WORLD WIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Jul 25, 2022 – 06:02 pm BST

PDB ID	:	7Q6N
Title	:	Structure of WrbA from Salmonella Typhimurium bound to ME0052
Authors	:	Gabrielsen, M.; Beckham, K.S.H.; Roe, A.J.
Deposited on	:	2021-11-08
Resolution	:	2.33 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.29
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.29

1 Overall quality at a glance ⓘ

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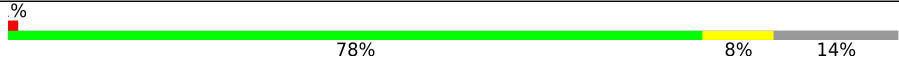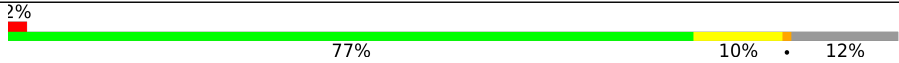*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.33 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.
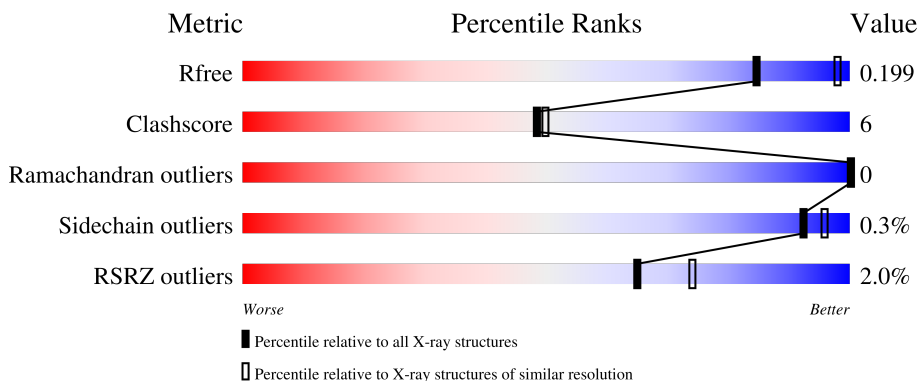
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2096 (2.36-2.32)
Clashscore	141614	2193 (2.36-2.32)
Ramachandran outliers	138981	2159 (2.36-2.32)
Sidechain outliers	138945	2160 (2.36-2.32)
RSRZ outliers	127900	2067 (2.36-2.32)

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

Mol	Chain	Length	Quality of chain
1	A	231	77% 8% 15%
1	B	231	3% 79% 6% 14%
1	C	231	% 78% 8% 14%
1	D	231	2% 77% 10% · 12%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 12080 atoms, of which 5837 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 NAD(P)H dehydrogenase (quinone).

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	197	Total	C	H	N	O	S	0	2	0
			2922	930	1450	249	286	7			
1	B	198	Total	C	H	N	O	S	0	0	0
			2860	917	1413	244	279	7			
1	C	198	Total	C	H	N	O	S	0	0	0
			2860	917	1410	244	282	7			
1	D	204	Total	C	H	N	O	S	0	2	0
			2953	949	1454	252	291	7			

There are 132 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-32	MET	-	initiating methionine	UNP Q8ZQ40
A	-31	HIS	-	expression tag	UNP Q8ZQ40
A	-30	HIS	-	expression tag	UNP Q8ZQ40
A	-29	HIS	-	expression tag	UNP Q8ZQ40
A	-28	HIS	-	expression tag	UNP Q8ZQ40
A	-27	HIS	-	expression tag	UNP Q8ZQ40
A	-26	HIS	-	expression tag	UNP Q8ZQ40
A	-25	GLY	-	expression tag	UNP Q8ZQ40
A	-24	LYS	-	expression tag	UNP Q8ZQ40
A	-23	PRO	-	expression tag	UNP Q8ZQ40
A	-22	ILE	-	expression tag	UNP Q8ZQ40
A	-21	PRO	-	expression tag	UNP Q8ZQ40
A	-20	ASN	-	expression tag	UNP Q8ZQ40
A	-19	PRO	-	expression tag	UNP Q8ZQ40
A	-18	LEU	-	expression tag	UNP Q8ZQ40
A	-17	LEU	-	expression tag	UNP Q8ZQ40
A	-16	GLY	-	expression tag	UNP Q8ZQ40
A	-15	LEU	-	expression tag	UNP Q8ZQ40
A	-14	ASP	-	expression tag	UNP Q8ZQ40
A	-13	SER	-	expression tag	UNP Q8ZQ40
A	-12	THR	-	expression tag	UNP Q8ZQ40

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	GLU	-	expression tag	UNP Q8ZQ40
A	-10	ASN	-	expression tag	UNP Q8ZQ40
A	-9	LEU	-	expression tag	UNP Q8ZQ40
A	-8	TYR	-	expression tag	UNP Q8ZQ40
A	-7	PHE	-	expression tag	UNP Q8ZQ40
A	-6	GLN	-	expression tag	UNP Q8ZQ40
A	-5	GLY	-	expression tag	UNP Q8ZQ40
A	-4	ILE	-	expression tag	UNP Q8ZQ40
A	-3	ASP	-	expression tag	UNP Q8ZQ40
A	-2	PRO	-	expression tag	UNP Q8ZQ40
A	-1	PHE	-	expression tag	UNP Q8ZQ40
A	0	THR	-	expression tag	UNP Q8ZQ40
B	-32	MET	-	initiating methionine	UNP Q8ZQ40
B	-31	HIS	-	expression tag	UNP Q8ZQ40
B	-30	HIS	-	expression tag	UNP Q8ZQ40
B	-29	HIS	-	expression tag	UNP Q8ZQ40
B	-28	HIS	-	expression tag	UNP Q8ZQ40
B	-27	HIS	-	expression tag	UNP Q8ZQ40
B	-26	HIS	-	expression tag	UNP Q8ZQ40
B	-25	GLY	-	expression tag	UNP Q8ZQ40
B	-24	LYS	-	expression tag	UNP Q8ZQ40
B	-23	PRO	-	expression tag	UNP Q8ZQ40
B	-22	ILE	-	expression tag	UNP Q8ZQ40
B	-21	PRO	-	expression tag	UNP Q8ZQ40
B	-20	ASN	-	expression tag	UNP Q8ZQ40
B	-19	PRO	-	expression tag	UNP Q8ZQ40
B	-18	LEU	-	expression tag	UNP Q8ZQ40
B	-17	LEU	-	expression tag	UNP Q8ZQ40
B	-16	GLY	-	expression tag	UNP Q8ZQ40
B	-15	LEU	-	expression tag	UNP Q8ZQ40
B	-14	ASP	-	expression tag	UNP Q8ZQ40
B	-13	SER	-	expression tag	UNP Q8ZQ40
B	-12	THR	-	expression tag	UNP Q8ZQ40
B	-11	GLU	-	expression tag	UNP Q8ZQ40
B	-10	ASN	-	expression tag	UNP Q8ZQ40
B	-9	LEU	-	expression tag	UNP Q8ZQ40
B	-8	TYR	-	expression tag	UNP Q8ZQ40
B	-7	PHE	-	expression tag	UNP Q8ZQ40
B	-6	GLN	-	expression tag	UNP Q8ZQ40
B	-5	GLY	-	expression tag	UNP Q8ZQ40
B	-4	ILE	-	expression tag	UNP Q8ZQ40
B	-3	ASP	-	expression tag	UNP Q8ZQ40

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-2	PRO	-	expression tag	UNP Q8ZQ40
B	-1	PHE	-	expression tag	UNP Q8ZQ40
B	0	THR	-	expression tag	UNP Q8ZQ40
C	-32	MET	-	initiating methionine	UNP Q8ZQ40
C	-31	HIS	-	expression tag	UNP Q8ZQ40
C	-30	HIS	-	expression tag	UNP Q8ZQ40
C	-29	HIS	-	expression tag	UNP Q8ZQ40
C	-28	HIS	-	expression tag	UNP Q8ZQ40
C	-27	HIS	-	expression tag	UNP Q8ZQ40
C	-26	HIS	-	expression tag	UNP Q8ZQ40
C	-25	GLY	-	expression tag	UNP Q8ZQ40
C	-24	LYS	-	expression tag	UNP Q8ZQ40
C	-23	PRO	-	expression tag	UNP Q8ZQ40
C	-22	ILE	-	expression tag	UNP Q8ZQ40
C	-21	PRO	-	expression tag	UNP Q8ZQ40
C	-20	ASN	-	expression tag	UNP Q8ZQ40
C	-19	PRO	-	expression tag	UNP Q8ZQ40
C	-18	LEU	-	expression tag	UNP Q8ZQ40
C	-17	LEU	-	expression tag	UNP Q8ZQ40
C	-16	GLY	-	expression tag	UNP Q8ZQ40
C	-15	LEU	-	expression tag	UNP Q8ZQ40
C	-14	ASP	-	expression tag	UNP Q8ZQ40
C	-13	SER	-	expression tag	UNP Q8ZQ40
C	-12	THR	-	expression tag	UNP Q8ZQ40
C	-11	GLU	-	expression tag	UNP Q8ZQ40
C	-10	ASN	-	expression tag	UNP Q8ZQ40
C	-9	LEU	-	expression tag	UNP Q8ZQ40
C	-8	TYR	-	expression tag	UNP Q8ZQ40
C	-7	PHE	-	expression tag	UNP Q8ZQ40
C	-6	GLN	-	expression tag	UNP Q8ZQ40
C	-5	GLY	-	expression tag	UNP Q8ZQ40
C	-4	ILE	-	expression tag	UNP Q8ZQ40
C	-3	ASP	-	expression tag	UNP Q8ZQ40
C	-2	PRO	-	expression tag	UNP Q8ZQ40
C	-1	PHE	-	expression tag	UNP Q8ZQ40
C	0	THR	-	expression tag	UNP Q8ZQ40
D	-32	MET	-	initiating methionine	UNP Q8ZQ40
D	-31	HIS	-	expression tag	UNP Q8ZQ40
D	-30	HIS	-	expression tag	UNP Q8ZQ40
D	-29	HIS	-	expression tag	UNP Q8ZQ40
D	-28	HIS	-	expression tag	UNP Q8ZQ40
D	-27	HIS	-	expression tag	UNP Q8ZQ40

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-26	HIS	-	expression tag	UNP Q8ZQ40
D	-25	GLY	-	expression tag	UNP Q8ZQ40
D	-24	LYS	-	expression tag	UNP Q8ZQ40
D	-23	PRO	-	expression tag	UNP Q8ZQ40
D	-22	ILE	-	expression tag	UNP Q8ZQ40
D	-21	PRO	-	expression tag	UNP Q8ZQ40
D	-20	ASN	-	expression tag	UNP Q8ZQ40
D	-19	PRO	-	expression tag	UNP Q8ZQ40
D	-18	LEU	-	expression tag	UNP Q8ZQ40
D	-17	LEU	-	expression tag	UNP Q8ZQ40
D	-16	GLY	-	expression tag	UNP Q8ZQ40
D	-15	LEU	-	expression tag	UNP Q8ZQ40
D	-14	ASP	-	expression tag	UNP Q8ZQ40
D	-13	SER	-	expression tag	UNP Q8ZQ40
D	-12	THR	-	expression tag	UNP Q8ZQ40
D	-11	GLU	-	expression tag	UNP Q8ZQ40
D	-10	ASN	-	expression tag	UNP Q8ZQ40
D	-9	LEU	-	expression tag	UNP Q8ZQ40
D	-8	TYR	-	expression tag	UNP Q8ZQ40
D	-7	PHE	-	expression tag	UNP Q8ZQ40
D	-6	GLN	-	expression tag	UNP Q8ZQ40
D	-5	GLY	-	expression tag	UNP Q8ZQ40
D	-4	ILE	-	expression tag	UNP Q8ZQ40
D	-3	ASP	-	expression tag	UNP Q8ZQ40
D	-2	PRO	-	expression tag	UNP Q8ZQ40
D	-1	PHE	-	expression tag	UNP Q8ZQ40
D	0	THR	-	expression tag	UNP Q8ZQ40

- Molecule 2 is 2-azanyl-4,6-bis(bromanyl)phenol (three-letter code: 8YX) (formula: $C_6H_5Br_2NO$) (labeled as "Ligand of Interest" by depositor).
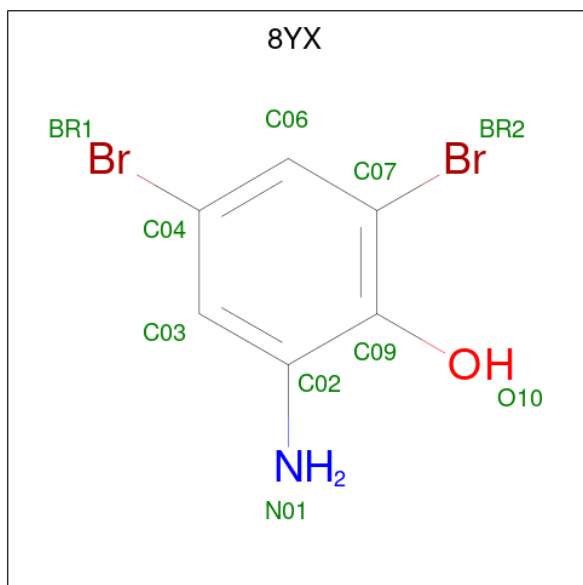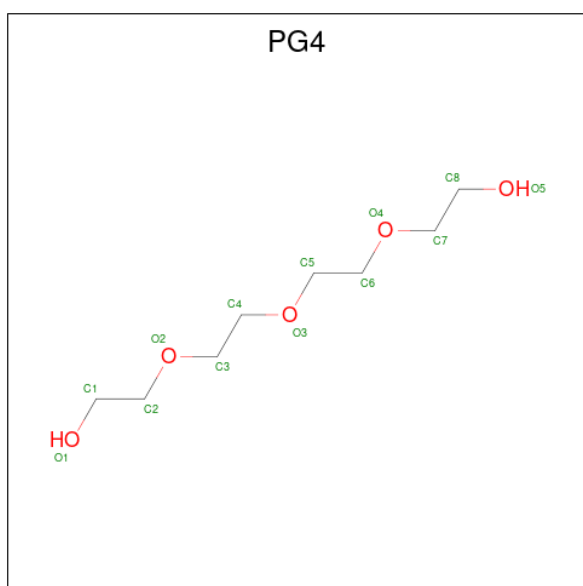
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	Br	C	H	N	O	0	0
			15	2	6	5	1	1		
2	A	1	Total	Br	C	H	N	O	0	0
			15	2	6	5	1	1		
2	C	1	Total	Br	C	H	N	O	0	0
			15	2	6	5	1	1		
2	D	1	Total	Br	C	H	N	O	0	0
			15	2	6	5	1	1		

- Molecule 3 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: $C_{17}H_{21}N_4O_9P$).
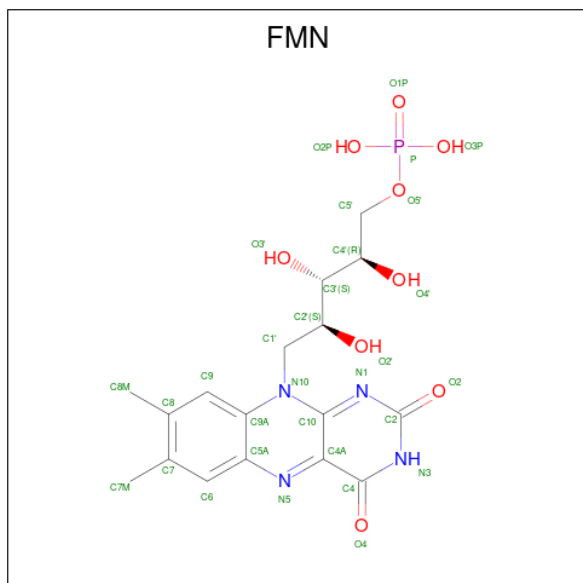
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total 49	C 17	H 18	N 4	O 9	P 1	0	0
3	B	1	Total 49	C 17	H 18	N 4	O 9	P 1	0	0
3	C	1	Total 49	C 17	H 18	N 4	O 9	P 1	0	0
3	D	1	Total 49	C 17	H 18	N 4	O 9	P 1	0	0

- Molecule 4 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total 31	C 8	H 18	O 5	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	64	Total 64	O 64	0	0
5	B	33	Total 33	O 33	0	0
5	C	50	Total 50	O 50	0	0
5	D	51	Total 51	O 51	0	0

3 Residue-property plots ⓘ

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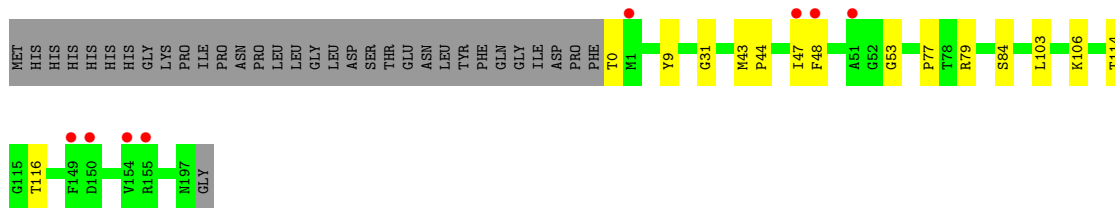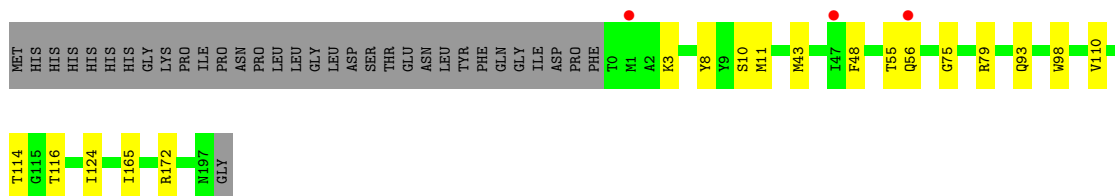
• Molecule 1: NAD(P)H dehydrogenase (quinone)
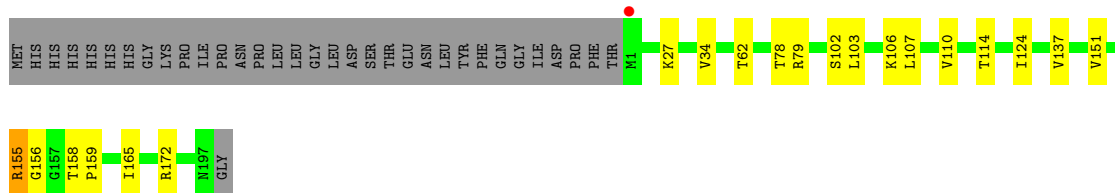
• Molecule 1: NAD(P)H dehydrogenase (quinone)

• Molecule 1: NAD(P)H dehydrogenase (quinone)

• Molecule 1: NAD(P)H dehydrogenase (quinone)

MET HIS HIS HIS HIS HIS GLY LYS PRO ILE PRO ASN PRO LEU LEU GLY LEU ASP SER THR GLU ASN LEU TYR PHE Q-6 G-5 I-4 D-3 K3 L7 A21 K37 R79 L103 K106 L107 G108 S112 S113 T114 T125 L131 E147 L148 V151

R155 G156 G157 T158 P159 T163 G168 E178 R183 N197 GLY
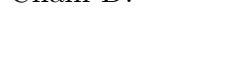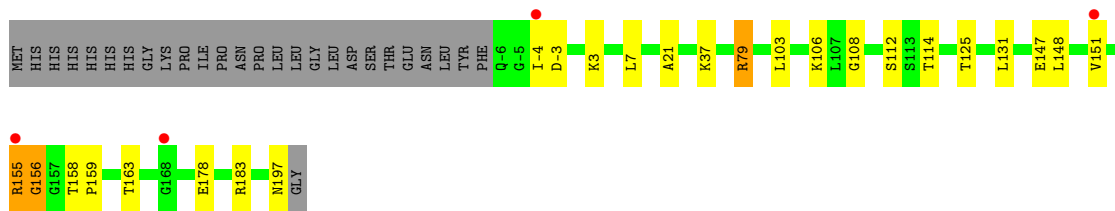
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	92.16Å 92.81Å 93.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.98 – 2.33 53.68 – 2.33	Depositor EDS
% Data completeness (in resolution range)	99.9 (46.98-2.33) 100.0 (53.68-2.33)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.61 (at 2.34Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874, PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.165 , 0.196 0.166 , 0.199	Depositor DCC
R_{free} test set	1757 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	29.3	Xtriage
Anisotropy	0.585	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< |L| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.020 for -h,l,k 0.018 for -l,-k,-h 0.019 for k,h,-l 0.002 for k,l,h 0.002 for l,h,k	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	12080	wwPDB-VP
Average B, all atoms (Å^2)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 14.66% of the height of the origin peak. No significant pseudotranslation is detected.*

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PG4, 8YX, FMN

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	0.65	0/1512	0.81	1/2050 (0.0%)
1	B	0.62	0/1478	0.74	0/2008
1	C	0.64	0/1481	0.77	1/2013 (0.0%)
1	D	0.60	0/1538	0.82	4/2091 (0.2%)
All	All	0.63	0/6009	0.79	6/8162 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	155	ARG	NE-CZ-NH2	-12.80	113.90	120.30
1	D	155	ARG	NE-CZ-NH1	7.55	124.07	120.30
1	D	156	GLY	C-N-CA	-6.86	107.90	122.30
1	C	93	GLN	CA-CB-CG	-6.46	99.18	113.40
1	A	155	ARG	NE-CZ-NH1	5.40	123.00	120.30
1	D	79	ARG	NE-CZ-NH1	-5.05	117.78	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1472	1450	1444	14	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1447	1413	1414	18	0
1	C	1450	1410	1411	17	0
1	D	1499	1454	1449	21	0
2	A	20	10	0	1	0
2	C	10	5	0	2	0
2	D	10	5	0	1	0
3	A	31	18	19	3	0
3	B	31	18	19	3	0
3	C	31	18	19	2	0
3	D	31	18	19	3	0
4	B	13	18	18	1	0
5	A	64	0	0	1	0
5	B	33	0	0	0	0
5	C	50	0	0	0	0
5	D	51	0	0	1	0
All	All	6243	5837	5812	71	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 6.

All (71) 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:47:ILE:CD1	1:B:47:ILE:CG1	1.77	1.55
1:A:27:LYS:HG3	1:A:34:VAL:HG11	1.50	0.91
1:B:44:PRO:HD2	1:B:47:ILE:HD12	1.54	0.86
1:D:147:GLU:O	1:D:155:ARG:NH2	2.13	0.80
1:B:47:ILE:CD1	1:B:47:ILE:CB	2.61	0.79
1:B:43:MET:CE	1:B:47:ILE:HG22	2.15	0.76
1:B:43:MET:HE2	1:B:47:ILE:HG22	1.70	0.71
1:D:155:ARG:HD2	1:D:156:GLY:O	1.91	0.71
1:A:27:LYS:HG3	1:A:34:VAL:CG1	2.20	0.71
1:A:155:ARG:HD2	1:A:156:GLY:O	1.91	0.69
1:C:79:ARG:HD2	3:C:202:FMN:HM73	1.75	0.67
1:C:10:SER:O	1:C:56:GLN:NE2	2.27	0.67
1:B:116:THR:HG22	1:B:116:THR:O	1.95	0.65
1:B:44:PRO:CD	1:B:47:ILE:HD12	2.27	0.62
1:B:116:THR:O	1:B:116:THR:CG2	2.49	0.61
1:C:43:MET:CE	1:C:48:PHE:HA	2.30	0.61
3:A:202:FMN:C4	2:D:202:8YX:BR2	3.05	0.60
1:D:148:LEU:HD23	1:D:155:ARG:HH12	1.67	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:155:ARG:HG2	1:D:178:GLU:HG3	1.84	0.59
3:B:202:FMN:C4	2:C:201:8YX:BR2	3.06	0.59
1:C:43:MET:HE3	1:C:48:PHE:HA	1.86	0.57
1:D:197:ASN:OD1	5:D:301:HOH:O	2.17	0.56
1:C:10:SER:HB3	1:C:56:GLN:NE2	2.20	0.56
1:B:103:LEU:HA	1:B:106:LYS:HD2	1.87	0.56
1:A:103:LEU:HA	1:A:106:LYS:HD2	1.90	0.54
1:D:147:GLU:C	1:D:155:ARG:NH2	2.61	0.53
1:B:116:THR:HG21	1:D:148:LEU:O	2.09	0.52
1:C:114:THR:HB	3:C:202:FMN:O2	2.10	0.51
1:D:147:GLU:C	1:D:155:ARG:HH22	2.13	0.51
1:A:114:THR:HB	3:A:202:FMN:O2	2.11	0.50
5:A:331:HOH:O	4:B:201:PG4:H81	2.12	0.50
1:A:79:ARG:HD2	3:A:202:FMN:HM73	1.95	0.49
1:D:114:THR:HB	3:D:201:FMN:O2	2.11	0.49
1:A:151:VAL:HG11	1:C:116:THR:HA	1.95	0.49
1:B:79:ARG:HG3	1:B:84:SER:HA	1.94	0.49
1:B:114:THR:HB	3:B:202:FMN:O2	2.13	0.48
1:D:79:ARG:HD2	3:D:201:FMN:HM73	1.94	0.48
1:B:43:MET:HE3	1:B:47:ILE:HG22	1.95	0.48
1:C:11:MET:HE2	1:C:43:MET:HE1	1.96	0.48
1:C:10:SER:HB3	1:C:56:GLN:HE22	1.78	0.48
1:C:110:VAL:HB	1:C:124:ILE:HG23	1.96	0.48
1:A:158:THR:HB	1:A:159:PRO:HD2	1.96	0.47
1:A:110:VAL:HB	1:A:124:ILE:HG23	1.98	0.46
1:B:9:TYR:O	1:B:77:PRO:HD3	2.15	0.46
1:C:8:TYR:HA	1:C:75:GLY:O	2.16	0.46
1:A:165:ILE:O	1:A:172:ARG:HD3	2.16	0.46
1:D:103:LEU:HA	1:D:106:LYS:HD2	1.98	0.46
2:A:201:8YX:C02	3:D:201:FMN:H1'2	2.46	0.46
1:B:0:THR:CG2	1:B:31:GLY:HA2	2.47	0.45
1:D:148:LEU:HA	1:D:155:ARG:HH22	1.83	0.44
1:D:7:LEU:HA	1:D:37:LYS:O	2.17	0.44
1:C:98:TRP:CZ2	2:C:201:8YX:BR2	3.25	0.44
1:D:158:THR:HB	1:D:159:PRO:HD2	2.00	0.44
1:D:3:LYS:HB3	1:D:3:LYS:HE2	1.81	0.43
1:C:11:MET:HE1	1:C:43:MET:HE2	2.01	0.42
1:C:43:MET:HE2	1:C:48:PHE:HA	2.00	0.42
1:A:107:LEU:HD23	1:A:137:VAL:HB	2.02	0.42
1:B:79:ARG:HD2	3:B:202:FMN:HM73	2.02	0.41
1:D:112[A]:SER:O	1:D:163:THR:HA	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:78:THR:CG2	1:A:114:THR:HG22	2.51	0.41
1:C:3:LYS:HB3	1:C:3:LYS:HE2	1.67	0.41
1:C:165:ILE:O	1:C:172:ARG:HD3	2.19	0.41
1:D:21:ALA:O	1:D:183:ARG:HG2	2.20	0.41
1:B:48:PHE:CZ	1:B:53:GLY:HA3	2.56	0.41
1:D:108:GLY:HA3	1:D:131:LEU:HD13	2.02	0.41
1:D:112[B]:SER:O	1:D:163:THR:HA	2.21	0.41
1:D:-4:ILE:HG23	1:D:-3:ASP:N	2.35	0.41
1:A:102:SER:O	1:A:106:LYS:HE2	2.21	0.41
1:C:11:MET:CE	1:C:43:MET:HE1	2.51	0.41
1:B:116:THR:HA	1:D:151:VAL:HG11	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	197/231 (85%)	195 (99%)	2 (1%)	0	100	100
1	B	196/231 (85%)	195 (100%)	1 (0%)	0	100	100
1	C	196/231 (85%)	195 (100%)	1 (0%)	0	100	100
1	D	204/231 (88%)	204 (100%)	0	0	100	100
All	All	793/924 (86%)	789 (100%)	4 (0%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	151/179 (84%)	151 (100%)	0	100	100
1	B	144/179 (80%)	144 (100%)	0	100	100
1	C	145/179 (81%)	144 (99%)	1 (1%)	84	90
1	D	151/179 (84%)	150 (99%)	1 (1%)	84	90
All	All	591/716 (82%)	589 (100%)	2 (0%)	92	96

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	55	THR
1	D	125	THR

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

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

9 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
3	FMN	A	202	-	33,33,33	2.30	7 (21%)	48,50,50	2.55	18 (37%)
3	FMN	B	202	-	33,33,33	1.93	8 (24%)	48,50,50	2.27	12 (25%)
3	FMN	C	202	-	33,33,33	2.22	6 (18%)	48,50,50	2.59	15 (31%)
2	8YX	C	201	-	10,10,10	1.47	3 (30%)	13,14,14	2.69	4 (30%)
2	8YX	D	202	-	10,10,10	1.47	3 (30%)	13,14,14	1.01	1 (7%)
2	8YX	A	203	-	10,10,10	2.14	4 (40%)	13,14,14	3.79	5 (38%)
2	8YX	A	201	-	10,10,10	1.45	2 (20%)	13,14,14	1.93	3 (23%)
4	PG4	B	201	-	12,12,12	0.50	0	11,11,11	0.67	0
3	FMN	D	201	-	33,33,33	1.75	6 (18%)	48,50,50	2.26	15 (31%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	FMN	A	202	-	-	2/18/18/18	0/3/3/3
3	FMN	B	202	-	-	0/18/18/18	0/3/3/3
3	FMN	C	202	-	-	3/18/18/18	0/3/3/3
2	8YX	C	201	-	-	-	0/1/1/1
2	8YX	D	202	-	-	-	0/1/1/1
2	8YX	A	201	-	-	-	0/1/1/1
2	8YX	A	203	-	-	-	0/1/1/1
4	PG4	B	201	-	-	7/10/10/10	-
3	FMN	D	201	-	-	0/18/18/18	0/3/3/3

All (39) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	202	FMN	C1'-C2'	9.63	1.66	1.52
3	C	202	FMN	C1'-C2'	9.22	1.65	1.52
3	B	202	FMN	C1'-C2'	6.64	1.62	1.52
3	D	201	FMN	C1'-C2'	5.80	1.60	1.52
3	C	202	FMN	C4A-N5	5.03	1.40	1.30
3	B	202	FMN	C4A-N5	4.85	1.40	1.30
2	A	203	8YX	BR2-C07	4.49	2.00	1.89
3	D	201	FMN	C4A-N5	4.45	1.39	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	202	FMN	C5'-C4'	4.34	1.57	1.51
3	A	202	FMN	C4A-N5	3.76	1.38	1.30
3	C	202	FMN	C5'-C4'	3.25	1.56	1.51
2	A	203	8YX	C02-N01	3.08	1.48	1.37
3	D	201	FMN	C5'-C4'	3.00	1.56	1.51
2	A	201	8YX	C02-N01	2.95	1.47	1.37
3	B	202	FMN	C5'-C4'	2.69	1.55	1.51
3	B	202	FMN	C2-N3	-2.66	1.32	1.39
3	A	202	FMN	C4-N3	-2.62	1.34	1.38
2	D	202	8YX	C02-N01	2.62	1.46	1.37
2	A	201	8YX	BR1-C04	2.58	1.95	1.90
3	D	201	FMN	C1'-N10	2.55	1.54	1.48
3	D	201	FMN	C4-N3	-2.52	1.34	1.38
2	D	202	8YX	BR1-C04	2.48	1.95	1.90
3	B	202	FMN	C4-N3	-2.47	1.34	1.38
3	C	202	FMN	C4-N3	-2.46	1.34	1.38
2	C	201	8YX	C02-N01	2.39	1.45	1.37
3	B	202	FMN	C10-N1	2.37	1.38	1.33
3	A	202	FMN	C9-C9A	2.33	1.43	1.39
2	C	201	8YX	BR2-C07	2.27	1.95	1.89
3	A	202	FMN	O2-C2	2.25	1.28	1.24
2	A	203	8YX	BR1-C04	2.23	1.94	1.90
3	B	202	FMN	C2'-C3'	2.21	1.57	1.53
3	D	201	FMN	C2-N3	-2.20	1.33	1.39
2	A	203	8YX	C09-C07	2.18	1.44	1.39
3	C	202	FMN	C6-C7	-2.13	1.36	1.39
2	C	201	8YX	BR1-C04	2.12	1.94	1.90
3	A	202	FMN	C2-N3	-2.09	1.34	1.39
2	D	202	8YX	BR2-C07	2.08	1.94	1.89
3	B	202	FMN	C1'-N10	2.05	1.53	1.48
3	C	202	FMN	C2-N3	-2.02	1.34	1.39

All (73) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	203	8YX	BR2-C07-C09	10.89	131.01	118.80
3	C	202	FMN	C1'-N10-C9A	7.63	133.23	120.51
2	A	203	8YX	C06-C07-C09	-6.68	114.65	121.90
3	B	202	FMN	C1'-N10-C9A	6.44	131.25	120.51
2	C	201	8YX	BR2-C07-C09	6.41	125.99	118.80
3	B	202	FMN	C4-N3-C2	-6.26	114.08	125.64
3	C	202	FMN	O2'-C2'-C1'	6.26	124.93	109.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	202	FMN	C5'-C4'-C3'	6.20	124.18	112.20
3	A	202	FMN	C1'-N10-C9A	6.13	130.72	120.51
3	D	201	FMN	C4-N3-C2	-5.73	115.05	125.64
3	C	202	FMN	C4-N3-C2	-5.71	115.09	125.64
3	A	202	FMN	C4A-C10-N10	5.67	124.77	116.48
3	B	202	FMN	C4-C4A-N5	5.62	126.23	118.23
3	B	202	FMN	C4A-C4-N3	5.62	127.45	113.19
3	A	202	FMN	O2'-C2'-C1'	5.59	123.32	109.80
3	D	201	FMN	C1'-N10-C9A	5.49	129.66	120.51
3	A	202	FMN	C4-N3-C2	-5.22	116.00	125.64
3	D	201	FMN	C4A-C4-N3	4.94	125.73	113.19
3	C	202	FMN	C4A-C10-N10	4.93	123.69	116.48
3	A	202	FMN	C4-C4A-N5	4.71	124.93	118.23
2	C	201	8YX	BR1-C04-C03	4.55	125.59	119.27
3	B	202	FMN	C4A-C10-N10	4.55	123.14	116.48
3	A	202	FMN	C4A-C4-N3	4.51	124.64	113.19
3	C	202	FMN	C4-C4A-N5	4.34	124.41	118.23
3	C	202	FMN	C4A-C4-N3	4.26	124.01	113.19
2	C	201	8YX	BR1-C04-C06	-4.20	113.42	119.27
3	C	202	FMN	C5'-C4'-C3'	4.20	120.32	112.20
3	D	201	FMN	C5'-C4'-C3'	4.17	120.26	112.20
3	D	201	FMN	O4-C4-C4A	-4.10	115.71	126.60
3	D	201	FMN	C4A-C10-N10	4.09	122.46	116.48
3	D	201	FMN	C4-C4A-N5	4.05	123.99	118.23
3	B	202	FMN	O4-C4-C4A	-3.89	116.28	126.60
2	A	201	8YX	C09-C02-N01	3.70	126.45	120.36
3	C	202	FMN	O4'-C4'-C5'	-3.64	101.74	109.92
3	C	202	FMN	N3-C2-N1	3.48	126.22	119.38
3	C	202	FMN	O4-C4-C4A	-3.43	117.50	126.60
3	C	202	FMN	O2-C2-N1	-3.41	116.17	121.83
2	A	201	8YX	C02-C03-C04	3.31	123.61	117.12
3	A	202	FMN	O3'-C3'-C2'	3.29	116.75	108.81
3	C	202	FMN	O2'-C2'-C3'	-3.15	101.45	109.10
3	D	201	FMN	O4'-C4'-C5'	-3.12	102.91	109.92
3	C	202	FMN	O3'-C3'-C2'	3.11	116.33	108.81
2	A	203	8YX	O10-C09-C02	-3.03	112.23	120.36
3	A	202	FMN	C10-C4A-N5	-2.90	118.69	124.86
3	D	201	FMN	O3'-C3'-C2'	2.89	115.79	108.81
3	B	202	FMN	O2-C2-N1	-2.87	117.08	121.83
3	D	201	FMN	N3-C2-N1	2.83	124.94	119.38
3	A	202	FMN	O4-C4-C4A	-2.82	119.12	126.60
3	A	202	FMN	O3'-C3'-C4'	-2.77	102.11	108.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	202	FMN	N3-C2-N1	2.76	124.81	119.38
3	D	201	FMN	C8M-C8-C9	-2.65	114.59	119.49
3	D	201	FMN	O4'-C4'-C3'	2.60	115.42	109.10
3	D	201	FMN	O2-C2-N1	-2.59	117.54	121.83
2	C	201	8YX	BR2-C07-C06	-2.57	114.01	118.39
3	A	202	FMN	C4A-C10-N1	-2.54	118.84	124.73
3	A	202	FMN	C6-C7-C8	2.49	123.23	119.67
3	A	202	FMN	O2'-C2'-C3'	-2.45	103.15	109.10
3	C	202	FMN	C9A-N10-C10	-2.44	116.96	120.77
2	A	201	8YX	C06-C07-C09	2.41	124.52	121.90
2	A	203	8YX	BR2-C07-C06	-2.37	114.34	118.39
3	C	202	FMN	C10-C4A-N5	-2.36	119.85	124.86
2	D	202	8YX	BR2-C07-C09	2.34	121.42	118.80
3	B	202	FMN	C4A-C10-N1	-2.30	119.40	124.73
3	B	202	FMN	C10-C4A-N5	-2.29	120.00	124.86
3	A	202	FMN	N3-C2-N1	2.28	123.85	119.38
3	D	201	FMN	C9A-N10-C10	-2.27	117.22	120.77
3	B	202	FMN	O4'-C4'-C5'	-2.24	104.87	109.92
3	D	201	FMN	C8M-C8-C7	2.18	125.20	120.74
2	A	203	8YX	C04-C06-C07	2.15	121.74	118.85
3	A	202	FMN	C9A-N10-C10	-2.11	117.48	120.77
3	A	202	FMN	C9-C8-C7	-2.07	116.70	119.67
3	B	202	FMN	O4-C4-N3	-2.03	116.23	120.12
3	A	202	FMN	O4-C4-N3	-2.02	116.24	120.12

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	201	PG4	O1-C1-C2-O2
4	B	201	PG4	O2-C3-C4-O3
4	B	201	PG4	O4-C7-C8-O5
4	B	201	PG4	O3-C5-C6-O4
3	C	202	FMN	O2'-C2'-C3'-C4'
3	A	202	FMN	O2'-C2'-C3'-C4'
3	A	202	FMN	O2'-C2'-C3'-O3'
4	B	201	PG4	C6-C5-O3-C4
3	C	202	FMN	O3'-C3'-C4'-C5'
3	C	202	FMN	O3'-C3'-C4'-O4'
4	B	201	PG4	C3-C4-O3-C5
4	B	201	PG4	C1-C2-O2-C3

There are no ring outliers.

8 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	202	FMN	3	0
3	B	202	FMN	3	0
3	C	202	FMN	2	0
2	C	201	8YX	2	0
2	D	202	8YX	1	0
2	A	201	8YX	1	0
4	B	201	PG4	1	0
3	D	201	FMN	3	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 A 202

Bond lengths

Bond angles

Torsions

Rings

Full wwPDB X-ray Structure Validation Report

Ligand FMN B 202

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN C 202

Bond lengths

Bond angles

Torsions

Rings

Ligand 8YX C 201

Bond lengths

Bond angles

Torsions

Rings

Ligand 8YX D 202

Bond lengths

Bond angles

Torsions

Rings

Ligand 8YX A 203

Bond lengths

Bond angles

Torsions

Rings

Ligand 8YX A 201

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN D 201

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	197/231 (85%)	0.05	1 (0%)	91	95	18, 25, 37, 53	0
1	B	198/231 (85%)	0.30	8 (4%)	38	49	20, 33, 53, 60	0
1	C	198/231 (85%)	0.12	3 (1%)	73	81	19, 28, 45, 60	0
1	D	204/231 (88%)	0.05	4 (1%)	65	74	21, 31, 47, 60	0
All	All	797/924 (86%)	0.13	16 (2%)	65	74	18, 29, 47, 60	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	151	VAL	4.7
1	B	149	PHE	4.2
1	B	154	VAL	4.1
1	D	155	ARG	3.8
1	B	47	ILE	2.8
1	A	1	MET	2.7
1	B	1	MET	2.7
1	B	155	ARG	2.6
1	B	48	PHE	2.5
1	C	1	MET	2.4
1	B	150	ASP	2.4
1	D	168	GLY	2.2
1	C	56	GLN	2.1
1	B	51	ALA	2.1
1	C	47	ILE	2.0
1	D	-4	ILE	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
2	8YX	A	201	10/10	0.72	0.23	30,39,55,67	15
2	8YX	C	201	10/10	0.78	0.20	32,40,52,53	15
4	PG4	B	201	13/13	0.80	0.18	33,45,54,54	0
2	8YX	D	202	10/10	0.83	0.29	25,32,45,48	15
2	8YX	A	203	10/10	0.90	0.27	21,27,41,47	15
3	FMN	A	202	31/31	0.93	0.17	19,28,33,33	0
3	FMN	B	202	31/31	0.94	0.18	31,37,40,43	0
3	FMN	D	201	31/31	0.95	0.15	25,30,37,39	0
3	FMN	C	202	31/31	0.95	0.15	21,24,29,29	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.
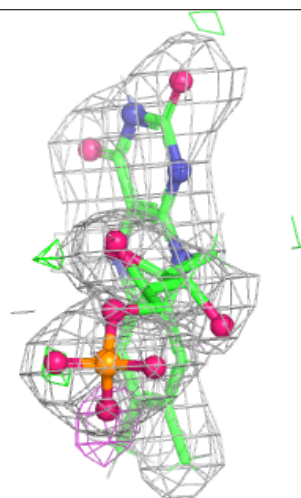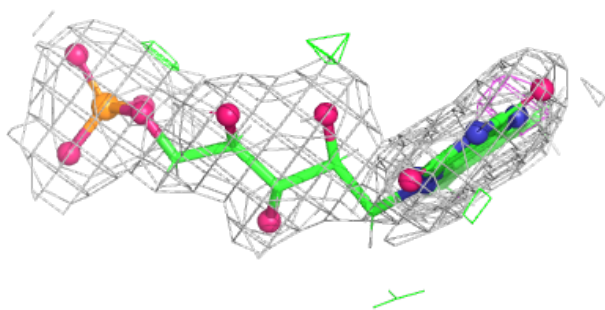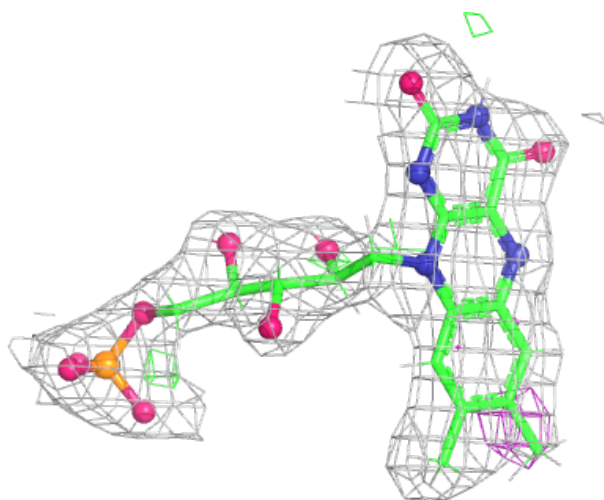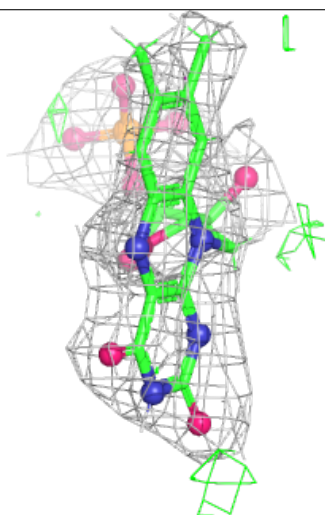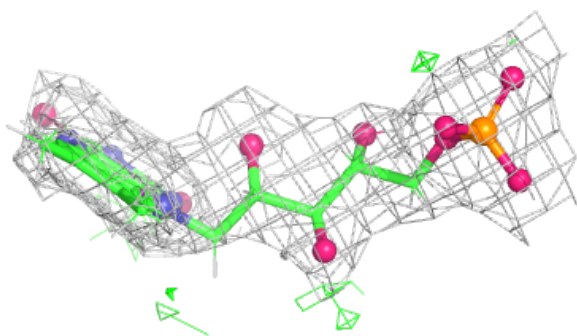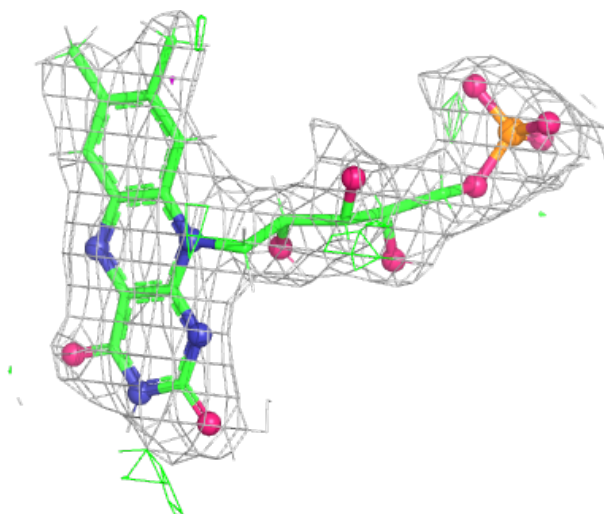
Electron density around 8YX A 201:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
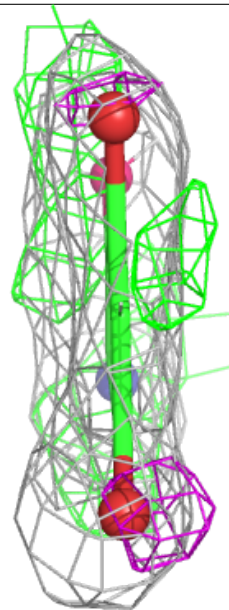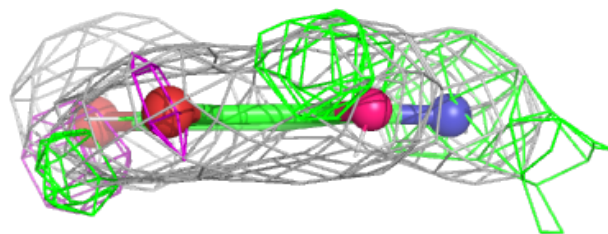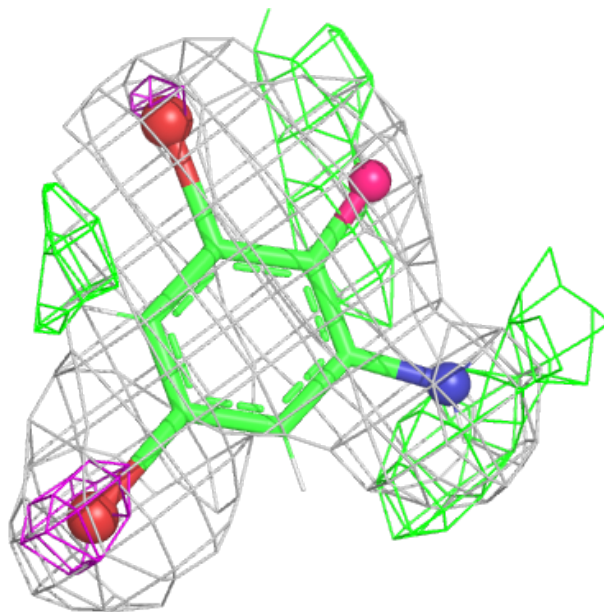
Electron density around 8YX C 201:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
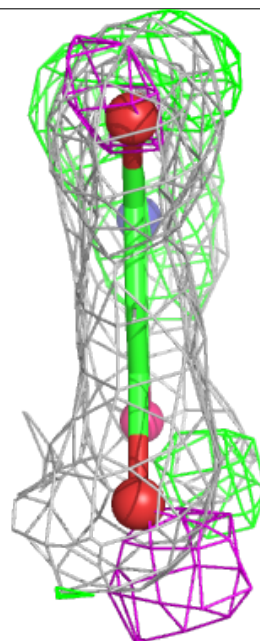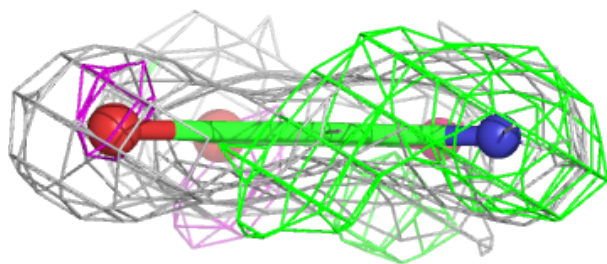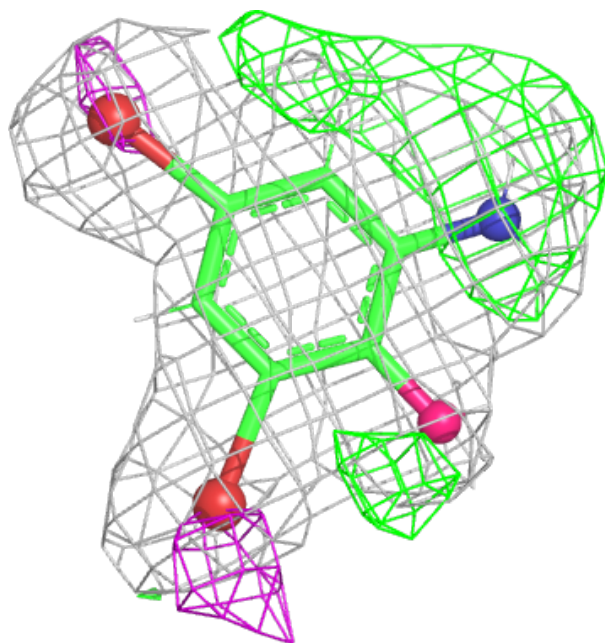
Electron density around 8YX D 202:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
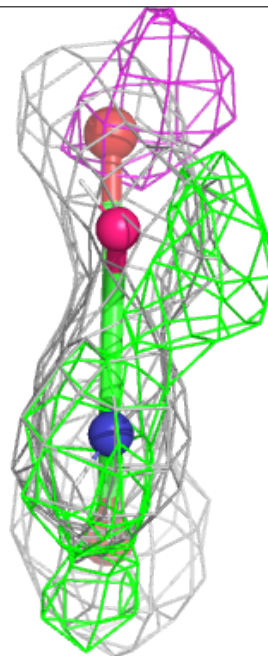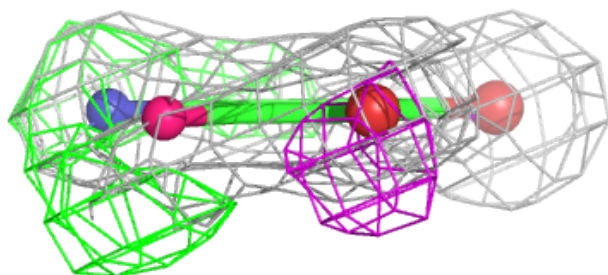
Electron density around 8YX A 203:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
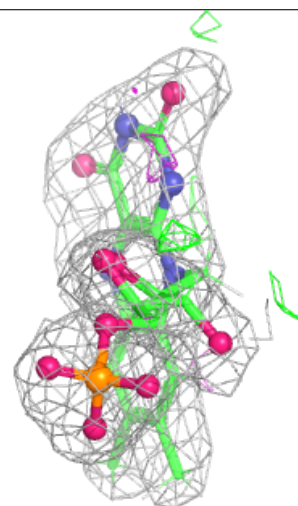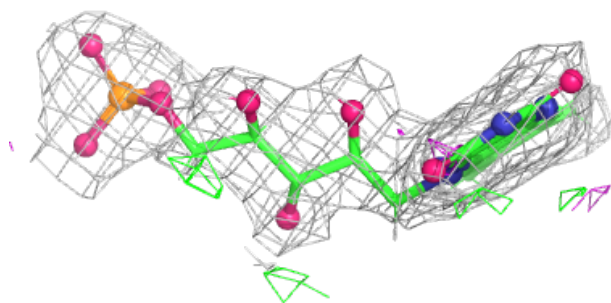and green (positive)
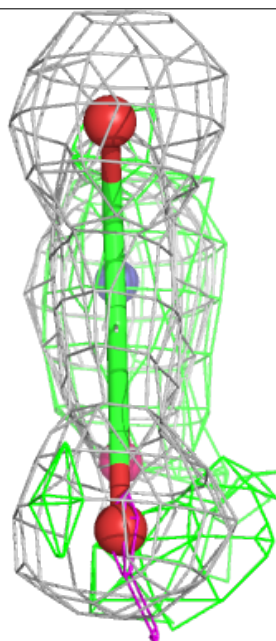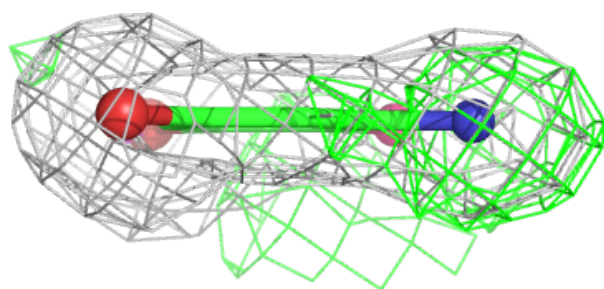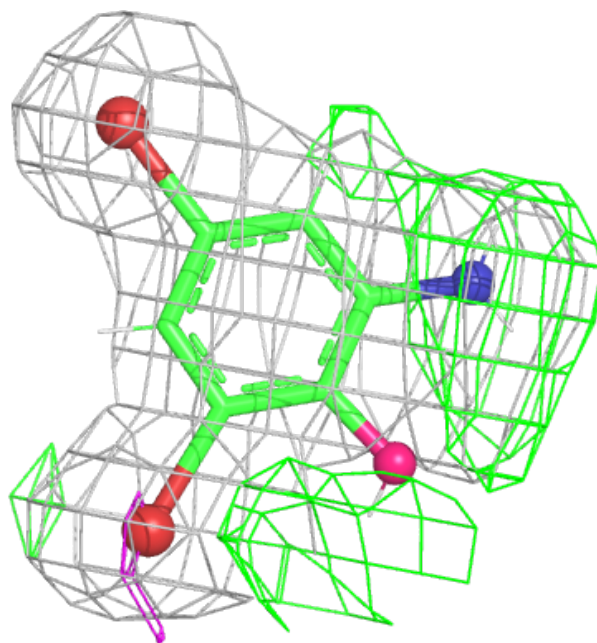
Electron density around FMN A 202:

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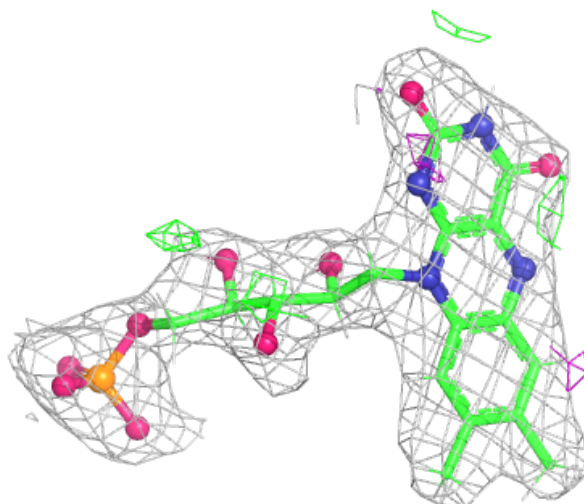and green (positive)

Electron density around FMN B 202:

$2mF_o$-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 D 201:
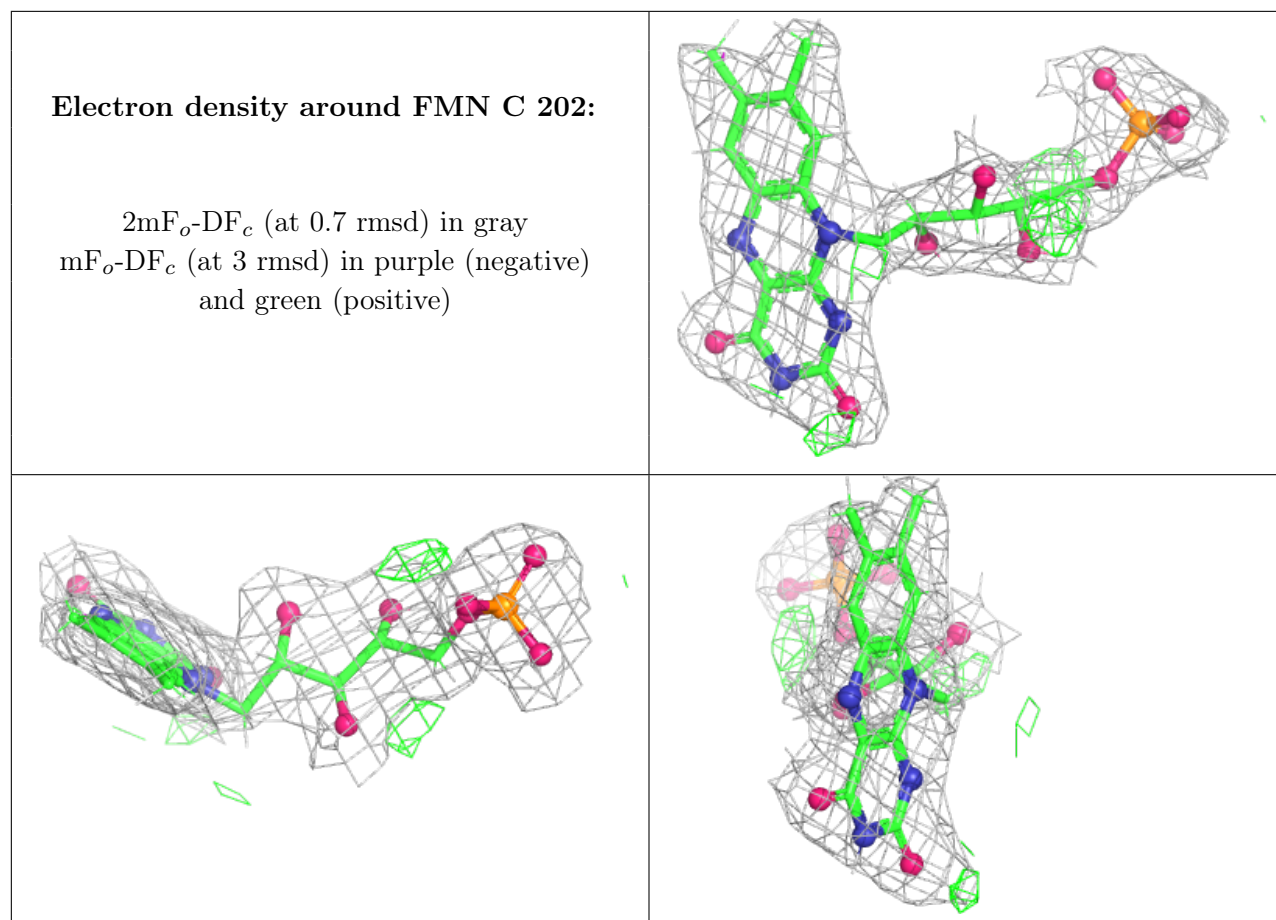
$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around FMN C 202:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.