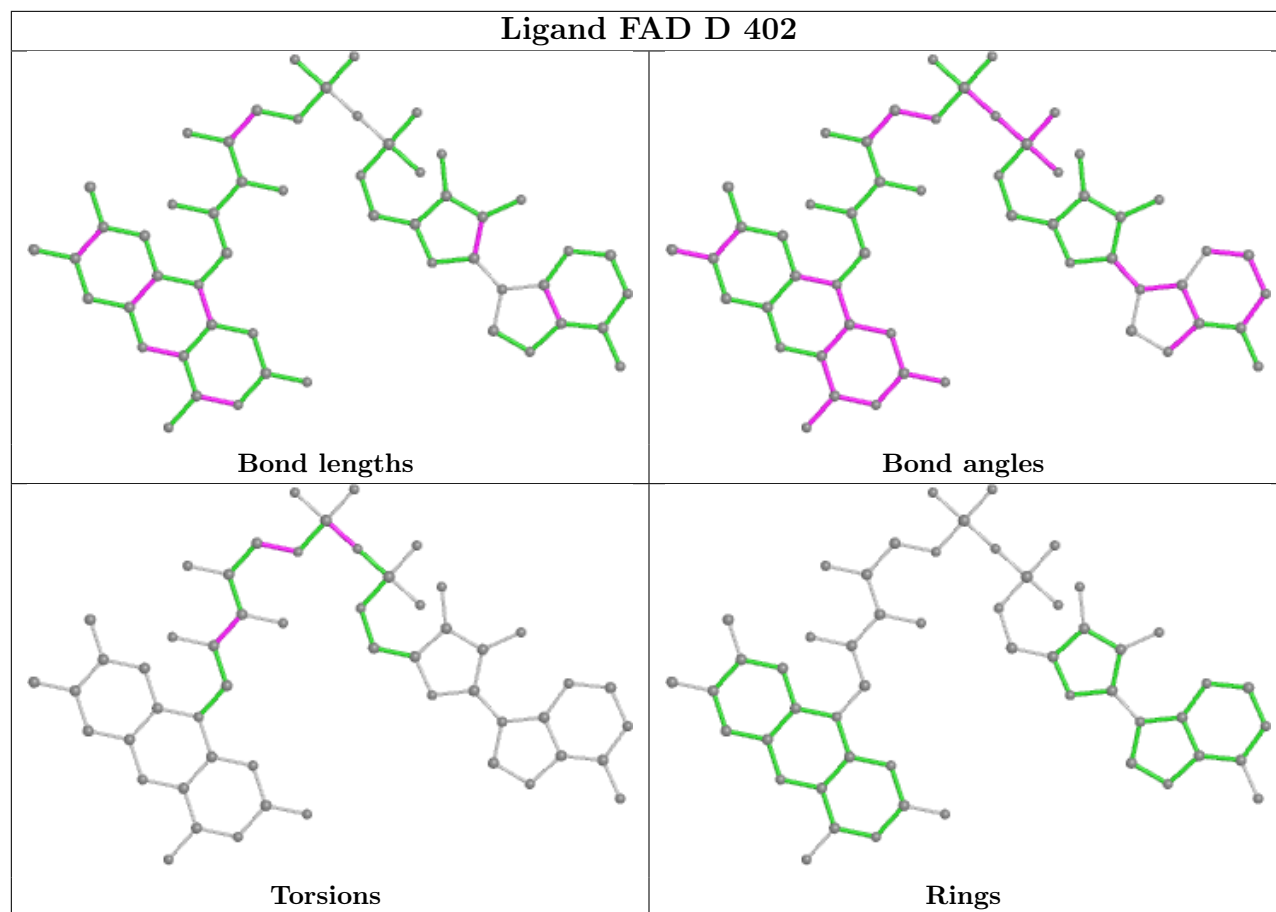


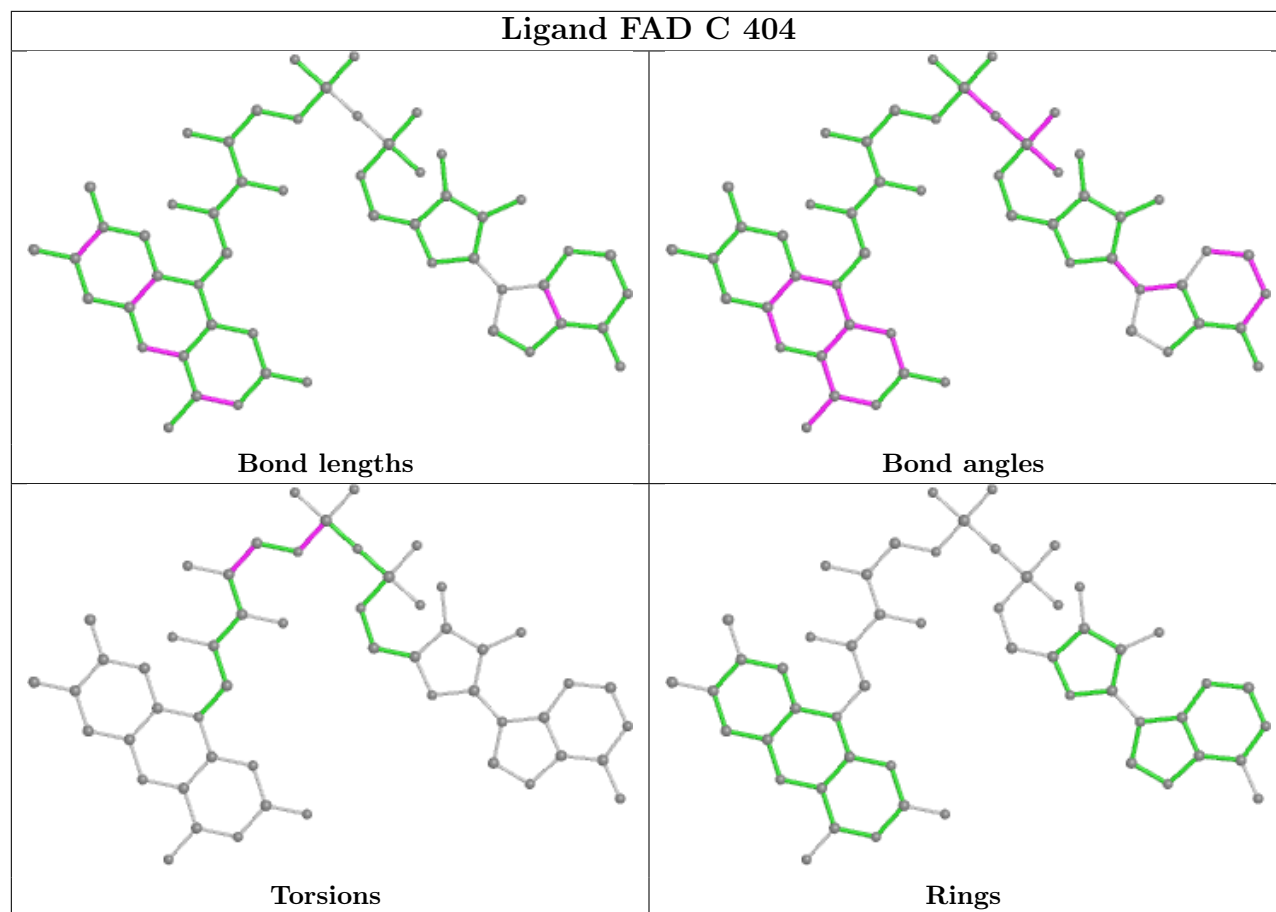
Torsions

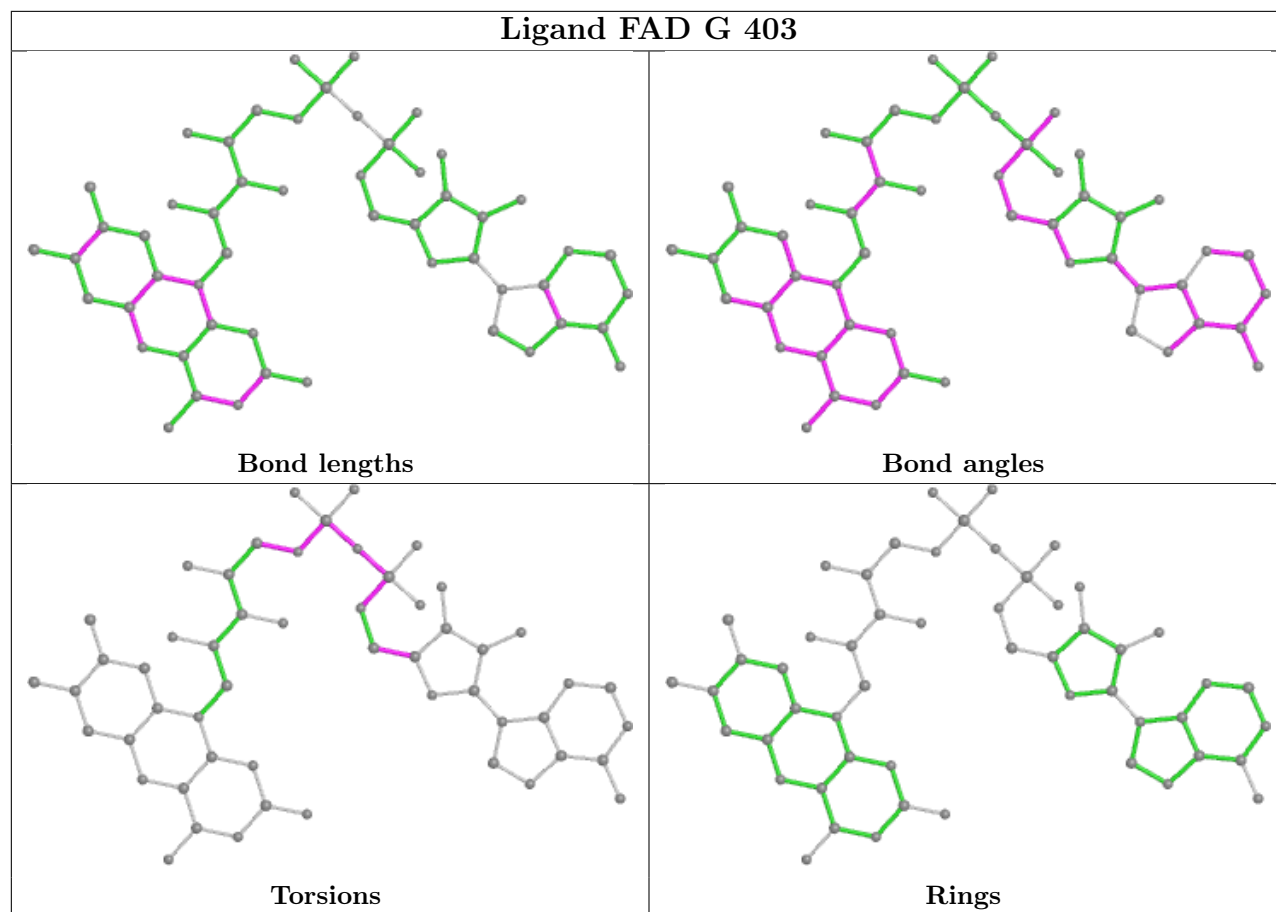


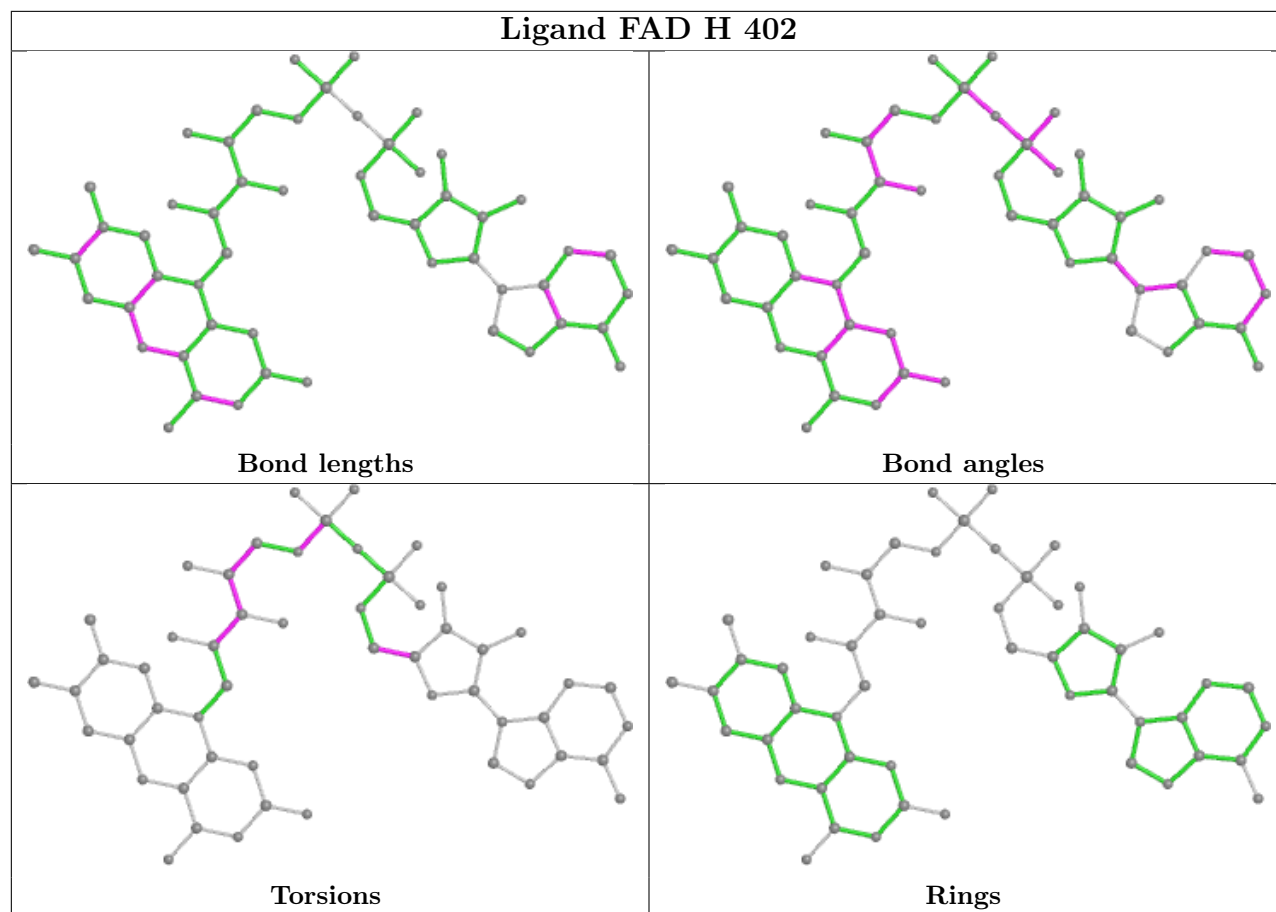
Rings

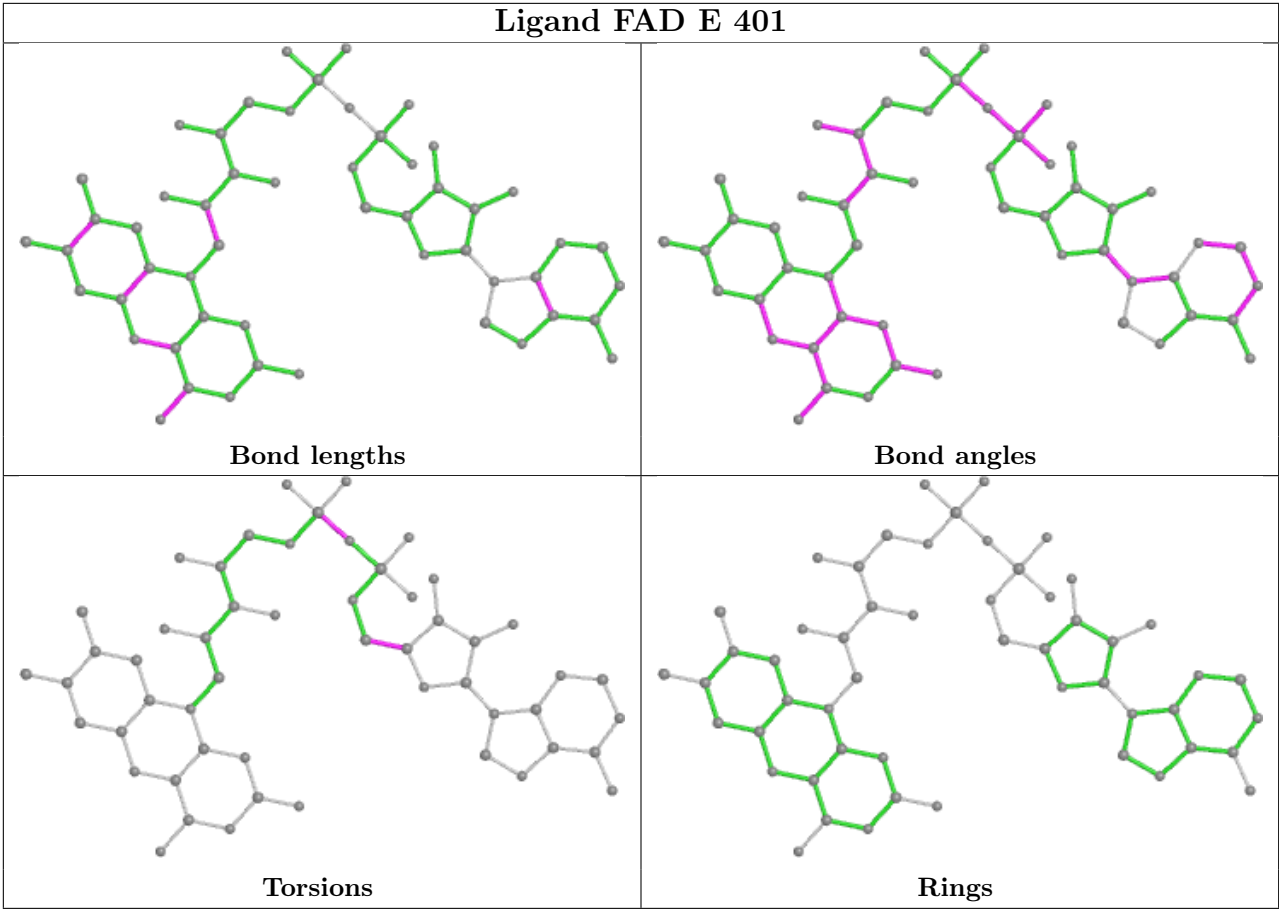












5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	H	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	H	307:GLY	C	308:LEU	N	1.02

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

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	367/379 (96%)	-0.24	1 (0%) 94 93	14, 30, 47, 65	0
1	B	372/379 (98%)	-0.20	1 (0%) 94 93	14, 34, 58, 73	0
1	C	364/379 (96%)	-0.09	4 (1%) 80 78	14, 36, 70, 95	0
1	D	374/379 (98%)	-0.21	1 (0%) 94 93	15, 33, 50, 72	0
1	E	368/379 (97%)	-0.17	3 (0%) 86 84	12, 34, 62, 89	0
1	F	372/379 (98%)	-0.17	0 100 100	15, 35, 58, 82	0
1	G	367/379 (96%)	-0.05	4 (1%) 80 78	14, 38, 70, 98	0
1	H	374/379 (98%)	-0.29	0 100 100	14, 32, 52, 70	0
All	All	2958/3032 (97%)	-0.18	14 (0%) 91 89	12, 34, 61, 98	0

The worst 5 of 14 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	98	TYR	3.5
1	E	120	ALA	3.5
1	A	173	ASP	2.9
1	C	187	ASN	2.9
1	E	175	GLY	2.5

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 ⓘ

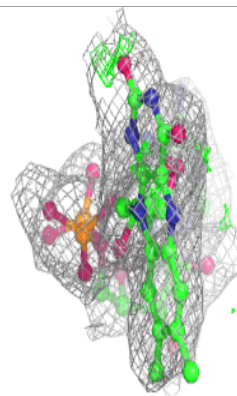
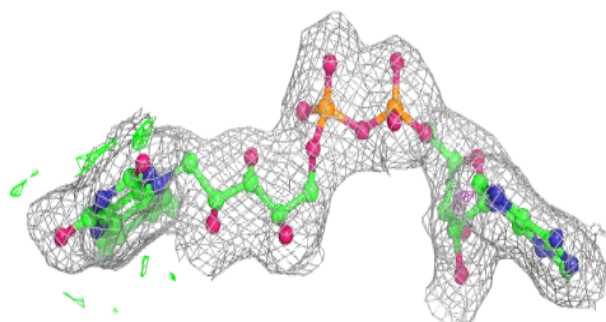
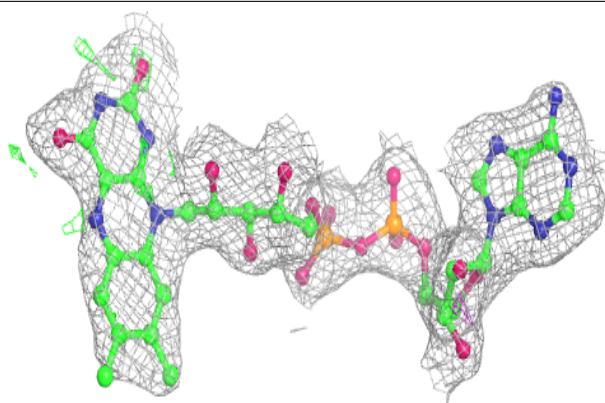
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	GOL	G	401	6/6	0.79	0.20	29,33,34,34	0
2	GOL	G	402	6/6	0.86	0.19	32,42,43,43	0
2	GOL	C	401	6/6	0.91	0.12	17,19,21,21	0
2	GOL	C	402	6/6	0.91	0.29	39,51,55,57	0
2	GOL	F	401	6/6	0.91	0.12	26,31,34,35	0
2	GOL	A	402	6/6	0.91	0.16	24,25,26,27	0
2	GOL	A	403	6/6	0.91	0.18	35,42,47,47	0
2	GOL	H	401	6/6	0.91	0.15	31,38,39,40	0
2	GOL	D	401	6/6	0.94	0.17	32,35,39,46	0
3	FAD	E	401	53/53	0.94	0.15	18,22,29,30	0
3	FAD	G	403	53/53	0.95	0.13	12,22,31,37	0
3	FAD	H	402	53/53	0.95	0.14	14,21,34,36	0
3	FAD	C	404	53/53	0.96	0.14	16,27,36,40	0
2	GOL	C	403	6/6	0.96	0.16	17,18,19,20	0
3	FAD	F	402	53/53	0.96	0.13	16,25,36,42	0
3	FAD	A	404	53/53	0.96	0.13	14,18,24,28	0
3	FAD	B	401	53/53	0.96	0.15	14,19,33,34	0
2	GOL	A	401	6/6	0.97	0.12	16,18,18,21	0
3	FAD	D	402	53/53	0.97	0.12	11,21,26,29	0

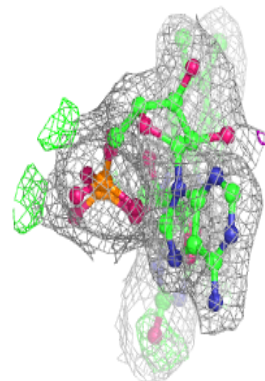
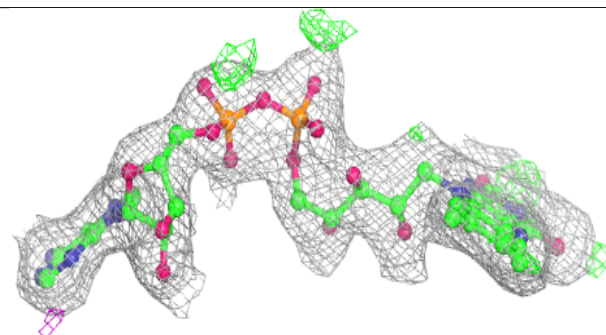
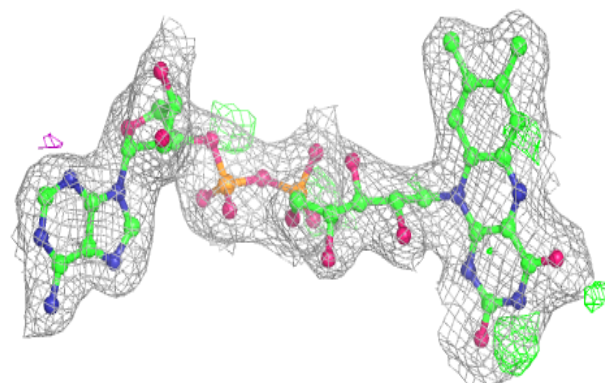
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around FAD 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)

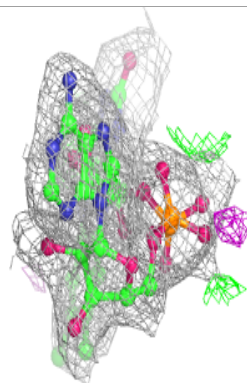
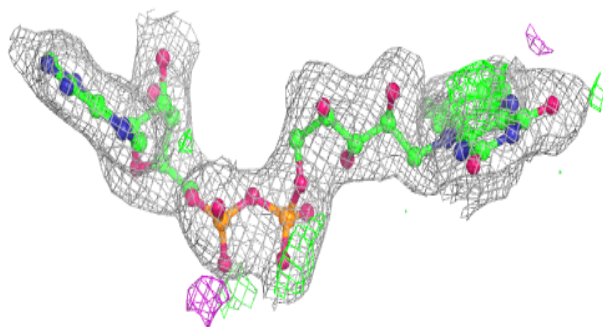
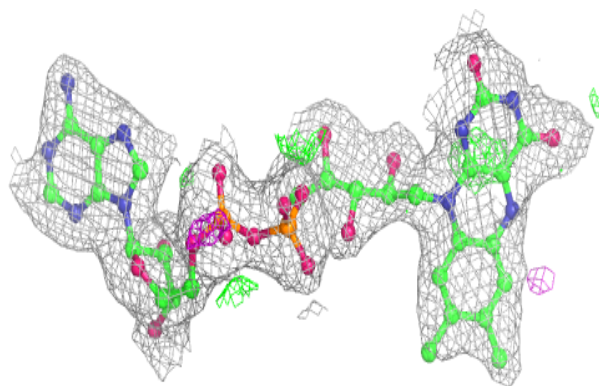
**Electron density around FAD G 403:**

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

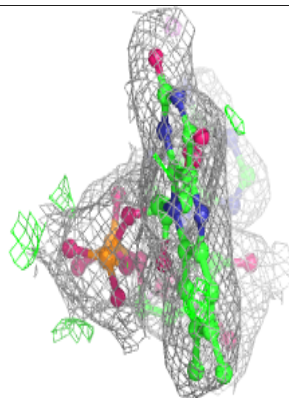
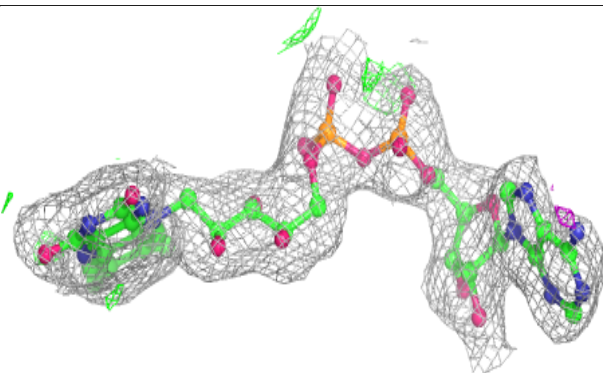
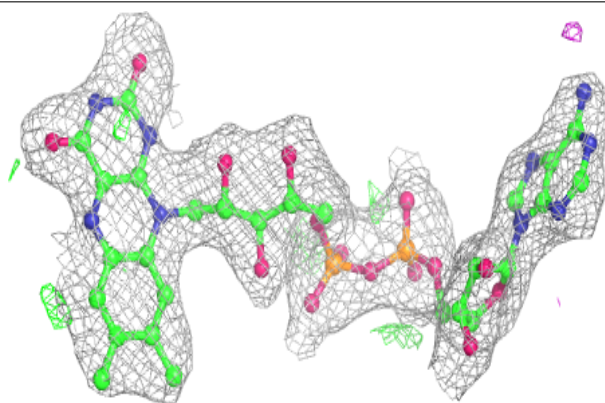


Electron density around FAD H 402:

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

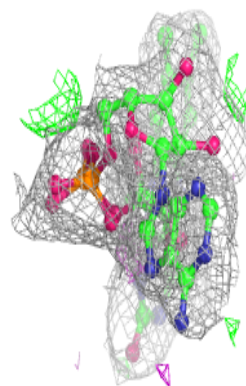
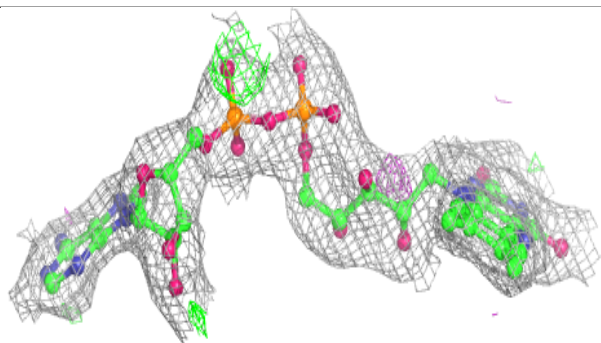
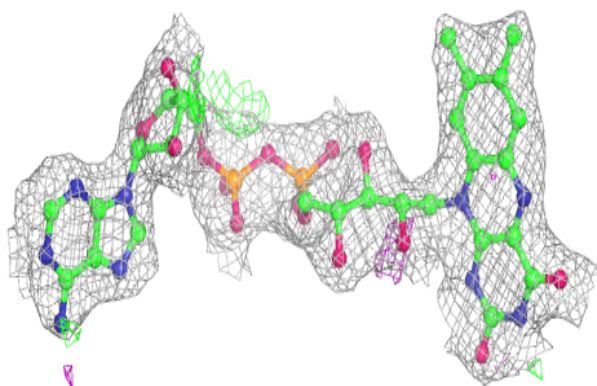
**Electron density around FAD C 404:**

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

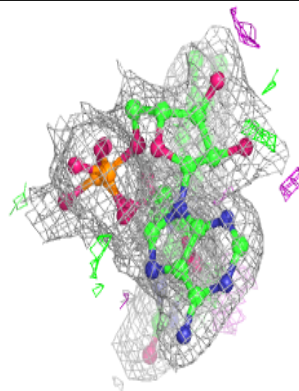
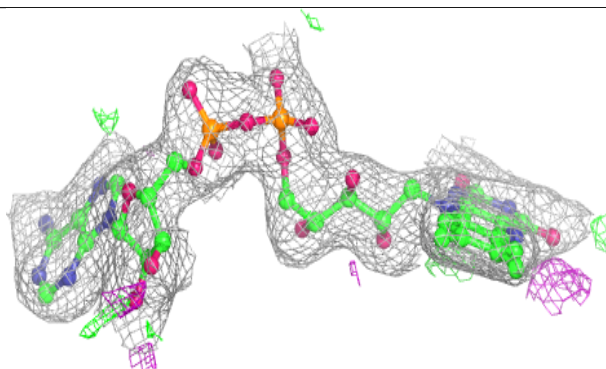
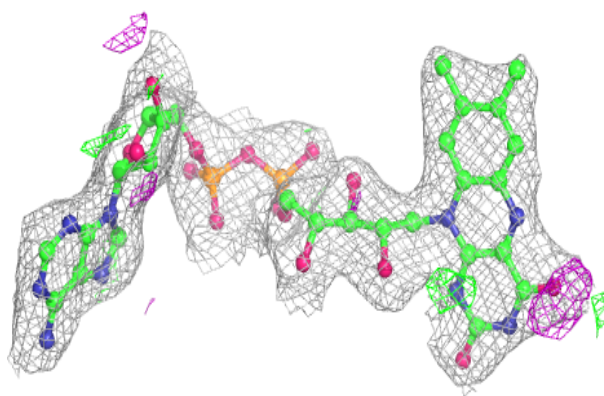


Electron density around FAD F 402:

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

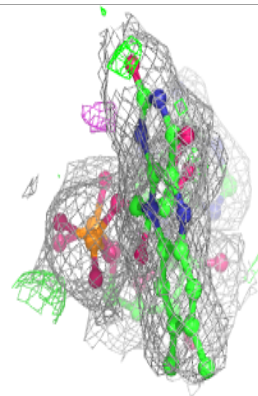
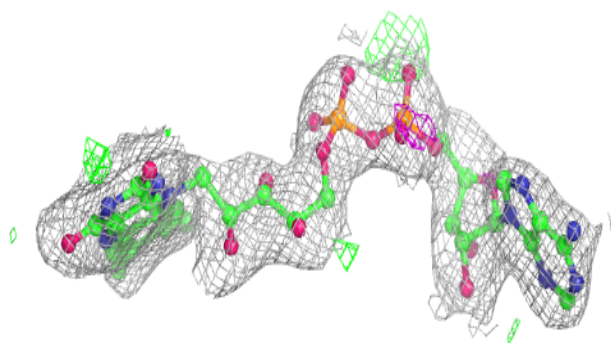
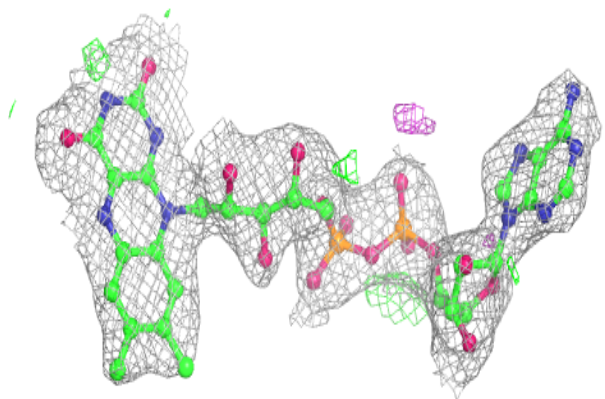
**Electron density around FAD A 404:**

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

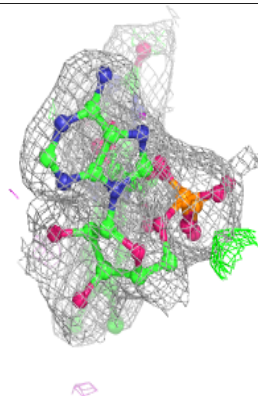
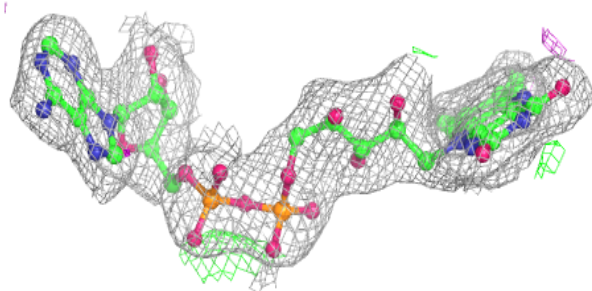
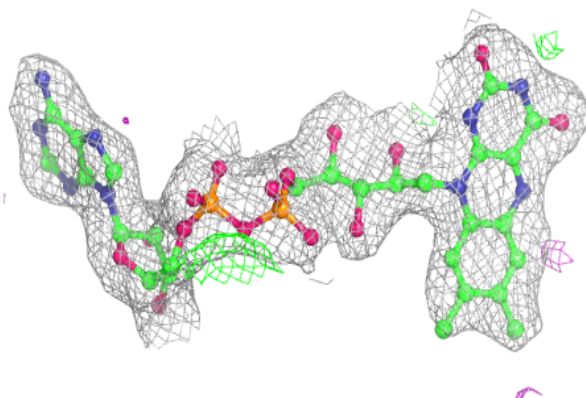


Electron density around FAD B 401:

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

**Electron density around FAD 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)



6.5 Other polymers [i](#)

There are no such residues in this entry.