



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 16, 2023 – 06:03 AM EDT

PDB ID : 2E3T
Title : Crystal structure of rat xanthine oxidoreductase mutant (W335A and F336L)
Authors : Asai, R.; Nishino, T.; Matsumura, T.; Okamoto, K.; Pai, E.F.; Nishino, T.
Deposited on : 2006-11-28
Resolution : 2.28 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

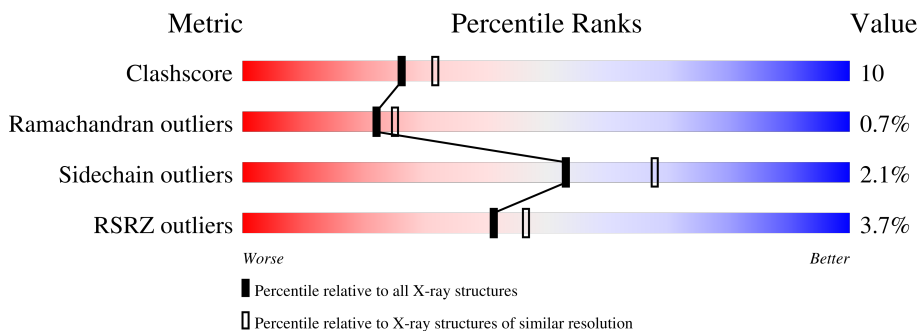
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

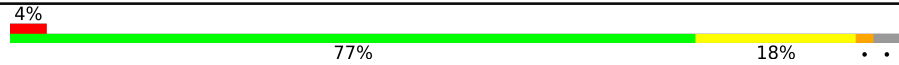

The reported resolution of this entry is 2.28 Å.

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	141614	7711 (2.30-2.26)
Ramachandran outliers	138981	7597 (2.30-2.26)
Sidechain outliers	138945	7598 (2.30-2.26)
RSRZ outliers	127900	6849 (2.30-2.26)

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	1331	 4% 77% 18%
1	B	1331	 3% 78% 18%

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 21444 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.

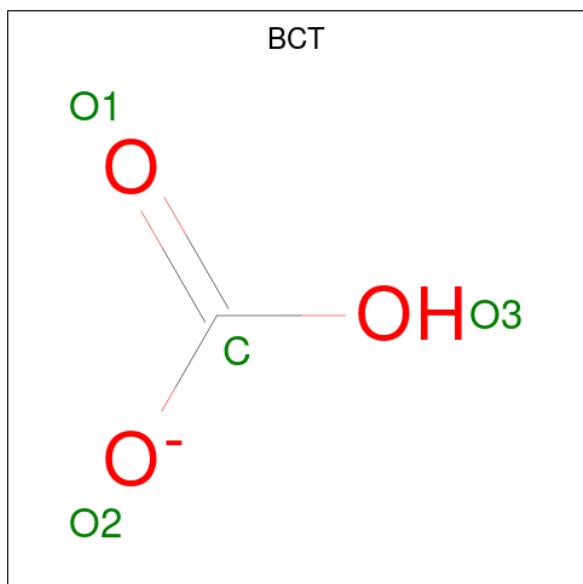
- Molecule 1 is a protein called Xanthine dehydrogenase/oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1291	9963	6309	1715	1875	64	0	0	0
1	B	1281	9877	6255	1702	1858	62	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	335	ALA	TRP	engineered mutation	UNP P22985
A	336	LEU	PHE	engineered mutation	UNP P22985
B	335	ALA	TRP	engineered mutation	UNP P22985
B	336	LEU	PHE	engineered mutation	UNP P22985

- Molecule 2 is BICARBONATE ION (three-letter code: BCT) (formula: CHO_3).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			4	1	3		
2	B	1	Total	C	O	0	0
			4	1	3		

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	P	0	0
			5	4	1		
3	A	1	Total	O	P	0	0
			5	4	1		
3	A	1	Total	O	P	0	0
			5	4	1		
3	A	1	Total	O	P	0	0
			5	4	1		
3	A	1	Total	O	P	0	0
			5	4	1		
3	B	1	Total	O	P	0	0
			5	4	1		
3	B	1	Total	O	P	0	0
			5	4	1		
3	B	1	Total	O	P	0	0
			5	4	1		

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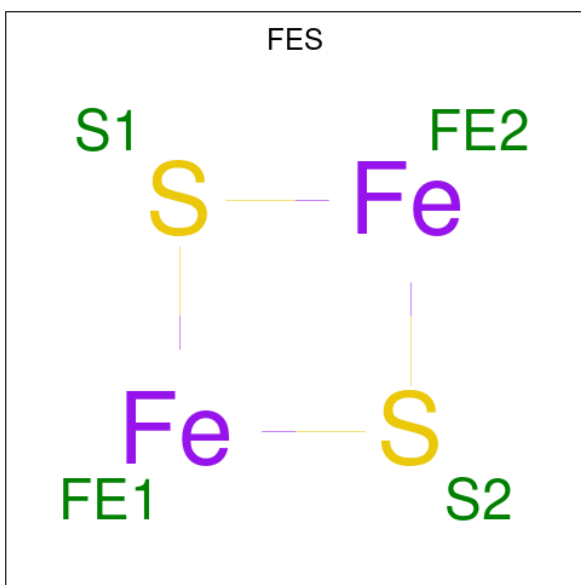
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	P	0	0
			5	4	1		

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Ca	0	0
			2	2		
4	B	2	Total	Ca	0	0
			2	2		

- Molecule 5 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



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

- Molecule 6 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: C₂₇H₃₃N₉O₁₅P₂).

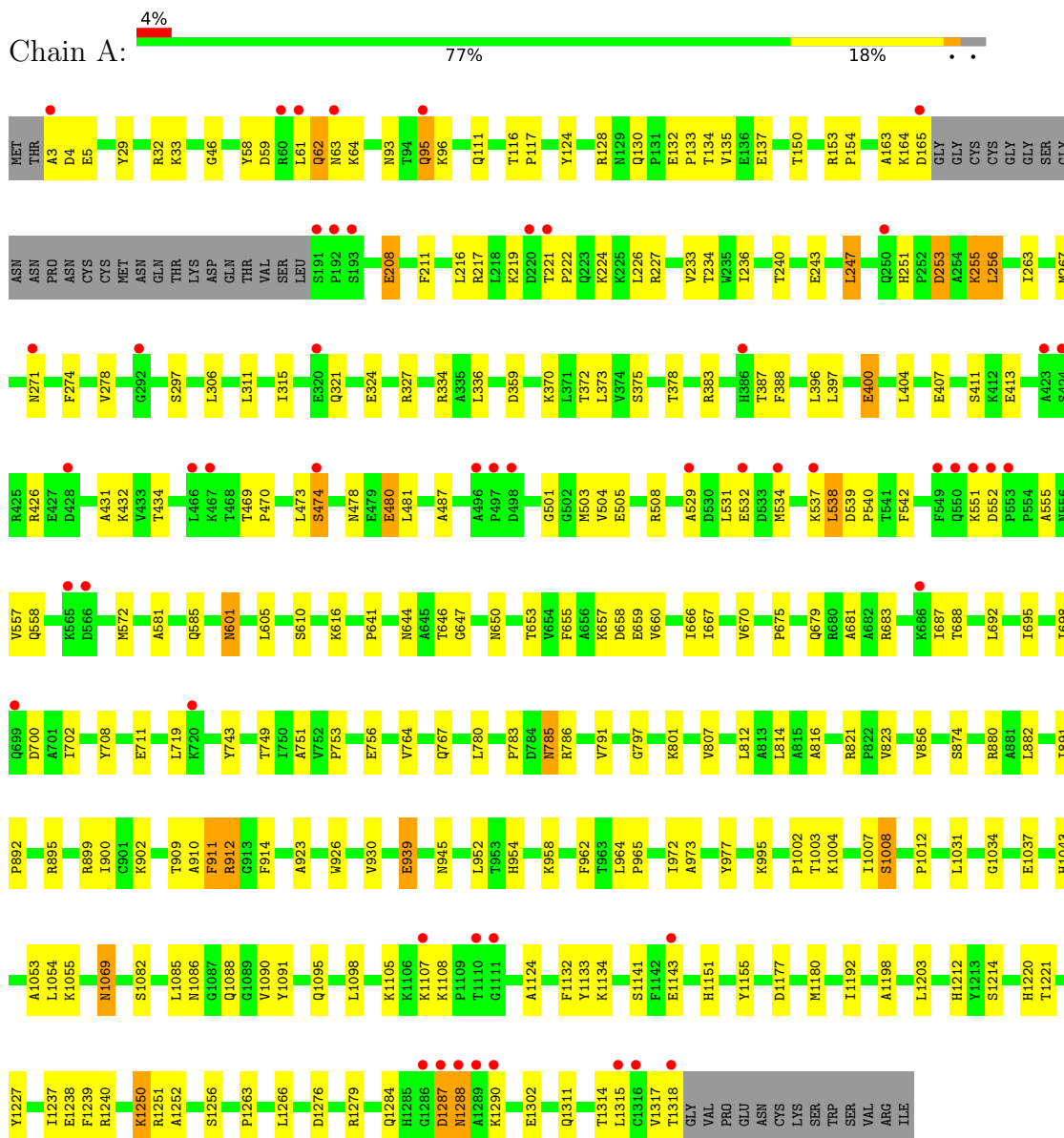
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	667	Total O 667 667	0	0
8	B	724	Total O 724 724	0	0

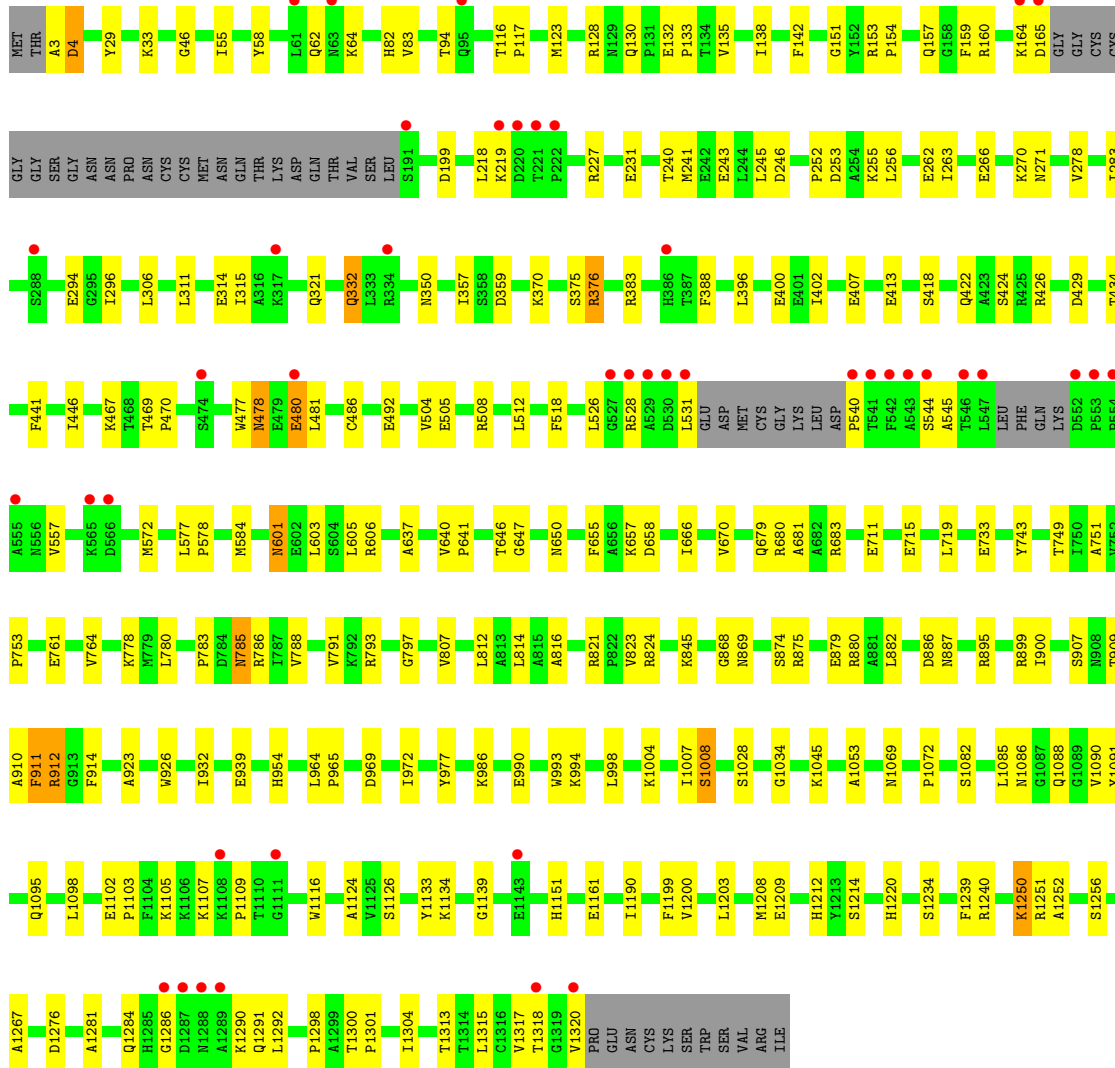
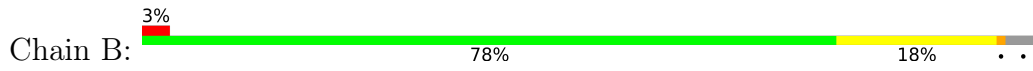
3 Residue-property plots

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

- Molecule 1: Xanthine dehydrogenase/oxidase



- Molecule 1: Xanthine dehydrogenase/oxidase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	101.07Å 139.51Å 222.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	25.00 – 2.28 24.94 – 2.28	Depositor EDS
% Data completeness (in resolution range)	100.0 (25.00-2.28) 95.8 (24.94-2.28)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.44 (at 2.28Å)	Xtrriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.185 , 0.229 0.181 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	26.4	Xtrriage
Anisotropy	0.532	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 47.6	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	21444	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.45% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: FES, CA, URC, BCT, FAD, PO4

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	0.32	0/10170	0.60	0/13763
1	B	0.33	0/10081	0.61	0/13642
All	All	0.33	0/20251	0.60	0/27405

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

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	9963	0	9972	208	0
1	B	9877	0	9888	211	0
2	A	4	0	0	0	0
2	B	4	0	0	0	0
3	A	30	0	0	1	0
3	B	25	0	0	1	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
5	A	8	0	0	1	0
5	B	8	0	0	1	0
6	A	53	0	28	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	53	0	26	3	0
7	A	12	0	4	0	0
7	B	12	0	4	0	0
8	A	667	0	0	7	0
8	B	724	0	0	7	0
All	All	21444	0	19922	415	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 10.

All (415) 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)
6:B:3003:FAD:C3B	6:B:3003:FAD:C2B	1.79	1.41
1:B:3:ALA:HB1	1:B:227:ARG:H	1.16	1.05
1:A:3:ALA:HB1	1:A:227:ARG:H	1.24	1.01
1:B:646:THR:HG22	1:B:647:GLY:H	1.28	0.97
1:A:646:THR:HG22	1:A:647:GLY:H	1.30	0.95
1:B:359:ASP:HA	1:B:434:THR:HG21	1.54	0.89
1:B:3:ALA:HB1	1:B:227:ARG:N	1.86	0.89
1:B:130:GLN:HE21	1:B:132:GLU:H	1.16	0.88
1:B:785:ASN:HD21	1:B:786:ARG:NH1	1.73	0.86
1:B:252:PRO:HG3	1:B:400:GLU:HG2	1.58	0.85
1:A:785:ASN:HD21	1:A:786:ARG:HH11	1.24	0.85
1:B:1088:GLN:HG2	1:B:1133:TYR:CD1	2.13	0.84
1:B:785:ASN:HD21	1:B:786:ARG:HH11	1.21	0.84
1:A:1088:GLN:HG2	1:A:1133:TYR:CD1	2.12	0.83
1:A:359:ASP:HA	1:A:434:THR:HG21	1.58	0.83
1:A:3:ALA:N	1:A:224:LYS:HZ2	1.77	0.81
1:A:130:GLN:HE21	1:A:132:GLU:H	1.29	0.81
1:A:555:ALA:HB3	1:A:1238:GLU:HG3	1.62	0.80
1:A:749:THR:HG22	1:A:812:LEU:HD23	1.63	0.80
1:A:939:GLU:HG2	1:A:977:TYR:CE2	2.17	0.79
1:A:557:VAL:HG12	1:A:1240:ARG:HG2	1.65	0.78
1:A:785:ASN:HD21	1:A:786:ARG:NH1	1.82	0.77
1:B:321:GLN:HG2	1:B:413:GLU:OE2	1.85	0.77
1:B:932:ILE:O	1:B:1290:LYS:HE3	1.84	0.76
1:B:785:ASN:ND2	1:B:786:ARG:HH11	1.82	0.76
1:B:650:ASN:HD21	1:B:778:LYS:NZ	1.83	0.76
1:A:1141:SER:OG	1:A:1143:GLU:HG2	1.87	0.75
1:B:332:GLN:HA	1:B:332:GLN:HE21	1.53	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:785:ASN:ND2	1:A:786:ARG:HH11	1.86	0.74
1:B:719:LEU:HD11	1:B:895:ARG:HB3	1.70	0.74
1:A:388:PHE:HA	1:A:396:LEU:HG	1.71	0.72
1:B:58:TYR:CE2	1:B:219:LYS:HG3	2.24	0.72
1:B:531:LEU:HA	1:B:540:PRO:HD2	1.73	0.71
1:B:749:THR:HG22	1:B:812:LEU:HD23	1.72	0.71
1:B:749:THR:HG22	1:B:812:LEU:CD2	2.20	0.71
1:B:939:GLU:HG2	1:B:977:TYR:CE2	2.24	0.71
1:B:1102:GLU:HB3	1:B:1103:PRO:HD3	1.72	0.71
1:A:749:THR:HG22	1:A:812:LEU:CD2	2.20	0.70
1:A:487:ALA:HA	1:A:1318:THR:HG23	1.73	0.69
1:A:3:ALA:HB1	1:A:227:ARG:N	2.05	0.69
1:B:1315:LEU:HA	1:B:1320:VAL:O	1.92	0.69
1:A:719:LEU:HD11	1:A:895:ARG:HB2	1.75	0.69
1:A:537:LYS:O	1:A:538:LEU:HB3	1.93	0.67
1:A:61:LEU:O	1:A:62:GLN:HG3	1.94	0.67
1:A:1124:ALA:HB3	1:B:1134:LYS:HD3	1.77	0.67
1:B:1290:LYS:O	1:B:1290:LYS:HG2	1.94	0.66
1:A:375:SER:HB3	1:A:378:THR:OG1	1.95	0.66
1:A:679:GLN:NE2	1:A:683:ARG:HH22	1.94	0.65
1:B:650:ASN:HD21	1:B:778:LYS:HZ1	1.44	0.65
1:A:1279:ARG:HH21	1:A:1290:LYS:HD3	1.61	0.65
1:A:666:ILE:CD1	1:A:807:VAL:HG13	2.27	0.64
1:B:426:ARG:HD3	1:B:1212:HIS:CG	2.32	0.64
1:B:123:MET:HE2	1:B:159:PHE:CD2	2.33	0.64
1:B:1208:MET:HE2	1:B:1234:SER:HB3	1.79	0.64
1:B:271:ASN:HB3	1:B:683:ARG:HH11	1.62	0.64
1:B:646:THR:HG22	1:B:647:GLY:N	2.07	0.64
1:A:646:THR:HG22	1:A:647:GLY:N	2.09	0.63
1:B:531:LEU:CA	1:B:540:PRO:HD2	2.28	0.62
1:A:646:THR:HG23	8:A:7667:HOH:O	1.99	0.62
1:B:1082:SER:HB2	3:B:6003:PO4:O2	1.98	0.62
1:B:271:ASN:CG	1:B:683:ARG:HD3	2.19	0.62
1:B:601:ASN:HD22	1:B:601:ASN:H	1.48	0.62
1:A:93:ASN:OD1	1:A:95:GLN:HG3	1.99	0.61
1:B:715:GLU:OE2	1:B:895:ARG:HD2	2.01	0.61
1:A:882:LEU:O	1:A:954:HIS:HE1	1.83	0.61
1:A:856:VAL:HG12	1:A:945:ASN:OD1	2.01	0.60
6:B:3003:FAD:C3B	6:B:3003:FAD:O2B	2.45	0.60
1:B:544:SER:HB2	1:B:994:LYS:HG3	1.84	0.60
1:A:240:THR:OG1	1:A:243:GLU:HG3	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:603:LEU:HD21	1:B:821:ARG:NH2	2.18	0.59
1:A:1004:LYS:HG3	1:A:1155:TYR:CE2	2.38	0.59
1:B:271:ASN:HB3	1:B:683:ARG:NH1	2.17	0.59
1:B:650:ASN:ND2	1:B:778:LYS:NZ	2.49	0.59
1:B:761:GLU:HA	1:B:788:VAL:HG13	1.85	0.59
1:A:616:LYS:HD3	1:A:659:GLU:HB3	1.85	0.58
1:B:812:LEU:HD21	1:B:823:VAL:O	2.03	0.58
1:A:1311:GLN:HB2	1:A:1317:VAL:HG13	1.85	0.58
1:A:601:ASN:HD22	1:A:601:ASN:H	1.51	0.58
1:A:271:ASN:OD1	1:A:683:ARG:CZ	2.51	0.58
1:A:164:LYS:HB2	1:A:164:LYS:NZ	2.19	0.57
1:B:478:ASN:HD21	1:B:480:GLU:HG3	1.68	0.57
1:B:130:GLN:HE21	1:B:132:GLU:N	1.96	0.57
1:B:123:MET:CE	1:B:138:ILE:HG23	2.33	0.57
1:B:1088:GLN:HG2	1:B:1133:TYR:CE1	2.39	0.57
1:A:370:LYS:HE2	1:A:383:ARG:HE	1.69	0.57
1:B:486:CYS:HA	1:B:512:LEU:HD22	1.85	0.57
1:B:606:ARG:HD3	1:B:679:GLN:HA	1.86	0.57
1:B:646:THR:HG23	8:B:7280:HOH:O	2.05	0.57
1:B:886:ASP:OD1	1:B:1004:LYS:NZ	2.38	0.57
1:A:306:LEU:HD23	1:A:306:LEU:O	2.05	0.56
1:B:749:THR:O	1:B:812:LEU:HD22	2.05	0.56
1:A:880:ARG:HD2	1:A:914:PHE:HB3	1.85	0.56
1:A:216:LEU:O	1:A:219:LYS:HB3	2.06	0.56
1:B:446:ILE:HG12	1:B:446:ILE:O	2.04	0.56
1:B:954:HIS:CD2	1:B:954:HIS:H	2.23	0.56
1:B:1203:LEU:CD2	1:B:1208:MET:HE3	2.35	0.56
1:B:4:ASP:HB3	8:B:7379:HOH:O	2.04	0.56
1:B:132:GLU:HB3	1:B:164:LYS:CG	2.36	0.56
1:B:446:ILE:HG12	1:B:477:TRP:H	1.69	0.56
1:B:880:ARG:HD2	1:B:914:PHE:HB3	1.87	0.56
1:A:1311:GLN:HG3	1:A:1317:VAL:CG1	2.36	0.55
1:B:882:LEU:O	1:B:954:HIS:HE1	1.89	0.55
1:B:246:ASP:OD2	1:B:376:ARG:HD2	2.06	0.55
1:B:321:GLN:HG2	1:B:413:GLU:CD	2.27	0.55
1:A:135:VAL:HG23	1:A:165:ASP:HB3	1.88	0.55
1:B:577:LEU:HD12	1:B:578:PRO:HD2	1.88	0.55
1:A:531:LEU:HD12	1:A:534:MET:SD	2.47	0.55
1:B:666:ILE:CD1	1:B:807:VAL:HG13	2.37	0.55
1:B:1250:LYS:CE	1:B:1251:ARG:HG3	2.35	0.55
1:A:59:ASP:HB3	1:A:62:GLN:HB2	1.87	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:640:VAL:HG23	1:B:640:VAL:O	2.07	0.55
1:B:1208:MET:CE	1:B:1234:SER:HB3	2.37	0.55
1:B:55:ILE:HG23	1:B:83:VAL:CG1	2.36	0.55
1:B:900:ILE:N	1:B:900:ILE:HD12	2.21	0.55
1:A:58:TYR:OH	1:A:63:ASN:HA	2.07	0.54
1:B:123:MET:HE3	1:B:138:ILE:HG23	1.88	0.54
1:B:135:VAL:HG23	1:B:165:ASP:HA	1.89	0.54
1:B:132:GLU:O	1:B:164:LYS:HE3	2.08	0.54
1:B:998:LEU:HD13	1:B:1161:GLU:HB2	1.89	0.54
1:A:58:TYR:CE2	1:A:219:LYS:HG3	2.43	0.54
1:B:370:LYS:HD2	1:B:407:GLU:OE1	2.08	0.54
1:B:55:ILE:HG23	1:B:83:VAL:HG13	1.90	0.54
1:B:164:LYS:HB2	1:B:164:LYS:NZ	2.22	0.54
1:B:332:GLN:HE21	1:B:332:GLN:CA	2.18	0.54
1:B:887:ASN:O	1:B:1004:LYS:HE2	2.08	0.54
1:A:785:ASN:C	1:A:785:ASN:HD22	2.12	0.53
1:B:82:HIS:CE1	1:B:218:LEU:HD13	2.43	0.53
1:A:812:LEU:HD11	1:A:823:VAL:C	2.27	0.53
1:B:296:ILE:CD1	1:B:314:GLU:HG3	2.39	0.53
1:B:332:GLN:HA	1:B:332:GLN:NE2	2.21	0.53
1:A:666:ILE:HD12	1:A:807:VAL:HG13	1.89	0.53
1:A:469:THR:N	1:A:470:PRO:HD2	2.23	0.53
1:A:508:ARG:CZ	1:A:1315:LEU:HD11	2.39	0.53
1:A:972:ILE:HG13	1:A:973:ALA:N	2.24	0.53
1:A:911:PHE:O	1:A:912:ARG:C	2.46	0.53
1:A:874:SER:HB3	1:A:900:ILE:HG21	1.90	0.52
1:B:1317:VAL:HG23	1:B:1318:THR:N	2.24	0.52
1:A:785:ASN:HD22	1:A:786:ARG:N	2.07	0.52
1:A:1082:SER:HB2	3:A:6002:PO4:O4	2.09	0.52
1:B:923:ALA:HA	1:B:926:TRP:NE1	2.25	0.52
1:A:749:THR:O	1:A:812:LEU:HD22	2.08	0.52
1:B:388:PHE:HA	1:B:396:LEU:HG	1.92	0.52
1:B:911:PHE:O	1:B:912:ARG:C	2.47	0.52
1:B:812:LEU:HD11	1:B:823:VAL:C	2.29	0.52
1:B:1091:TYR:O	1:B:1095:GLN:HG2	2.09	0.52
1:B:1053:ALA:O	1:B:1098:LEU:HD11	2.10	0.52
1:A:900:ILE:N	1:A:900:ILE:HD12	2.25	0.52
1:A:124:TYR:OH	1:A:208:GLU:HG3	2.09	0.52
1:B:478:ASN:C	1:B:478:ASN:HD22	2.12	0.52
1:B:240:THR:OG1	1:B:243:GLU:HG3	2.10	0.51
1:A:111:GLN:NE2	1:A:150:THR:HA	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:555:ALA:O	1:A:1238:GLU:HA	2.10	0.51
1:A:581:ALA:O	1:A:585:GLN:HG3	2.09	0.51
1:A:667:ILE:HD13	1:A:687:ILE:HD13	1.92	0.51
1:B:62:GLN:OE1	1:B:64:LYS:HE3	2.10	0.51
1:B:157:GLN:HA	1:B:160:ARG:NH1	2.26	0.51
1:B:123:MET:HE3	1:B:159:PHE:HB3	1.93	0.51
1:A:812:LEU:HD11	1:A:823:VAL:HG12	1.93	0.51
1:A:1053:ALA:O	1:A:1098:LEU:HD11	2.11	0.51
1:A:1221:THR:CG2	1:A:1227:TYR:HB2	2.41	0.51
1:B:666:ILE:HD11	1:B:807:VAL:HG13	1.91	0.51
1:A:267:MET:HE1	8:A:7168:HOH:O	2.10	0.51
1:B:601:ASN:HD22	1:B:601:ASN:N	2.07	0.51
1:A:487:ALA:CA	1:A:1318:THR:HG23	2.41	0.51
1:A:601:ASN:HD22	1:A:601:ASN:N	2.09	0.50
1:A:812:LEU:CD1	1:A:823:VAL:HG12	2.40	0.50
1:A:1054:LEU:O	1:A:1055:LYS:HB2	2.11	0.50
1:A:695:ILE:HG23	1:A:700:ASP:HB3	1.92	0.50
1:B:469:THR:N	1:B:470:PRO:HD2	2.26	0.50
1:B:764:VAL:O	1:B:791:VAL:HG22	2.10	0.50
1:B:123:MET:HE2	1:B:142:PHE:HZ	1.75	0.50
1:B:132:GLU:HB3	1:B:164:LYS:HG3	1.92	0.50
1:A:32:ARG:NH1	1:A:675:PRO:HD2	2.27	0.50
1:A:253:ASP:OD2	1:A:253:ASP:N	2.45	0.50
1:B:969:ASP:O	1:B:972:ILE:HG12	2.12	0.50
1:A:321:GLN:HG2	1:A:413:GLU:OE1	2.12	0.50
1:A:995:LYS:NZ	1:A:1284:GLN:NE2	2.60	0.50
1:B:670:VAL:HG11	1:B:681:ALA:HB3	1.92	0.50
1:A:426:ARG:HD3	1:A:1212:HIS:CG	2.46	0.50
1:A:3:ALA:CB	1:A:227:ARG:H	2.11	0.50
1:A:478:ASN:ND2	1:A:480:GLU:H	2.10	0.50
1:A:670:VAL:HG11	1:A:681:ALA:HB3	1.93	0.49
1:A:1134:LYS:HD3	1:B:1124:ALA:HB3	1.92	0.49
1:A:1287:ASP:O	1:A:1288:ASN:HB2	2.11	0.49
1:B:426:ARG:O	1:B:426:ARG:HG2	2.11	0.49
1:A:1037:GLU:HB2	1:A:1043:HIS:CD2	2.47	0.49
1:B:761:GLU:HG3	1:B:788:VAL:HG13	1.93	0.49
1:B:1086:ASN:O	1:B:1090:VAL:HG23	2.11	0.49
1:B:785:ASN:HD22	1:B:786:ARG:N	2.10	0.49
1:A:1004:LYS:HG3	1:A:1155:TYR:HE2	1.77	0.49
1:A:537:LYS:O	1:A:538:LEU:CB	2.60	0.49
1:A:387:THR:O	1:A:396:LEU:HD21	2.12	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1311:GLN:HG3	1:A:1317:VAL:HG13	1.93	0.49
1:B:733:GLU:OE1	1:B:845:LYS:HE2	2.12	0.49
1:A:1003:THR:HG22	1:A:1266:LEU:HD21	1.94	0.49
1:B:655:PHE:HE2	1:B:814:LEU:HD23	1.77	0.49
1:B:909:THR:OG1	1:B:910:ALA:N	2.43	0.49
1:A:311:LEU:O	1:A:315:ILE:HG13	2.13	0.49
1:B:733:GLU:HG2	1:B:845:LYS:HG2	1.95	0.49
1:B:749:THR:HG22	1:B:812:LEU:HD22	1.93	0.49
1:B:812:LEU:HD11	1:B:824:ARG:N	2.27	0.49
1:A:1107:LYS:O	1:A:1108:LYS:HD2	2.13	0.49
1:A:756:GLU:OE2	1:B:793:ARG:NH2	2.46	0.48
1:B:266:GLU:O	1:B:270:LYS:HB2	2.13	0.48
1:B:605:LEU:C	1:B:605:LEU:HD23	2.33	0.48
1:A:954:HIS:H	1:A:954:HIS:CD2	2.30	0.48
1:B:402:ILE:C	1:B:402:ILE:HD12	2.34	0.48
1:B:422:GLN:HG2	1:B:424:SER:H	1.78	0.48
1:B:785:ASN:HD22	1:B:785:ASN:C	2.15	0.48
1:A:558:GLN:HB3	1:A:1192:ILE:HD13	1.95	0.48
1:A:431:ALA:HB2	1:A:501:GLY:HA3	1.93	0.48
1:B:601:ASN:H	1:B:601:ASN:ND2	2.11	0.48
1:B:880:ARG:HD2	1:B:914:PHE:O	2.14	0.48
1:B:1107:LYS:C	1:B:1109:PRO:HD3	2.33	0.48
1:A:1107:LYS:C	1:A:1108:LYS:HD2	2.34	0.48
1:A:785:ASN:ND2	1:A:786:ARG:HG2	2.29	0.48
1:A:1132:PHE:CG	1:B:1126:SER:HB2	2.48	0.48
1:A:62:GLN:O	1:A:64:LYS:HG3	2.13	0.48
1:A:711:GLU:HA	1:A:899:ARG:CD	2.44	0.48
1:B:1214:SER:HB3	1:B:1220:HIS:NE2	2.29	0.48
1:B:1313:THR:O	1:B:1317:VAL:HG22	2.14	0.48
1:A:306:LEU:HD23	1:A:306:LEU:C	2.34	0.48
1:B:164:LYS:O	1:B:165:ASP:HB2	2.14	0.48
1:B:531:LEU:CB	1:B:540:PRO:HD2	2.43	0.47
1:A:667:ILE:CD1	1:A:687:ILE:HD13	2.43	0.47
1:B:245:LEU:HD22	1:B:375:SER:HA	1.95	0.47
1:B:1045:LYS:HE3	1:B:1190:ILE:HG21	1.97	0.47
1:B:646:THR:HG21	8:B:7201:HOH:O	2.14	0.47
1:A:552:ASP:HB2	1:A:1237:ILE:HD13	1.95	0.47
1:A:711:GLU:HA	1:A:899:ARG:HD3	1.97	0.47
1:B:528:ARG:HH11	1:B:528:ARG:HG2	1.80	0.47
1:A:909:THR:OG1	1:A:910:ALA:N	2.42	0.47
1:B:874:SER:HB3	1:B:900:ILE:HG21	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:153:ARG:C	1:B:153:ARG:HD2	2.35	0.47
1:B:1007:ILE:O	1:B:1008:SER:CB	2.63	0.47
1:A:557:VAL:HG12	1:A:1240:ARG:CG	2.41	0.47
1:A:236:ILE:HD12	1:A:247:LEU:HD11	1.97	0.46
1:B:657:LYS:O	1:B:658:ASP:HB2	2.14	0.46
1:B:1203:LEU:HD21	1:B:1208:MET:HE3	1.96	0.46
1:A:372:THR:HG21	1:A:404:LEU:HD23	1.96	0.46
1:A:217:ARG:C	1:A:219:LYS:H	2.18	0.46
1:A:370:LYS:CE	1:A:383:ARG:HH21	2.29	0.46
1:B:441:PHE:CZ	1:B:526:LEU:HD11	2.50	0.46
1:A:5:GLU:HG2	8:A:7612:HOH:O	2.16	0.46
1:A:163:ALA:C	1:A:165:ASP:H	2.19	0.46
1:A:923:ALA:HA	1:A:926:TRP:NE1	2.30	0.46
1:B:641:PRO:HG2	1:B:780:LEU:HA	1.96	0.46
1:A:400:GLU:H	1:A:400:GLU:CD	2.20	0.46
1:A:487:ALA:CB	1:A:1318:THR:HG23	2.45	0.46
1:B:467:LYS:HB2	1:B:492:GLU:CD	2.36	0.46
1:B:637:ALA:O	1:B:640:VAL:HG22	2.16	0.46
1:A:964:LEU:HB3	1:A:965:PRO:HD3	1.97	0.46
1:A:1007:ILE:O	1:A:1008:SER:CB	2.64	0.46
1:B:1209:GLU:O	1:B:1298:PRO:HG3	2.16	0.45
1:A:812:LEU:HD21	1:A:823:VAL:O	2.16	0.45
1:B:231:GLU:OE2	1:B:680:ARG:NH1	2.49	0.45
1:B:545:ALA:HB2	1:B:993:TRP:HB2	1.97	0.45
1:A:646:THR:HG21	8:A:7078:HOH:O	2.15	0.45
1:A:1221:THR:HG22	1:A:1227:TYR:HB2	1.97	0.45
1:B:646:THR:CG2	1:B:647:GLY:H	2.09	0.45
1:B:1281:ALA:O	1:B:1284:GLN:HB3	2.16	0.45
1:B:1318:THR:HG22	1:B:1320:VAL:H	1.80	0.45
1:B:1250:LYS:HE3	1:B:1251:ARG:HG3	1.97	0.45
1:B:296:ILE:HD11	1:B:314:GLU:HG3	1.98	0.45
1:B:875:ARG:O	1:B:879:GLU:HG3	2.16	0.45
1:B:481:LEU:C	1:B:481:LEU:HD23	2.37	0.45
1:B:711:GLU:HA	1:B:899:ARG:HD2	1.97	0.45
1:B:812:LEU:HD11	1:B:823:VAL:HG12	1.98	0.45
1:B:1252:ALA:HB3	1:B:1256:SER:O	2.17	0.45
1:A:255:LYS:HG3	1:A:274:PHE:CD1	2.52	0.45
1:B:1203:LEU:C	1:B:1203:LEU:HD23	2.37	0.45
1:A:256:LEU:HD22	1:A:278:VAL:CG1	2.47	0.45
1:A:373:LEU:HD22	1:A:397:LEU:HD11	1.98	0.45
1:A:529:ALA:HB3	1:A:531:LEU:HD23	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:606:ARG:CD	1:B:679:GLN:HA	2.46	0.45
1:B:964:LEU:HB3	1:B:965:PRO:HD3	1.97	0.45
1:B:751:ALA:H	1:B:812:LEU:HD21	1.82	0.45
1:A:64:LYS:NZ	1:A:64:LYS:HB3	2.32	0.44
1:A:751:ALA:H	1:A:812:LEU:HD21	1.82	0.44
1:B:241:MET:HE1	1:B:283:ILE:HG21	1.99	0.44
1:B:263:ILE:HD11	6:B:3003:FAD:H3B	1.99	0.44
1:A:130:GLN:O	1:A:133:PRO:HD3	2.17	0.44
1:A:504:VAL:HG23	1:A:505:GLU:N	2.33	0.44
1:B:557:VAL:HG22	1:B:1240:ARG:HG2	1.99	0.44
1:B:650:ASN:ND2	1:B:778:LYS:HZ3	2.15	0.44
1:B:711:GLU:HA	1:B:899:ARG:CD	2.47	0.44
1:B:986:LYS:O	1:B:990:GLU:HG3	2.17	0.44
1:A:1088:GLN:NE2	8:A:7582:HOH:O	2.49	0.44
1:A:1314:THR:O	1:A:1315:LEU:HB2	2.17	0.44
1:B:130:GLN:NE2	1:B:132:GLU:H	1.99	0.44
1:B:400:GLU:HB2	8:B:7626:HOH:O	2.18	0.44
1:B:939:GLU:CG	1:B:977:TYR:CE2	2.97	0.44
1:A:58:TYR:CZ	1:A:63:ASN:HA	2.52	0.44
1:A:952:LEU:HD23	1:A:958:LYS:HA	2.00	0.44
1:A:1086:ASN:O	1:A:1090:VAL:HG23	2.18	0.44
1:A:1034:GLY:HA3	8:A:7049:HOH:O	2.17	0.44
1:A:1088:GLN:HG2	1:A:1133:TYR:CE1	2.50	0.44
1:B:753:PRO:HD3	1:B:816:ALA:HB1	1.99	0.44
1:A:605:LEU:HD23	1:A:605:LEU:C	2.38	0.44
1:A:880:ARG:HD2	1:A:914:PHE:O	2.18	0.44
1:A:939:GLU:HG2	1:A:977:TYR:CZ	2.52	0.44
1:A:962:PHE:CE2	1:A:965:PRO:HD3	2.52	0.44
1:A:1180:MET:HE1	1:A:1263:PRO:HA	1.99	0.44
1:B:812:LEU:CD1	1:B:823:VAL:HG12	2.48	0.44
1:A:95:GLN:OE1	1:A:96:LYS:HB2	2.17	0.43
1:A:211:PHE:CD2	1:A:216:LEU:HD13	2.53	0.43
1:A:641:PRO:HG2	1:A:780:LEU:HA	1.99	0.43
1:A:756:GLU:CD	1:B:793:ARG:HH22	2.21	0.43
1:A:767:GLN:HG3	1:A:801:LYS:HB2	1.99	0.43
1:B:793:ARG:HG2	8:B:7042:HOH:O	2.18	0.43
1:A:324:GLU:HB2	1:A:411:SER:CB	2.48	0.43
1:B:128:ARG:HB3	1:B:128:ARG:NH1	2.33	0.43
1:A:503:MET:HG2	1:A:1302:GLU:OE2	2.18	0.43
1:A:315:ILE:HD13	1:A:327:ARG:HG2	1.99	0.43
1:A:751:ALA:N	1:A:812:LEU:HD21	2.33	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1034:GLY:HA3	8:B:7040:HOH:O	2.19	0.43
1:A:601:ASN:H	1:A:601:ASN:ND2	2.16	0.43
1:A:601:ASN:O	1:A:821:ARG:HD2	2.19	0.43
1:B:151:GLY:HA2	1:B:1200:VAL:HG21	1.99	0.43
1:B:153:ARG:N	1:B:154:PRO:HD2	2.34	0.43
1:B:751:ALA:N	1:B:812:LEU:HD21	2.34	0.43
1:B:1088:GLN:CG	1:B:1133:TYR:CD1	2.94	0.43
1:B:504:VAL:HG23	1:B:505:GLU:N	2.34	0.43
1:B:357:ILE:CD1	1:B:429:ASP:HA	2.49	0.43
1:A:217:ARG:C	1:A:219:LYS:N	2.72	0.43
1:A:388:PHE:HA	1:A:396:LEU:CG	2.44	0.43
1:A:753:PRO:HD3	1:A:816:ALA:HB1	1.99	0.43
1:B:29:TYR:CE1	1:B:33:LYS:HG2	2.54	0.43
1:B:1300:THR:O	1:B:1304:ILE:HG13	2.18	0.43
1:A:3:ALA:HA	1:A:226:LEU:HD22	2.00	0.43
1:A:263:ILE:HG22	1:A:267:MET:CE	2.48	0.43
1:A:251:HIS:C	1:A:253:ASP:H	2.23	0.42
1:A:616:LYS:HG2	1:A:692:LEU:HD11	2.02	0.42
1:A:1203:LEU:HD23	1:A:1203:LEU:C	2.40	0.42
1:A:481:LEU:C	1:A:481:LEU:HD23	2.38	0.42
1:A:688:THR:HG23	8:A:7329:HOH:O	2.19	0.42
1:B:252:PRO:CG	1:B:400:GLU:HG2	2.39	0.42
1:B:785:ASN:ND2	1:B:786:ARG:HG2	2.34	0.42
1:B:1151:HIS:NE2	1:B:1251:ARG:HB3	2.33	0.42
1:A:644:ASN:O	1:A:653:THR:HA	2.20	0.42
1:A:1088:GLN:HG2	1:A:1133:TYR:CG	2.51	0.42
1:B:82:HIS:NE2	1:B:218:LEU:HD13	2.33	0.42
1:B:256:LEU:HD22	1:B:278:VAL:HG13	2.00	0.42
1:A:666:ILE:HD11	1:A:807:VAL:CG1	2.49	0.42
1:A:926:TRP:O	1:A:930:VAL:HG23	2.19	0.42
1:B:1300:THR:HB	1:B:1301:PRO:HD2	2.02	0.42
1:A:698:ILE:O	1:A:702:ILE:HG13	2.20	0.42
1:A:1143:GLU:OE1	1:A:1143:GLU:N	2.48	0.42
1:A:1250:LYS:CE	1:A:1251:ARG:HG3	2.49	0.42
1:B:164:LYS:HB2	1:B:164:LYS:HZ2	1.85	0.42
1:A:749:THR:HG23	1:A:764:VAL:HG22	2.02	0.42
1:B:640:VAL:O	1:B:640:VAL:CG2	2.68	0.42
1:A:29:TYR:CZ	1:A:33:LYS:HG2	2.55	0.42
1:B:783:PRO:HB2	1:B:785:ASN:ND2	2.35	0.42
1:A:657:LYS:O	1:A:658:ASP:HB2	2.20	0.42
1:A:128:ARG:NE	1:A:208:GLU:HG2	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:336:LEU:HG	6:A:2003:FAD:C4	2.49	0.41
1:A:532:GLU:OE1	1:A:537:LYS:HA	2.20	0.41
1:B:94:THR:HG21	1:B:584:MET:HG2	2.02	0.41
1:B:508:ARG:HG2	1:B:508:ARG:HH11	1.84	0.41
1:A:251:HIS:C	1:A:253:ASP:N	2.72	0.41
1:A:711:GLU:CA	1:A:899:ARG:HD3	2.50	0.41
1:B:785:ASN:ND2	1:B:786:ARG:NH1	2.49	0.41
1:A:1180:MET:HE1	1:A:1266:LEU:HD12	2.01	0.41
1:B:1199:PHE:CE1	1:B:1267:ALA:HA	2.55	0.41
1:A:153:ARG:N	1:A:154:PRO:HD2	2.35	0.41
1:A:297:SER:HA	1:A:407:GLU:HA	2.03	0.41
1:B:123:MET:HE1	1:B:138:ILE:HG23	2.00	0.41
1:B:531:LEU:HD23	1:B:531:LEU:C	2.41	0.41
1:B:1004:LYS:HE2	1:B:1004:LYS:HB3	1.86	0.41
1:A:1198:ALA:HB3	1:A:1263:PRO:HB2	2.02	0.41
1:A:1279:ARG:NH2	1:A:1290:LYS:HD3	2.33	0.41
1:B:262:GLU:O	1:B:266:GLU:HG3	2.20	0.41
1:B:1291:GLN:HG2	1:B:1292:LEU:N	2.36	0.41
1:A:655:PHE:HE2	1:A:814:LEU:HD23	1.85	0.41
1:A:891:ILE:HA	1:A:892:PRO:HD3	1.91	0.41
1:A:233:VAL:HG12	1:A:234:THR:N	2.35	0.41
1:A:539:ASP:HB3	1:A:542:PHE:CD1	2.56	0.41
1:A:708:TYR:CE1	1:A:902:LYS:HA	2.56	0.41
1:A:719:LEU:HD11	1:A:895:ARG:CB	2.46	0.41
1:A:46:GLY:CA	5:A:2002:FES:S1	3.09	0.41
1:A:116:THR:HB	1:A:117:PRO:HD3	2.03	0.41
1:A:610:SER:HB2	1:A:660:VAL:HG11	2.02	0.41
1:A:1105:LYS:HE3	1:A:1105:LYS:HB2	1.91	0.41
1:A:1214:SER:HB3	1:A:1220:HIS:NE2	2.36	0.41
1:B:116:THR:HB	1:B:117:PRO:HD3	2.03	0.41
1:B:130:GLN:O	1:B:133:PRO:HD3	2.21	0.41
1:B:311:LEU:O	1:B:315:ILE:HG13	2.21	0.41
1:B:418:SER:HB2	1:B:518:PHE:CD1	2.56	0.41
1:B:1102:GLU:HB3	1:B:1103:PRO:CD	2.48	0.41
1:B:1105:LYS:HA	1:B:1116:TRP:NE1	2.36	0.41
1:B:1200:VAL:O	1:B:1203:LEU:HB3	2.21	0.41
1:A:3:ALA:HA	1:A:226:LEU:CD2	2.51	0.41
1:A:764:VAL:O	1:A:791:VAL:HG22	2.21	0.41
1:A:1069:ASN:HD22	1:A:1069:ASN:C	2.24	0.41
1:A:1252:ALA:HB3	1:A:1256:SER:O	2.20	0.41
1:B:504:VAL:HG22	8:B:7235:HOH:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:531:LEU:HB2	1:B:540:PRO:HD2	2.03	0.41
1:B:868:GLY:HA3	1:B:907:SER:HA	2.04	0.41
1:A:132:GLU:O	1:A:164:LYS:HE3	2.21	0.40
1:A:221:THR:HA	1:A:222:PRO:HD3	1.93	0.40
1:A:783:PRO:HB3	1:B:1028:SER:HB3	2.03	0.40
1:A:1151:HIS:NE2	1:A:1251:ARG:HB3	2.36	0.40
1:B:294:GLU:HG3	1:B:370:LYS:NZ	2.36	0.40
1:B:531:LEU:HG	1:B:540:PRO:HB2	2.03	0.40
1:A:1311:GLN:CG	1:A:1317:VAL:HG13	2.52	0.40
1:A:134:THR:OG1	1:A:137:GLU:HG3	2.22	0.40
1:A:473:LEU:O	1:A:474:SER:CB	2.69	0.40
1:A:1091:TYR:O	1:A:1095:GLN:HG2	2.22	0.40
1:B:132:GLU:HB3	1:B:164:LYS:HD3	2.02	0.40
1:A:132:GLU:HB3	1:A:164:LYS:HD3	2.04	0.40
1:A:334:ARG:NH1	1:A:334:ARG:HB3	2.36	0.40
1:A:539:ASP:HA	1:A:540:PRO:HD3	1.97	0.40
1:B:46:GLY:HA2	5:B:2002:FES:S1	2.62	0.40
1:B:478:ASN:C	1:B:478:ASN:ND2	2.75	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	1287/1331 (97%)	1220 (95%)	57 (4%)	10 (1%)	19 22
1	B	1273/1331 (96%)	1220 (96%)	46 (4%)	7 (0%)	29 34
All	All	2560/2662 (96%)	2440 (95%)	103 (4%)	17 (1%)	22 25

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	4	ASP
1	A	1008	SER
1	A	1287	ASP
1	A	1288	ASN
1	B	4	ASP
1	B	1008	SER
1	A	62	GLN
1	A	912	ARG
1	B	912	ARG
1	B	1286	GLY
1	A	797	GLY
1	B	376	ARG
1	B	797	GLY
1	A	538	LEU
1	A	474	SER
1	B	1139	GLY
1	A	1012	PRO

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	1089/1123 (97%)	1064 (98%)	25 (2%)	50 65
1	B	1079/1123 (96%)	1058 (98%)	21 (2%)	57 71
All	All	2168/2246 (96%)	2122 (98%)	46 (2%)	53 68

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

Mol	Chain	Res	Type
1	A	95	GLN
1	A	208	GLU
1	A	247	LEU
1	A	253	ASP
1	A	255	LYS
1	A	256	LEU
1	A	400	GLU

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Mol	Chain	Res	Type
1	A	432	LYS
1	A	480	GLU
1	A	551	LYS
1	A	572	MET
1	A	601	ASN
1	A	650	ASN
1	A	743	TYR
1	A	785	ASN
1	A	911	PHE
1	A	939	GLU
1	A	1002	PRO
1	A	1031	LEU
1	A	1069	ASN
1	A	1085	LEU
1	A	1177	ASP
1	A	1239	PHE
1	A	1250	LYS
1	A	1276	ASP
1	B	199	ASP
1	B	253	ASP
1	B	255	LYS
1	B	306	LEU
1	B	332	GLN
1	B	350	ASN
1	B	383	ARG
1	B	478	ASN
1	B	480	GLU
1	B	572	MET
1	B	601	ASN
1	B	743	TYR
1	B	785	ASN
1	B	869	ASN
1	B	911	PHE
1	B	1069	ASN
1	B	1072	PRO
1	B	1085	LEU
1	B	1239	PHE
1	B	1250	LYS
1	B	1276	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (41) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	63	ASN
1	A	71	ASN
1	A	111	GLN
1	A	130	GLN
1	A	145	ASN
1	A	350	ASN
1	A	472	GLN
1	A	478	ASN
1	A	583	ASN
1	A	585	GLN
1	A	601	ASN
1	A	642	ASN
1	A	650	ASN
1	A	679	GLN
1	A	747	ASN
1	A	785	ASN
1	A	954	HIS
1	A	1069	ASN
1	A	1088	GLN
1	A	1284	GLN
1	B	63	ASN
1	B	71	ASN
1	B	130	GLN
1	B	145	ASN
1	B	223	GLN
1	B	332	GLN
1	B	350	ASN
1	B	386	HIS
1	B	478	ASN
1	B	583	ASN
1	B	585	GLN
1	B	601	ASN
1	B	642	ASN
1	B	650	ASN
1	B	747	ASN
1	B	785	ASN
1	B	869	ASN
1	B	954	HIS
1	B	1069	ASN
1	B	1086	ASN
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](#)

Of 25 ligands modelled in this entry, 4 are monoatomic - leaving 21 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
6	FAD	A	2003	-	53,58,58	3.63	18 (33%)	68,89,89	2.01	24 (35%)
2	BCT	B	5002	-	2,3,3	0.69	0	2,3,3	1.53	0
3	PO4	B	6007	-	4,4,4	1.67	0	6,6,6	0.43	0
3	PO4	A	6001	-	4,4,4	1.65	0	6,6,6	0.44	0
3	PO4	B	6003	-	4,4,4	1.77	1 (25%)	6,6,6	0.43	0
3	PO4	B	6011	-	4,4,4	1.65	0	6,6,6	0.42	0
3	PO4	B	6005	-	4,4,4	1.66	0	6,6,6	0.44	0
3	PO4	A	6009	-	4,4,4	1.59	0	6,6,6	0.42	0
6	FAD	B	3003	-	53,58,58	4.41	25 (47%)	68,89,89	1.97	21 (30%)
5	FES	B	2002	1	0,4,4	-	-	-	-	-
7	URC	A	4001	-	8,13,13	2.42	3 (37%)	5,19,19	9.04	4 (80%)
3	PO4	B	6010	-	4,4,4	1.65	0	6,6,6	0.43	0
2	BCT	A	5001	-	2,3,3	0.62	0	2,3,3	1.54	0
3	PO4	A	6006	-	4,4,4	1.65	0	6,6,6	0.43	0
7	URC	B	4002	-	8,13,13	2.43	3 (37%)	5,19,19	9.16	5 (100%)
3	PO4	A	6004	-	4,4,4	1.60	0	6,6,6	0.43	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	PO4	A	6002	-	4,4,4	1.73	0	6,6,6	0.43	0
5	FES	A	2001	1	0,4,4	-	-	-		
5	FES	B	2001	1	0,4,4	-	-	-		
3	PO4	A	6008	-	4,4,4	1.62	0	6,6,6	0.43	0
5	FES	A	2002	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
5	FES	B	2002	1	-	-	0/1/1/1
7	URC	A	4001	-	-	-	0/2/2/2
5	FES	A	2001	1	-	-	0/1/1/1
6	FAD	A	2003	-	-	1/30/50/50	0/6/6/6
5	FES	B	2001	1	-	-	0/1/1/1
6	FAD	B	3003	-	-	5/30/50/50	0/6/6/6
5	FES	A	2002	1	-	-	0/1/1/1
7	URC	B	4002	-	-	-	0/2/2/2

All (50) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	3003	FAD	C5'-C4'	-21.88	1.20	1.51
6	A	2003	FAD	C5'-C4'	-15.88	1.29	1.51
6	A	2003	FAD	C2B-C1B	-11.50	1.36	1.53
6	B	3003	FAD	C2B-C3B	9.57	1.79	1.53
6	A	2003	FAD	O2B-C2B	-9.22	1.21	1.43
6	B	3003	FAD	C2B-C1B	-9.06	1.40	1.53
6	B	3003	FAD	O4B-C1B	8.56	1.53	1.41
6	B	3003	FAD	O2B-C2B	-7.61	1.25	1.43
6	A	2003	FAD	O4B-C1B	6.80	1.50	1.41
6	A	2003	FAD	C4X-N5	5.94	1.42	1.30
7	B	4002	URC	C5-C6	5.79	1.51	1.41
6	B	3003	FAD	C4X-N5	5.68	1.41	1.30
7	A	4001	URC	C5-C6	5.64	1.51	1.41
6	B	3003	FAD	C5B-C4B	-5.62	1.34	1.51
6	A	2003	FAD	C10-N1	5.22	1.43	1.33
6	B	3003	FAD	C10-N1	4.90	1.43	1.33
6	A	2003	FAD	O5'-C5'	-3.99	1.29	1.44
6	B	3003	FAD	C6-C7	3.35	1.44	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	2003	FAD	C9A-N10	3.21	1.46	1.41
6	B	3003	FAD	C9A-N10	3.20	1.46	1.41
6	B	3003	FAD	C9-C9A	3.18	1.44	1.39
6	B	3003	FAD	P-O5'	-3.17	1.46	1.59
6	A	2003	FAD	C9-C9A	3.09	1.44	1.39
6	A	2003	FAD	C6-C7	3.04	1.44	1.39
6	B	3003	FAD	C3B-C4B	2.94	1.60	1.53
6	B	3003	FAD	P-O1P	2.89	1.61	1.50
6	A	2003	FAD	C10-N10	2.72	1.43	1.37
6	B	3003	FAD	C10-N10	2.72	1.43	1.37
6	A	2003	FAD	C4-N3	2.57	1.43	1.38
6	B	3003	FAD	C4A-N3A	2.57	1.39	1.35
6	A	2003	FAD	C9A-C5X	2.49	1.45	1.41
7	A	4001	URC	C6-N1	2.45	1.37	1.33
6	B	3003	FAD	O5'-C5'	-2.45	1.35	1.44
6	B	3003	FAD	C6-C5X	2.43	1.43	1.40
6	B	3003	FAD	O5B-C5B	2.42	1.54	1.44
6	B	3003	FAD	O3B-C3B	-2.42	1.37	1.43
6	B	3003	FAD	PA-O5B	-2.41	1.49	1.59
6	B	3003	FAD	C2A-N3A	2.38	1.35	1.32
6	B	3003	FAD	PA-O2A	-2.35	1.44	1.55
6	A	2003	FAD	PA-O2A	-2.32	1.44	1.55
7	A	4001	URC	C4-N9	-2.32	1.30	1.34
6	B	3003	FAD	C9A-C5X	2.25	1.45	1.41
7	B	4002	URC	C4-N9	-2.25	1.30	1.34
6	A	2003	FAD	C2A-N3A	2.24	1.35	1.32
6	A	2003	FAD	O3B-C3B	-2.15	1.37	1.43
7	B	4002	URC	C6-N1	2.11	1.36	1.33
6	A	2003	FAD	C4A-N3A	2.11	1.38	1.35
6	A	2003	FAD	C8-C7	2.05	1.46	1.40
3	B	6003	PO4	P-O4	-2.05	1.48	1.54
6	B	3003	FAD	C4-N3	2.01	1.42	1.38

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	4002	URC	C4-N9-C8	16.92	111.39	101.12
7	A	4001	URC	C4-N9-C8	16.68	111.24	101.12
7	B	4002	URC	C2-N1-C6	9.39	123.07	115.14
7	A	4001	URC	C2-N1-C6	9.23	122.94	115.14
6	B	3003	FAD	N3A-C2A-N1A	-6.85	117.97	128.68
6	A	2003	FAD	N3A-C2A-N1A	-6.69	118.22	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	4001	URC	C5-C6-N1	-5.29	116.20	123.43
7	B	4002	URC	C5-C6-N1	-5.21	116.31	123.43
6	B	3003	FAD	O4B-C1B-C2B	5.19	114.52	106.93
6	B	3003	FAD	P-O5'-C5'	4.43	147.66	121.68
6	A	2003	FAD	O3B-C3B-C2B	4.18	125.35	111.82
6	A	2003	FAD	O4B-C1B-C2B	4.01	112.78	106.93
6	A	2003	FAD	C3B-C2B-C1B	-4.00	94.96	100.98
7	B	4002	URC	C4-C5-C6	-3.70	117.27	120.80
7	A	4001	URC	C4-C5-C6	-3.65	117.32	120.80
6	B	3003	FAD	C5B-C4B-C3B	3.56	128.52	115.18
6	A	2003	FAD	O2B-C2B-C1B	3.50	123.79	110.85
6	A	2003	FAD	C2B-C3B-C4B	3.13	108.72	102.64
6	A	2003	FAD	C4-N3-C2	-3.01	120.09	125.64
6	B	3003	FAD	C4X-C4-N3	3.00	120.81	113.19
6	B	3003	FAD	C4-N3-C2	-2.99	120.12	125.64
6	A	2003	FAD	C4X-C4-N3	2.95	120.68	113.19
6	A	2003	FAD	C1'-C2'-C3'	2.89	117.85	109.79
6	B	3003	FAD	C1'-C2'-C3'	2.85	117.77	109.79
6	B	3003	FAD	C3B-C2B-C1B	-2.75	96.84	100.98
6	A	2003	FAD	O4B-C4B-C3B	-2.71	99.76	105.11
6	B	3003	FAD	C4'-C3'-C2'	2.59	118.74	113.36
6	B	3003	FAD	C2A-N1A-C6A	2.58	123.17	118.75
6	B	3003	FAD	C9A-C5X-N5	-2.46	119.76	122.43
6	A	2003	FAD	C5B-C4B-C3B	2.42	124.24	115.18
6	A	2003	FAD	C9A-C5X-N5	-2.41	119.81	122.43
6	A	2003	FAD	O5'-C5'-C4'	2.41	115.78	109.36
6	A	2003	FAD	C2A-N1A-C6A	2.40	122.85	118.75
6	B	3003	FAD	C4X-C10-N1	-2.37	119.23	124.73
6	B	3003	FAD	C10-N1-C2	2.37	121.64	116.90
6	A	2003	FAD	C10-N1-C2	2.37	121.63	116.90
6	A	2003	FAD	C4'-C3'-C2'	2.35	118.25	113.36
6	B	3003	FAD	C5X-N5-C4X	2.31	121.92	118.07
6	B	3003	FAD	O4-C4-C4X	-2.30	120.49	126.60
6	A	2003	FAD	C4X-C10-N1	-2.28	119.44	124.73
6	A	2003	FAD	O4-C4-C4X	-2.26	120.61	126.60
6	B	3003	FAD	C8M-C8-C9	-2.24	115.35	119.49
6	B	3003	FAD	C10-C4X-N5	-2.23	120.13	124.86
6	A	2003	FAD	O2B-C2B-C3B	-2.22	104.63	111.82
6	A	2003	FAD	C10-C4X-N5	-2.21	120.16	124.86
6	A	2003	FAD	C5X-N5-C4X	2.19	121.71	118.07
6	B	3003	FAD	C6-C5X-C9A	2.18	122.02	118.94
6	B	3003	FAD	O2B-C2B-C1B	2.14	118.76	110.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	2003	FAD	C8M-C8-C9	-2.11	115.58	119.49
6	B	3003	FAD	P-O3P-PA	2.08	139.97	132.83
6	B	3003	FAD	O3'-C3'-C2'	-2.07	103.81	108.81
6	A	2003	FAD	C6-C5X-C9A	2.07	121.86	118.94
7	B	4002	URC	C4-C5-N7	-2.05	107.39	109.47
6	A	2003	FAD	C4A-C5A-N7A	-2.02	107.30	109.40

There are no chirality outliers.

All (6) torsion outliers are listed below:

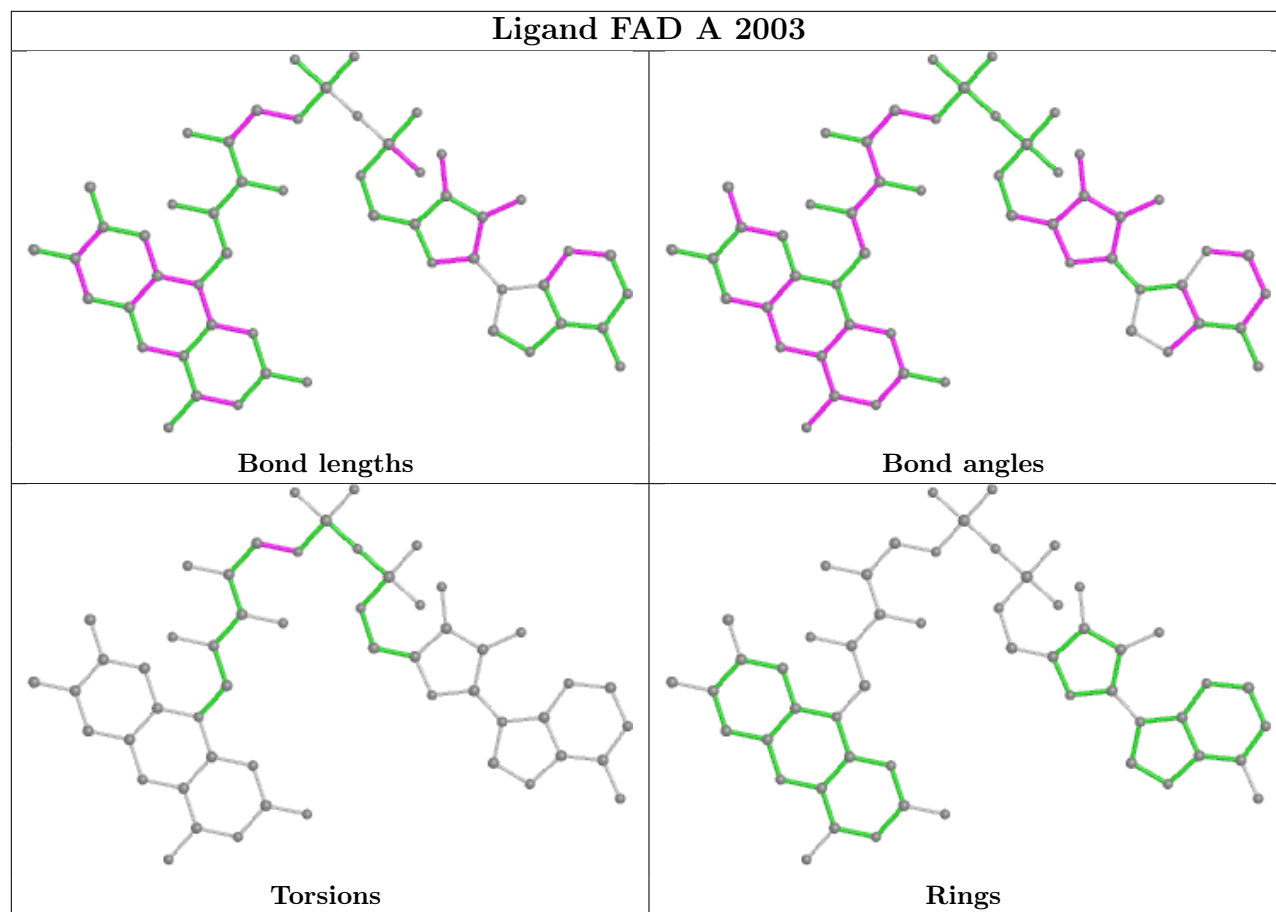
Mol	Chain	Res	Type	Atoms
6	B	3003	FAD	O4'-C4'-C5'-O5'
6	B	3003	FAD	C3'-C4'-C5'-O5'
6	A	2003	FAD	C4'-C5'-O5'-P
6	B	3003	FAD	C4'-C5'-O5'-P
6	B	3003	FAD	C5'-O5'-P-O3P
6	B	3003	FAD	C5'-O5'-P-O1P

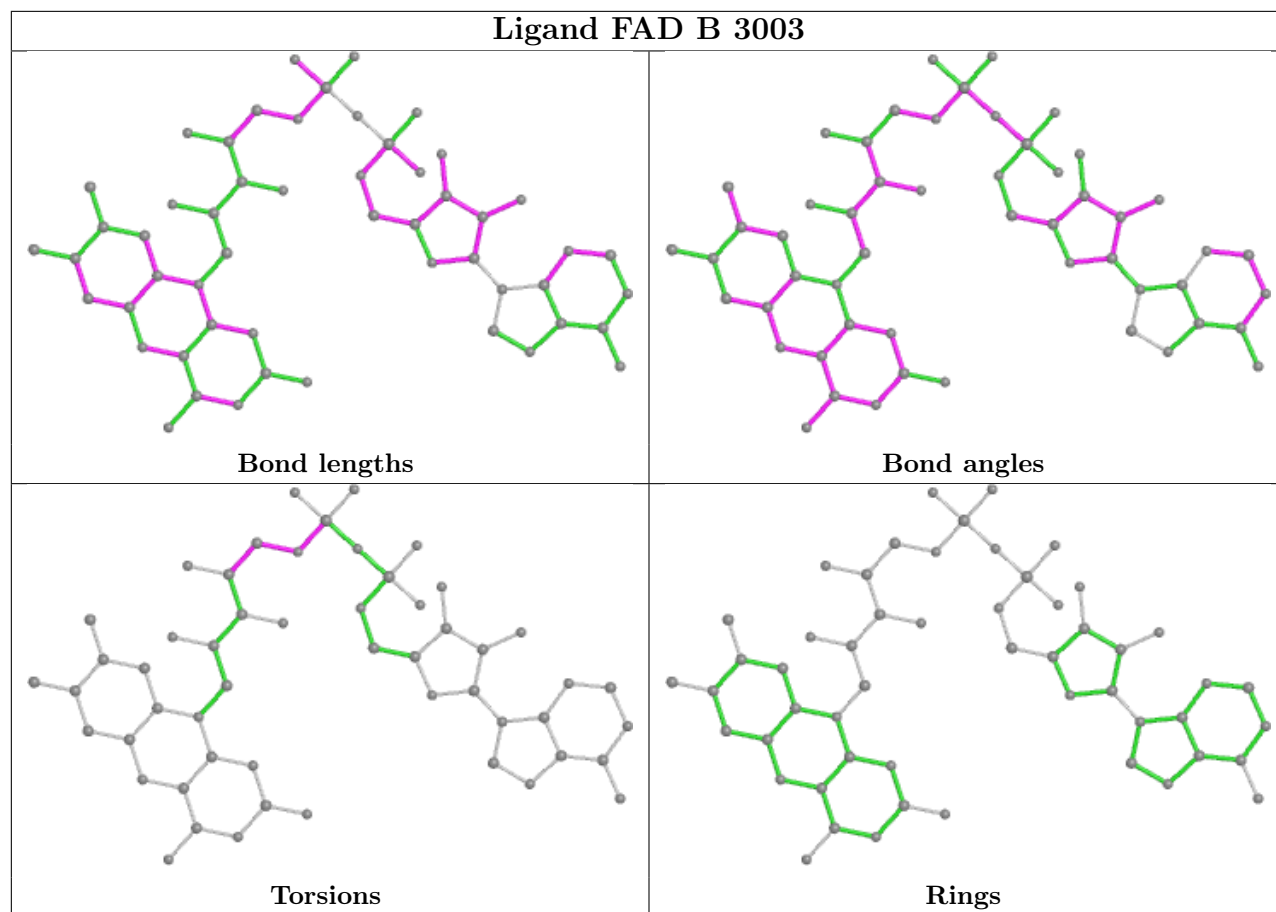
There are no ring outliers.

6 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	2003	FAD	1	0
3	B	6003	PO4	1	0
6	B	3003	FAD	3	0
5	B	2002	FES	1	0
3	A	6002	PO4	1	0
5	A	2002	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 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	1291/1331 (96%)	-0.14	51 (3%) 38 43	14, 29, 57, 96	0
1	B	1281/1331 (96%)	-0.16	43 (3%) 45 50	13, 26, 53, 116	0
All	All	2572/2662 (96%)	-0.15	94 (3%) 41 47	13, 28, 55, 116	0

All (94) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	553	PRO	12.1
1	A	1289	ALA	11.8
1	A	1288	ASN	10.5
1	B	554	PRO	8.2
1	B	1288	ASN	7.9
1	A	61	LEU	7.6
1	B	61	LEU	7.3
1	B	540	PRO	7.3
1	A	191	SER	6.8
1	B	543	ALA	6.7
1	B	552	ASP	6.7
1	B	541	THR	6.6
1	B	191	SER	6.4
1	B	1289	ALA	6.4
1	B	529	ALA	6.3
1	B	547	LEU	6.3
1	A	549	PHE	5.7
1	A	551	LYS	5.6
1	B	546	THR	5.5
1	A	550	GLN	5.4
1	B	1287	ASP	5.2
1	B	544	SER	4.7
1	A	221	THR	4.6
1	B	555	ALA	4.5

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Mol	Chain	Res	Type	RSRZ
1	A	95	GLN	4.3
1	A	1290	LYS	4.3
1	B	63	ASN	4.3
1	A	192	PRO	4.3
1	B	1320	VAL	4.3
1	B	527	GLY	4.3
1	B	1286	GLY	4.2
1	A	165	ASP	4.1
1	B	165	ASP	4.0
1	B	1318	THR	3.9
1	A	1111	GLY	3.9
1	B	531	LEU	3.8
1	A	1287	ASP	3.8
1	B	530	ASP	3.8
1	B	542	PHE	3.7
1	A	552	ASP	3.5
1	A	386	HIS	3.5
1	A	250	GLN	3.5
1	A	1110	THR	3.3
1	B	220	ASP	3.3
1	A	423	ALA	3.2
1	B	528	ARG	3.1
1	B	565	LYS	3.0
1	A	553	PRO	2.9
1	B	164	LYS	2.9
1	A	1315	LEU	2.9
1	A	424	SER	2.8
1	A	1318	THR	2.8
1	A	496	ALA	2.8
1	A	1316	CYS	2.8
1	A	529	ALA	2.7
1	B	1143	GLU	2.7
1	A	474	SER	2.6
1	A	428	ASP	2.6
1	A	292	GLY	2.6
1	B	334	ARG	2.6
1	A	497	PRO	2.6
1	B	222	PRO	2.6
1	A	566	ASP	2.6
1	A	467	LYS	2.6
1	B	1111	GLY	2.6
1	A	271	ASN	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	537	LYS	2.5
1	B	1108	LYS	2.5
1	B	474	SER	2.4
1	B	95	GLN	2.4
1	A	720	LYS	2.3
1	A	1143	GLU	2.3
1	A	220	ASP	2.3
1	A	193	SER	2.2
1	A	1286	GLY	2.2
1	B	480	GLU	2.2
1	A	3	ALA	2.2
1	B	386	HIS	2.2
1	A	686	LYS	2.2
1	B	219	LYS	2.2
1	B	317	LYS	2.2
1	A	532	GLU	2.1
1	A	320	GLU	2.1
1	A	466	LEU	2.1
1	B	288	SER	2.1
1	B	221	THR	2.1
1	B	566	ASP	2.1
1	A	60	ARG	2.1
1	A	565	LYS	2.1
1	A	498	ASP	2.0
1	A	63	ASN	2.0
1	A	534	MET	2.0
1	A	1107	LYS	2.0
1	A	699	GLN	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,

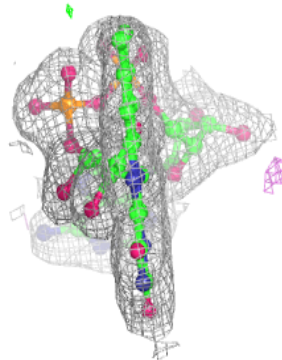
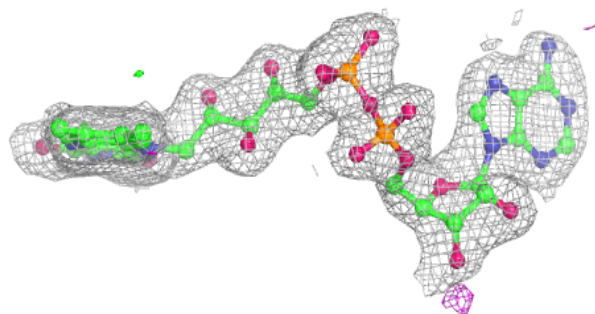
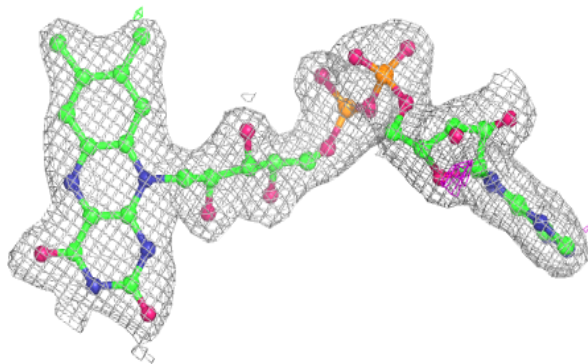
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	PO4	A	6004	5/5	0.78	0.22	97,97,98,99	0
3	PO4	A	6009	5/5	0.90	0.27	85,86,86,87	0
3	PO4	B	6005	5/5	0.91	0.19	82,83,84,84	0
7	URC	B	4002	12/12	0.93	0.12	32,34,39,39	0
3	PO4	B	6010	5/5	0.94	0.20	69,70,71,71	0
3	PO4	A	6008	5/5	0.94	0.13	73,74,74,75	0
3	PO4	A	6006	5/5	0.95	0.25	80,80,81,81	0
7	URC	A	4001	12/12	0.95	0.11	31,34,35,38	0
3	PO4	A	6001	5/5	0.95	0.20	46,48,51,51	0
5	FES	B	2001	4/4	0.96	0.07	26,30,30,33	0
3	PO4	B	6007	5/5	0.96	0.16	72,72,73,73	0
5	FES	A	2001	4/4	0.96	0.07	31,32,32,34	0
6	FAD	A	2003	53/53	0.97	0.09	20,28,31,37	0
3	PO4	B	6011	5/5	0.98	0.19	49,50,51,53	0
6	FAD	B	3003	53/53	0.98	0.09	14,22,26,28	0
3	PO4	B	6003	5/5	0.98	0.11	32,33,39,40	0
3	PO4	A	6002	5/5	0.98	0.10	34,37,39,42	0
5	FES	A	2002	4/4	0.99	0.05	20,20,21,21	0
2	BCT	A	5001	4/4	0.99	0.09	23,25,25,26	0
5	FES	B	2002	4/4	0.99	0.06	19,20,20,21	0
4	CA	A	7003	1/1	0.99	0.03	22,22,22,22	0
4	CA	B	7001	1/1	0.99	0.07	21,21,21,21	0
4	CA	B	7004	1/1	0.99	0.06	22,22,22,22	0
2	BCT	B	5002	4/4	0.99	0.12	22,22,23,24	0
4	CA	A	7002	1/1	1.00	0.07	23,23,23,23	0

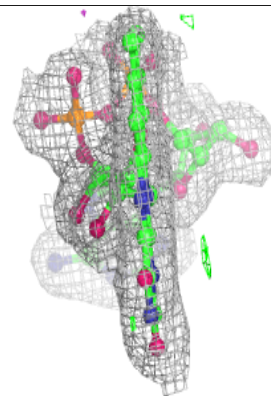
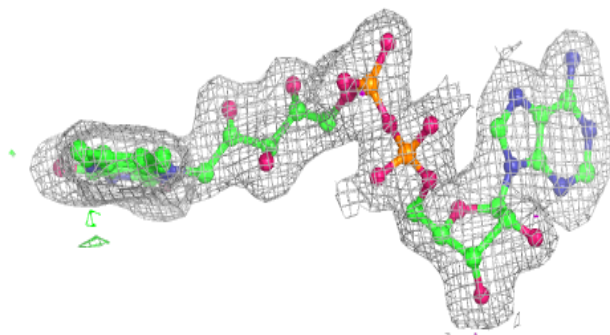
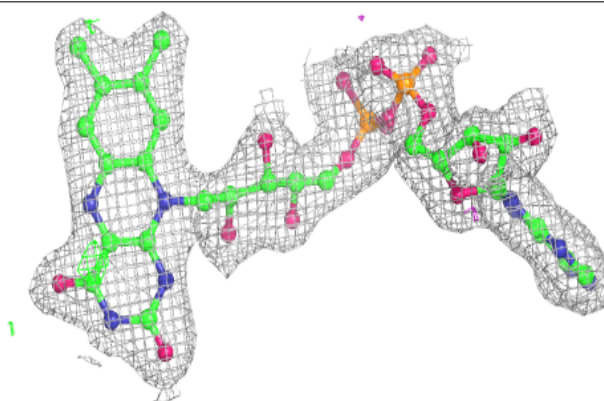
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around FAD A 2003:

$2mF_o-DF_c$ (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.