Full wwPDB X-ray Structure Validation Report (i)

Aug 20, 2020 – 07:42 PM BST

PDB ID	:	4APN
Title	:	Structure of TR from Leishmania infantum in complex with a diarylpirrole-based inhibitor
Authors	:	Baiocco, P.; Ilari, A.; Colotti, G.; Biava, M.
Deposited on	:	2012-04-04
Resolution	:	3.20 Å(reported)

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

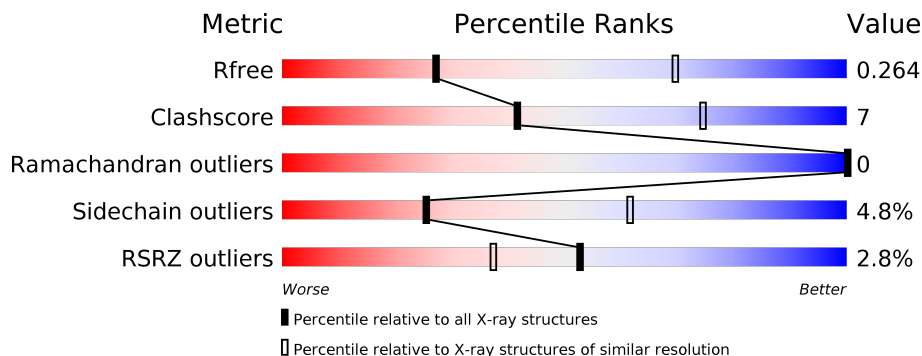|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.13.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.13.1

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 3.20 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	Percentile Ranks	Value
Rfree		0.264
Clashscore		7
Ramachandran outliers		0
Sidechain outliers		4.8%
RSRZ outliers		2.8%

Worse — Better

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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	511	2% 83% 12% • 5%
1	B	511	3% 82% 13% • 5%

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	JV0	B	1491	-	-	X	-
4	JV0	B	1492	-	-	X	-
4	JV0	B	1493	-	-	X	X
4	JV0	B	1494	-	-	X	-

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 7711 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 TRYPANOTHIONE REDUCTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	488	3694	2322	634	711	27	0	0	0
1	B	488	Total	C	N	O	S	0	0	0
			3694	2322	634	711	27			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP A4HSF7
A	-18	GLY	-	expression tag	UNP A4HSF7
A	-17	SER	-	expression tag	UNP A4HSF7
A	-16	SER	-	expression tag	UNP A4HSF7
A	-15	HIS	-	expression tag	UNP A4HSF7
A	-14	HIS	-	expression tag	UNP A4HSF7
A	-13	HIS	-	expression tag	UNP A4HSF7
A	-12	HIS	-	expression tag	UNP A4HSF7
A	-11	HIS	-	expression tag	UNP A4HSF7
A	-10	HIS	-	expression tag	UNP A4HSF7
A	-9	SER	-	expression tag	UNP A4HSF7
A	-8	SER	-	expression tag	UNP A4HSF7
A	-7	GLY	-	expression tag	UNP A4HSF7
A	-6	LEU	-	expression tag	UNP A4HSF7
A	-5	VAL	-	expression tag	UNP A4HSF7
A	-4	PRO	-	expression tag	UNP A4HSF7
A	-3	ARG	-	expression tag	UNP A4HSF7
A	-2	GLY	-	expression tag	UNP A4HSF7
A	-1	SER	-	expression tag	UNP A4HSF7
A	0	HIS	-	expression tag	UNP A4HSF7
B	-19	MET	-	expression tag	UNP A4HSF7
B	-18	GLY	-	expression tag	UNP A4HSF7
B	-17	SER	-	expression tag	UNP A4HSF7
B	-16	SER	-	expression tag	UNP A4HSF7
B	-15	HIS	-	expression tag	UNP A4HSF7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP A4HSF7
B	-13	HIS	-	expression tag	UNP A4HSF7
B	-12	HIS	-	expression tag	UNP A4HSF7
B	-11	HIS	-	expression tag	UNP A4HSF7
B	-10	HIS	-	expression tag	UNP A4HSF7
B	-9	SER	-	expression tag	UNP A4HSF7
B	-8	SER	-	expression tag	UNP A4HSF7
B	-7	GLY	-	expression tag	UNP A4HSF7
B	-6	LEU	-	expression tag	UNP A4HSF7
B	-5	VAL	-	expression tag	UNP A4HSF7
B	-4	PRO	-	expression tag	UNP A4HSF7
B	-3	ARG	-	expression tag	UNP A4HSF7
B	-2	GLY	-	expression tag	UNP A4HSF7
B	-1	SER	-	expression tag	UNP A4HSF7
B	0	HIS	-	expression tag	UNP A4HSF7

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).
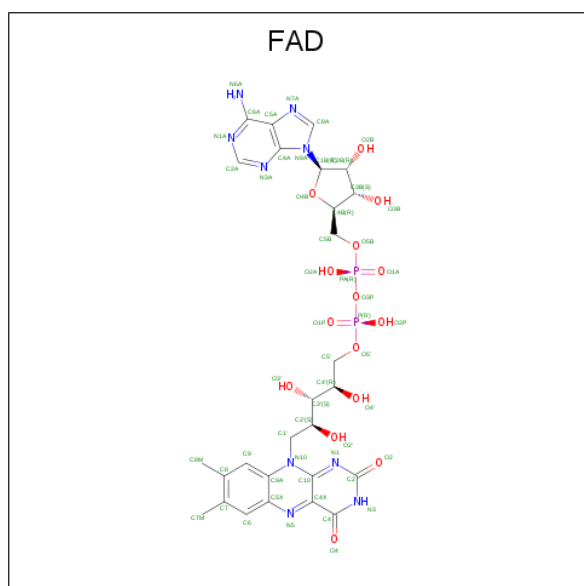
FAD

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

- Molecule 3 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$).
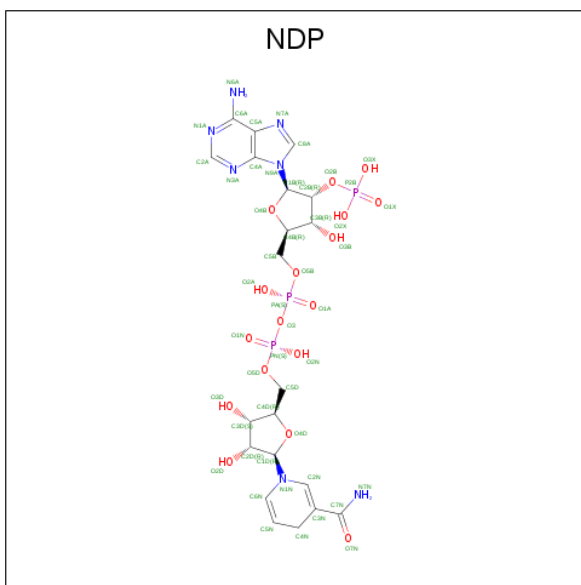
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 4 is 4-[[1-(4-ethylphenyl)-2-methyl-5-(4-methylsulfanylphenyl)pyrrol-3-yl]methyl]t hiomorpholine (three-letter code: JV0) (formula: $C_{25}H_{30}N_2S_2$).
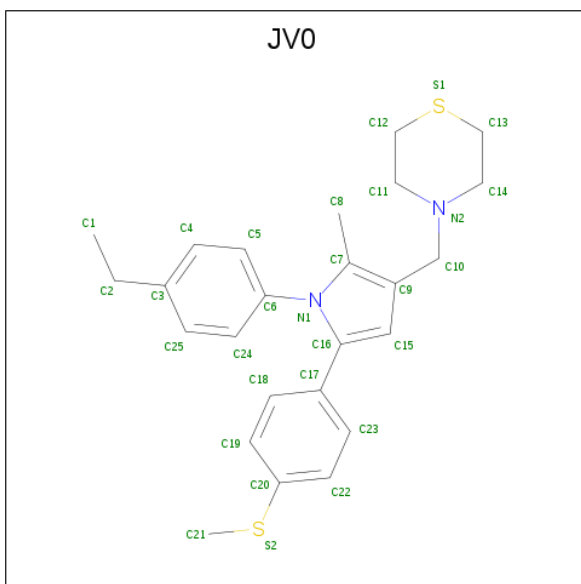
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total	C	N	S	0	0
			29	25	2	2		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total 29	C 25	N 2	S 2	0	0
4	B	1	Total 29	C 25	N 2	S 2	0	0
4	B	1	Total 29	C 25	N 2	S 2	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	2	Total 2	O 2	0	0
5	B	3	Total 3	O 3	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: TRYPANOTHIONE REDUCTASE
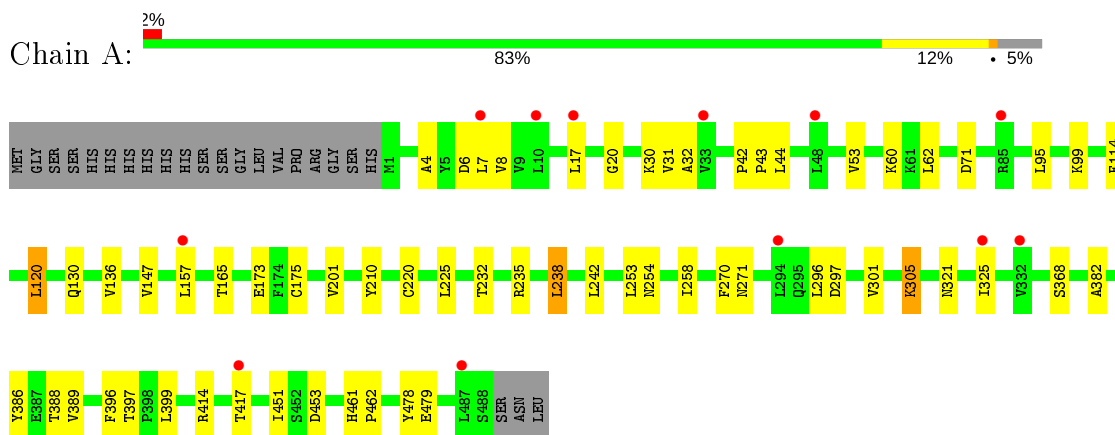
- Molecule 1: TRYPANOTHIONE REDUCTASE
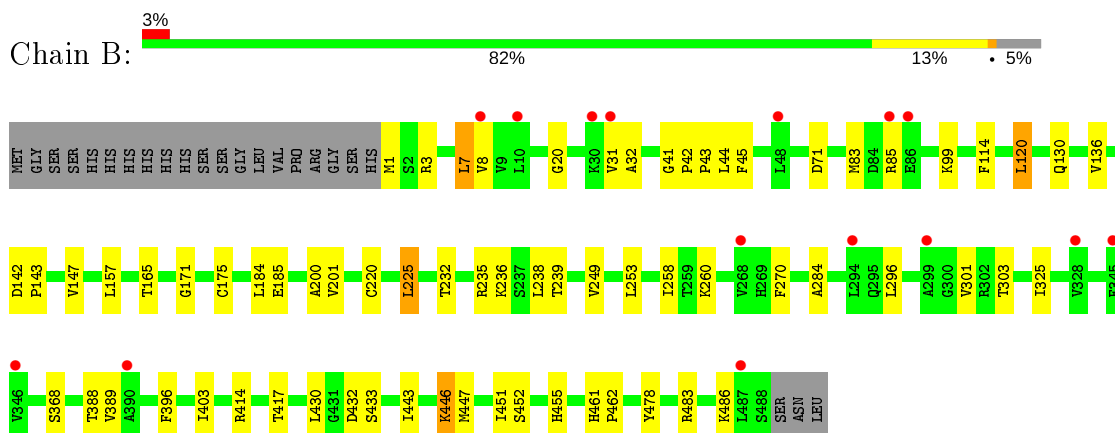
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α, β, γ	102.56Å 102.56Å 191.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 3.20 49.54 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (50.00-3.20) 99.9 (49.54-3.20)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.99 (at 3.19Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.239 , 0.277 0.234 , 0.264	Depositor DCC
R_{free} test set	1651 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	72.1	Xtriage
Anisotropy	0.128	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 28.4	EDS
L-test for twinning[2]	$< |L| > = 0.51, < L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.478 for h,-k,-l	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	7711	wwPDB-VP
Average B, all atoms (Å^2)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.53% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: NDP, JV0, FAD

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$>5	RMSZ	#$|Z|$>5
1	A	0.31	0/3767	0.48	0/5100
1	B	0.32	0/3767	0.48	0/5100
All	All	0.32	0/7534	0.48	0/10200

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (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	3694	0	3647	34	0
1	B	3694	0	3647	32	0
2	A	53	0	31	1	0
2	B	53	0	31	0	0
3	A	48	0	26	0	0
3	B	48	0	26	1	0
4	B	116	0	120	53	0
5	A	2	0	0	0	0
5	B	3	0	0	0	0
All	All	7711	0	7528	107	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 7.

All (107) 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)
4:B:1493:JV0:H15	4:B:1493:JV0:H141	1.18	1.16
4:B:1494:JV0:C23	4:B:1494:JV0:H5	1.85	1.07
4:B:1492:JV0:H112	4:B:1492:JV0:C8	1.87	1.05
4:B:1492:JV0:H112	4:B:1492:JV0:H81C	1.03	1.03
4:B:1493:JV0:C24	4:B:1493:JV0:H18	1.91	1.01
4:B:1491:JV0:H5	4:B:1491:JV0:H18	1.42	0.99
4:B:1492:JV0:C11	4:B:1492:JV0:H81C	1.96	0.96
4:B:1492:JV0:C24	4:B:1493:JV0:H4	1.96	0.95
4:B:1491:JV0:H5	4:B:1491:JV0:C18	1.95	0.95
4:B:1491:JV0:C5	4:B:1491:JV0:H18	1.97	0.95
4:B:1494:JV0:H23	4:B:1494:JV0:C5	1.98	0.94
4:B:1494:JV0:H24	4:B:1494:JV0:H82C	1.52	0.91
1:A:396:PHE:HB2	4:B:1493:JV0:H122	1.53	0.88
4:B:1492:JV0:H24	4:B:1493:JV0:C5	2.02	0.88
4:B:1491:JV0:H82C	4:B:1491:JV0:H24	1.53	0.88
4:B:1492:JV0:H24	4:B:1493:JV0:H5	1.56	0.88
4:B:1494:JV0:C8	4:B:1494:JV0:H24	2.04	0.87
4:B:1491:JV0:H24	4:B:1491:JV0:C8	2.04	0.86
4:B:1493:JV0:H141	4:B:1493:JV0:C15	1.91	0.85
4:B:1492:JV0:H24	4:B:1493:JV0:C4	2.06	0.85
4:B:1494:JV0:C23	4:B:1494:JV0:C5	2.56	0.82
1:A:396:PHE:HB2	4:B:1493:JV0:C12	2.10	0.81
4:B:1494:JV0:H23	4:B:1494:JV0:H5	1.60	0.81
4:B:1492:JV0:H24	4:B:1493:JV0:H4	1.64	0.79
4:B:1492:JV0:H111	4:B:1493:JV0:H112	1.69	0.74
4:B:1492:JV0:H111	4:B:1493:JV0:C11	2.18	0.73
4:B:1491:JV0:H102	4:B:1494:JV0:C18	2.18	0.73
4:B:1494:JV0:H81C	4:B:1494:JV0:H111	1.72	0.71
4:B:1493:JV0:H18	4:B:1493:JV0:C6	2.22	0.69
1:A:389:VAL:CG2	1:A:478:TYR:HB2	2.23	0.69
1:A:53:VAL:HG22	4:B:1494:JV0:C21	2.23	0.68
1:A:389:VAL:HG23	1:A:478:TYR:HB2	1.76	0.68
4:B:1493:JV0:C14	4:B:1493:JV0:H15	2.12	0.68
4:B:1492:JV0:C24	4:B:1493:JV0:C4	2.65	0.67
1:B:396:PHE:CB	4:B:1491:JV0:H132	2.25	0.67
1:B:389:VAL:HG23	1:B:478:TYR:HB2	1.77	0.66
1:B:396:PHE:HB2	4:B:1491:JV0:H132	1.78	0.65
4:B:1493:JV0:C24	4:B:1493:JV0:C18	2.71	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:396:PHE:HB3	4:B:1492:JV0:H121	1.79	0.64
4:B:1493:JV0:C14	4:B:1493:JV0:C15	2.74	0.61
1:B:389:VAL:CG2	1:B:478:TYR:HB2	2.30	0.61
4:B:1491:JV0:C8	4:B:1491:JV0:C24	2.76	0.61
1:A:232:THR:HA	1:A:235:ARG:HD3	1.83	0.60
1:A:254:ASN:H	1:A:271:ASN:HB2	1.67	0.59
1:A:305:LYS:H	1:A:305:LYS:HD3	1.67	0.58
1:B:396:PHE:HB3	4:B:1491:JV0:S1	2.44	0.58
1:A:396:PHE:CB	4:B:1493:JV0:H122	2.31	0.57
4:B:1494:JV0:C8	4:B:1494:JV0:C24	2.75	0.56
1:A:53:VAL:HG22	4:B:1494:JV0:H211	1.87	0.55
1:B:443:ILE:O	1:B:447:MET:HB2	2.07	0.55
4:B:1492:JV0:H18	4:B:1492:JV0:C5	2.37	0.55
1:A:397:THR:O	4:B:1493:JV0:H131	2.08	0.54
4:B:1491:JV0:C5	4:B:1491:JV0:C18	2.70	0.54
1:A:453:ASP:O	1:B:446:LYS:HE3	2.08	0.54
1:B:238:LEU:HD23	1:B:430:LEU:HD11	1.91	0.53
4:B:1492:JV0:H18	4:B:1492:JV0:H5	1.90	0.53
4:B:1494:JV0:H81C	4:B:1494:JV0:C11	2.38	0.52
1:A:20:GLY:HA2	1:A:31:VAL:HG11	1.93	0.51
3:B:1490:NDP:H51N	3:B:1490:NDP:H6N	1.92	0.51
1:B:200:ALA:HB2	1:B:284:ALA:HB3	1.93	0.51
1:B:296:LEU:HB3	1:B:301:VAL:HB	1.94	0.49
1:A:399:LEU:HG	4:B:1493:JV0:H132	1.95	0.49
1:B:232:THR:HA	1:B:235:ARG:HD3	1.94	0.49
1:A:114:PHE:CE1	1:A:120:LEU:HD22	2.49	0.47
1:A:157:LEU:HD11	1:A:325:ILE:HG12	1.96	0.47
1:A:4:ALA:O	1:A:30:LYS:HE3	2.14	0.47
1:A:53:VAL:HG22	4:B:1494:JV0:H213	1.96	0.47
1:B:175:CYS:SG	1:B:258:ILE:HD13	2.55	0.47
1:A:175:CYS:SG	1:A:258:ILE:HD13	2.55	0.46
4:B:1492:JV0:C25	4:B:1493:JV0:H4	2.44	0.46
1:B:20:GLY:HA2	1:B:31:VAL:HG11	1.97	0.46
1:B:452:SER:HA	1:B:455:HIS:CE1	2.51	0.46
1:A:253:LEU:HD11	1:A:270:PHE:HB3	1.98	0.45
1:B:8:VAL:HG22	1:B:32:ALA:HB3	1.99	0.45
1:A:238:LEU:HD22	1:A:242:LEU:HG	1.98	0.45
1:A:417:THR:HG21	1:A:451:ILE:HB	2.00	0.44
1:A:296:LEU:HB3	1:A:301:VAL:HB	1.98	0.44
1:B:114:PHE:CE1	1:B:120:LEU:HD22	2.52	0.44
4:B:1491:JV0:H23	4:B:1491:JV0:H15	1.64	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:461:HIS:HA	1:B:462:PRO:HA	1.83	0.43
4:B:1494:JV0:C17	4:B:1494:JV0:H5	2.39	0.43
1:B:253:LEU:HD11	1:B:270:PHE:HB3	1.99	0.43
1:B:201:VAL:HG12	1:B:368:SER:HB3	2.00	0.43
1:B:157:LEU:HD11	1:B:325:ILE:HG12	1.99	0.43
1:B:417:THR:HG21	1:B:451:ILE:HB	2.01	0.43
1:A:42:PRO:O	1:A:43:PRO:C	2.57	0.43
1:B:42:PRO:O	1:B:43:PRO:C	2.57	0.43
1:B:41:GLY:O	1:B:45:PHE:HA	2.18	0.42
1:A:382:ALA:O	1:A:386:TYR:HB2	2.19	0.42
1:A:60:LYS:HB3	1:A:60:LYS:HE2	1.90	0.42
1:B:136:VAL:HG13	1:B:147:VAL:HG13	2.02	0.42
1:B:142:ASP:HA	1:B:143:PRO:HD3	1.85	0.42
1:A:8:VAL:HG22	1:A:32:ALA:HB3	2.01	0.41
1:A:62:LEU:HD22	1:B:403:ILE:HD12	2.03	0.41
1:B:7:LEU:HB3	1:B:31:VAL:HG13	2.01	0.41
1:B:239:THR:HG23	1:B:249:VAL:HG11	2.03	0.41
1:A:201:VAL:HG12	1:A:368:SER:HB3	2.03	0.41
1:B:171:GLY:HA3	1:B:258:ILE:O	2.21	0.41
4:B:1493:JV0:C18	4:B:1493:JV0:C6	2.91	0.41
1:A:461:HIS:HA	1:A:462:PRO:HA	1.85	0.41
2:A:1489:FAD:H9	2:A:1489:FAD:H1'1	1.84	0.40
1:B:225:LEU:HD11	1:B:236:LYS:HG3	2.01	0.40
1:B:432:ASP:O	1:B:433:SER:HB2	2.21	0.40
1:B:486:LYS:HA	1:B:486:LYS:HD2	1.87	0.40
1:A:136:VAL:HG13	1:A:147:VAL:HG13	2.02	0.40
1:A:95:LEU:HD22	1:A:210:TYR:CZ	2.56	0.40
1:A:388:THR:HG22	1:A:479:GLU:HG3	2.02	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	486/511 (95%)	467 (96%)	19 (4%)	0	100	100
1	B	486/511 (95%)	465 (96%)	21 (4%)	0	100	100
All	All	972/1022 (95%)	932 (96%)	40 (4%)	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	397/417 (95%)	380 (96%)	17 (4%)	29	64
1	B	397/417 (95%)	376 (95%)	21 (5%)	22	58
All	All	794/834 (95%)	756 (95%)	38 (5%)	25	61

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	ASP
1	A	7	LEU
1	A	17	LEU
1	A	44	LEU
1	A	71	ASP
1	A	99	LYS
1	A	120	LEU
1	A	130	GLN
1	A	165	THR
1	A	173	GLU
1	A	220	CYS
1	A	225	LEU
1	A	238	LEU
1	A	297	ASP
1	A	305	LYS
1	A	321	ASN
1	A	414	ARG
1	B	1	MET

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Mol	Chain	Res	Type
1	B	3	ARG
1	B	7	LEU
1	B	44	LEU
1	B	71	ASP
1	B	83	MET
1	B	85	ARG
1	B	99	LYS
1	B	120	LEU
1	B	130	GLN
1	B	165	THR
1	B	184	LEU
1	B	185	GLU
1	B	220	CYS
1	B	225	LEU
1	B	260	LYS
1	B	303	THR
1	B	388	THR
1	B	414	ARG
1	B	446	LYS
1	B	483	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	306	ASN
1	A	321	ASN
1	A	340	ASN
1	B	340	ASN

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 (i)

8 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	NDP	B	1490	-	45,52,52	1.69	8 (17%)	53,80,80	1.73	5 (9%)
4	JV0	B	1494	-	30,32,32	1.78	5 (16%)	37,44,44	1.80	10 (27%)
2	FAD	A	1489	-	51,58,58	1.39	6 (11%)	60,89,89	1.57	8 (13%)
4	JV0	B	1493	-	30,32,32	2.02	5 (16%)	37,44,44	1.89	7 (18%)
2	FAD	B	1489	-	51,58,58	1.39	6 (11%)	60,89,89	1.58	8 (13%)
4	JV0	B	1492	-	30,32,32	1.92	5 (16%)	37,44,44	1.81	9 (24%)
3	NDP	A	1490	-	45,52,52	1.70	8 (17%)	53,80,80	1.71	6 (11%)
4	JV0	B	1491	-	30,32,32	1.83	4 (13%)	37,44,44	3.14	14 (37%)

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	NDP	B	1490	-	-	10/30/77/77	0/5/5/5
4	JV0	B	1494	-	-	9/15/24/24	0/4/4/4
2	FAD	A	1489	-	-	2/30/50/50	0/6/6/6
4	JV0	B	1493	-	-	6/15/24/24	0/4/4/4
2	FAD	B	1489	-	-	2/30/50/50	0/6/6/6
4	JV0	B	1492	-	-	4/15/24/24	0/4/4/4
3	NDP	A	1490	-	-	12/30/77/77	0/5/5/5
4	JV0	B	1491	-	-	8/15/24/24	0/4/4/4

All (47) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1493	JV0	C6-N1	-8.47	1.34	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1492	JV0	C6-N1	-7.65	1.35	1.46
4	B	1491	JV0	C6-N1	-6.94	1.36	1.46
4	B	1494	JV0	C6-N1	-6.72	1.37	1.46
2	B	1489	FAD	C10-N1	4.51	1.39	1.33
4	B	1491	JV0	C17-C16	-4.50	1.40	1.48
2	A	1489	FAD	C10-N1	4.41	1.38	1.33
3	A	1490	NDP	PN-O1N	4.39	1.66	1.50
4	B	1492	JV0	C17-C16	-4.35	1.40	1.48
3	B	1490	NDP	PN-O1N	4.33	1.66	1.50
3	B	1490	NDP	PA-O1A	4.25	1.66	1.50
3	A	1490	NDP	PA-O1A	4.18	1.65	1.50
4	B	1493	JV0	C17-C16	-4.13	1.40	1.48
4	B	1494	JV0	C17-C16	-4.09	1.41	1.48
2	B	1489	FAD	C2A-N3A	4.05	1.38	1.32
2	A	1489	FAD	C2A-N3A	4.05	1.38	1.32
3	B	1490	NDP	P2B-O1X	3.64	1.62	1.50
3	A	1490	NDP	C6N-C5N	3.63	1.39	1.33
3	B	1490	NDP	C6N-C5N	3.61	1.39	1.33
2	A	1489	FAD	C4X-N5	3.52	1.38	1.33
2	B	1489	FAD	C4X-N5	3.48	1.38	1.33
3	A	1490	NDP	O4B-C1B	3.46	1.45	1.41
3	A	1490	NDP	C4N-C5N	-3.46	1.39	1.48
3	B	1490	NDP	C4N-C5N	-3.43	1.39	1.48
3	A	1490	NDP	P2B-O1X	3.41	1.61	1.50
4	B	1493	JV0	C15-C16	-3.27	1.33	1.39
4	B	1491	JV0	C15-C16	-3.27	1.33	1.39
3	B	1490	NDP	O4B-C1B	3.25	1.45	1.41
2	B	1489	FAD	C4-N3	3.10	1.38	1.33
2	A	1489	FAD	C4-N3	3.04	1.38	1.33
2	A	1489	FAD	C1'-N10	3.00	1.51	1.48
2	B	1489	FAD	C1'-N10	2.81	1.51	1.48
4	B	1492	JV0	C10-C9	2.71	1.56	1.51
2	B	1489	FAD	C2A-N1A	2.66	1.38	1.33
4	B	1494	JV0	C15-C16	-2.64	1.34	1.39
4	B	1492	JV0	C15-C16	-2.64	1.34	1.39
2	A	1489	FAD	C2A-N1A	2.60	1.38	1.33
4	B	1491	JV0	C8-C7	2.56	1.55	1.49
3	A	1490	NDP	C7N-C3N	2.54	1.54	1.48
4	B	1494	JV0	C10-C9	2.51	1.55	1.51
3	B	1490	NDP	C7N-C3N	2.48	1.54	1.48
4	B	1492	JV0	C8-C7	2.43	1.54	1.49
4	B	1493	JV0	C10-C9	2.42	1.55	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1493	JV0	C8-C7	2.36	1.54	1.49
4	B	1494	JV0	C8-C7	2.35	1.54	1.49
3	B	1490	NDP	C4N-C3N	2.27	1.54	1.49
3	A	1490	NDP	C4N-C3N	2.24	1.54	1.49

All (67) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	1491	JV0	C13-C14-N2	-10.15	104.84	111.85
3	B	1490	NDP	O5B-PA-O1A	-7.57	79.50	109.07
4	B	1491	JV0	C15-C16-C17	-7.34	116.41	128.10
4	B	1491	JV0	C12-C11-N2	-6.99	107.03	111.85
4	B	1491	JV0	C17-C16-N1	6.96	135.09	122.90
3	A	1490	NDP	O5B-PA-O1A	-6.82	82.42	109.07
2	B	1489	FAD	C4-N3-C2	6.13	120.32	115.14
2	A	1489	FAD	C4-N3-C2	6.09	120.28	115.14
2	A	1489	FAD	N3A-C2A-N1A	-5.47	120.12	128.68
2	B	1489	FAD	N3A-C2A-N1A	-5.47	120.13	128.68
3	A	1490	NDP	O2A-PA-O5B	-5.29	83.20	107.75
4	B	1493	JV0	C13-C14-N2	5.23	115.46	111.85
3	B	1490	NDP	O2A-PA-O5B	-5.08	84.17	107.75
3	B	1490	NDP	N3A-C2A-N1A	-4.42	121.77	128.68
3	A	1490	NDP	N3A-C2A-N1A	-4.38	121.83	128.68
4	B	1492	JV0	C12-C11-N2	4.27	114.80	111.85
4	B	1494	JV0	C17-C16-N1	4.27	130.36	122.90
4	B	1492	JV0	C17-C16-N1	4.22	130.28	122.90
4	B	1493	JV0	C8-C7-N1	4.17	127.63	122.37
4	B	1493	JV0	C17-C16-N1	4.10	130.08	122.90
4	B	1493	JV0	C14-N2-C11	4.06	117.97	108.83
4	B	1494	JV0	C15-C16-C17	-4.04	121.67	128.10
4	B	1492	JV0	C15-C16-C17	-3.76	122.11	128.10
2	B	1489	FAD	C4X-N5-C5X	3.74	120.51	116.77
2	A	1489	FAD	C4X-N5-C5X	3.67	120.44	116.77
4	B	1493	JV0	C16-C15-C9	3.61	110.90	105.52
4	B	1491	JV0	C10-C9-C7	3.58	131.39	127.05
4	B	1491	JV0	C13-S1-C12	3.52	104.15	97.72
4	B	1494	JV0	C16-C15-C9	3.52	110.77	105.52
4	B	1494	JV0	C12-C11-N2	-3.51	109.43	111.85
4	B	1492	JV0	C14-N2-C11	3.48	116.67	108.83
4	B	1491	JV0	C8-C7-N1	3.46	126.73	122.37
4	B	1491	JV0	C16-C15-C9	3.39	110.58	105.52
4	B	1492	JV0	C16-C15-C9	3.34	110.50	105.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	1493	JV0	C15-C16-C17	-3.32	122.81	128.10
4	B	1494	JV0	C5-C6-C24	-3.22	116.57	121.33
2	A	1489	FAD	P-O3P-PA	-3.14	122.06	132.83
4	B	1491	JV0	C23-C17-C16	-3.12	115.16	120.74
3	A	1490	NDP	O2N-PN-O5D	3.07	122.03	107.75
2	B	1489	FAD	C5X-C9A-N10	3.05	119.93	117.72
2	A	1489	FAD	C5X-C9A-N10	3.02	119.91	117.72
2	B	1489	FAD	P-O3P-PA	-3.02	122.47	132.83
4	B	1494	JV0	C8-C7-N1	2.99	126.14	122.37
4	B	1491	JV0	C5-C6-C24	-2.92	117.01	121.33
4	B	1492	JV0	C5-C6-N1	2.84	123.16	119.19
2	B	1489	FAD	C4X-C4-N3	-2.67	119.78	123.43
2	A	1489	FAD	C4X-C4-N3	-2.62	119.85	123.43
3	A	1490	NDP	PN-O3-PA	-2.55	124.08	132.83
4	B	1492	JV0	C25-C24-C6	2.47	122.66	119.07
4	B	1491	JV0	C18-C17-C16	2.45	125.11	120.74
4	B	1494	JV0	C5-C6-N1	2.42	122.58	119.19
2	A	1489	FAD	C1'-N10-C9A	2.41	120.19	118.29
4	B	1491	JV0	C5-C6-N1	2.33	122.45	119.19
4	B	1492	JV0	C10-C9-C7	2.32	129.86	127.05
4	B	1492	JV0	C5-C6-C24	-2.27	117.97	121.33
4	B	1494	JV0	C10-C9-C7	2.26	129.79	127.05
3	B	1490	NDP	O2N-PN-O5D	2.26	118.23	107.75
2	B	1489	FAD	C3B-C2B-C1B	2.23	104.33	100.98
4	B	1494	JV0	C4-C5-C6	2.20	122.27	119.07
3	B	1490	NDP	PN-O3-PA	-2.17	125.39	132.83
4	B	1491	JV0	C14-N2-C11	2.16	113.70	108.83
2	B	1489	FAD	C1'-N10-C10	2.16	120.34	118.41
4	B	1491	JV0	C25-C24-C6	2.12	122.16	119.07
3	A	1490	NDP	O5D-C5D-C4D	2.12	116.28	108.99
4	B	1493	JV0	C24-C6-N1	2.07	122.09	119.19
2	A	1489	FAD	C3B-C2B-C1B	2.05	104.06	100.98
4	B	1494	JV0	C25-C24-C6	2.02	122.01	119.07

There are no chirality outliers.

All (53) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1490	NDP	C5D-O5D-PN-O2N
3	A	1490	NDP	O4D-C4D-C5D-O5D
4	B	1494	JV0	C24-C6-N1-C7
4	B	1494	JV0	C5-C6-N1-C7

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Mol	Chain	Res	Type	Atoms
4	B	1494	JV0	C24-C6-N1-C16
4	B	1494	JV0	C5-C6-N1-C16
4	B	1494	JV0	N2-C10-C9-C15
4	B	1493	JV0	N1-C16-C17-C18
3	B	1490	NDP	C5D-O5D-PN-O2N
4	B	1491	JV0	C24-C6-N1-C7
4	B	1491	JV0	C5-C6-N1-C7
4	B	1491	JV0	C24-C6-N1-C16
4	B	1491	JV0	C5-C6-N1-C16
4	B	1491	JV0	N2-C10-C9-C15
4	B	1494	JV0	C9-C10-N2-C11
3	A	1490	NDP	O4D-C1D-N1N-C2N
3	B	1490	NDP	O4D-C1D-N1N-C2N
2	A	1489	FAD	O4B-C4B-C5B-O5B
2	A	1489	FAD	C3B-C4B-C5B-O5B
3	B	1490	NDP	O4D-C4D-C5D-O5D
2	B	1489	FAD	O4B-C4B-C5B-O5B
2	B	1489	FAD	C3B-C4B-C5B-O5B
4	B	1494	JV0	C9-C10-N2-C14
4	B	1493	JV0	C19-C20-S2-C21
4	B	1493	JV0	C22-C20-S2-C21
4	B	1494	JV0	C19-C20-S2-C21
4	B	1494	JV0	C22-C20-S2-C21
4	B	1491	JV0	C19-C20-S2-C21
3	B	1490	NDP	PN-O3-PA-O1A
4	B	1491	JV0	C22-C20-S2-C21
4	B	1492	JV0	C19-C20-S2-C21
4	B	1492	JV0	C22-C20-S2-C21
3	A	1490	NDP	C4D-C5D-O5D-PN
4	B	1493	JV0	N1-C16-C17-C23
3	A	1490	NDP	PA-O3-PN-O5D
3	B	1490	NDP	PA-O3-PN-O5D
3	B	1490	NDP	C2B-O2B-P2B-O2X
3	A	1490	NDP	C5D-O5D-PN-O1N
3	B	1490	NDP	C5D-O5D-PN-O1N
4	B	1492	JV0	N2-C10-C9-C15
4	B	1493	JV0	C15-C16-C17-C23
4	B	1493	JV0	C15-C16-C17-C18
3	A	1490	NDP	PN-O3-PA-O1A
4	B	1492	JV0	C9-C10-N2-C14
4	B	1491	JV0	N1-C16-C17-C18
3	B	1490	NDP	O4B-C4B-C5B-O5B

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Mol	Chain	Res	Type	Atoms
3	A	1490	NDP	C2B-O2B-P2B-O1X
3	A	1490	NDP	C3D-C4D-C5D-O5D
3	A	1490	NDP	C2B-O2B-P2B-O2X
3	B	1490	NDP	C2B-O2B-P2B-O3X
3	A	1490	NDP	O4B-C4B-C5B-O5B
3	A	1490	NDP	C2N-C3N-C7N-N7N
3	B	1490	NDP	C2N-C3N-C7N-N7N

There are no ring outliers.

6 monomers are involved in 55 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1490	NDP	1	0
4	B	1494	JV0	14	0
2	A	1489	FAD	1	0
4	B	1493	JV0	22	0
4	B	1492	JV0	15	0
4	B	1491	JV0	12	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.

Full wwPDB X-ray Structure Validation Report

Ligand NDP B 1490

Bond lengths

Bond angles

Torsions

Rings

Ligand JV0 B 1494

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD A 1489

Bond lengths

Bond angles

Torsions

Rings

Ligand JV0 B 1493

Bond lengths

Bond angles

Torsions

Rings

Ligand FAD B 1489

Bond lengths

Bond angles

Torsions

Rings

Ligand JV0 B 1492

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP A 1490

Bond lengths

Bond angles

Torsions

Rings

Ligand JV0 B 1491

Bond lengths

Bond angles

Torsions

Rings

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 (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	488/511 (95%)	0.60	12 (2%)	57	43	54, 71, 93, 100	0
1	B	488/511 (95%)	0.60	15 (3%)	49	32	54, 71, 93, 100	0
All	All	976/1022 (95%)	0.60	27 (2%)	53	37	54, 71, 93, 100	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	85	ARG	3.0
1	B	390	ALA	2.9
1	B	487	LEU	2.8
1	B	30	LYS	2.6
1	A	48	LEU	2.4
1	B	8	VAL	2.4
1	A	332	VAL	2.4
1	B	86	GLU	2.4
1	A	325	ILE	2.3
1	A	17	LEU	2.3
1	A	85	ARG	2.3
1	B	48	LEU	2.3
1	B	328	VAL	2.3
1	A	10	LEU	2.3
1	B	345	PHE	2.2
1	B	31	VAL	2.2
1	A	7	LEU	2.1
1	B	10	LEU	2.1
1	B	299	ALA	2.1
1	B	346	VAL	2.1
1	B	268	VAL	2.1
1	B	294	LEU	2.1
1	A	157	LEU	2.1
1	A	487	LEU	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	33	VAL	2.0
1	A	294	LEU	2.0
1	A	417	THR	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	JV0	B	1491	29/29	0.72	0.29	67,68,69,71	29
4	JV0	B	1494	29/29	0.76	0.34	66,68,71,72	29
4	JV0	B	1493	29/29	0.77	0.41	83,84,87,88	29
4	JV0	B	1492	29/29	0.78	0.25	66,67,68,68	29
3	NDP	B	1490	48/48	0.95	0.25	64,67,68,68	0
3	NDP	A	1490	48/48	0.96	0.26	64,66,69,70	0
2	FAD	A	1489	53/53	0.97	0.32	54,57,62,62	0
2	FAD	B	1489	53/53	0.97	0.33	54,58,60,60	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 JV0 B 1491:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
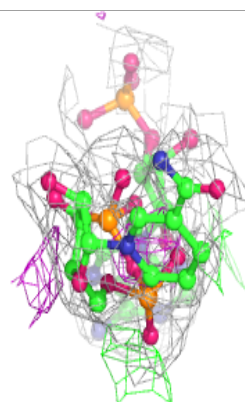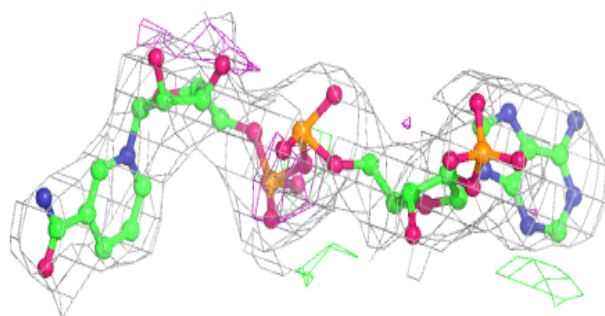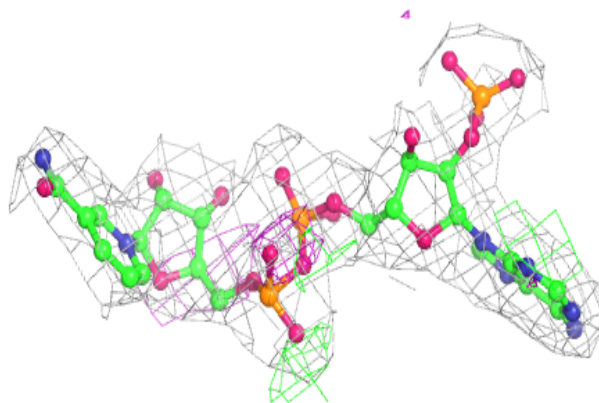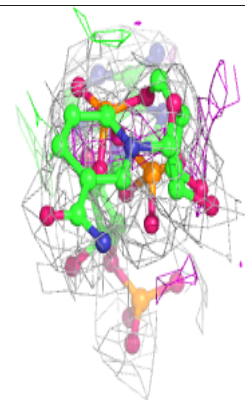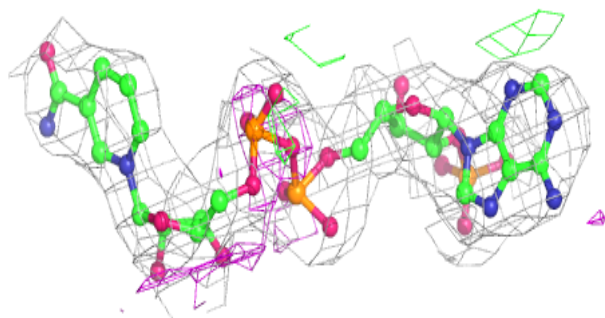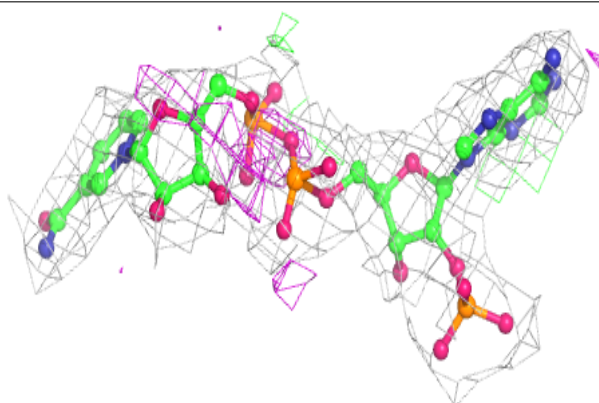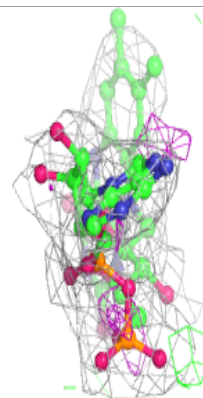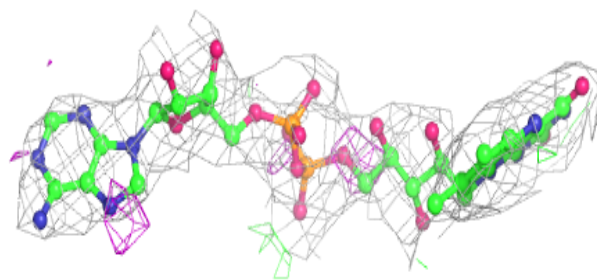$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
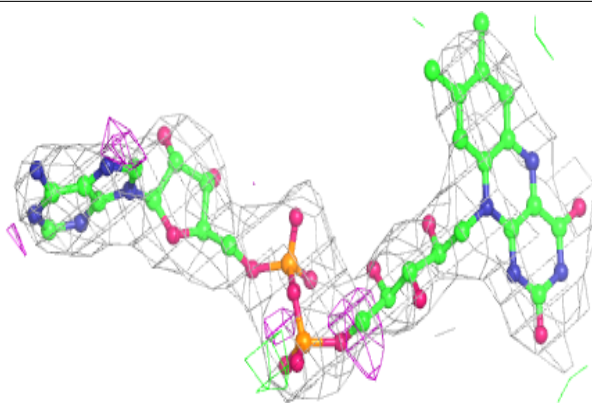and green (positive)
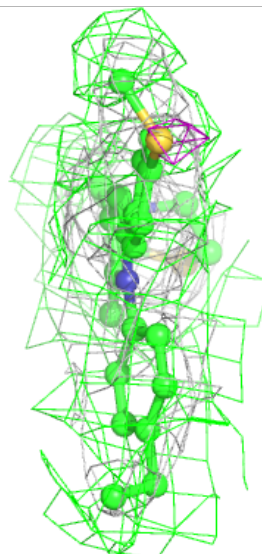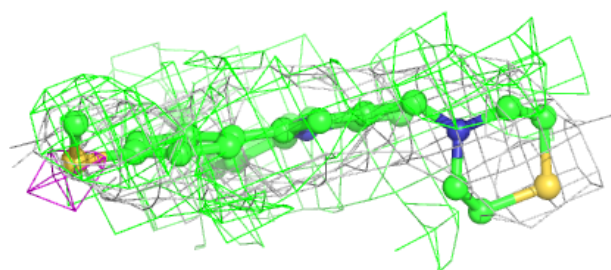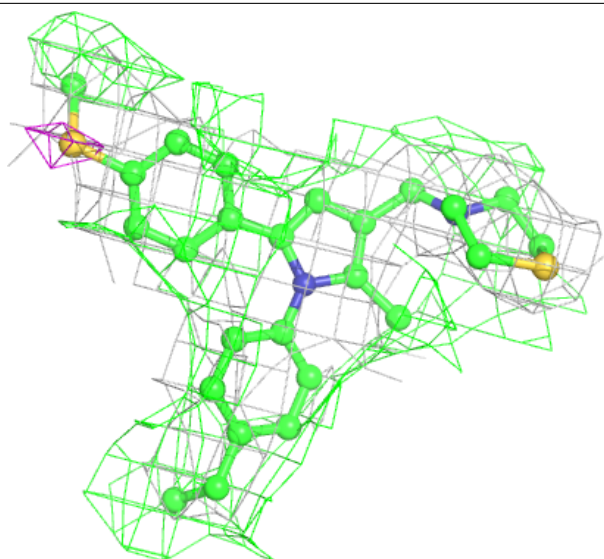
Electron density around JV0 B 1494:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
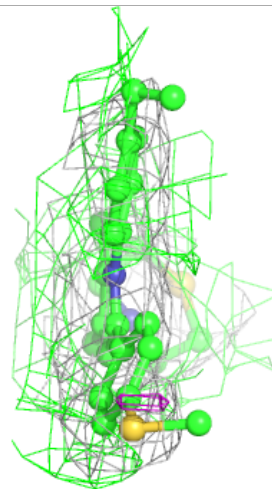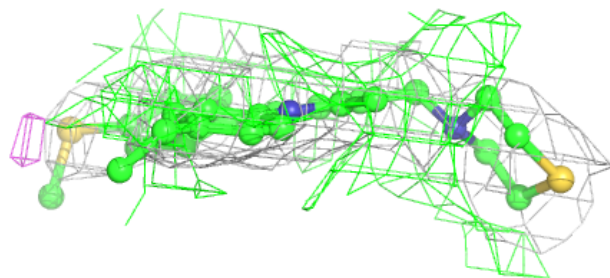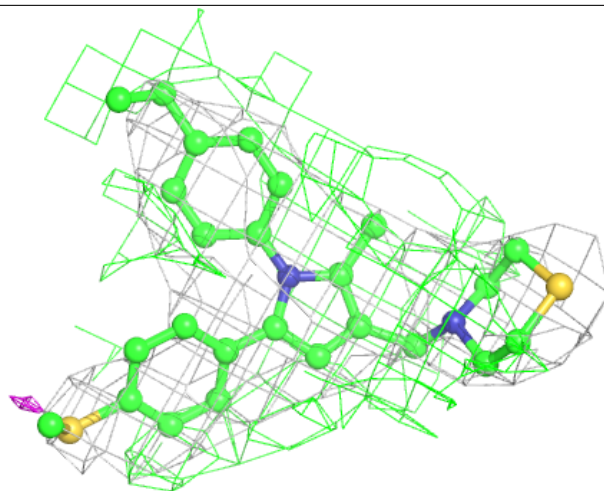
Electron density around JV0 B 1493:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
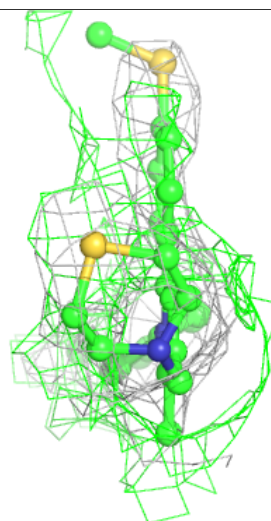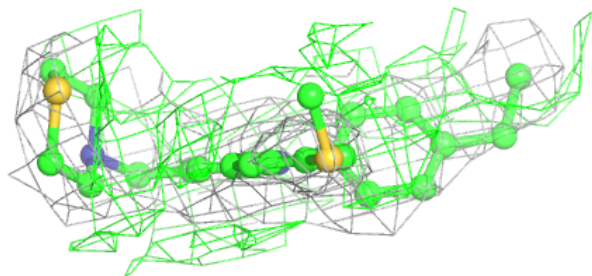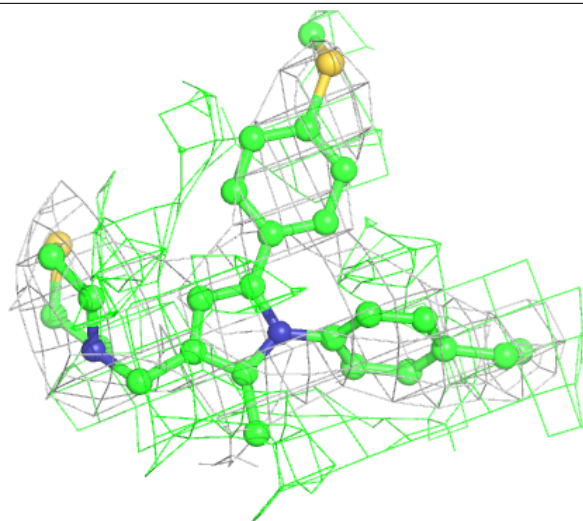
Electron density around JV0 B 1492:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
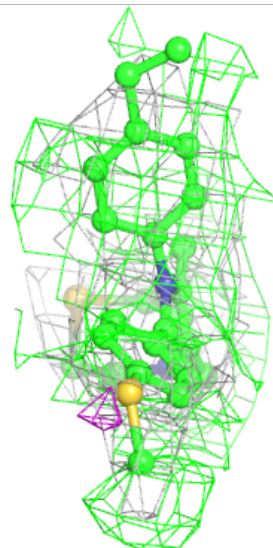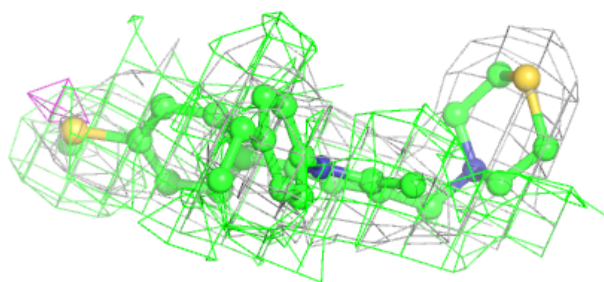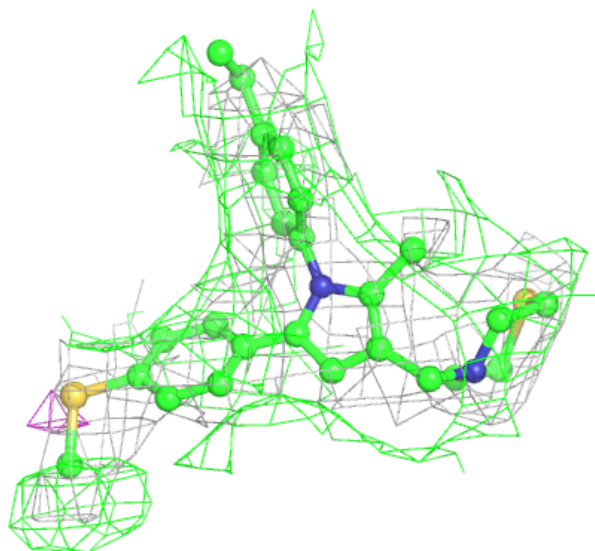
Electron density around NDP B 1490:

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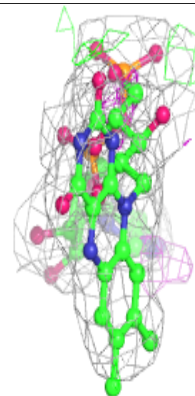mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around NDP A 1490:

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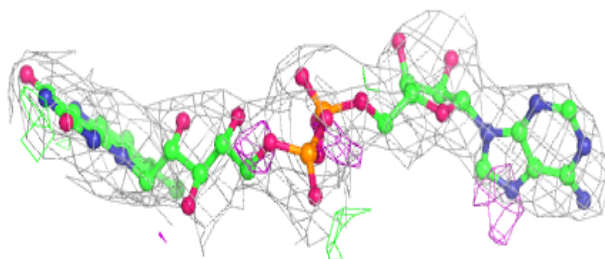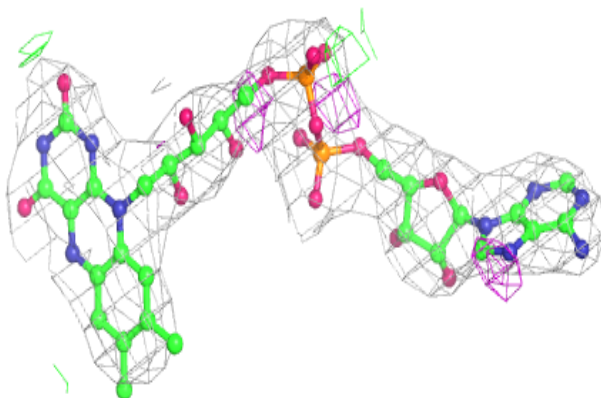mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around FAD A 1489:

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

Electron density around FAD B 1489:

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

6.5 Other polymers (i)

There are no such residues in this entry.