Full wwPDB X-ray Structure Validation Report ⓘ

Nov 12, 2024 – 08:26 PM EST

PDB ID	:	4EMW
Title	:	Crystal Structure of Staphylococcus aureus bound with the covalent inhibitor EtVC-CoA
Authors	:	Edwards, J.S.; Wallace, B.D.; Claiborne, A.; Redinbo, M.R.
Deposited on	:	2012-04-12
Resolution	:	2.39 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:

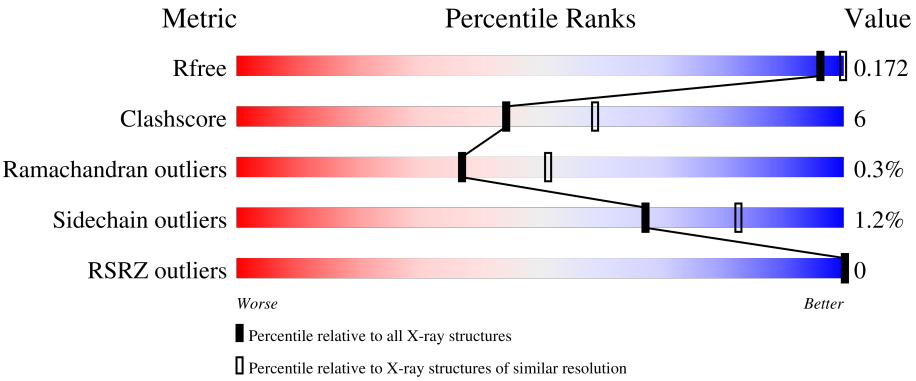
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.39 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}	164625	4642 (2.40-2.40)
Clashscore	180529	5218 (2.40-2.40)
Ramachandran outliers	177936	5158 (2.40-2.40)
Sidechain outliers	177891	5159 (2.40-2.40)
RSRZ outliers	164620	4642 (2.40-2.40)

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 <=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	436	90% 10%
1	B	436	88% 11%

2 Entry composition

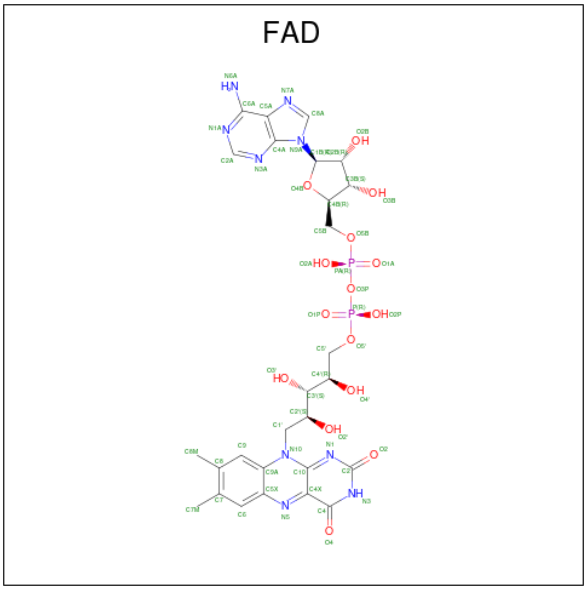
There are 6 unique types of molecules in this entry. The entry contains 7265 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Coenzyme A disulfide reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	436	Total	C	N	O	S	0	5	0
			3412	2171	581	648	12			
1	B	436	Total	C	N	O	S	0	3	0
			3418	2171	584	651	12			

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).

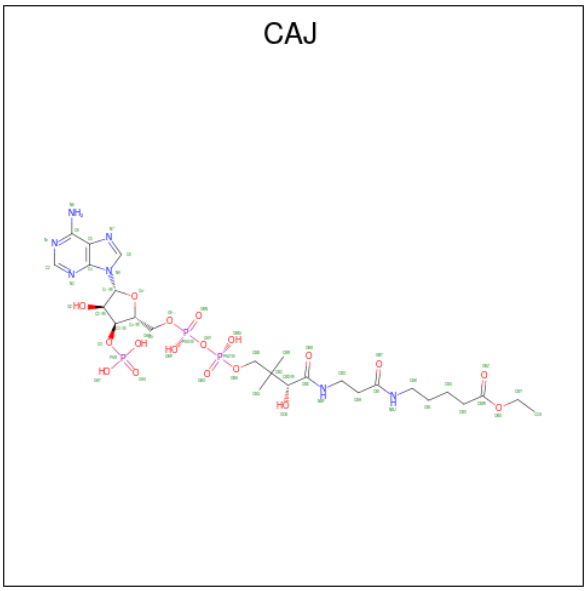


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0

- Molecule 4 is ethyl 5-[3-[[(2R)-4-[[[(2R,3S,4R,5R)-5-(6-aminopurin-9-yl)-4-oxidanyl-3-phosphonooxy-oxolan-2-yl]methoxy-oxidanyl-phosphoryl]oxy-oxidanyl-phosphoryl]oxy-3,3-dimethyl-2-oxidanyl-butanoyl]amino]propanoylamino]pentanoate (three-letter code: CAJ) (formula: $C_{26}H_{44}N_7O_{18}P_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O P 54 26 7 18 3	0	0
4	B	1	Total C N O P 54 26 7 18 3	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total Cl 1 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	100	Total O 100 100	0	0

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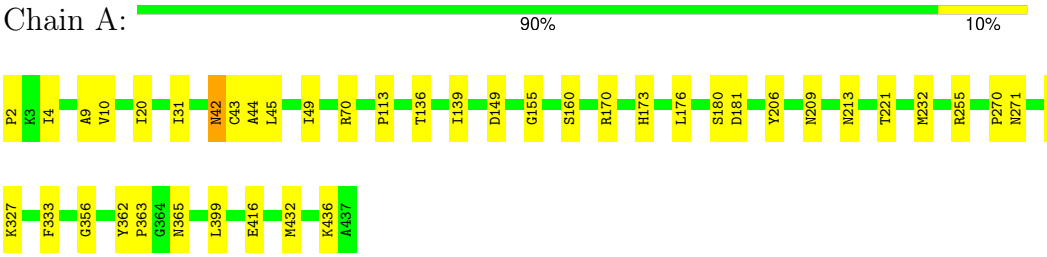
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	118	Total	O	0	0
			118	118		

3 Residue-property plots (i)

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

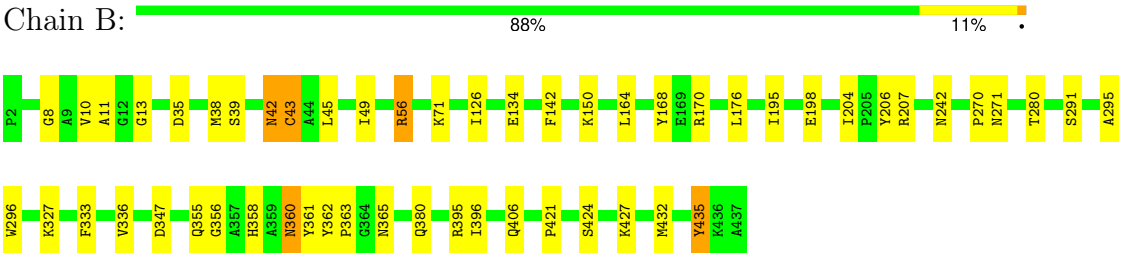
• Molecule 1: Coenzyme A disulfide reductase

Chain A:



• Molecule 1: Coenzyme A disulfide reductase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	76.04Å 64.89Å 94.39Å 90.00° 104.77° 90.00°	Depositor
Resolution (Å)	91.28 – 2.39 91.28 – 2.39	Depositor EDS
% Data completeness (in resolution range)	96.9 (91.28-2.39) 97.0 (91.28-2.39)	Depositor EDS
R_{merge}	0.20	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	9.01 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.6.0117, PHENIX	Depositor
R, R_{free}	0.164 , 0.218 0.167 , 0.172	Depositor DCC
R_{free} test set	1729 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å^2)	31.9	Xtriage
Anisotropy	0.884	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 33.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	7265	wwPDB-VP
Average B, all atoms (Å^2)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.66% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: FAD, CAJ, CL, MG

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	0.81	0/3501	0.87	0/4750
1	B	0.81	1/3500 (0.0%)	0.84	2/4746 (0.0%)
All	All	0.81	1/7001 (0.0%)	0.86	2/9496 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	435	TYR	CE1-CZ	5.06	1.45	1.38

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	207	ARG	NE-CZ-NH2	-5.20	117.70	120.30
1	B	43	CYS	CA-CB-SG	5.01	123.03	114.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3412	0	3344	30	0
1	B	3418	0	3353	43	0
2	A	53	0	31	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	53	0	31	3	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	54	0	35	9	0
4	B	54	0	36	15	0
5	B	1	0	0	0	0
6	A	100	0	0	0	0
6	B	118	0	0	3	0
All	All	7265	0	6830	82	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 6.

All (82) 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:B:43:CYS:H	4:B:504:CAJ:HBVA	0.96	1.12
1:B:43:CYS:N	4:B:504:CAJ:HBVA	1.65	0.99
4:A:503:CAJ:HCAA	4:A:503:CAJ:HBH	1.51	0.91
1:A:295:ALA:HB2	4:A:503:CAJ:HBK	1.55	0.86
1:B:43:CYS:H	4:B:504:CAJ:CBV	1.87	0.84
4:B:504:CAJ:OBZ	4:B:504:CAJ:HBL	1.80	0.79
1:A:42:ASN:OD1	4:A:503:CAJ:OBT	2.06	0.74
1:B:295:ALA:HB2	4:B:504:CAJ:HBLA	1.73	0.70
4:A:503:CAJ:NBJ	4:A:503:CAJ:OBZ	2.25	0.70
1:B:134:GLU:OE1	6:B:687:HOH:O	2.12	0.67
1:B:356:GLY:HA3	1:B:365:ASN:HD21	1.59	0.67
4:A:503:CAJ:OBZ	4:A:503:CAJ:HCAB	1.96	0.67
4:B:504:CAJ:OBZ	4:B:504:CAJ:HCAB	1.95	0.66
4:B:504:CAJ:CBW	4:B:504:CAJ:HBKA	2.24	0.66
1:B:380:GLN:NE2	1:B:406:GLN:O	2.30	0.65
1:B:270:PRO:O	1:B:271:ASN:HB2	1.96	0.65
1:A:2:PRO:HG2	1:A:4[B]:ILE:HD11	1.79	0.64
1:B:35:ASP:HB3	1:B:134:GLU:OE2	1.99	0.62
4:B:504:CAJ:CBW	4:B:504:CAJ:CBK	2.72	0.62
1:A:295:ALA:CB	4:A:503:CAJ:HBK	2.29	0.61
4:B:504:CAJ:OBZ	4:B:504:CAJ:CBL	2.31	0.60
1:B:168:TYR:CD1	1:B:204:ILE:HD11	2.38	0.58
1:A:299:HIS:HE2	4:A:503:CAJ:HBHA	1.68	0.58
1:A:9:ALA:HB2	1:A:31:ILE:CG2	2.34	0.58
1:A:9:ALA:HB2	1:A:31:ILE:HG21	1.86	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:43:CYS:SG	2:B:501:FAD:C4X	2.94	0.55
1:A:327:LYS:HE2	1:B:362:TYR:OH	2.08	0.54
1:A:270:PRO:O	1:A:271:ASN:HB2	2.07	0.53
1:A:416:GLU:HG3	1:B:296:TRP:CE3	2.44	0.53
1:B:164:LEU:CD1	1:B:176:LEU:HB2	2.39	0.53
4:B:504:CAJ:OBZ	4:B:504:CAJ:CCA	2.57	0.52
1:A:176:LEU:O	1:A:206:TYR:HA	2.09	0.52
1:B:355:GLN:NE2	1:B:432:MET:HG3	2.25	0.52
1:B:358:HIS:HB2	1:B:421:PRO:O	2.11	0.51
1:B:362:TYR:CD1	1:B:363:PRO:HD2	2.45	0.50
1:B:427:LYS:HD2	1:B:435:TYR:CE2	2.47	0.50
1:B:362:TYR:CG	1:B:363:PRO:HD2	2.46	0.50
1:A:139:ILE:HG23	1:A:232[B]:MET:HE1	1.94	0.49
1:B:356:GLY:HA3	1:B:365:ASN:ND2	2.26	0.49
1:A:113:PRO:O	2:A:501:FAD:H8A	2.13	0.48
1:A:180:SER:HA	1:A:209:ASN:OD1	2.14	0.48
4:B:504:CAJ:OBT	4:B:504:CAJ:NBF	2.47	0.48
1:A:362:TYR:OH	1:B:327:LYS:HE2	2.14	0.47
1:B:39:SER:HB3	4:B:504:CAJ:OBS	2.15	0.47
1:B:11:ALA:HB3	2:B:501:FAD:O5'	2.15	0.47
1:A:4[A]:ILE:HD13	1:A:20:ILE:HG21	1.97	0.46
4:A:503:CAJ:OBZ	4:A:503:CAJ:CCA	2.61	0.46
1:A:43:CYS:SG	2:A:501:FAD:C4X	3.04	0.46
1:B:71:LYS:NZ	6:B:634:HOH:O	2.49	0.46
1:A:432:MET:O	1:A:436:LYS:HG3	2.16	0.45
1:B:360:ASN:OD1	1:B:360:ASN:N	2.49	0.45
1:A:362:TYR:HA	1:A:363:PRO:HD3	1.83	0.45
1:A:9:ALA:CB	1:A:31:ILE:HG21	2.48	0.44
1:A:149:ASP:OD1	1:A:173:HIS:ND1	2.45	0.44
4:A:503:CAJ:HBH	4:A:503:CAJ:CCA	2.36	0.44
1:A:139:ILE:HG23	1:A:232[B]:MET:CE	2.48	0.44
1:B:43:CYS:N	4:B:504:CAJ:CBV	2.54	0.44
1:B:56:ARG:O	1:B:56:ARG:HG3	2.18	0.44
1:B:355:GLN:HE22	1:B:432:MET:HG3	1.83	0.43
1:A:213:ASN:HB3	1:A:221:THR:O	2.19	0.43
1:B:336:VAL:HG12	1:B:396:ILE:HG23	2.00	0.43
1:B:198:GLU:HA	1:B:198:GLU:OE2	2.19	0.43
1:B:195:ILE:HG13	1:B:333:PHE:CZ	2.54	0.43
1:B:49:ILE:O	1:B:170:ARG:HD2	2.19	0.43
1:A:333:PHE:CD1	1:A:333:PHE:N	2.88	0.42
1:B:242:ASN:HD22	2:B:501:FAD:H8A	1.85	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:295:ALA:HB2	4:B:504:CAJ:CBL	2.46	0.42
1:A:356:GLY:HA3	1:A:365:ASN:HD21	1.83	0.42
1:A:155:GLY:O	1:A:160[A]:SER:OG	2.28	0.42
1:B:280:THR:HG22	1:B:291[B]:SER:HB3	2.00	0.42
1:A:44:ALA:HB2	1:B:361:TYR:CZ	2.55	0.42
1:A:45:LEU:HD22	1:A:136:THR:OG1	2.20	0.41
1:A:49:ILE:O	1:A:170:ARG:HD2	2.20	0.41
1:B:38:MET:HG2	6:B:624:HOH:O	2.19	0.41
2:A:501:FAD:H1'1	2:A:501:FAD:H9	1.65	0.41
1:B:42:ASN:OD1	4:B:504:CAJ:HBH	2.21	0.41
1:B:176:LEU:O	1:B:206:TYR:HA	2.21	0.41
1:B:126:ILE:HG22	1:B:142:PHE:HZ	1.86	0.41
1:B:150:LYS:HB3	1:B:150:LYS:HE2	1.74	0.40
1:B:8:GLY:O	1:B:13:GLY:HA3	2.21	0.40
1:A:399:LEU:HD23	1:A:399:LEU:HA	1.89	0.40
1:B:42:ASN:O	1:B:45:LEU:HG	2.21	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	439/436 (101%)	426 (97%)	12 (3%)	1 (0%)	44	59
1	B	437/436 (100%)	414 (95%)	21 (5%)	2 (0%)	25	38
All	All	876/872 (100%)	840 (96%)	33 (4%)	3 (0%)	37	51

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	10	VAL
1	B	424	SER

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Mol	Chain	Res	Type
1	B	10	VAL

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	365/375 (97%)	361 (99%)	4 (1%)	70 84
1	B	366/375 (98%)	361 (99%)	5 (1%)	62 79
All	All	731/750 (98%)	722 (99%)	9 (1%)	67 82

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	ASN
1	A	70	ARG
1	A	181	ASP
1	A	255	ARG
1	B	42	ASN
1	B	56	ARG
1	B	347	ASP
1	B	360	ASN
1	B	395	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	99	ASN
1	B	178	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 7 ligands modelled in this entry, 3 are monoatomic - leaving 4 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	CAJ	A	503	1	50,56,56	3.52	16 (32%)	64,82,82	2.47	20 (31%)
4	CAJ	B	504	1	50,56,56	3.28	16 (32%)	64,82,82	3.04	22 (34%)
2	FAD	A	501	-	54,58,58	1.53	7 (12%)	71,89,89	1.44	9 (12%)
2	FAD	B	501	-	54,58,58	1.60	7 (12%)	71,89,89	1.66	17 (23%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	CAJ	A	503	1	-	8/51/71/71	0/3/3/3
4	CAJ	B	504	1	-	15/51/71/71	0/3/3/3
2	FAD	A	501	-	-	2/30/50/50	0/6/6/6
2	FAD	B	501	-	-	2/30/50/50	0/6/6/6

All (46) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	503	CAJ	PAR-O3'	-15.47	1.32	1.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	504	CAJ	C2'-C3'	-12.36	1.26	1.53
4	A	503	CAJ	CBU-CBV	-8.98	1.19	1.52
4	B	504	CAJ	O4'-C1'	8.64	1.52	1.40
4	A	503	CAJ	O4'-C1'	8.48	1.52	1.40
4	A	503	CAJ	PAR-OAU	7.54	1.73	1.50
4	B	504	CAJ	PAX-OAY	7.47	1.67	1.59
4	B	504	CAJ	PAR-O3'	6.65	1.71	1.59
4	B	504	CAJ	C2-N3	6.42	1.42	1.32
4	A	503	CAJ	C2-N3	5.44	1.40	1.32
2	B	501	FAD	PA-O3P	5.36	1.65	1.59
2	A	501	FAD	C9A-C5X	5.27	1.49	1.41
2	B	501	FAD	C9A-C5X	5.17	1.49	1.41
4	A	503	CAJ	O3'-C3'	5.15	1.61	1.44
4	B	504	CAJ	CBU-CBV	-5.07	1.33	1.52
4	B	504	CAJ	C2-N1	4.46	1.41	1.33
2	B	501	FAD	C8-C7	4.11	1.50	1.40
2	A	501	FAD	C8-C7	3.75	1.50	1.40
4	B	504	CAJ	PAZ-OBO	3.67	1.63	1.50
4	B	504	CAJ	O3'-C3'	-3.63	1.31	1.44
2	A	501	FAD	PA-O3P	3.62	1.63	1.59
4	B	504	CAJ	CBU-CBL	-3.59	1.33	1.51
4	A	503	CAJ	CBV-CBW	-3.44	1.40	1.50
4	A	503	CAJ	PAZ-OAY	3.40	1.63	1.59
2	A	501	FAD	C4-N3	-3.36	1.32	1.38
4	A	503	CAJ	C2-N1	3.25	1.39	1.33
4	A	503	CAJ	C2'-C3'	3.23	1.60	1.53
4	B	504	CAJ	O4'-C4'	3.14	1.52	1.45
4	B	504	CAJ	CBG-NBF	3.01	1.52	1.46
2	B	501	FAD	C5X-N5	-3.00	1.33	1.39
4	B	504	CAJ	PAZ-OBA	2.81	1.70	1.59
4	A	503	CAJ	PAZ-OBO	2.61	1.59	1.50
4	A	503	CAJ	CBB-CBC	2.57	1.56	1.52
4	A	503	CAJ	OBZ-CBW	2.55	1.30	1.22
4	A	503	CAJ	PAX-O5'	2.53	1.69	1.59
2	B	501	FAD	C4-N3	-2.49	1.34	1.38
4	B	504	CAJ	C6-C5	-2.49	1.34	1.43
2	B	501	FAD	C1'-C2'	-2.36	1.49	1.52
4	B	504	CAJ	CBI-NBJ	2.24	1.38	1.33
4	B	504	CAJ	CBE-NBF	2.23	1.38	1.33
2	A	501	FAD	C2-N3	-2.18	1.34	1.39
2	A	501	FAD	C2A-N3A	2.17	1.35	1.32
2	B	501	FAD	C6-C7	2.12	1.42	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	503	CAJ	CBG-CBH	2.09	1.58	1.51
2	A	501	FAD	C4X-C10	2.08	1.50	1.44
4	A	503	CAJ	C6-C5	-2.06	1.35	1.43

All (68) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	504	CAJ	C5'-C4'-C3'	-11.90	74.76	114.38
4	A	503	CAJ	N3-C2-N1	-9.02	116.43	128.67
4	B	504	CAJ	N3-C2-N1	-8.74	116.81	128.67
4	B	504	CAJ	CBL-CBU-CBV	7.85	141.98	113.13
4	A	503	CAJ	C5'-C4'-C3'	-7.61	89.05	114.38
4	B	504	CAJ	CBU-CBL-CBK	-5.88	86.41	113.56
4	B	504	CAJ	CBU-CBV-CBW	-5.85	92.26	113.69
4	B	504	CAJ	C3'-C2'-C1'	5.82	112.70	99.89
4	B	504	CAJ	C4'-O4'-C1'	-5.15	105.21	109.92
4	A	503	CAJ	CBG-NBF-CBE	5.02	131.56	122.55
4	A	503	CAJ	OBZ-CBW-CBV	-5.00	104.22	123.78
4	A	503	CAJ	CBH-CBG-NBF	-5.00	101.36	112.00
2	B	501	FAD	N3A-C2A-N1A	-4.94	121.97	128.67
4	A	503	CAJ	OBX-CBW-CBV	4.66	126.03	111.83
4	B	504	CAJ	CBK-NBJ-CBI	4.61	131.41	122.82
4	A	503	CAJ	CBU-CBL-CBK	-4.51	92.75	113.56
2	A	501	FAD	C5X-C9A-N10	4.00	121.58	117.97
4	B	504	CAJ	C5-C6-N6	-3.73	114.62	120.31
4	A	503	CAJ	CBU-CBV-CBW	-3.48	100.94	113.69
2	A	501	FAD	N3A-C2A-N1A	-3.47	123.96	128.67
4	B	504	CAJ	OBM-PAZ-OAY	3.44	116.58	107.27
2	A	501	FAD	C1B-N9A-C4A	-3.15	121.11	126.64
4	A	503	CAJ	CBL-CBU-CBV	-3.13	101.63	113.13
4	B	504	CAJ	CBH-CBI-NBJ	3.09	121.97	116.34
4	A	503	CAJ	OCB-CBD-CBC	-3.05	103.11	110.18
4	A	503	CAJ	CBY-OBX-CBW	-3.04	108.03	116.67
2	B	501	FAD	C4-C4X-N5	3.03	122.40	118.21
2	A	501	FAD	C9-C9A-N10	-3.03	117.78	121.85
2	B	501	FAD	O3P-PA-O1A	-3.01	101.65	110.70
2	B	501	FAD	C5'-C4'-C3'	-2.96	106.64	112.22
4	B	504	CAJ	CBR-CBC-CBD	2.95	113.81	108.77
2	B	501	FAD	O3'-C3'-C2'	-2.94	102.26	108.93
4	A	503	CAJ	O3'-C3'-C4'	2.92	120.32	110.03
2	B	501	FAD	C4-N3-C2	-2.89	120.51	125.64
2	B	501	FAD	C10-N1-C2	2.89	123.10	116.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	501	FAD	C4X-C4-N3	2.83	120.46	113.25
2	B	501	FAD	O4-C4-C4X	-2.81	119.13	126.53
4	B	504	CAJ	C2'-C3'-C4'	2.77	108.09	103.24
4	B	504	CAJ	CBD-CBE-NBF	2.77	121.74	116.48
2	A	501	FAD	C4X-C10-N1	-2.73	117.90	124.59
2	B	501	FAD	C1B-N9A-C4A	-2.72	121.87	126.64
2	B	501	FAD	C9A-C5X-N5	-2.65	119.65	122.45
2	A	501	FAD	C9A-N10-C10	-2.64	116.72	120.75
2	B	501	FAD	C4X-C10-N1	-2.61	118.20	124.59
4	B	504	CAJ	OAY-PAZ-OBO	-2.55	103.03	110.70
4	A	503	CAJ	O3'-C3'-C2'	-2.54	102.58	111.68
4	B	504	CAJ	CBL-CBK-NBJ	-2.49	105.20	112.20
4	B	504	CAJ	CBH-CBG-NBF	2.47	117.25	112.00
4	B	504	CAJ	CBQ-CBC-CBD	2.43	112.92	108.77
2	B	501	FAD	O2-C2-N1	-2.40	117.81	121.80
4	A	503	CAJ	C3'-C2'-C1'	2.40	105.16	99.89
4	B	504	CAJ	O4'-C4'-C5'	2.36	116.91	109.33
4	B	504	CAJ	OBT-CBI-CBH	-2.35	117.76	122.02
4	A	503	CAJ	C4'-O4'-C1'	-2.34	107.78	109.92
2	B	501	FAD	N6A-C6A-N1A	2.32	123.30	118.33
2	B	501	FAD	O2A-PA-O1A	2.31	123.20	112.44
2	A	501	FAD	C5'-C4'-C3'	-2.28	107.91	112.22
4	A	503	CAJ	OAS-PAR-O3'	2.20	114.42	105.85
2	B	501	FAD	C5X-N5-C4X	2.19	121.63	118.09
2	B	501	FAD	C5X-C9A-N10	2.18	119.94	117.97
2	A	501	FAD	N3-C2-N1	2.15	124.06	119.50
4	A	503	CAJ	OBP-PAX-OAY	-2.14	101.48	107.27
2	A	501	FAD	C9A-C5X-N5	-2.14	120.18	122.45
4	A	503	CAJ	O4'-C4'-C3'	2.13	109.41	104.92
4	A	503	CAJ	C4-C5-N7	-2.13	107.09	109.34
4	B	504	CAJ	O5'-PAX-OBN	2.12	117.35	108.94
4	A	503	CAJ	PAR-O3'-C3'	2.11	129.06	123.43
4	B	504	CAJ	O3'-C3'-C4'	-2.08	102.71	110.03

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	503	CAJ	CBB-OBA-PAZ-OAY
4	B	504	CAJ	CBB-OBA-PAZ-OAY
4	B	504	CAJ	CBB-OBA-PAZ-OBM
4	B	504	CAJ	OBA-CBB-CBC-CBD

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Mol	Chain	Res	Type	Atoms
4	B	504	CAJ	OBA-CBB-CBC-CBQ
4	B	504	CAJ	OBA-CBB-CBC-CBR
4	B	504	CAJ	NBF-CBG-CBH-CBI
4	B	504	CAJ	CCA-CBY-OBX-CBW
4	B	504	CAJ	CBH-CBI-NBJ-CBK
4	B	504	CAJ	OBT-CBI-NBJ-CBK
4	A	503	CAJ	CCA-CBY-OBX-CBW
4	B	504	CAJ	NBJ-CBK-CBL-CBU
4	B	504	CAJ	CBL-CBU-CBV-CBW
4	A	503	CAJ	OBZ-CBW-OBX-CBY
2	A	501	FAD	O4B-C4B-C5B-O5B
2	A	501	FAD	C3B-C4B-C5B-O5B
2	B	501	FAD	O4B-C4B-C5B-O5B
2	B	501	FAD	C3B-C4B-C5B-O5B
4	A	503	CAJ	O4'-C4'-C5'-O5'
4	B	504	CAJ	OBZ-CBW-OBX-CBY
4	A	503	CAJ	CBV-CBW-OBX-CBY
4	B	504	CAJ	CBV-CBW-OBX-CBY
4	A	503	CAJ	CBL-CBU-CBV-CBW
4	B	504	CAJ	CBK-CBL-CBU-CBV
4	B	504	CAJ	PAX-OAY-PAZ-OBA
4	A	503	CAJ	CBK-CBL-CBU-CBV
4	A	503	CAJ	CBB-CBC-CBD-CBE

There are no ring outliers.

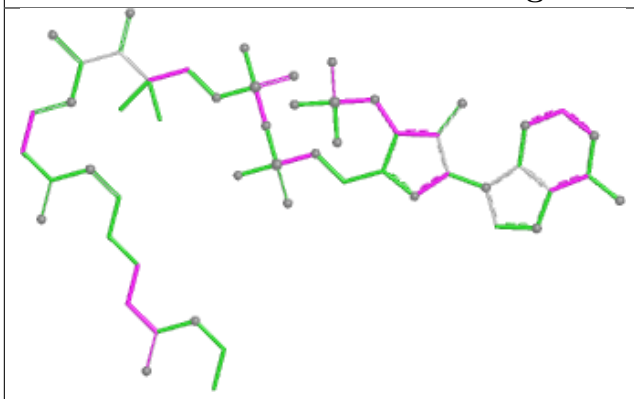
4 monomers are involved in 30 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	503	CAJ	9	0
4	B	504	CAJ	15	0
2	A	501	FAD	3	0
2	B	501	FAD	3	0

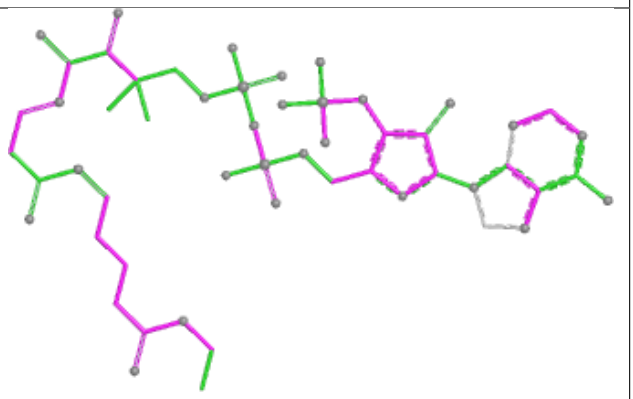
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

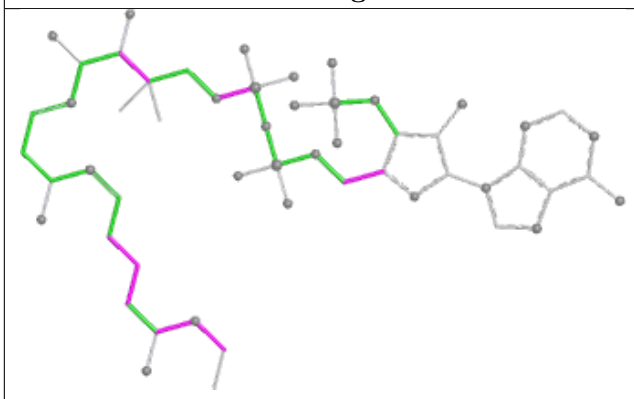
Ligand CAJ A 503



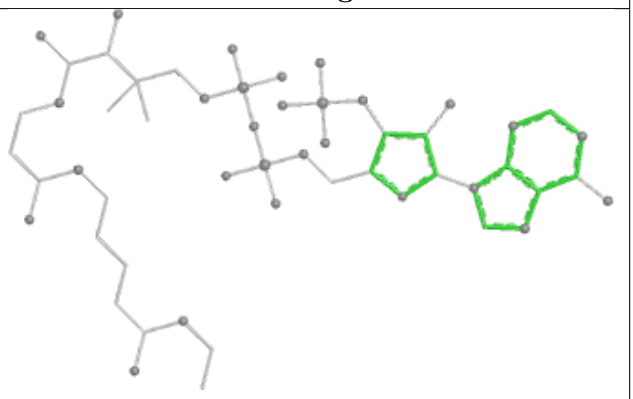
Bond lengths



Bond angles

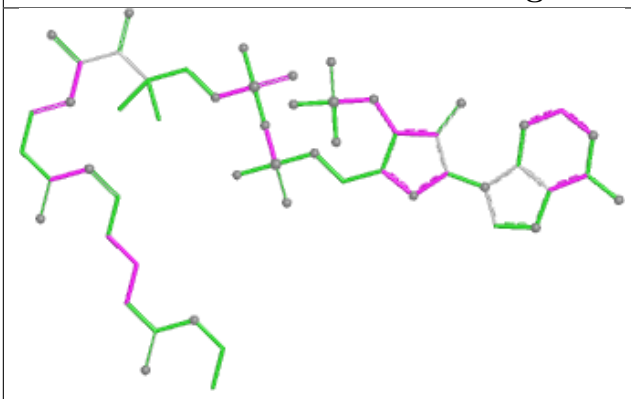


Torsions

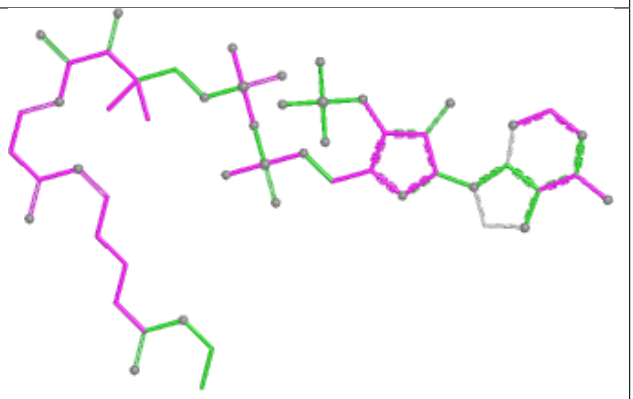


Rings

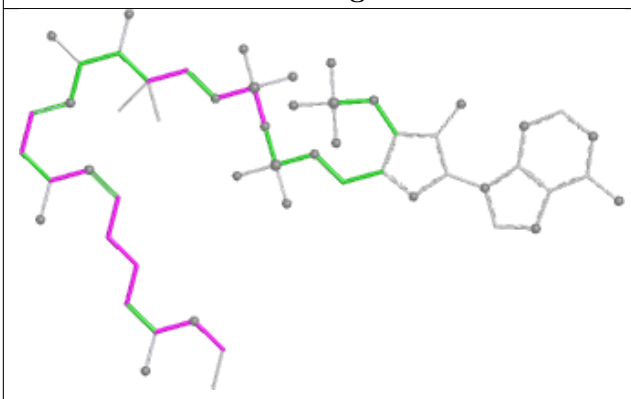
Ligand CAJ B 504



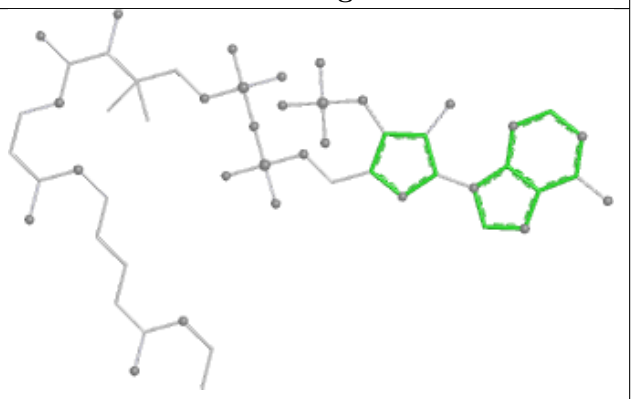
Bond lengths



Bond angles

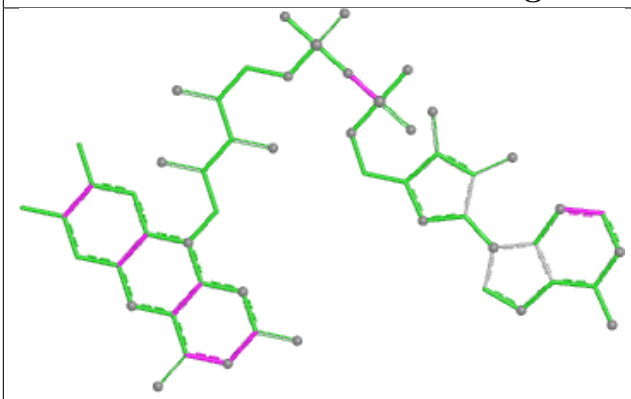


Torsions

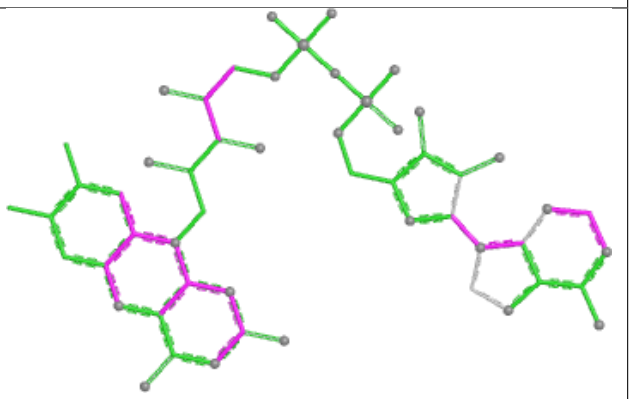


Rings

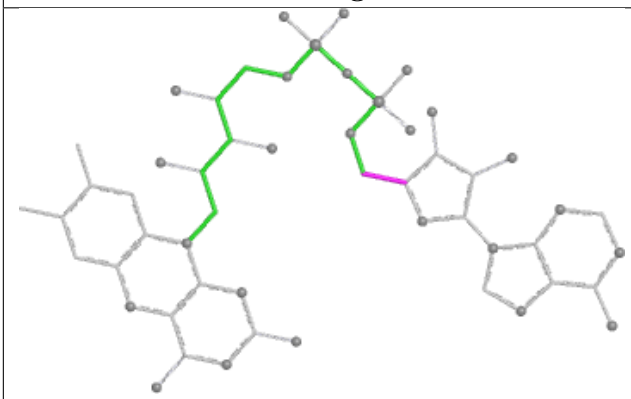
Ligand FAD A 501



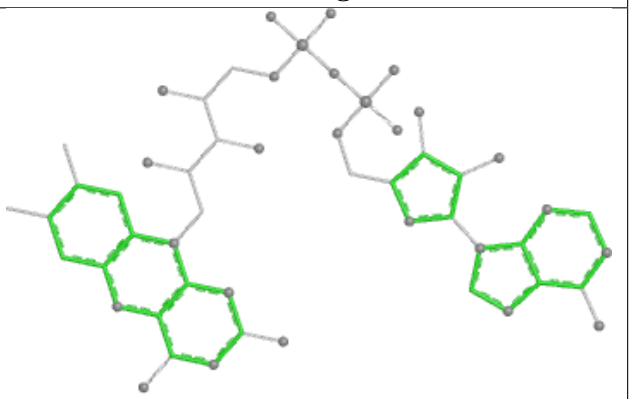
Bond lengths



Bond angles

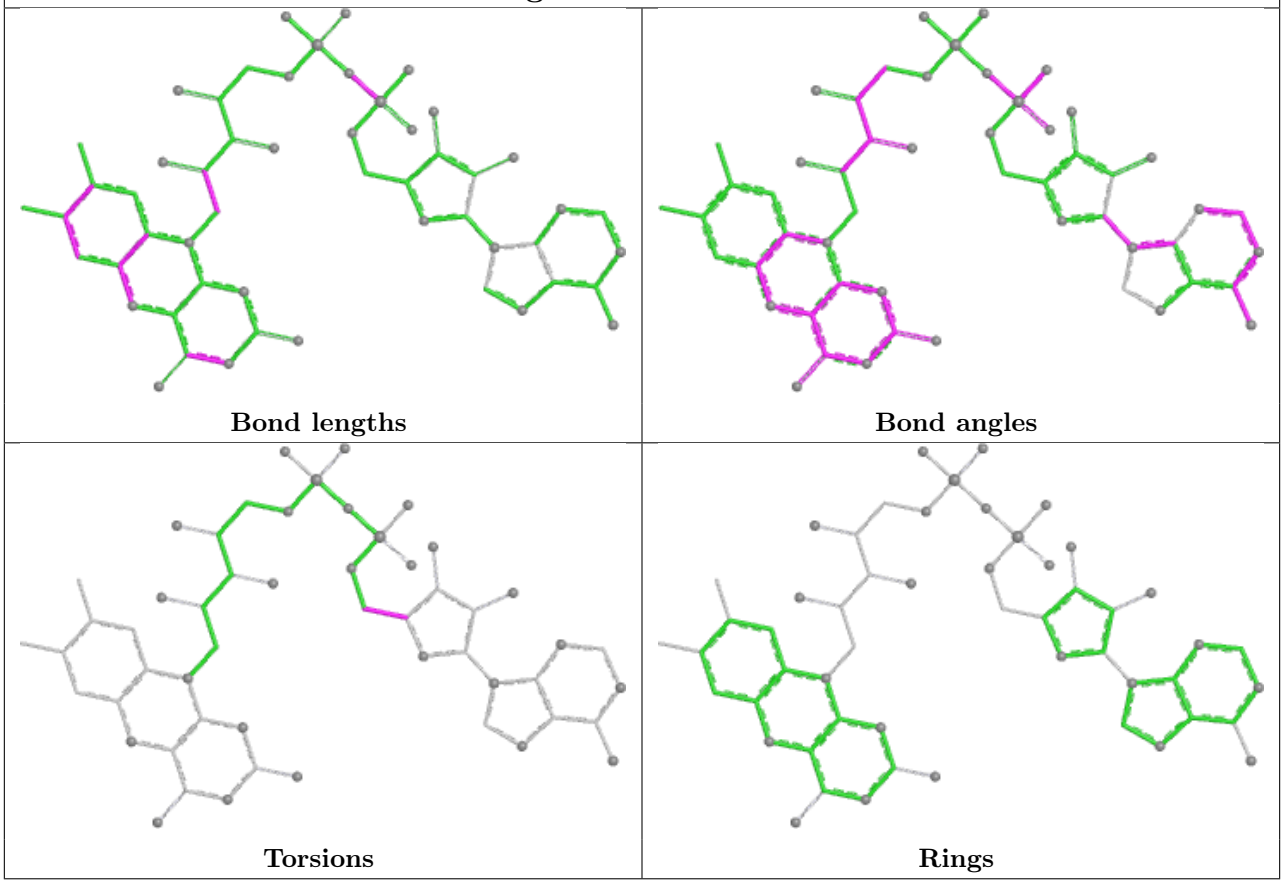


Torsions



Rings

Ligand FAD B 501



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

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, 95^{th} 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	436/436 (100%)	-0.59	0	100	100	18, 31, 49, 78	5 (1%)
1	B	436/436 (100%)	-0.55	0	100	100	19, 33, 51, 69	3 (0%)
All	All	872/872 (100%)	-0.57	0	100	100	18, 32, 50, 78	8 (0%)

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains

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

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands

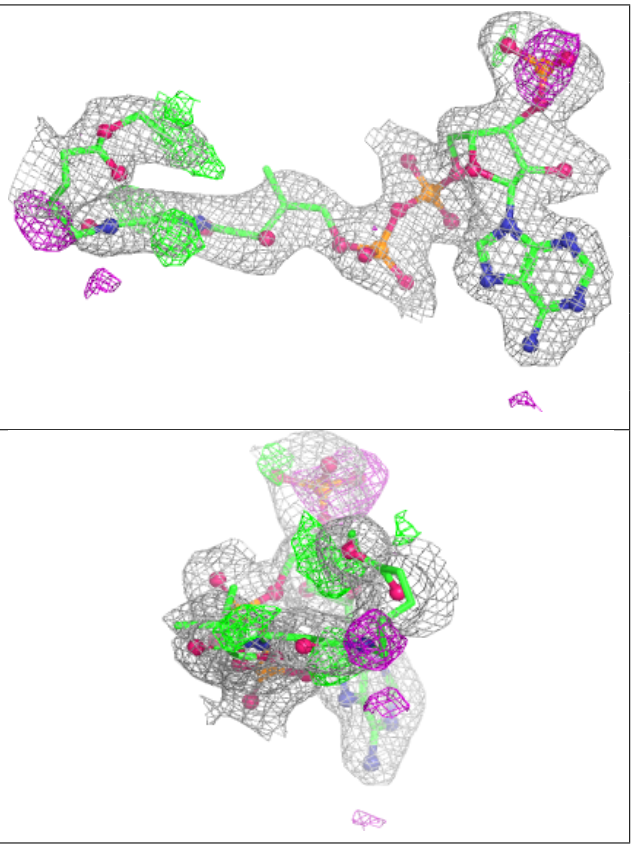
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

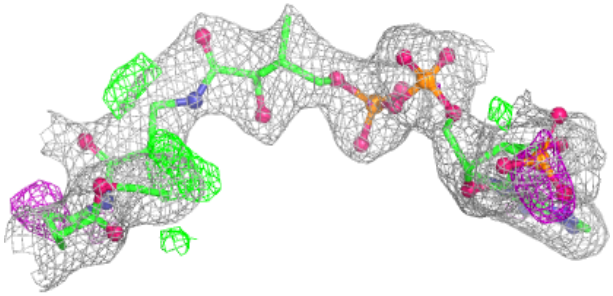
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	MG	B	502	1/1	0.87	0.18	96,96,96,96	0
4	CAJ	A	503	54/54	0.90	0.09	26,35,43,50	0
4	CAJ	B	504	54/54	0.90	0.10	30,40,46,52	0
5	CL	B	503	1/1	0.90	0.17	74,74,74,74	0
3	MG	A	502	1/1	0.95	0.10	49,49,49,49	0
2	FAD	B	501	53/53	0.96	0.06	23,29,33,37	0
2	FAD	A	501	53/53	0.97	0.05	21,26,30,34	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 CAJ A 503:

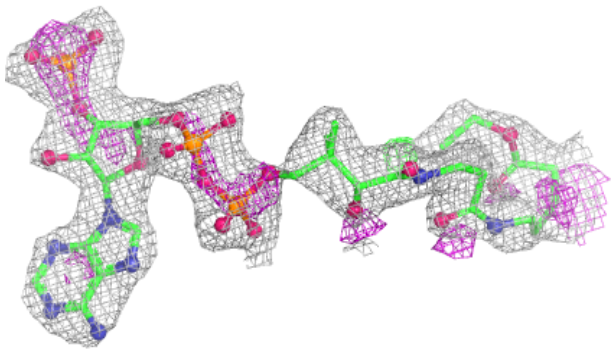
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

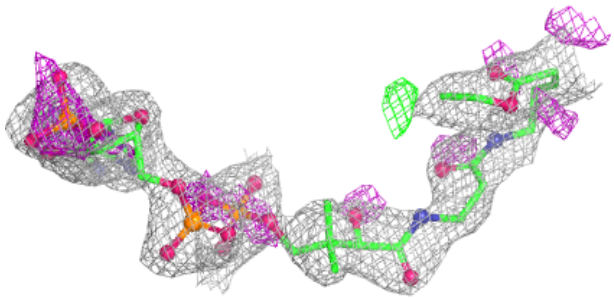


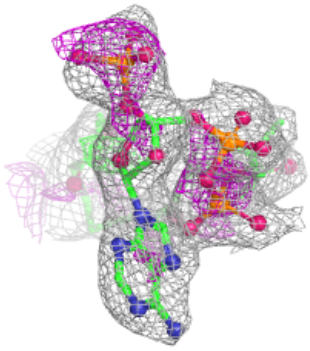


Electron density around CAJ B 504:

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

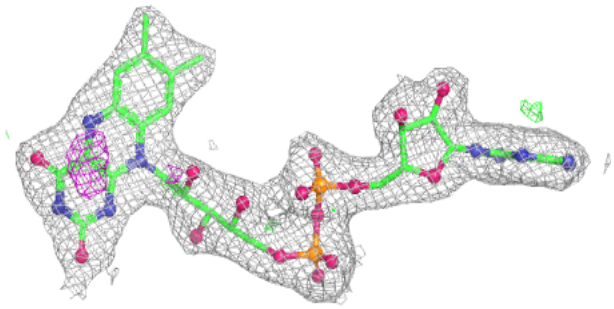


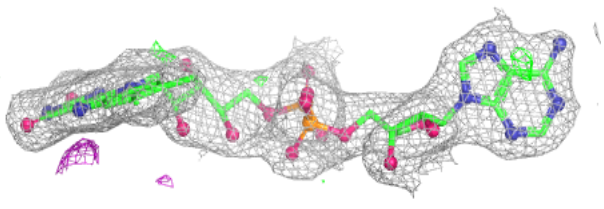


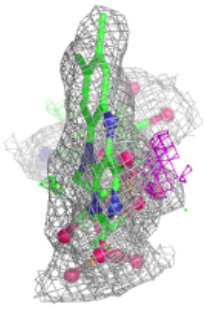


Electron density around FAD B 501:

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

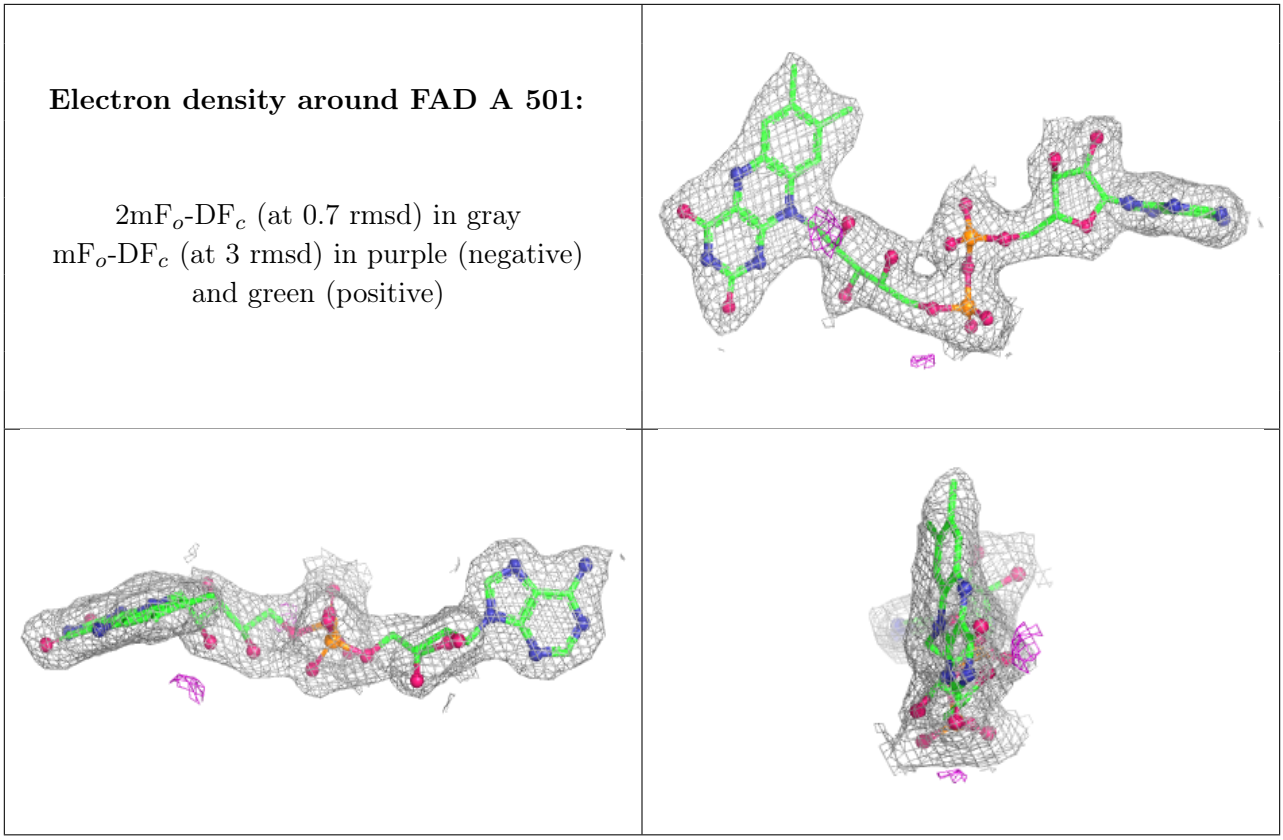






Electron density around FAD A 501:

$2mF_o$-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.