Full wwPDB X-ray Structure Validation Report ⓘ

Nov 14, 2023 – 09:13 PM JST

PDB ID	:	6AC4
Title	:	Rat Xanthine oxidoreductase, D428N variant
Authors	:	Okamoto, K.; Kawaguchi, Y.
Deposited on	:	2018-07-25
Resolution	:	2.19 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references ⓘ) were used in the production of this report:

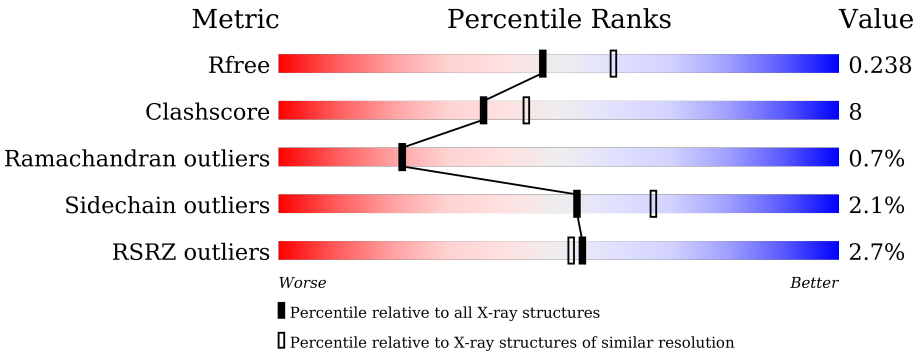
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.19 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	1331	2% 82% 13%
1	B	1331	3% 85% 11%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 21692 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.

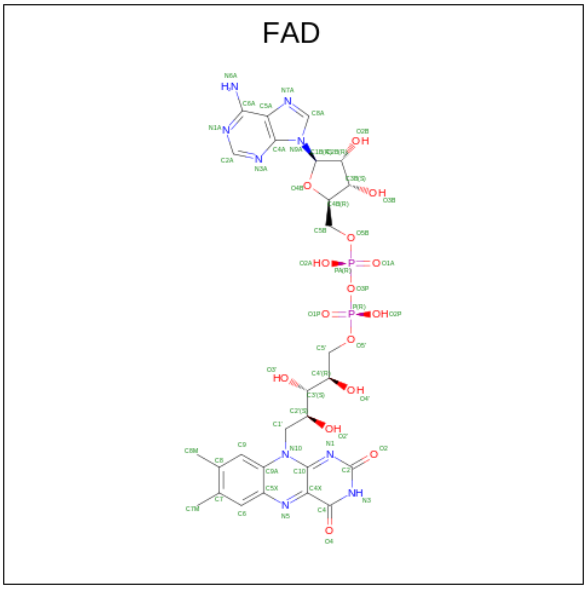
- Molecule 1 is a protein called Xanthine dehydrogenase/oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	1290	Total	C	N	O	S	0	0	0
			9962	6313	1715	1870	64			
1	B	1299	Total	C	N	O	S	0	0	0
			10040	6361	1730	1884	65			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	428	ASN	ASP	engineered mutation	UNP P22985
B	428	ASN	ASP	engineered mutation	UNP P22985

- 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		

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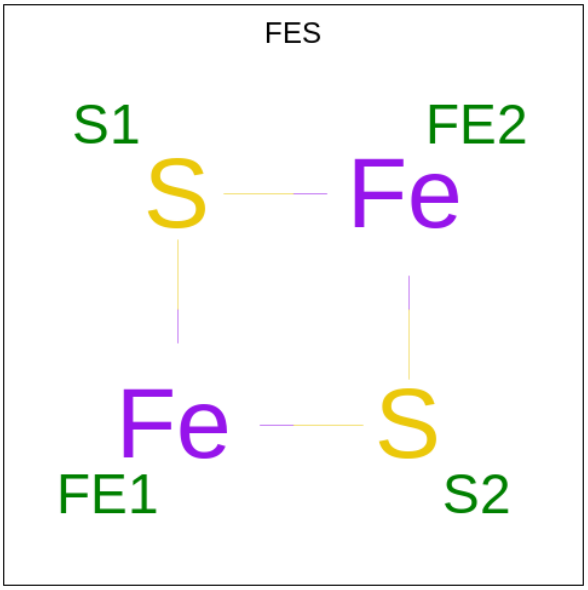
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).



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

- Molecule 4 is water.

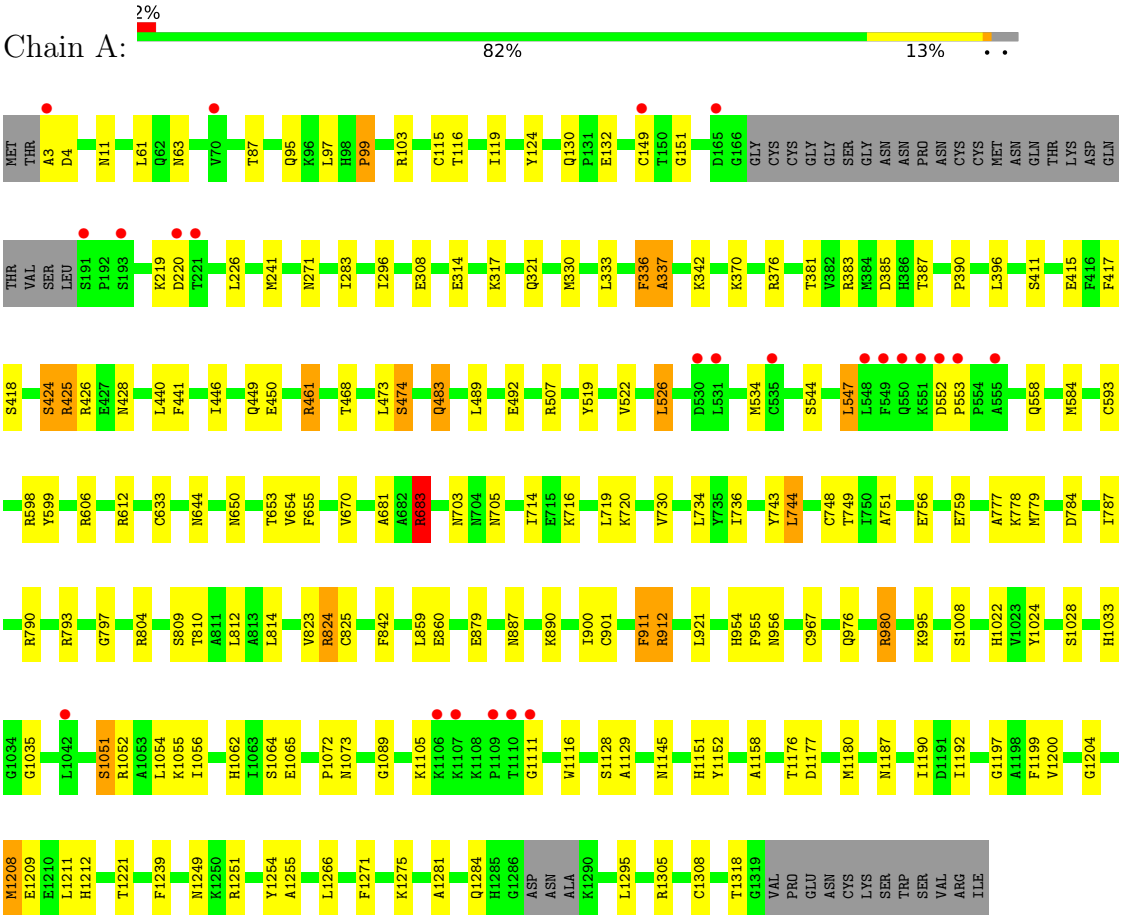
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	893	Total	O	0	0
			893	893		
4	B	675	Total	O	0	0
			675	675		

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.

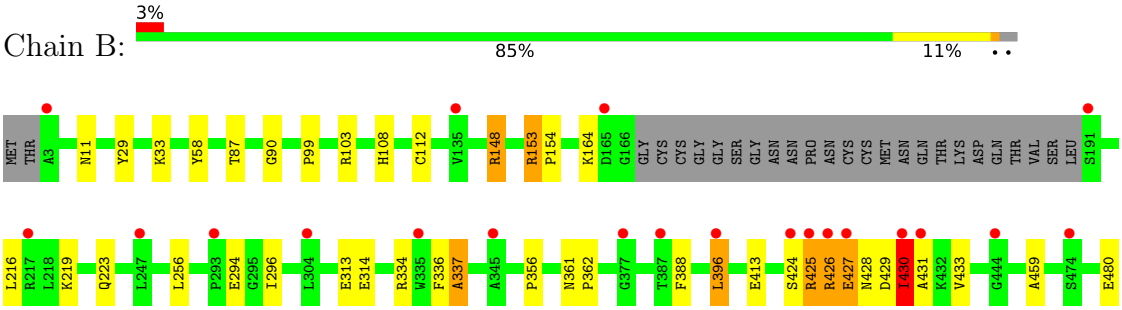
• Molecule 1: Xanthine dehydrogenase/oxidase

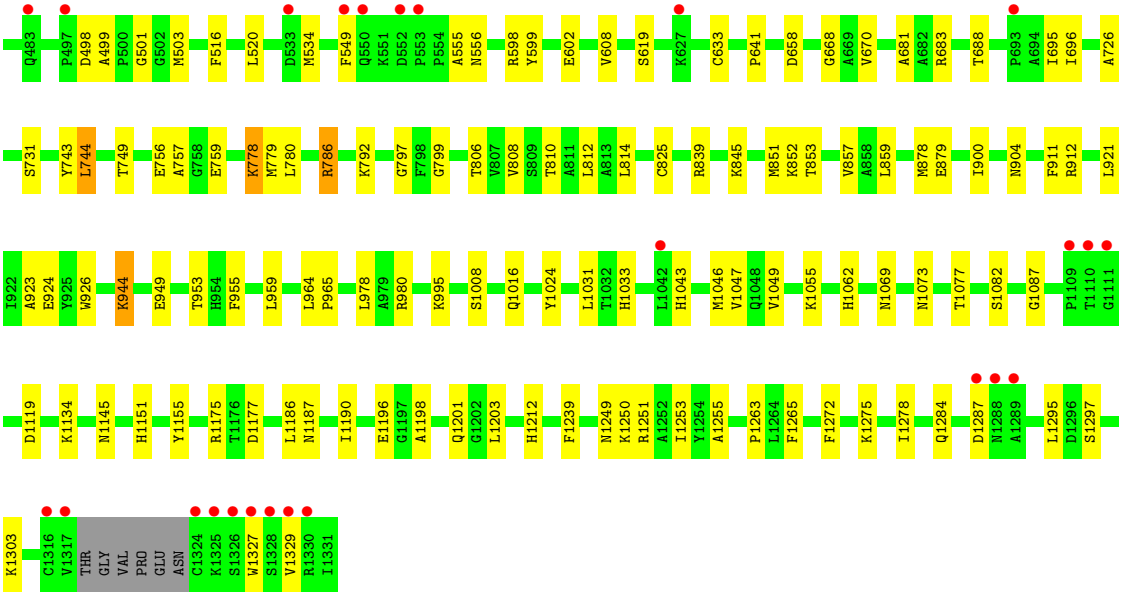
Chain A:



• Molecule 1: Xanthine dehydrogenase/oxidase

Chain B:




Q483 P497 D498 A499 P500 G501 G502 M503 F516 L520 D533 M534 F549 Q550 K551 D552 P553 P554 A555 N556 R598 Y599 E602 V608 S619 K627 C633 P641 D658 G668 A669 V670 A681 A682 R683 T688 P693 A694 I695 I696 A726
S731 Y743 L744 T749 E756 A757 G758 E759 K778 M779 L780 R786 K792 G797 F798 G799 T806 V807 V808 S809 T810 A811 L812 A813 L814 C825 R839 K845 M851 K852 T853 V857 A858 L859 M878 E879 I900 N904 F911 R912 L921
I922 A923 E924 Y925 W926 K944 E949 T953 H954 F955 L959 L964 P965 L978 A979 R980 K995 S1008 Q1016 Y1024 L1031 T1032 H1033 L1042 H1043 M1046 V1047 Q1048 V1049 K1055 H1062 N1069 N1073 T1077 S1082 G1087 P1109 T1110 G1111
D1119 K1134 N1145 H1151 Y1155 R1175 T1176 D1177 L1186 N1187 I1190 E1196 G1197 A1198 Q1201 G1202 L1203 H1212 F1239 N1249 K1250 R1251 A1252 I1253 Y1254 A1255 P1263 L1264 F1265 F1272 K1275 I1278 Q1284 D1287 N1288 A1289 L1295 D1296 S1297
K1303 C1316 V1317 THR GLY VAL PRO GLU ASN C1324 K1325 S1326 W1327 S1328 V1329 R1330 I1331

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	98.30Å 138.65Å 221.87Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.63 – 2.19 39.63 – 2.19	Depositor EDS
% Data completeness (in resolution range)	91.7 (39.63-2.19) 91.7 (39.63-2.19)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.40 (at 2.20Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, R_{free}	0.175 , 0.235 0.182 , 0.238	Depositor DCC
R_{free} test set	7313 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å^2)	30.3	Xtriage
Anisotropy	0.049	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 46.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	21692	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 2.71% 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, FES

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	0.56	0/10171	0.69	0/13762
1	B	0.52	0/10251	0.67	0/13869
All	All	0.54	0/20422	0.68	0/27631

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	11
1	B	0	5
All	All	0	16

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (16) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1305	ARG	Sidechain
1	A	3	ALA	Peptide
1	A	383	ARG	Sidechain
1	A	461	ARG	Sidechain
1	A	507	ARG	Sidechain
1	A	606	ARG	Sidechain
1	A	612	ARG	Sidechain
1	A	683	ARG	Sidechain
1	A	790	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	A	804	ARG	Sidechain
1	A	980	ARG	Sidechain
1	B	148	ARG	Sidechain
1	B	153	ARG	Sidechain
1	B	430	ILE	Peptide
1	B	683	ARG	Sidechain
1	B	786	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	9962	0	9970	183	0
1	B	10040	0	10046	146	0
2	A	53	0	31	2	0
2	B	53	0	31	2	0
3	A	8	0	0	1	0
3	B	8	0	0	1	0
4	A	893	0	0	99	1
4	B	675	0	0	68	1
All	All	21692	0	20078	319	1

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 8.

All (319) 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:953:THR:OG1	4:B:3101:HOH:O	1.58	1.20
1:A:271:ASN:HB3	1:A:683:ARG:HH21	1.02	1.18
1:A:584:MET:SD	4:B:3577:HOH:O	2.03	1.16
1:A:1089:GLY:HA3	4:A:1944:HOH:O	0.99	1.15
1:A:584:MET:CE	4:B:3577:HOH:O	1.96	1.13
1:A:598:ARG:NH1	4:A:1501:HOH:O	1.79	1.11
1:B:812:LEU:HB3	4:B:3207:HOH:O	1.47	1.11
1:B:921:LEU:O	4:B:3102:HOH:O	1.68	1.10

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:967:CYS:SG	4:A:1653:HOH:O	2.07	1.10
1:B:1155:TYR:OH	4:B:3103:HOH:O	1.70	1.09
1:A:425:ARG:HG3	1:A:425:ARG:HH11	1.06	1.08
1:A:271:ASN:HB3	1:A:683:ARG:NH2	1.72	1.02
1:A:593:CYS:SG	4:A:2165:HOH:O	2.19	0.98
1:A:415:GLU:HB3	4:A:1740:HOH:O	1.66	0.96
1:A:411:SER:HB2	4:A:1740:HOH:O	1.66	0.95
1:B:749:THR:HB	1:B:812:LEU:HD22	1.50	0.94
1:A:1211:LEU:HA	1:A:1221:THR:HG21	1.52	0.91
1:A:812:LEU:HD21	1:A:823:VAL:O	1.71	0.91
1:A:11:ASN:HD21	1:A:87:THR:H	1.19	0.90
1:A:901:CYS:SG	4:A:1601:HOH:O	2.31	0.89
1:A:418:SER:O	4:A:1502:HOH:O	1.90	0.88
1:A:271:ASN:CB	1:A:683:ARG:HH21	1.87	0.88
1:A:1200:VAL:HG13	4:A:1715:HOH:O	1.75	0.86
1:B:1275:LYS:HA	4:B:3637:HOH:O	1.75	0.86
1:B:1253:ILE:HG12	4:B:3256:HOH:O	1.75	0.86
1:A:714:ILE:HG21	4:A:1604:HOH:O	1.78	0.83
1:A:411:SER:CB	4:A:1740:HOH:O	2.23	0.82
1:A:1271:PHE:O	4:A:1503:HOH:O	1.99	0.81
1:A:425:ARG:HH11	1:A:425:ARG:CG	1.93	0.79
1:B:995:LYS:NZ	1:B:1284:GLN:HE21	1.81	0.79
1:A:426:ARG:CZ	1:A:1212:HIS:HB2	2.13	0.79
1:A:1028:SER:O	4:A:1504:HOH:O	2.01	0.78
1:A:425:ARG:HG3	1:A:425:ARG:NH1	1.86	0.78
1:B:1049:VAL:HG11	4:B:3256:HOH:O	1.83	0.78
1:B:1031:LEU:HD23	4:B:3115:HOH:O	1.82	0.78
1:A:784:ASP:HA	4:A:1803:HOH:O	1.82	0.78
1:B:668:GLY:N	4:B:3105:HOH:O	2.16	0.77
1:A:1221:THR:HB	4:A:1520:HOH:O	1.85	0.77
1:A:449:GLN:HG3	4:A:2266:HOH:O	1.84	0.77
1:B:812:LEU:CB	4:B:3207:HOH:O	2.14	0.76
1:B:633:CYS:SG	4:B:3678:HOH:O	2.42	0.76
1:A:633:CYS:SG	4:A:2270:HOH:O	2.44	0.75
1:A:115:CYS:SG	4:A:2107:HOH:O	2.45	0.74
1:A:1281:ALA:HB3	4:A:1599:HOH:O	1.88	0.74
1:B:995:LYS:HZ1	1:B:1284:GLN:HE21	1.35	0.74
1:A:749:THR:HG22	1:A:812:LEU:HD22	1.70	0.74
1:A:734:LEU:CD2	4:A:1588:HOH:O	2.37	0.73
1:A:954:HIS:CD2	4:A:1604:HOH:O	2.42	0.73
1:B:11:ASN:HD21	1:B:87:THR:H	1.35	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:241:MET:HE2	1:A:283:ILE:HG21	1.71	0.71
1:A:1024:TYR:O	4:A:1504:HOH:O	2.07	0.71
1:A:719:LEU:HA	4:A:1773:HOH:O	1.90	0.71
1:B:534:MET:HE1	4:B:3554:HOH:O	1.91	0.70
1:A:130:GLN:HE21	1:A:132:GLU:H	1.40	0.70
1:B:959:LEU:HD22	4:B:3103:HOH:O	1.92	0.69
1:B:726:ALA:HA	1:B:851:MET:CE	2.23	0.69
1:A:526:LEU:HD21	4:A:2068:HOH:O	1.92	0.69
1:A:593:CYS:CB	4:A:2165:HOH:O	2.38	0.68
1:B:1082:SER:OG	4:B:3104:HOH:O	2.12	0.68
1:A:1151:HIS:CG	4:A:1506:HOH:O	2.47	0.68
1:A:151:GLY:O	4:A:1505:HOH:O	2.12	0.67
1:B:608:VAL:HB	4:B:3105:HOH:O	1.93	0.67
1:A:1251:ARG:HD3	4:A:1506:HOH:O	1.92	0.67
1:A:1249:ASN:O	1:A:1255:ALA:HA	1.95	0.67
1:A:759:GLU:OE2	1:B:1062:HIS:HE1	1.79	0.66
1:A:1024:TYR:HA	1:B:1073:ASN:HD21	1.60	0.66
1:A:1151:HIS:O	4:A:1506:HOH:O	2.13	0.66
1:B:1049:VAL:HG21	4:B:3256:HOH:O	1.93	0.66
1:B:598:ARG:CZ	4:B:3133:HOH:O	2.43	0.66
1:B:148:ARG:HG3	4:B:3106:HOH:O	1.95	0.66
1:B:749:THR:HB	1:B:812:LEU:CD2	2.23	0.66
2:A:1401:FAD:H3'	4:A:2195:HOH:O	1.96	0.66
1:A:1128:SER:OG	4:A:1507:HOH:O	2.13	0.65
1:A:330:MET:SD	4:A:2093:HOH:O	2.54	0.65
1:A:779:MET:HG3	4:A:1906:HOH:O	1.97	0.65
1:B:924:GLU:HG2	4:B:3111:HOH:O	1.96	0.64
1:A:860:GLU:O	4:A:1508:HOH:O	2.15	0.64
1:B:1297:SER:C	4:B:3127:HOH:O	2.36	0.64
1:A:730:VAL:HG21	4:A:1511:HOH:O	1.97	0.64
1:A:1073:ASN:HD21	1:B:1024:TYR:HA	1.63	0.63
1:B:1278:ILE:HD12	4:B:3637:HOH:O	1.97	0.63
1:A:1204:GLY:O	1:A:1208:MET:O	2.16	0.63
1:A:1051:SER:O	4:A:1509:HOH:O	2.15	0.63
1:A:703:ASN:HB2	4:A:2065:HOH:O	1.98	0.63
1:A:995:LYS:NZ	1:A:1284:GLN:HE21	1.96	0.63
1:B:812:LEU:CG	4:B:3207:HOH:O	2.43	0.62
1:A:890:LYS:NZ	4:A:1514:HOH:O	2.33	0.62
1:A:473:LEU:O	1:A:474:SER:HB2	1.98	0.62
1:B:602:GLU:HG2	4:B:3133:HOH:O	2.00	0.62
1:B:812:LEU:HD21	1:B:825:CYS:HB3	1.82	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1046:MET:C	4:B:3115:HOH:O	2.37	0.62
1:B:1087:GLY:CA	4:B:3256:HOH:O	2.49	0.61
1:B:1134:LYS:HB3	4:B:3110:HOH:O	2.01	0.61
1:A:995:LYS:HZ1	1:A:1284:GLN:HE21	1.48	0.61
1:A:734:LEU:HD21	4:A:1588:HOH:O	1.98	0.60
1:A:744:LEU:HD13	3:A:1402:FES:S1	2.41	0.60
1:A:584:MET:HE1	4:B:3577:HOH:O	1.78	0.59
1:B:923:ALA:HA	1:B:926:TRP:NE1	2.17	0.59
1:B:779:MET:CE	1:B:780:LEU:HD23	2.33	0.59
1:B:1151:HIS:NE2	1:B:1251:ARG:HB2	2.17	0.59
1:B:726:ALA:HA	1:B:851:MET:HE1	1.84	0.59
1:A:751:ALA:HB3	1:A:812:LEU:HD23	1.84	0.58
1:B:1016:GLN:HB2	4:B:3110:HOH:O	2.03	0.58
1:B:812:LEU:HD11	1:B:825:CYS:CB	2.33	0.58
1:B:904:ASN:HB2	4:B:3116:HOH:O	2.01	0.58
1:A:1033:HIS:HD1	1:A:1035:GLY:H	1.50	0.58
1:A:705:ASN:HB2	4:A:2205:HOH:O	2.04	0.58
1:B:695:ILE:H	1:B:904:ASN:HD22	1.51	0.58
1:B:388:PHE:CD1	1:B:396:LEU:HD22	2.39	0.58
1:B:426:ARG:HG2	1:B:501:GLY:O	2.04	0.58
1:A:787:ILE:HG12	4:A:1803:HOH:O	2.03	0.57
1:A:1062:HIS:HE1	1:B:759:GLU:OE2	1.87	0.57
1:A:426:ARG:NH1	1:A:1212:HIS:HB2	2.19	0.57
1:B:1016:GLN:CB	4:B:3110:HOH:O	2.51	0.57
1:B:58:TYR:CE2	1:B:219:LYS:HD2	2.40	0.57
1:B:786:ARG:NH2	4:B:3112:HOH:O	2.37	0.57
1:A:683:ARG:NH1	4:A:1523:HOH:O	2.38	0.57
1:B:688:THR:HG23	4:B:3451:HOH:O	2.04	0.57
1:B:851:MET:HE3	1:B:857:VAL:HG21	1.85	0.57
1:B:641:PRO:HD3	1:B:814:LEU:HD11	1.87	0.56
1:B:814:LEU:HD12	4:B:3164:HOH:O	2.05	0.56
1:A:654:VAL:HG21	4:A:1669:HOH:O	2.04	0.56
1:A:759:GLU:OE2	1:B:1062:HIS:CE1	2.57	0.56
1:B:516:PHE:CZ	1:B:520:LEU:HD11	2.41	0.56
1:B:757:ALA:O	1:B:786:ARG:HD2	2.07	0.56
1:B:1272:PHE:HZ	4:B:3102:HOH:O	1.89	0.55
1:A:748:CYS:HB2	4:A:1524:HOH:O	2.07	0.55
1:A:777:ALA:HB2	4:A:1803:HOH:O	2.07	0.55
1:B:1077:THR:HA	4:B:3104:HOH:O	2.07	0.55
1:B:99:PRO:O	1:B:103:ARG:HG3	2.07	0.55
1:A:593:CYS:HB2	4:A:2165:HOH:O	2.04	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:787:ILE:CG1	4:A:1803:HOH:O	2.54	0.54
1:B:427:GLU:CB	1:B:1327:TRP:CZ2	2.90	0.54
1:A:751:ALA:CB	1:A:812:LEU:HD23	2.38	0.54
1:B:426:ARG:HD3	1:B:1212:HIS:NE2	2.23	0.54
1:B:1047:VAL:N	4:B:3115:HOH:O	2.39	0.54
1:B:695:ILE:N	4:B:3116:HOH:O	2.40	0.54
1:A:424:SER:HB2	4:A:2163:HOH:O	2.08	0.54
1:A:370:LYS:HG3	1:A:381:THR:HG23	1.90	0.54
1:A:119:ILE:HD12	4:A:2107:HOH:O	2.07	0.54
1:A:1211:LEU:HA	1:A:1221:THR:CG2	2.30	0.54
1:A:522:VAL:HG12	1:A:526:LEU:HD22	1.90	0.53
1:A:428:ASN:HA	4:A:1610:HOH:O	2.06	0.53
1:B:430:ILE:HG23	1:B:430:ILE:O	2.08	0.53
1:A:812:LEU:HD11	1:A:824:ARG:CA	2.38	0.53
1:B:1295:LEU:HD22	4:B:3637:HOH:O	2.09	0.53
1:A:1295:LEU:CD2	4:A:1503:HOH:O	2.56	0.53
1:B:1201:GLN:CD	4:B:3106:HOH:O	2.48	0.52
1:B:726:ALA:HA	1:B:851:MET:HE3	1.90	0.52
1:B:424:SER:O	1:B:425:ARG:HB2	2.10	0.52
1:A:519:TYR:N	4:A:1513:HOH:O	2.42	0.52
1:A:716:LYS:HE3	1:A:956:ASN:HD21	1.73	0.52
1:B:256:LEU:O	2:B:3003:FAD:H2B	2.09	0.52
1:B:1201:GLN:NE2	4:B:3106:HOH:O	2.43	0.52
1:B:812:LEU:HG	4:B:3207:HOH:O	2.06	0.52
1:A:1024:TYR:N	4:A:1504:HOH:O	2.43	0.51
1:B:814:LEU:CD1	4:B:3164:HOH:O	2.57	0.51
1:B:924:GLU:HB2	4:B:3102:HOH:O	2.10	0.51
1:A:1151:HIS:CD2	4:A:1506:HOH:O	2.61	0.51
1:A:1318:THR:HG23	1:A:1318:THR:O	2.09	0.51
1:B:148:ARG:O	4:B:3106:HOH:O	2.19	0.51
1:A:333:LEU:O	1:A:342:LYS:NZ	2.41	0.51
1:A:1056:ILE:HG12	4:A:1509:HOH:O	2.11	0.50
1:B:112:CYS:HB3	4:B:3220:HOH:O	2.12	0.50
1:A:1308:CYS:SG	4:A:1599:HOH:O	2.59	0.50
1:B:779:MET:HE2	1:B:780:LEU:HG	1.94	0.50
1:B:853:THR:O	1:B:944:LYS:HE3	2.12	0.49
1:B:878:MET:HG3	4:B:3132:HOH:O	2.12	0.49
1:A:1151:HIS:C	4:A:1506:HOH:O	2.47	0.49
1:A:390:PRO:C	1:A:461:ARG:NH1	2.66	0.49
1:B:1033:HIS:HE2	1:B:1043:HIS:HD2	1.59	0.49
1:A:308:GLU:HA	4:A:2093:HOH:O	2.13	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1249:ASN:O	1:B:1255:ALA:HA	2.11	0.49
1:A:1187:ASN:ND2	1:A:1190:ILE:HD12	2.28	0.49
1:A:911:PHE:O	1:A:912:ARG:C	2.50	0.49
1:B:949:GLU:CD	4:B:3177:HOH:O	2.50	0.49
1:A:812:LEU:HD11	1:A:824:ARG:C	2.33	0.49
1:A:1062:HIS:CE1	1:B:759:GLU:OE2	2.66	0.49
1:B:1119:ASP:HB3	4:B:3465:HOH:O	2.13	0.49
1:A:489:LEU:HD23	4:A:1510:HOH:O	2.12	0.49
1:A:1275:LYS:N	4:A:1503:HOH:O	2.46	0.49
1:B:426:ARG:HE	1:B:503:MET:HG3	1.78	0.49
1:B:427:GLU:HB2	1:B:1327:TRP:CZ2	2.47	0.49
1:B:356:PRO:HD2	1:B:429:ASP:HB2	1.95	0.48
1:A:1054:LEU:HB2	4:A:1509:HOH:O	2.13	0.48
1:B:296:ILE:CD1	1:B:314:GLU:HG3	2.44	0.48
1:A:336:PHE:HD1	1:A:336:PHE:O	1.97	0.48
1:A:95:GLN:NE2	4:A:1537:HOH:O	2.46	0.48
1:B:670:VAL:HG11	1:B:681:ALA:HB3	1.95	0.48
1:B:812:LEU:HD11	1:B:825:CYS:HB2	1.94	0.48
1:A:116:THR:HA	4:A:2107:HOH:O	2.13	0.48
1:A:809:SER:CB	4:A:1528:HOH:O	2.61	0.48
1:B:430:ILE:HD13	1:B:459:ALA:O	2.13	0.48
1:A:1208:MET:O	1:A:1209:GLU:HB2	2.14	0.48
1:B:336:PHE:O	1:B:337:ALA:O	2.32	0.48
1:A:954:HIS:CG	4:A:1604:HOH:O	2.64	0.47
1:B:839:ARG:CZ	4:B:3172:HOH:O	2.62	0.47
1:A:336:PHE:HZ	2:A:1401:FAD:HO2'	1.63	0.47
1:A:1022:HIS:HD2	1:A:1128:SER:OG	1.97	0.47
1:B:426:ARG:HD3	1:B:1212:HIS:CE1	2.49	0.47
1:B:1303:LYS:NZ	4:B:3127:HOH:O	2.47	0.47
1:A:308:GLU:HG3	1:A:333:LEU:HD13	1.96	0.47
1:A:1212:HIS:H	1:A:1221:THR:CG2	2.28	0.47
1:A:810:THR:HB	4:A:2161:HOH:O	2.14	0.47
1:B:1198:ALA:HB3	1:B:1263:PRO:HB2	1.97	0.47
1:A:655:PHE:HE2	1:A:814:LEU:HD23	1.80	0.47
1:A:734:LEU:HD23	4:A:1588:HOH:O	2.10	0.47
1:A:779:MET:HE2	4:A:1906:HOH:O	2.14	0.47
1:B:695:ILE:H	1:B:904:ASN:ND2	2.11	0.47
1:A:1295:LEU:HD21	4:A:1503:HOH:O	2.15	0.46
1:B:779:MET:CE	1:B:780:LEU:CD2	2.92	0.46
1:A:492:GLU:OE1	4:A:1510:HOH:O	2.20	0.46
1:B:749:THR:O	1:B:812:LEU:HD23	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:812:LEU:HD11	1:B:825:CYS:HB3	1.97	0.46
1:A:793:ARG:NH1	1:B:756:GLU:OE2	2.40	0.46
1:B:1303:LYS:CE	4:B:3127:HOH:O	2.63	0.46
1:B:361:ASN:N	1:B:362:PRO:CD	2.77	0.46
1:A:787:ILE:HB	4:A:1803:HOH:O	2.15	0.46
1:A:650:ASN:OD1	1:A:778:LYS:NZ	2.47	0.46
1:A:1180:MET:HE1	1:A:1266:LEU:HD12	1.97	0.46
1:B:498:ASP:O	1:B:499:ALA:C	2.54	0.46
1:B:879:GLU:N	4:B:3132:HOH:O	2.49	0.45
1:B:602:GLU:CG	4:B:3133:HOH:O	2.63	0.45
1:A:756:GLU:OE1	1:B:792:LYS:HE3	2.16	0.45
1:B:337:ALA:HB2	2:B:3003:FAD:C6	2.47	0.45
1:A:417:PHE:CE2	4:A:1502:HOH:O	2.68	0.45
1:A:736:ILE:HG13	4:A:1526:HOH:O	2.17	0.45
1:A:921:LEU:C	4:A:1588:HOH:O	2.54	0.45
1:A:1022:HIS:HE1	1:B:1069:ASN:O	1.98	0.45
1:A:1055:LYS:HD2	4:A:2295:HOH:O	2.17	0.45
1:B:980:ARG:HH12	1:B:1175:ARG:HB3	1.80	0.45
1:A:1152:TYR:HD2	4:A:1506:HOH:O	1.98	0.45
1:B:696:ILE:HD13	4:B:3116:HOH:O	2.16	0.45
1:A:1064:SER:O	1:A:1065:GLU:HB3	2.17	0.45
1:B:108:HIS:HD2	4:B:3472:HOH:O	1.98	0.45
1:B:1265:PHE:O	1:B:1265:PHE:CG	2.70	0.45
1:A:599:TYR:HA	1:B:599:TYR:HA	1.98	0.44
1:B:1250:LYS:HA	4:B:3659:HOH:O	2.16	0.44
1:B:11:ASN:ND2	1:B:90:GLY:HA3	2.32	0.44
1:B:744:LEU:HD13	3:B:3001:FES:S1	2.58	0.44
1:A:670:VAL:HG11	1:A:681:ALA:HB3	2.00	0.44
1:A:900:ILE:N	1:A:900:ILE:HD12	2.33	0.44
1:B:808:VAL:O	1:B:812:LEU:HD13	2.18	0.44
1:B:949:GLU:CG	4:B:3177:HOH:O	2.66	0.44
1:B:1186:LEU:HB3	4:B:3120:HOH:O	2.16	0.44
1:A:1176:THR:HG21	1:A:1199:PHE:CZ	2.53	0.44
1:A:955:PHE:HA	1:A:1145:ASN:OD1	2.17	0.44
1:A:1022:HIS:CD2	1:A:1128:SER:OG	2.70	0.44
1:B:427:GLU:CB	1:B:1327:TRP:HZ2	2.30	0.44
1:B:695:ILE:C	4:B:3116:HOH:O	2.54	0.44
1:B:1203:LEU:C	1:B:1203:LEU:HD23	2.38	0.44
1:A:415:GLU:CB	4:A:1740:HOH:O	2.41	0.44
1:A:793:ARG:HH12	1:B:756:GLU:CD	2.20	0.44
1:A:654:VAL:CG2	4:A:1669:HOH:O	2.65	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:296:ILE:CD1	1:A:314:GLU:HG3	2.47	0.43
1:A:812:LEU:CD1	1:A:825:CYS:N	2.81	0.43
1:B:845:LYS:HE3	4:B:3501:HOH:O	2.19	0.43
1:B:900:ILE:N	1:B:900:ILE:HD12	2.34	0.43
1:B:388:PHE:HA	1:B:396:LEU:HD13	1.99	0.43
1:A:468:THR:OG1	4:A:1510:HOH:O	2.21	0.43
1:A:879:GLU:HA	4:A:1659:HOH:O	2.18	0.43
1:B:555:ALA:O	1:B:556:ASN:ND2	2.51	0.43
1:B:334:ARG:NH1	4:B:3134:HOH:O	2.50	0.43
1:B:641:PRO:HD3	1:B:814:LEU:CD1	2.49	0.43
1:A:492:GLU:HB3	4:A:1510:HOH:O	2.19	0.43
1:B:29:TYR:O	1:B:33:LYS:HB3	2.18	0.43
1:A:440:LEU:HB3	1:A:450:GLU:HB2	2.00	0.42
1:A:859:LEU:HD12	4:A:1508:HOH:O	2.18	0.42
1:A:976:GLN:O	1:A:980:ARG:HG3	2.19	0.42
1:B:396:LEU:C	1:B:396:LEU:HD23	2.39	0.42
1:A:1158:ALA:HA	1:A:1177:ASP:O	2.19	0.42
1:A:1212:HIS:H	1:A:1221:THR:HG22	1.83	0.42
1:A:220:ASP:HA	4:A:1542:HOH:O	2.19	0.42
1:A:390:PRO:O	1:A:461:ARG:NH1	2.52	0.42
1:A:483:GLN:HE21	1:A:483:GLN:HA	1.84	0.42
1:A:644:ASN:HA	4:A:1669:HOH:O	2.19	0.42
1:A:124:TYR:HA	4:A:2226:HOH:O	2.19	0.42
1:A:415:GLU:CG	4:A:1740:HOH:O	2.67	0.42
1:B:778:LYS:HE3	4:B:3557:HOH:O	2.20	0.42
1:A:424:SER:CB	4:A:2163:HOH:O	2.67	0.42
1:A:446:ILE:HB	4:A:2068:HOH:O	2.18	0.42
1:A:544:SER:HA	1:A:547:LEU:CD2	2.50	0.42
1:B:216:LEU:O	1:B:219:LYS:HG2	2.20	0.42
1:B:430:ILE:HA	1:B:431:ALA:HA	1.87	0.42
1:A:552:ASP:HB3	1:A:553:PRO:HD2	2.01	0.41
1:A:1204:GLY:HA3	1:A:1209:GLU:OE2	2.20	0.41
1:B:153:ARG:N	1:B:154:PRO:HD2	2.34	0.41
1:A:441:PHE:CZ	4:A:2068:HOH:O	2.73	0.41
1:A:220:ASP:HB3	4:A:1606:HOH:O	2.20	0.41
1:A:336:PHE:O	1:A:337:ALA:O	2.39	0.41
1:A:751:ALA:H	1:A:812:LEU:HD21	1.85	0.41
1:A:385:ASP:OD1	1:A:387:THR:HB	2.20	0.41
1:B:1196:GLU:HB3	4:B:3228:HOH:O	2.20	0.41
1:A:449:GLN:CG	4:A:2266:HOH:O	2.58	0.41
1:A:1251:ARG:CD	4:A:1506:HOH:O	2.62	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:644:ASN:O	1:A:653:THR:HA	2.20	0.41
1:B:425:ARG:O	1:B:431:ALA:O	2.38	0.41
1:A:544:SER:HA	1:A:547:LEU:HD22	2.02	0.41
1:A:736:ILE:HD11	4:A:1588:HOH:O	2.21	0.41
1:A:1052:ARG:HD2	1:A:1254:TYR:CZ	2.56	0.41
1:A:1105:LYS:HG3	1:A:1116:TRP:CZ2	2.56	0.41
1:A:1129:ALA:N	4:A:1507:HOH:O	2.53	0.41
1:B:964:LEU:N	1:B:965:PRO:CD	2.84	0.41
1:A:778:LYS:HD3	4:A:2276:HOH:O	2.21	0.41
1:A:823:VAL:N	4:A:1575:HOH:O	2.54	0.41
1:B:859:LEU:HD22	1:B:926:TRP:CZ2	2.55	0.41
1:B:978:LEU:HD12	4:B:3442:HOH:O	2.21	0.41
1:A:99:PRO:O	1:A:103:ARG:HG3	2.21	0.40
1:A:809:SER:HB3	4:A:1528:HOH:O	2.22	0.40
1:A:842:PHE:N	4:A:1561:HOH:O	2.53	0.40
1:B:619:SER:HA	4:B:3474:HOH:O	2.21	0.40
1:B:1187:ASN:ND2	1:B:1190:ILE:HD12	2.36	0.40
1:A:149:CYS:O	1:A:1197:GLY:HA3	2.22	0.40
1:A:558:GLN:HB3	1:A:1192:ILE:HD13	2.03	0.40
1:B:799:GLY:HA2	4:B:3382:HOH:O	2.20	0.40
1:B:955:PHE:HA	1:B:1145:ASN:OD1	2.20	0.40
1:A:97:LEU:HD13	4:A:1616:HOH:O	2.20	0.40
1:A:426:ARG:HG3	1:A:426:ARG:HH11	1.86	0.40
1:B:806:THR:O	1:B:810:THR:HG23	2.21	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:2232:HOH:O	4:B:3397:HOH:O[2_444]	2.07	0.13

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	1284/1331 (96%)	1228 (96%)	47 (4%)	9 (1%)	22	22
1	B	1293/1331 (97%)	1230 (95%)	53 (4%)	10 (1%)	19	19
All	All	2577/2662 (97%)	2458 (95%)	100 (4%)	19 (1%)	22	22

All (19) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1008	SER
1	B	425	ARG
1	B	428	ASN
1	B	430	ILE
1	B	1008	SER
1	A	912	ARG
1	B	337	ALA
1	B	433	VAL
1	A	4	ASP
1	A	337	ALA
1	A	474	SER
1	A	797	GLY
1	A	887	ASN
1	B	427	GLU
1	B	912	ARG
1	A	424	SER
1	B	658	ASP
1	B	797	GLY
1	A	1111	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	1088/1124 (97%)	1063 (98%)	25 (2%)	50	63
1	B	1097/1124 (98%)	1076 (98%)	21 (2%)	57	71

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	2185/2248 (97%)	2139 (98%)	46 (2%)	53 67

All (46) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	61	LEU
1	A	63	ASN
1	A	99	PRO
1	A	219	LYS
1	A	226	LEU
1	A	317	LYS
1	A	321	GLN
1	A	336	PHE
1	A	376	ARG
1	A	396	LEU
1	A	425	ARG
1	A	483	GLN
1	A	526	LEU
1	A	534	MET
1	A	547	LEU
1	A	683	ARG
1	A	720	LYS
1	A	743	TYR
1	A	744	LEU
1	A	824	ARG
1	A	911	PHE
1	A	1051	SER
1	A	1072	PRO
1	A	1208	MET
1	A	1239	PHE
1	B	164	LYS
1	B	223	GLN
1	B	294	GLU
1	B	313	GLU
1	B	396	LEU
1	B	413	GLU
1	B	426	ARG
1	B	480	GLU
1	B	549	PHE
1	B	731	SER
1	B	743	TYR
1	B	744	LEU

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Mol	Chain	Res	Type
1	B	778	LYS
1	B	852	LYS
1	B	911	PHE
1	B	944	LYS
1	B	1055	LYS
1	B	1177	ASP
1	B	1239	PHE
1	B	1287	ASP
1	B	1329	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (34) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	11	ASN
1	A	62	GLN
1	A	95	GLN
1	A	130	GLN
1	A	145	ASN
1	A	483	GLN
1	A	956	ASN
1	A	1016	GLN
1	A	1022	HIS
1	A	1043	HIS
1	A	1062	HIS
1	A	1073	ASN
1	A	1173	ASN
1	A	1284	GLN
1	B	11	ASN
1	B	108	HIS
1	B	145	ASN
1	B	157	GLN
1	B	207	GLN
1	B	422	GLN
1	B	556	ASN
1	B	558	GLN
1	B	585	GLN
1	B	699	GLN
1	B	703	ASN
1	B	893	ASN
1	B	904	ASN
1	B	956	ASN
1	B	1016	GLN

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Mol	Chain	Res	Type
1	B	1043	HIS
1	B	1062	HIS
1	B	1073	ASN
1	B	1194	GLN
1	B	1284	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

6 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	FES	B	3002	1	0,4,4	-	-	-		
2	FAD	B	3003	-	53,58,58	1.42	7 (13%)	68,89,89	1.40	12 (17%)
3	FES	A	1403	1	0,4,4	-	-	-		
3	FES	B	3001	1,4	0,4,4	-	-	-		
2	FAD	A	1401	-	53,58,58	1.46	9 (16%)	68,89,89	1.58	14 (20%)
3	FES	A	1402	1	0,4,4	-	-	-		

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

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	FES	B	3002	1	-	-	0/1/1/1
2	FAD	B	3003	-	-	0/30/50/50	0/6/6/6
3	FES	A	1403	1	-	-	0/1/1/1
3	FES	B	3001	1,4	-	-	0/1/1/1
2	FAD	A	1401	-	-	0/30/50/50	0/6/6/6
3	FES	A	1402	1	-	-	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	3003	FAD	C9A-C5X	5.27	1.50	1.41
2	A	1401	FAD	C9A-C5X	4.98	1.49	1.41
2	B	3003	FAD	C8-C7	3.39	1.49	1.40
2	A	1401	FAD	C5X-N5	-3.16	1.33	1.39
2	A	1401	FAD	C2B-C1B	-3.12	1.49	1.53
2	A	1401	FAD	O2'-C2'	2.87	1.49	1.43
2	A	1401	FAD	C4X-N5	2.60	1.35	1.30
2	B	3003	FAD	O2-C2	2.57	1.29	1.24
2	A	1401	FAD	C4-N3	-2.55	1.34	1.38
2	A	1401	FAD	O4B-C1B	2.54	1.44	1.41
2	A	1401	FAD	C8-C7	2.49	1.47	1.40
2	B	3003	FAD	O4B-C1B	2.45	1.44	1.41
2	B	3003	FAD	C5A-C4A	2.36	1.47	1.40
2	B	3003	FAD	C5X-N5	-2.33	1.35	1.39
2	A	1401	FAD	C5A-C4A	2.26	1.46	1.40
2	B	3003	FAD	C4-N3	-2.24	1.34	1.38

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1401	FAD	C9A-C5X-N5	-4.39	117.66	122.43
2	B	3003	FAD	N3A-C2A-N1A	-3.36	123.42	128.68
2	A	1401	FAD	N3A-C2A-N1A	-3.34	123.45	128.68
2	A	1401	FAD	O2'-C2'-C1'	3.06	117.19	109.80
2	B	3003	FAD	O4-C4-C4X	-2.96	118.75	126.60
2	A	1401	FAD	C2A-N1A-C6A	2.86	123.64	118.75
2	A	1401	FAD	O4-C4-C4X	-2.80	119.18	126.60
2	A	1401	FAD	C5X-C9A-N10	2.70	120.75	117.95
2	B	3003	FAD	C10-N1-C2	2.53	121.95	116.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1401	FAD	C5X-N5-C4X	2.51	122.25	118.07
2	B	3003	FAD	O3'-C3'-C2'	-2.46	102.88	108.81
2	B	3003	FAD	C4A-C5A-N7A	-2.40	106.89	109.40
2	A	1401	FAD	N6A-C6A-N1A	2.40	123.55	118.57
2	B	3003	FAD	C4X-C10-N1	-2.37	119.22	124.73
2	A	1401	FAD	O5'-C5'-C4'	-2.34	103.11	109.36
2	A	1401	FAD	C4X-C4-N3	2.30	119.04	113.19
2	B	3003	FAD	C4X-C4-N3	2.30	119.03	113.19
2	B	3003	FAD	C9A-C5X-N5	-2.26	119.97	122.43
2	A	1401	FAD	C1'-C2'-C3'	-2.22	103.58	109.79
2	B	3003	FAD	O4'-C4'-C3'	2.22	114.49	109.10
2	A	1401	FAD	C4-C4X-N5	2.17	121.33	118.23
2	A	1401	FAD	C7M-C7-C6	2.11	123.39	119.49
2	B	3003	FAD	O2B-C2B-C1B	2.07	118.51	110.85
2	A	1401	FAD	C4X-C10-N1	-2.03	120.02	124.73
2	B	3003	FAD	C2A-N1A-C6A	2.02	122.21	118.75
2	B	3003	FAD	C2B-C3B-C4B	2.01	106.55	102.64

There are no chirality outliers.

There are no torsion outliers.

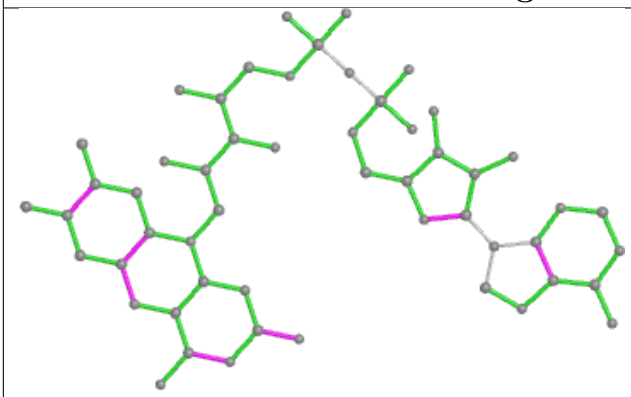
There are no ring outliers.

4 monomers are involved in 6 short contacts:

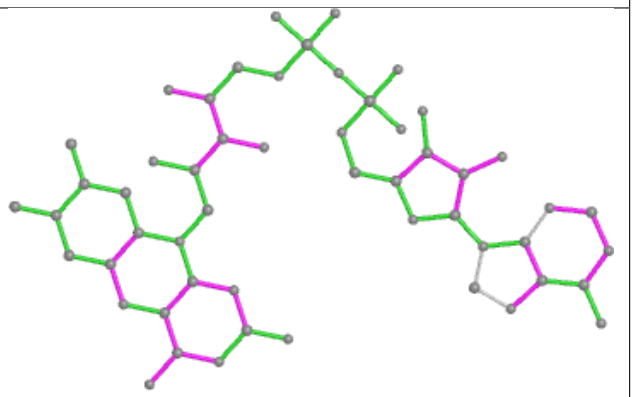
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	3003	FAD	2	0
3	B	3001	FES	1	0
2	A	1401	FAD	2	0
3	A	1402	FES	1	0

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.

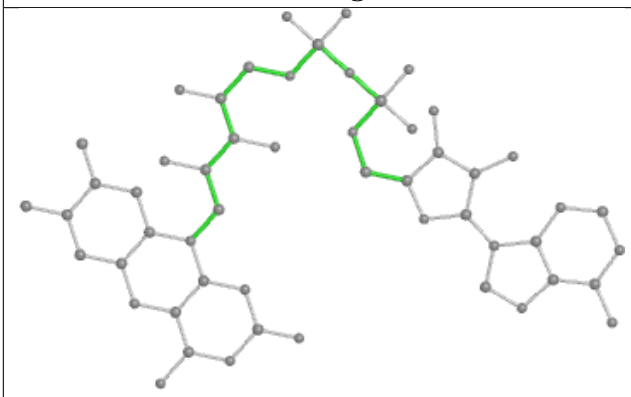
Ligand FAD B 3003



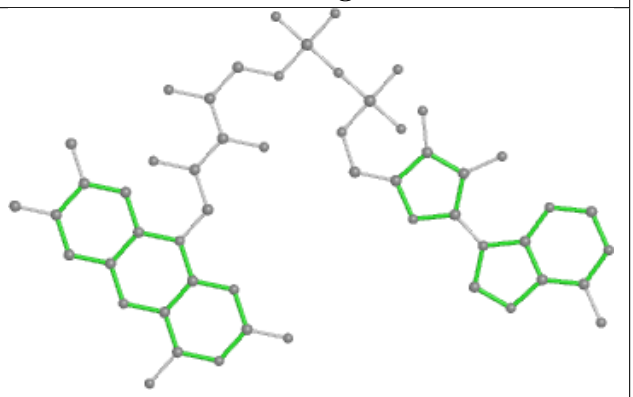
Bond lengths



Bond angles

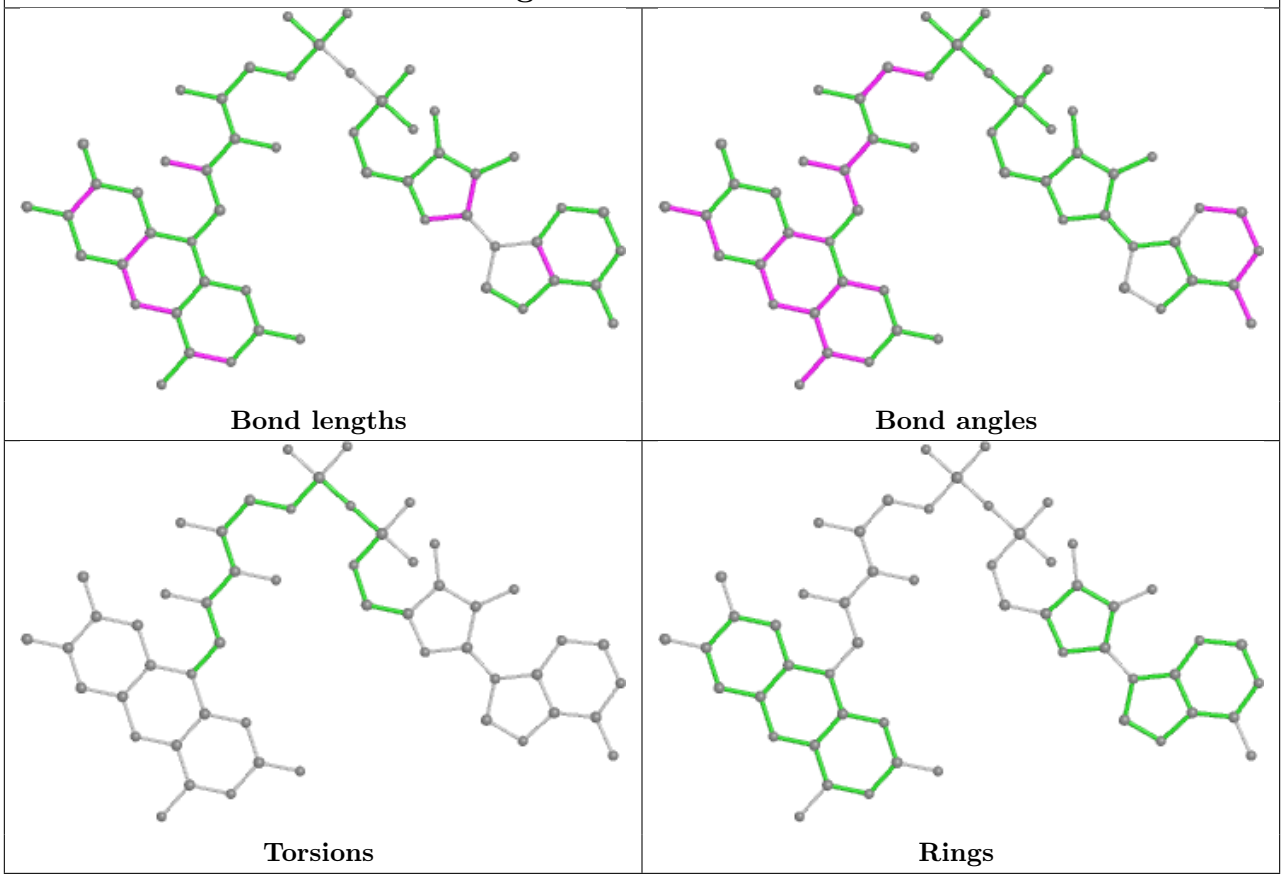


Torsions



Rings

Ligand FAD A 1401



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, 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	1290/1331 (96%)	-0.13	24 (1%)	66	65	18, 28, 52, 101	0
1	B	1299/1331 (97%)	0.05	46 (3%)	44	42	19, 33, 60, 122	0
All	All	2589/2662 (97%)	-0.04	70 (2%)	54	52	18, 30, 57, 122	0

All (70) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1324	CYS	13.7
1	B	1327	TRP	5.6
1	B	1326	SER	5.5
1	B	427	GLU	5.4
1	A	551	LYS	4.9
1	B	1328	SER	4.8
1	B	1317	VAL	4.3
1	A	550	GLN	4.1
1	B	1110	THR	4.0
1	A	549	PHE	4.0
1	A	553	PRO	4.0
1	B	191	SER	3.9
1	B	1325	LYS	3.8
1	B	430	ILE	3.8
1	B	549	PHE	3.7
1	B	1288	ASN	3.6
1	B	1287	ASP	3.5
1	B	1111	GLY	3.4
1	B	550	GLN	3.4
1	B	425	ARG	3.2
1	B	497	PRO	3.1
1	A	221	THR	3.0
1	A	1110	THR	3.0
1	B	426	ARG	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	1111	GLY	3.0
1	A	552	ASP	2.9
1	B	444	GLY	2.9
1	B	553	PRO	2.9
1	B	165	ASP	2.9
1	B	627	LYS	2.9
1	A	555	ALA	2.8
1	B	693	PRO	2.8
1	A	535	CYS	2.8
1	B	424	SER	2.8
1	A	1042	LEU	2.8
1	A	1106	LYS	2.7
1	A	220	ASP	2.7
1	B	1289	ALA	2.7
1	B	1316	CYS	2.7
1	B	3	ALA	2.7
1	B	483	GLN	2.6
1	A	530	ASP	2.5
1	B	396	LEU	2.5
1	B	377	GLY	2.5
1	B	217	ARG	2.5
1	B	247	LEU	2.5
1	A	1109	PRO	2.5
1	A	191	SER	2.5
1	B	552	ASP	2.4
1	A	531	LEU	2.3
1	B	135	VAL	2.3
1	B	1109	PRO	2.3
1	B	533	ASP	2.3
1	B	293	PRO	2.3
1	A	548	LEU	2.2
1	A	1107	LYS	2.2
1	B	304	LEU	2.2
1	A	3	ALA	2.2
1	B	1042	LEU	2.2
1	B	387	THR	2.2
1	B	431	ALA	2.2
1	B	1329	VAL	2.2
1	B	345	ALA	2.2
1	B	1330	ARG	2.1
1	A	193	SER	2.1
1	A	165	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	70	VAL	2.0
1	B	335	TRP	2.0
1	B	474	SER	2.0
1	A	149	CYS	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)

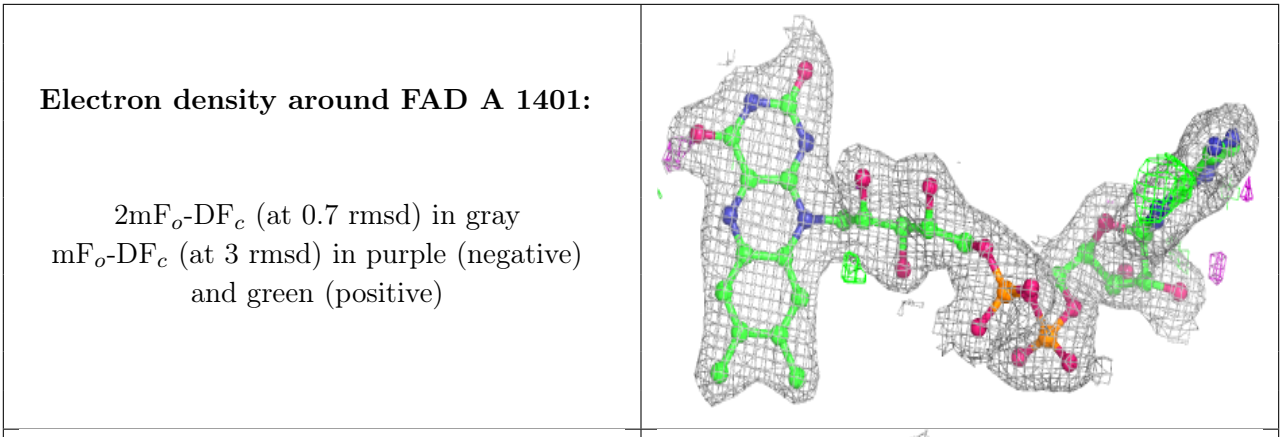
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
2	FAD	A	1401	53/53	0.97	0.12	21,25,29,37	0
2	FAD	B	3003	53/53	0.97	0.12	27,33,38,43	0
3	FES	A	1402	4/4	0.99	0.07	23,24,26,26	0
3	FES	A	1403	4/4	0.99	0.09	23,24,24,25	0
3	FES	B	3001	4/4	0.99	0.05	25,26,27,27	0
3	FES	B	3002	4/4	0.99	0.07	27,28,28,29	0

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

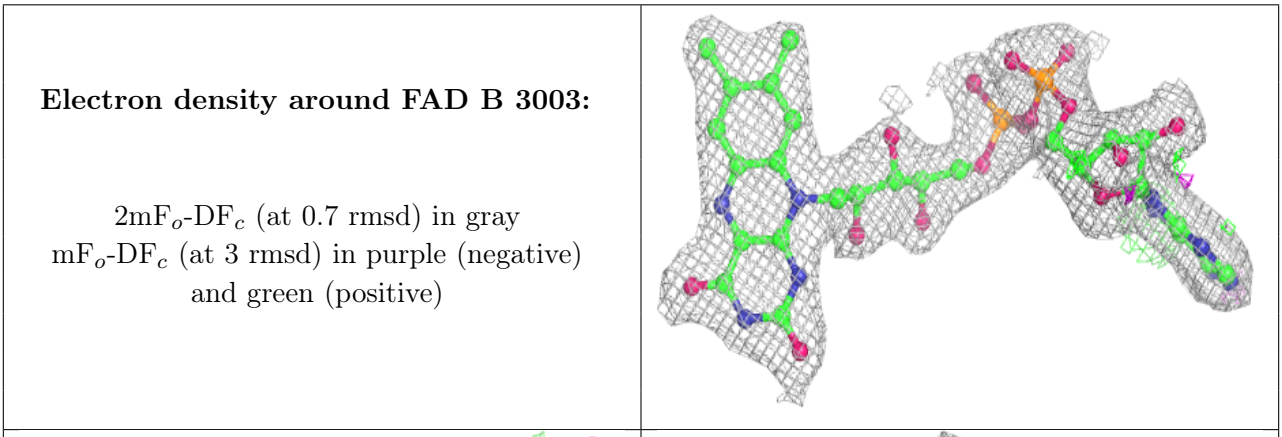
Electron density around FAD A 1401:

$2mF_o$-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 3003:

$2mF_o$-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.