



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 6, 2024 – 03:16 AM EDT

PDB ID : 1RSG
Title : Crystal structure of the polyamine oxidase Fms1 from yeast
Authors : Huang, Q.; Liu, Q.; Hao, Q.
Deposited on : 2003-12-09
Resolution : 1.90 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

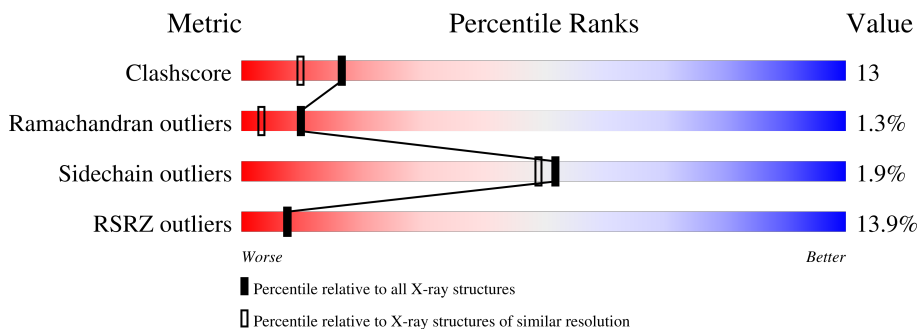
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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))
Clashscore	180529	8090 (1.90-1.90)
Ramachandran outliers	177936	8022 (1.90-1.90)
Sidechain outliers	177891	8022 (1.90-1.90)
RSRZ outliers	164620	7292 (1.90-1.90)

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	516	
1	B	516	

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 8861 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 FMS1 protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	481	3855	2443	670	720	11	11	0	0	0
1	B	491	3931	2486	683	740	11	11	0	0	0

There are 40 discrepancies between the modelled and reference sequences:

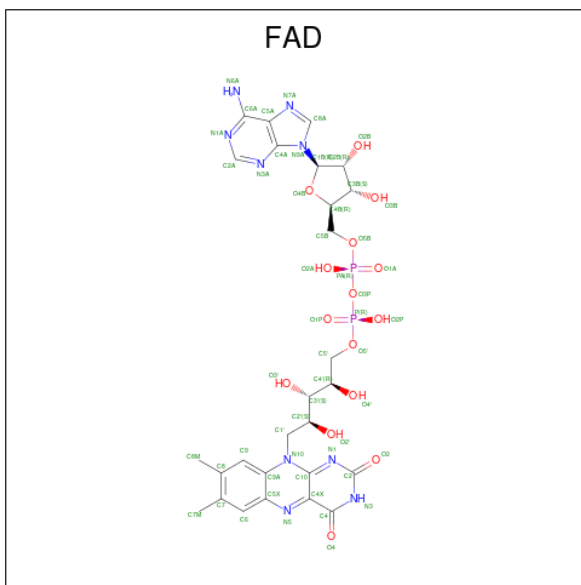
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	MET	modified residue	UNP P50264
A	122	MSE	MET	modified residue	UNP P50264
A	146	MSE	MET	modified residue	UNP P50264
A	339	MSE	MET	modified residue	UNP P50264
A	373	MSE	MET	modified residue	UNP P50264
A	374	MSE	MET	modified residue	UNP P50264
A	376	MSE	MET	modified residue	UNP P50264
A	406	MSE	MET	modified residue	UNP P50264
A	418	MSE	MET	modified residue	UNP P50264
A	462	MSE	MET	modified residue	UNP P50264
A	466	MSE	MET	modified residue	UNP P50264
A	483	MSE	MET	modified residue	UNP P50264
A	509	LEU	-	cloning artifact	UNP P50264
A	510	GLU	-	cloning artifact	UNP P50264
A	511	HIS	-	cloning artifact	UNP P50264
A	512	HIS	-	cloning artifact	UNP P50264
A	513	HIS	-	cloning artifact	UNP P50264
A	514	HIS	-	cloning artifact	UNP P50264
A	515	HIS	-	cloning artifact	UNP P50264
A	516	HIS	-	cloning artifact	UNP P50264
B	1	MSE	MET	modified residue	UNP P50264
B	122	MSE	MET	modified residue	UNP P50264
B	146	MSE	MET	modified residue	UNP P50264
B	339	MSE	MET	modified residue	UNP P50264
B	373	MSE	MET	modified residue	UNP P50264

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Chain	Residue	Modelled	Actual	Comment	Reference
B	374	MSE	MET	modified residue	UNP P50264
B	376	MSE	MET	modified residue	UNP P50264
B	406	MSE	MET	modified residue	UNP P50264
B	418	MSE	MET	modified residue	UNP P50264
B	462	MSE	MET	modified residue	UNP P50264
B	466	MSE	MET	modified residue	UNP P50264
B	483	MSE	MET	modified residue	UNP P50264
B	509	LEU	-	cloning artifact	UNP P50264
B	510	GLU	-	cloning artifact	UNP P50264
B	511	HIS	-	cloning artifact	UNP P50264
B	512	HIS	-	cloning artifact	UNP P50264
B	513	HIS	-	cloning artifact	UNP P50264
B	514	HIS	-	cloning artifact	UNP P50264
B	515	HIS	-	cloning artifact	UNP P50264
B	516	HIS	-	cloning artifact	UNP P50264

- 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	
			Total	C	N	O			P
2	A	1	53	27	9	15	2	0	0
2	B	1	53	27	9	15	2	0	0

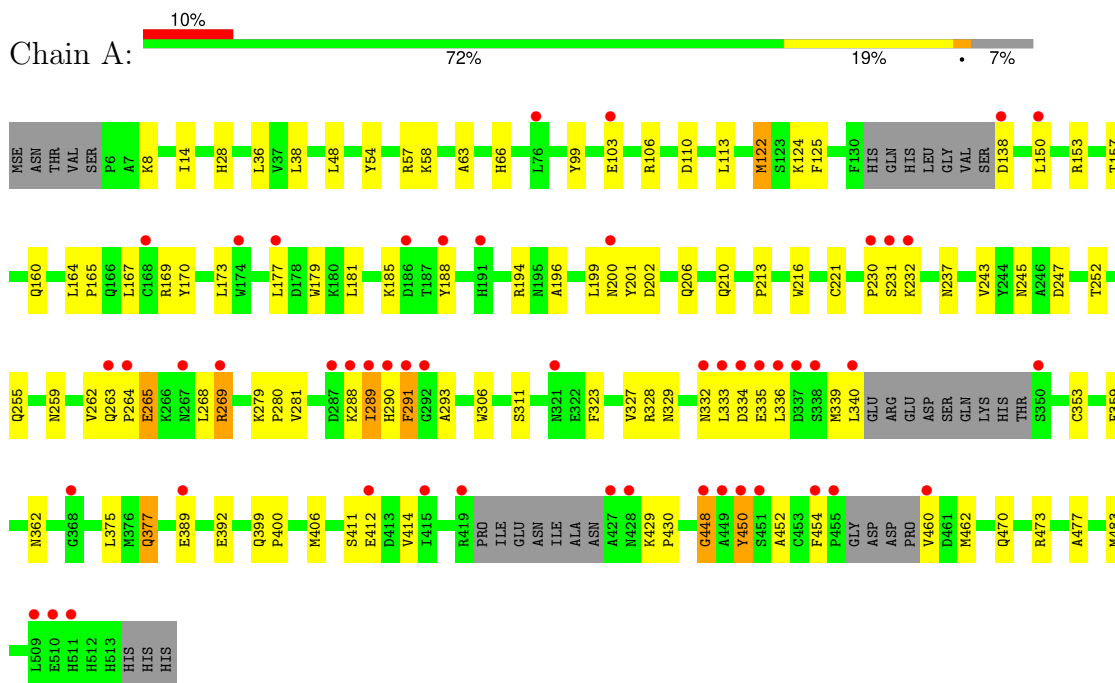
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	528	Total 528	O 528	0	0
3	B	441	Total 441	O 441	0	0

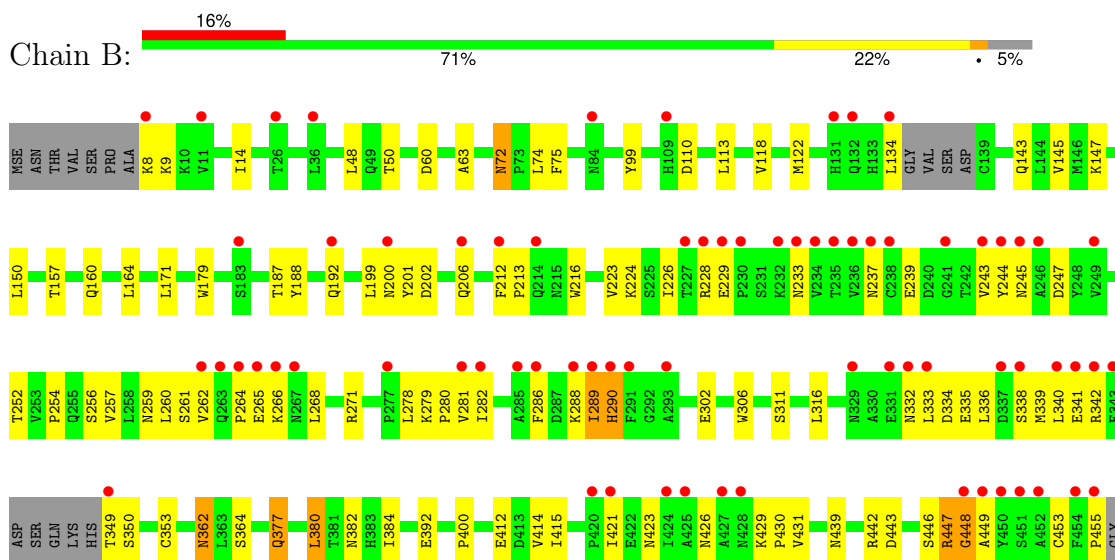
3 Residue-property plots i

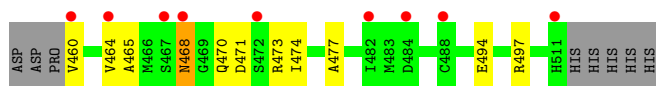
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: FMS1 protein



- Molecule 1: FMS1 protein





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	162.38Å 103.13Å 77.59Å 90.00° 94.98° 90.00°	Depositor
Resolution (Å)	35.95 – 1.90 35.95 – 1.90	Depositor EDS
% Data completeness (in resolution range)	93.4 (35.95-1.90) 93.6 (35.95-1.90)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.42 (at 1.89Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.206 , 0.245 0.214 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	27.4	Xtrriage
Anisotropy	0.105	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 54.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8861	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.65% 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: 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	0.33	0/3922	0.57	0/5278
1	B	0.31	0/3998	0.55	0/5385
All	All	0.32	0/7920	0.56	0/10663

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	3855	0	3778	92	0
1	B	3931	0	3841	107	0
2	A	53	0	31	1	0
2	B	53	0	31	2	0
3	A	528	0	0	18	0
3	B	441	0	0	10	0
All	All	8861	0	7681	198	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 13.

All (198) 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:278:LEU:HA	1:B:470:GLN:HE22	1.15	1.05
1:A:353:CYS:SG	1:A:400:PRO:HG2	2.05	0.96
1:B:353:CYS:SG	1:B:400:PRO:HG2	2.13	0.88
1:B:470:GLN:HB3	1:B:474:ILE:HB	1.55	0.86
1:A:269:ARG:HA	1:A:269:ARG:CZ	2.05	0.85
1:B:290:HIS:HA	1:B:449:ALA:HB3	1.57	0.84
1:A:377:GLN:NE2	1:A:377:GLN:H	1.78	0.81
1:B:282:ILE:HD13	1:B:465:ALA:HB1	1.63	0.81
1:B:278:LEU:HA	1:B:470:GLN:NE2	1.96	0.81
1:B:150:LEU:HD12	1:B:333:LEU:HD23	1.62	0.80
1:A:406:MSE:HE2	1:A:430:PRO:HB3	1.65	0.79
1:B:192:GLN:HE21	1:B:455:PRO:HB2	1.47	0.78
1:B:14:ILE:HD12	1:B:226:ILE:HD11	1.70	0.74
1:B:8:LYS:HG3	1:B:9:LYS:HG2	1.67	0.73
1:A:289:ILE:HD11	1:A:462:MSE:HE2	1.74	0.70
1:B:289:ILE:HG22	1:B:290:HIS:N	2.06	0.70
1:B:289:ILE:HG23	3:B:2165:HOH:O	1.90	0.70
1:B:377:GLN:NE2	1:B:377:GLN:H	1.90	0.69
1:A:237:ASN:OD1	1:A:243:VAL:HG22	1.92	0.68
1:A:406:MSE:HE3	1:A:411:SER:OG	1.95	0.67
1:A:138:ASP:OD1	1:A:185:LYS:HD2	1.93	0.67
1:A:332:ASN:HD21	1:A:334:ASP:HB2	1.60	0.67
1:A:448:GLY:HA2	3:A:1861:HOH:O	1.94	0.67
1:A:150:LEU:HD12	1:A:333:LEU:HD23	1.77	0.67
1:B:289:ILE:HG22	1:B:290:HIS:H	1.60	0.67
1:A:252:THR:HG22	1:A:477:ALA:HB3	1.76	0.66
1:B:72:ASN:C	1:B:72:ASN:HD22	1.99	0.66
1:A:406:MSE:HE2	1:A:430:PRO:CB	2.25	0.66
1:B:256:SER:CB	1:B:448:GLY:HA3	2.25	0.66
1:B:14:ILE:CD1	1:B:226:ILE:HD11	2.26	0.65
1:B:48:LEU:CD2	1:B:63:ALA:HB3	2.26	0.65
1:B:261:SER:HA	1:B:271:ARG:NH1	2.12	0.65
1:B:380:LEU:HD22	1:B:384:ILE:HG12	1.78	0.65
1:B:122:MSE:HE2	1:B:145:VAL:HG22	1.78	0.65
1:A:306:TRP:HE3	1:A:406:MSE:HE1	1.62	0.65
1:B:143:GLN:O	1:B:147:LYS:HG3	1.96	0.64
1:B:260:LEU:HD22	1:B:268:LEU:HD13	1.79	0.64
1:B:8:LYS:HE2	1:B:245:ASN:H	1.63	0.64
1:A:265:GLU:CG	1:A:268:LEU:HG	2.29	0.63
1:A:291:PHE:HA	3:A:2117:HOH:O	1.99	0.63
1:A:268:LEU:HD12	3:A:2161:HOH:O	1.99	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:259:ASN:O	1:B:262:VAL:HG22	1.98	0.63
1:B:122:MSE:CE	1:B:145:VAL:HG22	2.29	0.62
1:A:58:LYS:HE2	3:A:2013:HOH:O	1.99	0.62
1:A:289:ILE:HD13	1:A:462:MSE:HB2	1.81	0.62
1:A:259:ASN:O	1:A:262:VAL:HG22	2.01	0.61
1:B:256:SER:HB2	1:B:448:GLY:HA3	1.82	0.61
1:A:288:LYS:O	1:A:289:ILE:HG23	2.01	0.60
1:B:302:GLU:HG3	1:B:431:VAL:HB	1.83	0.60
1:A:264:PRO:O	1:A:265:GLU:CB	2.50	0.59
1:B:122:MSE:HE3	1:B:188:TYR:OH	2.02	0.58
1:B:63:ALA:HA	2:B:1802:FAD:N5	2.19	0.58
1:B:171:LEU:HD13	1:B:187:THR:HG22	1.86	0.57
1:A:202:ASP:O	1:A:206:GLN:HG2	2.05	0.57
1:B:289:ILE:O	1:B:290:HIS:HB2	2.04	0.57
1:B:439:ASN:HD21	1:B:442:ARG:HD3	1.69	0.57
1:A:36:LEU:HD12	1:A:216:TRP:O	2.03	0.57
1:B:311:SER:HA	1:B:362:ASN:HB3	1.87	0.57
1:A:63:ALA:HA	2:A:1801:FAD:N5	2.20	0.57
1:A:412:GLU:OE1	1:A:429:LYS:HG2	2.05	0.57
1:B:228:ARG:HD3	1:B:471:ASP:OD2	2.05	0.57
1:B:290:HIS:HA	1:B:449:ALA:CB	2.33	0.57
1:A:48:LEU:CD2	1:A:63:ALA:HB3	2.35	0.56
1:A:265:GLU:HG3	1:A:268:LEU:HG	1.87	0.56
1:A:206:GLN:O	1:A:210:GLN:HG3	2.05	0.56
1:A:311:SER:HA	1:A:362:ASN:HB3	1.87	0.56
1:A:247:ASP:O	1:A:473:ARG:HD2	2.05	0.56
1:B:392:GLU:HG3	3:B:2083:HOH:O	2.06	0.56
1:A:122:MSE:HE2	1:A:188:TYR:OH	2.05	0.56
1:B:279:LYS:HG3	1:B:281:VAL:HG12	1.87	0.56
1:A:460:VAL:N	3:A:1955:HOH:O	2.39	0.55
1:B:237:ASN:OD1	1:B:243:VAL:HG13	2.06	0.55
1:A:232:LYS:HG2	3:A:2155:HOH:O	2.07	0.55
1:B:349:THR:HB	3:B:2186:HOH:O	2.07	0.55
1:A:377:GLN:H	1:A:377:GLN:HE21	1.52	0.54
1:B:439:ASN:ND2	1:B:442:ARG:HD3	2.22	0.54
1:A:231:SER:O	1:A:232:LYS:HB2	2.07	0.53
1:A:306:TRP:CE3	1:A:406:MSE:HE1	2.41	0.53
1:B:447:ARG:HG3	1:B:448:GLY:H	1.73	0.53
1:B:332:ASN:HD21	1:B:334:ASP:HB2	1.73	0.53
1:A:290:HIS:O	1:A:291:PHE:HB2	2.09	0.53
1:B:110:ASP:HB3	1:B:113:LEU:HB2	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:254:PRO:HG2	1:B:257:VAL:HG23	1.91	0.52
1:B:282:ILE:HG22	1:B:286:PHE:HE1	1.74	0.52
1:B:289:ILE:CG2	1:B:290:HIS:H	2.21	0.52
1:B:447:ARG:HG3	1:B:448:GLY:N	2.24	0.52
1:A:36:LEU:HD21	1:A:38:LEU:HD21	1.91	0.52
1:B:212:PHE:HB2	1:B:213:PRO:HD2	1.92	0.52
1:A:177:LEU:HD11	1:A:181:LEU:HB2	1.93	0.51
1:B:256:SER:HB3	1:B:448:GLY:HA3	1.92	0.51
1:A:150:LEU:O	1:A:153:ARG:HD2	2.11	0.51
1:A:14:ILE:HD12	1:A:14:ILE:N	2.25	0.51
1:B:460:VAL:HG22	3:B:2101:HOH:O	2.09	0.51
1:A:54:TYR:O	1:A:57:ARG:HG3	2.10	0.51
1:A:452:ALA:HB3	1:A:454:PHE:CZ	2.46	0.51
1:B:423:ASN:HB3	1:B:426:ASN:ND2	2.26	0.51
1:B:289:ILE:CG2	1:B:290:HIS:N	2.73	0.51
1:B:266:LYS:HA	1:B:271:ARG:HE	1.76	0.50
1:A:323:PHE:O	1:A:327:VAL:HG23	2.10	0.50
1:A:414:VAL:HA	1:A:430:PRO:HG2	1.93	0.50
1:A:265:GLU:HG2	1:A:268:LEU:HG	1.93	0.50
1:A:406:MSE:HE3	1:A:411:SER:CB	2.42	0.50
1:B:264:PRO:O	1:B:265:GLU:HB2	2.12	0.50
1:B:278:LEU:CA	1:B:470:GLN:HE22	2.05	0.50
1:A:289:ILE:CD1	1:A:462:MSE:HB2	2.42	0.49
1:B:157:THR:OG1	1:B:160:GLN:HG3	2.13	0.49
1:B:8:LYS:HG2	1:B:245:ASN:OD1	2.13	0.49
1:B:415:ILE:HD11	1:B:429:LYS:HD2	1.93	0.49
1:A:157:THR:OG1	1:A:160:GLN:HG3	2.13	0.49
1:B:63:ALA:HA	2:B:1802:FAD:C4X	2.43	0.49
1:A:406:MSE:HE2	1:A:430:PRO:CG	2.43	0.48
1:B:447:ARG:CG	1:B:448:GLY:H	2.24	0.48
1:A:359:PHE:HD2	1:A:375:LEU:HD22	1.78	0.48
1:B:8:LYS:NZ	1:B:244:TYR:HA	2.28	0.48
1:B:335:GLU:O	1:B:339:MSE:HG3	2.14	0.48
1:A:329:ASN:HB2	1:A:339:MSE:HE1	1.94	0.48
1:B:252:THR:HG22	1:B:477:ALA:HB3	1.95	0.48
1:A:165:PRO:O	1:A:169:ARG:HG3	2.13	0.48
1:B:342:ARG:HB3	3:B:2184:HOH:O	2.14	0.48
1:A:280:PRO:HG2	3:A:1916:HOH:O	2.12	0.47
1:B:118:VAL:HG23	1:B:164:LEU:HD13	1.95	0.47
1:A:199:LEU:HD23	1:A:199:LEU:HA	1.75	0.47
1:B:332:ASN:ND2	1:B:334:ASP:HB2	2.28	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:414:VAL:HA	1:B:430:PRO:HG2	1.96	0.47
1:B:72:ASN:C	1:B:72:ASN:ND2	2.67	0.47
1:A:58:LYS:HD3	3:A:2282:HOH:O	2.13	0.47
1:A:255:GLN:NE2	1:A:289:ILE:HD12	2.30	0.47
1:B:134:LEU:HA	3:B:2019:HOH:O	2.15	0.47
1:B:338:SER:HA	1:B:341:GLU:OE2	2.14	0.47
1:B:377:GLN:H	1:B:377:GLN:HE21	1.60	0.47
1:B:415:ILE:HD13	1:B:426:ASN:OD1	2.15	0.47
1:A:164:LEU:N	1:A:165:PRO:HD2	2.30	0.47
1:A:281:VAL:HG13	3:A:1916:HOH:O	2.15	0.47
1:A:264:PRO:O	1:A:265:GLU:HB3	2.15	0.47
1:B:286:PHE:C	1:B:288:LYS:H	2.19	0.46
1:B:289:ILE:HD12	3:B:2167:HOH:O	2.14	0.46
1:A:28:HIS:HD2	3:A:1835:HOH:O	1.98	0.46
1:A:122:MSE:O	1:A:125:PHE:HB3	2.15	0.46
1:A:406:MSE:HE2	1:A:430:PRO:HG3	1.97	0.46
1:A:138:ASP:HB3	3:A:1993:HOH:O	2.15	0.46
1:A:269:ARG:HA	1:A:269:ARG:NH1	2.31	0.46
1:B:50:THR:OG1	1:B:202:ASP:HB3	2.14	0.45
1:B:464:VAL:O	1:B:468:ASN:HB2	2.16	0.45
1:A:230:PRO:C	1:A:232:LYS:H	2.20	0.45
1:A:263:GLN:HB2	3:A:2161:HOH:O	2.15	0.45
1:B:229:GLU:OE1	1:B:233:ASN:HB2	2.16	0.45
1:B:224:LYS:HD3	1:B:239:GLU:OE1	2.16	0.45
1:A:306:TRP:HE1	1:A:362:ASN:HD21	1.65	0.45
1:B:316:LEU:HD12	1:B:316:LEU:N	2.31	0.45
1:A:288:LYS:C	1:A:289:ILE:HG12	2.37	0.45
1:B:202:ASP:O	1:B:206:GLN:HG3	2.17	0.45
1:B:213:PRO:HG2	1:B:216:TRP:CE2	2.52	0.45
1:A:293:ALA:HA	1:A:450:TYR:HB3	1.99	0.44
1:A:399:GLN:N	1:A:400:PRO:HD2	2.32	0.44
1:B:60:ASP:HB3	1:B:63:ALA:O	2.17	0.44
1:B:306:TRP:HE1	1:B:362:ASN:HD21	1.65	0.44
1:A:8:LYS:HD2	1:A:245:ASN:HD22	1.81	0.44
1:A:269:ARG:HA	1:A:269:ARG:NE	2.32	0.44
1:B:494:GLU:OE1	1:B:497:ARG:NH2	2.51	0.43
1:A:167:LEU:C	1:A:167:LEU:HD23	2.38	0.43
1:B:281:VAL:HG13	1:B:282:ILE:N	2.33	0.43
1:A:173:LEU:HD22	1:A:173:LEU:N	2.34	0.43
1:A:336:LEU:O	1:A:340:LEU:HG	2.18	0.43
1:A:279:LYS:HG3	1:A:470:GLN:OE1	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:483:MSE:HE2	3:A:2195:HOH:O	2.19	0.43
1:A:124:LYS:HG2	1:B:192:GLN:HA	2.01	0.42
1:A:335:GLU:O	1:A:339:MSE:HG3	2.19	0.42
1:A:483:MSE:HG3	3:A:2063:HOH:O	2.17	0.42
1:B:412:GLU:HB2	3:B:1919:HOH:O	2.18	0.42
1:B:72:ASN:HD21	1:B:74:LEU:HB3	1.85	0.42
1:B:213:PRO:HG2	1:B:216:TRP:CD1	2.54	0.42
1:B:254:PRO:HG2	1:B:257:VAL:CG2	2.49	0.42
1:B:382:ASN:HB3	3:B:2080:HOH:O	2.18	0.42
1:B:260:LEU:O	1:B:271:ARG:NH1	2.52	0.42
1:B:199:LEU:HD23	1:B:199:LEU:HA	1.72	0.42
1:B:288:LYS:O	1:B:289:ILE:HB	2.19	0.42
1:B:192:GLN:NE2	1:B:455:PRO:HB2	2.24	0.42
1:B:447:ARG:CG	1:B:448:GLY:N	2.83	0.42
1:B:279:LYS:HB2	1:B:280:PRO:HD2	2.02	0.41
1:A:194:ARG:NH1	3:A:1821:HOH:O	2.50	0.41
1:A:66:HIS:HB2	1:A:196:ALA:HB3	2.02	0.41
1:B:443:ASP:HB3	1:B:446:SER:OG	2.20	0.41
1:A:153:ARG:NH2	1:A:328:ARG:O	2.52	0.41
1:A:99:TYR:O	1:A:106:ARG:HA	2.20	0.41
1:B:336:LEU:O	1:B:340:LEU:HG	2.20	0.41
1:B:362:ASN:HD21	1:B:364:SER:HB3	1.86	0.41
1:A:103:GLU:HG3	3:A:2227:HOH:O	2.19	0.41
1:B:8:LYS:HB2	3:B:2030:HOH:O	2.20	0.41
1:A:110:ASP:HB3	1:A:113:LEU:HB2	2.03	0.41
1:B:72:ASN:ND2	1:B:75:PHE:H	2.18	0.41
1:A:167:LEU:O	1:A:170:TYR:CD2	2.74	0.41
1:A:28:HIS:CD2	1:A:213:PRO:HD3	2.55	0.40
1:B:278:LEU:HD23	1:B:470:GLN:NE2	2.36	0.40
1:B:247:ASP:O	1:B:473:ARG:HD2	2.21	0.40
1:A:392:GLU:HG3	3:A:1999:HOH:O	2.21	0.40
1:A:138:ASP:N	3:A:2140:HOH:O	2.54	0.40
1:B:14:ILE:HD13	1:B:223:VAL:HG11	2.03	0.40
1:B:99:TYR:HB3	1:B:316:LEU:HD11	2.03	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	471/516 (91%)	446 (95%)	20 (4%)	5 (1%)	12	4
1	B	483/516 (94%)	456 (94%)	20 (4%)	7 (1%)	9	3
All	All	954/1032 (92%)	902 (94%)	40 (4%)	12 (1%)	10	3

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	200	ASN
1	A	265	GLU
1	A	291	PHE
1	A	448	GLY
1	A	450	TYR
1	B	200	ASN
1	B	289	ILE
1	B	290	HIS
1	B	350	SER
1	B	447	ARG
1	B	448	GLY
1	B	421	ILE

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	422/445 (95%)	414 (98%)	8 (2%)	52	49

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	431/445 (97%)	423 (98%)	8 (2%)	52	49
All	All	853/890 (96%)	837 (98%)	16 (2%)	52	49

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	122	MSE
1	A	179	TRP
1	A	201	TYR
1	A	221	CYS
1	A	269	ARG
1	A	289	ILE
1	A	377	GLN
1	A	389	GLU
1	B	72	ASN
1	B	179	TRP
1	B	201	TYR
1	B	362	ASN
1	B	377	GLN
1	B	380	LEU
1	B	453	CYS
1	B	468	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	HIS
1	A	29	GLN
1	A	80	GLN
1	A	84	ASN
1	A	214	GLN
1	A	245	ASN
1	A	255	GLN
1	A	267	ASN
1	A	332	ASN
1	A	362	ASN
1	A	377	GLN
1	A	434	ASN
1	B	72	ASN
1	B	192	GLN
1	B	233	ASN

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Mol	Chain	Res	Type
1	B	259	ASN
1	B	329	ASN
1	B	332	ASN
1	B	362	ASN
1	B	377	GLN
1	B	382	ASN
1	B	434	ASN
1	B	439	ASN
1	B	470	GLN

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](#)

2 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	$\# Z > 2$
2	FAD	A	1801	-	54,58,58	1.19	6 (11%)	71,89,89	1.18	7 (9%)
2	FAD	B	1802	-	54,58,58	1.26	5 (9%)	71,89,89	1.23	10 (14%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	FAD	A	1801	-	-	0/30/50/50	0/6/6/6
2	FAD	B	1802	-	-	0/30/50/50	0/6/6/6

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1802	FAD	C4X-N5	4.51	1.40	1.30
2	A	1801	FAD	C4X-N5	4.21	1.39	1.30
2	A	1801	FAD	C2A-N3A	2.81	1.36	1.32
2	B	1802	FAD	C2A-N3A	2.65	1.36	1.32
2	B	1802	FAD	C10-N1	2.62	1.38	1.33
2	B	1802	FAD	C2A-N1A	2.49	1.38	1.33
2	A	1801	FAD	C10-N1	2.33	1.37	1.33
2	B	1802	FAD	C9A-C5X	2.24	1.44	1.41
2	A	1801	FAD	C9-C8	2.20	1.42	1.39
2	A	1801	FAD	C2A-N1A	2.04	1.37	1.33
2	A	1801	FAD	C9A-C5X	2.01	1.44	1.41

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1802	FAD	C4B-O4B-C1B	-3.65	106.58	109.92
2	A	1801	FAD	C4B-O4B-C1B	-3.40	106.81	109.92
2	B	1802	FAD	C9A-C5X-N5	-2.70	119.59	122.45
2	A	1801	FAD	N3A-C2A-N1A	-2.69	125.02	128.67
2	B	1802	FAD	O3'-C3'-C4'	-2.66	102.89	108.93
2	B	1802	FAD	C5A-C6A-N6A	2.60	124.27	120.31
2	A	1801	FAD	C5A-C6A-N6A	2.58	124.24	120.31
2	B	1802	FAD	N3A-C2A-N1A	-2.56	125.20	128.67
2	A	1801	FAD	O3'-C3'-C4'	-2.54	103.16	108.93
2	A	1801	FAD	C9A-C5X-N5	-2.49	119.82	122.45
2	B	1802	FAD	C5'-C4'-C3'	-2.29	107.89	112.22
2	B	1802	FAD	C4'-C3'-C2'	2.28	117.37	113.57
2	B	1802	FAD	C4-C4X-N5	2.18	121.22	118.21
2	A	1801	FAD	C5'-C4'-C3'	-2.13	108.19	112.22
2	B	1802	FAD	O3P-PA-O1A	-2.03	104.59	110.70
2	A	1801	FAD	C4'-C3'-C2'	2.02	116.93	113.57
2	B	1802	FAD	C10-C4X-N5	-2.02	120.69	124.81

There are no chirality outliers.

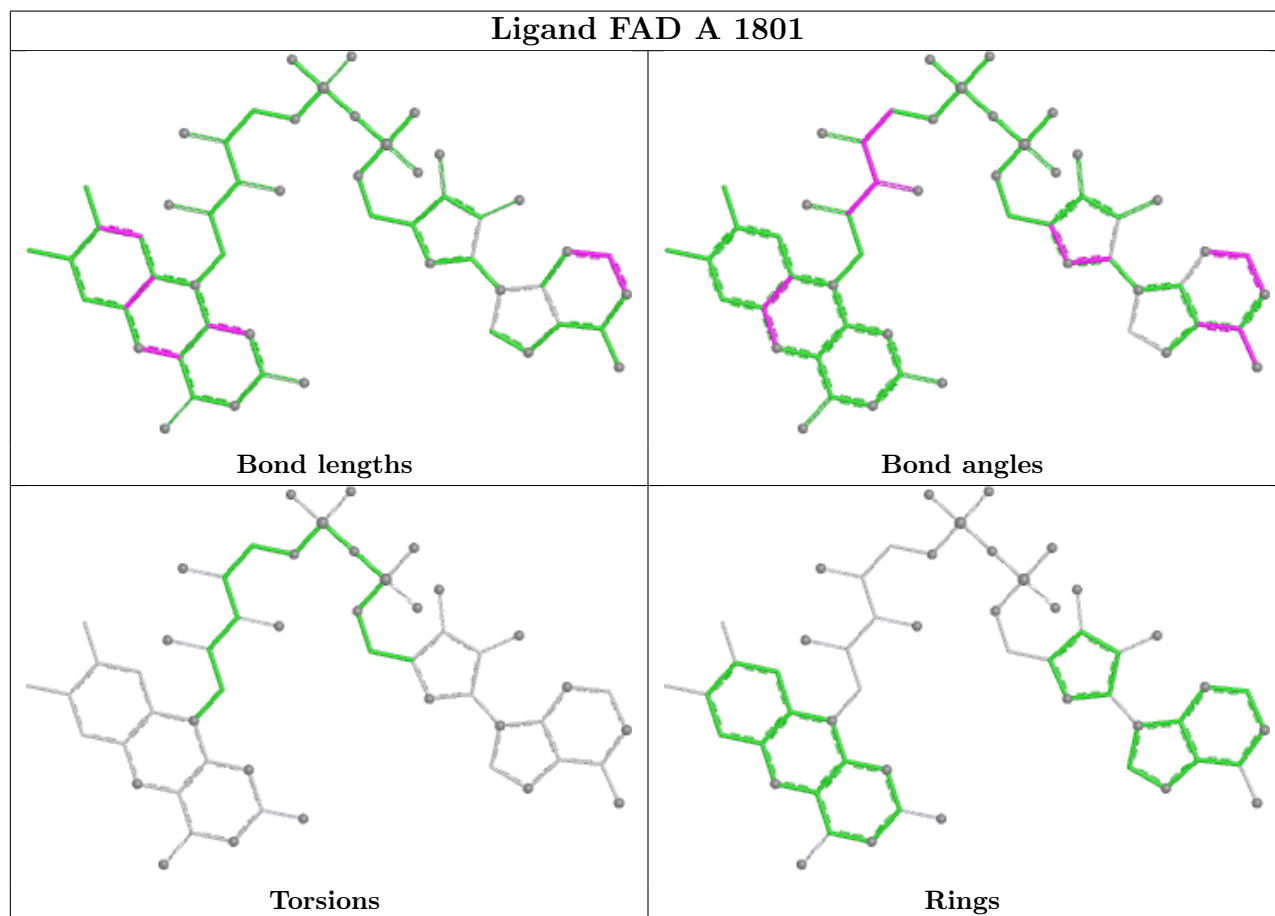
There are no torsion outliers.

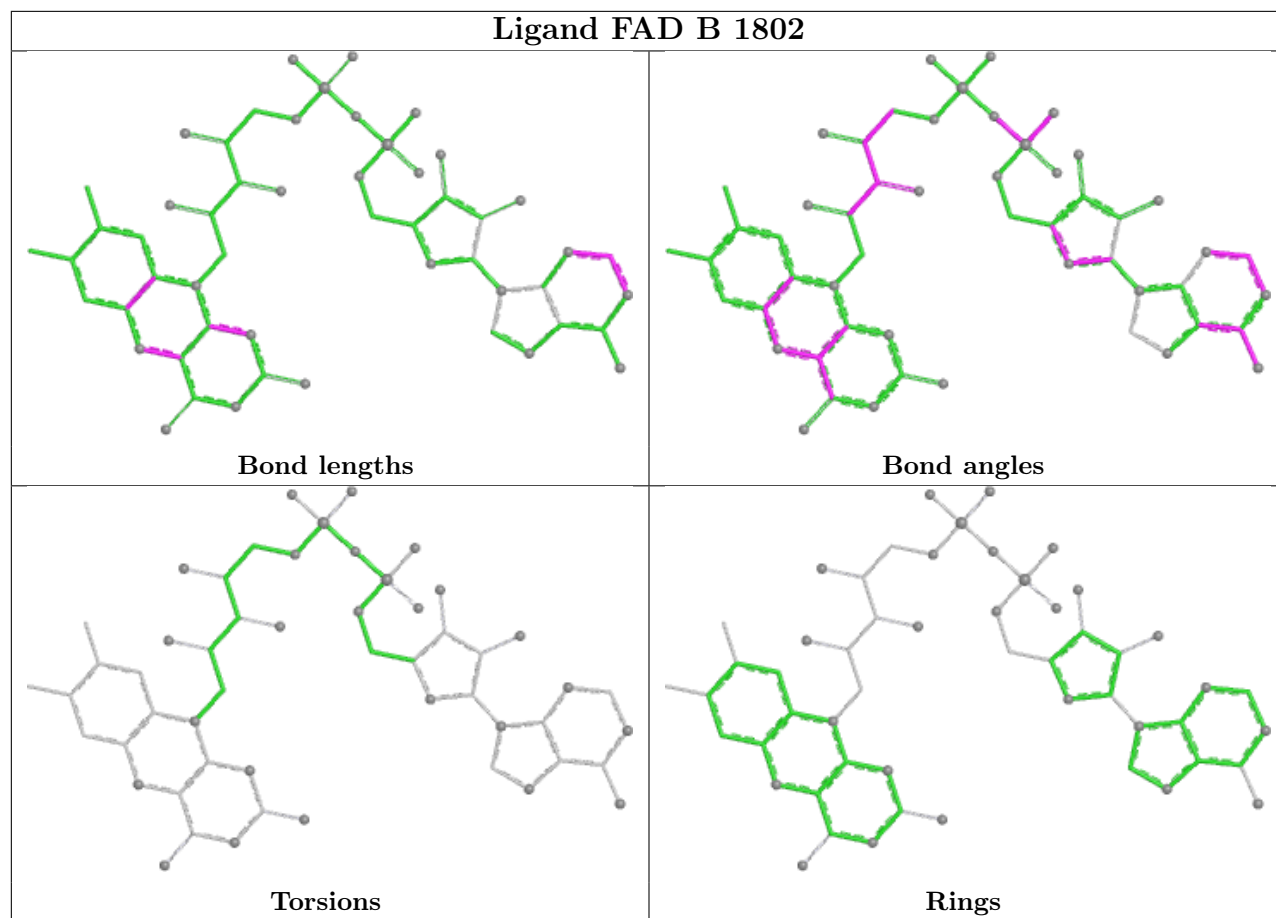
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1801	FAD	1	0
2	B	1802	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.





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	470/516 (91%)	0.71	51 (10%) 12 12	16, 30, 54, 71	0
1	B	480/516 (93%)	0.93	81 (16%) 5 5	20, 33, 59, 73	0
All	All	950/1032 (92%)	0.82	132 (13%) 7 7	16, 32, 57, 73	0

All (132) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	291	PHE	7.4
1	A	449	ALA	6.9
1	B	448	GLY	6.6
1	B	449	ALA	6.5
1	B	291	PHE	6.2
1	A	264	PRO	5.7
1	A	289	ILE	5.5
1	A	290	HIS	5.4
1	B	342	ARG	5.4
1	B	454	PHE	5.4
1	B	290	HIS	5.3
1	B	341	GLU	5.2
1	B	281	VAL	4.8
1	B	132	GLN	4.7
1	A	454	PHE	4.4
1	B	349	THR	4.4
1	B	229	GLU	4.3
1	B	289	ILE	4.3
1	A	337	ASP	4.3
1	B	511	HIS	4.3
1	B	266	LYS	4.2
1	A	450	TYR	4.2
1	B	265	GLU	4.1
1	B	263	GLN	3.9

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Mol	Chain	Res	Type	RSRZ
1	A	340	LEU	3.8
1	B	428	ASN	3.8
1	A	448	GLY	3.8
1	A	460	VAL	3.8
1	A	333	LEU	3.7
1	A	138	ASP	3.7
1	B	425	ALA	3.7
1	B	460	VAL	3.7
1	B	340	LEU	3.7
1	A	336	LEU	3.7
1	B	230	PRO	3.7
1	B	228	ARG	3.6
1	A	350	SER	3.5
1	B	262	VAL	3.5
1	B	206	GLN	3.5
1	A	230	PRO	3.4
1	B	286	PHE	3.4
1	A	338	SER	3.4
1	A	455	PRO	3.3
1	B	8	LYS	3.3
1	A	428	ASN	3.1
1	B	11	VAL	3.1
1	A	200	ASN	3.1
1	A	427	ALA	3.1
1	B	343	GLU	3.1
1	A	150	LEU	3.1
1	A	232	LYS	3.1
1	B	264	PRO	3.1
1	B	282	ILE	3.1
1	A	174	TRP	3.1
1	A	321	ASN	3.0
1	A	288	LYS	3.0
1	B	235	THR	3.0
1	A	269	ARG	2.9
1	A	267	ASN	2.9
1	A	510	GLU	2.9
1	B	424	ILE	2.9
1	A	332	ASN	2.9
1	B	245	ASN	2.9
1	B	232	LYS	2.8
1	B	237	ASN	2.8
1	B	331	GLU	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	334	ASP	2.8
1	B	233	ASN	2.8
1	A	103	GLU	2.8
1	A	335	GLU	2.8
1	B	285	ALA	2.7
1	B	452	ALA	2.7
1	B	451	SER	2.7
1	A	287	ASP	2.7
1	B	244	TYR	2.6
1	A	263	GLN	2.6
1	B	293	ALA	2.6
1	B	427	ALA	2.6
1	B	212	PHE	2.6
1	B	472	SER	2.6
1	A	511	HIS	2.5
1	A	231	SER	2.5
1	B	464	VAL	2.5
1	B	246	ALA	2.5
1	A	292	GLY	2.4
1	A	509	LEU	2.4
1	B	134	LEU	2.4
1	B	338	SER	2.4
1	B	337	ASP	2.4
1	A	412	GLU	2.4
1	B	332	ASN	2.4
1	A	419	ARG	2.4
1	A	168	CYS	2.4
1	B	26	THR	2.4
1	B	234	VAL	2.3
1	B	84	ASN	2.3
1	B	267	ASN	2.3
1	B	421	ILE	2.3
1	A	451	SER	2.3
1	B	183	SER	2.3
1	B	467	SER	2.3
1	B	241	GLY	2.3
1	A	177	LEU	2.3
1	B	36	LEU	2.3
1	B	333	LEU	2.3
1	B	484	ASP	2.3
1	B	243	VAL	2.3
1	B	488	CYS	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	214	GLN	2.2
1	A	186	ASP	2.2
1	B	238	CYS	2.2
1	B	288	LYS	2.2
1	B	249	VAL	2.1
1	B	192	GLN	2.1
1	B	277	PRO	2.1
1	B	227	THR	2.1
1	B	131	HIS	2.1
1	B	420	PRO	2.1
1	B	329	ASN	2.1
1	B	236	VAL	2.1
1	B	455	PRO	2.1
1	A	188	TYR	2.1
1	A	389	GLU	2.1
1	B	450	TYR	2.1
1	B	109	HIS	2.0
1	A	76	LEU	2.0
1	A	415	ILE	2.0
1	B	200	ASN	2.0
1	B	468	ASN	2.0
1	B	482	ILE	2.0
1	A	191	HIS	2.0
1	A	368	GLY	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](#)

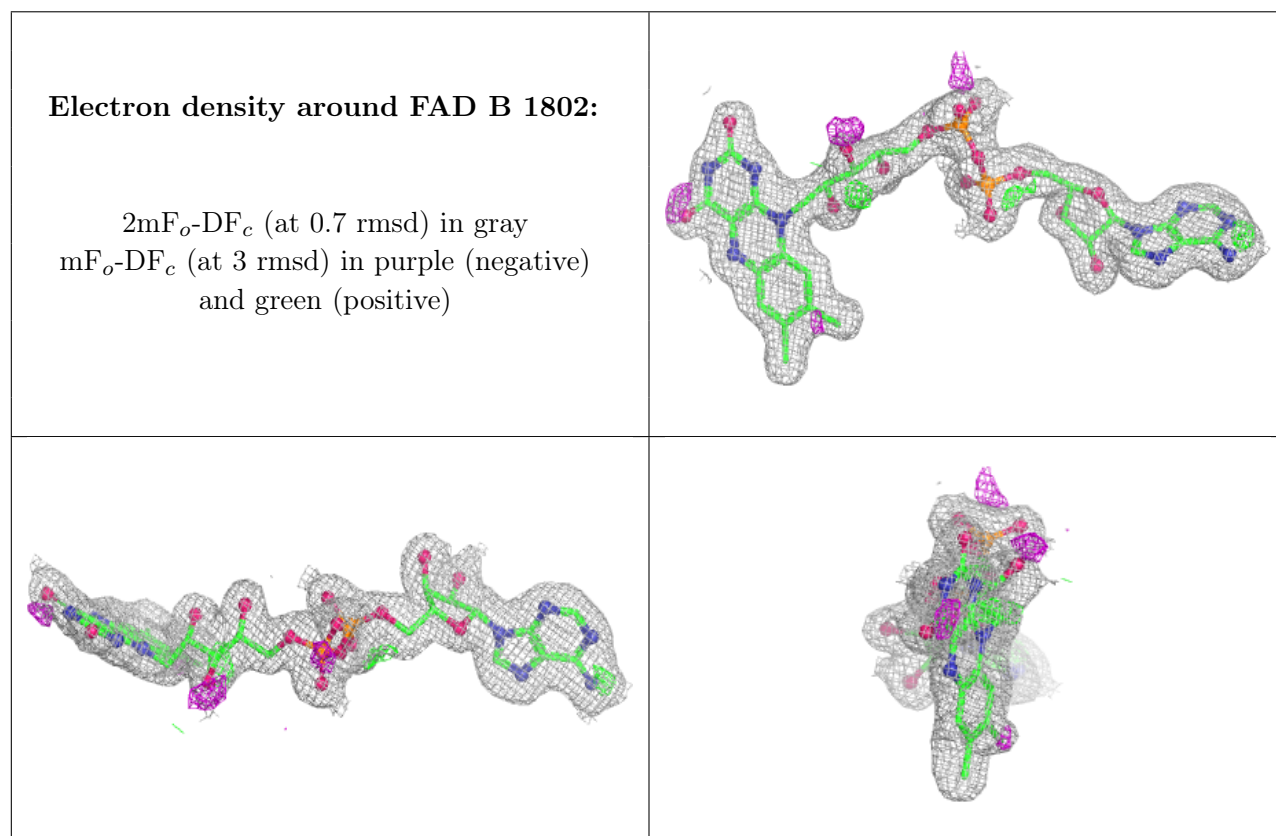
There are no monosaccharides in this entry.

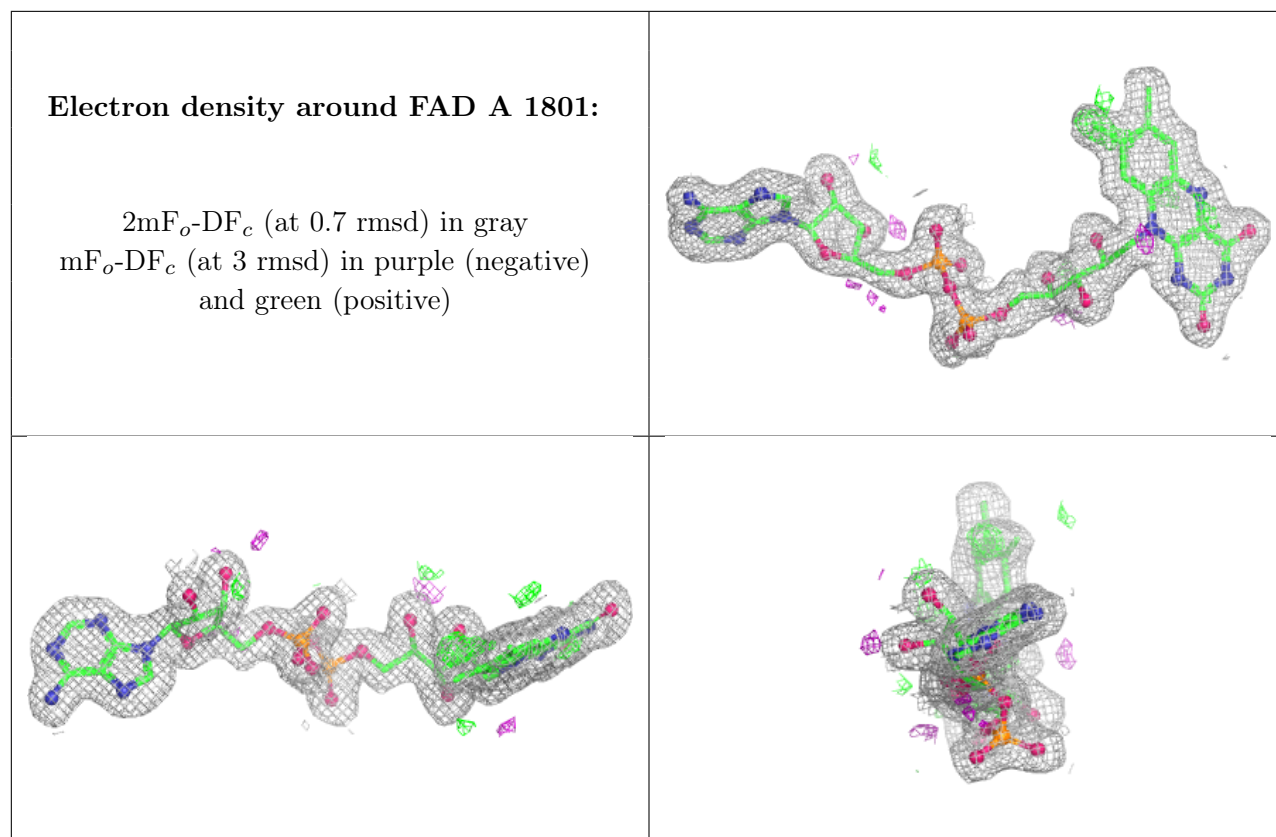
6.4 Ligands [i](#)

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(\AA^2)	Q<0.9
2	FAD	B	1802	53/53	0.94	0.09	23,27,30,33	0
2	FAD	A	1801	53/53	0.97	0.06	13,17,21,23	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.