WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Jun 23, 2024 – 04:23 AM EDT

PDB ID	:	6JWQ
Title	:	Crystal structure of Plasmodium falciparum HPPK-DHPS wild type
Authors	:	Chitnumsub, P.; Jaruwat, A.; Yuthavong, Y.
Deposited on	:	2019-04-21
Resolution	:	2.50 Å(reported)

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

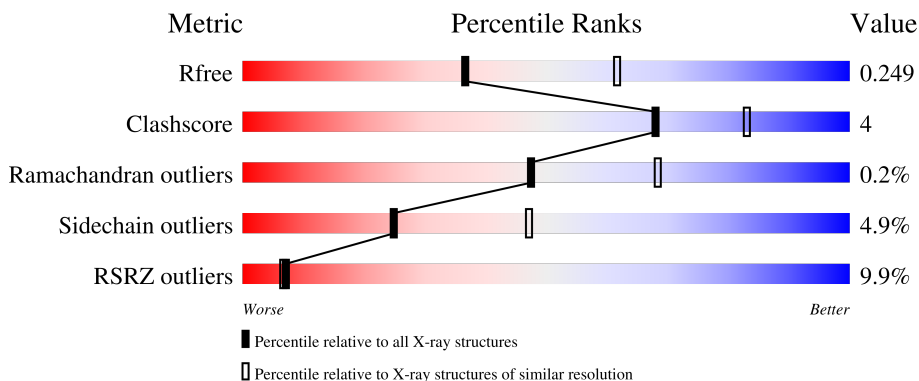|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 2.50 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		0.249
Clashscore		4
Ramachandran outliers		0.2%
Sidechain outliers		4.9%
RSRZ outliers		9.9%

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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	728	7% / 66% / 9% · 25%
1	B	728	8% / 70% / 10% · 19%

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 9605 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 7,8-dihydro-6-hydroxymethylpterin pyrophosphokinase-dihydropteroate synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	548	Total	C	N	O	S	0	0	0
			4544	2923	753	845	23			
1	B	590	Total	C	N	O	S	0	0	0
			4866	3132	801	907	26			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	707	LYS	-	expression tag	UNP Q25704
A	708	ASP	-	expression tag	UNP Q25704
A	709	PRO	-	expression tag	UNP Q25704
A	710	ASN	-	expression tag	UNP Q25704
A	711	SER	-	expression tag	UNP Q25704
A	712	SER	-	expression tag	UNP Q25704
A	713	SER	-	expression tag	UNP Q25704
A	714	VAL	-	expression tag	UNP Q25704
A	715	ASP	-	expression tag	UNP Q25704
A	716	LYS	-	expression tag	UNP Q25704
A	717	LEU	-	expression tag	UNP Q25704
A	718	ALA	-	expression tag	UNP Q25704
A	719	ALA	-	expression tag	UNP Q25704
A	720	ALA	-	expression tag	UNP Q25704
A	721	LEU	-	expression tag	UNP Q25704
A	722	GLU	-	expression tag	UNP Q25704
A	723	HIS	-	expression tag	UNP Q25704
A	724	HIS	-	expression tag	UNP Q25704
A	725	HIS	-	expression tag	UNP Q25704
A	726	HIS	-	expression tag	UNP Q25704
A	727	HIS	-	expression tag	UNP Q25704
A	728	HIS	-	expression tag	UNP Q25704
B	707	LYS	-	expression tag	UNP Q25704
B	708	ASP	-	expression tag	UNP Q25704

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Chain	Residue	Modelled	Actual	Comment	Reference
B	709	PRO	-	expression tag	UNP Q25704
B	710	ASN	-	expression tag	UNP Q25704
B	711	SER	-	expression tag	UNP Q25704
B	712	SER	-	expression tag	UNP Q25704
B	713	SER	-	expression tag	UNP Q25704
B	714	VAL	-	expression tag	UNP Q25704
B	715	ASP	-	expression tag	UNP Q25704
B	716	LYS	-	expression tag	UNP Q25704
B	717	LEU	-	expression tag	UNP Q25704
B	718	ALA	-	expression tag	UNP Q25704
B	719	ALA	-	expression tag	UNP Q25704
B	720	ALA	-	expression tag	UNP Q25704
B	721	LEU	-	expression tag	UNP Q25704
B	722	GLU	-	expression tag	UNP Q25704
B	723	HIS	-	expression tag	UNP Q25704
B	724	HIS	-	expression tag	UNP Q25704
B	725	HIS	-	expression tag	UNP Q25704
B	726	HIS	-	expression tag	UNP Q25704
B	727	HIS	-	expression tag	UNP Q25704
B	728	HIS	-	expression tag	UNP Q25704

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Mg 1 1	0	0
2	B	1	Total Mg 1 1	0	0

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).
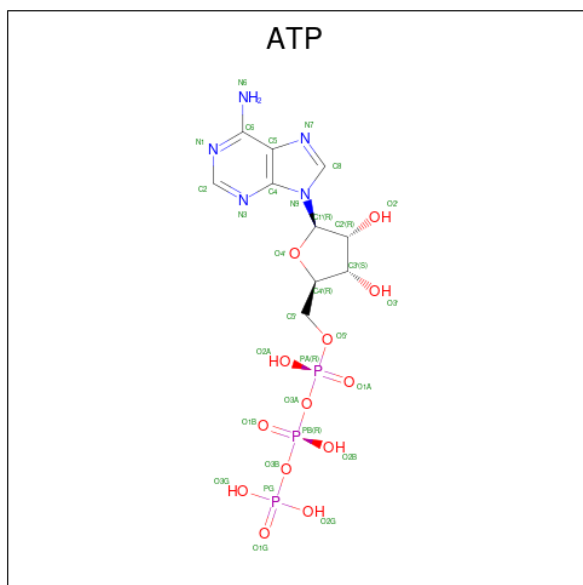
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 31	C 10	N 5	O 13	P 3	0	0

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total 1	Ca 1	0	0

- Molecule 5 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).
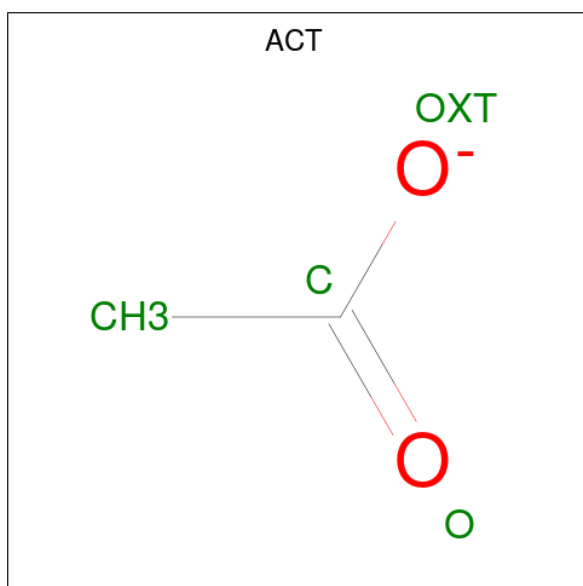
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 4	C 2	O 2	0	0
5	B	1	Total 4	C 2	O 2	0	0

- Molecule 6 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: $C_{10}H_{14}N_5O_7P$).
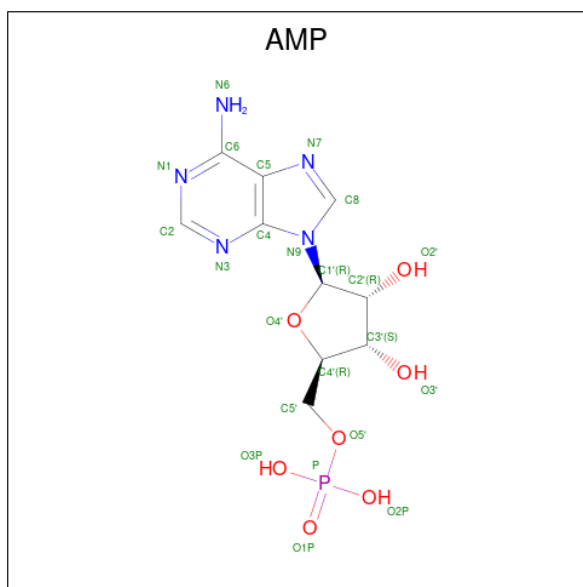
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	B	1	Total 23	C 10	N 5	O 7	P 1	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	70	Total 70	O 70	0	0
7	B	60	Total 60	O 60	0	0

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: 7,8-dihydro-6-hydroxymethylpterin pyrophosphokinase-dihydropteroate synthase
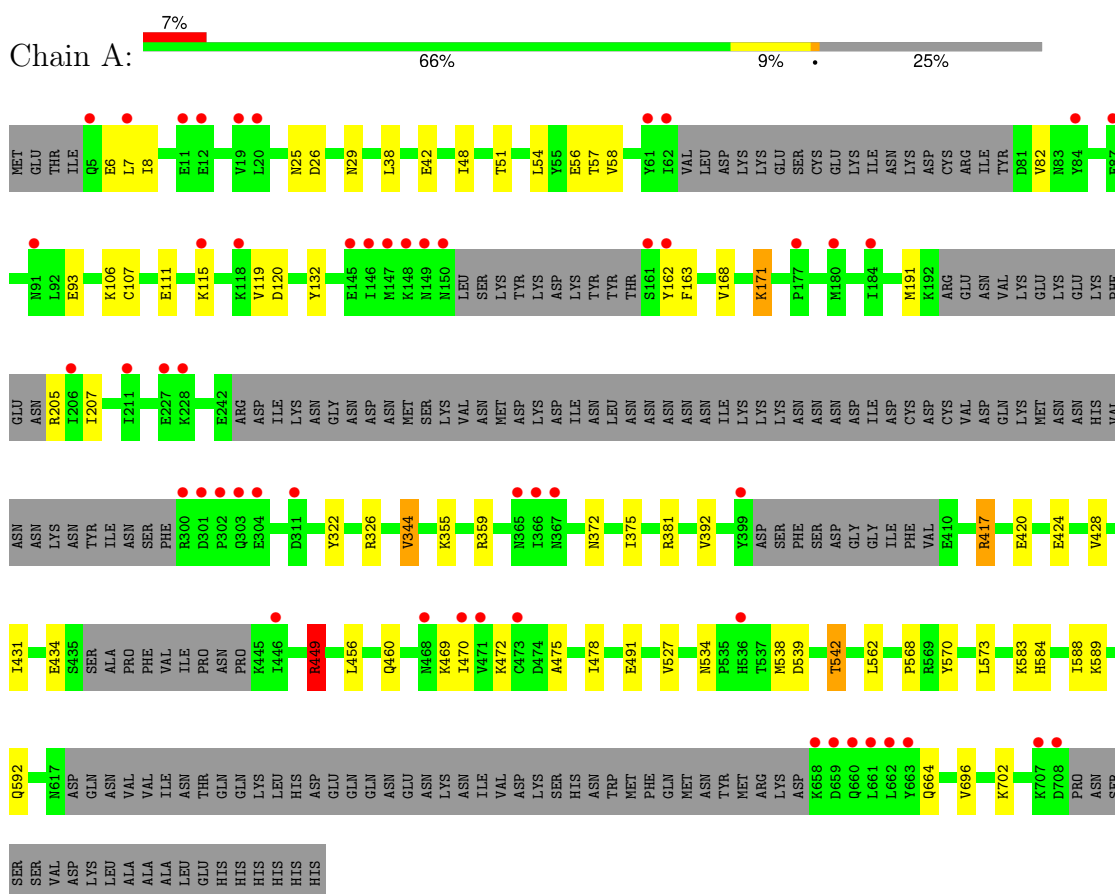
• Molecule 1: 7,8-dihydro-6-hydroxymethylpterin pyrophosphokinase-dihydropteroate synthase
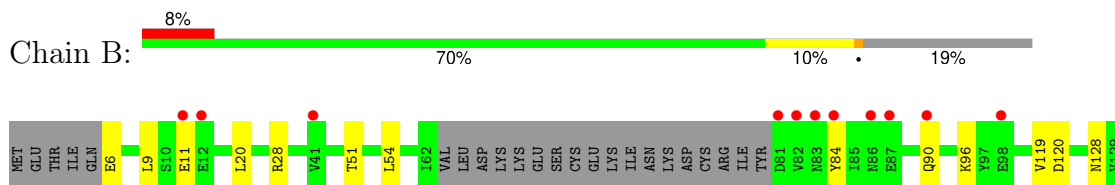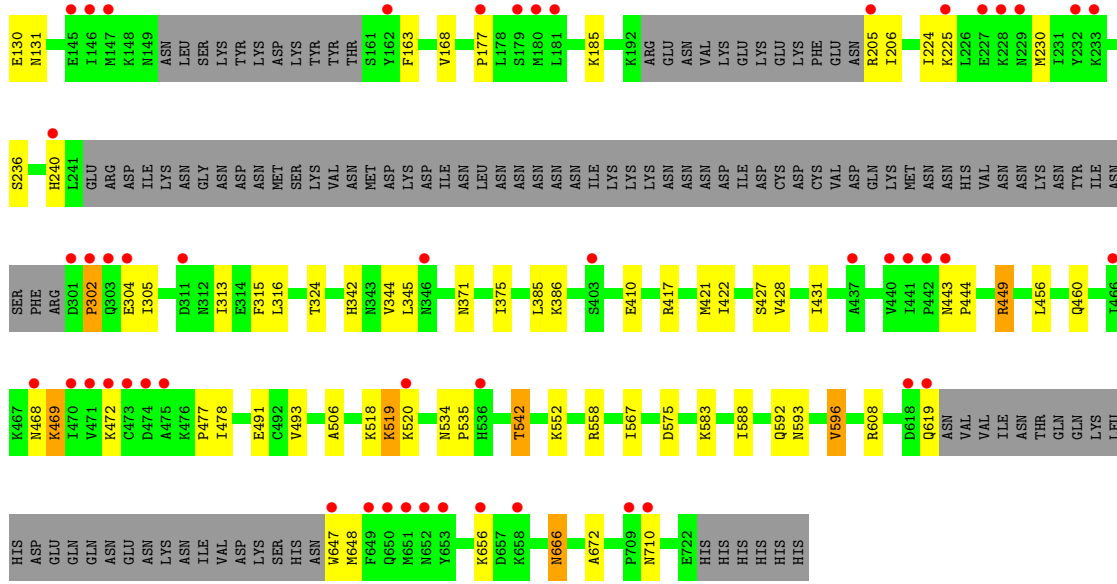
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	101.17Å 137.22Å 139.28Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.50 25.81 – 2.50	Depositor EDS
% Data completeness (in resolution range)	97.1 (30.00-2.50) 97.2 (25.81-2.50)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.49 (at 2.50Å)	Xtriage
Refinement program	REFMAC 5.8.0103	Depositor
R, R_{free}	0.205 , 0.257 0.199 , 0.249	Depositor DCC
R_{free} test set	6644 reflections (10.12%)	wwPDB-VP
Wilson B-factor (Å^2)	45.2	Xtriage
Anisotropy	0.783	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 50.5	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.013 for -h,l,k	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	9605	wwPDB-VP
Average B, all atoms (Å^2)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% 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: MG, CA, AMP, ATP, ACT

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	0.53	0/4613	0.73	2/6217 (0.0%)
1	B	0.52	0/4948	0.71	2/6677 (0.0%)
All	All	0.52	0/9561	0.72	4/12894 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	562	LEU	CA-CB-CG	6.33	129.87	115.30
1	A	449	ARG	NE-CZ-NH2	-6.01	117.30	120.30
1	B	421	MET	CG-SD-CE	-5.22	91.85	100.20
1	B	575	ASP	CB-CG-OD1	5.12	122.91	118.30

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4544	0	4645	37	0
1	B	4866	0	4950	38	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	31	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	1	0	0	0	0
5	A	4	0	3	0	0
5	B	4	0	3	0	0
6	B	23	0	12	0	0
7	A	70	0	0	0	0
7	B	60	0	0	0	0
All	All	9605	0	9625	73	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 4.

All (73) 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:443:ASN:HB3	1:B:444:PRO:HD3	1.58	0.84
1:A:449:ARG:HH11	1:A:449:ARG:HG3	1.49	0.77
1:A:51:THR:HG22	1:A:168:VAL:HG12	1.67	0.74
1:B:608:ARG:HA	1:B:666:ASN:ND2	2.01	0.74
1:B:449:ARG:HH11	1:B:449:ARG:HG3	1.53	0.74
1:B:608:ARG:HA	1:B:666:ASN:HD21	1.57	0.68
1:B:51:THR:HG22	1:B:168:VAL:HG12	1.81	0.62
1:B:552:LYS:HD2	1:B:596:VAL:HG13	1.82	0.60
1:B:177:PRO:HB2	1:B:316:LEU:HD21	1.84	0.59
1:A:107:CYS:SG	1:A:171:LYS:NZ	2.75	0.57
1:A:584:HIS:O	1:A:588:ILE:HD12	2.04	0.57
1:A:111:GLU:O	1:A:115:LYS:HG2	2.05	0.57
1:A:42:GLU:HG2	1:A:48:ILE:HG13	1.87	0.57
1:A:469:LYS:HB3	1:A:472:LYS:HG2	1.89	0.54
1:A:449:ARG:NE	1:A:491:GLU:OE1	2.40	0.54
1:A:58:VAL:HG22	1:A:162:TYR:CE1	2.43	0.53
1:A:417:ARG:O	1:A:417:ARG:HD2	2.09	0.53
1:A:542:THR:HG21	1:A:583:LYS:HE2	1.92	0.52
1:B:54:LEU:HB3	1:B:375:ILE:HB	1.92	0.52
1:B:534:ASN:HB2	1:B:535:PRO:CD	2.41	0.51
1:B:302:PRO:HA	1:B:305:ILE:HD12	1.93	0.51
1:B:344:VAL:HG12	1:B:345:LEU:HD23	1.92	0.51
1:A:449:ARG:HH11	1:A:449:ARG:CG	2.19	0.51
1:B:449:ARG:HD3	1:B:491:GLU:OE1	2.10	0.51
1:B:443:ASN:HB3	1:B:444:PRO:CD	2.35	0.50
1:A:58:VAL:HG22	1:A:162:TYR:HE1	1.77	0.50
1:A:191:MET:HE1	1:A:207:ILE:HG12	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:428:VAL:HG22	1:A:478:ILE:HB	1.94	0.50
1:B:542:THR:HG21	1:B:583:LYS:HE2	1.94	0.50
1:A:355:LYS:O	1:A:359:ARG:HB2	2.13	0.49
1:B:324:THR:HG21	1:B:345:LEU:HD22	1.95	0.49
1:B:342:HIS:HB3	1:B:345:LEU:HG	1.95	0.49
1:B:518:LYS:HD2	1:B:567:ILE:HD13	1.95	0.48
1:B:469:LYS:H	1:B:469:LYS:HD2	1.78	0.48
1:A:534:ASN:O	1:A:538:MET:HB2	2.13	0.48
1:B:449:ARG:CD	1:B:491:GLU:OE1	2.62	0.48
1:B:431:ILE:HG21	1:B:456:LEU:HD21	1.95	0.47
1:A:119:VAL:HG12	1:A:120:ASP:H	1.79	0.47
1:B:128:ASN:HD21	1:B:131:ASN:HD22	1.61	0.47
1:A:54:LEU:HB3	1:A:375:ILE:HB	1.96	0.46
1:B:119:VAL:HG12	1:B:120:ASP:H	1.79	0.46
1:A:26:ASP:OD2	1:A:29:ASN:HB2	2.16	0.46
1:A:392:VAL:HG22	1:A:428:VAL:HB	1.97	0.46
1:B:385:LEU:HG	1:B:386:LYS:HG2	1.98	0.46
1:A:132:TYR:CD2	1:A:344:VAL:HG21	2.52	0.45
1:A:664:GLN:HE22	1:B:648:MET:HG3	1.82	0.45
1:A:449:ARG:HE	1:A:491:GLU:CD	2.18	0.44
1:B:534:ASN:HB2	1:B:535:PRO:HD2	1.99	0.44
1:B:20:LEU:HB2	1:B:168:VAL:CG2	2.48	0.43
1:B:96:LYS:HG2	1:B:240:HIS:CD2	2.52	0.43
1:B:593:ASN:O	1:B:596:VAL:HB	2.18	0.43
1:A:56:GLU:O	1:A:372:ASN:HA	2.19	0.43
1:B:185:LYS:HG3	1:B:313:ILE:HD11	2.00	0.43
1:B:519:LYS:HB3	1:B:520:LYS:H	1.70	0.43
1:A:472:LYS:HB2	1:A:475:ALA:HB3	2.00	0.43
1:B:506:ALA:HB1	1:B:558:ARG:HG3	2.00	0.43
1:A:420:GLU:HG2	1:A:424:GLU:OE2	2.19	0.43
1:A:696:VAL:HA	1:B:672:ALA:HB2	2.00	0.43
1:B:20:LEU:HB2	1:B:168:VAL:HG22	2.01	0.43
1:A:431:ILE:HG21	1:A:456:LEU:HD21	2.01	0.42
1:A:588:ILE:O	1:A:592:GLN:HG3	2.19	0.42
1:B:224:ILE:HD12	1:B:315:PHE:HA	2.00	0.42
1:A:568:PRO:HB3	1:A:570:TYR:CE2	2.54	0.42
1:A:107:CYS:SG	1:A:171:LYS:HE3	2.60	0.42
1:A:38:LEU:CD2	1:A:168:VAL:HG11	2.50	0.42
1:A:322:TYR:HB3	1:A:326:ARG:HG3	2.02	0.42
1:A:542:THR:HG21	1:A:583:LYS:HG2	2.02	0.41
1:B:588:ILE:O	1:B:592:GLN:HG3	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:449:ARG:HG3	1:A:449:ARG:NH1	2.24	0.41
1:B:422:ILE:HG12	1:B:477:PRO:HG3	2.03	0.41
1:A:527:VAL:HG22	1:A:573:LEU:HD12	2.03	0.41
1:B:119:VAL:HG12	1:B:120:ASP:N	2.35	0.40
1:B:428:VAL:HG22	1:B:478:ILE:HB	2.04	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	532/728 (73%)	510 (96%)	21 (4%)	1 (0%)	47	68
1	B	578/728 (79%)	552 (96%)	25 (4%)	1 (0%)	47	68
All	All	1110/1456 (76%)	1062 (96%)	46 (4%)	2 (0%)	47	68

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	6	GLU
1	B	302	PRO

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	523/696 (75%)	502 (96%)	21 (4%)	31	56
1	B	559/696 (80%)	527 (94%)	32 (6%)	20	39
All	All	1082/1392 (78%)	1029 (95%)	53 (5%)	25	47

All (53) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	LEU
1	A	8	ILE
1	A	25	ASN
1	A	57	THR
1	A	82	VAL
1	A	93	GLU
1	A	106	LYS
1	A	163	PHE
1	A	171	LYS
1	A	205	ARG
1	A	344	VAL
1	A	381	ARG
1	A	417	ARG
1	A	434	GLU
1	A	449	ARG
1	A	460	GLN
1	A	470	ILE
1	A	539	ASP
1	A	542	THR
1	A	589	LYS
1	A	702	LYS
1	B	6	GLU
1	B	9	LEU
1	B	11	GLU
1	B	28	ARG
1	B	84	TYR
1	B	90	GLN
1	B	130	GLU
1	B	163	PHE
1	B	205	ARG
1	B	206	ILE
1	B	225	LYS
1	B	230	MET
1	B	236	SER
1	B	304	GLU

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Mol	Chain	Res	Type
1	B	371	ASN
1	B	410	GLU
1	B	417	ARG
1	B	427	SER
1	B	449	ARG
1	B	460	GLN
1	B	468	ASN
1	B	469	LYS
1	B	472	LYS
1	B	493	VAL
1	B	519	LYS
1	B	542	THR
1	B	596	VAL
1	B	619	GLN
1	B	647	TRP
1	B	656	LYS
1	B	666	ASN
1	B	710	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	21	ASN
1	A	25	ASN
1	A	29	ASN
1	A	100	ASN
1	A	116	ASN
1	A	165	ASN
1	A	347	ASN
1	A	363	GLN
1	A	416	GLN
1	A	664	GLN
1	B	39	HIS
1	B	100	ASN
1	B	131	ASN
1	B	137	ASN
1	B	240	HIS
1	B	666	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 ⓘ

Of 7 ligands modelled in this entry, 3 are monoatomic - leaving 4 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	#$|Z| > 2$
6	AMP	B	801	2	21,25,25	0.95	1 (4%)	23,38,38	1.47	2 (8%)
5	ACT	A	804	-	3,3,3	0.67	0	3,3,3	1.33	0
5	ACT	B	803	-	3,3,3	0.69	0	3,3,3	0.97	0
3	ATP	A	802	2	28,33,33	1.33	5 (17%)	34,52,52	1.30	3 (8%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	AMP	B	801	2	-	0/6/26/26	0/3/3/3
3	ATP	A	802	2	-	4/18/38/38	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	802	ATP	PB-O3A	3.68	1.63	1.59
3	A	802	ATP	PA-O3A	2.95	1.62	1.59
3	A	802	ATP	PB-O3B	2.79	1.62	1.59
6	B	801	AMP	C2-N3	2.27	1.35	1.32
3	A	802	ATP	O4'-C1'	2.14	1.43	1.40
3	A	802	ATP	C2-N3	2.01	1.35	1.32

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	B	801	AMP	N3-C2-N1	-3.96	123.30	128.67
3	A	802	ATP	N3-C2-N1	-3.92	123.35	128.67
6	B	801	AMP	C4'-O4'-C1'	-3.41	106.80	109.92
3	A	802	ATP	C4'-O4'-C1'	-3.34	106.86	109.92
3	A	802	ATP	O4'-C1'-N9	2.26	111.75	108.75

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	802	ATP	C5'-O5'-PA-O1A
3	A	802	ATP	C5'-O5'-PA-O3A
3	A	802	ATP	PB-O3A-PA-O5'
3	A	802	ATP	C5'-O5'-PA-O2A

There are no ring outliers.

No monomer is involved in short contacts.

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 AMP B 801

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP A 802

Bond lengths

Bond angles

Torsions

Rings
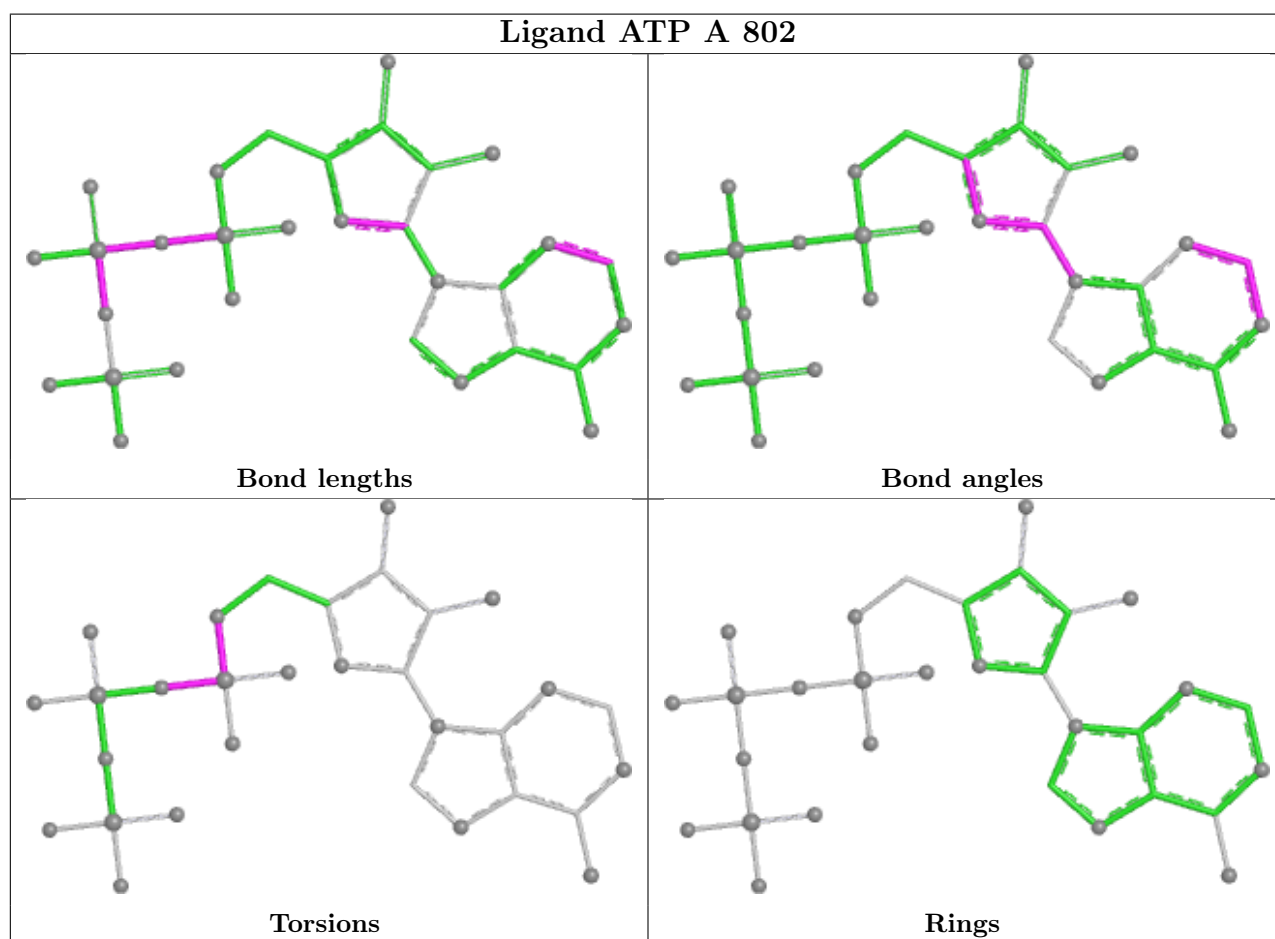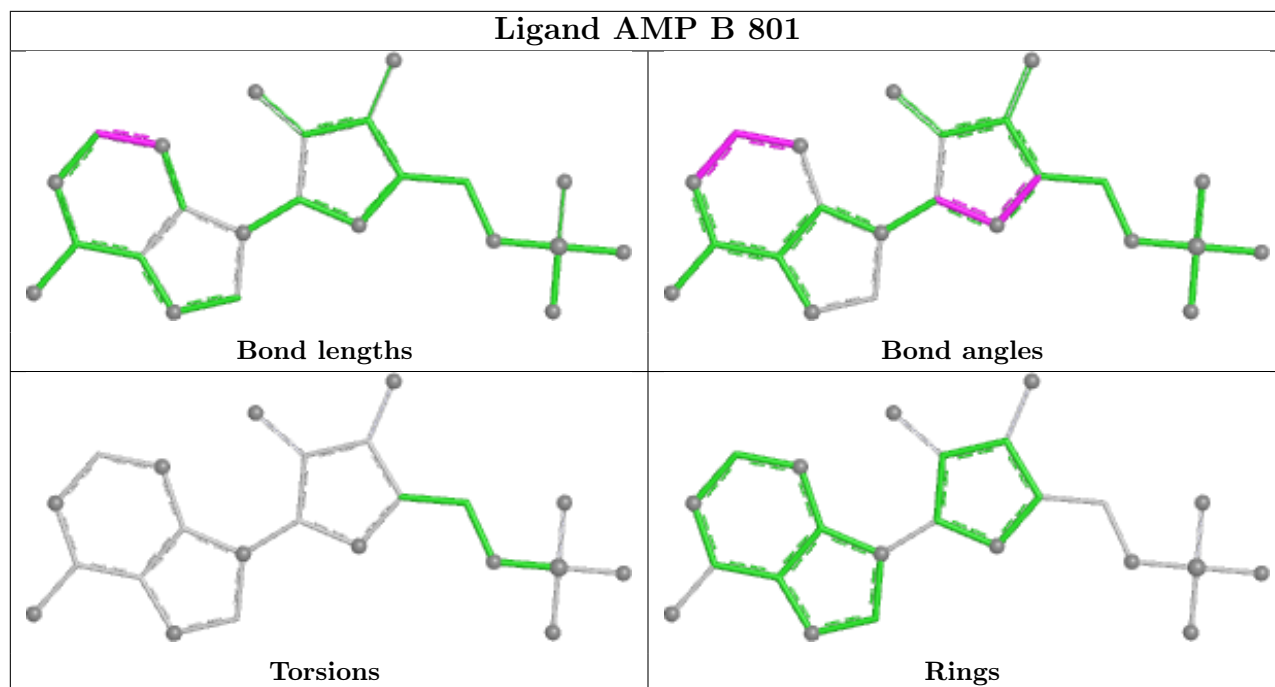
5.7 Other polymers (i)

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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å²)	Q<0.9
1	A	548/728 (75%)	0.33	52 (9%)	8	8	28, 52, 119, 120	0
1	B	590/728 (81%)	0.36	61 (10%)	6	6	27, 59, 118, 120	0
All	All	1138/1456 (78%)	0.35	113 (9%)	7	7	27, 56, 119, 120	0

All (113) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	470	ILE	8.6
1	A	471	VAL	7.8
1	A	150	ASN	7.8
1	B	470	ILE	7.3
1	A	147	MET	6.5
1	B	471	VAL	6.4
1	B	473	CYS	5.9
1	A	468	ASN	5.8
1	B	466	ILE	5.7
1	A	61	TYR	5.6
1	A	708	ASP	5.5
1	A	84	TYR	5.5
1	A	473	CYS	5.4
1	B	225	LYS	5.0
1	A	115	LYS	4.9
1	A	446	ILE	4.9
1	A	146	ILE	4.7
1	A	302	PRO	4.7
1	B	653	TYR	4.6
1	B	11	GLU	4.5
1	B	301	ASP	4.2
1	B	651	MET	4.2
1	A	11	GLU	4.2
1	B	180	MET	4.2

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Mol	Chain	Res	Type	RSRZ
1	A	148	LYS	4.0
1	A	161	SER	4.0
1	A	399	TYR	4.0
1	B	709	PRO	3.9
1	B	304	GLU	3.9
1	B	468	ASN	3.9
1	A	303	GLN	3.9
1	B	229	ASN	3.9
1	A	62	ILE	3.8
1	B	440	VAL	3.8
1	B	147	MET	3.8
1	A	228	LYS	3.8
1	A	663	TYR	3.7
1	B	303	GLN	3.7
1	B	619	GLN	3.6
1	A	162	TYR	3.6
1	B	12	GLU	3.5
1	B	87	GLU	3.5
1	B	83	ASN	3.4
1	B	181	LEU	3.4
1	B	649	PHE	3.4
1	A	707	LYS	3.4
1	B	647	TRP	3.4
1	B	90	GLN	3.4
1	B	403	SER	3.3
1	B	82	VAL	3.3
1	B	98	GLU	3.3
1	A	145	GLU	3.3
1	B	177	PRO	3.3
1	A	311	ASP	3.2
1	B	443	ASN	3.2
1	B	205	ARG	3.2
1	A	7	LEU	3.1
1	B	228	LYS	3.1
1	A	301	ASP	3.1
1	B	311	ASP	3.1
1	B	474	ASP	2.9
1	B	652	ASN	2.9
1	A	177	PRO	2.9
1	B	346	ASN	2.8
1	B	658	LYS	2.8
1	B	618	ASP	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	20	LEU	2.8
1	B	475	ALA	2.7
1	B	441	ILE	2.7
1	A	149	ASN	2.7
1	A	367	ASN	2.7
1	B	233	LYS	2.6
1	A	365	ASN	2.6
1	B	146	ILE	2.6
1	A	662	LEU	2.5
1	A	184	ILE	2.5
1	A	206	ILE	2.5
1	A	366	ILE	2.5
1	A	660	GLN	2.5
1	B	162	TYR	2.5
1	B	656	LYS	2.5
1	B	472	LYS	2.5
1	B	710	ASN	2.4
1	B	650	GLN	2.4
1	B	84	TYR	2.4
1	B	145	GLU	2.4
1	B	240	HIS	2.4
1	B	86	ASN	2.4
1	B	227	GLU	2.4
1	A	658	LYS	2.3
1	A	87	GLU	2.3
1	A	227	GLU	2.3
1	A	536	HIS	2.3
1	A	300	ARG	2.3
1	A	659	ASP	2.3
1	A	211	ILE	2.2
1	B	437	ALA	2.2
1	A	19	VAL	2.2
1	A	180	MET	2.2
1	B	179	SER	2.2
1	A	91	ASN	2.1
1	B	232	TYR	2.1
1	B	520	LYS	2.1
1	B	536	HIS	2.1
1	A	12	GLU	2.1
1	B	302	PRO	2.1
1	A	5	GLN	2.1
1	A	304	GLU	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	118	LYS	2.1
1	B	41	VAL	2.1
1	B	81	ASP	2.1
1	A	661	LEU	2.0
1	B	442	PRO	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)

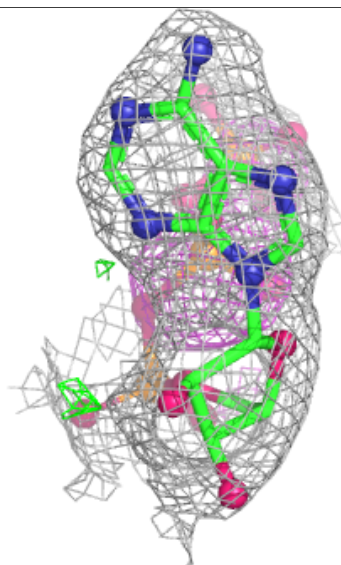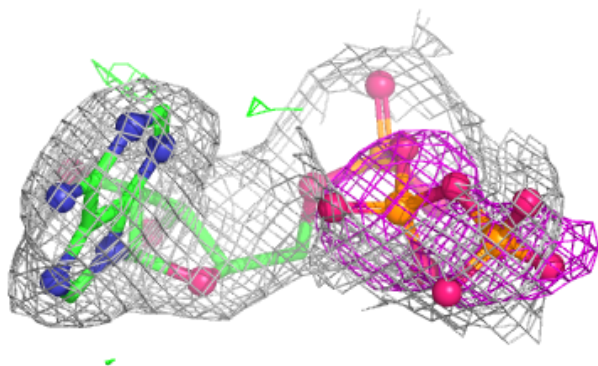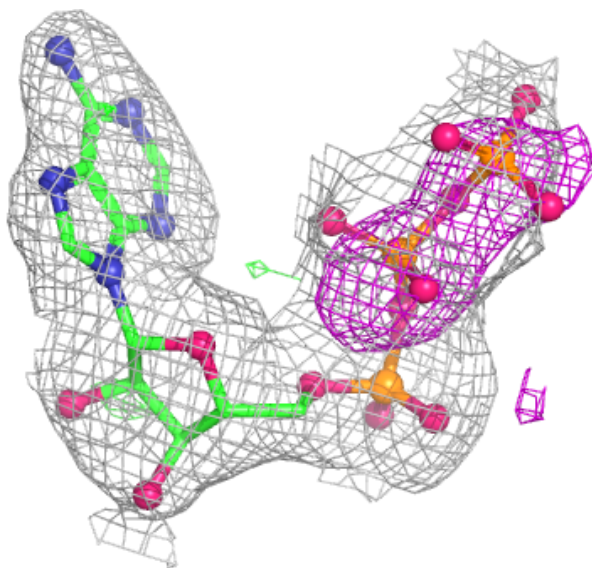There are no monosaccharides in this entry.

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.
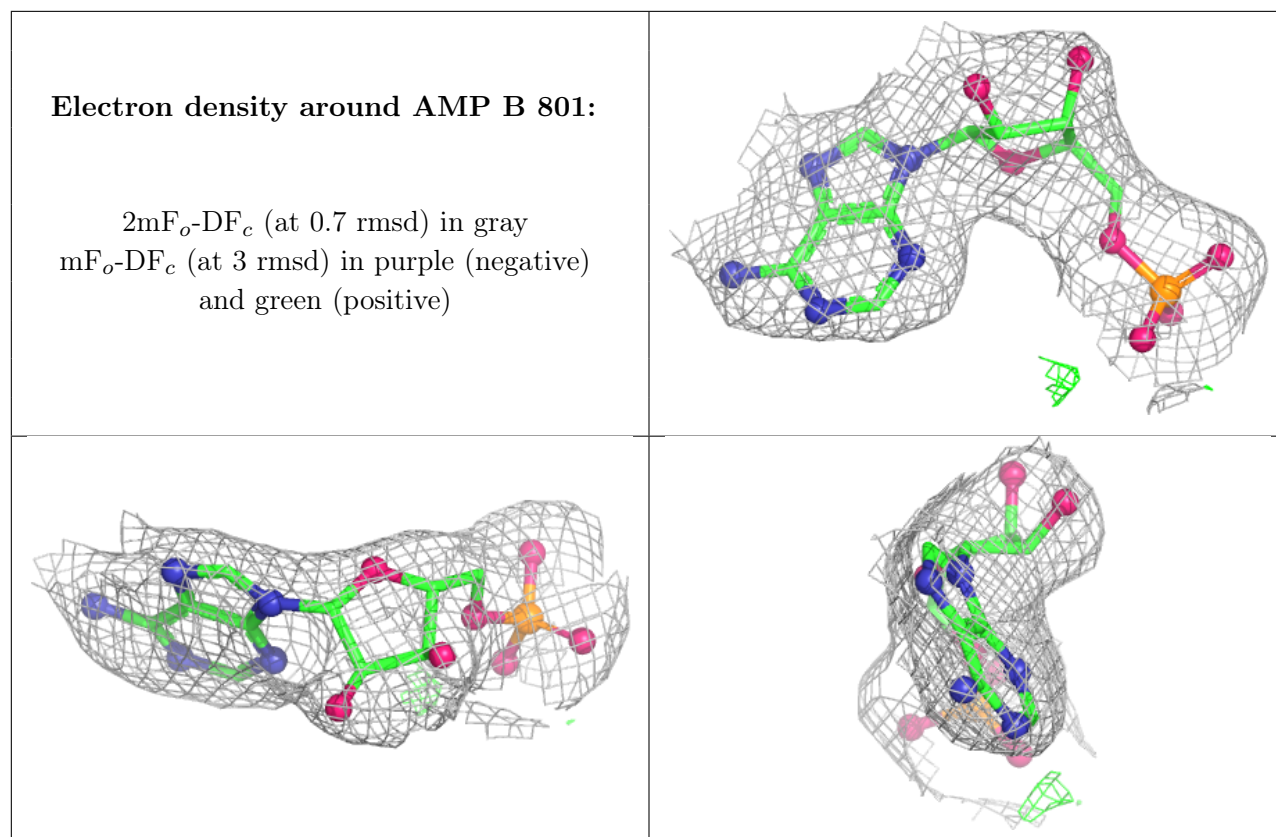
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	MG	B	802	1/1	0.69	0.13	64,64,64,64	0
3	ATP	A	802	31/31	0.87	0.17	59,91,120,120	0
2	MG	A	801	1/1	0.90	0.07	67,67,67,67	0
6	AMP	B	801	23/23	0.91	0.12	60,77,107,110	0
4	CA	A	803	1/1	0.94	0.13	63,63,63,63	0
5	ACT	A	804	4/4	0.95	0.19	38,41,44,48	0
5	ACT	B	803	4/4	0.97	0.14	33,37,37,39	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 ATP A 802:

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

Electron density around AMP B 801:

$2mF_o\text{-}DF_c$ (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.