



Full wwPDB X-ray Structure Validation Report ⓘ

May 17, 2023 – 02:20 PM JST

PDB ID : 8J79
Title : Bovine Xanthine Oxidoreductase Crystallized with oxypurinol
Authors : Okamoto, K.; Sekine, M.
Deposited on : 2023-04-27
Resolution : 1.99 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 : 2.32.2
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) : 2.32.2

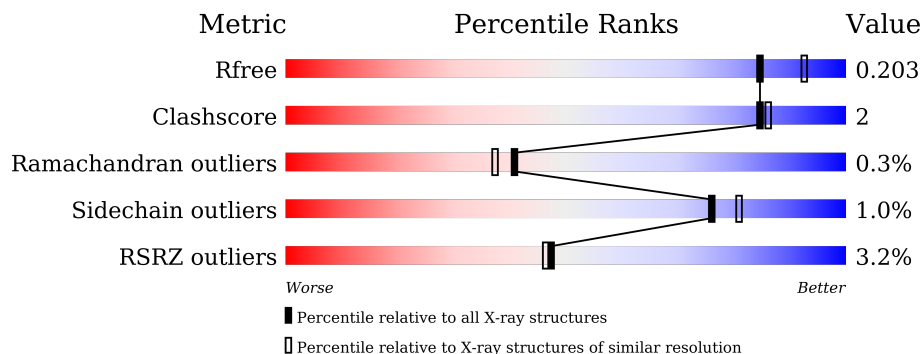
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.99 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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	1332	
1	B	1332	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
9	GOL	B	1413	-	-	X	-

2 Entry composition [i](#)

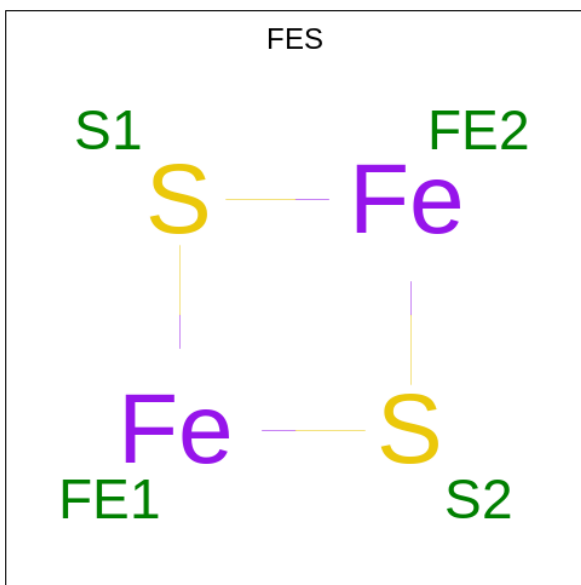
There are 10 unique types of molecules in this entry. The entry contains 22065 atoms, of which 0 are hydrogens and 0 are deuteriums.

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.

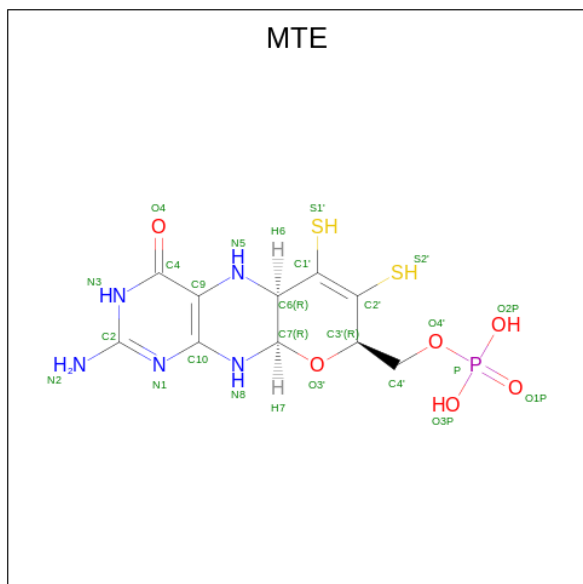
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1285	9980	6346	1708	1866	60	0	0	0
1	B	1288	10000	6358	1711	1870	61	0	0	0

- Molecule 2 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



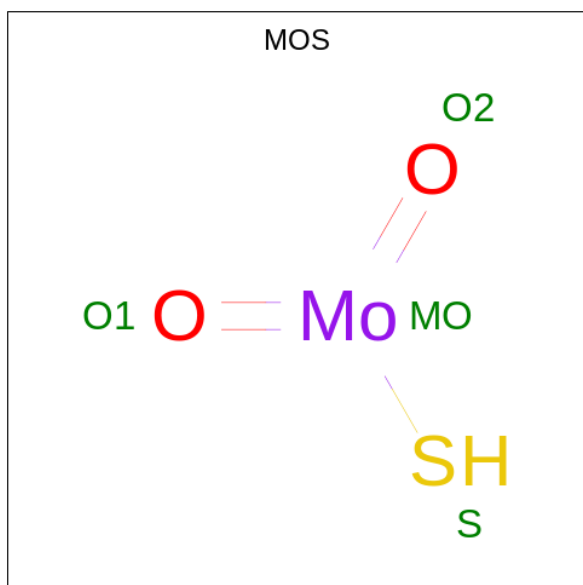
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Fe	S		
2	A	1	4	2	2	0	0
2	A	1	4	2	2	0	0
2	B	1	4	2	2	0	0
2	B	1	4	2	2	0	0

- Molecule 3 is PHOSPHONIC ACIDMONO-(2-AMINO-5,6-DIMERCAPTO-4-OXO-3,7,8A, 9,10,10A-HEXAHYDRO-4H-8-OXA-1,3,9,10-TETRAAZA-ANTHRACEN-7-YLMETHYL) ESTER (three-letter code: MTE) (formula: $C_{10}H_{14}N_5O_6PS_2$).



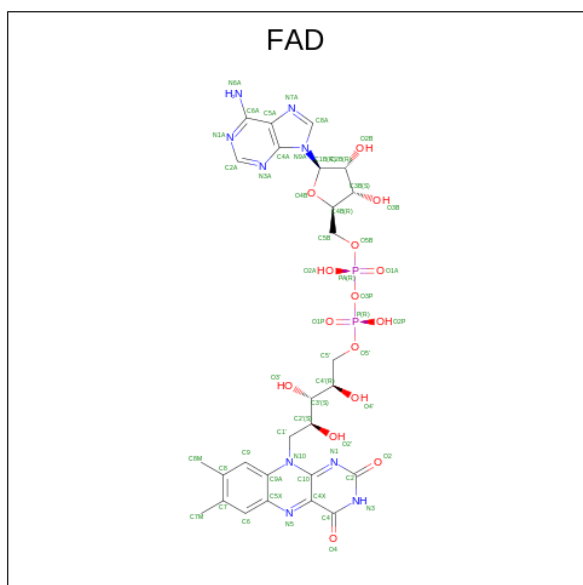
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			S
3	A	1	Total	C	N	O	P	S	0	0
			24	10	5	6	1	2		
3	B	1	Total	C	N	O	P	S	0	0
			24	10	5	6	1	2		

- Molecule 4 is DIOXOTHIOMOLYBDENUM(VI) ION (three-letter code: MOS) (formula: $HMoO_2S$).



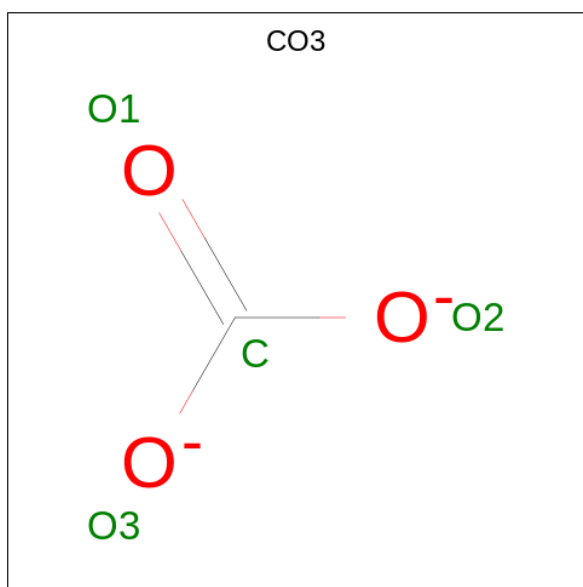
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	Mo	O	S	0	0
			4	1	2	1		
4	B	1	Total	Mo	O	S	0	0
			4	1	2	1		

- Molecule 5 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



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

- Molecule 6 is CARBONATE ION (three-letter code: CO3) (formula: CO_3).

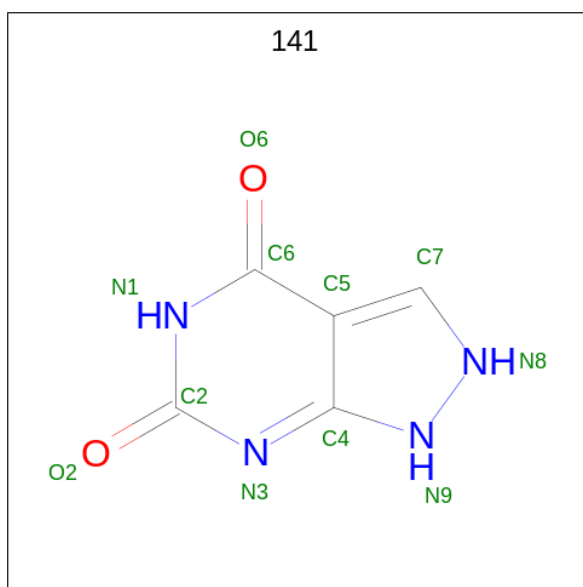


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O 4 1 3	0	0
6	B	1	Total C O 4 1 3	0	0

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

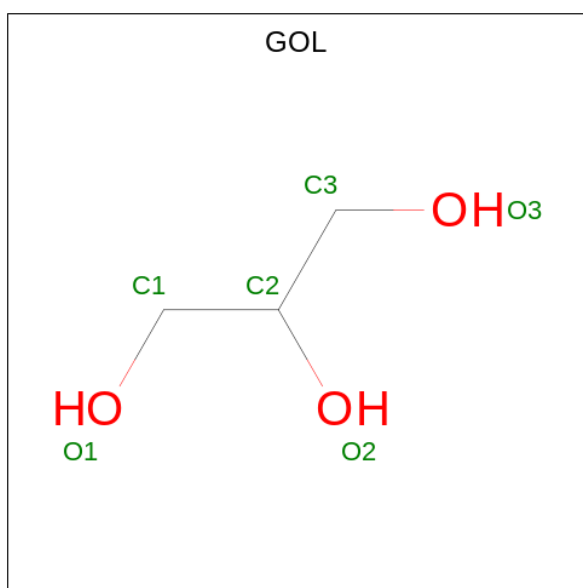
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	2	Total Ca 2 2	0	0
7	B	2	Total Ca 2 2	0	0

- Molecule 8 is Oxypurinol (three-letter code: 141) (formula: C₅H₄N₄O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
8	A	1	22	10	8	4	0	1
8	B	1	22	10	8	4	0	1

- Molecule 9 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
9	A	1	6	3	3	0	0
9	A	1	6	3	3	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	B	1	Total	C	O	0	0
			6	3	3		
9	B	1	Total	C	O	0	0
			6	3	3		
9	B	1	Total	C	O	0	0
			6	3	3		
9	B	1	Total	C	O	0	0
			6	3	3		

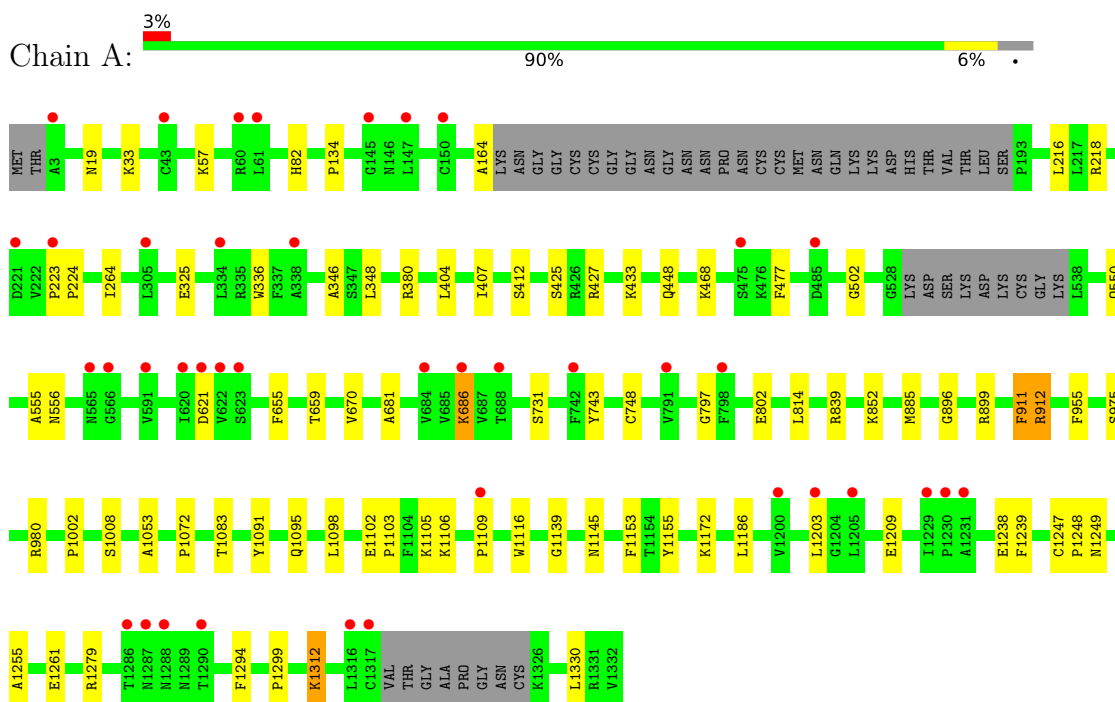
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	928	Total	O	0	0
			928	928		
10	B	887	Total	O	0	0
			887	887		

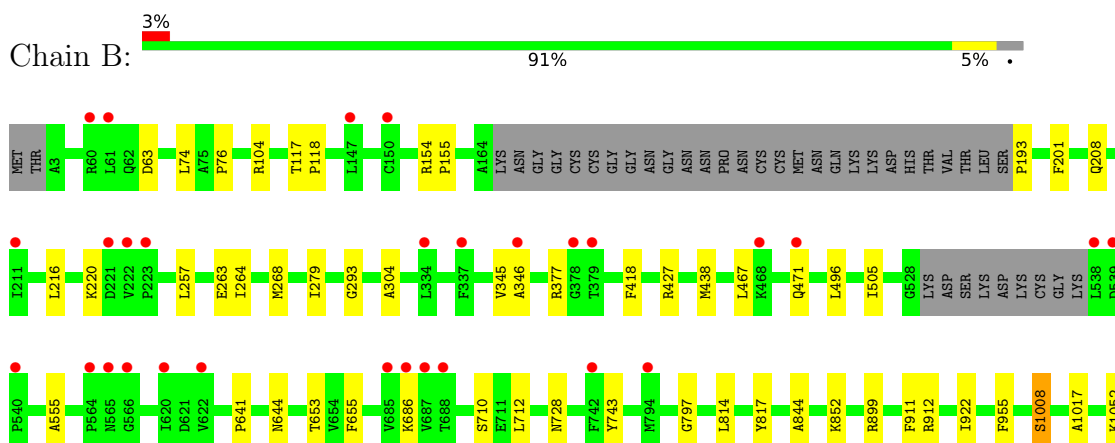
3 Residue-property plots i

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



- Molecule 1: Xanthine dehydrogenase/oxidase





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	167.68Å 123.47Å 150.06Å 90.00° 90.89° 90.00°	Depositor
Resolution (Å)	47.72 – 1.99 47.67 – 1.98	Depositor EDS
% Data completeness (in resolution range)	99.7 (47.72-1.99) 99.7 (47.67-1.98)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.62 (at 1.98Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.163 , 0.197 0.171 , 0.203	Depositor DCC
R_{free} test set	10629 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	28.6	Xtrriage
Anisotropy	0.071	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 44.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.045 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	22065	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.30% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, CO3, 141, FES, MOS, CA, MTE, 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	0.74	1/10198 (0.0%)	0.84	1/13803 (0.0%)
1	B	0.74	0/10218	0.84	1/13831 (0.0%)
All	All	0.74	1/20416 (0.0%)	0.84	2/27634 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1261	GLU	CD-OE1	5.12	1.31	1.25

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	839	ARG	NE-CZ-NH2	-5.76	117.42	120.30
1	B	427	ARG	NE-CZ-NH1	5.04	122.82	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	9980	0	9976	44	0
1	B	10000	0	9995	41	0
2	A	8	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	8	0	0	0	0
3	A	24	0	10	0	0
3	B	24	0	10	0	0
4	A	4	0	0	1	0
4	B	4	0	0	1	0
5	A	53	0	31	4	0
5	B	53	0	31	5	0
6	A	4	0	0	0	0
6	B	4	0	0	0	0
7	A	2	0	0	0	0
7	B	2	0	0	0	0
8	A	22	0	8	2	0
8	B	22	0	8	2	0
9	A	12	0	16	2	0
9	B	24	0	32	6	0
10	A	928	0	0	8	0
10	B	887	0	0	7	0
All	All	22065	0	20117	91	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 2.

All (91) 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:A:404:LEU:HD21	1:A:407:ILE:HD11	1.63	0.80
1:A:659:THR:HG21	10:A:1817:HOH:O	1.81	0.79
1:B:63:ASP:O	10:B:1501:HOH:O	2.01	0.77
1:A:19:ASN:ND2	10:A:1501:HOH:O	2.08	0.74
5:B:1405:FAD:C7	9:B:1410:GOL:H32	2.18	0.73
1:A:1312:LYS:NZ	10:A:1502:HOH:O	2.23	0.71
1:B:467:LEU:O	1:B:471:GLN:HG2	1.93	0.69
1:A:380:ARG:NH1	10:A:1506:HOH:O	2.27	0.67
5:A:1405:FAD:C8	9:A:1411:GOL:H32	2.31	0.61
4:A:1404:MOS:O1	8:A:1409[A]:141:O2	2.20	0.59
1:B:345:VAL:HA	9:B:1413:GOL:H11	1.85	0.56
1:B:1107:LYS:NZ	10:B:1517:HOH:O	2.35	0.56
1:A:556:ASN:ND2	10:A:1512:HOH:O	2.37	0.55
1:A:1279:ARG:HG2	1:A:1294:PHE:HE1	1.73	0.54
1:A:1053:ALA:O	1:A:1098:LEU:HD11	2.08	0.54
1:B:74:LEU:O	1:B:76:PRO:HD3	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:346:ALA:HB1	5:A:1405:FAD:H4'	1.90	0.53
1:B:208:GLN:OE1	10:B:1505:HOH:O	2.18	0.53
1:A:425:SER:OG	1:A:433:LYS:NZ	2.42	0.52
1:B:1216:GLU:OE1	10:B:1504:HOH:O	2.17	0.52
4:B:1404:MOS:O1	8:B:1409[A]:141:O2	2.27	0.52
1:A:655:PHE:HE2	1:A:814:LEU:HD23	1.75	0.52
1:B:655:PHE:HE2	1:B:814:LEU:HD23	1.76	0.51
1:B:1249:ASN:O	1:B:1255:ALA:HA	2.10	0.51
1:B:193:PRO:HD2	10:B:1855:HOH:O	2.10	0.51
1:B:257:LEU:O	5:B:1405:FAD:H2B	2.11	0.51
1:A:82:HIS:HA	1:A:216:LEU:HD21	1.93	0.50
1:B:712:LEU:HD12	1:B:712:LEU:N	2.27	0.49
1:B:496:LEU:HB2	1:B:505:ILE:HG23	1.94	0.49
1:A:404:LEU:CD2	1:A:407:ILE:HD11	2.38	0.49
1:A:1209:GLU:O	1:A:1299:PRO:HG3	2.11	0.48
1:A:1203:LEU:C	1:A:1203:LEU:HD23	2.34	0.48
1:B:346:ALA:HB1	5:B:1405:FAD:H4'	1.97	0.47
1:A:550:GLN:O	1:A:1172:LYS:NZ	2.44	0.47
1:B:304:ALA:HB2	9:B:1413:GOL:H32	1.97	0.47
5:A:1405:FAD:C7	9:A:1411:GOL:H32	2.45	0.47
1:A:134:PRO:O	1:A:164:ALA:HA	2.15	0.47
1:B:1261:GLU:N	1:B:1262:PRO:CD	2.78	0.47
5:B:1405:FAD:C8	9:B:1410:GOL:H32	2.45	0.46
1:A:218:ARG:NH1	10:A:1527:HOH:O	2.41	0.46
1:B:293:GLY:O	10:B:1506:HOH:O	2.20	0.46
1:A:502:GLY:HA3	10:A:2203:HOH:O	2.15	0.46
1:B:641:PRO:HG3	1:B:817:TYR:CE2	2.50	0.46
1:B:852:LYS:HD3	10:B:1688:HOH:O	2.15	0.46
1:B:955:PHE:HA	1:B:1145:ASN:OD1	2.16	0.46
1:B:257:LEU:HA	1:B:279:ILE:O	2.15	0.45
1:B:1079:ALA:HB2	8:B:1409[B]:141:C7	2.46	0.45
1:B:1008:SER:HA	1:B:1081:VAL:HG11	1.99	0.45
1:A:655:PHE:CE2	1:A:814:LEU:HD23	2.52	0.45
1:A:911:PHE:O	1:A:912:ARG:C	2.54	0.45
1:A:1105:LYS:HE2	1:A:1116:TRP:CZ3	2.51	0.45
1:B:104:ARG:HD3	1:B:201:PHE:CD2	2.52	0.45
1:A:1106:LYS:O	1:A:1109:PRO:HD3	2.17	0.44
1:A:325:GLU:HB2	1:A:412:SER:HB3	2.00	0.44
1:B:345:VAL:HA	9:B:1413:GOL:C1	2.48	0.44
1:B:154:ARG:N	1:B:155:PRO:HD2	2.34	0.43
1:B:1102:GLU:HB3	1:B:1103:PRO:HD3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:555:ALA:O	1:A:1238:GLU:HA	2.18	0.43
1:A:1083:THR:HG21	1:A:1186:LEU:HD12	2.01	0.43
1:A:885:MET:SD	1:A:896:GLY:HA3	2.59	0.43
1:B:117:THR:HB	1:B:118:PRO:HD3	2.00	0.43
1:A:975:SER:O	1:A:980:ARG:HD3	2.18	0.43
1:A:1247:CYS:N	1:A:1248:PRO:CD	2.81	0.43
1:B:216:LEU:HD23	1:B:216:LEU:HA	1.90	0.43
1:B:844:ALA:HB2	1:B:922:ILE:HD13	2.01	0.42
1:A:336:TRP:CZ3	1:A:427:ARG:HG2	2.55	0.42
1:A:1153:PHE:HB2	1:A:1155:TYR:CZ	2.55	0.42
1:A:264:ILE:HD11	5:A:1405:FAD:H3B	2.02	0.42
1:B:345:VAL:HA	9:B:1413:GOL:H2	2.01	0.42
1:B:644:ASN:O	1:B:653:THR:HA	2.20	0.42
1:B:1052:LYS:HD3	1:B:1254:TYR:CZ	2.55	0.42
1:A:57:LYS:NZ	10:A:1576:HOH:O	2.53	0.41
1:B:1053:ALA:O	1:B:1098:LEU:HD11	2.20	0.41
1:A:348:LEU:HD23	1:A:348:LEU:HA	1.95	0.41
1:B:728:ASN:OD1	1:B:852:LYS:HD2	2.20	0.41
1:B:899:ARG:HA	1:B:899:ARG:HD2	1.90	0.41
1:B:418:PHE:HA	1:B:438:MET:O	2.21	0.41
1:B:1017:ALA:O	1:B:1132:PHE:HA	2.21	0.41
1:A:621:ASP:HB3	1:A:686:LYS:HE3	2.02	0.41
1:A:955:PHE:HA	1:A:1145:ASN:OD1	2.21	0.41
1:A:1091:TYR:O	1:A:1095:GLN:HG2	2.21	0.40
1:A:1249:ASN:O	1:A:1255:ALA:HA	2.21	0.40
1:A:448:GLN:HB2	1:A:477:PHE:CE2	2.56	0.40
1:B:555:ALA:O	1:B:1238:GLU:HA	2.21	0.40
1:A:802:GLU:CD	8:A:1409[A]:141:H4	2.23	0.40
1:A:468:LYS:HE2	1:A:468:LYS:HB3	1.95	0.40
1:A:670:VAL:HG11	1:A:681:ALA:HB3	2.03	0.40
1:A:1102:GLU:HB3	1:A:1103:PRO:HD3	2.04	0.40
1:B:263:GLU:HB2	5:B:1405:FAD:H52A	2.02	0.40
1:B:264:ILE:O	1:B:268:MET:HG3	2.21	0.40
1:A:223:PRO:HA	1:A:224:PRO:HD3	1.91	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	1277/1332 (96%)	1235 (97%)	38 (3%)	4 (0%)	41	37
1	B	1280/1332 (96%)	1248 (98%)	28 (2%)	4 (0%)	41	37
All	All	2557/2664 (96%)	2483 (97%)	66 (3%)	8 (0%)	41	37

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	912	ARG
1	A	1008	SER
1	B	1008	SER
1	B	912	ARG
1	A	797	GLY
1	B	1139	GLY
1	A	1139	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	1090/1128 (97%)	1077 (99%)	13 (1%)	71	76
1	B	1093/1128 (97%)	1085 (99%)	8 (1%)	84	88
All	All	2183/2256 (97%)	2162 (99%)	21 (1%)	76	81

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	33	LYS
1	A	686	LYS
1	A	731	SER
1	A	743	TYR
1	A	748	CYS
1	A	852	LYS
1	A	899	ARG
1	A	911	PHE
1	A	1002	PRO
1	A	1072	PRO
1	A	1239	PHE
1	A	1312	LYS
1	A	1330	LEU
1	B	220	LYS
1	B	377	ARG
1	B	686	LYS
1	B	710	SER
1	B	743	TYR
1	B	911	PHE
1	B	1239	PHE
1	B	1288	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1288	ASN

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

Of 26 ligands modelled in this entry, 4 are monoatomic - leaving 22 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
5	FAD	A	1405	-	53,58,58	0.71	0	68,89,89	0.81	2 (2%)
9	GOL	A	1410	-	5,5,5	0.11	0	5,5,5	0.32	0
2	FES	A	1401	1	0,4,4	-	-	-	-	-
5	FAD	B	1405	-	53,58,58	0.73	0	68,89,89	0.83	2 (2%)
2	FES	B	1401	1	0,4,4	-	-	-	-	-
6	CO3	B	1406	-	2,3,3	0.76	0	2,3,3	0.14	0
6	CO3	A	1406	-	2,3,3	0.67	0	2,3,3	0.38	0
9	GOL	B	1412	-	5,5,5	0.19	0	5,5,5	0.31	0
2	FES	B	1402	1	0,4,4	-	-	-	-	-
3	MTE	A	1403	4	21,26,26	1.41	2 (9%)	21,40,40	2.62	9 (42%)
4	MOS	B	1404	3	0,3,3	-	-	-	-	-
8	141	A	1409[B]	-	10,12,12	1.50	1 (10%)	10,17,17	1.10	0
3	MTE	B	1403	4	21,26,26	1.39	1 (4%)	21,40,40	2.33	10 (47%)
8	141	B	1409[B]	-	10,12,12	1.22	1 (10%)	10,17,17	0.95	0
9	GOL	B	1413	-	5,5,5	0.27	0	5,5,5	0.63	0
8	141	A	1409[A]	-	10,12,12	1.27	1 (10%)	10,17,17	0.83	0
9	GOL	A	1411	-	5,5,5	0.19	0	5,5,5	0.58	0
8	141	B	1409[A]	-	10,12,12	1.25	1 (10%)	10,17,17	0.92	0
2	FES	A	1402	1	0,4,4	-	-	-	-	-
4	MOS	A	1404	3	0,3,3	-	-	-	-	-
9	GOL	B	1411	-	5,5,5	0.11	0	5,5,5	0.37	0
9	GOL	B	1410	-	5,5,5	0.14	0	5,5,5	0.59	0

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	FAD	A	1405	-	-	2/30/50/50	0/6/6/6

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
9	GOL	A	1410	-	-	2/4/4/4	-
3	MTE	A	1403	4	-	3/6/34/34	0/3/3/3
8	141	A	1409[A]	-	-	-	0/2/2/2
2	FES	A	1401	1	-	-	0/1/1/1
9	GOL	A	1411	-	-	2/4/4/4	-
2	FES	B	1402	1	-	-	0/1/1/1
8	141	A	1409[B]	-	-	-	0/2/2/2
9	GOL	B	1412	-	-	0/4/4/4	-
5	FAD	B	1405	-	-	2/30/50/50	0/6/6/6
3	MTE	B	1403	4	-	3/6/34/34	0/3/3/3
8	141	B	1409[A]	-	-	-	0/2/2/2
2	FES	A	1402	1	-	-	0/1/1/1
2	FES	B	1401	1	-	-	0/1/1/1
9	GOL	B	1411	-	-	4/4/4/4	-
8	141	B	1409[B]	-	-	-	0/2/2/2
9	GOL	B	1410	-	-	0/4/4/4	-
9	GOL	B	1413	-	-	3/4/4/4	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1403	MTE	C4-N3	4.47	1.40	1.33
3	B	1403	MTE	C4-N3	4.18	1.40	1.33
8	A	1409[B]	141	C5-C4	-3.36	1.39	1.46
8	B	1409[A]	141	C5-C4	-3.14	1.40	1.46
8	A	1409[A]	141	C5-C4	-2.95	1.40	1.46
8	B	1409[B]	141	C5-C4	-2.64	1.41	1.46
3	A	1403	MTE	C7-C6	-2.05	1.52	1.53

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1403	MTE	C10-C9-C4	6.16	120.04	114.57
3	A	1403	MTE	O3'-C7-N8	5.04	113.75	108.57
3	A	1403	MTE	C2-N3-C4	4.58	123.21	115.93
3	B	1403	MTE	C2-N3-C4	4.11	122.46	115.93
3	B	1403	MTE	C10-C9-C4	3.86	118.00	114.57
3	B	1403	MTE	O3'-C7-N8	3.15	111.80	108.57
3	B	1403	MTE	O3P-P-O4'	-3.06	98.58	106.73
3	B	1403	MTE	C4-C9-N5	3.03	121.66	119.12

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1403	MTE	C9-C4-N3	-3.02	115.43	124.01
3	B	1403	MTE	N1-C2-N3	-2.90	120.87	125.42
3	A	1403	MTE	N1-C2-N3	-2.80	121.03	125.42
3	B	1403	MTE	O4'-P-O1P	-2.66	99.02	106.47
5	B	1405	FAD	C5A-C6A-N6A	2.66	124.39	120.35
3	B	1403	MTE	C9-C4-N3	-2.57	116.72	124.01
3	B	1403	MTE	C9-C10-N8	2.52	120.44	118.13
5	A	1405	FAD	C5A-C6A-N6A	2.40	124.00	120.35
3	A	1403	MTE	C9-C10-N8	2.30	120.23	118.13
3	A	1403	MTE	O3P-P-O4'	-2.28	100.67	106.73
3	A	1403	MTE	C4-C9-N5	2.25	121.01	119.12
5	A	1405	FAD	O2A-PA-O1A	2.21	123.14	112.24
3	B	1403	MTE	C2-N1-C10	2.14	119.34	114.54
5	B	1405	FAD	O2A-PA-O1A	2.06	122.43	112.24
3	A	1403	MTE	O3'-C7-C6	-2.02	107.62	108.96

There are no chirality outliers.

All (21) torsion outliers are listed below:

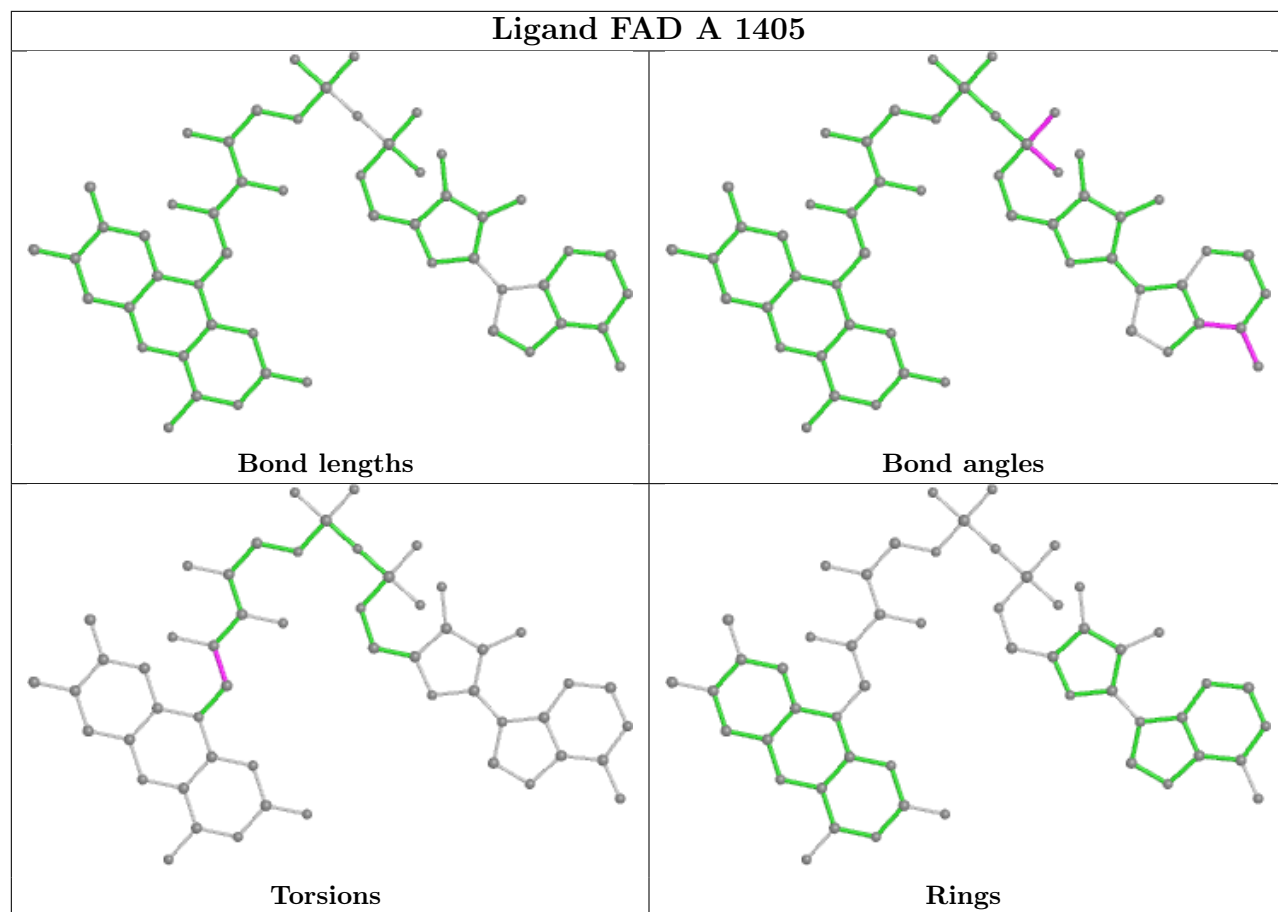
Mol	Chain	Res	Type	Atoms
3	A	1403	MTE	C4'-O4'-P-O3P
3	B	1403	MTE	C4'-O4'-P-O1P
5	A	1405	FAD	N10-C1'-C2'-O2'
5	A	1405	FAD	N10-C1'-C2'-C3'
5	B	1405	FAD	N10-C1'-C2'-O2'
5	B	1405	FAD	N10-C1'-C2'-C3'
9	A	1410	GOL	O1-C1-C2-O2
9	A	1410	GOL	O1-C1-C2-C3
9	B	1411	GOL	O1-C1-C2-C3
9	B	1413	GOL	C1-C2-C3-O3
9	A	1411	GOL	C1-C2-C3-O3
9	B	1411	GOL	C1-C2-C3-O3
9	B	1413	GOL	O1-C1-C2-C3
9	A	1411	GOL	O2-C2-C3-O3
9	B	1413	GOL	O2-C2-C3-O3
9	B	1411	GOL	O2-C2-C3-O3
3	B	1403	MTE	C3'-C4'-O4'-P
3	B	1403	MTE	C4'-O4'-P-O3P
9	B	1411	GOL	O1-C1-C2-O2
3	A	1403	MTE	C3'-C4'-O4'-P
3	A	1403	MTE	C4'-O4'-P-O2P

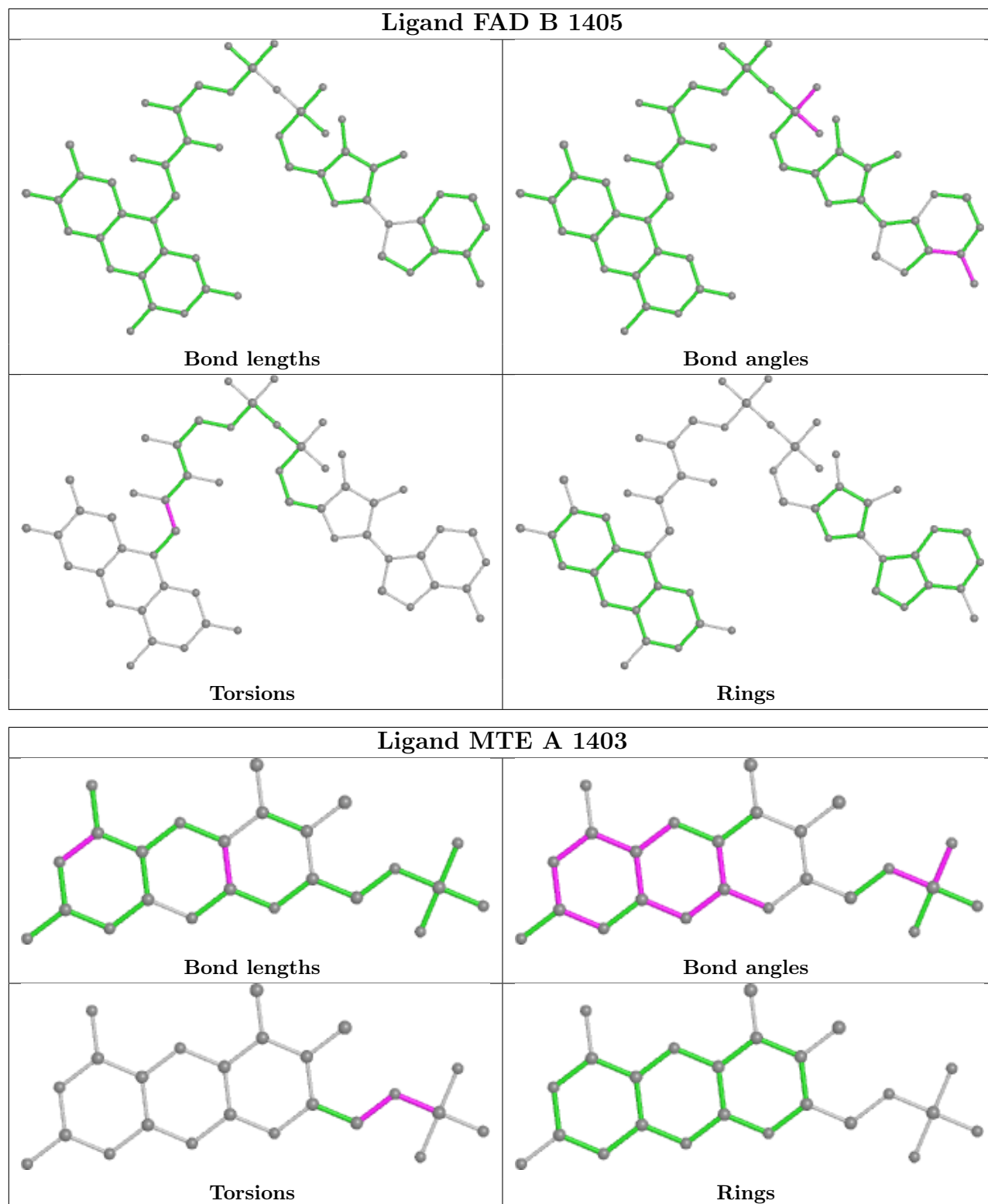
There are no ring outliers.

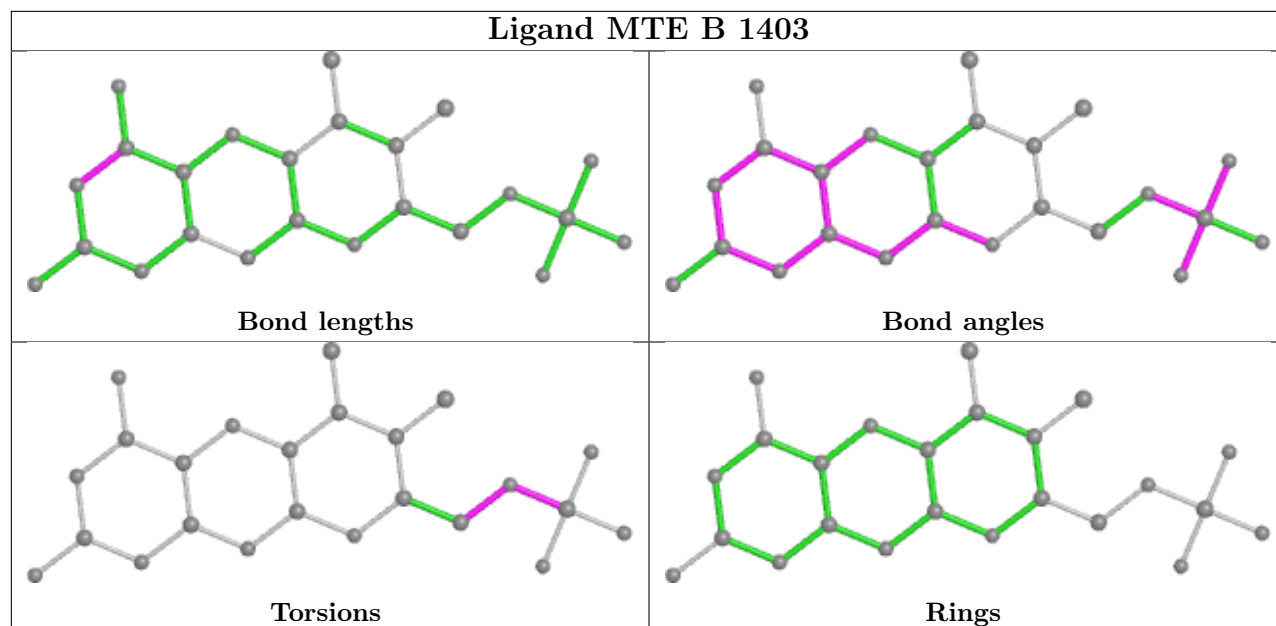
10 monomers are involved in 17 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1405	FAD	4	0
5	B	1405	FAD	5	0
4	B	1404	MOS	1	0
8	B	1409[B]	141	1	0
9	B	1413	GOL	4	0
8	A	1409[A]	141	2	0
9	A	1411	GOL	2	0
8	B	1409[A]	141	1	0
4	A	1404	MOS	1	0
9	B	1410	GOL	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	1285/1332 (96%)	0.20	40 (3%) 49 48	19, 29, 46, 80	0
1	B	1288/1332 (96%)	0.21	42 (3%) 46 45	19, 29, 47, 78	0
All	All	2573/2664 (96%)	0.21	82 (3%) 47 46	19, 29, 47, 80	0

All (82) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	566	GLY	6.4
1	B	1288	ASN	6.1
1	B	565	ASN	5.6
1	A	1288	ASN	4.9
1	A	1290	THR	3.8
1	A	60	ARG	3.7
1	B	378	GLY	3.7
1	A	223	PRO	3.5
1	B	211	ILE	3.3
1	A	1286	THR	3.3
1	A	1316	LEU	3.3
1	A	565	ASN	3.1
1	A	688	THR	3.1
1	B	1229	ILE	3.0
1	A	1287	ASN	3.0
1	A	1229	ILE	3.0
1	A	221	ASP	2.9
1	A	1109	PRO	2.9
1	A	620	ILE	2.9
1	B	468	LYS	2.8
1	A	338	ALA	2.7
1	B	1290	THR	2.7
1	B	1205	LEU	2.7
1	B	1325	CYS	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	471	GLN	2.6
1	B	620	ILE	2.6
1	A	566	GLY	2.6
1	A	1317	CYS	2.6
1	A	623	SER	2.6
1	B	1287	ASN	2.6
1	B	147	LEU	2.5
1	B	688	THR	2.5
1	B	538	LEU	2.5
1	B	1208	LEU	2.5
1	A	684	VAL	2.4
1	A	622	VAL	2.4
1	A	1231	ALA	2.4
1	A	1200	VAL	2.4
1	B	223	PRO	2.4
1	B	685	VAL	2.4
1	B	61	LEU	2.4
1	A	798	PHE	2.4
1	B	687	VAL	2.4
1	A	1203	LEU	2.3
1	A	1205	LEU	2.3
1	B	337	PHE	2.3
1	B	1200	VAL	2.3
1	B	221	ASP	2.3
1	B	1107	LYS	2.3
1	A	475	SER	2.3
1	B	564	PRO	2.3
1	A	147	LEU	2.3
1	A	61	LEU	2.2
1	A	742	PHE	2.2
1	B	379	THR	2.2
1	B	1110	ASP	2.2
1	A	1230	PRO	2.2
1	B	742	PHE	2.2
1	B	1286	THR	2.1
1	A	145	GLY	2.1
1	B	540	PRO	2.1
1	B	539	ASP	2.1
1	A	591	VAL	2.1
1	A	150	CYS	2.1
1	B	222	VAL	2.1
1	B	346	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	622	VAL	2.1
1	A	621	ASP	2.1
1	B	334	LEU	2.1
1	B	60	ARG	2.0
1	A	485	ASP	2.0
1	A	334	LEU	2.0
1	A	43	CYS	2.0
1	B	150	CYS	2.0
1	B	794	MET	2.0
1	B	686	LYS	2.0
1	A	791	VAL	2.0
1	A	3	ALA	2.0
1	B	1198	ALA	2.0
1	A	305	LEU	2.0
1	B	1264	LEU	2.0
1	A	686	LYS	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.

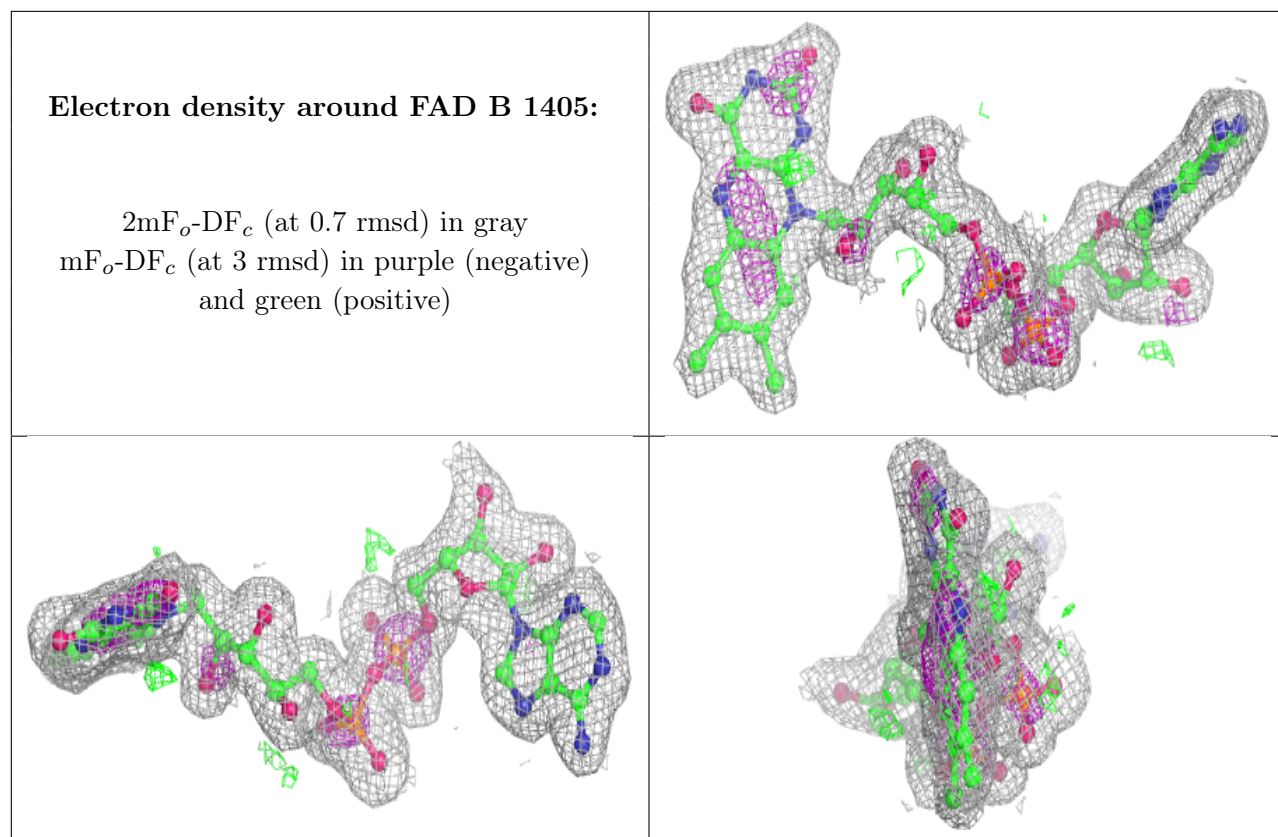
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
8	141	A	1409[A]	11/11	0.82	0.25	26,31,34,35	11
8	141	A	1409[B]	11/11	0.82	0.25	30,36,40,40	11
9	GOL	B	1412	6/6	0.82	0.20	42,54,58,58	0
8	141	B	1409[B]	11/11	0.83	0.22	30,40,43,44	11
8	141	B	1409[A]	11/11	0.83	0.22	35,42,45,53	11
9	GOL	B	1410	6/6	0.86	0.20	52,53,55,55	0
9	GOL	A	1411	6/6	0.87	0.23	50,51,52,55	0

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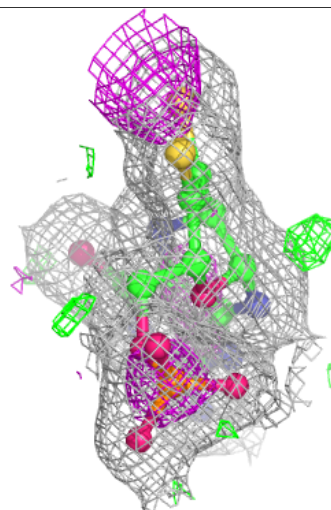
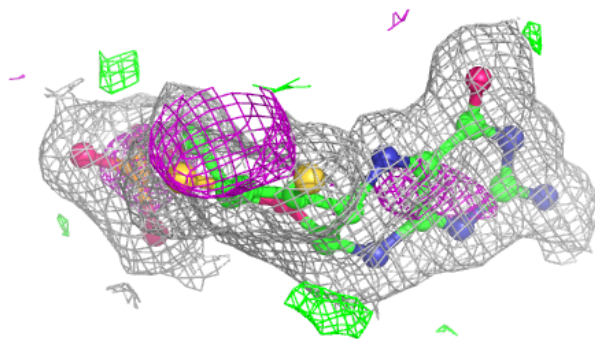
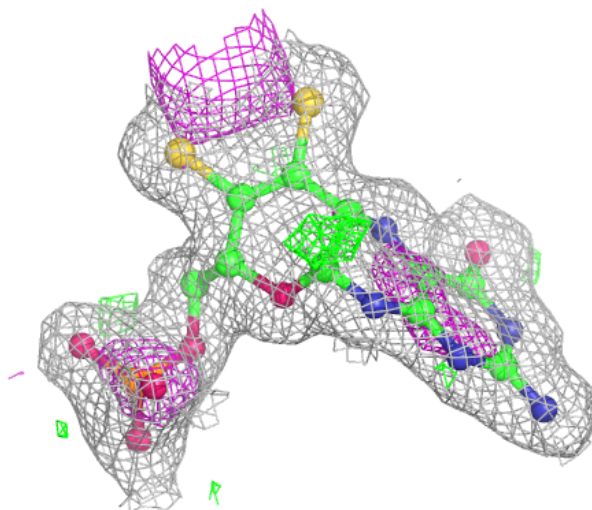
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
9	GOL	B	1413	6/6	0.87	0.36	25,27,28,30	6
9	GOL	A	1410	6/6	0.89	0.15	37,50,53,56	0
9	GOL	B	1411	6/6	0.89	0.21	47,57,60,64	0
5	FAD	B	1405	53/53	0.96	0.11	22,25,30,32	0
3	MTE	A	1403	24/24	0.97	0.14	16,23,29,32	0
6	CO3	A	1406	4/4	0.97	0.14	21,23,24,24	0
5	FAD	A	1405	53/53	0.97	0.10	22,27,32,33	0
6	CO3	B	1406	4/4	0.98	0.12	23,27,27,28	0
7	CA	A	1408	1/1	0.98	0.07	29,29,29,29	0
3	MTE	B	1403	24/24	0.98	0.14	16,23,26,28	0
7	CA	B	1407	1/1	0.99	0.06	25,25,25,25	0
7	CA	B	1408	1/1	0.99	0.08	29,29,29,29	0
2	FES	B	1402	4/4	0.99	0.10	21,22,22,23	0
2	FES	A	1401	4/4	1.00	0.12	20,21,22,22	0
2	FES	A	1402	4/4	1.00	0.11	23,23,24,25	0
2	FES	B	1401	4/4	1.00	0.12	21,21,21,24	0
4	MOS	A	1404	4/4	1.00	0.07	28,31,32,41	0
7	CA	A	1407	1/1	1.00	0.07	24,24,24,24	0
4	MOS	B	1404	4/4	1.00	0.07	27,27,34,40	0

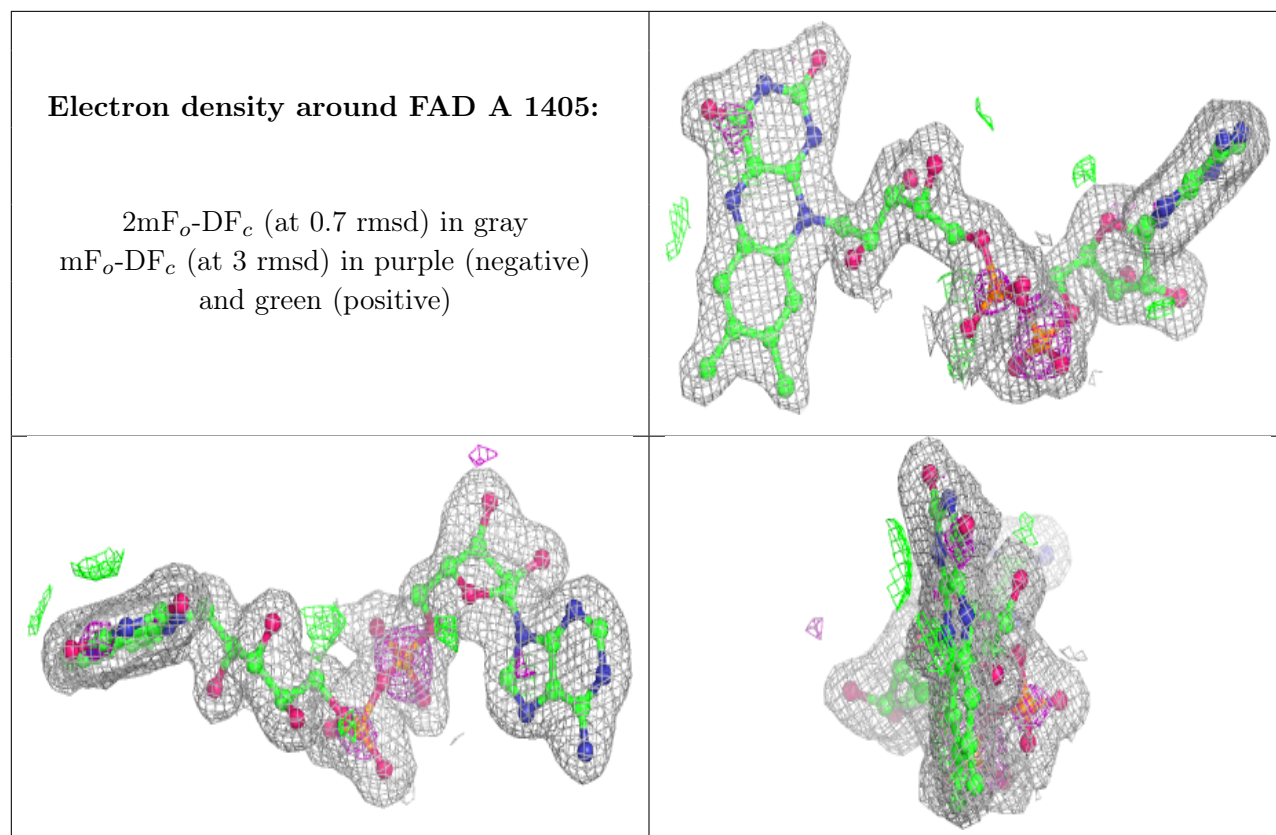
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

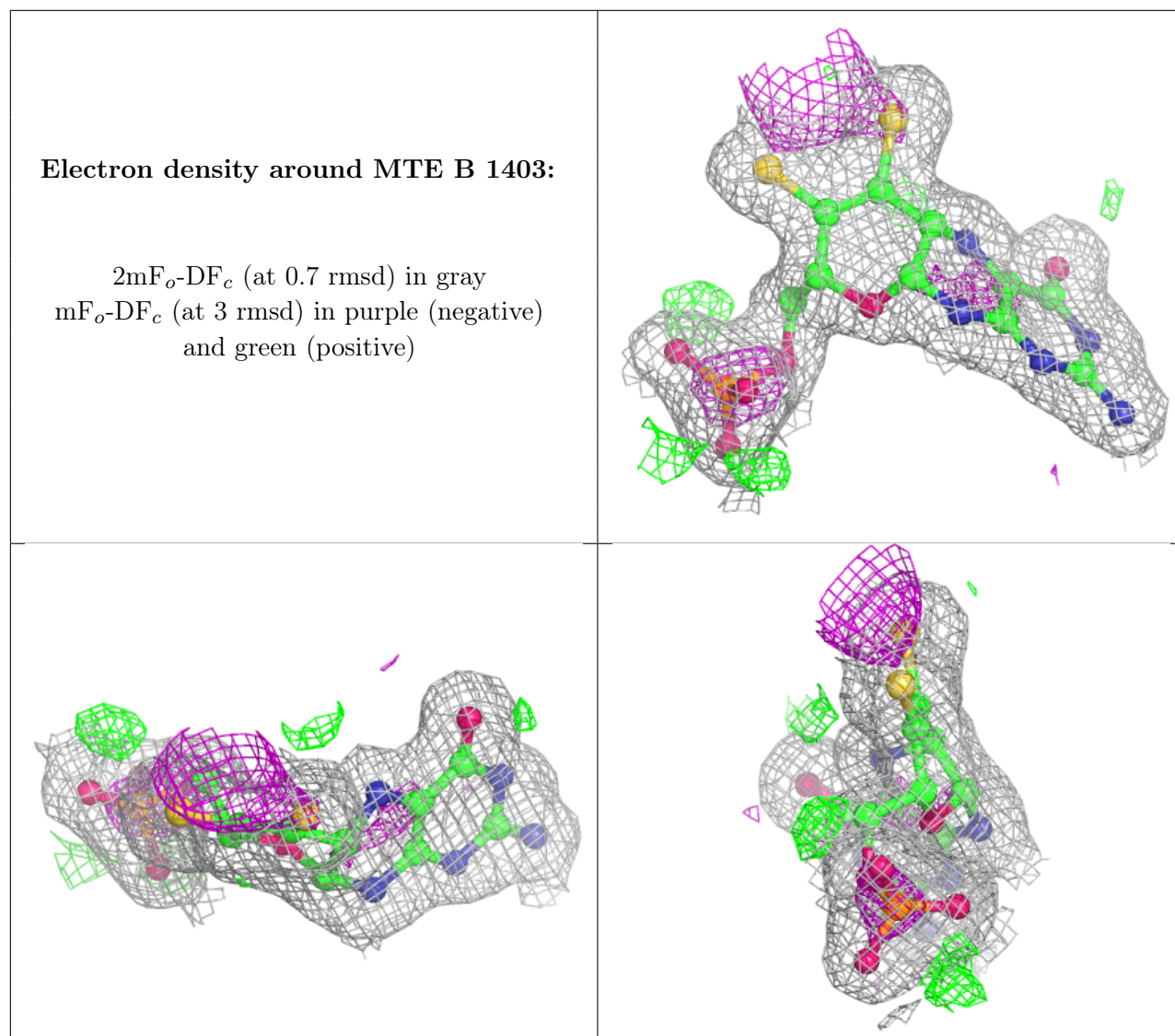


Electron density around MTE A 1403:

$2mF_o-DF_c$ (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.