Full wwPDB X-ray Structure Validation Report ⓘ

Jul 6, 2023 – 12:24 PM JST

PDB ID	:	7Y77
Title	:	Crystal structure of rice NAL1
Authors	:	Yan, J.J.; Guan, Z.Y.; Yin, P.; Xiong, L.Z.
Deposited on	:	2022-06-21
Resolution	:	2.60 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

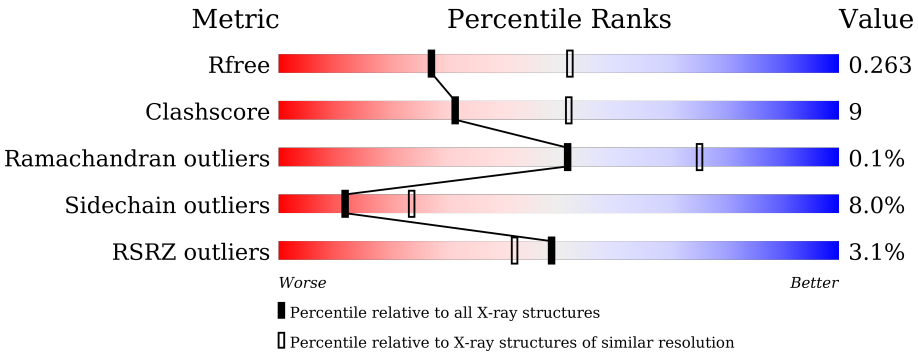
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.34
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.34

1 Overall quality at a glance (i)

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

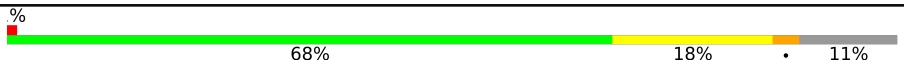
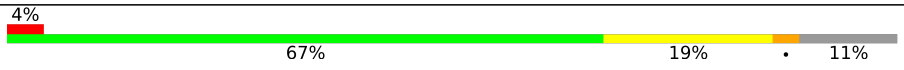
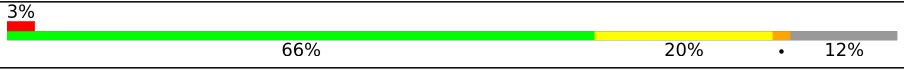
The reported resolution of this entry is 2.60 Å.

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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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	435	
1	B	435	
1	C	435	

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 9030 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 Protein NARROW LEAF 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	388	Total	C	N	O	S	0	0	0
			2988	1895	522	565	6			
1	B	386	Total	C	N	O	S	0	0	0
			2978	1890	519	563	6			
1	C	382	Total	C	N	O	S	0	0	0
			2945	1866	514	559	6			

There are 108 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	31	MET	-	initiating methionine	UNP B4XT64
A	32	GLY	-	expression tag	UNP B4XT64
A	33	SER	-	expression tag	UNP B4XT64
A	34	SER	-	expression tag	UNP B4XT64
A	35	HIS	-	expression tag	UNP B4XT64
A	36	HIS	-	expression tag	UNP B4XT64
A	37	HIS	-	expression tag	UNP B4XT64
A	38	HIS	-	expression tag	UNP B4XT64
A	39	HIS	-	expression tag	UNP B4XT64
A	40	HIS	-	expression tag	UNP B4XT64
A	41	SER	-	expression tag	UNP B4XT64
A	42	SER	-	expression tag	UNP B4XT64
A	43	GLY	-	expression tag	UNP B4XT64
A	44	LEU	-	expression tag	UNP B4XT64
A	45	VAL	-	expression tag	UNP B4XT64
A	46	PRO	-	expression tag	UNP B4XT64
A	47	ARG	-	expression tag	UNP B4XT64
A	48	GLY	-	expression tag	UNP B4XT64
A	49	SER	-	expression tag	UNP B4XT64
A	50	HIS	-	expression tag	UNP B4XT64
A	51	SER	-	expression tag	UNP B4XT64
A	52	ASP	-	expression tag	UNP B4XT64
A	53	GLU	-	expression tag	UNP B4XT64

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Chain	Residue	Modelled	Actual	Comment	Reference
A	54	VAL	-	expression tag	UNP B4XT64
A	55	ASP	-	expression tag	UNP B4XT64
A	56	ALA	-	expression tag	UNP B4XT64
A	57	HIS	-	expression tag	UNP B4XT64
A	58	MET	-	expression tag	UNP B4XT64
A	61	SER	CYS	engineered mutation	UNP B4XT64
A	193	SER	CYS	engineered mutation	UNP B4XT64
A	198	SER	CYS	engineered mutation	UNP B4XT64
A	326	SER	CYS	engineered mutation	UNP B4XT64
A	337	SER	CYS	engineered mutation	UNP B4XT64
A	364	SER	CYS	engineered mutation	UNP B4XT64
A	470	ARG	-	expression tag	UNP B4XT64
A	471	PHE	-	expression tag	UNP B4XT64
B	31	MET	-	initiating methionine	UNP B4XT64
B	32	GLY	-	expression tag	UNP B4XT64
B	33	SER	-	expression tag	UNP B4XT64
B	34	SER	-	expression tag	UNP B4XT64
B	35	HIS	-	expression tag	UNP B4XT64
B	36	HIS	-	expression tag	UNP B4XT64
B	37	HIS	-	expression tag	UNP B4XT64
B	38	HIS	-	expression tag	UNP B4XT64
B	39	HIS	-	expression tag	UNP B4XT64
B	40	HIS	-	expression tag	UNP B4XT64
B	41	SER	-	expression tag	UNP B4XT64
B	42	SER	-	expression tag	UNP B4XT64
B	43	GLY	-	expression tag	UNP B4XT64
B	44	LEU	-	expression tag	UNP B4XT64
B	45	VAL	-	expression tag	UNP B4XT64
B	46	PRO	-	expression tag	UNP B4XT64
B	47	ARG	-	expression tag	UNP B4XT64
B	48	GLY	-	expression tag	UNP B4XT64
B	49	SER	-	expression tag	UNP B4XT64
B	50	HIS	-	expression tag	UNP B4XT64
B	51	SER	-	expression tag	UNP B4XT64
B	52	ASP	-	expression tag	UNP B4XT64
B	53	GLU	-	expression tag	UNP B4XT64
B	54	VAL	-	expression tag	UNP B4XT64
B	55	ASP	-	expression tag	UNP B4XT64
B	56	ALA	-	expression tag	UNP B4XT64
B	57	HIS	-	expression tag	UNP B4XT64
B	58	MET	-	expression tag	UNP B4XT64
B	61	SER	CYS	engineered mutation	UNP B4XT64

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Chain	Residue	Modelled	Actual	Comment	Reference
B	193	SER	CYS	engineered mutation	UNP B4XT64
B	198	SER	CYS	engineered mutation	UNP B4XT64
B	326	SER	CYS	engineered mutation	UNP B4XT64
B	337	SER	CYS	engineered mutation	UNP B4XT64
B	364	SER	CYS	engineered mutation	UNP B4XT64
B	464	ARG	-	expression tag	UNP B4XT64
B	465	PHE	-	expression tag	UNP B4XT64
C	31	MET	-	initiating methionine	UNP B4XT64
C	32	GLY	-	expression tag	UNP B4XT64
C	33	SER	-	expression tag	UNP B4XT64
C	34	SER	-	expression tag	UNP B4XT64
C	35	HIS	-	expression tag	UNP B4XT64
C	36	HIS	-	expression tag	UNP B4XT64
C	37	HIS	-	expression tag	UNP B4XT64
C	38	HIS	-	expression tag	UNP B4XT64
C	39	HIS	-	expression tag	UNP B4XT64
C	40	HIS	-	expression tag	UNP B4XT64
C	41	SER	-	expression tag	UNP B4XT64
C	42	SER	-	expression tag	UNP B4XT64
C	43	GLY	-	expression tag	UNP B4XT64
C	44	LEU	-	expression tag	UNP B4XT64
C	45	VAL	-	expression tag	UNP B4XT64
C	46	PRO	-	expression tag	UNP B4XT64
C	47	ARG	-	expression tag	UNP B4XT64
C	48	GLY	-	expression tag	UNP B4XT64
C	49	SER	-	expression tag	UNP B4XT64
C	50	HIS	-	expression tag	UNP B4XT64
C	51	SER	-	expression tag	UNP B4XT64
C	52	ASP	-	expression tag	UNP B4XT64
C	53	GLU	-	expression tag	UNP B4XT64
C	54	VAL	-	expression tag	UNP B4XT64
C	55	ASP	-	expression tag	UNP B4XT64
C	56	ALA	-	expression tag	UNP B4XT64
C	57	HIS	-	expression tag	UNP B4XT64
C	58	MET	-	expression tag	UNP B4XT64
C	61	SER	CYS	engineered mutation	UNP B4XT64
C	193	SER	CYS	engineered mutation	UNP B4XT64
C	198	SER	CYS	engineered mutation	UNP B4XT64
C	326	SER	CYS	engineered mutation	UNP B4XT64
C	337	SER	CYS	engineered mutation	UNP B4XT64
C	364	SER	CYS	engineered mutation	UNP B4XT64
C	464	ARG	-	expression tag	UNP B4XT64

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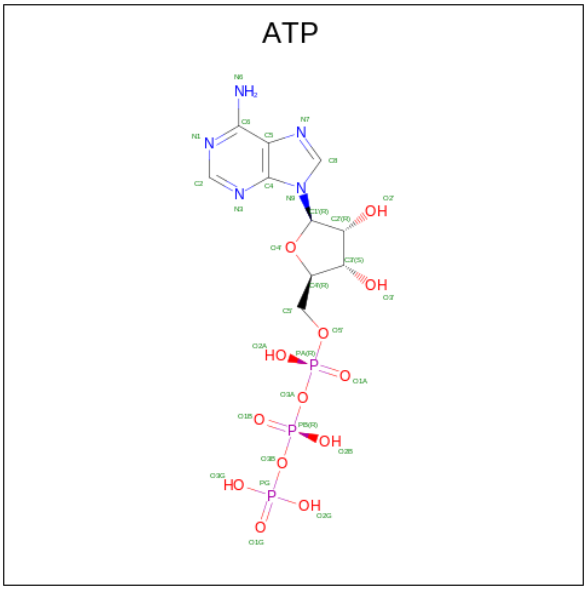
Chain	Residue	Modelled	Actual	Comment	Reference
C	465	PHE	-	expression tag	UNP B4XT64

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 3 is water.

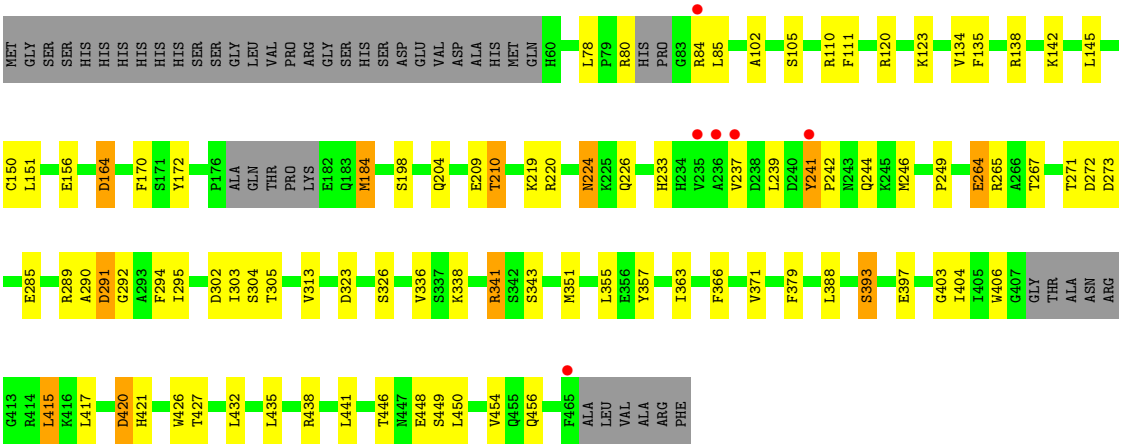
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	7	Total	O	0	0
			7	7		
3	B	11	Total	O	0	0
			11	11		
3	C	8	Total	O	0	0
			8	8		

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.

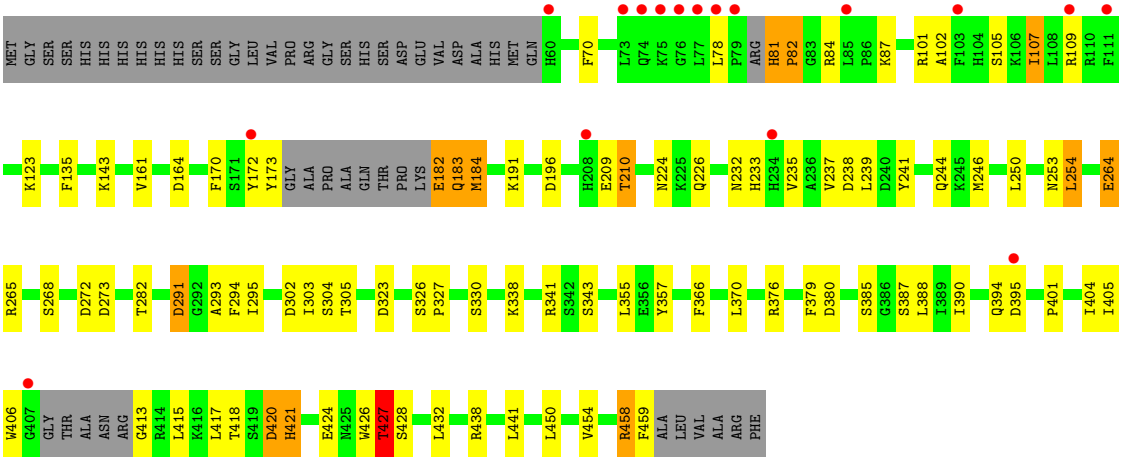
• Molecule 1: Protein NARROW LEAF 1

Chain A:



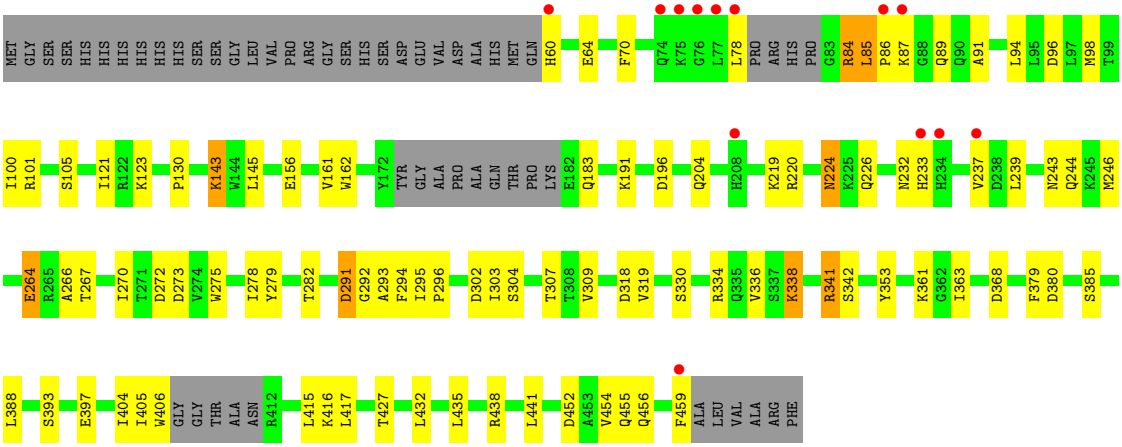
• Molecule 1: Protein NARROW LEAF 1

Chain B:



• Molecule 1: Protein NARROW LEAF 1

Chain C:


MET GLY SER SER HIS HIS HIS HIS HIS SER SER GLY LEU VAL PRO ARG GLY SER HIS SER ASP GLU VAL ASP ALA HIS MET GLN H60 E64 F70 Q74 K75 G76 L77 L78 PRO ARG HIS PRO G83 R84 L85 P86 K87 G88 Q89 Q90 A91 L94 L95 D96 L97 M98 T99
I100 R101 S105 I121 R122 K123 P130 K143 W144 L145 E156 V161 W162 Y172 TYR GLY ALA PRO ALA GLN THR PRO LYS E182 Q183 K191 D196 Q204 H208 K219 R220 N224 K225 Q226 N232 H233 H234 V237 D238 L239 N243 Q244 K245 M246
E264 R265 A266 T267 I270 T271 D272 D273 V274 W275 I278 Y279 T282 D291 G292 A293 F294 I295 P296 D302 I303 S304 T307 T308 V309 D318 V319 S330 R334 Q335 V336 S337 K338 R341 S342 Y353 K361 G362 I363 D368 F379 D380 S385
L388 S393 E397 I404 I405 W406 GLY GLY THR ALA ASN R412 L415 K416 L417 T427 L432 L435 R438 L441 D452 A453 V454 Q455 Q456 F459 ALA LEU VAL ALA ARG PHE

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	89.41Å 194.40Å 173.37Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.67 – 2.60 49.67 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.9 (49.67-2.60) 99.9 (49.67-2.60)	Depositor EDS
R_{merge}	0.02	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.73 (at 2.61Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.224 , 0.268 0.220 , 0.263	Depositor DCC
R_{free} test set	2279 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å^2)	66.5	Xtriage
Anisotropy	0.528	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.29 , 46.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	9030	wwPDB-VP
Average B, all atoms (Å^2)	81.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.25% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ATP

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	0.28	0/3049	0.51	0/4131
1	B	0.35	0/3040	0.60	2/4120 (0.0%)
1	C	0.32	0/3003	0.55	0/4067
All	All	0.32	0/9092	0.56	2/12318 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	427	THR	OG1-CB-CG2	5.54	122.73	110.00
1	B	254	LEU	CA-CB-CG	5.29	127.47	115.30

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	2988	0	2956	54	1
1	B	2978	0	2942	52	0
1	C	2945	0	2914	54	1
2	A	31	0	12	2	0
2	B	31	0	12	0	0
2	C	31	0	12	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	7	0	0	2	0
3	B	11	0	0	0	0
3	C	8	0	0	2	0
All	All	9030	0	8848	160	1

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 9.

All (160) 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:406:TRP:HE3	1:B:428:SER:HG	1.11	0.98
1:A:420:ASP:OD1	1:A:421:HIS:ND1	2.06	0.88
1:A:237:VAL:HA	1:A:244:GLN:HG2	1.60	0.84
1:C:237:VAL:HA	1:C:244:GLN:HG2	1.61	0.82
1:C:60:HIS:CE1	1:C:64:GLU:OE1	2.37	0.78
1:B:237:VAL:HA	1:B:244:GLN:HG2	1.64	0.78
1:A:291:ASP:HB2	1:A:406:TRP:CD1	2.21	0.76
1:A:291:ASP:HB2	1:A:406:TRP:HD1	1.50	0.73
1:A:204:GLN:OE1	1:A:341:ARG:NH1	2.24	0.70
1:A:110:ARG:O	3:A:601:HOH:O	2.07	0.70
2:C:501:ATP:O1G	3:C:601:HOH:O	2.08	0.70
1:B:184:MET:HG3	1:B:343:SER:HA	1.76	0.67
1:B:173:TYR:O	1:B:413:GLY:N	2.28	0.67
1:C:267:THR:HG21	1:C:438:ARG:HG3	1.77	0.67
1:B:253:ASN:OD1	1:B:254:LEU:HD12	1.95	0.66
1:B:82:PRO:HD2	1:B:84:ARG:HB2	1.78	0.65
1:A:246:MET:HG3	1:A:295:ILE:HG12	1.78	0.65
1:B:380:ASP:OD2	1:B:427:THR:OG1	2.15	0.64
1:B:418:THR:HG23	1:B:421:HIS:H	1.62	0.63
1:C:224:ASN:HB2	1:C:226:GLN:HG2	1.81	0.63
1:A:102:ALA:O	1:A:105:SER:OG	2.17	0.62
1:B:224:ASN:HB2	1:B:226:GLN:HG2	1.83	0.61
1:C:60:HIS:HE1	1:C:64:GLU:OE1	1.82	0.60
1:A:142:LYS:HE2	1:A:150:CYS:SG	2.42	0.60
1:C:204:GLN:HG3	1:C:341:ARG:HD2	1.83	0.59
1:C:303:ILE:HG21	1:C:454:VAL:HG21	1.83	0.59
1:C:121:ILE:O	3:C:601:HOH:O	2.17	0.59
1:B:294:PHE:HB2	1:B:441:LEU:HD11	1.84	0.59
1:C:96:ASP:O	1:C:100:ILE:HG13	2.03	0.59
1:B:232:ASN:ND2	1:B:235:VAL:H	2.01	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:305:THR:HG22	1:C:143:LYS:HD3	1.85	0.57
1:A:446:THR:HG23	1:A:449:SER:H	1.70	0.57
1:A:388:LEU:HD12	1:A:404:ILE:HG22	1.87	0.56
1:C:338:LYS:HD2	1:C:405:ILE:HD11	1.86	0.56
1:A:204:GLN:NE2	1:A:249:PRO:O	2.38	0.56
1:A:184:MET:HG3	1:A:343:SER:HA	1.87	0.56
1:A:450:LEU:O	1:A:454:VAL:HG23	2.06	0.56
1:B:323:ASP:HB3	1:B:326:SER:OG	2.04	0.56
1:A:267:THR:OG1	1:A:290:ALA:O	2.24	0.56
1:A:85:LEU:HD13	1:A:156:GLU:HG2	1.89	0.54
1:B:291:ASP:HB2	1:B:406:TRP:HD1	1.74	0.53
1:C:388:LEU:HD12	1:C:404:ILE:HG22	1.92	0.52
1:A:420:ASP:OD1	1:A:421:HIS:CE1	2.63	0.52
1:B:70:PHE:HE2	1:B:282:THR:HA	1.75	0.52
1:B:102:ALA:O	1:B:105:SER:OG	2.26	0.52
1:A:302:ASP:OD1	1:A:304:SER:OG	2.23	0.52
1:A:138:ARG:NH1	1:B:250:LEU:HD11	2.25	0.52
1:A:448:GLU:OE1	1:A:448:GLU:N	2.27	0.52
1:A:415:LEU:CD2	1:A:426:TRP:HB3	2.41	0.51
1:C:380:ASP:OD2	1:C:427:THR:OG1	2.26	0.51
1:C:379:PHE:HD2	1:C:427:THR:HG21	1.75	0.51
1:C:415:LEU:HD13	1:C:417:LEU:HG	1.92	0.50
1:C:294:PHE:HB2	1:C:441:LEU:HD11	1.94	0.50
1:A:393:SER:HB2	1:A:397:GLU:O	2.12	0.50
1:B:302:ASP:OD1	1:B:304:SER:OG	2.24	0.50
1:C:404:ILE:HG23	1:C:432:LEU:HD13	1.94	0.50
1:A:134:VAL:HG11	1:A:151:LEU:HD21	1.94	0.49
1:B:370:LEU:HD21	1:B:426:TRP:HB2	1.94	0.49
1:A:371:VAL:HB	1:A:427:THR:HG22	1.95	0.49
1:A:273:ASP:N	1:A:273:ASP:OD1	2.44	0.49
1:A:379:PHE:HD2	1:A:427:THR:HG21	1.77	0.49
1:C:70:PHE:HE2	1:C:282:THR:HA	1.77	0.49
1:C:302:ASP:OD1	1:C:304:SER:OG	2.23	0.49
1:B:246:MET:HG3	1:B:295:ILE:HG12	1.95	0.49
1:A:404:ILE:HG23	1:A:432:LEU:HD13	1.94	0.49
1:A:292:GLY:HA3	1:A:435:LEU:HD11	1.95	0.48
1:B:182:GLU:OE1	1:B:183:GLN:N	2.45	0.48
1:B:327:PRO:O	1:B:330:SER:OG	2.26	0.48
1:C:291:ASP:HB2	1:C:406:TRP:HD1	1.77	0.48
1:A:209:GLU:OE1	1:A:209:GLU:N	2.46	0.48
1:B:302:ASP:O	1:B:305:THR:OG1	2.31	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:450:LEU:O	1:B:454:VAL:HG23	2.14	0.48
1:B:388:LEU:HD12	1:B:404:ILE:HG22	1.94	0.48
1:C:438:ARG:O	1:C:438:ARG:HD3	2.14	0.48
1:A:241:TYR:HE1	1:A:244:GLN:HA	1.77	0.47
1:A:241:TYR:CE1	1:A:244:GLN:HG3	2.49	0.47
1:C:246:MET:HG3	1:C:295:ILE:HG12	1.96	0.47
1:B:191:LYS:HB3	1:B:196:ASP:HB2	1.97	0.47
1:A:241:TYR:HB2	1:A:242:PRO:HD2	1.97	0.47
1:B:379:PHE:HD2	1:B:427:THR:HG21	1.80	0.47
1:A:145:LEU:HD11	2:A:501:ATP:C4	2.50	0.47
1:C:84:ARG:HA	1:C:84:ARG:HD2	1.66	0.47
1:C:145:LEU:HD11	2:C:501:ATP:C4	2.50	0.46
1:C:338:LYS:HD2	1:C:405:ILE:CD1	2.46	0.46
1:B:209:GLU:N	1:B:209:GLU:OE1	2.49	0.46
1:C:233:HIS:ND1	1:C:266:ALA:HB1	2.30	0.46
1:C:78:LEU:HA	1:C:78:LEU:HD23	1.79	0.46
1:C:94:LEU:O	1:C:98:MET:HG3	2.16	0.46
1:C:270:ILE:HD11	1:C:438:ARG:CZ	2.46	0.45
1:A:110:ARG:HG2	1:A:111:PHE:CE2	2.51	0.45
1:A:323:ASP:HB3	1:A:326:SER:OG	2.16	0.45
1:B:233:HIS:HA	1:B:293:ALA:HB2	1.98	0.45
1:B:107:ILE:H	1:B:107:ILE:HG13	1.54	0.45
1:B:238:ASP:HB3	1:B:241:TYR:HE1	1.81	0.45
1:B:272:ASP:N	1:B:272:ASP:OD1	2.50	0.45
1:B:81:HIS:O	1:B:81:HIS:CG	2.70	0.45
1:B:415:LEU:HD13	1:B:417:LEU:HG	1.98	0.45
1:C:233:HIS:HA	1:C:293:ALA:HB2	1.98	0.45
1:C:452:ASP:O	1:C:456:GLN:HG2	2.17	0.44
1:A:135:PHE:HB3	1:A:170:PHE:HB3	1.98	0.44
1:A:233:HIS:CE1	1:A:237:VAL:HB	2.53	0.44
1:C:264:GLU:HG2	1:C:296:PRO:HG3	1.99	0.44
1:C:307:THR:OG1	1:C:309:VAL:HG12	2.17	0.44
1:B:264:GLU:HG3	1:B:265:ARG:HG2	1.98	0.44
1:C:291:ASP:HB2	1:C:406:TRP:CD1	2.52	0.44
1:B:135:PHE:HB3	1:B:170:PHE:HB3	2.00	0.44
1:C:338:LYS:HG2	1:C:379:PHE:CZ	2.53	0.44
1:C:318:ASP:OD1	1:C:319:VAL:N	2.48	0.44
1:A:294:PHE:HB2	1:A:441:LEU:HD11	1.99	0.44
1:C:330:SER:O	1:C:334:ARG:NH1	2.51	0.43
1:A:85:LEU:H	1:A:85:LEU:HD23	1.84	0.43
1:B:387:SER:HB2	1:B:405:ILE:HD12	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:156:GLU:HA	1:C:162:TRP:HA	1.99	0.43
1:B:172:TYR:CE2	1:B:357:TYR:HD1	2.37	0.43
1:A:355:LEU:O	1:A:366:PHE:HA	2.19	0.43
1:A:351:MET:CE	1:A:417:LEU:HD11	2.48	0.42
1:C:270:ILE:HG22	1:C:275:TRP:HB2	2.01	0.42
1:A:264:GLU:OE2	1:A:265:ARG:NE	2.47	0.42
1:B:303:ILE:HD12	1:B:304:SER:N	2.34	0.42
1:C:183:GLN:HE22	1:C:342:SER:HA	1.85	0.42
1:B:376:ARG:NH1	1:B:424:GLU:OE2	2.51	0.42
1:A:209:GLU:HG2	1:A:210:THR:HG22	2.02	0.42
1:C:270:ILE:HA	1:C:270:ILE:HD13	1.76	0.42
1:B:238:ASP:HB3	1:B:241:TYR:CE1	2.55	0.42
1:C:272:ASP:OD1	1:C:272:ASP:N	2.52	0.42
1:A:289:ARG:HD3	1:A:406:TRP:CZ2	2.55	0.42
1:A:403:GLY:HA2	1:A:432:LEU:HB2	2.01	0.42
1:C:70:PHE:CE2	1:C:282:THR:HA	2.54	0.42
1:A:241:TYR:HE1	1:A:244:GLN:HG3	1.85	0.42
1:B:233:HIS:HB3	1:B:291:ASP:OD1	2.20	0.42
1:B:404:ILE:HG23	1:B:432:LEU:HD13	2.02	0.42
1:B:420:ASP:HB2	1:B:421:HIS:ND1	2.35	0.42
1:C:191:LYS:HB3	1:C:196:ASP:HB2	2.00	0.42
1:C:270:ILE:HD11	1:C:438:ARG:NH1	2.35	0.42
1:A:120:ARG:NH1	1:A:164:ASP:OD2	2.53	0.41
1:A:272:ASP:OD1	1:A:272:ASP:N	2.51	0.41
1:A:80:ARG:CZ	1:A:80:ARG:HB2	2.50	0.41
1:C:393:SER:HB2	1:C:397:GLU:O	2.20	0.41
1:B:454:VAL:HG12	1:B:458:ARG:HE	1.86	0.41
1:C:397:GLU:H	1:C:397:GLU:CD	2.24	0.41
1:B:355:LEU:O	1:B:366:PHE:HA	2.20	0.41
1:C:70:PHE:CD2	1:C:282:THR:HG22	2.55	0.41
1:C:292:GLY:HA3	1:C:435:LEU:HD11	2.01	0.41
1:A:78:LEU:HD23	1:A:78:LEU:HA	1.83	0.41
1:A:172:TYR:CZ	1:A:357:TYR:HB2	2.56	0.41
1:B:390:ILE:HA	1:B:401:PRO:HA	2.02	0.41
1:B:232:ASN:HD21	1:B:235:VAL:H	1.68	0.41
1:B:70:PHE:CE2	1:B:282:THR:HA	2.55	0.40
1:B:388:LEU:HD12	1:B:388:LEU:HA	1.93	0.40
1:C:278:ILE:HD12	1:C:279:TYR:C	2.41	0.40
1:A:220:ARG:NH2	1:A:224:ASN:OD1	2.54	0.40
1:A:303:ILE:HG21	1:A:454:VAL:HG21	2.03	0.40
1:B:209:GLU:HG2	1:B:210:THR:N	2.37	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:85:LEU:HG	1:C:86:PRO:HD2	2.03	0.40
2:A:501:ATP:O1G	3:A:602:HOH:O	2.22	0.40
1:B:105:SER:O	1:B:109:ARG:HG3	2.20	0.40
1:C:91:ALA:O	1:C:130:PRO:HG2	2.21	0.40
1:B:380:ASP:CG	1:B:427:THR:OG1	2.60	0.40
1:C:89:GLN:O	1:C:161:VAL:HA	2.21	0.40
1:C:353:TYR:HA	1:C:368:ASP:O	2.21	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:285:GLU:OE2	1:C:243:ASN:ND2[3_455]	2.08	0.12

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	380/435 (87%)	364 (96%)	16 (4%)	0	100	100
1	B	378/435 (87%)	365 (97%)	12 (3%)	1 (0%)	41	64
1	C	374/435 (86%)	362 (97%)	12 (3%)	0	100	100
All	All	1132/1305 (87%)	1091 (96%)	40 (4%)	1 (0%)	51	75

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	82	PRO

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	321/360 (89%)	297 (92%)	24 (8%)	13 27
1	B	321/360 (89%)	292 (91%)	29 (9%)	9 18
1	C	318/360 (88%)	294 (92%)	24 (8%)	13 27
All	All	960/1080 (89%)	883 (92%)	77 (8%)	12 24

All (77) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	84	ARG
1	A	123	LYS
1	A	164	ASP
1	A	184	MET
1	A	198	SER
1	A	210	THR
1	A	219	LYS
1	A	224	ASN
1	A	226	GLN
1	A	239	LEU
1	A	241	TYR
1	A	264	GLU
1	A	271	THR
1	A	291	ASP
1	A	313	VAL
1	A	336	VAL
1	A	338	LYS
1	A	341	ARG
1	A	363	ILE
1	A	393	SER
1	A	415	LEU
1	A	420	ASP
1	A	438	ARG
1	A	456	GLN
1	B	78	LEU
1	B	81	HIS

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Mol	Chain	Res	Type
1	B	87	LYS
1	B	101	ARG
1	B	107	ILE
1	B	123	LYS
1	B	143	LYS
1	B	161	VAL
1	B	164	ASP
1	B	182	GLU
1	B	183	GLN
1	B	184	MET
1	B	210	THR
1	B	239	LEU
1	B	264	GLU
1	B	268	SER
1	B	273	ASP
1	B	291	ASP
1	B	338	LYS
1	B	341	ARG
1	B	385	SER
1	B	394	GLN
1	B	395	ASP
1	B	420	ASP
1	B	421	HIS
1	B	427	THR
1	B	438	ARG
1	B	458	ARG
1	B	459	PHE
1	C	84	ARG
1	C	85	LEU
1	C	87	LYS
1	C	101	ARG
1	C	105	SER
1	C	123	LYS
1	C	143	LYS
1	C	219	LYS
1	C	220	ARG
1	C	224	ASN
1	C	232	ASN
1	C	239	LEU
1	C	264	GLU
1	C	273	ASP
1	C	291	ASP

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Mol	Chain	Res	Type
1	C	336	VAL
1	C	338	LYS
1	C	341	ARG
1	C	361	LYS
1	C	363	ILE
1	C	385	SER
1	C	416	LYS
1	C	455	GLN
1	C	459	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	60	HIS
1	C	232	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

3 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	$\#\|Z\|>2$
2	ATP	C	501	-	26,33,33	0.61	0	31,52,52	0.76	2 (6%)
2	ATP	B	501	-	26,33,33	0.74	0	31,52,52	0.78	1 (3%)
2	ATP	A	501	-	26,33,33	0.62	0	31,52,52	0.77	2 (6%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ATP	C	501	-	-	0/18/38/38	0/3/3/3
2	ATP	B	501	-	-	1/18/38/38	0/3/3/3
2	ATP	A	501	-	-	0/18/38/38	0/3/3/3

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	501	ATP	C5-C6-N6	2.33	123.89	120.35
2	B	501	ATP	C5-C6-N6	2.31	123.86	120.35
2	A	501	ATP	C5-C6-N6	2.28	123.82	120.35
2	C	501	ATP	PB-O3B-PG	2.08	139.97	132.83
2	A	501	ATP	PB-O3B-PG	2.04	139.84	132.83

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	ATP	PA-O3A-PB-O2B

There are no ring outliers.

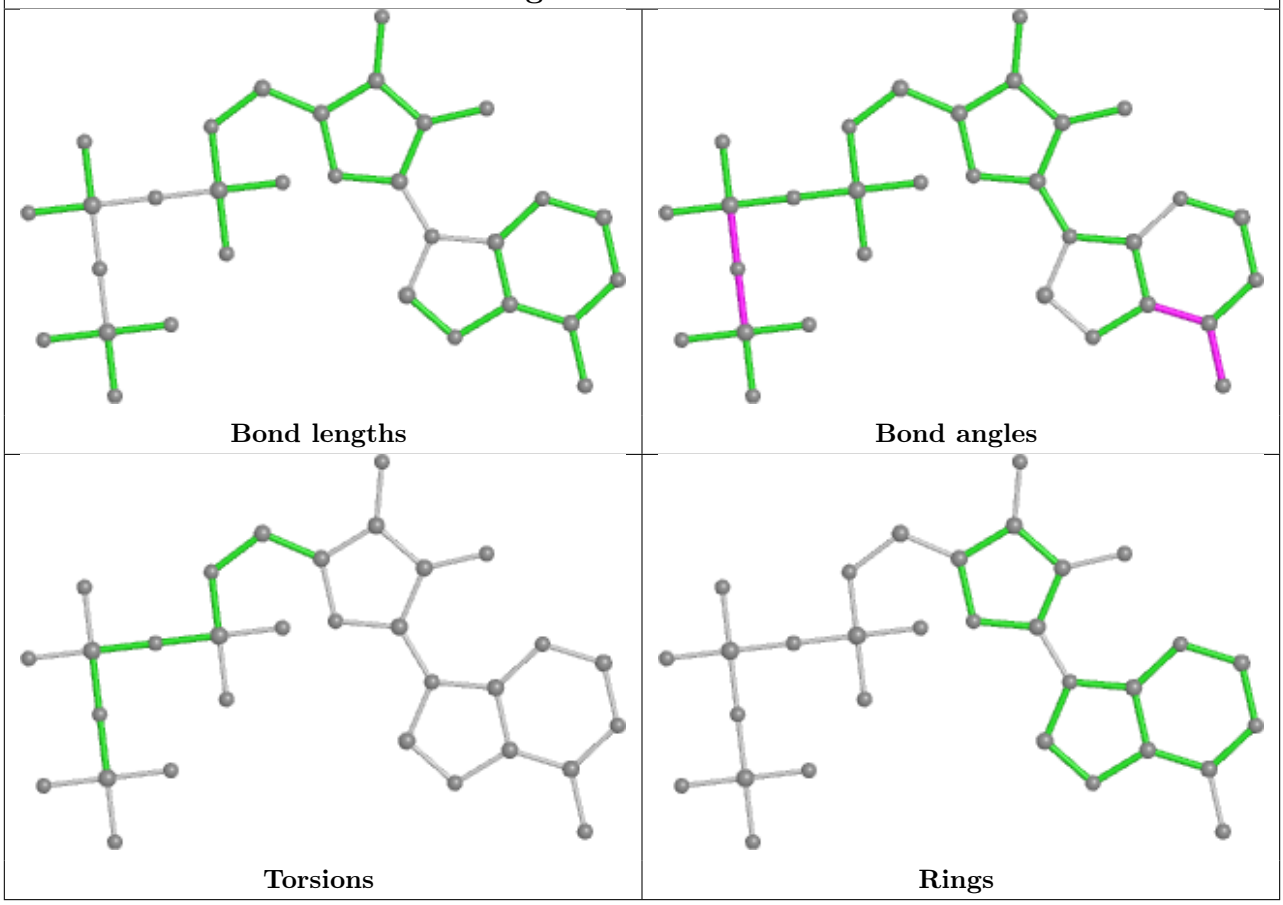
2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	501	ATP	2	0
2	A	501	ATP	2	0

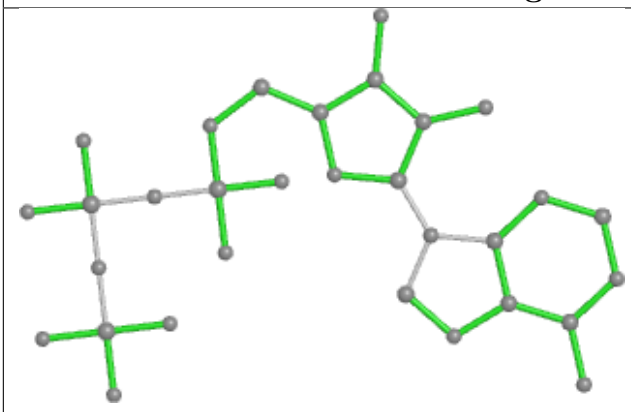
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

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.

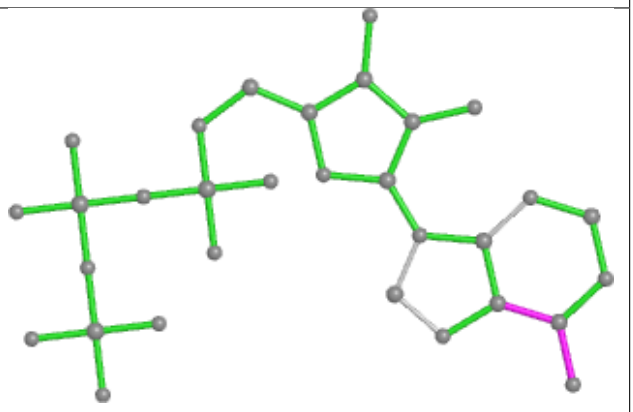
Ligand ATP C 501



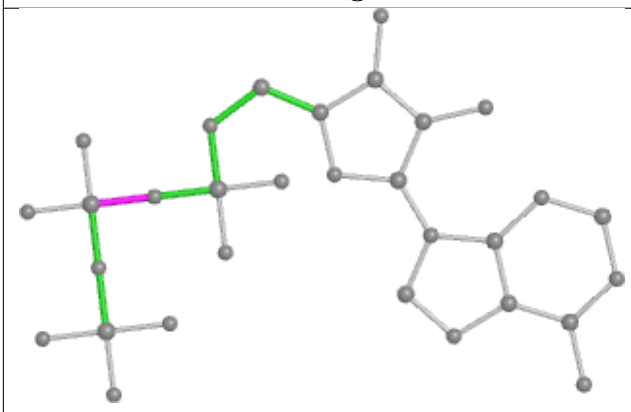
Ligand ATP B 501



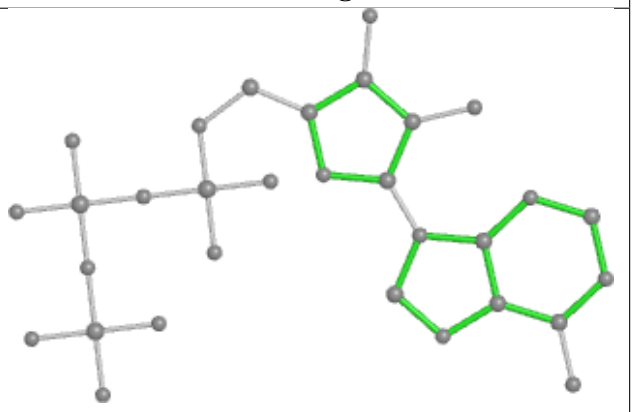
Bond lengths



Bond angles

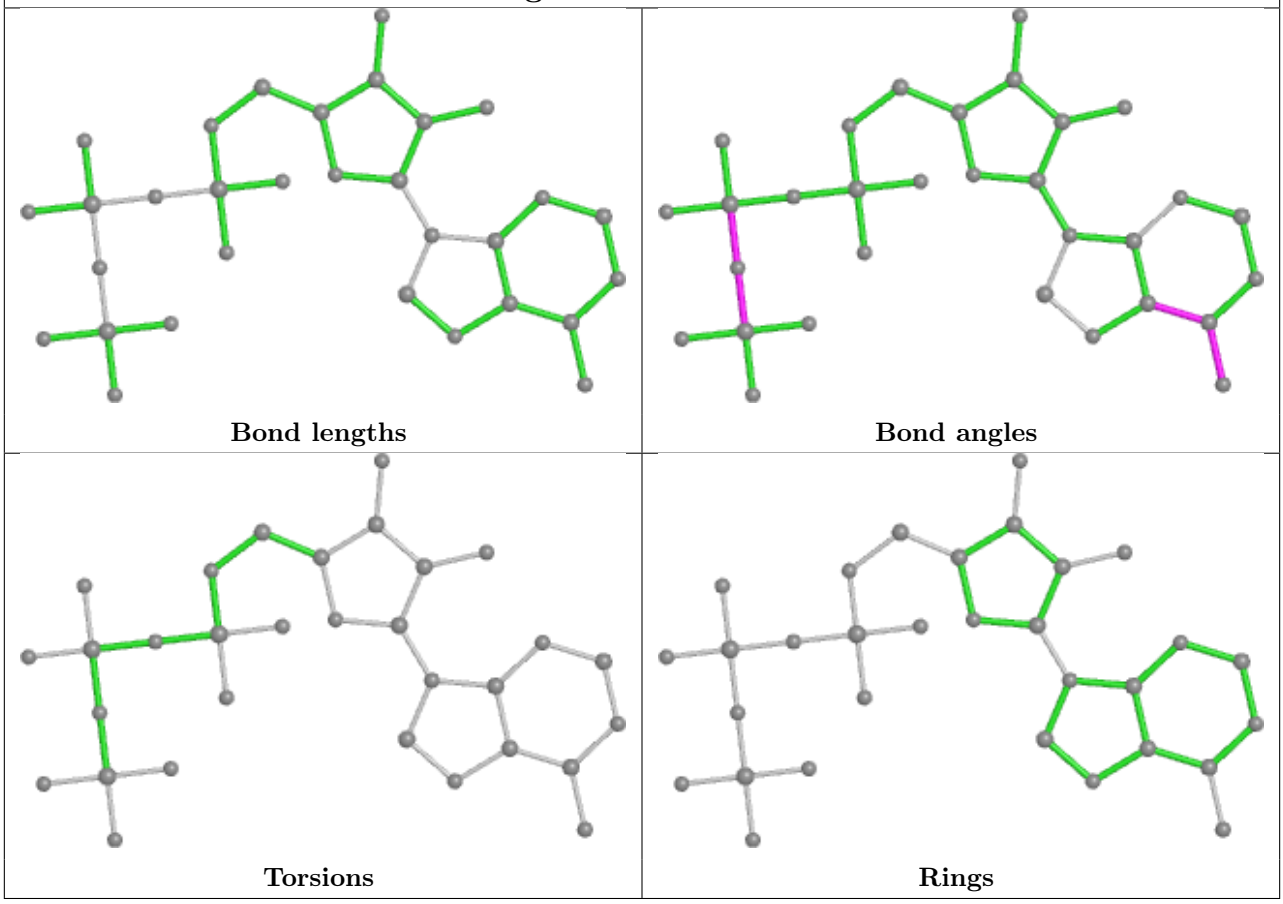


Torsions



Rings

Ligand ATP A 501



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} 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	388/435 (89%)	-0.02	6 (1%)	73	70	48, 70, 118, 147	0
1	B	386/435 (88%)	0.12	17 (4%)	34	27	52, 72, 137, 198	0
1	C	382/435 (87%)	0.09	13 (3%)	45	38	56, 80, 135, 185	0
All	All	1156/1305 (88%)	0.06	36 (3%)	49	42	48, 74, 130, 198	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	78	LEU	7.9
1	A	237	VAL	5.8
1	C	77	LEU	5.7
1	B	78	LEU	5.6
1	B	60	HIS	5.2
1	B	73	LEU	4.7
1	C	234	HIS	4.3
1	A	236	ALA	4.2
1	C	74	GLN	3.8
1	C	60	HIS	3.6
1	B	77	LEU	3.6
1	A	84	ARG	3.5
1	A	241	TYR	3.4
1	B	74	GLN	3.4
1	B	85	LEU	3.3
1	C	76	GLY	3.1
1	A	235	VAL	3.1
1	C	208	HIS	3.0
1	C	237	VAL	2.9
1	B	109	ARG	2.7
1	B	111	PHE	2.7
1	B	407	GLY	2.6
1	B	75	LYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	172	TYR	2.4
1	C	87	LYS	2.4
1	B	208	HIS	2.4
1	B	79	PRO	2.3
1	C	233	HIS	2.3
1	C	86	PRO	2.2
1	B	395	ASP	2.2
1	A	465	PHE	2.2
1	B	234	HIS	2.2
1	C	459	PHE	2.1
1	B	103	PHE	2.1
1	C	75	LYS	2.1
1	B	76	GLY	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)

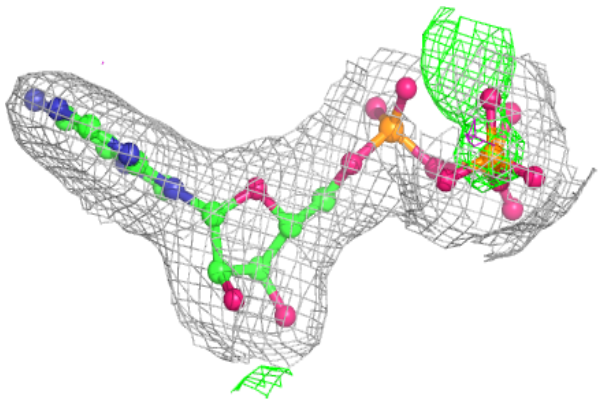
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

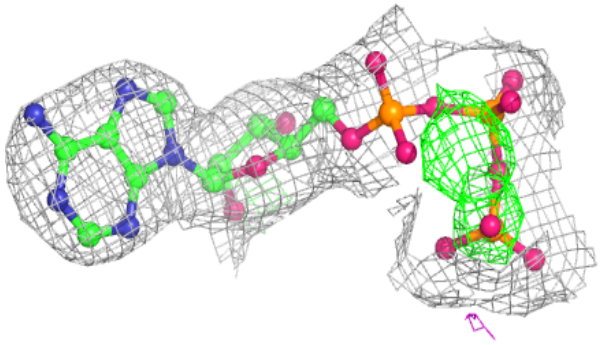
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	ATP	A	501	31/31	0.94	0.17	45,64,79,133	0
2	ATP	B	501	31/31	0.95	0.15	49,60,70,74	0
2	ATP	C	501	31/31	0.97	0.16	64,74,85,88	0

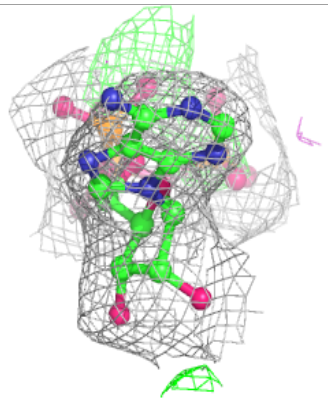
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ATP A 501:

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

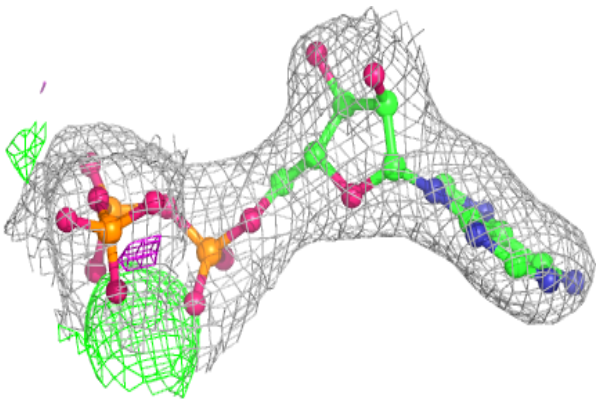


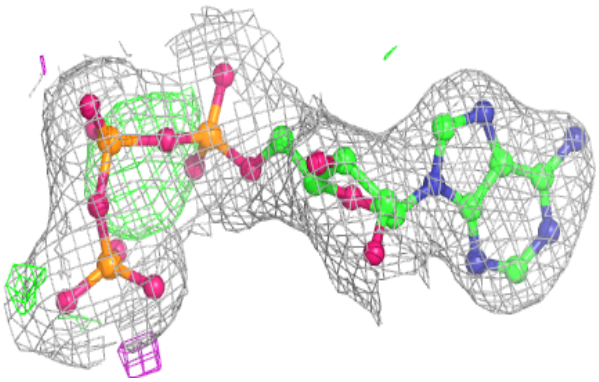




Electron density around ATP B 501:

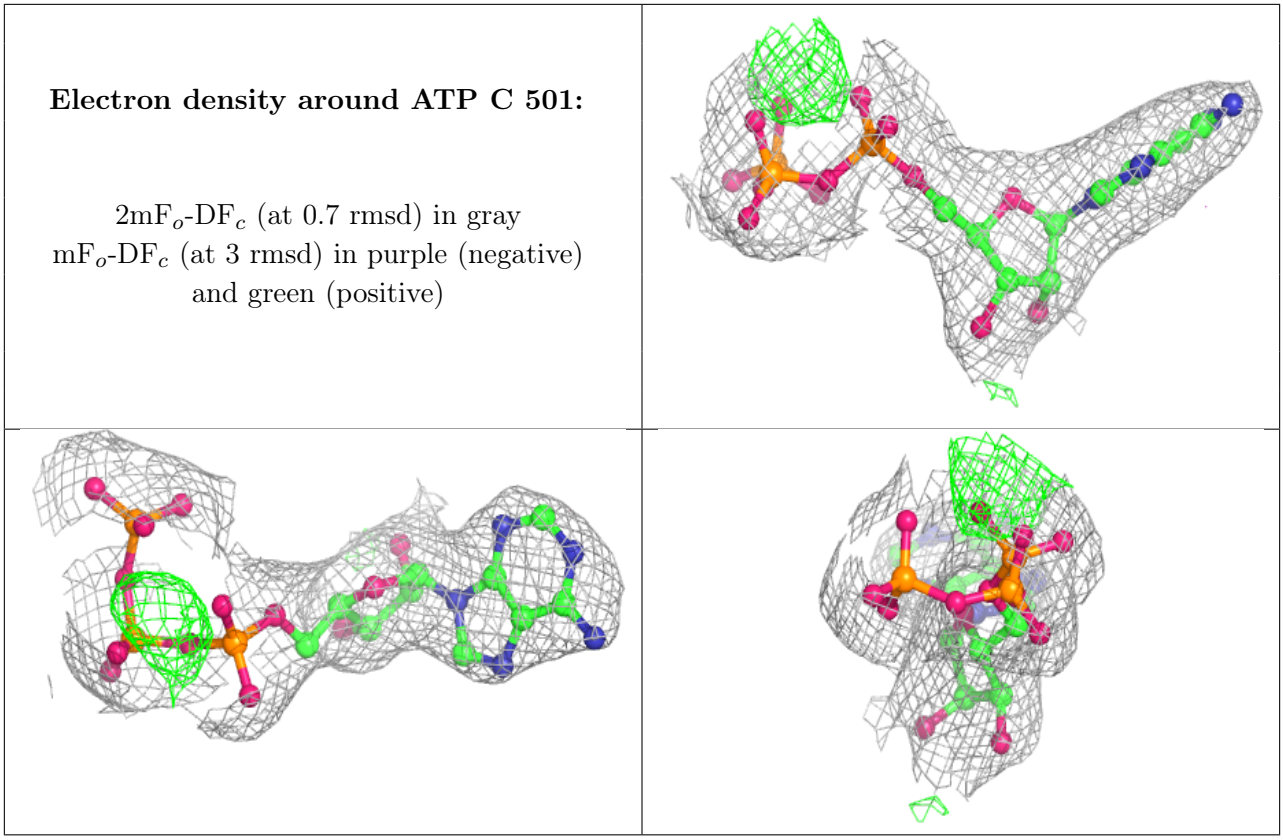
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)





Electron density around ATP C 501:

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



6.5 Other polymers (i)

There are no such residues in this entry.