Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 11:55 am BST

PDB ID	:	6ADJ
Title	:	Rat Xanthine oxidoreductase, D428E variant
Authors	:	Okamoto, K.; Kawaguchi, Y.
Deposited on	:	2018-08-01
Resolution	:	2.18 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 following versions of software and data (see references ⓘ) were used in the production of this report:

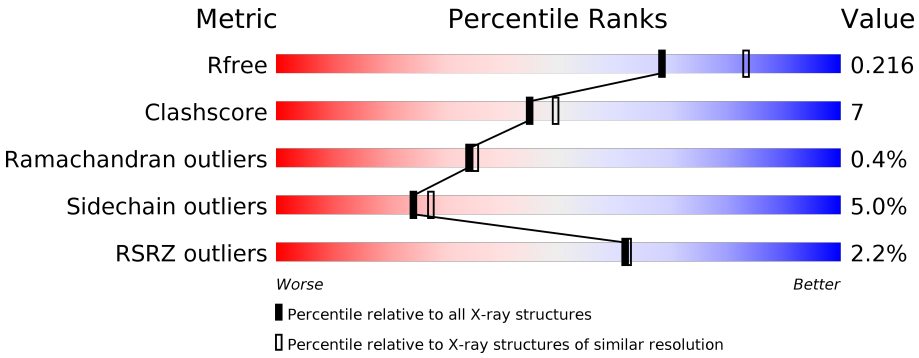
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.18 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	6864 (2.20-2.16)
Clashscore	141614	7689 (2.20-2.16)
Ramachandran outliers	138981	7564 (2.20-2.16)
Sidechain outliers	138945	7564 (2.20-2.16)
RSRZ outliers	127900	6738 (2.20-2.16)

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 on 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	1331	3% 84% 11%
1	B	1331	% 82% 12%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 21477 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.

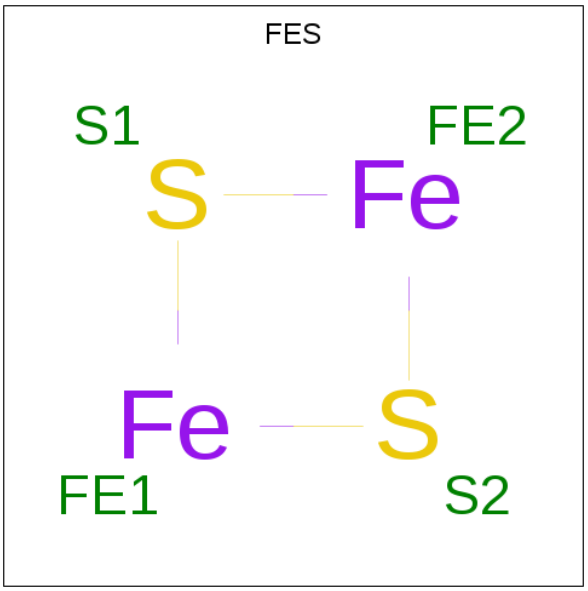
- Molecule 1 is a protein called Xanthine dehydrogenase/oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	1297	Total	C	N	O	S	0	0	0
			10030	6357	1727	1881	65			
1	B	1286	Total	C	N	O	S	0	0	0
			9938	6301	1709	1864	64			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	428	GLU	ASP	see sequence details	UNP P22985
B	428	GLU	ASP	see sequence details	UNP P22985

- Molecule 2 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	Fe	S	0	0
			4	2	2		

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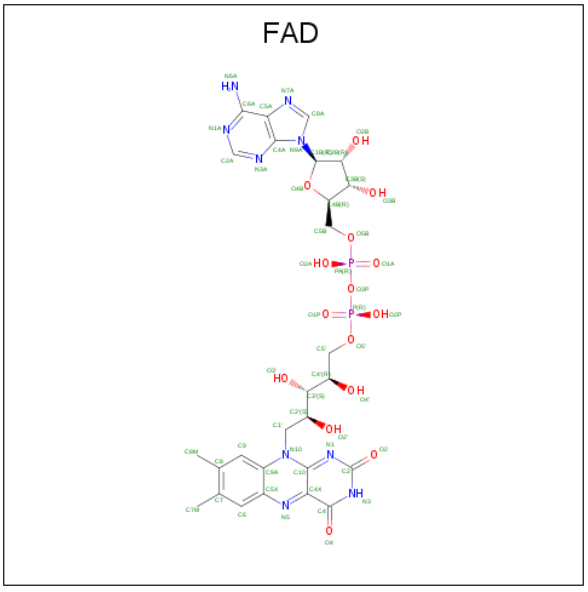
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Fe S 4 2 2	0	0
2	B	1	Total Fe S 4 2 2	0	0
2	B	1	Total Fe S 4 2 2	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

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

- Molecule 4 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



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

- Molecule 5 is water.

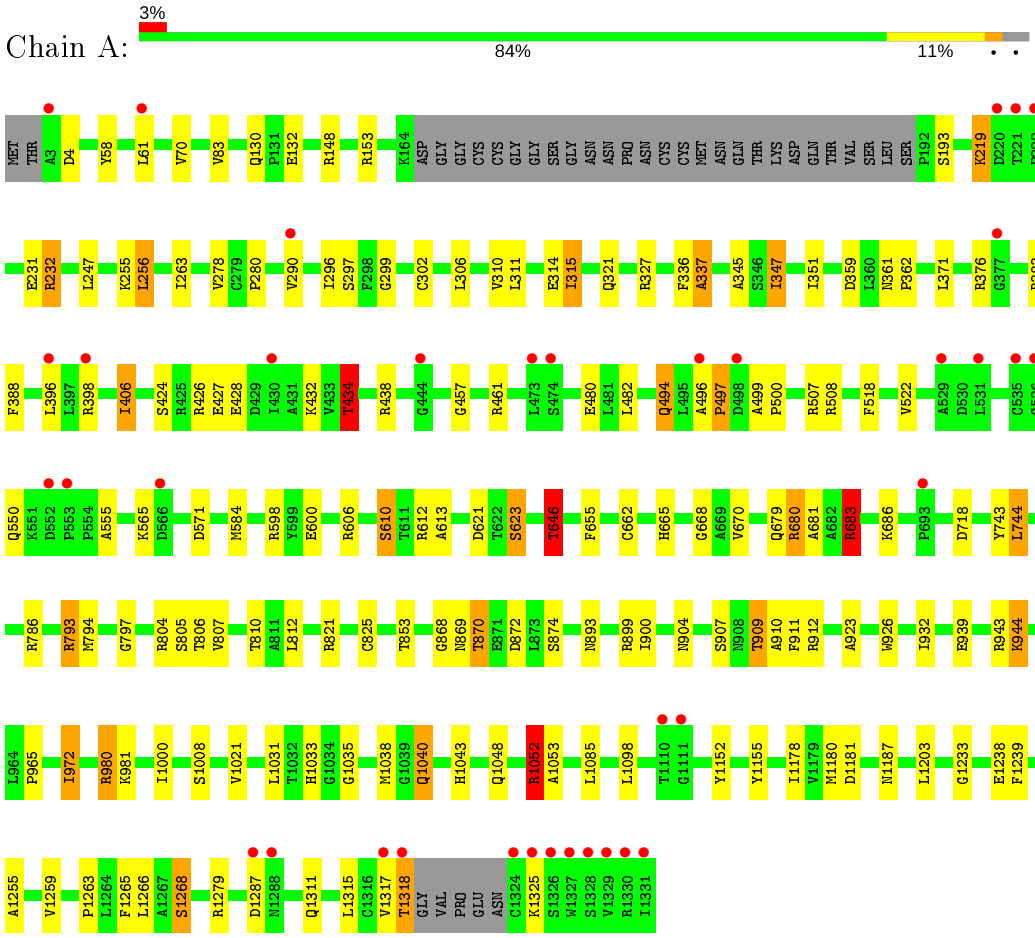
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	623	Total O 623 623	0	0
5	B	762	Total O 762 762	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA and DNA 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.

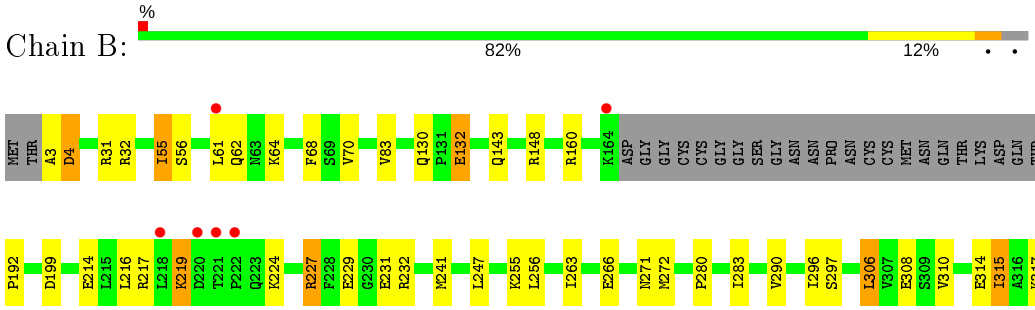
- Molecule 1: Xanthine dehydrogenase/oxidase

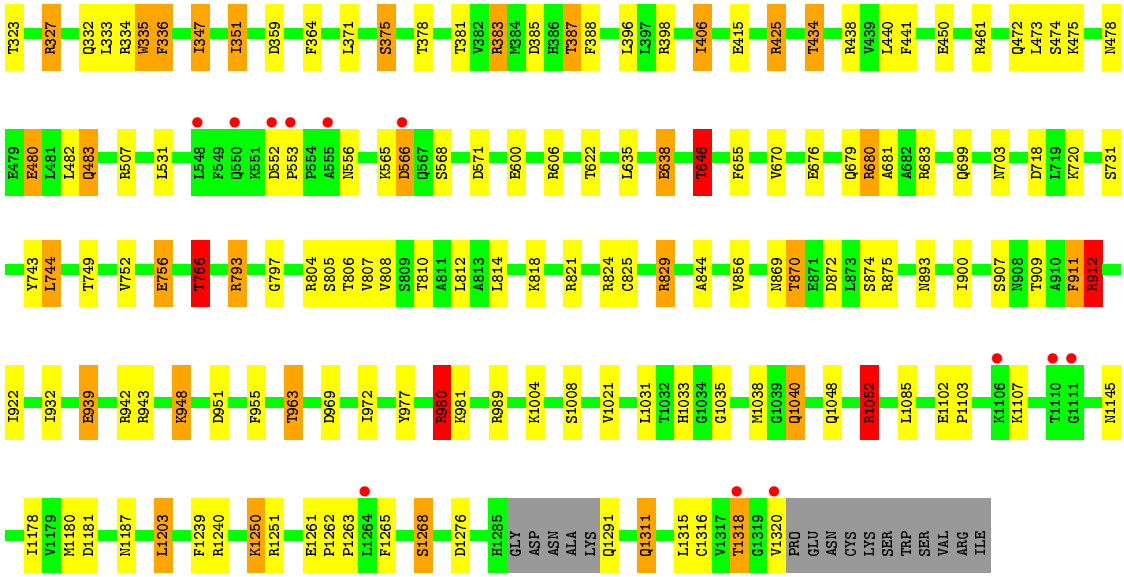
Chain A:



- Molecule 1: Xanthine dehydrogenase/oxidase

Chain B:




T323 R327 Q332 L333 R334 W335 F336 I347 I351 D359 F364 L371 S375 T378 T381 V382 R383 N384 D385 H386 T387 F388 L396 L397 R398 I406 E415 R425 T434 R438 V439 L440 F441 E450 R461 Q472 L473 S474 K475 N478
E479 E480 L481 L482 Q483 R507 L531 L548 F549 Q550 K551 D552 P553 P554 A555 N556 K565 D566 Q567 S568 D571 E600 R606 T622 L635 E638 T646 F655 V670 E676 Q679 R680 A681 A682 R683 Q699 N703 D718 L719 K720 S731
Y743 L744 T749 V752 E756 T766 R793 G797 R804 S805 T806 V807 V808 S809 T810 A811 L812 A813 L814 K818 R821 R824 C825 R829 A844 V856 N869 T870 E871 D872 L873 S874 R875 N893 I900 S907 N908 T909 A910 F911 R912
I922 I932 E939 R942 R943 K948 D951 F955 T963 D969 I972 Y977 R980 K981 R989 K1004 S1008 V1021 L1031 T1032 H1033 G1034 G1035 M1038 G1039 Q1040 Q1048 R1052 L1085 E1102 P1103 K1106 K1107 T1110 G1111 N1145
I1178 V1179 M1180 D1181 N1187 L1203 F1239 R1240 K1250 R1251 E1261 P1262 P1263 L1264 F1265 S1268 D1276 H1285 GLY ASP ASN ALA LYS Q1291 Q1311 L1315 C1316 V1317 T1318 G1319 V1320 PRO GLU ASN CYS LYS SER TRP SER VAL ARG ILE

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	98.84Å 138.66Å 222.46Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.40 – 2.18 42.37 – 2.18	Depositor EDS
% Data completeness (in resolution range)	99.4 (42.40-2.18) 99.4 (42.37-2.18)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	8.98 (at 2.18Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, R_{free}	0.167 , 0.210 0.175 , 0.216	Depositor DCC
R_{free} test set	1625 reflections (1.02%)	wwPDB-VP
Wilson B-factor (Å^2)	22.9	Xtriage
Anisotropy	0.038	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 44.9	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	0.95	EDS
Total number of atoms	21477	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.86% 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: CA, FES, 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	0.64	1/10241 (0.0%)	0.80	12/13855 (0.1%)
1	B	0.69	2/10147 (0.0%)	0.85	16/13730 (0.1%)
All	All	0.66	3/20388 (0.0%)	0.82	28/27585 (0.1%)

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	13
1	B	0	22
All	All	0	35

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	600	GLU	CD-OE2	7.48	1.33	1.25
1	B	480	GLU	CD-OE2	5.13	1.31	1.25
1	A	600	GLU	CD-OE2	5.04	1.31	1.25

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	829	ARG	NE-CZ-NH2	-11.80	114.40	120.30
1	A	793	ARG	NE-CZ-NH2	-11.17	114.71	120.30
1	A	793	ARG	NE-CZ-NH1	11.00	125.80	120.30
1	A	980	ARG	NE-CZ-NH2	-9.18	115.71	120.30
1	B	766	THR	CB-CA-C	-8.01	89.97	111.60
1	A	766	THR	CB-CA-C	-7.56	91.18	111.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	327	ARG	NE-CZ-NH1	-7.46	116.57	120.30
1	B	1052	ARG	NE-CZ-NH2	-7.34	116.63	120.30
1	A	1052	ARG	NE-CZ-NH2	-6.99	116.80	120.30
1	B	31	ARG	NE-CZ-NH1	-6.75	116.93	120.30
1	B	980	ARG	NE-CZ-NH2	-6.28	117.16	120.30
1	B	638	GLU	CB-CA-C	-6.27	97.87	110.40
1	B	425	ARG	NE-CZ-NH1	-6.03	117.28	120.30
1	B	869	ASN	CB-CA-C	-5.97	98.46	110.40
1	B	646	THR	CB-CA-C	-5.96	95.51	111.60
1	B	347	ILE	CB-CA-C	-5.84	99.92	111.60
1	A	944	LYS	CB-CA-C	-5.75	98.90	110.40
1	A	793	ARG	CD-NE-CZ	5.67	131.54	123.60
1	A	980	ARG	NE-CZ-NH1	5.61	123.10	120.30
1	B	766	THR	CA-CB-OG1	5.47	120.48	109.00
1	A	646	THR	CB-CA-C	-5.36	97.12	111.60
1	A	868	GLY	C-N-CA	5.32	135.00	121.70
1	B	327	ARG	NE-CZ-NH2	5.29	122.94	120.30
1	B	824	ARG	NE-CZ-NH2	-5.28	117.66	120.30
1	A	963	THR	N-CA-CB	-5.15	100.52	110.30
1	B	566	ASP	CB-CA-C	-5.10	100.20	110.40
1	A	434	THR	CB-CA-C	-5.07	97.90	111.60
1	B	829	ARG	CB-CG-CD	-5.00	98.59	111.60

There are no chirality outliers.

All (35) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	148	ARG	Sidechain
1	A	227	ARG	Sidechain
1	A	232	ARG	Sidechain
1	A	327	ARG	Sidechain
1	A	438	ARG	Sidechain
1	A	461	ARG	Sidechain
1	A	612	ARG	Sidechain
1	A	680	ARG	Sidechain
1	A	683	ARG	Sidechain
1	A	786	ARG	Sidechain
1	A	804	ARG	Sidechain
1	A	821	ARG	Sidechain
1	A	980	ARG	Sidechain
1	B	1240	ARG	Sidechain
1	B	1318	THR	Peptide

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Mol	Chain	Res	Type	Group
1	B	148	ARG	Sidechain
1	B	160	ARG	Sidechain
1	B	227	ARG	Sidechain
1	B	3	ALA	Peptide
1	B	334	ARG	Sidechain
1	B	335	TRP	Peptide
1	B	383	ARG	Sidechain
1	B	425	ARG	Sidechain
1	B	461	ARG	Sidechain
1	B	507	ARG	Sidechain
1	B	680	ARG	Sidechain
1	B	793	ARG	Sidechain
1	B	821	ARG	Sidechain
1	B	829	ARG	Sidechain
1	B	875	ARG	Sidechain
1	B	912	ARG	Sidechain
1	B	942	ARG	Sidechain
1	B	943	ARG	Sidechain
1	B	980	ARG	Sidechain
1	B	989	ARG	Sidechain

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	10030	0	10041	117	0
1	B	9938	0	9948	147	0
2	A	8	0	0	1	0
2	B	8	0	0	1	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	53	0	31	2	0
4	B	53	0	31	0	0
5	A	623	0	0	17	0
5	B	762	0	0	35	0
All	All	21477	0	20051	262	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.

All (262) 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:1316:CYS:HB2	5:B:4770:HOH:O	1.19	1.30
1:B:752:VAL:HB	5:B:4649:HOH:O	1.20	1.27
1:B:812:LEU:HB3	5:B:4421:HOH:O	1.06	1.19
1:B:909:THR:HB	5:B:4245:HOH:O	0.89	1.06
1:B:398:ARG:HD2	5:B:4120:HOH:O	1.61	1.01
1:B:323:THR:OG1	1:B:327:ARG:NH1	1.94	1.00
1:A:812:LEU:HD21	1:A:825:CYS:HB2	1.41	0.99
1:B:752:VAL:CB	5:B:4649:HOH:O	1.86	0.97
1:B:939:GLU:HG3	5:B:4101:HOH:O	1.65	0.95
1:B:718:ASP:H	1:B:893:ASN:HD22	1.04	0.93
1:B:1040:GLN:HE21	1:B:1040:GLN:H	1.10	0.93
1:B:752:VAL:CG1	5:B:4649:HOH:O	2.12	0.93
1:A:584:MET:SD	1:B:756:GLU:HB3	2.09	0.93
1:B:812:LEU:HD21	1:B:825:CYS:HB2	1.51	0.93
1:B:271:ASN:OD1	1:B:683:ARG:NH1	2.04	0.90
1:A:1040:GLN:H	1:A:1040:GLN:HE21	1.13	0.89
1:A:872:ASP:OD2	1:A:909:THR:HG23	1.72	0.88
1:A:749:THR:HB	1:A:812:LEU:HD12	1.55	0.88
1:B:646:THR:HG23	5:B:4323:HOH:O	1.74	0.87
1:B:812:LEU:HD11	1:B:825:CYS:HB3	1.57	0.87
1:B:1311:GLN:HE21	1:B:1311:GLN:H	1.18	0.87
1:A:598:ARG:NH1	5:A:3102:HOH:O	2.09	0.85
1:B:793:ARG:HD3	5:B:4636:HOH:O	1.76	0.85
1:B:939:GLU:OE1	5:B:4101:HOH:O	1.96	0.84
1:B:963:THR:HG21	1:B:1181:ASP:OD2	1.78	0.83
1:B:231:GLU:OE2	1:B:680:ARG:NH2	2.11	0.83
1:B:804:ARG:CG	1:B:909:THR:HG21	2.09	0.82
1:A:793:ARG:NE	5:A:3101:HOH:O	1.98	0.82
1:A:766:THR:HG23	1:A:805:SER:OG	1.80	0.81
1:A:963:THR:HG21	1:A:1181:ASP:OD2	1.79	0.80
1:B:718:ASP:H	1:B:893:ASN:ND2	1.78	0.80
1:A:749:THR:HB	1:A:812:LEU:CD1	2.12	0.80
1:B:385:ASP:OD1	1:B:387:THR:HB	1.83	0.78
1:A:1038:MET:H	1:A:1040:GLN:HE22	1.31	0.78
1:B:351:ILE:HD11	1:B:364:PHE:CE2	2.19	0.78
1:B:351:ILE:HD11	1:B:364:PHE:HE2	1.47	0.77
1:B:55:ILE:HD13	1:B:56:SER:N	1.99	0.77
1:B:1315:LEU:O	1:B:1318:THR:O	2.03	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1038:MET:H	1:B:1040:GLN:HE22	1.33	0.76
1:B:939:GLU:CD	5:B:4101:HOH:O	2.23	0.76
1:B:1265:PHE:O	1:B:1268:SER:HB2	1.85	0.76
1:A:1265:PHE:O	1:A:1268:SER:HB2	1.86	0.75
1:B:1040:GLN:N	1:B:1040:GLN:HE21	1.84	0.75
1:B:872:ASP:OD2	1:B:909:THR:HG22	1.86	0.75
1:A:130:GLN:HE21	1:A:132:GLU:H	1.32	0.75
1:A:359:ASP:OD1	1:A:434:THR:HG21	1.86	0.75
1:B:766:THR:HG23	1:B:805:SER:OG	1.86	0.75
1:B:939:GLU:CG	5:B:4101:HOH:O	2.28	0.75
1:B:749:THR:HB	1:B:812:LEU:HD12	1.69	0.75
1:B:812:LEU:HD21	1:B:825:CYS:CB	2.17	0.75
1:A:359:ASP:OD1	1:A:434:THR:CG2	2.36	0.74
1:B:241:MET:HE2	1:B:283:ILE:HG21	1.68	0.74
1:A:385:ASP:OD1	1:A:387:THR:HG22	1.87	0.74
1:A:646:THR:HG23	5:A:3181:HOH:O	1.88	0.73
1:A:909:THR:HG22	1:A:910:ALA:H	1.53	0.72
1:A:1040:GLN:N	1:A:1040:GLN:HE21	1.86	0.72
1:A:812:LEU:HD21	1:A:825:CYS:CB	2.18	0.72
1:A:812:LEU:HD11	1:A:825:CYS:HB3	1.73	0.71
1:B:130:GLN:HE21	1:B:132:GLU:H	1.41	0.69
1:B:749:THR:HB	1:B:812:LEU:CD1	2.23	0.69
1:A:311:LEU:O	1:A:315:ILE:HG23	1.91	0.69
1:A:793:ARG:NH2	5:A:3101:HOH:O	2.27	0.68
1:A:909:THR:HG21	5:A:3433:HOH:O	1.93	0.68
1:B:315:ILE:CD1	5:B:4363:HOH:O	2.42	0.68
1:B:216:LEU:O	1:B:219:LYS:HG3	1.94	0.67
1:B:359:ASP:HA	1:B:434:THR:HG21	1.77	0.67
1:B:804:ARG:HG2	1:B:909:THR:HG21	1.76	0.67
1:B:1320:VAL:O	1:B:1320:VAL:CG1	2.43	0.66
1:B:638:GLU:HG3	5:B:4673:HOH:O	1.96	0.66
1:A:359:ASP:HA	1:A:434:THR:HG21	1.78	0.66
1:B:699:GLN:NE2	1:B:703:ASN:OD1	2.28	0.66
1:B:909:THR:CB	5:B:4245:HOH:O	1.64	0.66
1:A:1048:GLN:HE22	1:A:1187:ASN:HD22	1.44	0.65
1:B:909:THR:CG2	5:B:4245:HOH:O	2.12	0.65
1:B:398:ARG:CD	5:B:4120:HOH:O	2.31	0.65
1:B:315:ILE:HD13	5:B:4363:HOH:O	1.96	0.65
1:B:441:PHE:O	5:B:4103:HOH:O	2.15	0.64
1:B:375:SER:HB2	1:B:378:THR:OG1	1.97	0.64
1:B:680:ARG:NH1	5:B:4102:HOH:O	2.04	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1040:GLN:NE2	1:B:1040:GLN:H	1.90	0.64
1:B:718:ASP:N	1:B:893:ASN:HD22	1.87	0.64
1:A:376:ARG:HG2	1:A:376:ARG:HH11	1.61	0.63
1:B:55:ILE:CD1	1:B:55:ILE:C	2.69	0.61
1:A:943:ARG:HD3	5:A:3118:HOH:O	2.00	0.61
1:A:388:PHE:HA	1:A:396:LEU:HG	1.81	0.61
1:B:306:LEU:O	1:B:310:VAL:HG13	2.01	0.60
1:B:1320:VAL:HG11	5:B:4543:HOH:O	2.00	0.60
1:B:70:VAL:HG22	5:B:4621:HOH:O	2.01	0.60
1:B:478:ASN:OD1	1:B:480:GLU:HG3	2.02	0.60
1:A:606:ARG:HD3	1:A:679:GLN:HA	1.83	0.59
1:A:1040:GLN:H	1:A:1040:GLN:NE2	1.91	0.59
1:A:426:ARG:NH2	5:A:3105:HOH:O	2.31	0.59
1:A:646:THR:CG2	5:A:3181:HOH:O	2.49	0.59
1:B:483:GLN:HA	1:B:483:GLN:HE21	1.68	0.59
1:A:256:LEU:HD22	1:A:278:VAL:HG13	1.84	0.58
1:B:192:PRO:HD2	5:B:4646:HOH:O	2.02	0.58
1:A:1203:LEU:HD11	5:A:3389:HOH:O	2.01	0.58
1:B:1320:VAL:O	1:B:1320:VAL:HG12	2.04	0.58
1:B:388:PHE:HA	1:B:396:LEU:HG	1.84	0.58
1:B:335:TRP:HA	1:B:335:TRP:CE3	2.38	0.58
1:A:1038:MET:H	1:A:1040:GLN:NE2	2.02	0.57
1:A:1315:LEU:HD13	5:A:3486:HOH:O	2.04	0.57
1:A:1259:VAL:O	1:A:1259:VAL:HG22	2.06	0.56
1:B:1250:LYS:HD2	1:B:1250:LYS:N	2.21	0.56
1:B:271:ASN:CG	1:B:683:ARG:HD3	2.26	0.56
1:B:1048:GLN:HE22	1:B:1187:ASN:HD22	1.54	0.55
1:B:1180:MET:HE1	1:B:1263:PRO:HB3	1.88	0.55
1:A:662:CYS:SG	1:A:869:ASN:ND2	2.78	0.55
1:A:371:LEU:CD2	1:A:406:ILE:HG23	2.37	0.54
1:A:744:LEU:HD13	2:A:3001:FES:S2	2.47	0.54
1:A:359:ASP:OD1	1:A:434:THR:HG23	2.08	0.54
1:B:1311:GLN:NE2	1:B:1311:GLN:H	1.98	0.54
1:B:62:GLN:HB2	1:B:64:LYS:HG2	1.90	0.54
1:B:939:GLU:HG2	1:B:977:TYR:CE2	2.43	0.54
1:B:804:ARG:HD3	1:B:909:THR:HG21	1.89	0.53
1:B:1033:HIS:HD2	1:B:1035:GLY:H	1.56	0.53
1:B:232:ARG:CZ	1:B:680:ARG:HD3	2.39	0.53
1:B:227:ARG:HD3	1:B:229:GLU:OE2	2.08	0.53
1:A:670:VAL:HG11	1:A:681:ALA:HB3	1.89	0.53
1:A:874:SER:HB3	1:A:900:ILE:HG21	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:804:ARG:CD	1:B:909:THR:HG21	2.39	0.52
1:A:853:THR:O	1:A:944:LYS:HE3	2.10	0.52
1:B:571:ASP:OD2	1:B:1052:ARG:HD2	2.09	0.52
1:A:296:ILE:CD1	1:A:314:GLU:HG3	2.40	0.52
1:A:900:ILE:N	1:A:900:ILE:HD12	2.24	0.52
1:A:427:GLU:OE2	1:A:1233:GLY:HA3	2.10	0.52
1:A:584:MET:SD	1:B:756:GLU:CB	2.90	0.52
1:B:1316:CYS:CB	5:B:4770:HOH:O	2.04	0.52
1:B:371:LEU:CD2	1:B:406:ILE:HG23	2.40	0.51
1:A:296:ILE:HD11	1:A:314:GLU:HG3	1.92	0.51
1:A:290:VAL:CG2	1:A:297:SER:HB2	2.41	0.51
1:B:371:LEU:HD23	1:B:406:ILE:HG23	1.93	0.51
1:A:870:THR:HB	1:A:907:SER:HB2	1.93	0.51
1:B:806:THR:O	1:B:810:THR:HG23	2.11	0.51
1:A:1048:GLN:NE2	1:A:1187:ASN:HD22	2.07	0.50
1:A:518:PHE:O	1:A:522:VAL:HG23	2.11	0.50
1:A:571:ASP:OD2	1:A:1052:ARG:HD2	2.11	0.50
1:B:290:VAL:HG22	1:B:297:SER:HB2	1.93	0.50
1:A:1180:MET:HE1	1:A:1263:PRO:HB3	1.93	0.50
1:B:55:ILE:HG23	1:B:68:PHE:CE2	2.47	0.50
1:B:359:ASP:OD1	1:B:434:THR:HG21	2.12	0.50
1:B:552:ASP:HB3	1:B:553:PRO:HD2	1.94	0.50
1:B:415:GLU:OE1	1:B:438:ARG:HD2	2.12	0.50
1:A:932:ILE:HD13	1:A:1279:ARG:CZ	2.41	0.50
1:B:70:VAL:CG2	5:B:4621:HOH:O	2.58	0.50
1:A:555:ALA:HB3	1:A:1238:GLU:HG2	1.93	0.49
1:A:718:ASP:H	1:A:893:ASN:HD22	1.60	0.49
1:A:972:ILE:HG23	1:A:1000:ILE:HD13	1.95	0.49
1:A:1021:VAL:HG22	1:A:1031:LEU:CD1	2.43	0.49
1:A:70:VAL:CG2	5:A:3541:HOH:O	2.59	0.49
1:B:670:VAL:HG11	1:B:681:ALA:HB3	1.93	0.49
1:A:496:ALA:O	1:A:499:ALA:N	2.43	0.49
1:A:70:VAL:HG22	5:A:3541:HOH:O	2.12	0.49
1:B:1048:GLN:NE2	1:B:1187:ASN:HD22	2.11	0.49
1:A:923:ALA:HA	1:A:926:TRP:NE1	2.28	0.48
1:B:55:ILE:CD1	1:B:56:SER:N	2.74	0.48
1:B:606:ARG:HD3	1:B:679:GLN:HA	1.95	0.48
1:A:256:LEU:HD22	1:A:278:VAL:CG1	2.44	0.48
1:B:308:GLU:HG3	1:B:333:LEU:HD13	1.94	0.48
1:B:55:ILE:HD13	1:B:55:ILE:C	2.34	0.48
1:B:804:ARG:HD3	1:B:909:THR:CG2	2.44	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:870:THR:HG22	1:B:907:SER:OG	2.14	0.48
1:A:1033:HIS:CD2	1:A:1035:GLY:H	2.31	0.48
1:B:874:SER:HB3	1:B:900:ILE:HG21	1.96	0.48
1:A:256:LEU:HD13	1:A:280:PRO:HG3	1.95	0.48
1:B:948:LYS:HD3	1:B:951:ASP:OD2	2.13	0.48
1:A:1053:ALA:O	1:A:1098:LEU:HD11	2.14	0.47
1:A:539:ASP:OD1	1:A:540:PRO:HD2	2.15	0.47
1:B:1038:MET:H	1:B:1040:GLN:NE2	2.06	0.47
1:B:900:ILE:HD12	1:B:900:ILE:N	2.30	0.47
1:A:232:ARG:NH2	1:A:680:ARG:HD3	2.30	0.47
1:B:963:THR:HG21	1:B:1181:ASP:CG	2.34	0.47
1:A:432:LYS:O	1:A:457:GLY:HA3	2.15	0.47
1:B:351:ILE:N	1:B:351:ILE:HD13	2.29	0.47
1:A:232:ARG:HH21	1:A:680:ARG:HD3	1.79	0.46
1:B:336:PHE:O	1:B:336:PHE:HD2	1.98	0.46
1:B:232:ARG:NH1	1:B:680:ARG:HD3	2.31	0.46
1:A:1317:VAL:HG23	1:A:1318:THR:HG23	1.98	0.46
1:A:337:ALA:HA	1:A:428:GLU:HG3	1.98	0.46
1:B:680:ARG:HG2	1:B:683:ARG:NH2	2.30	0.46
1:A:299:GLY:O	1:A:347:ILE:HD11	2.16	0.46
1:B:939:GLU:CG	1:B:977:TYR:CE2	2.98	0.46
1:B:1311:GLN:N	1:B:1311:GLN:HE21	1.99	0.46
1:B:473:LEU:O	1:B:474:SER:HB2	2.16	0.46
1:A:963:THR:HG22	1:A:1155:TYR:CD2	2.51	0.46
1:B:969:ASP:HA	1:B:972:ILE:HG12	1.98	0.46
1:A:371:LEU:HD23	1:A:406:ILE:HG23	1.97	0.45
1:B:296:ILE:CD1	1:B:314:GLU:HG3	2.47	0.45
1:A:290:VAL:HG23	1:A:297:SER:HB2	1.98	0.45
1:B:1261:GLU:N	1:B:1262:PRO:CD	2.79	0.45
1:A:494:GLN:HA	1:A:508:ARG:NH1	2.32	0.45
1:A:555:ALA:HB3	1:A:1238:GLU:CG	2.45	0.45
1:A:58:TYR:CE2	1:A:219:LYS:HD3	2.52	0.45
1:A:499:ALA:O	1:A:500:PRO:C	2.54	0.45
1:B:808:VAL:HG12	1:B:812:LEU:CD1	2.47	0.45
1:A:1249:ASN:O	1:A:1255:ALA:HA	2.16	0.45
1:B:255:LYS:HE3	1:B:263:ILE:HD11	1.98	0.45
1:B:398:ARG:NE	5:B:4120:HOH:O	2.50	0.45
1:B:1203:LEU:C	1:B:1203:LEU:HD12	2.38	0.44
1:A:1033:HIS:HE1	1:A:1043:HIS:ND1	2.16	0.44
1:A:870:THR:HG21	5:A:3405:HOH:O	2.18	0.44
1:B:680:ARG:HG2	1:B:683:ARG:HH21	1.83	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:752:VAL:HG12	5:B:4649:HOH:O	1.99	0.44
1:A:1180:MET:HE1	1:A:1266:LEU:HD12	2.00	0.44
1:A:655:PHE:CD1	1:A:668:GLY:HA2	2.52	0.44
1:B:266:GLU:HB3	1:B:272:MET:HG3	2.00	0.44
1:B:808:VAL:HG12	1:B:812:LEU:HD12	2.00	0.44
1:A:932:ILE:HD11	5:A:3561:HOH:O	2.18	0.44
1:B:32:ARG:NH2	1:B:676:GLU:OE2	2.48	0.43
1:A:962:PHE:CE2	1:A:965:PRO:HD3	2.53	0.43
1:B:635:LEU:HD21	1:B:818:LYS:HD2	2.00	0.43
1:B:646:THR:HG21	5:B:4603:HOH:O	2.18	0.43
1:B:1276:ASP:HB3	5:B:4225:HOH:O	2.19	0.43
1:B:214:GLU:HG2	1:B:217:ARG:NH2	2.33	0.43
1:B:556:ASN:ND2	5:B:4122:HOH:O	2.50	0.43
1:A:932:ILE:HD13	1:A:1279:ARG:NH2	2.33	0.43
1:A:351:ILE:CD1	1:A:406:ILE:HD12	2.48	0.43
1:B:332:GLN:NE2	5:B:4123:HOH:O	2.51	0.43
1:A:1033:HIS:HD2	1:A:1035:GLY:H	1.66	0.43
1:A:610:SER:OG	1:A:665:HIS:HB3	2.18	0.43
1:B:1102:GLU:HG2	1:B:1103:PRO:HD3	2.00	0.43
1:B:1178:ILE:CG2	1:B:1180:MET:HE2	2.48	0.43
1:B:359:ASP:OD1	1:B:434:THR:CG2	2.66	0.43
1:B:955:PHE:HA	1:B:1145:ASN:OD1	2.19	0.43
1:B:315:ILE:HD11	5:B:4795:HOH:O	2.19	0.42
1:A:345:ALA:HB1	4:A:3004:FAD:H4'	2.00	0.42
1:B:1315:LEU:C	1:B:1318:THR:O	2.57	0.42
1:A:1311:GLN:HG2	5:A:3534:HOH:O	2.19	0.42
1:A:963:THR:HG21	1:A:1181:ASP:CG	2.38	0.42
1:B:440:LEU:HB3	1:B:450:GLU:HB2	2.02	0.42
1:A:613:ALA:O	1:A:904:ASN:HB3	2.19	0.42
1:A:263:ILE:HD11	4:A:3004:FAD:H3B	2.01	0.42
1:A:302:CYS:HB2	1:A:347:ILE:HD11	2.02	0.42
1:A:371:LEU:HD12	1:A:388:PHE:CE1	2.54	0.42
1:A:621:ASP:OD1	1:A:623:SER:OG	2.23	0.42
1:A:424:SER:HB3	5:A:3527:HOH:O	2.20	0.41
1:B:335:TRP:HA	1:B:335:TRP:HE3	1.83	0.41
1:A:765:SER:OG	1:A:794:MET:HG2	2.19	0.41
1:B:744:LEU:HD13	2:B:4001:FES:S2	2.60	0.41
1:A:1178:ILE:CG2	1:A:1180:MET:HE2	2.51	0.41
1:A:231:GLU:OE2	1:A:680:ARG:NH2	2.54	0.41
1:A:361:ASN:N	1:A:362:PRO:CD	2.84	0.41
1:B:472:GLN:NE2	1:B:475:LYS:HD2	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:806:THR:O	1:A:810:THR:HG23	2.21	0.41
1:B:1021:VAL:HG22	1:B:1031:LEU:CD1	2.51	0.41
1:A:555:ALA:O	1:A:1238:GLU:HA	2.21	0.41
1:A:679:GLN:HE21	1:A:683:ARG:NH1	2.19	0.41
1:A:963:THR:HG22	1:A:1155:TYR:HB2	2.01	0.41
1:A:1180:MET:CE	1:A:1263:PRO:HB3	2.51	0.41
1:A:457:GLY:O	1:A:507:ARG:NH1	2.49	0.40
1:A:870:THR:HG22	1:A:907:SER:OG	2.21	0.40
1:B:1107:LYS:HB2	1:B:1107:LYS:HE2	1.88	0.40
1:B:1250:LYS:HD2	1:B:1251:ARG:H	1.85	0.40
1:B:655:PHE:HE2	1:B:814:LEU:HD23	1.87	0.40
1:B:844:ALA:HB2	1:B:922:ILE:HD13	2.03	0.40
1:B:911:PHE:O	1:B:912:ARG:C	2.59	0.40
1:A:153:ARG:HD2	1:A:153:ARG:C	2.41	0.40
1:B:55:ILE:HD12	1:B:55:ILE:C	2.41	0.40
1:B:699:GLN:HB2	5:B:4814:HOH:O	2.22	0.40
1:A:1152:TYR:HB3	1:A:1251:ARG:HD2	2.03	0.40
1:A:870:THR:CG2	5:A:3405:HOH:O	2.70	0.40
1:B:1250:LYS:HE2	5:B:4598:HOH:O	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	1291/1331 (97%)	1235 (96%)	49 (4%)	7 (0%)	29	28
1	B	1280/1331 (96%)	1242 (97%)	34 (3%)	4 (0%)	41	43
All	All	2571/2662 (97%)	2477 (96%)	83 (3%)	11 (0%)	34	35

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1008	SER
1	B	4	ASP
1	B	1008	SER
1	A	497	PRO
1	A	912	ARG
1	A	1287	ASP
1	B	912	ARG
1	A	337	ALA
1	A	4	ASP
1	A	797	GLY
1	B	797	GLY

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	1096/1124 (98%)	1047 (96%)	49 (4%)	27	32
1	B	1086/1124 (97%)	1026 (94%)	60 (6%)	21	23
All	All	2182/2248 (97%)	2073 (95%)	109 (5%)	24	27

All (109) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	61	LEU
1	A	83	VAL
1	A	193	SER
1	A	219	LYS
1	A	224	LYS
1	A	247	LEU
1	A	255	LYS
1	A	256	LEU
1	A	306	LEU
1	A	310	VAL
1	A	315	ILE
1	A	321	GLN
1	A	336	PHE

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Mol	Chain	Res	Type
1	A	347	ILE
1	A	383	ARG
1	A	398	ARG
1	A	406	ILE
1	A	434	THR
1	A	480	GLU
1	A	482	LEU
1	A	494	GLN
1	A	497	PRO
1	A	550	GLN
1	A	565	LYS
1	A	610	SER
1	A	623	SER
1	A	646	THR
1	A	683	ARG
1	A	686	LYS
1	A	743	TYR
1	A	744	LEU
1	A	766	THR
1	A	807	VAL
1	A	870	THR
1	A	899	ARG
1	A	909	THR
1	A	911	PHE
1	A	939	GLU
1	A	948	LYS
1	A	963	THR
1	A	972	ILE
1	A	981	LYS
1	A	1040	GLN
1	A	1052	ARG
1	A	1085	LEU
1	A	1239	PHE
1	A	1268	SER
1	A	1318	THR
1	A	1325	LYS
1	B	4	ASP
1	B	55	ILE
1	B	61	LEU
1	B	83	VAL
1	B	132	GLU
1	B	143	GLN

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Mol	Chain	Res	Type
1	B	199	ASP
1	B	219	LYS
1	B	224	LYS
1	B	247	LEU
1	B	256	LEU
1	B	280	PRO
1	B	306	LEU
1	B	315	ILE
1	B	317	LYS
1	B	318	LEU
1	B	321	GLN
1	B	336	PHE
1	B	347	ILE
1	B	351	ILE
1	B	375	SER
1	B	381	THR
1	B	383	ARG
1	B	387	THR
1	B	406	ILE
1	B	434	THR
1	B	482	LEU
1	B	483	GLN
1	B	531	LEU
1	B	565	LYS
1	B	566	ASP
1	B	568	SER
1	B	622	THR
1	B	646	THR
1	B	720	LYS
1	B	731	SER
1	B	743	TYR
1	B	744	LEU
1	B	756	GLU
1	B	766	THR
1	B	807	VAL
1	B	856	VAL
1	B	870	THR
1	B	911	PHE
1	B	932	ILE
1	B	939	GLU
1	B	948	LYS
1	B	963	THR

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Mol	Chain	Res	Type
1	B	980	ARG
1	B	981	LYS
1	B	1004	LYS
1	B	1040	GLN
1	B	1052	ARG
1	B	1085	LEU
1	B	1203	LEU
1	B	1239	PHE
1	B	1250	LYS
1	B	1268	SER
1	B	1291	GLN
1	B	1311	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	130	GLN
1	A	145	ASN
1	A	472	GLN
1	A	585	GLN
1	A	642	ASN
1	A	869	ASN
1	A	893	ASN
1	A	1033	HIS
1	A	1040	GLN
1	A	1048	GLN
1	A	1173	ASN
1	A	1288	ASN
1	A	1294	GLN
1	B	130	GLN
1	B	143	GLN
1	B	145	ASN
1	B	291	HIS
1	B	332	GLN
1	B	449	GLN
1	B	472	GLN
1	B	483	GLN
1	B	550	GLN
1	B	556	ASN
1	B	585	GLN
1	B	893	ASN
1	B	1033	HIS

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Mol	Chain	Res	Type
1	B	1040	GLN
1	B	1048	GLN
1	B	1088	GLN
1	B	1173	ASN
1	B	1285	HIS
1	B	1311	GLN

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 carbohydrates in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 2 are monoatomic - leaving 6 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	FAD	B	4004	-	51,58,58	1.98	12 (23%)	60,89,89	2.23	14 (23%)
2	FES	A	3001	1	0,4,4	0.00	-	-		
4	FAD	A	3004	-	51,58,58	1.89	9 (17%)	60,89,89	2.57	16 (26%)
2	FES	B	4002	1	0,4,4	0.00	-	-		
2	FES	B	4001	1	0,4,4	0.00	-	-		
2	FES	A	3002	1	0,4,4	0.00	-	-		

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	FAD	B	4004	-	-	0/30/50/50	0/6/6/6
2	FES	A	3001	1	-	-	0/1/1/1
4	FAD	A	3004	-	-	0/30/50/50	0/6/6/6
2	FES	B	4002	1	-	-	0/1/1/1
2	FES	B	4001	1	-	-	0/1/1/1
2	FES	A	3002	1	-	-	0/1/1/1

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	3004	FAD	C4X-C10	8.72	1.47	1.38
4	B	4004	FAD	C4X-C10	8.31	1.47	1.38
4	B	4004	FAD	C9A-N10	4.41	1.44	1.38
4	B	4004	FAD	C4-C4X	4.13	1.48	1.41
4	B	4004	FAD	C2'-C3'	-3.53	1.46	1.53
4	A	3004	FAD	C6-C5X	-3.21	1.36	1.41
4	B	4004	FAD	C9A-C5X	3.00	1.48	1.42
4	A	3004	FAD	C9A-N10	2.98	1.42	1.38
4	A	3004	FAD	C4-C4X	2.92	1.46	1.41
4	B	4004	FAD	C8A-N7A	2.90	1.39	1.34
4	A	3004	FAD	C2-N3	-2.87	1.32	1.38
4	B	4004	FAD	O4B-C1B	2.80	1.45	1.41
4	A	3004	FAD	C9A-C5X	2.70	1.48	1.42
4	A	3004	FAD	C2'-C3'	-2.53	1.48	1.53
4	A	3004	FAD	C2B-C1B	-2.53	1.49	1.53
4	B	4004	FAD	C1'-N10	-2.47	1.45	1.48
4	A	3004	FAD	C8-C7	2.46	1.47	1.40
4	B	4004	FAD	O2'-C2'	2.38	1.48	1.43
4	B	4004	FAD	C6-C5X	-2.11	1.38	1.41
4	B	4004	FAD	C5X-N5	-2.07	1.31	1.35
4	B	4004	FAD	C8-C7	2.01	1.45	1.40

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	3004	FAD	C4-N3-C2	10.98	124.41	115.14
4	B	4004	FAD	C4-N3-C2	8.88	122.64	115.14
4	A	3004	FAD	C4-C4X-C10	-7.63	114.90	119.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	4004	FAD	C4X-N5-C5X	5.95	122.72	116.77
4	A	3004	FAD	C1'-N10-C9A	5.52	122.64	118.29
4	A	3004	FAD	O3'-C3'-C2'	-5.38	95.82	108.81
4	B	4004	FAD	C4-C4X-C10	-4.65	116.87	119.95
4	A	3004	FAD	C4X-C4-N3	-4.40	117.42	123.43
4	B	4004	FAD	C4X-C4-N3	-4.38	117.45	123.43
4	B	4004	FAD	O2'-C2'-C3'	-4.10	99.13	109.10
4	A	3004	FAD	C4-C4X-N5	3.98	123.15	118.60
4	B	4004	FAD	O3'-C3'-C2'	-3.86	99.50	108.81
4	B	4004	FAD	C1'-N10-C9A	3.78	121.27	118.29
4	A	3004	FAD	C4A-C5A-N7A	-3.64	105.61	109.40
4	A	3004	FAD	O4'-C4'-C3'	3.51	117.64	109.10
4	B	4004	FAD	O2'-C2'-C1'	3.04	116.91	109.59
4	B	4004	FAD	C5'-C4'-C3'	-3.04	106.34	112.20
4	A	3004	FAD	C4X-N5-C5X	3.00	119.77	116.77
4	B	4004	FAD	C4X-C10-N10	-2.71	117.52	120.30
4	A	3004	FAD	C2B-C3B-C4B	2.67	107.82	102.64
4	A	3004	FAD	C5'-C4'-C3'	-2.66	107.06	112.20
4	B	4004	FAD	C9A-C5X-N5	-2.59	118.31	122.36
4	A	3004	FAD	O2'-C2'-C3'	-2.46	103.12	109.10
4	A	3004	FAD	N3A-C2A-N1A	-2.43	124.87	128.68
4	B	4004	FAD	C1'-C2'-C3'	-2.22	103.57	109.79
4	A	3004	FAD	C9A-N10-C10	-2.20	119.02	121.91
4	B	4004	FAD	C4-C4X-N5	2.19	121.10	118.60
4	B	4004	FAD	C5X-C9A-N10	2.19	119.30	117.72
4	A	3004	FAD	C3B-C2B-C1B	-2.12	97.79	100.98
4	A	3004	FAD	O2P-P-O1P	2.12	122.71	112.24

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

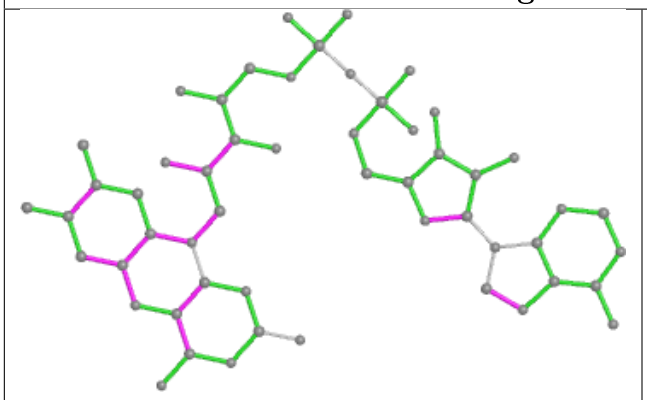
3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	3001	FES	1	0
4	A	3004	FAD	2	0
2	B	4001	FES	1	0

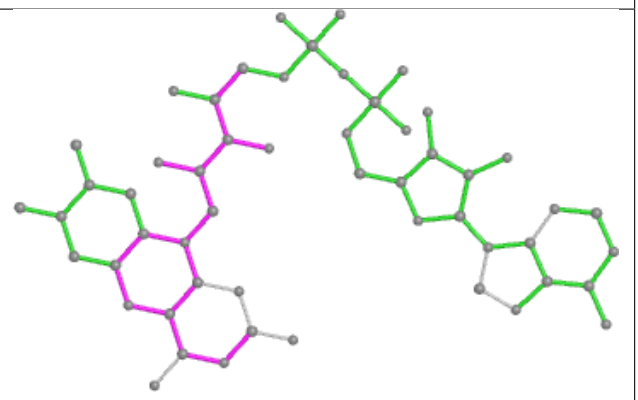
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

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.

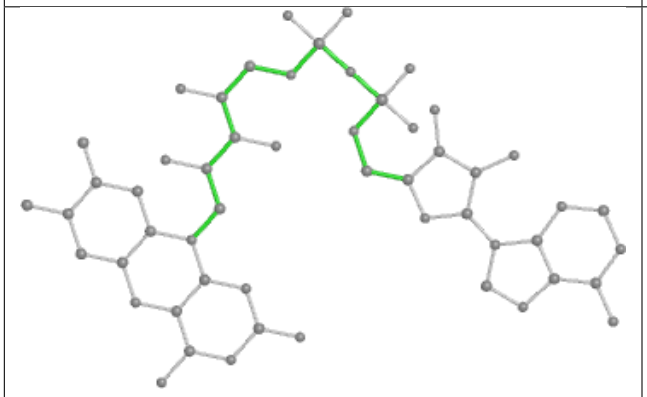
Ligand FAD B 4004



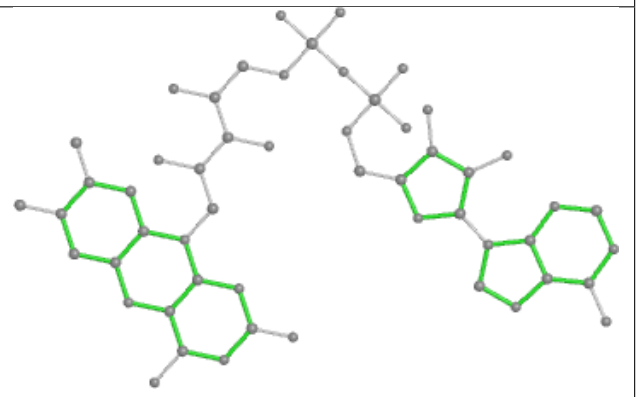
Bond lengths



Bond angles

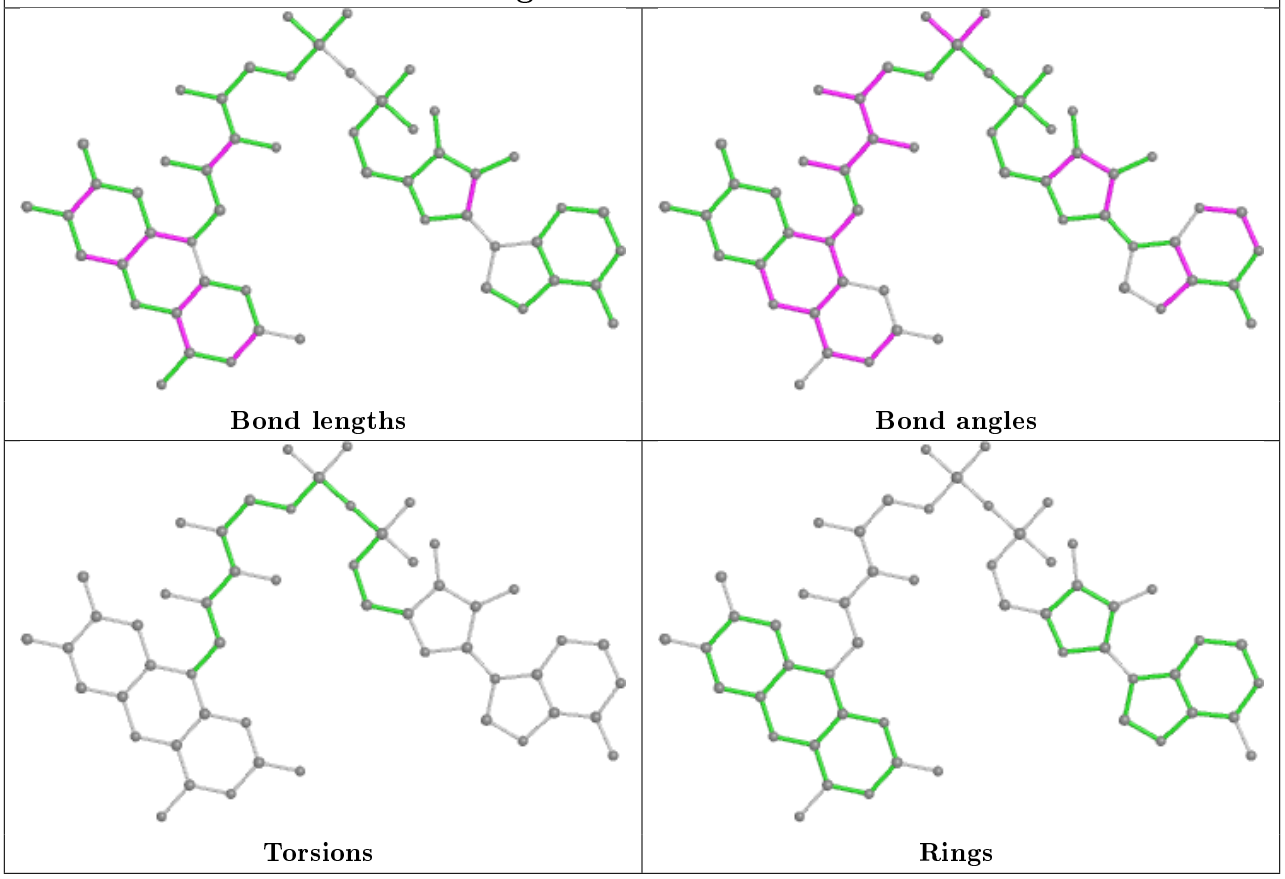


Torsions



Rings

Ligand FAD A 3004



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	1297/1331 (97%)	0.02	38 (2%)	51	52	13, 25, 53, 108	0
1	B	1286/1331 (96%)	-0.20	18 (1%)	75	75	11, 20, 43, 78	0
All	All	2583/2662 (97%)	-0.09	56 (2%)	62	62	11, 23, 50, 108	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1324	CYS	9.1
1	A	1318	THR	8.5
1	A	1325	LYS	5.1
1	B	1111	GLY	4.2
1	B	1106	LYS	4.1
1	A	1111	GLY	4.0
1	A	3	ALA	3.6
1	A	1287	ASP	3.4
1	B	220	ASP	3.4
1	B	1110	THR	3.4
1	A	1110	THR	3.3
1	B	61	LEU	3.3
1	A	496	ALA	3.3
1	A	444	GLY	3.2
1	A	1288	ASN	3.2
1	A	1317	VAL	3.2
1	A	430	ILE	3.2
1	A	396	LEU	3.1
1	B	550	GLN	3.0
1	A	1326	SER	2.9
1	A	1328	SER	2.9
1	A	553	PRO	2.9
1	A	498	ASP	2.8
1	A	473	LEU	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	221	THR	2.8
1	B	218	LEU	2.8
1	B	1320	VAL	2.8
1	A	398	ARG	2.8
1	A	531	LEU	2.7
1	A	536	GLY	2.7
1	B	222	PRO	2.7
1	A	220	ASP	2.6
1	A	566	ASP	2.6
1	A	474	SER	2.5
1	A	377	GLY	2.5
1	A	290	VAL	2.5
1	A	1327	TRP	2.5
1	A	387	THR	2.4
1	A	61	LEU	2.4
1	B	553	PRO	2.4
1	A	221	THR	2.3
1	A	1330	ARG	2.2
1	A	529	ALA	2.2
1	B	548	LEU	2.2
1	B	1318	THR	2.2
1	B	555	ALA	2.2
1	A	693	PRO	2.2
1	A	552	ASP	2.2
1	A	1331	ILE	2.2
1	A	1329	VAL	2.2
1	B	164	LYS	2.1
1	B	566	ASP	2.1
1	B	552	ASP	2.1
1	A	222	PRO	2.0
1	A	535	CYS	2.0
1	B	1264	LEU	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 carbohydrates in this entry.

6.4 Ligands

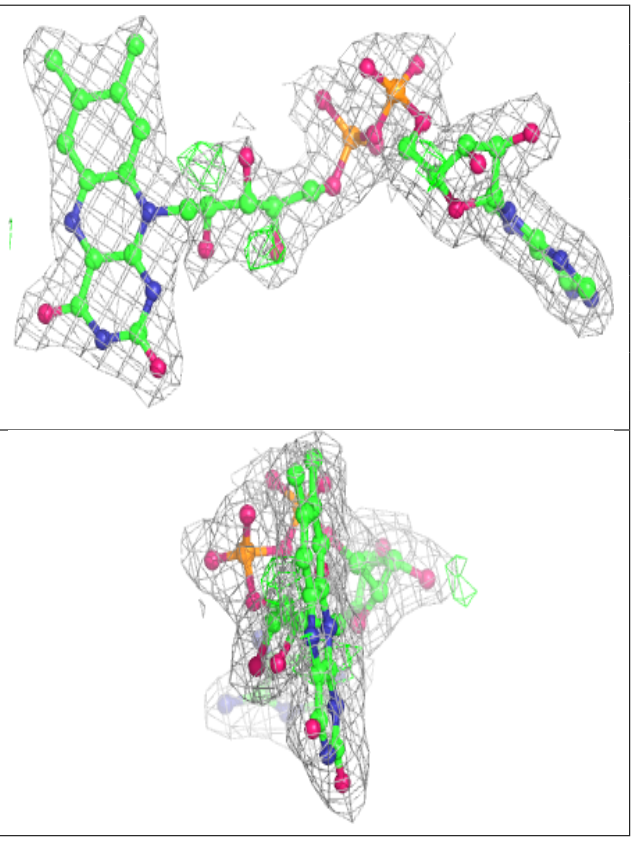
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
4	FAD	A	3004	53/53	0.96	0.10	19,26,34,41	0
4	FAD	B	4004	53/53	0.97	0.10	13,16,20,27	0
2	FES	A	3001	4/4	0.99	0.06	19,20,21,22	0
2	FES	B	4002	4/4	0.99	0.07	14,14,14,15	0
3	CA	A	3003	1/1	0.99	0.07	22,22,22,22	0
2	FES	B	4001	4/4	0.99	0.05	17,18,19,21	0
3	CA	B	4003	1/1	1.00	0.07	19,19,19,19	0
2	FES	A	3002	4/4	1.00	0.07	15,17,18,18	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.

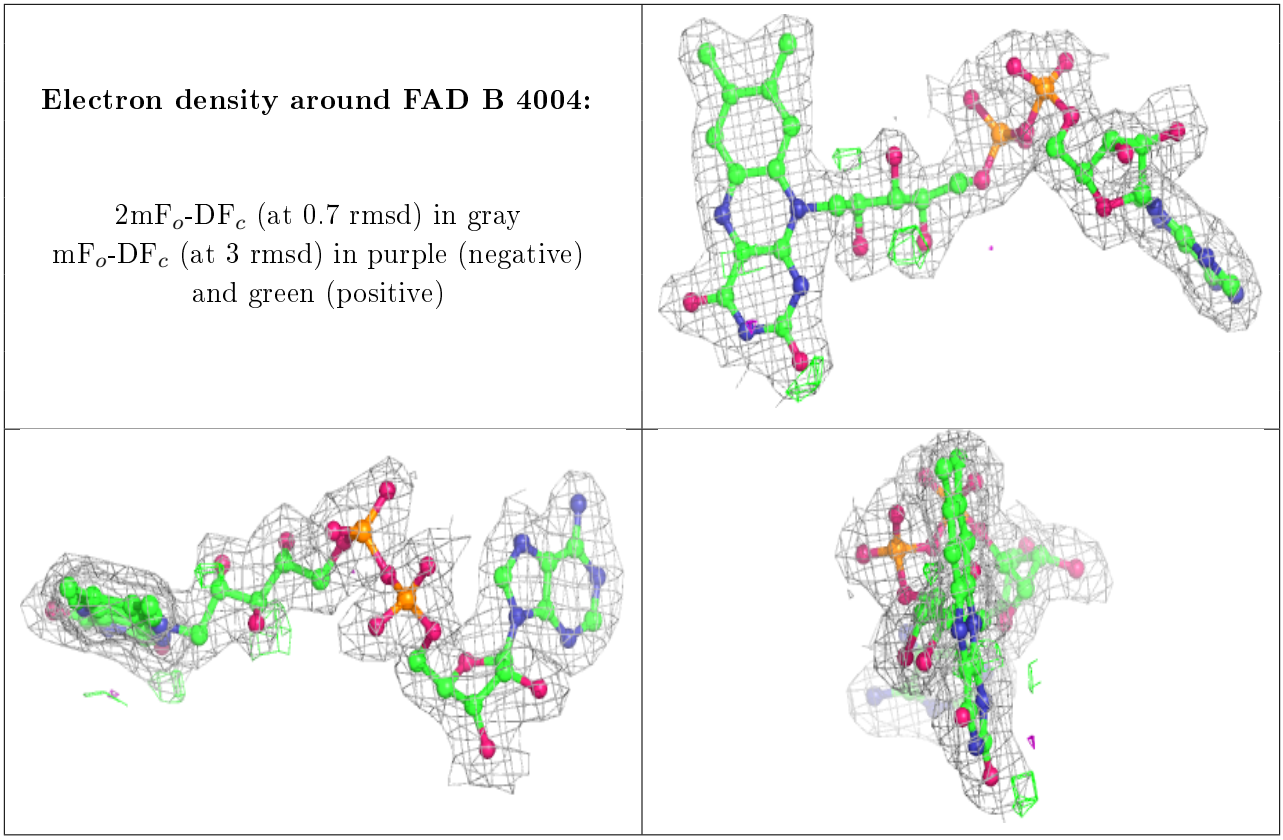
Electron density around FAD A 3004:

$2mF_o$-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 4004:

$2mF_o$-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

There are no such residues in this entry.