



# Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 10:07 am BST

PDB ID : 5E93  
Title : Crystal Structure of Trypanosoma cruzi Dihydroorotate Dehydrogenase in Complex with Neq0071  
Authors : Rocha, J.R.; Inaoka, D.K.; Cheleski, J.; Shiba, T.; Harada, S.; Montanari, C.A.; Kita, K.  
Deposited on : 2015-10-14  
Resolution : 1.41 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](mailto: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.

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

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

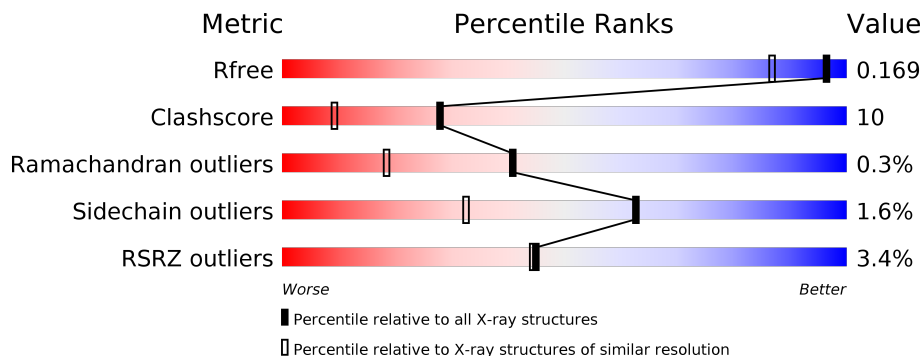
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.41 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	2579 (1.44-1.40)
Clashscore	141614	2696 (1.44-1.40)
Ramachandran outliers	138981	2632 (1.44-1.40)
Sidechain outliers	138945	2631 (1.44-1.40)
RSRZ outliers	127900	2528 (1.44-1.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	314	<p>4% 82% 16%</p>
1	B	314	<p>3% 84% 14%</p>

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
3	GOL	A	405	-	X	-	-
6	EDO	A	417	-	-	X	-
6	EDO	A	418	-	-	X	-
6	EDO	B	414	-	-	X	-
6	EDO	B	416	-	-	X	-
6	EDO	B	421	-	-	X	-
8	PEG	B	423	-	X	X	-

## 2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 5936 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.

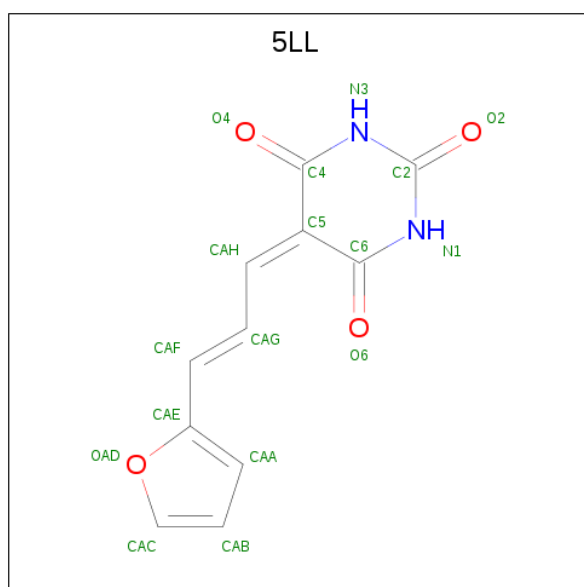
- Molecule 1 is a protein called Dihydroorotate dehydrogenase (fumarate).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	313	2498	1607	407	463	21	0	19	0
1	B	313	2468	1586	406	456	20	0	14	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	SER	-	expression tag	UNP Q4D3W2
B	-1	SER	-	expression tag	UNP Q4D3W2

- Molecule 2 is 5-[(E)-3-(furan-2-yl)prop-2-enylidene]-1,3-diazinane-2,4,6-trione (three-letter code: 5LL) (formula: C<sub>11</sub>H<sub>8</sub>N<sub>2</sub>O<sub>4</sub>).



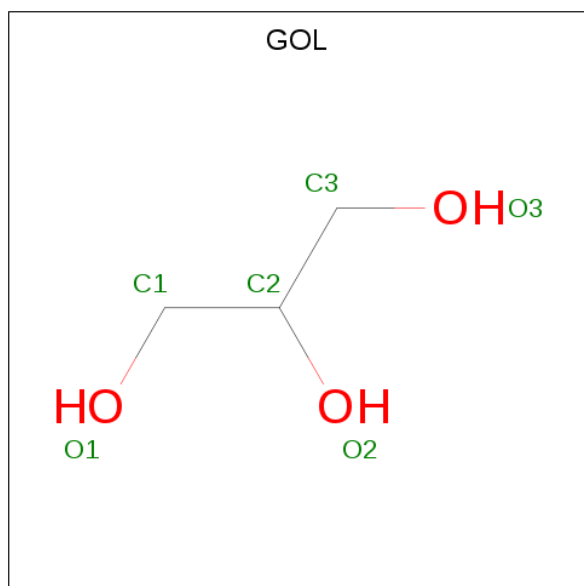
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	17	11	2	4	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	B	1	17	11	2	4	0	0

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



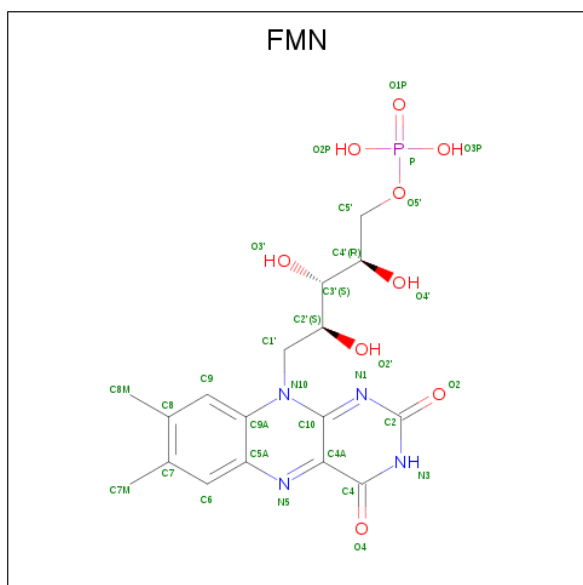
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	6	3	3	0	0
3	A	1	6	3	3	0	0
3	A	1	6	3	3	0	0
3	A	1	6	3	3	0	0
3	A	1	6	3	3	0	0
3	A	1	6	3	3	0	0
3	B	1	6	3	3	0	0
3	B	1	6	3	3	0	0
3	B	1	6	3	3	0	0
3	B	1	6	3	3	0	0

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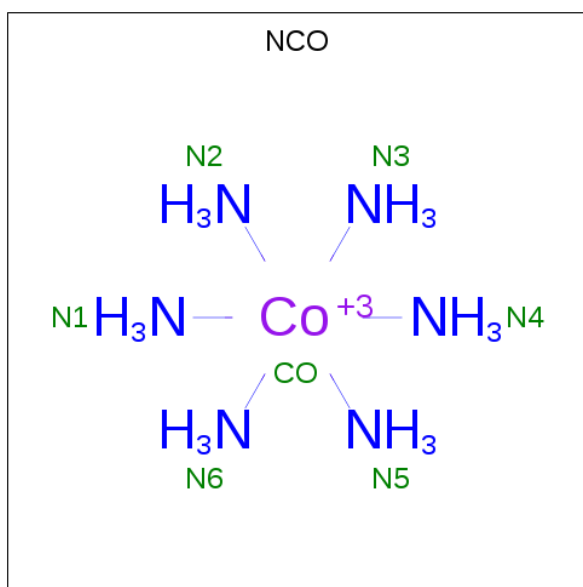
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	1
			12	6	6		

- Molecule 4 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: C<sub>17</sub>H<sub>21</sub>N<sub>4</sub>O<sub>9</sub>P).



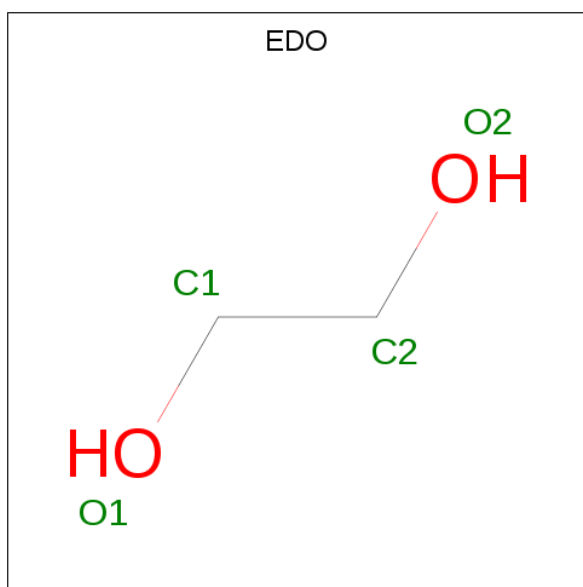
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
4	B	1	Total	C	N	O	P	0	0
			31	17	4	9	1		

- Molecule 5 is COBALT HEXAMMINE(III) (three-letter code: NCO) (formula: CoH<sub>18</sub>N<sub>6</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	Co	N	0	0
			7	1	6		
5	B	1	Total	Co	N	0	0
			7	1	6		
5	B	1	Total	Co	N	0	1
			14	2	12		

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 8	C 4	O 4	0	1
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	A	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0
6	B	1	Total 4	C 2	O 2	0	0

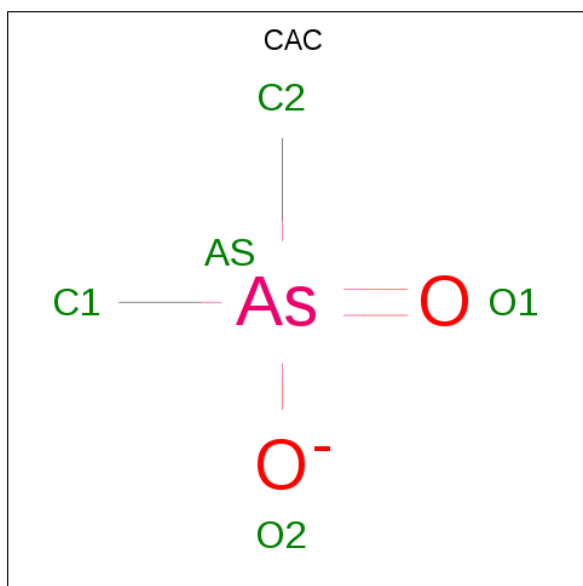
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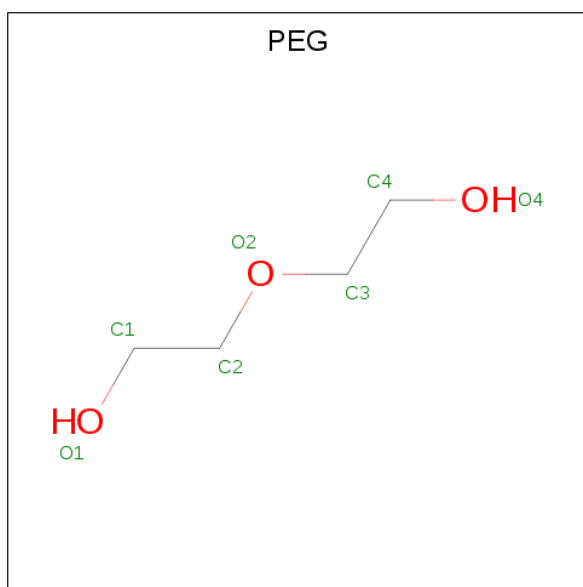
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	B	1	4	2	2	0	0

- Molecule 7 is CACODYLATE ION (three-letter code: CAC) (formula: C<sub>2</sub>H<sub>6</sub>AsO<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	As	C	O		
7	A	1	5	1	2	2	0	0
7	A	1	5	1	2	2	0	0

- Molecule 8 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total	C	O	0	0
			7	4	3		

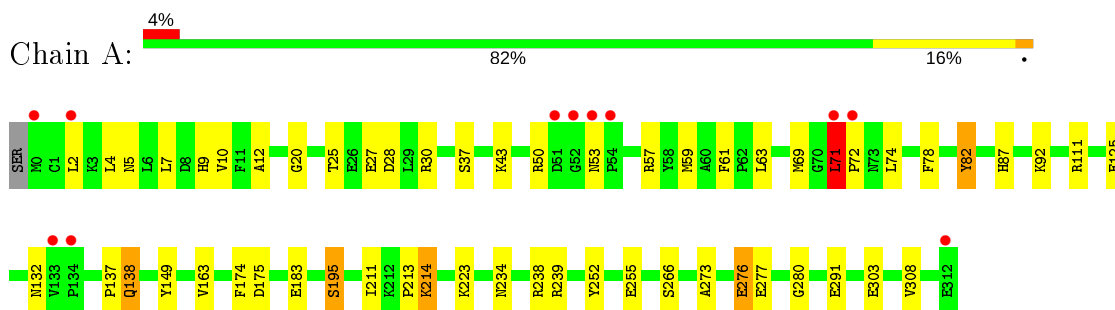
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	330	Total	O	0	0
			330	330		
9	B	325	Total	O	0	0
			325	325		

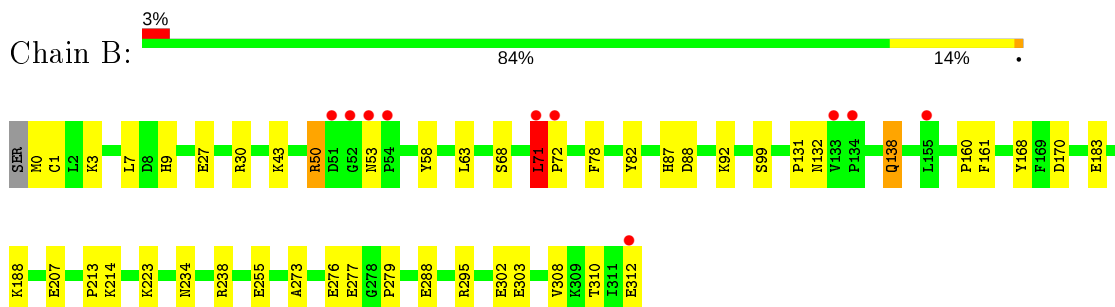
### 3 Residue-property plots [i](#)

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

- Molecule 1: Dihydroorotate dehydrogenase (fumarate)



- Molecule 1: Dihydroorotate dehydrogenase (fumarate)



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	68.33Å 71.79Å 124.34Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 1.41 27.63 – 1.41	Depositor EDS
% Data completeness (in resolution range)	97.9 (50.00-1.41) 97.9 (27.63-1.41)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.04 (at 1.41Å)	Xtrriage
Refinement program	REFMAC 5.8.0103	Depositor
R, $R_{free}$	0.145 , 0.168 0.146 , 0.169	Depositor DCC
$R_{free}$ test set	5946 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	13.7	Xtrriage
Anisotropy	0.039	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.41 , 49.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.000 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	5936	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 59.13 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.8480e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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, EDO, FMN, 5LL, NCO, CAC, PEG

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	1.27	8/2599 (0.3%)	1.20	15/3515 (0.4%)
1	B	1.32	10/2559 (0.4%)	1.23	8/3458 (0.2%)
All	All	1.30	18/5158 (0.3%)	1.21	23/6973 (0.3%)

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	1
1	B	0	2
All	All	0	3

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	303	GLU	CD-OE1	-8.41	1.16	1.25
1	B	303	GLU	CD-OE2	-7.23	1.17	1.25
1	A	255	GLU	CD-OE1	-7.02	1.18	1.25
1	B	207	GLU	CD-OE1	-6.89	1.18	1.25
1	A	291	GLU	CG-CD	5.97	1.60	1.51
1	B	255	GLU	CD-OE1	-5.86	1.19	1.25
1	A	71	LEU	CA-C	5.84	1.68	1.52
1	B	1	CYS	CB-SG	-5.72	1.72	1.81
1	B	288	GLU	CD-OE1	-5.57	1.19	1.25
1	B	302	GLU	CD-OE1	5.54	1.31	1.25
1	A	82	TYR	CE1-CZ	-5.40	1.31	1.38
1	B	168	TYR	CE1-CZ	-5.11	1.31	1.38
1	B	71	LEU	C-N	5.10	1.44	1.34
1	B	183	GLU	CD-OE1	-5.09	1.20	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	280	GLY	N-CA	-5.07	1.38	1.46
1	A	266	SER	C-O	-5.04	1.13	1.23
1	B	27	GLU	CD-OE1	-5.03	1.20	1.25
1	A	276	GLU	CD-OE1	5.02	1.31	1.25

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	4	LEU	O-C-N	9.59	138.05	122.70
1	A	71	LEU	CB-CG-CD2	8.63	125.68	111.00
1	A	4	LEU	CA-C-N	-7.50	100.70	117.20
1	B	71	LEU	C-N-CD	7.37	143.87	128.40
1	A	125	GLU	OE1-CD-OE2	-5.98	116.13	123.30
1	A	71	LEU	C-N-CD	5.93	140.84	128.40
1	B	161	PHE	CB-CG-CD2	5.92	124.94	120.80
1	A	175	ASP	CB-CG-OD1	5.89	123.60	118.30
1	B	161	PHE	CB-CG-CD1	-5.67	116.83	120.80
1	A	195[A]	SER	CB-CA-C	-5.42	99.80	110.10
1	A	195[B]	SER	CB-CA-C	-5.42	99.80	110.10
1	A	149	TYR	CB-CG-CD1	5.40	124.24	121.00
1	B	295	ARG	NE-CZ-NH1	5.37	122.98	120.30
1	B	88	ASP	CB-CG-OD2	-5.36	113.48	118.30
1	A	174	PHE	CB-CG-CD2	-5.31	117.08	120.80
1	A	2	LEU	CB-CG-CD2	5.31	120.03	111.00
1	B	170	ASP	CB-CG-OD1	5.25	123.02	118.30
1	B	58	TYR	CB-CG-CD1	5.22	124.13	121.00
1	B	71	LEU	N-CA-C	5.21	125.08	111.00
1	A	183	GLU	OE1-CD-OE2	-5.17	117.09	123.30
1	A	71	LEU	N-CA-C	5.17	124.95	111.00
1	A	61	PHE	CB-CG-CD2	5.11	124.38	120.80
1	A	239	ARG	NE-CZ-NH1	5.04	122.82	120.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	71	LEU	Peptide
1	B	50	ARG	Mainchain
1	B	71	LEU	Peptide

## 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	2498	0	2536	48	0
1	B	2468	0	2514	36	0
2	A	17	0	0	1	0
2	B	17	0	0	1	0
3	A	36	0	46	6	0
3	B	42	0	56	0	0
4	A	31	0	19	1	0
4	B	31	0	19	0	0
5	A	7	0	0	0	0
5	B	21	0	0	3	0
6	A	48	0	69	25	0
6	B	48	0	70	21	0
7	A	10	0	0	3	0
8	B	7	0	10	5	0
9	A	330	0	0	9	0
9	B	325	0	0	10	0
All	All	5936	0	5339	105	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 (105) 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:3[B]:LYS:NZ	1:B:3[B]:LYS:CE	1.80	1.42
1:A:50:ARG:HD3	1:A:71:LEU:HD12	1.10	1.06
1:A:50:ARG:HD3	1:A:71:LEU:CD1	1.86	1.05
1:A:138:GLN:HE21	1:A:138:GLN:H	1.12	0.96
6:B:414:EDO:H22	6:B:421:EDO:C1	1.96	0.94
6:B:414:EDO:H22	6:B:421:EDO:H11	1.50	0.94
6:A:417:EDO:H22	9:A:680:HOH:O	1.66	0.94
1:B:138:GLN:HE21	1:B:138:GLN:H	1.11	0.93
6:B:421:EDO:H12	9:B:513:HOH:O	1.70	0.90
1:B:78:PHE:N	6:B:414:EDO:H11	1.86	0.89
1:B:279:PRO:HD2	8:B:423:PEG:H42	1.55	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:234:ASN:HD21	1:A:238:ARG:HE	1.24	0.85
1:B:277:GLU:HB2	6:B:416:EDO:H12	1.55	0.85
3:A:406:GOL:H11	6:A:416:EDO:H21	1.56	0.85
1:B:78:PHE:H	6:B:414:EDO:H11	1.44	0.82
6:B:414:EDO:C2	6:B:421:EDO:H11	2.10	0.81
6:A:415:EDO:H21	9:B:734:HOH:O	1.80	0.80
1:B:188[B]:LYS:HE2	9:B:593:HOH:O	1.82	0.80
1:A:277:GLU:HB2	6:A:412:EDO:H12	1.66	0.76
1:B:234:ASN:HD21	1:B:238:ARG:HE	1.34	0.76
1:A:132:ASN:OD1	1:A:214[A]:LYS:NZ	2.23	0.72
1:B:160:PRO:HB3	1:B:188[A]:LYS:HG3	1.71	0.72
6:A:416:EDO:H22	9:A:573:HOH:O	1.91	0.71
6:B:414:EDO:H22	6:B:421:EDO:O1	1.90	0.70
6:B:412:EDO:H21	9:B:741:HOH:O	1.92	0.70
8:B:423:PEG:H11	9:B:680:HOH:O	1.92	0.69
1:A:5[B]:ASN:ND2	1:A:10:VAL:HG22	2.11	0.65
6:A:410:EDO:H21	9:A:772:HOH:O	1.97	0.65
1:A:25:THR:HG22	6:A:417:EDO:H12	1.79	0.65
1:B:188[B]:LYS:HE3	9:B:556:HOH:O	1.97	0.65
1:A:37:SER:O	6:A:419:EDO:H22	1.97	0.64
1:A:82:TYR:OH	1:A:87:HIS:HD2	1.82	0.62
1:B:279:PRO:CD	8:B:423:PEG:H42	2.28	0.62
1:B:273:ALA:HB1	6:B:416:EDO:H11	1.82	0.61
1:A:276:GLU:HB2	6:A:412:EDO:H22	1.82	0.60
5:B:409:NCO:N4	8:B:423:PEG:H22	2.16	0.60
1:A:92:LYS:HB3	6:A:419:EDO:H11	1.84	0.60
1:A:27:GLU:HA	6:A:420:EDO:H22	1.85	0.59
1:B:82:TYR:OH	1:B:87:HIS:HD2	1.85	0.59
1:A:238:ARG:NH2	6:A:418:EDO:H22	2.17	0.59
1:A:308:VAL:O	6:A:418:EDO:H21	2.03	0.59
1:A:273:ALA:HB1	6:A:412:EDO:H11	1.85	0.58
6:B:414:EDO:C2	6:B:421:EDO:C1	2.72	0.58
1:B:276:GLU:HB2	6:B:416:EDO:H22	1.86	0.56
1:B:87:HIS:HA	6:B:420:EDO:H11	1.87	0.56
6:A:420:EDO:H12	9:A:763:HOH:O	2.05	0.56
1:A:7:LEU:O	1:A:9:HIS:HD2	1.88	0.55
1:A:25:THR:HG22	6:A:417:EDO:C1	2.37	0.55
1:A:59[B]:MET:CE	9:A:602:HOH:O	2.54	0.55
1:B:234:ASN:ND2	1:B:238:ARG:HE	2.03	0.53
1:B:160:PRO:HB3	1:B:188[A]:LYS:CG	2.37	0.53
7:A:421:CAC:C1	9:A:508:HOH:O	2.56	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:132:ASN:OD1	1:B:214[B]:LYS:NZ	2.37	0.53
1:A:28:ASP:OD2	7:A:421:CAC:C2	2.58	0.52
1:A:234:ASN:ND2	1:A:238:ARG:HE	2.00	0.52
1:A:87:HIS:HE1	1:A:92:LYS:O	1.93	0.52
1:B:87:HIS:HE1	1:B:92:LYS:O	1.91	0.51
5:B:410[B]:NCO:N6	9:B:503:HOH:O	2.35	0.50
1:A:9:HIS:HE1	9:A:666:HOH:O	1.93	0.50
1:B:78:PHE:HB2	6:B:414:EDO:H12	1.94	0.50
1:A:5[B]:ASN:HD21	1:A:10:VAL:HG22	1.74	0.49
1:A:71:LEU:HA	2:A:401:5LL:CAA	2.43	0.49
1:B:78:PHE:H	6:B:414:EDO:C1	2.22	0.49
1:A:223:LYS:HG2	1:A:252:TYR:CE1	2.48	0.49
1:B:9:HIS:HE1	9:B:656:HOH:O	1.96	0.49
3:A:406:GOL:H11	6:A:416:EDO:C2	2.36	0.48
1:B:78:PHE:HB2	6:B:414:EDO:C1	2.43	0.48
1:B:7:LEU:O	1:B:9:HIS:HD2	1.96	0.48
1:B:308:VAL:O	6:B:413:EDO:C2	2.62	0.48
1:A:195[B]:SER:HB3	9:A:527:HOH:O	2.14	0.48
1:A:12:ALA:HB3	6:A:419:EDO:H21	1.96	0.47
1:A:30[B]:ARG:HD3	6:A:420:EDO:C2	2.45	0.47
1:A:308:VAL:O	6:A:418:EDO:C2	2.62	0.47
1:A:63:LEU:HD21	6:B:412:EDO:H12	1.97	0.46
1:A:74:LEU:HD12	1:A:78[B]:PHE:CZ	2.50	0.46
1:B:43:LYS:HE2	1:B:72:PRO:O	2.15	0.46
1:B:223:LYS:HD2	6:B:412:EDO:H11	1.97	0.46
1:A:74:LEU:HD11	6:A:417:EDO:H12	1.99	0.45
3:A:405:GOL:C1	9:B:575:HOH:O	2.63	0.45
5:B:409:NCO:N1	8:B:423:PEG:H21	2.31	0.45
3:A:403:GOL:O3	7:A:421:CAC:C1	2.65	0.45
1:B:310:THR:HG23	6:B:413:EDO:H12	1.99	0.45
1:A:211:ILE:HG13	9:A:501:HOH:O	2.16	0.45
1:A:50:ARG:HH11	1:A:71:LEU:HD12	1.82	0.45
1:A:238:ARG:HH22	6:A:418:EDO:H22	1.81	0.44
1:A:137:PRO:HD3	3:A:405:GOL:C3	2.47	0.44
1:B:214[B]:LYS:HE2	1:B:214[B]:LYS:HB3	1.90	0.44
1:A:57:ARG:HG3	1:A:69:MET:SD	2.58	0.44
1:A:137:PRO:HD3	3:A:405:GOL:H32	1.99	0.43
1:B:30[B]:ARG:HG3	9:B:619:HOH:O	2.18	0.43
1:A:59[B]:MET:HE2	1:A:59[B]:MET:HB3	1.86	0.43
6:A:410:EDO:H22	1:B:63:LEU:HD11	2.01	0.42
1:A:50:ARG:CD	1:A:71:LEU:CD1	2.78	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:53:ASN:HB3	1:B:213:PRO:HG3	2.00	0.42
1:B:277:GLU:OE1	6:B:416:EDO:H12	2.20	0.42
1:A:111:ARG:O	6:A:414[A]:EDO:H12	2.19	0.42
1:B:99:SER:HB3	2:B:401:5LL:CAC	2.49	0.42
1:B:68[A]:SER:OG	1:B:214[A]:LYS:HD3	2.20	0.42
1:A:238:ARG:HH22	6:A:418:EDO:C2	2.34	0.41
1:A:53:ASN:HB3	1:A:213:PRO:HG3	2.01	0.41
1:A:43:LYS:HE2	1:A:72:PRO:O	2.20	0.41
1:A:20:GLY:HA3	4:A:408:FMN:N5	2.36	0.41
1:A:50:ARG:HH11	1:A:71:LEU:CD1	2.34	0.40
1:B:50:ARG:HG3	1:B:71:LEU:HB3	2.04	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	331/314 (105%)	321 (97%)	9 (3%)	1 (0%)	41	18
1	B	326/314 (104%)	316 (97%)	9 (3%)	1 (0%)	41	18
All	All	657/628 (105%)	637 (97%)	18 (3%)	2 (0%)	41	18

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	71	LEU
1	A	71	LEU

### 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	278/259 (107%)	274 (99%)	4 (1%)	67	38
1	B	273/259 (105%)	268 (98%)	5 (2%)	59	27
All	All	551/518 (106%)	542 (98%)	9 (2%)	62	32

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	LEU
1	A	138	GLN
1	A	214[A]	LYS
1	A	214[C]	LYS
1	B	0	MET
1	B	71	LEU
1	B	131	PRO
1	B	138	GLN
1	B	312	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	9	HIS
1	A	87	HIS
1	A	138	GLN
1	A	234	ASN
1	A	275	GLN
1	B	9	HIS
1	B	87	HIS
1	B	138	GLN
1	B	215	GLN
1	B	234	ASN
1	B	275	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 carbohydrates in this entry.

### 5.6 Ligand geometry [i](#)

48 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
6	EDO	B	414	-	3,3,3	0.73	0	2,2,2	1.92	1 (50%)
6	EDO	A	414[B]	-	3,3,3	0.89	0	2,2,2	0.30	0
6	EDO	A	416	-	3,3,3	1.48	1 (33%)	2,2,2	1.69	0
6	EDO	B	418	-	3,3,3	0.43	0	2,2,2	0.40	0
6	EDO	B	421	-	3,3,3	0.96	0	2,2,2	0.79	0
3	GOL	A	407	-	5,5,5	1.39	1 (20%)	5,5,5	1.29	1 (20%)
6	EDO	B	415	-	3,3,3	0.59	0	2,2,2	0.73	0
3	GOL	A	404	-	5,5,5	0.82	0	5,5,5	0.74	0
3	GOL	A	403	-	5,5,5	0.39	0	5,5,5	0.55	0
6	EDO	B	419	-	3,3,3	0.23	0	2,2,2	0.66	0
3	GOL	B	407[A]	-	5,5,5	0.64	0	5,5,5	0.98	0
2	5LL	A	401	1	13,18,18	2.81	7 (53%)	20,24,24	3.75	13 (65%)
6	EDO	A	413	-	3,3,3	0.44	0	2,2,2	0.22	0
6	EDO	A	417	-	3,3,3	1.67	1 (33%)	2,2,2	0.60	0
3	GOL	A	406	-	5,5,5	1.09	1 (20%)	5,5,5	0.90	0
6	EDO	A	418	-	3,3,3	1.15	0	2,2,2	1.93	1 (50%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	EDO	A	411	-	3,3,3	0.68	0	2,2,2	0.06	0
3	GOL	B	403	-	5,5,5	0.51	0	5,5,5	0.89	0
6	EDO	A	410	-	3,3,3	1.07	0	2,2,2	0.90	0
6	EDO	A	415	-	3,3,3	0.43	0	2,2,2	1.30	0
5	NCO	B	409	-	6,6,6	3.78	6 (100%)	-	-	-
3	GOL	B	406	-	5,5,5	0.94	0	5,5,5	0.74	0
7	CAC	A	421	-	0,4,4	0.00	-	0,6,6	0.00	-
6	EDO	B	417	-	3,3,3	0.32	0	2,2,2	1.04	0
3	GOL	B	407[B]	-	5,5,5	0.66	0	5,5,5	0.93	0
5	NCO	A	409	-	6,6,6	1.49	1 (16%)	-	-	-
6	EDO	A	419	-	3,3,3	0.59	0	2,2,2	0.31	0
3	GOL	B	404	-	5,5,5	0.60	0	5,5,5	0.82	0
6	EDO	A	420	-	3,3,3	1.76	1 (33%)	2,2,2	1.46	0
4	FMN	B	408	-	31,33,33	1.93	7 (22%)	40,50,50	2.25	6 (15%)
6	EDO	A	412	-	3,3,3	0.65	0	2,2,2	1.08	0
6	EDO	B	411	-	3,3,3	0.61	0	2,2,2	0.43	0
6	EDO	B	413	-	3,3,3	1.02	0	2,2,2	2.07	1 (50%)
3	GOL	B	402	-	5,5,5	0.54	0	5,5,5	0.73	0
5	NCO	B	410[B]	-	6,6,6	1.43	1 (16%)	-	-	-
6	EDO	B	422	-	3,3,3	0.62	0	2,2,2	0.54	0
5	NCO	B	410[A]	-	6,6,6	0.81	0	-	-	-
3	GOL	A	402	-	5,5,5	0.83	0	5,5,5	1.16	0
7	CAC	A	422	-	0,4,4	0.00	-	0,6,6	0.00	-
6	EDO	B	412	-	3,3,3	0.50	0	2,2,2	0.82	0
4	FMN	A	408	-	31,33,33	1.60	3 (9%)	40,50,50	2.47	6 (15%)
6	EDO	B	416	-	3,3,3	1.03	0	2,2,2	0.74	0
6	EDO	B	420	-	3,3,3	1.84	1 (33%)	2,2,2	0.85	0
8	PEG	B	423	-	6,6,6	1.58	2 (33%)	5,5,5	6.28	5 (100%)
3	GOL	B	405	-	5,5,5	0.93	0	5,5,5	2.38	2 (40%)
3	GOL	A	405	-	5,5,5	1.22	1 (20%)	5,5,5	3.29	4 (80%)
6	EDO	A	414[A]	-	3,3,3	0.87	0	2,2,2	0.26	0
2	5LL	B	401	1	13,18,18	2.78	7 (53%)	20,24,24	2.31	11 (55%)

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
6	EDO	B	414	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	EDO	A	414[B]	-	-	0/1/1/1	-
6	EDO	A	416	-	-	1/1/1/1	-
6	EDO	B	418	-	-	1/1/1/1	-
6	EDO	B	421	-	-	1/1/1/1	-
3	GOL	A	407	-	-	0/4/4/4	-
6	EDO	B	415	-	-	1/1/1/1	-
3	GOL	A	404	-	-	0/4/4/4	-
3	GOL	A	403	-	-	2/4/4/4	-
6	EDO	B	419	-	-	0/1/1/1	-
3	GOL	B	407[A]	-	-	0/4/4/4	-
6	EDO	A	413	-	-	1/1/1/1	-
6	EDO	A	417	-	-	1/1/1/1	-
3	GOL	A	406	-	-	1/4/4/4	-
6	EDO	A	418	-	-	1/1/1/1	-
6	EDO	A	411	-	-	0/1/1/1	-
3	GOL	B	403	-	-	0/4/4/4	-
6	EDO	A	410	-	-	1/1/1/1	-
6	EDO	A	415	-	-	1/1/1/1	-
2	5LL	A	401	1	-	3/4/22/22	0/2/2/2
3	GOL	B	406	-	-	0/4/4/4	-
6	EDO	B	417	-	-	1/1/1/1	-
3	GOL	B	407[B]	-	-	0/4/4/4	-
2	5LL	B	401	1	-	3/4/22/22	0/2/2/2
6	EDO	A	419	-	-	1/1/1/1	-
3	GOL	B	404	-	-	0/4/4/4	-
6	EDO	A	420	-	-	1/1/1/1	-
4	FMN	B	408	-	-	1/18/18/18	0/3/3/3
6	EDO	B	411	-	-	1/1/1/1	-
6	EDO	B	413	-	-	1/1/1/1	-
3	GOL	B	402	-	-	0/4/4/4	-
6	EDO	B	422	-	-	0/1/1/1	-
6	EDO	A	412	-	-	1/1/1/1	-
3	GOL	A	402	-	-	2/4/4/4	-
6	EDO	B	412	-	-	0/1/1/1	-
4	FMN	A	408	-	-	1/18/18/18	0/3/3/3
6	EDO	B	416	-	-	1/1/1/1	-
6	EDO	B	420	-	-	0/1/1/1	-
8	PEG	B	423	-	-	4/4/4/4	-
3	GOL	B	405	-	-	0/4/4/4	-
3	GOL	A	405	-	-	2/4/4/4	-
6	EDO	A	414[A]	-	-	1/1/1/1	-

All (41) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	408	FMN	C4A-C10	7.40	1.46	1.38
4	A	408	FMN	C4A-C10	6.18	1.45	1.38
2	B	401	5LL	C2-N1	-5.84	1.27	1.37
5	B	409	NCO	CO-N5	5.81	2.17	1.96
2	A	401	5LL	CAH-C5	5.35	1.51	1.37
5	B	409	NCO	CO-N3	4.77	2.13	1.96
2	A	401	5LL	O4-C4	4.67	1.32	1.23
2	B	401	5LL	CAH-C5	4.48	1.48	1.37
2	A	401	5LL	C5-C4	-3.65	1.38	1.45
4	B	408	FMN	C1'-N10	-3.62	1.44	1.48
2	A	401	5LL	C2-N1	-3.51	1.31	1.37
5	B	409	NCO	CO-N6	3.47	2.09	1.96
2	B	401	5LL	O4-C4	3.28	1.29	1.23
2	A	401	5LL	C6-N1	-3.27	1.32	1.38
4	A	408	FMN	C1'-N10	-3.04	1.45	1.48
4	A	408	FMN	C5A-N5	2.98	1.40	1.35
2	B	401	5LL	C5-C4	-2.92	1.39	1.45
2	B	401	5LL	C4-N3	-2.91	1.33	1.38
3	A	407	GOL	O2-C2	2.77	1.51	1.43
2	B	401	5LL	O6-C6	2.76	1.28	1.23
4	B	408	FMN	C6-C5A	-2.72	1.37	1.41
6	B	420	EDO	O1-C1	2.68	1.55	1.42
6	A	420	EDO	O1-C1	2.56	1.55	1.42
8	B	423	PEG	O4-C4	2.54	1.55	1.42
6	A	416	EDO	O1-C1	-2.52	1.29	1.42
5	B	410[B]	NCO	CO-N5	2.43	2.05	1.96
5	B	409	NCO	CO-N2	2.42	2.05	1.96
5	B	409	NCO	CO-N1	2.38	2.05	1.96
3	A	405	GOL	O3-C3	-2.37	1.32	1.42
4	B	408	FMN	C5'-C4'	2.35	1.55	1.51
5	B	409	NCO	CO-N4	2.34	2.05	1.96
6	A	417	EDO	O1-C1	-2.34	1.30	1.42
8	B	423	PEG	C3-C4	2.29	1.61	1.49
4	B	408	FMN	C5A-N5	2.17	1.38	1.35
2	B	401	5LL	CAG-CAF	-2.17	1.30	1.34
4	B	408	FMN	C10-N1	-2.14	1.30	1.33
3	A	406	GOL	O2-C2	-2.13	1.37	1.43
2	A	401	5LL	CAG-CAF	-2.11	1.30	1.34
2	A	401	5LL	C4-N3	-2.09	1.35	1.38
5	A	409	NCO	CO-N2	2.07	2.04	1.96
4	B	408	FMN	C9A-N10	2.03	1.41	1.38

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	408	FMN	C4-N3-C2	11.97	125.25	115.14
2	A	401	5LL	CAH-CAG-CAF	-9.94	103.20	122.45
4	B	408	FMN	C4-N3-C2	8.54	122.35	115.14
8	B	423	PEG	O2-C2-C1	8.16	145.91	110.07
4	B	408	FMN	C4-C4A-C10	-7.95	114.69	119.95
8	B	423	PEG	O2-C3-C4	7.34	142.31	110.07
8	B	423	PEG	C3-O2-C2	7.25	144.71	113.29
2	A	401	5LL	C6-C5-C4	-5.53	113.67	119.48
2	A	401	5LL	CAG-CAH-C5	-5.28	117.73	128.57
4	A	408	FMN	C4A-C4-N3	-5.15	116.39	123.43
2	A	401	5LL	C4-N3-C2	-4.90	119.28	126.34
2	A	401	5LL	C5-C4-N3	4.85	122.74	114.35
3	A	405	GOL	O3-C3-C2	4.61	132.33	110.20
8	B	423	PEG	O1-C1-C2	4.42	137.48	111.81
2	B	401	5LL	CAH-CAG-CAF	-4.32	114.09	122.45
2	A	401	5LL	O2-C2-N3	-4.20	113.89	121.82
2	B	401	5LL	O2-C2-N3	-4.18	113.94	121.82
4	B	408	FMN	C1'-N10-C9A	4.06	121.49	118.29
3	A	405	GOL	O2-C2-C3	-3.48	93.78	109.12
3	B	405	GOL	O2-C2-C3	-3.44	93.95	109.12
4	A	408	FMN	C4-C4A-C10	-3.43	117.68	119.95
3	A	405	GOL	O2-C2-C1	3.25	123.44	109.12
4	B	408	FMN	C10-C4A-N5	3.22	123.48	121.26
2	A	401	5LL	N3-C2-N1	3.13	120.83	115.80
2	A	401	5LL	C5-C6-N1	3.10	119.71	114.35
3	A	405	GOL	C3-C2-C1	2.95	123.18	111.70
6	B	413	EDO	O2-C2-C1	2.87	132.56	111.91
2	A	401	5LL	O4-C4-C5	-2.87	119.27	125.99
4	A	408	FMN	C1'-N10-C10	2.81	120.92	118.41
2	A	401	5LL	C6-N1-C2	-2.77	122.35	126.34
6	A	418	EDO	O2-C2-C1	2.73	131.52	111.91
4	B	408	FMN	C4-C4A-N5	2.72	121.71	118.60
4	A	408	FMN	C5A-C9A-N10	2.66	119.64	117.72
6	B	414	EDO	O1-C1-C2	2.62	130.75	111.91
2	B	401	5LL	O4-C4-N3	-2.61	115.12	120.12
4	B	408	FMN	C4A-C4-N3	-2.60	119.88	123.43
3	B	405	GOL	O1-C1-C2	2.59	122.64	110.20
2	B	401	5LL	C4-N3-C2	-2.53	122.69	126.34
2	B	401	5LL	C6-C5-C4	-2.53	116.83	119.48
2	B	401	5LL	N3-C2-N1	2.49	119.80	115.80
2	A	401	5LL	O6-C6-C5	-2.46	120.22	125.99
2	B	401	5LL	O2-C2-N1	2.36	126.26	121.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	5LL	C6-N1-C2	-2.27	123.07	126.34
3	A	407	GOL	C3-C2-C1	-2.25	102.94	111.70
2	B	401	5LL	CAH-C5-C6	2.21	125.87	120.14
2	A	401	5LL	CAA-CAB-CAC	-2.15	105.28	112.92
2	B	401	5LL	C5-C4-N3	2.15	118.06	114.35
2	A	401	5LL	CAH-C5-C6	2.11	125.62	120.14
8	B	423	PEG	O4-C4-C3	2.11	124.03	111.81
4	A	408	FMN	C1'-C2'-C3'	2.09	115.63	109.79
2	B	401	5LL	CAG-CAH-C5	-2.01	124.44	128.57

There are no chirality outliers.

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	403	GOL	O1-C1-C2-O2
3	A	403	GOL	O1-C1-C2-C3
2	A	401	5LL	C4-C5-CAH-CAG
2	A	401	5LL	C6-C5-CAH-CAG
2	A	401	5LL	CAF-CAG-CAH-C5
3	A	402	GOL	C1-C2-C3-O3
3	A	405	GOL	C1-C2-C3-O3
2	B	401	5LL	C4-C5-CAH-CAG
2	B	401	5LL	C6-C5-CAH-CAG
8	B	423	PEG	C4-C3-O2-C2
3	A	405	GOL	O2-C2-C3-O3
8	B	423	PEG	O1-C1-C2-O2
2	B	401	5LL	CAF-CAG-CAH-C5
8	B	423	PEG	O2-C3-C4-O4
6	B	418	EDO	O1-C1-C2-O2
6	B	421	EDO	O1-C1-C2-O2
6	A	413	EDO	O1-C1-C2-O2
6	A	417	EDO	O1-C1-C2-O2
6	A	415	EDO	O1-C1-C2-O2
6	B	417	EDO	O1-C1-C2-O2
6	A	419	EDO	O1-C1-C2-O2
3	A	402	GOL	O2-C2-C3-O3
4	B	408	FMN	C4'-C5'-O5'-P
4	A	408	FMN	C4'-C5'-O5'-P
6	A	418	EDO	O1-C1-C2-O2
6	A	420	EDO	O1-C1-C2-O2
6	B	411	EDO	O1-C1-C2-O2
6	B	413	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
6	B	415	EDO	O1-C1-C2-O2
6	A	410	EDO	O1-C1-C2-O2
8	B	423	PEG	C1-C2-O2-C3
6	B	414	EDO	O1-C1-C2-O2
6	A	416	EDO	O1-C1-C2-O2
6	A	412	EDO	O1-C1-C2-O2
6	A	414[A]	EDO	O1-C1-C2-O2
3	A	406	GOL	C1-C2-C3-O3
6	B	416	EDO	O1-C1-C2-O2

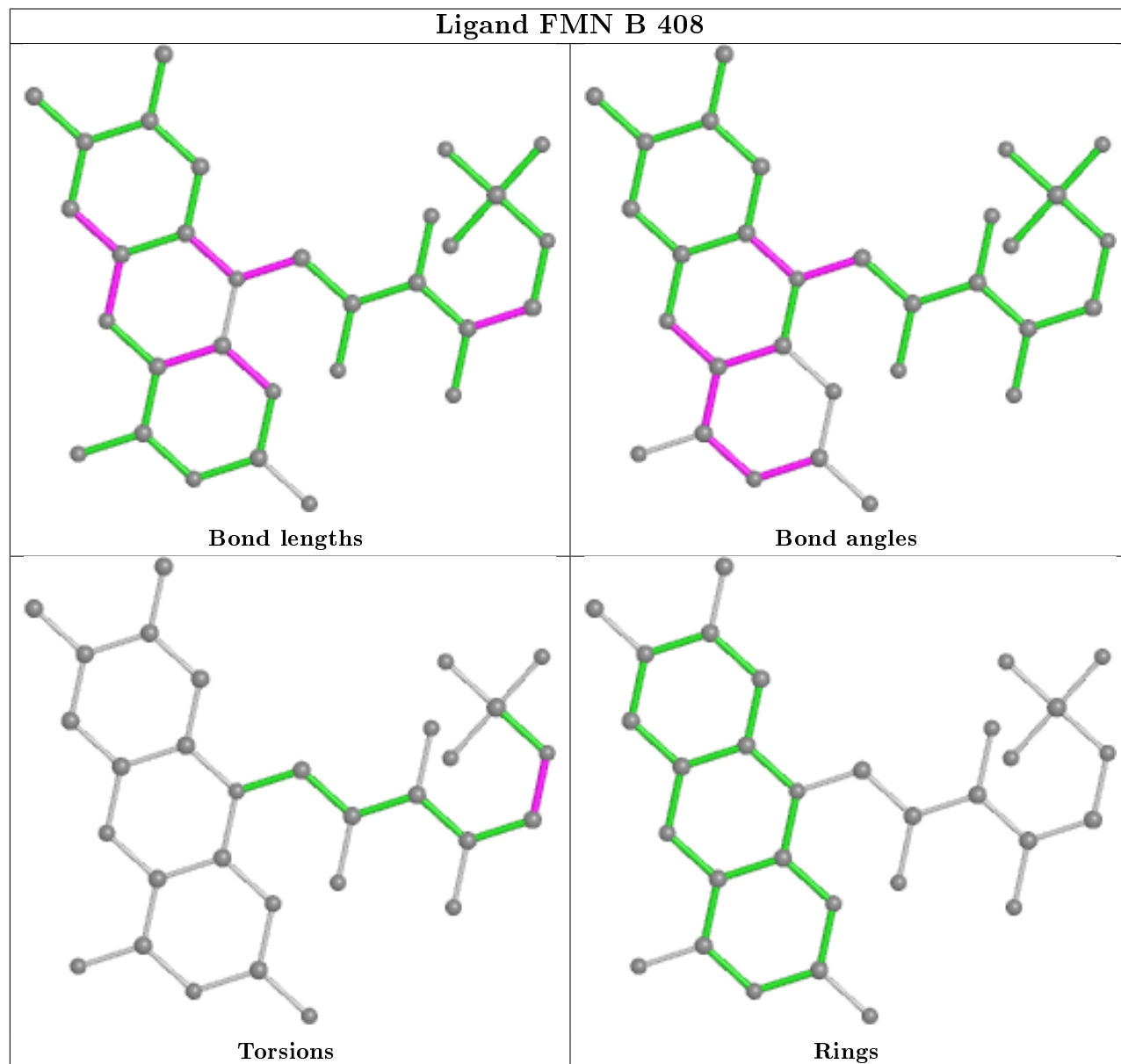
There are no ring outliers.

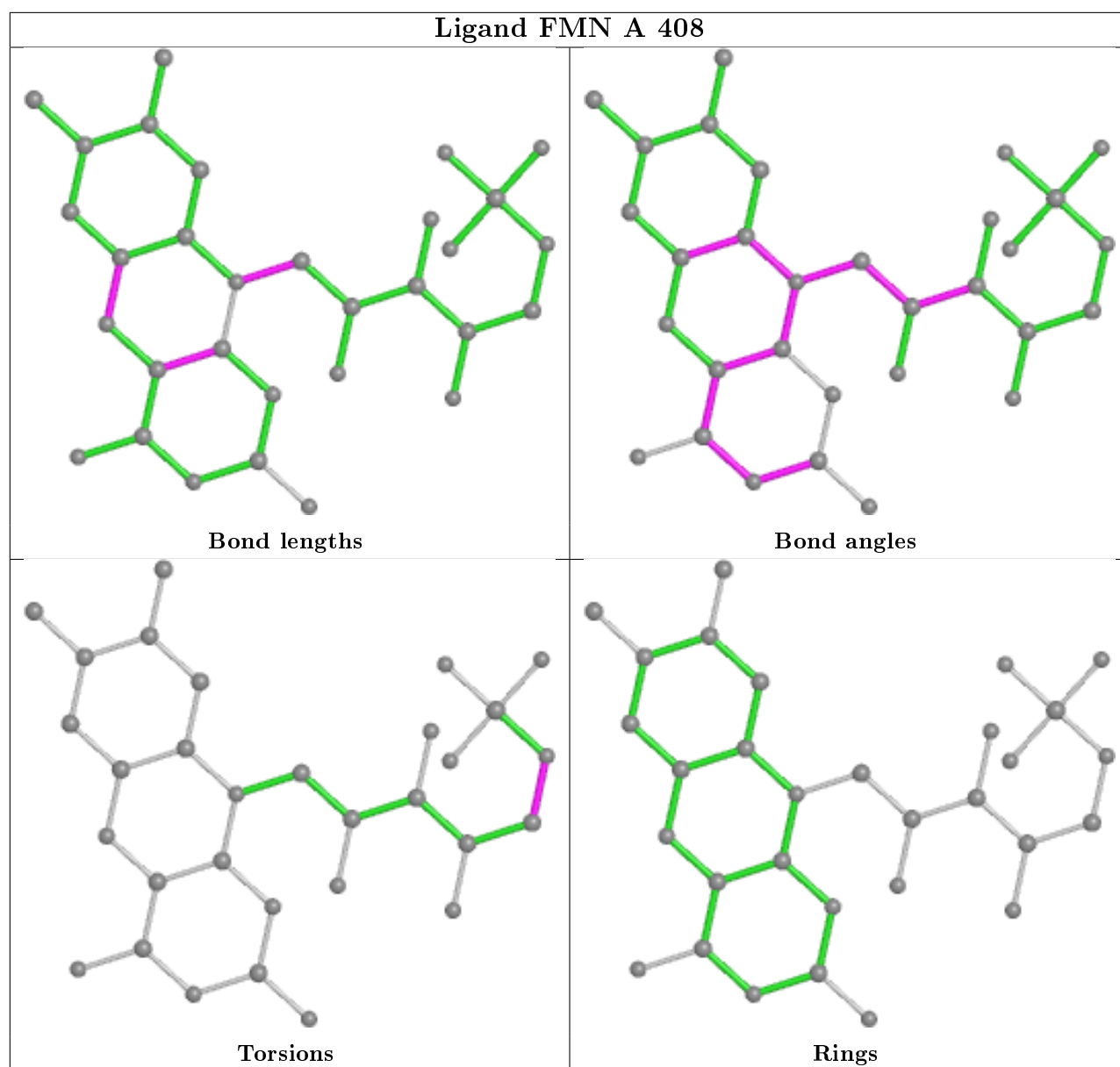
25 monomers are involved in 61 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	414	EDO	10	0
6	A	416	EDO	3	0
6	B	421	EDO	6	0
3	A	403	GOL	1	0
2	A	401	5LL	1	0
6	A	417	EDO	4	0
3	A	406	GOL	2	0
6	A	418	EDO	5	0
6	A	410	EDO	2	0
6	A	415	EDO	1	0
5	B	409	NCO	2	0
7	A	421	CAC	3	0
6	A	419	EDO	3	0
6	A	420	EDO	3	0
6	A	412	EDO	3	0
6	B	413	EDO	2	0
5	B	410[B]	NCO	1	0
6	B	412	EDO	3	0
4	A	408	FMN	1	0
6	B	416	EDO	4	0
6	B	420	EDO	1	0
8	B	423	PEG	5	0
3	A	405	GOL	3	0
6	A	414[A]	EDO	1	0
2	B	401	5LL	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	313/314 (99%)	-0.19	11 (3%) 44 43	10, 14, 28, 46	0
1	B	313/314 (99%)	-0.13	10 (3%) 47 46	9, 14, 31, 48	0
All	All	626/628 (99%)	-0.16	21 (3%) 45 44	9, 14, 30, 48	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	54	PRO	5.0
1	B	312	GLU	4.6
1	B	54	PRO	4.2
1	B	52	GLY	4.0
1	A	312	GLU	4.0
1	A	51	ASP	4.0
1	B	51	ASP	3.9
1	A	71	LEU	3.5
1	B	53	ASN	3.4
1	B	133	VAL	3.4
1	A	0	MET	3.4
1	A	52	GLY	3.3
1	B	134	PRO	2.7
1	B	71	LEU	2.7
1	A	72	PRO	2.6
1	B	155	LEU	2.6
1	A	53	ASN	2.5
1	B	72	PRO	2.3
1	A	2	LEU	2.1
1	A	134	PRO	2.0
1	A	133	VAL	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.4 Ligands [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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
6	EDO	B	420	4/4	0.62	0.23	26,26,30,33	0
3	GOL	A	403	6/6	0.73	0.16	38,41,44,46	0
6	EDO	A	410	4/4	0.78	0.35	32,32,35,44	0
6	EDO	A	418	4/4	0.78	0.32	26,26,33,35	0
6	EDO	A	413	4/4	0.79	0.19	39,45,46,51	0
3	GOL	A	406	6/6	0.80	0.20	28,29,31,36	0
6	EDO	B	415	4/4	0.80	0.27	35,41,43,53	0
3	GOL	B	403	6/6	0.82	0.13	36,40,47,48	0
6	EDO	B	421	4/4	0.83	0.41	32,35,37,37	0
6	EDO	B	411	4/4	0.84	0.18	32,37,47,52	0
6	EDO	A	420	4/4	0.84	0.24	18,27,29,36	0
6	EDO	A	414[B]	4/4	0.85	0.15	25,27,29,32	4
6	EDO	A	414[A]	4/4	0.85	0.15	25,28,30,34	4
6	EDO	A	411	4/4	0.86	0.24	37,38,38,47	0
3	GOL	B	406	6/6	0.86	0.19	23,24,24,25	0
3	GOL	A	407	6/6	0.86	0.19	28,32,34,41	0
7	CAC	A	421	5/5	0.87	0.31	15,22,33,33	0
3	GOL	A	402	6/6	0.87	0.13	27,30,32,39	0
6	EDO	A	419	4/4	0.87	0.22	28,28,30,30	0
6	EDO	A	415	4/4	0.87	0.34	25,30,32,35	0
3	GOL	A	404	6/6	0.88	0.10	20,25,27,28	0
6	EDO	B	412	4/4	0.89	0.32	32,37,39,40	0
5	NCO	A	409	7/7	0.90	0.44	34,38,39,43	0
7	CAC	A	422	5/5	0.91	0.33	21,22,35,35	0
6	EDO	A	412	4/4	0.91	0.30	25,26,27,29	0
6	EDO	B	416	4/4	0.91	0.21	23,26,26,28	0
6	EDO	B	414	4/4	0.91	0.19	20,26,28,43	0

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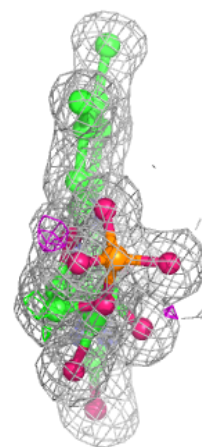
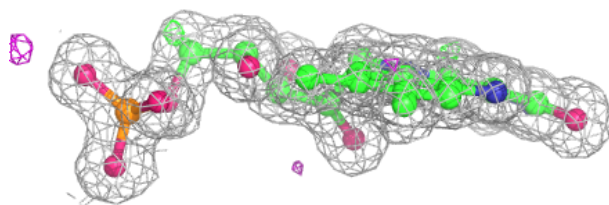
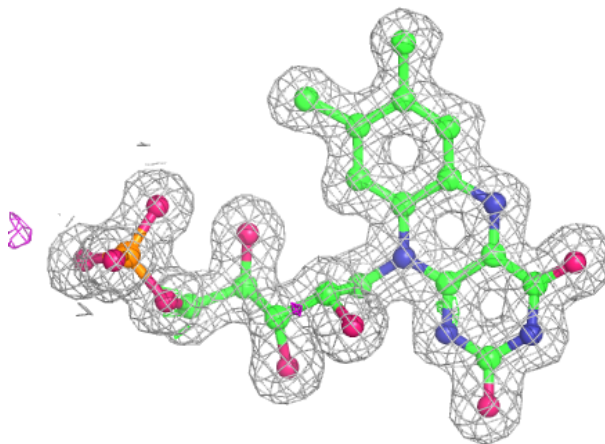
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	5LL	A	401	17/17	0.91	0.15	13,21,37,38	0
8	PEG	B	423	7/7	0.92	0.11	15,18,26,26	0
3	GOL	A	405	6/6	0.92	0.13	21,26,32,32	0
6	EDO	B	418	4/4	0.92	0.22	36,36,39,40	0
6	EDO	B	422	4/4	0.93	0.06	27,27,28,28	0
2	5LL	B	401	17/17	0.93	0.13	12,22,37,39	0
3	GOL	B	405	6/6	0.94	0.17	14,31,34,36	0
6	EDO	B	413	4/4	0.94	0.23	25,27,29,45	0
3	GOL	B	402	6/6	0.95	0.07	18,23,25,26	0
6	EDO	A	416	4/4	0.95	0.12	18,21,29,32	0
6	EDO	B	419	4/4	0.95	0.16	29,36,42,43	0
6	EDO	B	417	4/4	0.95	0.33	25,40,41,63	0
3	GOL	B	404	6/6	0.96	0.09	17,23,26,28	0
5	NCO	B	410[A]	7/7	0.96	0.18	21,23,24,25	7
6	EDO	A	417	4/4	0.96	0.17	22,26,29,29	0
5	NCO	B	410[B]	7/7	0.96	0.18	20,22,25,26	7
4	FMN	B	408	31/31	0.98	0.06	8,10,12,13	0
3	GOL	B	407[A]	6/6	0.98	0.09	12,17,17,17	6
3	GOL	B	407[B]	6/6	0.98	0.09	14,17,18,18	6
4	FMN	A	408	31/31	0.99	0.06	8,9,11,13	0
5	NCO	B	409	7/7	0.99	0.07	12,13,14,14	0

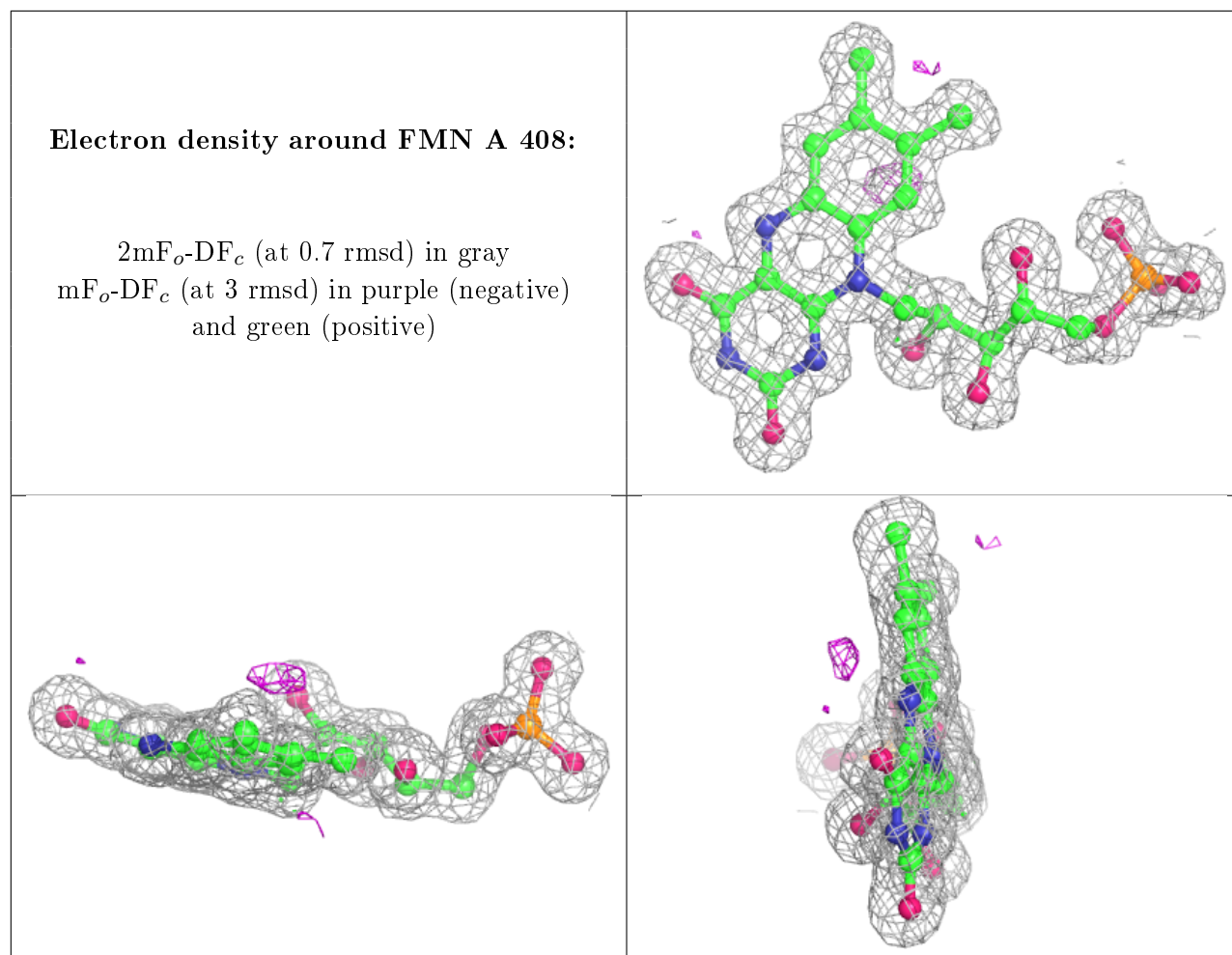
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around FMN B 408:**

$2mF_o-DF_c$  (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.