Full wwPDB X-ray Structure Validation Report (i)

Nov 16, 2020 – 05:45 PM GMT

PDB ID	:	6ZLF
Title	:	Aerobic crystal structure of F420H2-Oxidase from Methanothermococcus thermolithotrophicus at 1.8A resolution under 125 bars of krypton
Authors	:	Engilberge, S.; Wagner, T.; Carpentier, P.; Girard, E.; Shima, S.
Deposited on	:	2020-06-30
Resolution	:	1.80 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 (i) symbol.

<hr/>

The following versions of software and data (see references (i)) 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	:	2.14.6
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)	:	2.14.6

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.80 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.
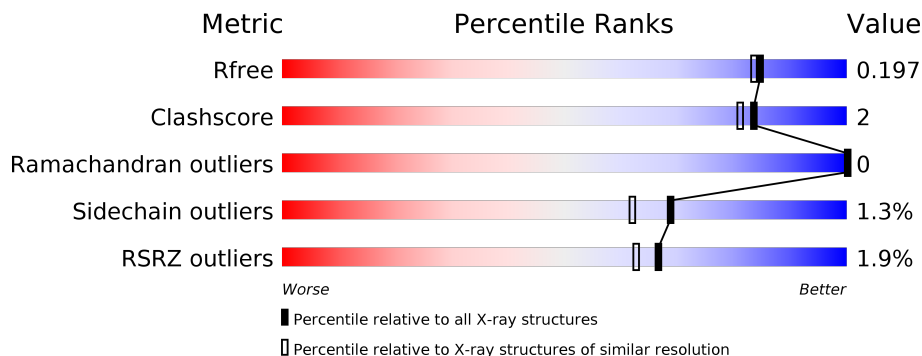
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	410	
1	F	410	
1	G	410	
1	H	410	
1	I	410	
1	J	410	

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	K	410	2% ▮▮ 95% ████████████████████████ 5%
1	L	410	2% ▮▮ 96% ████████████████████████ •

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:

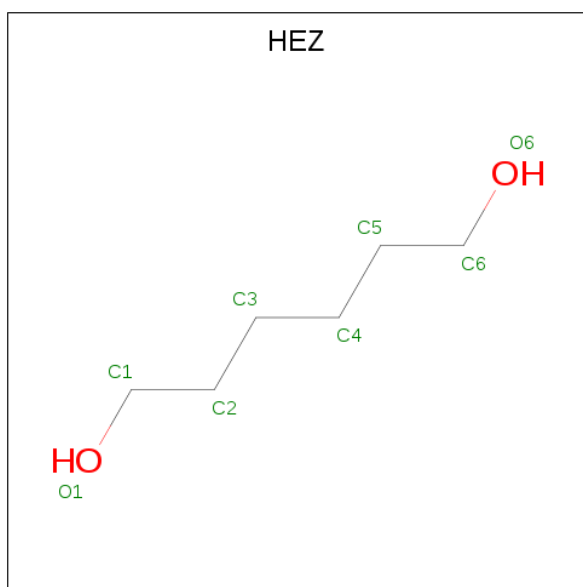| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	KR	A	512	-	-	X	-
4	KR	F	503	-	-	X	-
4	KR	G	506	-	-	X	-
4	KR	G	508	-	-	-	X
4	KR	H	708	-	-	X	X
4	KR	I	510	-	-	X	-
4	KR	I	514	-	-	X	-
4	KR	J	509	-	-	X	-
4	KR	K	508	-	-	X	-
4	KR	K	510	-	-	X	X
4	KR	L	506	-	-	X	-

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 28860 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 Coenzyme F420H2 oxidase (FprA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	409	Total 3246	C 2101	N 523	O 601	S 21	0	1	0
1	F	408	Total 3262	C 2115	N 524	O 602	S 21	0	6	0
1	G	408	Total 3252	C 2108	N 523	O 600	S 21	0	3	0
1	H	408	Total 3267	C 2120	N 523	O 603	S 21	0	5	0
1	I	408	Total 3266	C 2121	N 523	O 601	S 21	0	5	0
1	J	408	Total 3276	C 2129	N 524	O 602	S 21	0	7	0
1	K	408	Total 3263	C 2118	N 524	O 600	S 21	0	5	0
1	L	410	Total 3279	C 2129	N 524	O 605	S 21	0	5	0

- Molecule 2 is HEXANE-1,6-DIOL (three-letter code: HEZ) (formula: $C_6H_{14}O_2$).

HEZ

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 8	C 6	O 2	0	0
2	A	1	Total 8	C 6	O 2	0	0
2	A	1	Total 8	C 6	O 2	0	0
2	A	1	Total 8	C 6	O 2	0	0
2	F	1	Total 8	C 6	O 2	0	0
2	G	1	Total 8	C 6	O 2	0	0
2	G	1	Total 8	C 6	O 2	0	0
2	H	1	Total 8	C 6	O 2	0	0
2	I	1	Total 8	C 6	O 2	0	0
2	I	1	Total 8	C 6	O 2	0	0
2	I	1	Total 8	C 6	O 2	0	0
2	I	1	Total 8	C 6	O 2	0	0
2	I	1	Total 8	C 6	O 2	0	0
2	I	1	Total 8	C 6	O 2	0	0

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	J	1	Total 8	C 6	O 2	0	0
2	J	1	Total 8	C 6	O 2	0	0
2	J	1	Total 8	C 6	O 2	0	0
2	K	1	Total 8	C 6	O 2	0	0
2	K	1	Total 8	C 6	O 2	0	0
2	K	1	Total 8	C 6	O 2	0	0
2	L	1	Total 8	C 6	O 2	0	0
2	L	1	Total 8	C 6	O 2	0	0

- Molecule 3 is MU-OXO-DIIRON (three-letter code: FEO) (formula: Fe_2O).
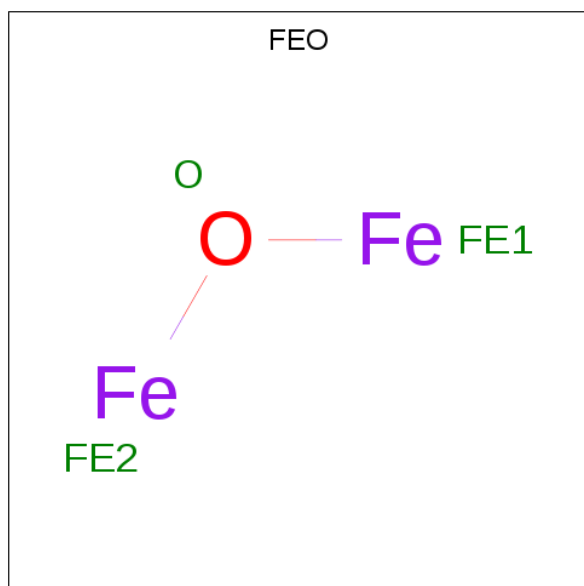
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 3	Fe 2	O 1	0	0
3	F	1	Total 3	Fe 2	O 1	0	0
3	G	1	Total 3	Fe 2	O 1	0	0

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	H	1	Total 3	Fe 2	O 1	0	0
3	I	1	Total 3	Fe 2	O 1	0	0
3	J	1	Total 3	Fe 2	O 1	0	0
3	K	1	Total 3	Fe 2	O 1	0	0
3	L	1	Total 3	Fe 2	O 1	0	0

- Molecule 4 is KRYPTON (three-letter code: KR) (formula: Kr).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	G	5	Total 5	Kr 5	0	0
4	J	6	Total 6	Kr 6	0	0
4	K	6	Total 6	Kr 6	0	0
4	H	6	Total 6	Kr 6	0	0
4	I	7	Total 7	Kr 7	0	0
4	A	7	Total 7	Kr 7	0	0
4	L	6	Total 6	Kr 6	0	0
4	F	5	Total 5	Kr 5	0	0

- Molecule 5 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: $C_{17}H_{21}N_4O_9P$).

FMN
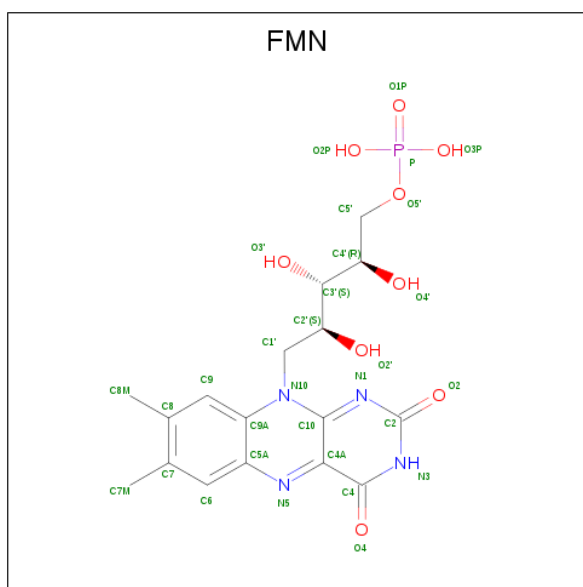
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
5	F	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
5	G	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
5	H	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
5	I	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
5	J	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
5	K	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
5	L	1	Total	C	N	O	P	0	0
			31	17	4	9	1		

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	G	1	Total	Cl	0	0
			1	1		
6	J	1	Total	Cl	0	0
			1	1		
6	K	1	Total	Cl	0	0
			1	1		
6	H	1	Total	Cl	0	0
			1	1		

Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	I	1	Total 1	Cl 1	0	0
6	A	1	Total 1	Cl 1	0	0
6	L	1	Total 1	Cl 1	0	0
6	F	1	Total 1	Cl 1	0	0

- Molecule 7 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	275	Total 279	O 279	0	5
7	F	283	Total 284	O 284	0	3
7	G	280	Total 284	O 284	0	4
7	H	228	Total 231	O 231	0	4
7	I	320	Total 325	O 325	0	6
7	J	285	Total 289	O 289	0	5
7	K	252	Total 253	O 253	0	2
7	L	299	Total 300	O 300	0	2

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.
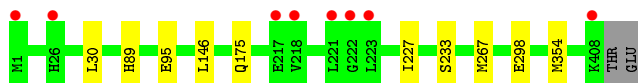
- Molecule 1: Coenzyme F420H2 oxidase (FprA)
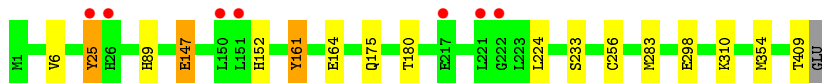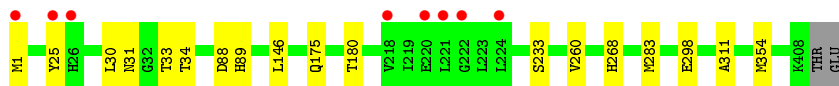
- Molecule 1: Coenzyme F420H2 oxidase (FprA)

- Molecule 1: Coenzyme F420H2 oxidase (FprA)

- Molecule 1: Coenzyme F420H2 oxidase (FprA)
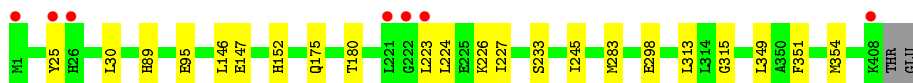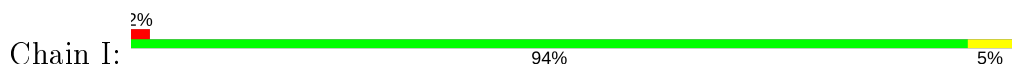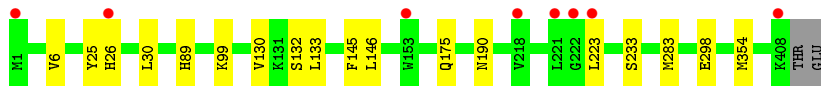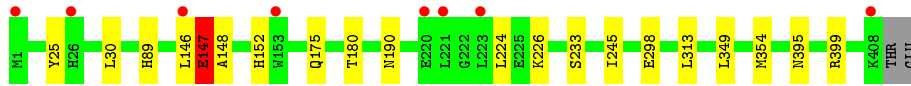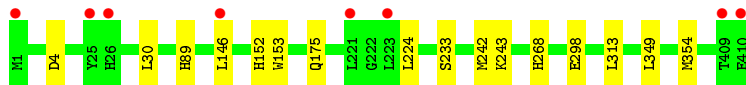

- Molecule 1: Coenzyme F420H2 oxidase (FprA)

- Molecule 1: Coenzyme F420H2 oxidase (FprA)

Chain J:

• Molecule 1: Coenzyme F420H2 oxidase (FprA)

Chain K:

• Molecule 1: Coenzyme F420H2 oxidase (FprA)

Chain L:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	75.03Å 162.55Å 134.38Å 90.00° 93.75° 90.00°	Depositor
Resolution (Å)	48.40 – 1.80 49.23 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.40-1.80) 99.1 (49.23-1.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	1.03 (at 1.79Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.182 , 0.197 0.182 , 0.197	Depositor DCC
R_{free} test set	14768 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å²)	31.8	Xtriage
Anisotropy	0.009	Xtriage
Bulk solvent k_{sol}(e/Å³), B_{sol}(Å²)	0.32 , 39.8	EDS
L-test for twinning[2]	$<|L|> = 0.51$, $<L^2> = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	28860	wwPDB-VP
Average B, all atoms (Å²)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.86% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $<|L|>$, $<L^2>$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: FMN, FEO, KR, HEZ, CL

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	0.33	0/3323	0.53	3/4485 (0.1%)
1	F	0.33	0/3354	0.51	2/4527 (0.0%)
1	G	0.31	0/3335	0.46	0/4501
1	H	0.29	0/3357	0.47	0/4531
1	I	0.31	0/3356	0.47	0/4530
1	J	0.33	0/3372	0.50	0/4552
1	K	0.36	1/3352 (0.0%)	0.52	3/4523 (0.1%)
1	L	0.35	1/3366 (0.0%)	0.48	0/4545
All	All	0.33	2/26815 (0.0%)	0.49	8/36194 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	K	148	ALA	C-N	9.45	1.52	1.34
1	L	153	TRP	C-N	7.92	1.49	1.34

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	25	TYR	CB-CG-CD2	-8.88	115.67	121.00
1	A	25	TYR	CB-CG-CD1	7.59	125.56	121.00
1	K	147	GLU	N-CA-CB	6.65	122.58	110.60
1	F	31[A]	ASN	CA-C-O	6.26	133.24	120.10
1	F	31[B]	ASN	CA-C-O	6.26	133.24	120.10
1	K	25	TYR	CB-CG-CD2	-6.04	117.38	121.00
1	K	147	GLU	CA-CB-CG	6.03	126.66	113.40
1	A	147	GLU	CB-CG-CD	5.48	129.00	114.20

There are no chirality outliers.

There are no planarity outliers.

Full wwPDB X-ray Structure Validation Report

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	3246	0	3239	14	0
1	F	3262	0	3271	17	0
1	G	3252	0	3258	10	0
1	H	3267	0	3273	15	0
1	I	3266	0	3278	23	0
1	J	3276	0	3295	20	0
1	K	3263	0	3282	25	0
1	L	3279	0	3279	15	0
2	A	32	0	56	2	0
2	F	8	0	14	0	0
2	G	16	0	28	0	0
2	H	8	0	14	3	0
2	I	48	0	84	1	0
2	J	24	0	42	3	0
2	K	24	0	42	2	0
2	L	16	0	28	2	0
3	A	3	0	0	0	0
3	F	3	0	0	0	0
3	G	3	0	0	0	0
3	H	3	0	0	0	0
3	I	3	0	0	0	0
3	J	3	0	0	0	0
3	K	3	0	0	0	0
3	L	3	0	0	0	0
4	A	7	0	0	7	0
4	F	5	0	0	7	0
4	G	5	0	0	7	0
4	H	6	0	0	7	0
4	I	7	0	0	12	0
4	J	6	0	0	6	0
4	K	6	0	0	15	0
4	L	6	0	0	7	0
5	A	31	0	19	0	0
5	F	31	0	19	0	0
5	G	31	0	19	0	0
5	H	31	0	19	0	0
5	I	31	0	19	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	J	31	0	19	0	0
5	K	31	0	19	0	0
5	L	31	0	19	0	0
6	A	1	0	0	0	0
6	F	1	0	0	0	0
6	G	1	0	0	0	0
6	H	1	0	0	0	0
6	I	1	0	0	0	0
6	J	1	0	0	0	0
6	K	1	0	0	0	0
6	L	1	0	0	0	0
7	A	279	0	0	0	0
7	F	284	0	0	1	0
7	G	284	0	0	1	0
7	H	231	0	0	3	0
7	I	325	0	0	1	0
7	J	289	0	0	1	0
7	K	253	0	0	0	0
7	L	300	0	0	3	0
All	All	28860	0	26635	129	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 (129) 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:I:146[A]:LEU:HD11	4:I:510:KR:KR	1.46	1.75
1:F:146[A]:LEU:HD21	4:F:503:KR:KR	1.48	1.72
1:F:146[A]:LEU:HD11	4:F:503:KR:KR	1.55	1.67
1:L:146[B]:LEU:HD11	4:L:506:KR:KR	1.56	1.66
1:K:146[A]:LEU:HD11	4:K:508:KR:KR	1.62	1.59
1:I:146[A]:LEU:CD1	4:I:510:KR:KR	2.13	1.55
1:F:146[A]:LEU:CD2	4:F:503:KR:KR	2.15	1.54
1:G:146[B]:LEU:HD11	4:G:506:KR:KR	1.68	1.53
1:I:146[A]:LEU:HD21	4:I:510:KR:KR	1.71	1.52
1:F:146[A]:LEU:CD1	4:F:503:KR:KR	2.20	1.50
1:I:146[A]:LEU:CG	4:I:510:KR:KR	2.25	1.46
1:F:146[A]:LEU:CG	4:F:503:KR:KR	2.25	1.45
1:K:146[A]:LEU:HD21	4:K:508:KR:KR	1.77	1.45
1:L:146[B]:LEU:CD1	4:L:506:KR:KR	2.26	1.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:146[B]:LEU:CD1	4:G:506:KR:KR	2.32	1.38
1:I:146[A]:LEU:CD2	4:I:510:KR:KR	2.31	1.38
1:K:146[A]:LEU:CD1	4:K:508:KR:KR	2.33	1.36
1:G:146[B]:LEU:CG	4:G:506:KR:KR	2.43	1.27
1:K:146[A]:LEU:CG	4:K:508:KR:KR	2.44	1.26
1:L:146[B]:LEU:CG	4:L:506:KR:KR	2.44	1.26
1:K:146[A]:LEU:CD2	4:K:508:KR:KR	2.44	1.25
1:K:147:GLU:CB	4:K:510:KR:KR	2.51	1.19
1:A:147:GLU:HG3	4:A:512:KR:KR	2.04	1.17
1:A:147:GLU:CG	4:A:512:KR:KR	2.53	1.17
1:K:147:GLU:CG	4:K:510:KR:KR	2.63	1.07
1:G:146[B]:LEU:HG	4:G:506:KR:KR	2.10	1.07
1:L:146[B]:LEU:HD21	4:L:506:KR:KR	2.16	1.06
1:I:146[A]:LEU:HG	4:I:510:KR:KR	2.15	1.03
1:A:147:GLU:HG2	4:A:512:KR:KR	2.18	1.02
1:K:147:GLU:HB3	4:K:510:KR:KR	2.19	1.01
1:L:146[B]:LEU:CD2	4:L:506:KR:KR	2.71	0.99
1:L:146[B]:LEU:HG	4:L:506:KR:KR	2.18	0.99
1:G:146[B]:LEU:HD21	4:G:506:KR:KR	2.24	0.99
1:F:146[A]:LEU:HG	4:F:503:KR:KR	2.23	0.98
1:G:146[B]:LEU:CD2	4:G:506:KR:KR	2.76	0.94
1:K:147:GLU:CA	4:K:510:KR:KR	2.78	0.92
1:I:224:LEU:HD13	4:I:514:KR:KR	2.34	0.89
1:K:146[A]:LEU:HG	4:K:508:KR:KR	2.31	0.88
1:I:147:GLU:N	4:I:513:KR:KR	2.67	0.88
1:J:223:LEU:CD2	4:J:509:KR:KR	2.83	0.87
1:H:147:GLU:HG3	4:H:708:KR:KR	2.36	0.85
1:H:147:GLU:HB2	4:H:708:KR:KR	2.38	0.84
1:H:147:GLU:CB	4:H:708:KR:KR	2.87	0.84
1:K:147:GLU:HG2	4:K:510:KR:KR	2.38	0.82
1:H:164:GLU:OE1	7:H:801:HOH:O	1.99	0.81
1:J:223:LEU:HD23	4:J:509:KR:KR	2.47	0.75
1:K:147:GLU:N	4:K:510:KR:KR	2.83	0.72
1:K:147:GLU:CD	4:K:510:KR:KR	2.90	0.70
1:H:147:GLU:CG	4:H:708:KR:KR	3.02	0.69
1:I:223:LEU:HD12	1:I:226:LYS:HB2	1.77	0.67
1:K:399:ARG:HH22	2:K:503:HEZ:H61	1.59	0.67
1:J:223:LEU:HD21	4:J:509:KR:KR	2.55	0.66
1:L:4:ASP:HB2	2:L:501:HEZ:H32	1.76	0.66
1:K:147:GLU:HA	4:K:510:KR:KR	2.57	0.64
1:I:25:TYR:HE1	7:I:759:HOH:O	1.81	0.64

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:147:GLU:CA	4:H:708:KR:KR	3.09	0.62
1:J:190[B]:ASN:CG	1:K:190[B]:ASN:ND2	2.53	0.61
1:J:190[B]:ASN:OD1	1:K:190[B]:ASN:ND2	2.33	0.61
1:A:310:LYS:HE2	1:A:409:THR:HG23	1.83	0.60
1:A:152:HIS:HB3	4:A:509:KR:KR	2.62	0.60
1:J:190[B]:ASN:CG	1:K:190[B]:ASN:HD21	2.08	0.57
1:L:224:LEU:HD11	1:L:242:MET:SD	2.44	0.57
1:A:256:CYS:H	1:A:409:THR:HG21	1.70	0.56
1:A:224:LEU:HD23	4:A:511:KR:KR	2.67	0.55
1:H:95:GLU:HB2	2:H:702:HEZ:H12	1.88	0.55
1:J:146[A]:LEU:HB2	4:J:508:KR:KR	2.67	0.55
1:L:268:HIS:HD2	7:L:776:HOH:O	1.92	0.53
1:J:133:LEU:HD23	1:J:146[B]:LEU:CD2	2.39	0.52
1:F:268:HIS:HD2	7:H:943:HOH:O	1.93	0.51
1:G:227:ILE:HD11	4:G:507:KR:KR	2.71	0.51
1:J:190[B]:ASN:OD1	1:K:190[B]:ASN:CG	2.49	0.51
1:J:6:VAL:HG22	2:J:501:HEZ:H51	1.92	0.50
1:H:61:TRP:CD2	2:H:702:HEZ:H41	2.47	0.50
1:J:283:MET:SD	1:K:180:THR:HG22	2.52	0.50
1:F:268:HIS:CD2	7:H:943:HOH:O	2.65	0.50
1:A:147:GLU:N	4:A:512:KR:KR	3.06	0.49
1:F:89:HIS:CE1	1:F:233:SER:HB2	2.47	0.49
1:H:89:HIS:CE1	1:H:233:SER:HB2	2.48	0.49
1:K:224:LEU:HD11	1:K:245:ILE:HD13	1.95	0.49
1:H:147:GLU:N	4:H:708:KR:KR	3.07	0.49
1:G:89:HIS:CE1	1:G:233:SER:HB2	2.48	0.49
1:L:89:HIS:CE1	1:L:233:SER:HB2	2.48	0.49
1:I:89:HIS:CE1	1:I:233:SER:HB2	2.48	0.49
1:H:227:ILE:HD11	4:H:705:KR:KR	2.73	0.49
1:A:89:HIS:CE1	1:A:233:SER:HB2	2.48	0.49
1:J:223:LEU:HG	4:J:509:KR:KR	2.74	0.49
1:A:283:MET:SD	1:F:180:THR:HG22	2.53	0.48
1:J:89:HIS:CE1	1:J:233:SER:HB2	2.48	0.48
1:H:180:THR:HG22	1:I:283:MET:SD	2.53	0.48
1:L:152:HIS:HB3	4:L:511:KR:KR	2.75	0.48
1:L:268:HIS:CD2	7:L:776:HOH:O	2.67	0.48
1:I:95:GLU:HB2	2:I:506:HEZ:H11	1.97	0.47
1:K:89:HIS:CE1	1:K:233:SER:HB2	2.50	0.47
1:F:1[B]:MET:HG3	7:F:604:HOH:O	2.14	0.47
1:A:180:THR:HG22	1:F:283:MET:SD	2.55	0.46
1:G:95:GLU:HG3	7:G:760:HOH:O	2.16	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:99:LYS:HB2	2:J:504:HEZ:H12	1.98	0.46
1:I:146[B]:LEU:HB2	4:I:510:KR:KR	2.76	0.46
1:J:223:LEU:CG	4:J:509:KR:KR	3.25	0.45
1:A:147:GLU:CA	4:A:512:KR:KR	3.25	0.45
1:F:25:TYR:OH	1:F:88:ASP:HB3	2.16	0.45
1:G:267:MET:HG2	1:J:26:HIS:HB2	1.99	0.44
1:I:152:HIS:HB3	4:I:512:KR:KR	2.79	0.43
1:I:224:LEU:CD1	4:I:514:KR:KR	3.18	0.43
1:L:243:LYS:HE2	7:L:861:HOH:O	2.18	0.43
1:J:25:TYR:HE2	7:J:629:HOH:O	2.02	0.42
1:H:283:MET:SD	1:I:180:THR:HG22	2.59	0.42
1:I:224:LEU:HD11	1:I:245:ILE:HD13	2.01	0.42
1:J:133:LEU:HD23	1:J:146[B]:LEU:HD23	2.00	0.42
1:K:152:HIS:HB3	4:K:507:KR:KR	2.80	0.42
1:J:99:LYS:HB2	2:J:504:HEZ:C1	2.50	0.42
1:H:25:TYR:OH	1:H:88:ASP:HB3	2.19	0.42
1:I:25:TYR:CD1	1:I:25:TYR:O	2.73	0.42
1:F:33:THR:OG1	1:F:34:THR:N	2.53	0.41
1:I:227:ILE:HD11	4:I:511:KR:KR	2.81	0.41
1:K:313:LEU:HG	1:K:349[B]:LEU:HB3	2.01	0.41
1:A:6:VAL:CG2	2:A:501:HEZ:H52	2.50	0.41
2:A:501:HEZ:H42	1:F:283:MET:HB3	2.01	0.41
1:L:4:ASP:HB2	2:L:501:HEZ:C3	2.49	0.41
1:H:95:GLU:HB2	2:H:702:HEZ:C1	2.51	0.41
1:J:130:VAL:HG11	1:J:145:PHE:CD2	2.56	0.41
1:F:260:VAL:HG22	1:F:311:ALA:HB3	2.02	0.41
1:I:315:GLY:HA2	1:I:351:PHE:O	2.21	0.40
1:L:313:LEU:HG	1:L:349:LEU:HB3	2.03	0.40
1:A:161:TYR:CE2	1:A:164:GLU:HG3	2.56	0.40
1:I:223:LEU:HD12	1:I:226:LYS:CB	2.50	0.40
1:I:313:LEU:HG	1:I:349[B]:LEU:HB3	2.02	0.40
1:F:146[B]:LEU:HB2	4:F:503:KR:KR	2.82	0.40
1:K:395:ASN:OD1	2:K:503:HEZ:H42	2.22	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	407/410 (99%)	398 (98%)	9 (2%)	0	100	100
1	F	411/410 (100%)	401 (98%)	10 (2%)	0	100	100
1	G	408/410 (100%)	398 (98%)	10 (2%)	0	100	100
1	H	410/410 (100%)	400 (98%)	10 (2%)	0	100	100
1	I	410/410 (100%)	400 (98%)	10 (2%)	0	100	100
1	J	412/410 (100%)	402 (98%)	10 (2%)	0	100	100
1	K	410/410 (100%)	400 (98%)	10 (2%)	0	100	100
1	L	412/410 (100%)	402 (98%)	10 (2%)	0	100	100
All	All	3280/3280 (100%)	3201 (98%)	79 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	347/348 (100%)	342 (99%)	5 (1%)	67	59
1	F	351/348 (101%)	347 (99%)	4 (1%)	73	68
1	G	349/348 (100%)	345 (99%)	4 (1%)	73	68
1	H	351/348 (101%)	347 (99%)	4 (1%)	73	68
1	I	351/348 (101%)	347 (99%)	4 (1%)	73	68
1	J	353/348 (101%)	348 (99%)	5 (1%)	67	59

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	K	351/348 (101%)	345 (98%)	6 (2%)	60	51
1	L	351/348 (101%)	347 (99%)	4 (1%)	73	68
All	All	2804/2784 (101%)	2768 (99%)	36 (1%)	69	62

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	TYR
1	A	161	TYR
1	A	175	GLN
1	A	298	GLU
1	A	354	MET
1	F	30	LEU
1	F	175	GLN
1	F	298	GLU
1	F	354	MET
1	G	30	LEU
1	G	175	GLN
1	G	298	GLU
1	G	354	MET
1	H	30	LEU
1	H	175	GLN
1	H	298	GLU
1	H	354	MET
1	I	30	LEU
1	I	175	GLN
1	I	298	GLU
1	I	354	MET
1	J	30	LEU
1	J	132	SER
1	J	175	GLN
1	J	298	GLU
1	J	354	MET
1	K	30	LEU
1	K	147	GLU
1	K	175	GLN
1	K	226	LYS
1	K	298	GLU
1	K	354	MET
1	L	30	LEU
1	L	175	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	L	298	GLU
1	L	354	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 94 ligands modelled in this entry, 56 are monoatomic - leaving 38 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
2	HEZ	L	503	-	7,7,7	0.15	0	6,6,6	0.71	0
2	HEZ	A	501	-	7,7,7	0.15	0	6,6,6	0.60	0
5	FMN	J	511	-	31,33,33	1.59	5 (16%)	40,50,50	2.57	5 (12%)
5	FMN	K	511	-	31,33,33	1.66	5 (16%)	40,50,50	2.59	6 (15%)
2	HEZ	K	503	-	7,7,7	0.28	0	6,6,6	0.29	0
2	HEZ	I	504	-	7,7,7	0.21	0	6,6,6	0.41	0
3	FEO	H	701	1,7	0,2,2	0.00	-	-		
5	FMN	A	513	-	31,33,33	1.66	5 (16%)	40,50,50	2.58	5 (12%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	HEZ	L	501	-	7,7,7	0.25	0	6,6,6	0.74	0
3	FEO	F	509	1,7	0,2,2	0.00	-		-	
5	FMN	L	509	-	31,33,33	1.73	5 (16%)	40,50,50	2.57	5 (12%)
2	HEZ	J	504	-	7,7,7	0.33	0	6,6,6	0.34	0
2	HEZ	I	502	-	7,7,7	0.24	0	6,6,6	0.43	0
5	FMN	I	515	-	31,33,33	1.74	5 (16%)	40,50,50	2.59	5 (12%)
2	HEZ	K	504	-	7,7,7	0.33	0	6,6,6	0.57	0
3	FEO	I	503	1,7	0,2,2	0.00	-		-	
2	HEZ	A	504	-	7,7,7	0.15	0	6,6,6	0.52	0
5	FMN	F	506	-	31,33,33	1.72	5 (16%)	40,50,50	2.57	5 (12%)
3	FEO	L	502	1,7	0,2,2	0.00	-		-	
3	FEO	G	502	1,7	0,2,2	0.00	-		-	
2	HEZ	I	507	-	7,7,7	0.11	0	6,6,6	0.54	0
2	HEZ	F	508	-	7,7,7	0.28	0	6,6,6	0.87	1 (16%)
2	HEZ	I	505	-	7,7,7	0.25	0	6,6,6	0.41	0
2	HEZ	K	501	-	7,7,7	0.25	0	6,6,6	0.45	0
2	HEZ	I	501	-	7,7,7	0.53	0	6,6,6	0.47	0
2	HEZ	A	505	-	7,7,7	0.09	0	6,6,6	0.69	0
3	FEO	A	502	1,7	0,2,2	0.00	-		-	
2	HEZ	I	506	-	7,7,7	0.22	0	6,6,6	0.31	0
2	HEZ	G	503	-	7,7,7	0.25	0	6,6,6	0.29	0
2	HEZ	A	503	-	7,7,7	0.20	0	6,6,6	0.75	0
5	FMN	G	509	-	31,33,33	1.64	5 (16%)	40,50,50	2.57	5 (12%)
2	HEZ	H	702	-	7,7,7	0.16	0	6,6,6	0.69	0
3	FEO	J	502	1,7	0,2,2	0.00	-		-	
2	HEZ	J	501	-	7,7,7	0.43	0	6,6,6	0.85	0
3	FEO	K	502	1,7	0,2,2	0.00	-		-	
5	FMN	H	709	-	31,33,33	1.64	5 (16%)	40,50,50	2.58	5 (12%)
2	HEZ	J	503	-	7,7,7	0.17	0	6,6,6	0.46	0
2	HEZ	G	501	-	7,7,7	0.47	0	6,6,6	0.61	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
2	HEZ	L	503	-	-	1/5/5/5	-
2	HEZ	A	501	-	-	1/5/5/5	-
5	FMN	J	511	-	-	1/18/18/18	0/3/3/3
5	FMN	K	511	-	-	0/18/18/18	0/3/3/3

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	HEZ	K	503	-	-	0/5/5/5	-
2	HEZ	I	504	-	-	2/5/5/5	-
5	FMN	A	513	-	-	1/18/18/18	0/3/3/3
2	HEZ	L	501	-	-	3/5/5/5	-
5	FMN	L	509	-	-	1/18/18/18	0/3/3/3
5	FMN	F	506	-	-	0/18/18/18	0/3/3/3
2	HEZ	I	502	-	-	1/5/5/5	-
5	FMN	I	515	-	-	0/18/18/18	0/3/3/3
2	HEZ	K	504	-	-	1/5/5/5	-
2	HEZ	A	504	-	-	0/5/5/5	-
2	HEZ	J	504	-	-	2/5/5/5	-
2	HEZ	I	506	-	-	2/5/5/5	-
2	HEZ	I	507	-	-	3/5/5/5	-
2	HEZ	F	508	-	-	4/5/5/5	-
2	HEZ	I	505	-	-	1/5/5/5	-
2	HEZ	K	501	-	-	2/5/5/5	-
2	HEZ	I	501	-	-	1/5/5/5	-
2	HEZ	A	505	-	-	1/5/5/5	-
2	HEZ	G	503	-	-	4/5/5/5	-
2	HEZ	A	503	-	-	1/5/5/5	-
5	FMN	G	509	-	-	1/18/18/18	0/3/3/3
2	HEZ	H	702	-	-	4/5/5/5	-
2	HEZ	J	501	-	-	2/5/5/5	-
5	FMN	H	709	-	-	1/18/18/18	0/3/3/3
2	HEZ	J	503	-	-	1/5/5/5	-
2	HEZ	G	501	-	-	2/5/5/5	-

All (40) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	F	506	FMN	C4A-C10	7.22	1.46	1.38
5	L	509	FMN	C4A-C10	7.01	1.45	1.38
5	I	515	FMN	C4A-C10	6.97	1.45	1.38
5	A	513	FMN	C4A-C10	6.90	1.45	1.38
5	H	709	FMN	C4A-C10	6.52	1.45	1.38
5	K	511	FMN	C4A-C10	6.43	1.45	1.38
5	G	509	FMN	C4A-C10	6.35	1.45	1.38
5	J	511	FMN	C4A-C10	6.30	1.45	1.38
5	I	515	FMN	C4-C4A	3.65	1.47	1.41
5	L	509	FMN	C4-C4A	3.58	1.47	1.41

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	K	511	FMN	C4-C4A	3.53	1.47	1.41
5	G	509	FMN	C4-N3	3.46	1.39	1.33
5	J	511	FMN	C4-N3	3.44	1.39	1.33
5	G	509	FMN	C4-C4A	3.43	1.47	1.41
5	K	511	FMN	C4-N3	3.40	1.38	1.33
5	F	506	FMN	C4-N3	3.33	1.38	1.33
5	A	513	FMN	C4-N3	3.32	1.38	1.33
5	L	509	FMN	C4-N3	3.31	1.38	1.33
5	I	515	FMN	C4-N3	3.29	1.38	1.33
5	H	709	FMN	C4-N3	3.28	1.38	1.33
5	H	709	FMN	C4-C4A	3.21	1.46	1.41
5	J	511	FMN	C4-C4A	3.09	1.46	1.41
5	F	506	FMN	C4-C4A	2.80	1.46	1.41
5	G	509	FMN	C5A-N5	2.72	1.39	1.35
5	I	515	FMN	C5A-N5	2.69	1.39	1.35
5	L	509	FMN	C9A-N10	2.66	1.42	1.38
5	L	509	FMN	C5A-N5	2.65	1.39	1.35
5	I	515	FMN	C9A-N10	2.60	1.42	1.38
5	H	709	FMN	C5A-N5	2.59	1.39	1.35
5	A	513	FMN	C5A-N5	2.59	1.39	1.35
5	H	709	FMN	C9A-N10	2.57	1.42	1.38
5	K	511	FMN	C9A-N10	2.56	1.42	1.38
5	F	506	FMN	C5A-N5	2.53	1.39	1.35
5	K	511	FMN	C5A-N5	2.53	1.39	1.35
5	A	513	FMN	C4-C4A	2.51	1.45	1.41
5	F	506	FMN	C9A-N10	2.50	1.41	1.38
5	J	511	FMN	C5A-N5	2.50	1.39	1.35
5	G	509	FMN	C9A-N10	2.39	1.41	1.38
5	A	513	FMN	C9A-N10	2.33	1.41	1.38
5	J	511	FMN	C9A-N10	2.21	1.41	1.38

All (42) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	709	FMN	C4-N3-C2	12.85	125.99	115.14
5	I	515	FMN	C4-N3-C2	12.78	125.93	115.14
5	A	513	FMN	C4-N3-C2	12.77	125.92	115.14
5	G	509	FMN	C4-N3-C2	12.76	125.91	115.14
5	L	509	FMN	C4-N3-C2	12.74	125.90	115.14
5	F	506	FMN	C4-N3-C2	12.74	125.90	115.14
5	K	511	FMN	C4-N3-C2	12.70	125.86	115.14
5	J	511	FMN	C4-N3-C2	12.69	125.86	115.14

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	I	515	FMN	C4A-C4-N3	-7.19	113.59	123.43
5	L	509	FMN	C4A-C4-N3	-6.99	113.88	123.43
5	K	511	FMN	C4A-C4-N3	-6.97	113.90	123.43
5	G	509	FMN	C4A-C4-N3	-6.95	113.93	123.43
5	A	513	FMN	C4A-C4-N3	-6.95	113.93	123.43
5	H	709	FMN	C4A-C4-N3	-6.93	113.96	123.43
5	F	506	FMN	C4A-C4-N3	-6.92	113.97	123.43
5	J	511	FMN	C4A-C4-N3	-6.78	114.16	123.43
5	G	509	FMN	C10-C4A-N5	4.35	124.26	121.26
5	H	709	FMN	C10-C4A-N5	4.34	124.26	121.26
5	A	513	FMN	C10-C4A-N5	4.29	124.23	121.26
5	J	511	FMN	C10-C4A-N5	4.29	124.22	121.26
5	K	511	FMN	C10-C4A-N5	4.29	124.22	121.26
5	L	509	FMN	C10-C4A-N5	4.28	124.22	121.26
5	F	506	FMN	C10-C4A-N5	4.25	124.20	121.26
5	I	515	FMN	C10-C4A-N5	4.24	124.19	121.26
5	J	511	FMN	C4-C4A-C10	-4.00	117.31	119.95
5	K	511	FMN	C4-C4A-C10	-3.82	117.42	119.95
5	G	509	FMN	C4-C4A-C10	-3.81	117.43	119.95
5	H	709	FMN	C4-C4A-C10	-3.76	117.46	119.95
5	I	515	FMN	C4-C4A-C10	-3.73	117.48	119.95
5	A	513	FMN	C4-C4A-C10	-3.72	117.49	119.95
5	L	509	FMN	C4-C4A-C10	-3.63	117.55	119.95
5	F	506	FMN	C4-C4A-C10	-3.57	117.58	119.95
5	J	511	FMN	C4A-C10-N10	-3.37	116.83	120.30
5	K	511	FMN	C4A-C10-N10	-3.35	116.86	120.30
5	F	506	FMN	C4A-C10-N10	-3.31	116.90	120.30
5	L	509	FMN	C4A-C10-N10	-3.31	116.90	120.30
5	A	513	FMN	C4A-C10-N10	-3.31	116.90	120.30
5	G	509	FMN	C4A-C10-N10	-3.23	116.98	120.30
5	H	709	FMN	C4A-C10-N10	-3.20	117.01	120.30
5	I	515	FMN	C4A-C10-N10	-3.12	117.09	120.30
5	K	511	FMN	C1'-N10-C9A	2.46	120.23	118.29
2	F	508	HEZ	O6-C6-C5	-2.00	98.50	111.66

There are no chirality outliers.

All (44) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	H	709	FMN	C5'-O5'-P-O3P
2	I	501	HEZ	C2-C3-C4-C5
2	L	503	HEZ	O1-C1-C2-C3

Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	K	501	HEZ	C2-C3-C4-C5
2	L	501	HEZ	C1-C2-C3-C4
2	J	501	HEZ	C3-C4-C5-C6
2	F	508	HEZ	C1-C2-C3-C4
2	A	503	HEZ	C4-C5-C6-O6
2	I	505	HEZ	C3-C4-C5-C6
2	J	503	HEZ	C3-C4-C5-C6
2	H	702	HEZ	C1-C2-C3-C4
2	I	506	HEZ	C2-C3-C4-C5
2	G	501	HEZ	O1-C1-C2-C3
2	A	505	HEZ	C3-C4-C5-C6
2	L	501	HEZ	O1-C1-C2-C3
2	F	508	HEZ	O1-C1-C2-C3
2	G	503	HEZ	C4-C5-C6-O6
2	H	702	HEZ	O1-C1-C2-C3
2	L	501	HEZ	C4-C5-C6-O6
2	I	502	HEZ	C2-C3-C4-C5
5	G	509	FMN	C5'-O5'-P-O3P
2	K	504	HEZ	C4-C5-C6-O6
2	J	504	HEZ	C2-C3-C4-C5
2	I	504	HEZ	C3-C4-C5-C6
2	J	504	HEZ	O1-C1-C2-C3
2	I	504	HEZ	C4-C5-C6-O6
2	K	501	HEZ	C4-C5-C6-O6
2	J	501	HEZ	C4-C5-C6-O6
2	G	503	HEZ	O1-C1-C2-C3
2	G	501	HEZ	C4-C5-C6-O6
2	G	503	HEZ	C3-C4-C5-C6
2	A	501	HEZ	O1-C1-C2-C3
2	F	508	HEZ	C3-C4-C5-C6
2	H	702	HEZ	C2-C3-C4-C5
2	I	507	HEZ	O1-C1-C2-C3
2	I	507	HEZ	C1-C2-C3-C4
2	H	702	HEZ	C3-C4-C5-C6
5	A	513	FMN	C5'-O5'-P-O3P
5	J	511	FMN	C5'-O5'-P-O3P
5	L	509	FMN	C5'-O5'-P-O3P
2	I	506	HEZ	C4-C5-C6-O6
2	F	508	HEZ	C2-C3-C4-C5
2	I	507	HEZ	C2-C3-C4-C5
2	G	503	HEZ	C2-C3-C4-C5

There are no ring outliers.

7 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	HEZ	2	0
2	K	503	HEZ	2	0
2	L	501	HEZ	2	0
2	J	504	HEZ	2	0
2	I	506	HEZ	1	0
2	H	702	HEZ	3	0
2	J	501	HEZ	1	0

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

Ligand FMN J 511

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN K 511

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN A 513

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN L 509

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN I 515

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN F 506

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN G 509

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN H 709

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

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	409/410 (99%)	-0.27	7 (1%)	70	66	22, 35, 61, 82	0
1	F	408/410 (99%)	-0.21	8 (1%)	65	61	24, 36, 58, 86	0
1	G	408/410 (99%)	-0.27	8 (1%)	65	61	23, 34, 58, 100	0
1	H	408/410 (99%)	-0.16	8 (1%)	65	61	25, 39, 68, 85	0
1	I	408/410 (99%)	-0.35	7 (1%)	70	66	21, 33, 54, 81	0
1	J	408/410 (99%)	-0.31	8 (1%)	65	61	24, 34, 56, 86	0
1	K	408/410 (99%)	-0.25	8 (1%)	65	61	24, 36, 62, 86	0
1	L	410/410 (100%)	-0.29	8 (1%)	65	61	23, 34, 57, 87	0
All	All	3267/3280 (99%)	-0.26	62 (1%)	66	63	21, 35, 61, 100	0

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	K	221	LEU	5.7
1	L	410	GLU	5.5
1	F	221	LEU	5.5
1	L	409	THR	5.2
1	F	222	GLY	4.6
1	K	220	GLU	4.4
1	I	221	LEU	3.9
1	L	25	TYR	3.9
1	J	218	VAL	3.8
1	A	221	LEU	3.7
1	F	220	GLU	3.6
1	F	25	TYR	3.6
1	K	408	LYS	3.6
1	H	221	LEU	3.5
1	F	218	VAL	3.5
1	J	221	LEU	3.5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	I	25	TYR	3.4
1	L	223	LEU	3.4
1	H	124	GLY	3.2
1	G	221	LEU	3.1
1	H	1[A]	MET	3.1
1	G	217	GLU	3.1
1	A	25	TYR	3.0
1	H	123	LYS	2.9
1	J	408	LYS	2.9
1	J	222	GLY	2.7
1	F	1[A]	MET	2.7
1	G	26	HIS	2.7
1	J	1[A]	MET	2.7
1	A	26	HIS	2.6
1	I	26	HIS	2.5
1	K	1[A]	MET	2.5
1	L	221	LEU	2.5
1	G	223	LEU	2.5
1	G	408	LYS	2.4
1	J	153	TRP	2.4
1	L	1[A]	MET	2.4
1	G	218	VAL	2.4
1	H	223	LEU	2.4
1	H	25	TYR	2.3
1	I	408	LYS	2.3
1	A	217	GLU	2.3
1	L	26	HIS	2.3
1	A	151	LEU	2.3
1	A	222	GLY	2.3
1	K	223	LEU	2.3
1	J	223	LEU	2.2
1	H	147	GLU	2.2
1	I	1[A]	MET	2.2
1	H	153	TRP	2.2
1	J	26	HIS	2.2
1	I	223	LEU	2.2
1	G	1[A]	MET	2.2
1	K	26	HIS	2.2
1	F	26	HIS	2.1
1	F	224	LEU	2.1
1	L	146[A]	LEU	2.1
1	G	222	GLY	2.1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	150	LEU	2.1
1	K	153	TRP	2.0
1	I	222	GLY	2.0
1	K	146[A]	LEU	2.0

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

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

6.3 Carbohydrates (i)

There are no 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
4	KR	I	513	1/1	0.59	0.38	36,36,36,36	1
4	KR	I	514	1/1	0.60	0.21	53,53,53,53	1
2	HEZ	I	501	8/8	0.61	0.31	35,35,36,37	8
2	HEZ	A	504	8/8	0.62	0.35	44,45,45,45	8
4	KR	G	508	1/1	0.63	1.03	32,32,32,32	1
4	KR	K	510	1/1	0.65	0.43	51,51,51,51	1
4	KR	I	510	1/1	0.67	0.30	65,65,65,65	1
2	HEZ	G	501	8/8	0.67	0.21	33,33,34,34	8
2	HEZ	L	501	8/8	0.70	0.25	34,34,35,35	8
2	HEZ	J	504	8/8	0.71	0.24	40,40,40,40	8
2	HEZ	J	503	8/8	0.71	0.23	37,37,37,37	8
2	HEZ	H	702	8/8	0.72	0.20	50,51,51,51	8
4	KR	H	708	1/1	0.73	0.56	53,53,53,53	1
2	HEZ	K	503	8/8	0.74	0.20	39,39,40,41	8
2	HEZ	I	504	8/8	0.74	0.23	39,39,39,39	8
4	KR	H	706	1/1	0.74	0.39	70,70,70,70	1
2	HEZ	A	503	8/8	0.77	0.30	42,42,42,42	8
2	HEZ	I	507	8/8	0.79	0.21	40,40,40,40	8
4	KR	I	511	1/1	0.79	0.14	46,46,46,46	1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å²)	Q<0.9
2	HEZ	J	501	8/8	0.79	0.21	32,32,33,33	8
4	KR	F	504	1/1	0.79	0.18	51,51,51,51	1
4	KR	L	511	1/1	0.79	0.38	55,55,55,55	1
2	HEZ	L	503	8/8	0.80	0.20	37,37,37,38	8
2	HEZ	I	502	8/8	0.80	0.20	33,34,34,35	8
4	KR	F	503	1/1	0.80	0.17	67,67,67,67	1
2	HEZ	G	503	8/8	0.81	0.20	42,42,42,42	8
2	HEZ	K	501	8/8	0.81	0.22	34,35,35,36	8
2	HEZ	A	501	8/8	0.81	0.19	35,35,36,37	8
2	HEZ	I	506	8/8	0.81	0.18	41,41,41,41	8
2	HEZ	I	505	8/8	0.82	0.36	35,35,35,35	8
2	HEZ	A	505	8/8	0.82	0.22	41,41,41,42	8
4	KR	K	509	1/1	0.83	0.11	57,57,57,57	1
4	KR	L	507	1/1	0.84	0.14	58,58,58,58	1
4	KR	L	506	1/1	0.84	0.25	57,57,57,57	1
4	KR	A	509	1/1	0.84	0.16	44,44,44,44	1
4	KR	H	704	1/1	0.85	0.08	73,73,73,73	1
4	KR	A	508	1/1	0.85	0.12	51,51,51,51	1
2	HEZ	F	508	8/8	0.86	0.19	32,32,32,33	8
4	KR	L	508	1/1	0.87	0.50	42,42,42,42	1
2	HEZ	K	504	8/8	0.87	0.15	39,39,40,40	8
4	KR	H	705	1/1	0.87	0.14	57,57,57,57	1
4	KR	G	506	1/1	0.88	0.19	63,63,63,63	1
4	KR	A	511	1/1	0.88	0.33	50,50,50,50	1
4	KR	F	502	1/1	0.89	0.07	63,63,63,63	1
4	KR	J	508	1/1	0.89	0.09	59,59,59,59	1
4	KR	I	509	1/1	0.90	0.06	60,60,60,60	1
4	KR	H	707	1/1	0.90	0.23	47,47,47,47	1
4	KR	I	512	1/1	0.90	0.18	38,38,38,38	1
4	KR	J	510	1/1	0.91	0.20	38,38,38,38	1
4	KR	G	505	1/1	0.92	0.08	60,60,60,60	1
4	KR	F	505	1/1	0.92	0.24	43,43,43,43	1
4	KR	K	507	1/1	0.92	0.15	41,41,41,41	1
4	KR	L	505	1/1	0.93	0.07	58,58,58,58	1
4	KR	A	506	1/1	0.93	0.06	64,64,64,64	1
4	KR	K	506	1/1	0.94	0.09	61,61,61,61	1
4	KR	G	507	1/1	0.94	0.11	61,61,61,61	1
4	KR	A	510	1/1	0.94	0.87	59,59,59,59	1
4	KR	K	508	1/1	0.94	0.21	57,57,57,57	1
4	KR	J	509	1/1	0.95	0.12	45,45,45,45	1
4	KR	J	506	1/1	0.95	0.07	63,63,63,63	1
5	FMN	G	509	31/31	0.95	0.09	28,30,34,35	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
4	KR	F	501	1/1	0.95	0.07	66,66,66,66	1
4	KR	K	505	1/1	0.95	0.06	65,65,65,65	1
5	FMN	I	515	31/31	0.96	0.08	29,32,35,39	0
5	FMN	F	506	31/31	0.96	0.08	30,34,37,42	0
4	KR	A	507	1/1	0.96	0.08	63,63,63,63	1
4	KR	A	512	1/1	0.96	0.21	44,44,44,44	1
5	FMN	J	511	31/31	0.97	0.08	27,30,32,35	0
5	FMN	A	513	31/31	0.97	0.08	26,27,30,34	0
5	FMN	L	509	31/31	0.97	0.07	28,32,35,36	0
3	FEO	J	502	3/3	0.97	0.07	27,27,27,27	3
5	FMN	H	709	31/31	0.97	0.08	27,33,36,41	0
5	FMN	K	511	31/31	0.97	0.07	28,31,32,33	0
4	KR	L	504	1/1	0.97	0.07	56,56,56,56	1
4	KR	J	507	1/1	0.97	0.07	58,58,58,58	1
4	KR	J	505	1/1	0.97	0.06	61,61,61,61	1
6	CL	K	512	1/1	0.97	0.03	43,43,43,43	0
6	CL	H	710	1/1	0.97	0.04	45,45,45,45	0
4	KR	G	504	1/1	0.98	0.06	62,62,62,62	1
6	CL	G	510	1/1	0.98	0.04	38,38,38,38	0
4	KR	H	703	1/1	0.98	0.05	65,65,65,65	1
3	FEO	F	509	3/3	0.98	0.09	28,28,28,29	3
6	CL	F	507	1/1	0.98	0.04	41,41,41,41	0
3	FEO	K	502	3/3	0.98	0.10	28,28,29,30	3
4	KR	I	508	1/1	0.98	0.05	57,57,57,57	1
3	FEO	H	701	3/3	0.99	0.10	32,32,32,32	3
3	FEO	A	502	3/3	0.99	0.08	27,27,29,30	3
3	FEO	I	503	3/3	0.99	0.09	23,23,24,25	3
6	CL	I	516	1/1	0.99	0.06	38,38,38,38	0
6	CL	J	512	1/1	0.99	0.06	38,38,38,38	0
6	CL	A	514	1/1	0.99	0.05	41,41,41,41	0
3	FEO	L	502	3/3	0.99	0.10	25,25,26,26	3
6	CL	L	510	1/1	0.99	0.07	35,35,35,35	0
3	FEO	G	502	3/3	0.99	0.09	26,26,26,26	3

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.
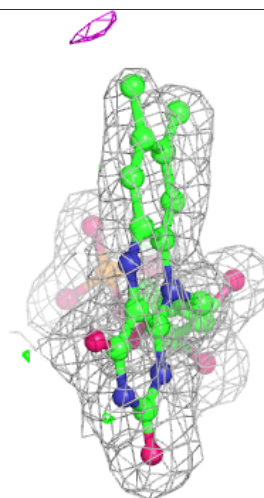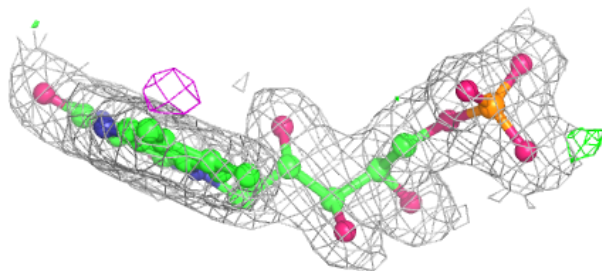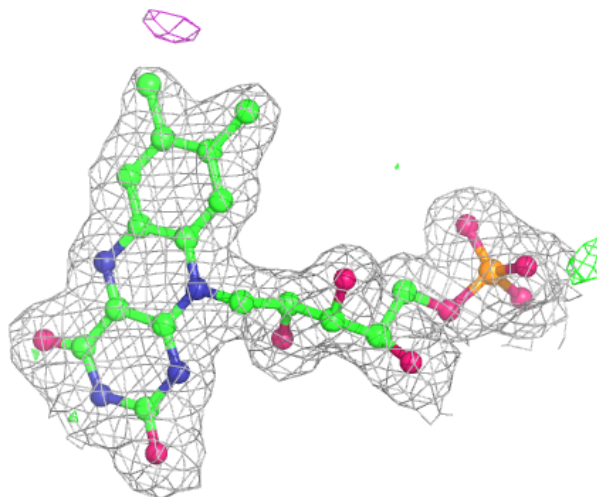
Electron density around FMN G 509:

2mF_o-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
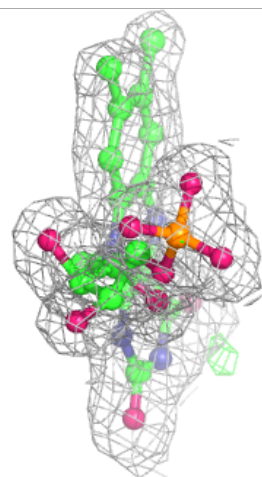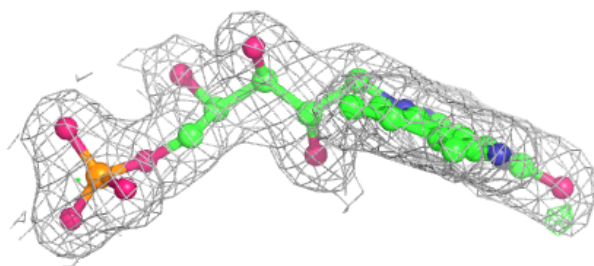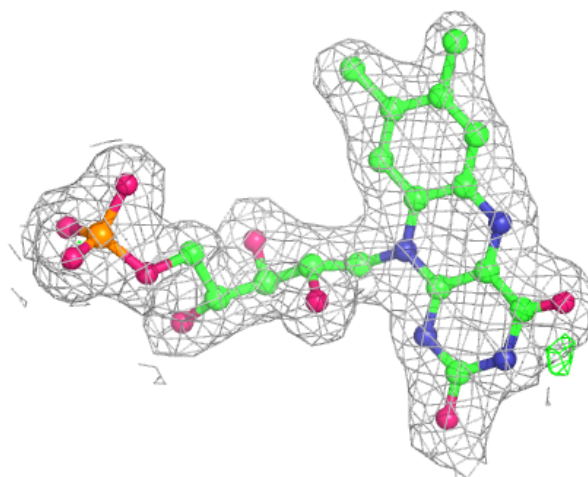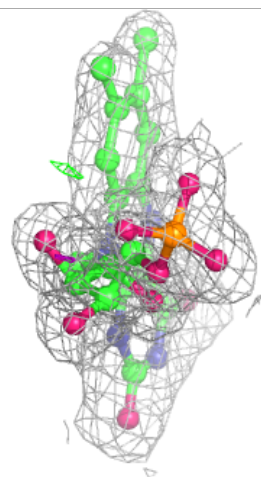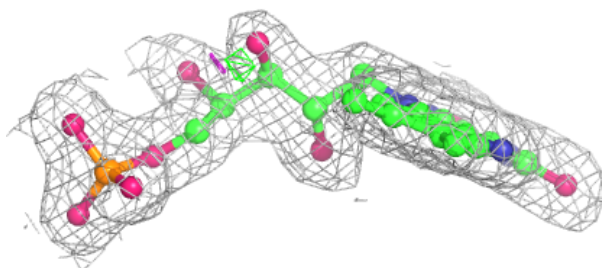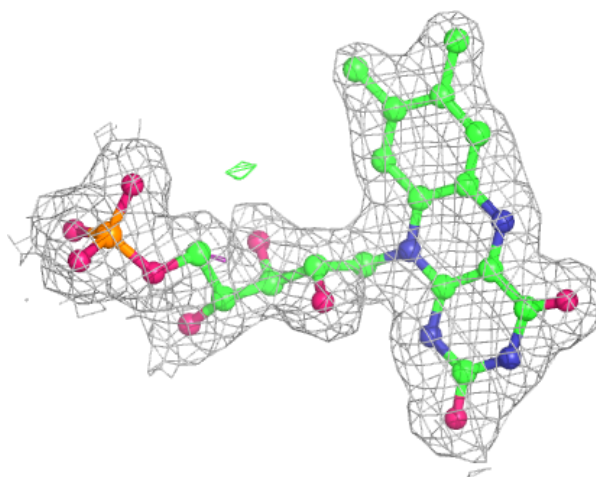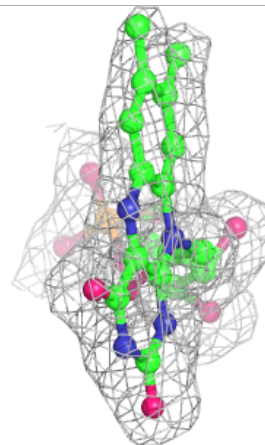and green (positive)
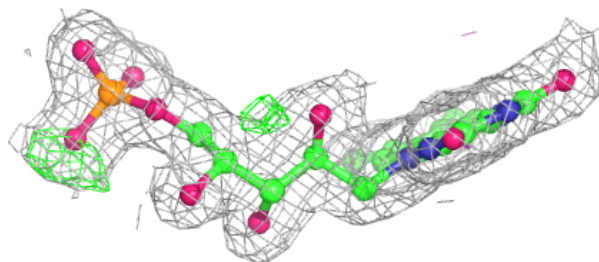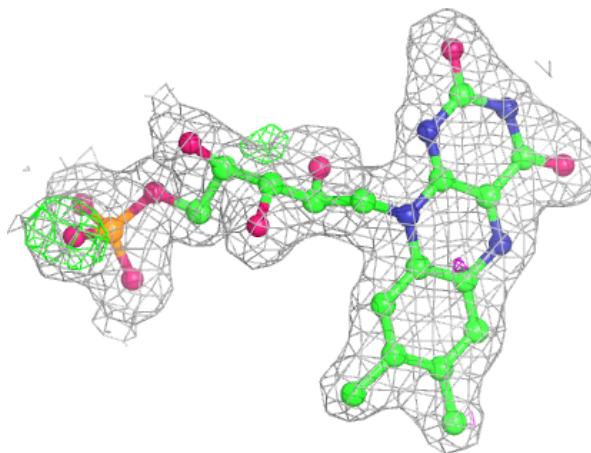
Electron density around FMN I 515:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
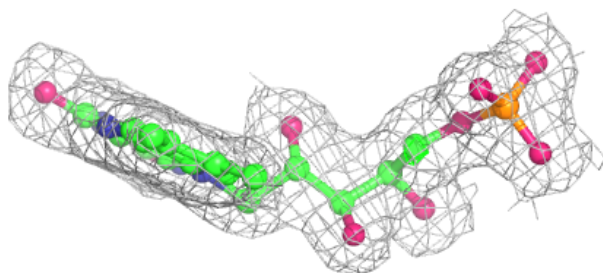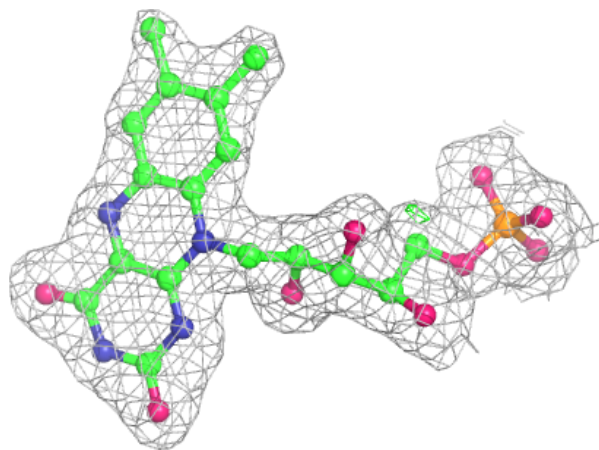and green (positive)
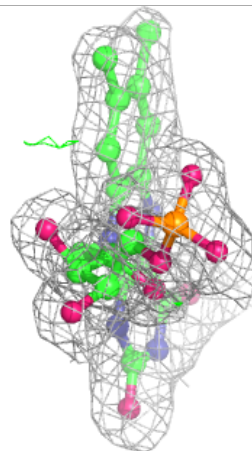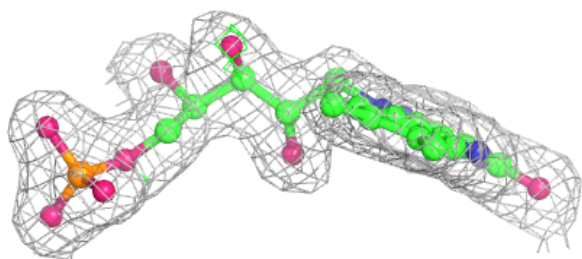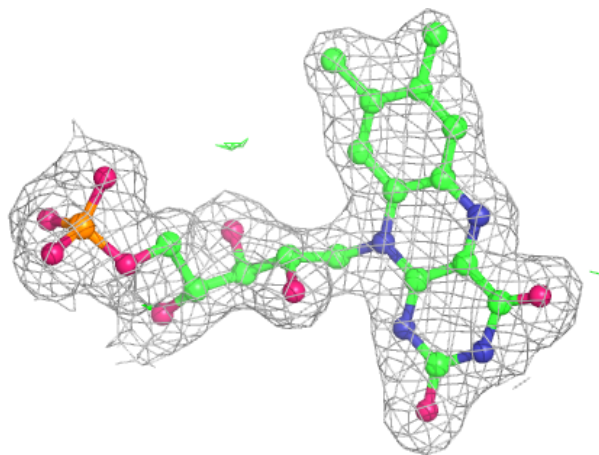
Electron density around FMN F 506:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
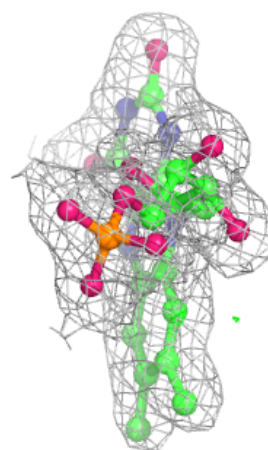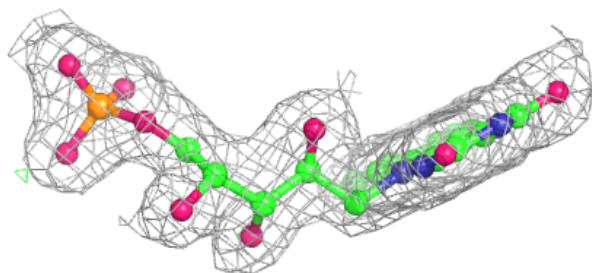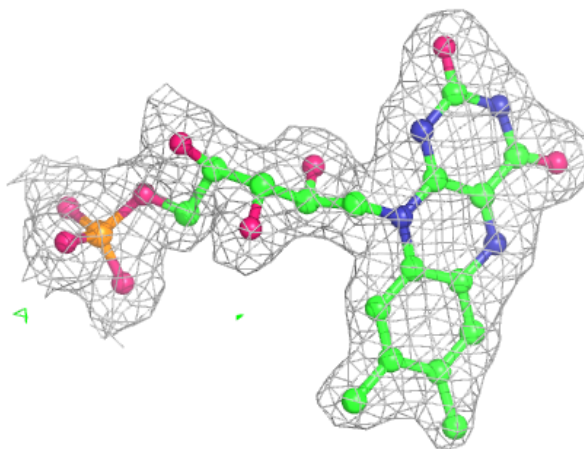
Electron density around FMN J 511:

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 FMN A 513:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
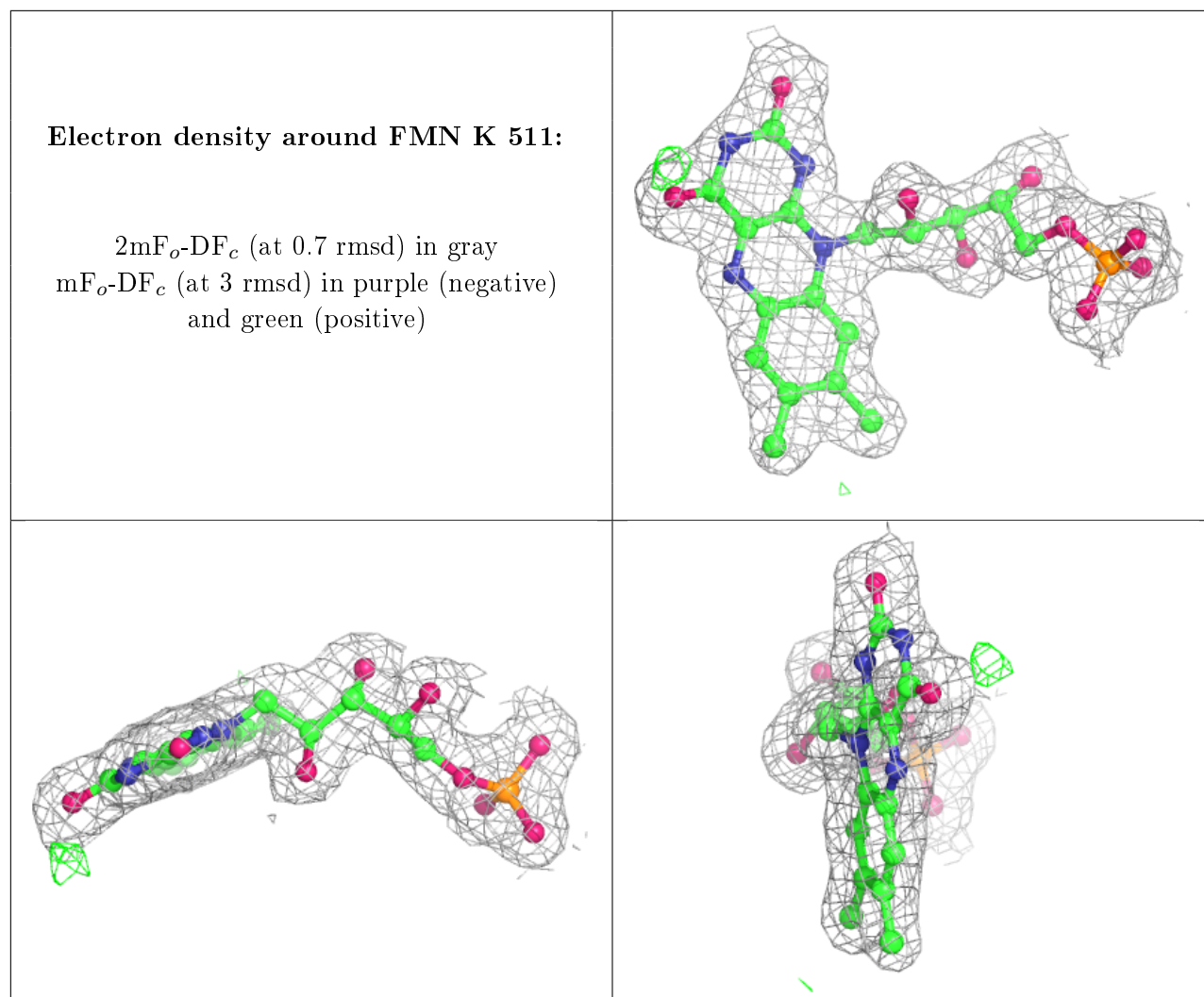and green (positive)

Electron density around FMN L 509:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around FMN H 709:

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 FMN K 511:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.