



Full wwPDB X-ray Structure Validation Report ⓘ

May 25, 2020 – 08:27 am BST

PDB ID : 1KH2
Title : Crystal Structure of Thermus thermophilus HB8 Argininosuccinate Synthetase in complex with ATP
Authors : Goto, M.; Nakajima, Y.; Hirotsu, K.; RIKEN Structural Genomics/Proteomics Initiative (RSGI)
Deposited on : 2001-11-29
Resolution : 2.30 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 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 : 2.11
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) : 2.11

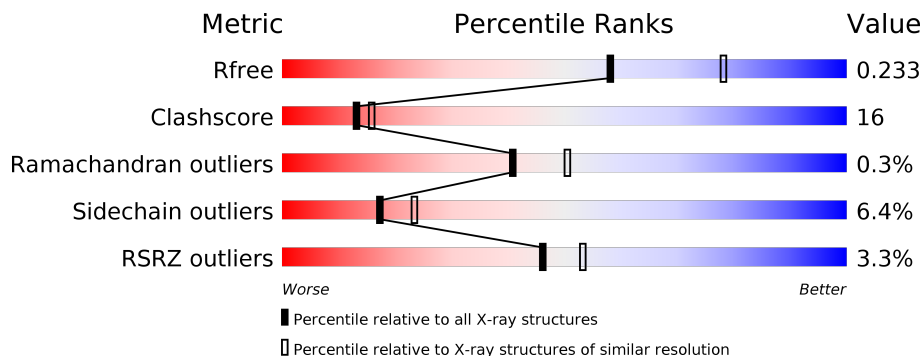
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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 $\leq 5\%$. 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	400	 2% 69% 23% • 5%
1	B	400	 2% 70% 22% • 5%
1	C	400	 5% 68% 26% • •
1	D	400	 4% 67% 27% • •

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	ATP	A	510	X	-	-	-

2 Entry composition [i](#)

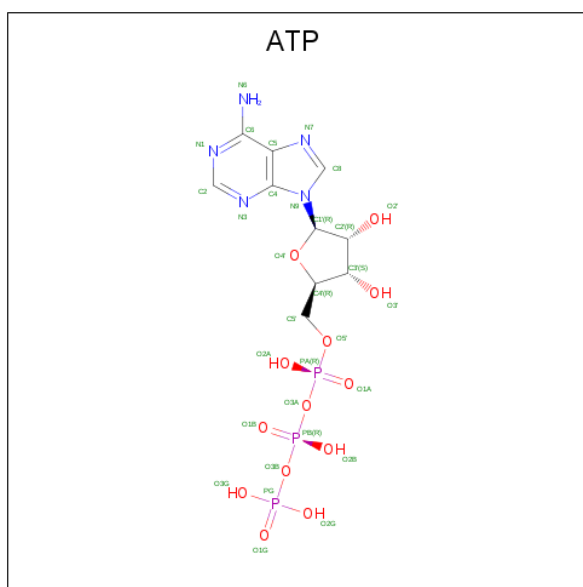
There are 3 unique types of molecules in this entry. The entry contains 12681 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Argininosuccinate Synthetase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	380	Total	C	N	O	S	0	0	0
			3017	1931	526	551	9			
1	B	382	Total	C	N	O	S	0	0	0
			3034	1940	529	556	9			
1	C	386	Total	C	N	O	S	0	0	0
			3066	1963	533	561	9			
1	D	385	Total	C	N	O	S	0	0	0
			3055	1954	532	560	9			

- 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	
			Total	C	N	O			P
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		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	D	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	111	Total	O	0	0
			111	111		
3	B	106	Total	O	0	0
			106	106		
3	C	87	Total	O	0	0
			87	87		
3	D	81	Total	O	0	0
			81	81		

4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	228.91Å 228.91Å 161.68Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	10.00 – 2.30 19.97 – 2.30	Depositor EDS
% Data completeness (in resolution range)	(Not available) (10.00-2.30) 100.0 (19.97-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.38 (at 2.30Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.209 , 0.241 0.203 , 0.233	Depositor DCC
R_{free} test set	13999 reflections (9.99%)	wwPDB-VP
Wilson B-factor (Å ²)	32.6	Xtrriage
Anisotropy	0.051	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 50.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.53$, $\langle L^2 \rangle = 0.36$	Xtrriage
Estimated twinning fraction	0.003 for h,-h-k,-l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	12681	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.62% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: 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	0.38	0/3085	0.66	3/4169 (0.1%)
1	B	0.38	0/3102	0.68	2/4192 (0.0%)
1	C	0.40	0/3135	0.67	2/4237 (0.0%)
1	D	0.38	0/3123	0.66	3/4221 (0.1%)
All	All	0.39	0/12445	0.67	10/16819 (0.1%)

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	221	PHE	CB-CA-C	-12.34	85.72	110.40
1	C	221	PHE	CB-CA-C	-11.87	86.67	110.40
1	D	221	PHE	CB-CA-C	-11.59	87.21	110.40
1	A	221	PHE	CB-CA-C	-11.41	87.58	110.40
1	A	222	GLU	N-CA-C	6.70	129.08	111.00
1	B	222	GLU	N-CA-C	6.36	128.16	111.00
1	D	222	GLU	N-CA-CB	5.75	120.95	110.60
1	C	222	GLU	N-CA-C	5.65	126.26	111.00
1	A	221	PHE	N-CA-C	-5.37	96.51	111.00
1	D	222	GLU	N-CA-C	5.21	125.05	111.00

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	3017	0	3006	103	0
1	B	3034	0	3018	104	0
1	C	3066	0	3052	120	0
1	D	3055	0	3043	115	0
2	A	31	0	10	5	0
2	B	31	0	10	3	0
2	C	31	0	12	4	0
2	D	31	0	12	4	0
3	A	111	0	0	9	0
3	B	106	0	0	6	0
3	C	87	0	0	3	0
3	D	81	0	0	2	0
All	All	12681	0	12163	399	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 16.

All (399) 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:C:151:LYS:HD2	1:C:151:LYS:H	1.02	1.12
1:D:151:LYS:H	1:D:151:LYS:HD2	1.10	1.09
1:B:151:LYS:HD2	1:B:151:LYS:H	1.21	1.01
1:D:395:ARG:NH1	1:D:395:ARG:HB3	1.77	0.99
1:A:12:ASP:HB2	2:A:510:ATP:O1G	1.65	0.96
1:C:151:LYS:CD	1:C:151:LYS:H	1.76	0.96
1:D:124:ARG:O	1:D:128:THR:HG23	1.68	0.94
1:C:150:ARG:HB2	1:C:150:ARG:HH11	1.32	0.93
1:A:151:LYS:H	1:A:151:LYS:HD2	1.32	0.92
1:A:123:VAL:HG22	1:B:380:ILE:HD11	1.52	0.92
1:A:349:VAL:HG13	1:B:194:GLU:HB2	1.51	0.91
1:B:35:ILE:H	1:B:37:GLN:NE2	1.71	0.89
1:C:151:LYS:HD2	1:C:151:LYS:N	1.87	0.88
1:D:35:ILE:H	1:D:37:GLN:NE2	1.73	0.87
1:C:37:GLN:H	1:C:37:GLN:NE2	1.73	0.86
1:A:318:GLU:HG2	1:C:293:GLU:CB	2.06	0.86
1:D:351:ARG:HD2	1:D:351:ARG:N	1.90	0.86
1:B:41:VAL:HG12	1:B:58:ALA:HB1	1.58	0.85
1:A:10:GLY:HA3	2:A:510:ATP:O2G	1.78	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:151:LYS:H	1:D:151:LYS:CD	1.89	0.82
1:D:262:VAL:HG12	1:D:264:MET:HE2	1.62	0.82
1:D:151:LYS:N	1:D:151:LYS:HD2	1.92	0.81
1:B:37:GLN:H	1:B:37:GLN:NE2	1.79	0.81
1:A:351:ARG:N	1:A:351:ARG:HD2	1.96	0.80
1:C:35:ILE:H	1:C:37:GLN:NE2	1.80	0.79
1:B:351:ARG:N	1:B:351:ARG:HD2	1.99	0.77
1:C:351:ARG:N	1:C:351:ARG:HD2	2.01	0.76
1:A:109:GLU:O	1:A:137:LYS:HE2	1.86	0.76
1:C:343:LYS:HD2	1:D:343:LYS:HD2	1.67	0.76
1:A:318:GLU:HG2	1:C:293:GLU:HB3	1.67	0.76
1:B:37:GLN:H	1:B:37:GLN:HE21	1.33	0.76
1:B:318:GLU:HG2	1:D:293:GLU:CB	2.15	0.76
1:C:245:ILE:O	1:C:248:ARG:HG2	1.87	0.74
1:B:13:THR:HG23	2:B:1510:ATP:O1G	1.85	0.74
1:C:37:GLN:H	1:C:37:GLN:HE21	1.32	0.74
1:B:34:ASP:HB2	1:B:41:VAL:HG21	1.69	0.73
1:A:133:LYS:HG2	1:A:136:ILE:HB	1.68	0.73
1:A:318:GLU:HG2	1:C:293:GLU:HB2	1.68	0.72
1:B:318:GLU:HG2	1:D:293:GLU:HB3	1.69	0.72
1:A:151:LYS:N	1:A:151:LYS:HD2	2.03	0.72
1:A:293:GLU:CB	1:C:318:GLU:HG2	2.20	0.72
1:B:118:LYS:H	1:B:118:LYS:HD2	1.55	0.72
1:D:395:ARG:HB3	1:D:395:ARG:HH11	1.54	0.71
1:B:151:LYS:CD	1:B:151:LYS:H	1.98	0.70
1:D:128:THR:HG22	3:D:1342:HOH:O	1.91	0.70
1:B:359:ARG:O	1:B:361:ASP:N	2.24	0.70
1:C:122:GLN:HE21	1:C:143:ARG:HH11	1.39	0.69
1:D:126:GLU:HG2	1:D:138:VAL:HG11	1.75	0.69
1:A:293:GLU:HB3	1:C:318:GLU:HG2	1.73	0.68
1:A:151:LYS:CD	1:A:151:LYS:H	1.95	0.68
1:C:122:GLN:NE2	1:C:143:ARG:HH11	1.92	0.68
1:D:395:ARG:CB	1:D:395:ARG:HH11	2.06	0.68
1:A:390:ARG:O	1:A:394:GLU:HG2	1.93	0.68
1:B:318:GLU:CG	1:D:293:GLU:HB2	2.24	0.68
1:A:41:VAL:HG12	1:A:58:ALA:HB1	1.76	0.67
1:C:319:ARG:HH21	1:C:323:GLN:HE21	1.40	0.67
1:A:318:GLU:CG	1:C:293:GLU:HB2	2.24	0.67
1:D:395:ARG:NH1	1:D:395:ARG:CB	2.57	0.66
1:A:98:HIS:HD2	1:A:101:ARG:NH1	1.92	0.66
1:B:359:ARG:HB3	1:B:361:ASP:OD1	1.96	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:118:LYS:N	1:A:118:LYS:HD2	2.10	0.66
1:D:395:ARG:HB3	1:D:395:ARG:CZ	2.25	0.66
1:A:264:MET:HE3	3:A:1205:HOH:O	1.95	0.66
1:D:148:GLN:HB2	1:D:152:GLU:OE2	1.96	0.66
1:B:293:GLU:CB	1:D:318:GLU:HG2	2.25	0.66
1:D:42:GLU:O	1:D:46:GLU:HG3	1.95	0.66
1:D:98:HIS:HD2	1:D:101:ARG:NH1	1.92	0.65
1:A:293:GLU:HB2	1:C:318:GLU:CG	2.26	0.65
1:A:41:VAL:CG1	1:A:58:ALA:HB1	2.27	0.65
1:B:314:TRP:O	1:B:319:ARG:HD3	1.96	0.65
1:C:314:TRP:O	1:C:319:ARG:HD3	1.96	0.65
1:B:293:GLU:HB3	1:D:318:GLU:HG2	1.78	0.64
1:D:314:TRP:O	1:D:319:ARG:HD3	1.98	0.64
1:A:21:LYS:HD3	3:A:1370:HOH:O	1.97	0.63
1:D:171:PRO:O	1:D:186:GLY:HA3	1.99	0.63
1:C:150:ARG:NH1	1:C:150:ARG:HB2	2.09	0.63
1:C:343:LYS:HD2	1:D:343:LYS:CD	2.29	0.63
1:A:117:GLY:HA3	1:B:373:GLN:NE2	2.14	0.62
1:A:123:VAL:HG22	1:B:380:ILE:CD1	2.25	0.62
1:C:373:GLN:NE2	1:C:373:GLN:H	1.97	0.62
1:C:264:MET:HB2	1:D:362:LEU:CD1	2.29	0.62
1:B:126:GLU:HG2	1:B:138:VAL:HG11	1.81	0.62
1:D:60:ASP:OD1	1:D:62:LYS:HD3	1.99	0.62
1:D:1:MET:O	1:D:26:ALA:HB1	1.99	0.62
1:B:41:VAL:CG1	1:B:58:ALA:HB1	2.29	0.62
1:A:214:GLU:OE1	1:A:249:HIS:HE1	1.84	0.61
1:A:84:TYR:CE2	1:A:86:LEU:HA	2.36	0.61
1:C:264:MET:HB2	1:D:362:LEU:HD13	1.81	0.60
1:D:360:GLN:O	1:D:360:GLN:HG2	2.00	0.60
1:A:373:GLN:H	1:A:373:GLN:NE2	2.00	0.60
1:B:1:MET:O	1:B:26:ALA:HB1	2.01	0.60
1:A:373:GLN:H	1:A:373:GLN:CD	2.04	0.60
1:C:41:VAL:CG1	1:C:58:ALA:HB1	2.32	0.60
1:B:318:GLU:HG2	1:D:293:GLU:HB2	1.83	0.59
1:D:393:VAL:C	1:D:395:ARG:N	2.55	0.59
1:A:93:PRO:HA	1:A:128:THR:HG21	1.84	0.59
1:B:35:ILE:N	1:B:37:GLN:NE2	2.48	0.59
1:A:73:MET:CE	1:A:90:ILE:HG12	2.32	0.59
1:A:249:HIS:HD2	3:A:1241:HOH:O	1.86	0.59
1:B:314:TRP:CE3	1:B:319:ARG:HD2	2.38	0.59
1:A:6:ALA:HB1	2:A:510:ATP:N3	2.17	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:118:LYS:H	1:A:118:LYS:HD2	1.66	0.58
1:B:293:GLU:HB2	1:D:318:GLU:CG	2.33	0.58
1:C:6:ALA:HB1	2:C:2510:ATP:N3	2.18	0.58
1:A:93:PRO:HG3	3:A:1346:HOH:O	2.03	0.58
1:B:12:ASP:HB2	2:B:1510:ATP:O2G	2.04	0.58
1:D:341:LEU:HD22	1:D:346:VAL:HG22	1.86	0.58
1:C:179:LEU:O	1:C:272:THR:HG23	2.04	0.58
1:A:349:VAL:HG12	3:B:1091:HOH:O	2.04	0.57
1:C:192:TRP:CH2	1:D:352:LYS:HE3	2.38	0.57
1:D:16:ILE:HG23	1:D:141:PRO:HG2	1.86	0.57
1:D:359:ARG:HB3	1:D:361:ASP:OD1	2.03	0.57
1:A:8:SER:OG	2:A:510:ATP:O3G	2.23	0.57
1:B:122:GLN:HE21	1:B:143:ARG:HH11	1.52	0.57
1:B:93:PRO:HA	1:B:128:THR:HG21	1.86	0.57
1:D:35:ILE:H	1:D:37:GLN:HE22	1.52	0.57
1:A:150:ARG:HG3	1:A:154:ILE:HD13	1.87	0.56
1:D:260:ARG:HD2	1:D:264:MET:SD	2.45	0.56
1:C:35:ILE:H	1:C:37:GLN:HE22	1.51	0.56
1:B:282:ARG:O	1:B:286:GLU:HG3	2.05	0.56
1:C:150:ARG:HH12	1:C:153:MET:HE1	1.71	0.56
3:A:1291:HOH:O	1:B:191:PRO:HG2	2.05	0.56
1:D:40:GLU:HB3	1:D:43:GLU:HG3	1.86	0.56
1:A:282:ARG:HD2	3:A:1301:HOH:O	2.04	0.56
1:A:393:VAL:C	1:A:395:ARG:H	2.07	0.56
1:D:339:LEU:N	1:D:339:LEU:HD12	2.20	0.56
1:A:316:ALA:HB1	1:A:318:GLU:OE2	2.06	0.56
1:B:124:ARG:O	1:B:128:THR:HG23	2.06	0.56
1:B:75:ARG:NH2	3:B:1339:HOH:O	2.39	0.56
1:C:37:GLN:N	1:C:37:GLN:HE21	2.01	0.56
1:C:8:SER:OG	2:C:2510:ATP:O3G	2.18	0.56
1:B:151:LYS:HD2	1:B:151:LYS:N	2.05	0.56
1:C:393:VAL:C	1:C:395:ARG:N	2.59	0.56
1:C:104:GLU:OE2	1:C:133:LYS:HD3	2.06	0.55
1:D:12:ASP:HB2	2:D:3510:ATP:O2G	2.06	0.55
1:A:98:HIS:CD2	1:A:101:ARG:HH11	2.25	0.55
1:A:98:HIS:HD2	1:A:101:ARG:HH11	1.54	0.55
1:B:214:GLU:OE1	1:B:249:HIS:HE1	1.88	0.55
1:D:262:VAL:HG12	1:D:264:MET:CE	2.36	0.55
1:D:393:VAL:C	1:D:395:ARG:H	2.09	0.55
1:B:98:HIS:HD2	1:B:101:ARG:NH1	2.05	0.55
1:D:203:THR:HB	1:D:250:GLY:HA2	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:314:TRP:O	1:A:319:ARG:HD3	2.07	0.54
1:C:41:VAL:HG12	1:C:58:ALA:HB1	1.88	0.54
1:B:100:VAL:O	1:B:104:GLU:HG3	2.07	0.54
1:C:319:ARG:HH21	1:C:323:GLN:NE2	2.04	0.54
1:D:122:GLN:HE21	1:D:143:ARG:HH11	1.54	0.54
1:C:282:ARG:O	1:C:286:GLU:HG3	2.07	0.54
1:B:35:ILE:H	1:B:37:GLN:HE22	1.48	0.54
1:B:116:THR:HB	1:B:118:LYS:HD2	1.90	0.54
1:C:176:ALA:CB	1:C:181:ILE:HG12	2.38	0.54
1:D:261:PHE:HB2	1:D:311:TYR:CD1	2.43	0.54
1:B:215:TYR:OH	1:B:340:LYS:HE3	2.09	0.54
1:D:264:MET:CE	1:D:264:MET:H	2.20	0.54
1:D:316:ALA:HB1	1:D:318:GLU:OE2	2.07	0.54
1:C:154:ILE:O	1:C:158:GLU:HG3	2.09	0.53
1:A:302:SER:HB2	1:A:303:PRO:HD3	1.89	0.53
1:B:37:GLN:HE21	1:B:37:GLN:N	2.04	0.53
1:C:189:GLU:HB3	1:D:360:GLN:HG3	1.91	0.53
1:A:21:LYS:HD2	1:A:26:ALA:O	2.08	0.53
1:C:35:ILE:N	1:C:37:GLN:NE2	2.54	0.53
1:C:185:GLY:O	1:C:188:LEU:HB2	2.08	0.53
1:D:264:MET:HE3	1:D:264:MET:H	1.74	0.53
1:C:393:VAL:C	1:C:395:ARG:H	2.12	0.53
1:B:180:HIS:ND1	1:B:180:HIS:C	2.61	0.52
1:C:122:GLN:HE21	1:C:143:ARG:NH1	2.06	0.52
1:D:101:ARG:O	1:D:105:GLU:HG3	2.08	0.52
1:D:29:ILE:HD12	1:D:29:ILE:N	2.24	0.52
1:C:209:ALA:O	1:C:343:LYS:NZ	2.43	0.52
1:A:282:ARG:O	1:A:286:GLU:HG3	2.09	0.52
1:D:98:HIS:CD2	1:D:101:ARG:NH1	2.75	0.52
1:A:393:VAL:C	1:A:395:ARG:N	2.61	0.52
1:C:392:LEU:O	1:C:395:ARG:HA	2.09	0.52
1:A:372:ASP:HB2	1:A:373:GLN:NE2	2.25	0.52
1:B:122:GLN:HE22	1:B:143:ARG:HD3	1.75	0.52
1:B:359:ARG:C	1:B:361:ASP:H	2.11	0.52
1:D:282:ARG:O	1:D:286:GLU:HG3	2.10	0.51
1:C:151:LYS:CD	1:C:151:LYS:N	2.57	0.51
1:A:84:TYR:CZ	1:A:86:LEU:HA	2.45	0.51
1:B:179:LEU:HD22	1:B:272:THR:HG23	1.92	0.51
1:C:33:ALA:HB1	1:C:61:LEU:HD12	1.91	0.51
1:C:179:LEU:HD22	1:C:272:THR:CG2	2.41	0.51
1:A:345:ASN:HB3	1:A:347:TYR:CE1	2.46	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:84:TYR:CE2	1:D:86:LEU:HA	2.45	0.51
1:D:359:ARG:C	1:D:361:ASP:H	2.14	0.51
1:A:172:TYR:CZ	1:A:199:MET:HG3	2.46	0.51
1:C:194:GLU:HG3	1:D:349:VAL:HB	1.93	0.51
1:C:40:GLU:HB3	1:C:43:GLU:HG3	1.92	0.50
1:C:12:ASP:OD1	1:C:150:ARG:NH2	2.44	0.50
1:C:75:ARG:NH2	3:C:1188:HOH:O	2.44	0.50
1:C:390:ARG:O	1:C:394:GLU:HG2	2.12	0.50
1:A:146:SER:O	1:A:147:PHE:C	2.50	0.50
1:A:339:LEU:N	1:A:339:LEU:HD12	2.27	0.50
1:D:98:HIS:CD2	1:D:101:ARG:HH11	2.30	0.50
1:C:150:ARG:O	1:C:154:ILE:HG13	2.11	0.50
1:C:35:ILE:N	1:C:37:GLN:HE22	2.10	0.50
1:D:34:ASP:HA	1:D:37:GLN:HE22	1.77	0.50
1:D:179:LEU:O	1:D:272:THR:HG23	2.12	0.50
1:B:376:ALA:O	1:B:380:ILE:HG12	2.12	0.49
1:D:363:VAL:HG23	1:D:364:SER:N	2.27	0.49
1:C:16:ILE:HG23	1:C:141:PRO:HG2	1.93	0.49
1:C:86:LEU:O	1:C:90:ILE:HG13	2.12	0.49
1:C:17:LEU:O	1:C:21:LYS:HG2	2.12	0.49
1:A:328:HIS:CD2	1:C:321:ALA:HA	2.48	0.49
1:D:345:ASN:HB3	1:D:347:TYR:CE1	2.48	0.49
1:C:98:HIS:HD2	1:C:101:ARG:NH1	2.10	0.49
1:A:104:GLU:HG2	1:A:133:LYS:NZ	2.27	0.49
1:A:90:ILE:HD11	1:A:179:LEU:HD12	1.94	0.49
1:B:35:ILE:N	1:B:37:GLN:HE22	2.11	0.49
1:C:350:GLY:C	1:C:351:ARG:HD2	2.34	0.49
1:A:349:VAL:CG1	1:B:194:GLU:HB2	2.32	0.49
1:D:314:TRP:CE3	1:D:319:ARG:HD2	2.47	0.49
1:B:34:ASP:HA	1:B:37:GLN:HE22	1.78	0.48
1:B:98:HIS:CD2	1:B:101:ARG:NH1	2.80	0.48
1:B:395:ARG:NH2	1:C:355:LYS:HE3	2.27	0.48
1:C:98:HIS:CD2	1:C:101:ARG:NH1	2.81	0.48
1:C:395:ARG:HB2	1:C:395:ARG:CZ	2.43	0.48
1:B:37:GLN:HG2	3:B:1380:HOH:O	2.13	0.48
1:C:13:THR:HG23	2:C:2510:ATP:O1G	2.13	0.48
1:C:248:ARG:HG3	1:C:249:HIS:CD2	2.49	0.48
1:A:6:ALA:HB2	1:A:99:LEU:HD11	1.95	0.48
1:A:191:PRO:HD3	1:B:358:TYR:CE2	2.48	0.48
1:A:16:ILE:O	1:A:20:LEU:HG	2.14	0.47
1:B:293:GLU:HB2	1:D:318:GLU:HG2	1.94	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:293:GLU:HB2	1:C:318:GLU:HG3	1.95	0.47
1:B:249:HIS:HD2	3:B:1115:HOH:O	1.96	0.47
1:D:35:ILE:N	1:D:37:GLN:NE2	2.54	0.47
1:B:87:GLY:HA3	1:B:180:HIS:CD2	2.50	0.47
1:B:282:ARG:NE	3:B:1177:HOH:O	2.35	0.47
1:C:34:ASP:HB2	1:C:41:VAL:HG21	1.97	0.47
1:A:319:ARG:HH21	1:A:323:GLN:NE2	2.13	0.47
1:B:97:LYS:HD2	1:B:315:TYR:OH	2.15	0.47
1:B:122:GLN:NE2	1:B:143:ARG:HD3	2.30	0.47
1:C:67:ARG:HG2	1:C:68:ASP:OD1	2.15	0.47
1:D:302:SER:HB2	1:D:303:PRO:HD3	1.96	0.47
1:B:350:GLY:C	1:B:351:ARG:HD2	2.36	0.46
1:C:360:GLN:O	1:C:363:VAL:HG22	2.15	0.46
1:D:359:ARG:HD2	1:D:361:ASP:OD2	2.15	0.46
1:D:57:ILE:HD12	1:D:102:ILE:HD13	1.96	0.46
1:C:18:LYS:HE3	1:C:160:HIS:HB3	1.97	0.46
1:C:34:ASP:HA	1:C:37:GLN:HE22	1.78	0.46
1:A:40:GLU:HB3	1:A:43:GLU:HG3	1.97	0.46
1:A:189:GLU:OE2	1:B:360:GLN:OE1	2.33	0.46
1:B:42:GLU:O	1:B:46:GLU:HG3	2.15	0.46
1:C:1:MET:O	1:C:26:ALA:HB1	2.15	0.46
1:A:66:VAL:HG21	1:A:236:ALA:HA	1.96	0.46
1:A:372:ASP:HB2	1:A:373:GLN:HE21	1.80	0.46
1:A:179:LEU:HD22	1:A:272:THR:HG23	1.98	0.46
1:D:35:ILE:H	1:D:37:GLN:HE21	1.56	0.46
1:D:126:GLU:CG	1:D:138:VAL:HG11	2.45	0.46
1:B:382:ILE:HG23	1:D:262:VAL:O	2.16	0.46
1:A:125:PHE:HE1	2:A:510:ATP:H4'	1.81	0.46
1:C:384:ALA:O	1:C:388:ARG:HG3	2.15	0.46
1:A:104:GLU:HG2	1:A:133:LYS:HZ2	1.81	0.46
1:D:148:GLN:H	1:D:152:GLU:CD	2.19	0.46
1:D:185:GLY:O	1:D:188:LEU:HB2	2.16	0.46
1:B:171:PRO:O	1:B:186:GLY:HA3	2.16	0.46
1:B:393:VAL:C	1:B:395:ARG:H	2.19	0.46
1:D:21:LYS:O	1:D:25:ARG:HA	2.15	0.46
1:C:189:GLU:O	1:C:191:PRO:HD3	2.16	0.46
1:C:176:ALA:HB2	1:C:181:ILE:HG12	1.98	0.45
1:C:18:LYS:HG3	1:C:162:ILE:HD11	1.99	0.45
1:B:202:MET:HB3	1:B:271:GLU:CD	2.37	0.45
1:C:180:HIS:HB2	1:C:271:GLU:O	2.16	0.45
1:C:378:GLY:O	1:C:382:ILE:HG12	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:260:ARG:HB2	1:D:264:MET:HE3	1.99	0.45
1:D:67:ARG:HD2	1:D:68:ASP:OD1	2.16	0.45
1:C:27:GLU:HG3	1:C:54:SER:OG	2.16	0.45
1:C:357:LEU:HB2	1:D:265:LYS:CE	2.46	0.45
1:B:392:LEU:O	1:B:395:ARG:HA	2.16	0.45
1:C:392:LEU:HG	1:D:134:PRO:HG3	1.99	0.45
1:D:282:ARG:NH2	3:D:1236:HOH:O	2.50	0.45
1:C:180:HIS:ND1	1:C:180:HIS:C	2.70	0.45
1:D:341:LEU:CD2	1:D:346:VAL:HG22	2.46	0.45
1:D:359:ARG:HB3	1:D:361:ASP:CG	2.36	0.45
1:B:6:ALA:HB1	2:B:1510:ATP:N3	2.32	0.45
1:B:69:PHE:C	1:B:72:PRO:HD2	2.37	0.45
1:D:117:GLY:HA2	1:D:122:GLN:HE22	1.82	0.45
1:A:92:ARG:HD2	1:A:125:PHE:CZ	2.52	0.44
1:A:358:TYR:CE2	1:B:191:PRO:HD3	2.52	0.44
1:B:122:GLN:NE2	1:B:143:ARG:HH11	2.13	0.44
1:A:343:LYS:HD2	1:B:343:LYS:HD3	2.00	0.44
1:B:393:VAL:C	1:B:395:ARG:N	2.71	0.44
1:C:359:ARG:HB2	1:C:362:LEU:HG	1.98	0.44
1:D:37:GLN:NE2	1:D:37:GLN:H	2.14	0.44
1:B:86:LEU:O	1:B:90:ILE:HG13	2.18	0.44
1:D:6:ALA:HB1	2:D:3510:ATP:N3	2.33	0.44
1:A:17:LEU:HD23	1:A:17:LEU:O	2.17	0.44
1:B:84:TYR:CE2	1:B:86:LEU:HA	2.53	0.44
1:C:87:GLY:HA3	1:C:180:HIS:CD2	2.53	0.44
1:D:328:HIS:CE1	1:D:331:ARG:HH22	2.35	0.44
1:D:71:PHE:CZ	1:D:225:PRO:HG2	2.53	0.44
1:C:371:TYR:OH	1:D:262:VAL:HG11	2.18	0.44
1:D:34:ASP:CG	1:D:62:LYS:HD2	2.38	0.44
1:C:101:ARG:HD3	3:C:1367:HOH:O	2.17	0.44
1:C:302:SER:HB2	1:C:303:PRO:HD3	1.99	0.44
1:A:180:HIS:C	1:A:180:HIS:ND1	2.70	0.44
1:D:93:PRO:HA	1:D:128:THR:HG21	2.00	0.44
1:D:18:LYS:HE3	1:D:160:HIS:HB3	2.00	0.44
1:C:109:GLU:O	1:C:137:LYS:HE2	2.18	0.43
1:D:51:THR:O	1:D:51:THR:HG22	2.17	0.43
1:A:104:GLU:OE2	1:A:133:LYS:NZ	2.43	0.43
1:A:180:HIS:HB2	1:A:271:GLU:O	2.18	0.43
1:C:133:LYS:O	1:C:136:ILE:HG22	2.18	0.43
1:C:314:TRP:CE3	1:C:319:ARG:HD2	2.54	0.43
1:D:114:GLY:HA3	2:D:3510:ATP:O3'	2.17	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:117:GLY:HA2	1:D:122:GLN:NE2	2.33	0.43
1:D:392:LEU:O	1:D:395:ARG:HA	2.18	0.43
1:A:123:VAL:HG12	1:A:127:LEU:HD12	2.00	0.43
1:A:32:THR:O	1:A:58:ALA:HA	2.19	0.43
1:B:176:ALA:CB	1:B:181:ILE:HG12	2.48	0.43
1:C:101:ARG:NH2	3:C:1289:HOH:O	2.50	0.43
1:C:6:ALA:HB2	1:C:99:LEU:HD11	2.00	0.43
1:D:13:THR:HG23	2:D:3510:ATP:O1G	2.18	0.43
1:D:34:ASP:HB3	1:D:60:ASP:HA	2.00	0.43
1:A:128:THR:HG22	3:A:1346:HOH:O	2.18	0.43
1:A:319:ARG:HH21	1:A:323:GLN:HE21	1.65	0.43
1:A:75:ARG:NH2	3:A:1143:HOH:O	2.52	0.43
1:B:345:ASN:HB3	1:B:347:TYR:CE1	2.54	0.43
1:C:179:LEU:HD22	1:C:272:THR:HG23	2.00	0.43
1:D:96:ALA:HB3	1:D:128:THR:OG1	2.19	0.43
1:C:60:ASP:OD1	1:C:62:LYS:HE3	2.18	0.43
1:D:122:GLN:NE2	1:D:143:ARG:HH11	2.17	0.43
1:C:286:GLU:HB3	1:C:290:LEU:HD12	2.01	0.43
1:D:6:ALA:HB2	1:D:99:LEU:HD11	2.00	0.42
1:A:67:ARG:HH11	1:A:67:ARG:HG2	1.83	0.42
1:B:70:VAL:O	1:B:74:MET:HG3	2.20	0.42
1:C:252:GLY:O	1:C:271:GLU:HA	2.19	0.42
1:A:264:MET:SD	1:C:386:ARG:HA	2.59	0.42
1:A:21:LYS:O	1:A:25:ARG:HA	2.19	0.42
1:A:71:PHE:HB2	1:A:72:PRO:HD3	2.01	0.42
1:D:71:PHE:HB2	1:D:72:PRO:HD3	2.01	0.42
1:B:185:GLY:O	1:B:188:LEU:HB2	2.19	0.42
1:B:34:ASP:CB	1:B:41:VAL:HG21	2.43	0.42
1:D:70:VAL:O	1:D:74:MET:HG3	2.19	0.42
1:A:136:ILE:C	1:A:137:LYS:HD3	2.38	0.42
1:B:298:ARG:HD2	1:B:298:ARG:O	2.18	0.42
1:B:73:MET:CE	1:B:90:ILE:HG12	2.50	0.42
1:D:353:ALA:HA	1:D:354:PRO:HD3	1.91	0.42
1:C:114:GLY:HA3	2:C:2510:ATP:O3'	2.19	0.42
1:C:365:PHE:CD1	1:C:365:PHE:N	2.88	0.42
1:C:27:GLU:HG3	1:C:54:SER:CB	2.50	0.42
1:D:2:LYS:HB2	1:D:108:ALA:HA	2.01	0.42
1:C:18:LYS:CG	1:C:162:ILE:HD11	2.50	0.42
1:C:25:ARG:HG3	1:C:25:ARG:HH11	1.84	0.42
1:D:133:LYS:HD3	1:D:136:ILE:HB	2.01	0.42
1:C:264:MET:HB2	1:D:362:LEU:HD12	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:172:TYR:CZ	1:D:199:MET:HG3	2.55	0.42
1:A:101:ARG:HD3	3:A:1090:HOH:O	2.20	0.42
1:A:98:HIS:CD2	1:A:101:ARG:NH1	2.79	0.42
1:C:122:GLN:HE22	1:C:143:ARG:HD3	1.85	0.42
1:C:345:ASN:HB3	1:C:347:TYR:CE1	2.55	0.42
1:B:254:VAL:CG1	1:B:256:ILE:HG23	2.50	0.42
1:C:181:ILE:HD12	1:C:202:MET:HB2	2.01	0.42
1:A:288:LEU:HD11	1:A:351:ARG:HG2	2.01	0.41
1:B:252:GLY:O	1:B:271:GLU:HA	2.19	0.41
1:C:109:GLU:HG3	1:C:137:LYS:HE3	2.00	0.41
1:D:197:LYS:HB3	1:D:197:LYS:HE2	1.86	0.41
1:D:262:VAL:CG1	1:D:262:VAL:O	2.67	0.41
1:D:180:HIS:ND1	1:D:180:HIS:C	2.72	0.41
1:A:85:LEU:HA	1:A:85:LEU:HD23	1.84	0.41
1:B:175:ASP:O	1:B:181:ILE:HA	2.20	0.41
1:B:66:VAL:HG21	1:B:236:ALA:HA	2.01	0.41
1:B:262:VAL:HG12	1:B:263:GLY:N	2.35	0.41
1:B:353:ALA:HA	1:B:354:PRO:HD3	1.90	0.41
1:C:21:LYS:O	1:C:25:ARG:HA	2.20	0.41
1:C:32:THR:O	1:C:58:ALA:HA	2.21	0.41
1:C:395:ARG:HG3	1:C:395:ARG:HH11	1.86	0.41
1:D:66:VAL:HG21	1:D:236:ALA:HA	2.02	0.41
1:A:137:LYS:N	1:A:137:LYS:HD3	2.36	0.41
1:A:86:LEU:O	1:A:90:ILE:HG13	2.20	0.41
1:B:180:HIS:HD2	3:B:1300:HOH:O	2.03	0.41
1:A:118:LYS:CD	1:A:118:LYS:N	2.82	0.41
1:A:286:GLU:HB3	1:A:290:LEU:HD12	2.03	0.41
1:C:25:ARG:CG	1:C:25:ARG:HH11	2.34	0.41
1:B:359:ARG:C	1:B:361:ASP:N	2.72	0.41
1:C:71:PHE:HB2	1:C:72:PRO:HD3	2.02	0.41
1:A:148:GLN:HB2	1:A:152:GLU:OE2	2.20	0.41
1:A:71:PHE:CZ	1:A:225:PRO:HG2	2.55	0.41
1:D:180:HIS:HB2	1:D:271:GLU:O	2.21	0.41
1:B:316:ALA:HB1	1:B:318:GLU:OE2	2.19	0.41
1:A:245:ILE:O	1:A:248:ARG:HG2	2.20	0.41
1:B:118:LYS:CD	1:B:118:LYS:H	2.31	0.41
1:A:176:ALA:CB	1:A:181:ILE:HG12	2.50	0.41
1:B:71:PHE:HB2	1:B:72:PRO:HD3	2.02	0.41
1:A:343:LYS:HD2	1:B:343:LYS:CD	2.51	0.40
1:B:179:LEU:O	1:B:272:THR:HG23	2.21	0.40
1:C:298:ARG:C	1:C:298:ARG:HD2	2.41	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:318:GLU:HG3	1:D:293:GLU:HB2	2.01	0.40
1:A:209:ALA:O	1:A:343:LYS:NZ	2.55	0.40
1:B:181:ILE:HD12	1:B:202:MET:HB2	2.03	0.40
1:B:33:ALA:HB1	1:B:61:LEU:HD12	2.02	0.40
1:B:395:ARG:HE	1:B:395:ARG:HB2	1.71	0.40
1:C:75:ARG:HG2	1:C:330:ALA:CB	2.51	0.40
1:C:349:VAL:HB	1:D:194:GLU:HB2	2.03	0.40
1:B:98:HIS:CD2	1:B:101:ARG:HH11	2.38	0.40
1:B:124:ARG:O	1:B:128:THR:CG2	2.68	0.40
1:A:350:GLY:C	1:A:351:ARG:HD2	2.42	0.40
1:C:374:LYS:HD2	1:C:374:LYS:HA	1.88	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	374/400 (94%)	362 (97%)	10 (3%)	2 (0%)	29	35
1	B	376/400 (94%)	365 (97%)	10 (3%)	1 (0%)	41	50
1	C	380/400 (95%)	366 (96%)	13 (3%)	1 (0%)	41	50
1	D	379/400 (95%)	367 (97%)	11 (3%)	1 (0%)	41	50
All	All	1509/1600 (94%)	1460 (97%)	44 (3%)	5 (0%)	41	50

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	360	GLN
1	C	371	TYR
1	A	263	GLY
1	D	360	GLN

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Mol	Chain	Res	Type
1	A	147	PHE

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	304/319 (95%)	284 (93%)	20 (7%)	16	22
1	B	306/319 (96%)	284 (93%)	22 (7%)	14	18
1	C	310/319 (97%)	293 (94%)	17 (6%)	21	30
1	D	309/319 (97%)	289 (94%)	20 (6%)	17	23
All	All	1229/1276 (96%)	1150 (94%)	79 (6%)	17	23

All (79) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ARG
1	A	37	GLN
1	A	90	ILE
1	A	94	LEU
1	A	118	LYS
1	A	121	ASP
1	A	128	THR
1	A	145	TRP
1	A	151	LYS
1	A	172	TYR
1	A	179	LEU
1	A	180	HIS
1	A	188	LEU
1	A	239	LEU
1	A	267	ARG
1	A	291	ASP
1	A	318	GLU
1	A	319	ARG
1	A	351	ARG
1	A	373	GLN

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Mol	Chain	Res	Type
1	B	37	GLN
1	B	62	LYS
1	B	90	ILE
1	B	118	LYS
1	B	128	THR
1	B	145	TRP
1	B	151	LYS
1	B	164	VAL
1	B	165	PRO
1	B	179	LEU
1	B	180	HIS
1	B	188	LEU
1	B	239	LEU
1	B	267	ARG
1	B	291	ASP
1	B	318	GLU
1	B	319	ARG
1	B	351	ARG
1	B	359	ARG
1	B	360	GLN
1	B	361	ASP
1	B	395	ARG
1	C	8	SER
1	C	25	ARG
1	C	37	GLN
1	C	62	LYS
1	C	145	TRP
1	C	150	ARG
1	C	151	LYS
1	C	179	LEU
1	C	180	HIS
1	C	188	LEU
1	C	239	LEU
1	C	267	ARG
1	C	291	ASP
1	C	318	GLU
1	C	319	ARG
1	C	351	ARG
1	C	373	GLN
1	D	25	ARG
1	D	37	GLN
1	D	62	LYS

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Mol	Chain	Res	Type
1	D	90	ILE
1	D	94	LEU
1	D	128	THR
1	D	137	LYS
1	D	145	TRP
1	D	178	LEU
1	D	179	LEU
1	D	180	HIS
1	D	188	LEU
1	D	197	LYS
1	D	239	LEU
1	D	264	MET
1	D	267	ARG
1	D	291	ASP
1	D	319	ARG
1	D	351	ARG
1	D	394	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (27) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	98	HIS
1	A	148	GLN
1	A	249	HIS
1	A	323	GLN
1	A	373	GLN
1	B	37	GLN
1	B	98	HIS
1	B	122	GLN
1	B	180	HIS
1	B	249	HIS
1	B	323	GLN
1	B	360	GLN
1	C	37	GLN
1	C	98	HIS
1	C	122	GLN
1	C	148	GLN
1	C	323	GLN
1	C	360	GLN
1	C	373	GLN
1	D	37	GLN
1	D	98	HIS

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Mol	Chain	Res	Type
1	D	122	GLN
1	D	148	GLN
1	D	249	HIS
1	D	297	GLN
1	D	323	GLN
1	D	328	HIS

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

4 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	B	1510	-	26,33,33	2.36	9 (34%)	31,52,52	3.48	9 (29%)
2	ATP	D	3510	-	26,33,33	2.33	8 (30%)	31,52,52	3.37	8 (25%)
2	ATP	C	2510	-	26,33,33	2.32	9 (34%)	31,52,52	3.35	7 (22%)
2	ATP	A	510	-	26,33,33	3.58	10 (38%)	31,52,52	3.69	11 (35%)

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	B	1510	-	-	1/18/38/38	0/3/3/3
2	ATP	D	3510	-	-	1/18/38/38	0/3/3/3
2	ATP	C	2510	-	-	1/18/38/38	0/3/3/3
2	ATP	A	510	-	1/1/7/7	1/18/38/38	0/3/3/3

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	510	ATP	O3'-C3'	-13.91	1.10	1.43
2	D	3510	ATP	O4'-C1'	6.08	1.49	1.41
2	C	2510	ATP	O4'-C1'	5.69	1.49	1.41
2	B	1510	ATP	O5'-C5'	-5.59	1.23	1.44
2	A	510	ATP	O5'-C5'	-5.57	1.23	1.44
2	B	1510	ATP	O4'-C1'	5.47	1.48	1.41
2	C	2510	ATP	O5'-C5'	-5.32	1.24	1.44
2	A	510	ATP	C4-N3	5.29	1.43	1.35
2	D	3510	ATP	C4-N3	5.10	1.42	1.35
2	D	3510	ATP	O5'-C5'	-4.98	1.25	1.44
2	B	1510	ATP	C4-N3	4.95	1.42	1.35
2	A	510	ATP	O4'-C1'	4.89	1.47	1.41
2	C	2510	ATP	C4-N3	4.83	1.42	1.35
2	A	510	ATP	PA-O5'	-3.37	1.45	1.59
2	B	1510	ATP	PA-O5'	-3.27	1.46	1.59
2	B	1510	ATP	C2'-C1'	3.19	1.58	1.53
2	C	2510	ATP	PA-O5'	-3.13	1.46	1.59
2	D	3510	ATP	C2'-C1'	3.05	1.58	1.53
2	D	3510	ATP	C3'-C4'	-2.93	1.45	1.53
2	D	3510	ATP	PA-O5'	-2.86	1.47	1.59
2	C	2510	ATP	C3'-C4'	-2.85	1.45	1.53
2	C	2510	ATP	C8-N7	-2.74	1.29	1.34
2	D	3510	ATP	C2-N3	2.70	1.36	1.32
2	A	510	ATP	C2-N3	2.66	1.36	1.32
2	A	510	ATP	C2'-C1'	2.60	1.57	1.53
2	B	1510	ATP	C8-N7	-2.53	1.30	1.34
2	A	510	ATP	C3'-C4'	-2.51	1.46	1.53
2	B	1510	ATP	C3'-C4'	-2.49	1.46	1.53
2	C	2510	ATP	C2'-C1'	2.42	1.57	1.53
2	B	1510	ATP	C2-N3	2.40	1.36	1.32
2	A	510	ATP	C5'-C4'	-2.35	1.44	1.51
2	C	2510	ATP	C2-N3	2.35	1.35	1.32
2	B	1510	ATP	C5'-C4'	-2.28	1.44	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	510	ATP	C8-N7	-2.22	1.30	1.34
2	C	2510	ATP	C5'-C4'	-2.13	1.45	1.51
2	D	3510	ATP	C8-N7	-2.12	1.30	1.34

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1510	ATP	O5'-C5'-C4'	15.11	161.00	108.99
2	C	2510	ATP	O5'-C5'-C4'	14.40	158.56	108.99
2	D	3510	ATP	O5'-C5'-C4'	14.32	158.28	108.99
2	A	510	ATP	O5'-C5'-C4'	12.63	152.47	108.99
2	A	510	ATP	O3'-C3'-C2'	-9.28	81.79	111.82
2	A	510	ATP	O3'-C3'-C4'	7.47	132.65	111.05
2	B	1510	ATP	C5'-C4'-C3'	-6.92	89.23	115.18
2	C	2510	ATP	C5'-C4'-C3'	-6.75	89.89	115.18
2	D	3510	ATP	C5'-C4'-C3'	-6.73	89.95	115.18
2	A	510	ATP	PA-O5'-C5'	5.64	154.73	121.68
2	A	510	ATP	C5'-C4'-C3'	-5.10	96.08	115.18
2	D	3510	ATP	PA-O5'-C5'	5.00	151.02	121.68
2	C	2510	ATP	PA-O5'-C5'	4.88	150.31	121.68
2	B	1510	ATP	PA-O5'-C5'	4.85	150.11	121.68
2	D	3510	ATP	O2A-PA-O5'	-3.59	91.09	107.75
2	C	2510	ATP	O4'-C4'-C3'	3.52	112.07	105.11
2	D	3510	ATP	O4'-C4'-C3'	3.51	112.06	105.11
2	A	510	ATP	O4'-C4'-C3'	3.42	111.88	105.11
2	B	1510	ATP	O4'-C4'-C3'	3.40	111.85	105.11
2	A	510	ATP	O2A-PA-O5'	-3.24	92.70	107.75
2	B	1510	ATP	O2A-PA-O5'	-3.14	93.14	107.75
2	C	2510	ATP	O2A-PA-O5'	-3.01	93.75	107.75
2	D	3510	ATP	C3'-C2'-C1'	2.92	105.37	100.98
2	C	2510	ATP	C4-C5-N7	2.72	112.23	109.40
2	B	1510	ATP	C4-C5-N7	2.69	112.21	109.40
2	C	2510	ATP	C3'-C2'-C1'	2.69	105.03	100.98
2	A	510	ATP	C3'-C2'-C1'	2.68	105.01	100.98
2	B	1510	ATP	C3'-C2'-C1'	2.54	104.81	100.98
2	D	3510	ATP	C4-C5-N7	2.54	112.05	109.40
2	A	510	ATP	C4-C5-N7	2.52	112.02	109.40
2	A	510	ATP	O5'-PA-O1A	-2.33	99.95	109.07
2	B	1510	ATP	O3'-C3'-C4'	2.28	117.63	111.05
2	A	510	ATP	O2A-PA-O1A	2.18	123.02	112.24
2	B	1510	ATP	O5'-PA-O1A	-2.17	100.61	109.07
2	D	3510	ATP	O3'-C3'-C4'	2.05	116.99	111.05

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	510	ATP	C3'

All (4) torsion outliers are listed below:

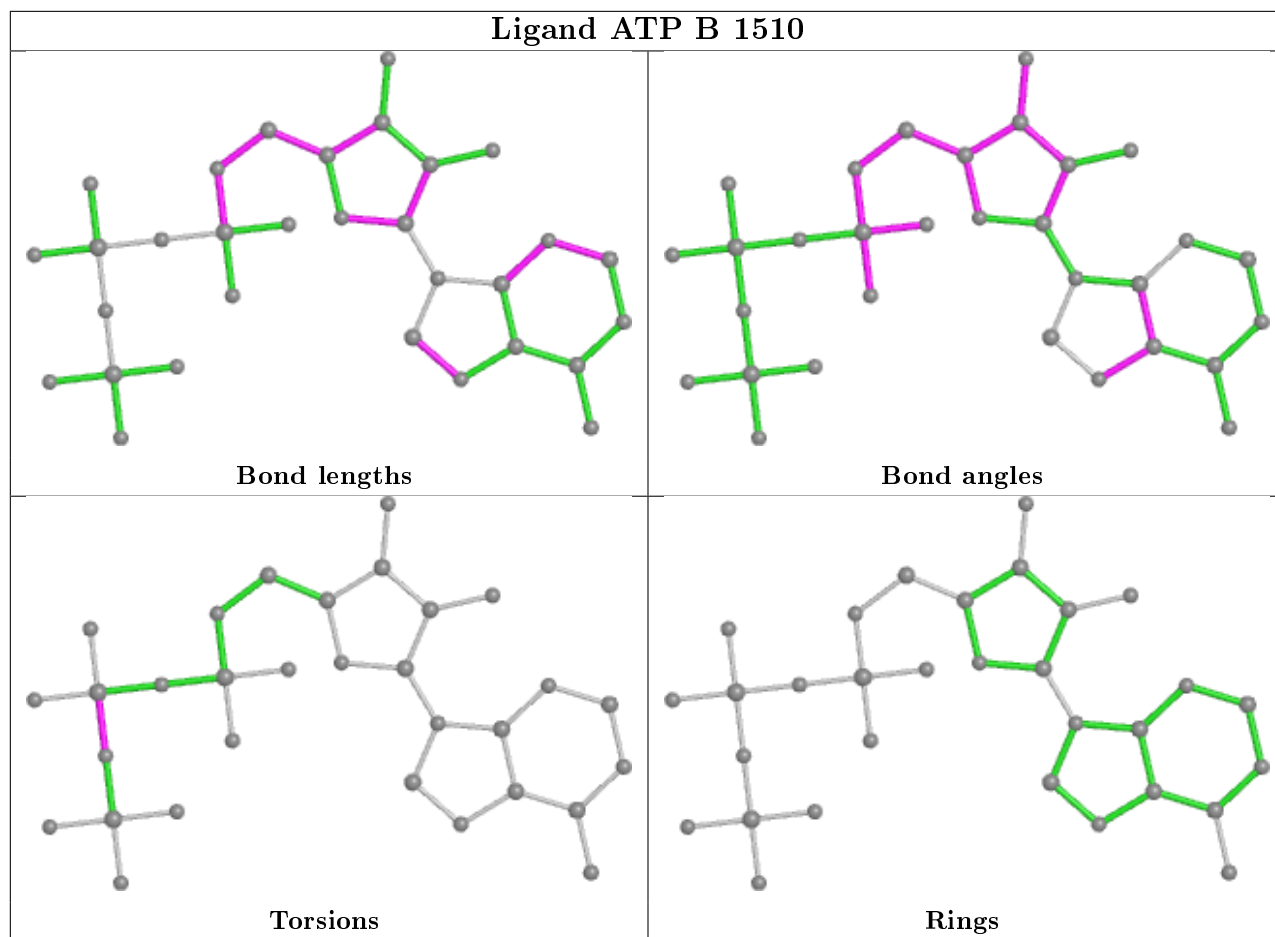
Mol	Chain	Res	Type	Atoms
2	D	3510	ATP	PG-O3B-PB-O2B
2	B	1510	ATP	PG-O3B-PB-O2B
2	C	2510	ATP	PG-O3B-PB-O2B
2	A	510	ATP	PG-O3B-PB-O1B

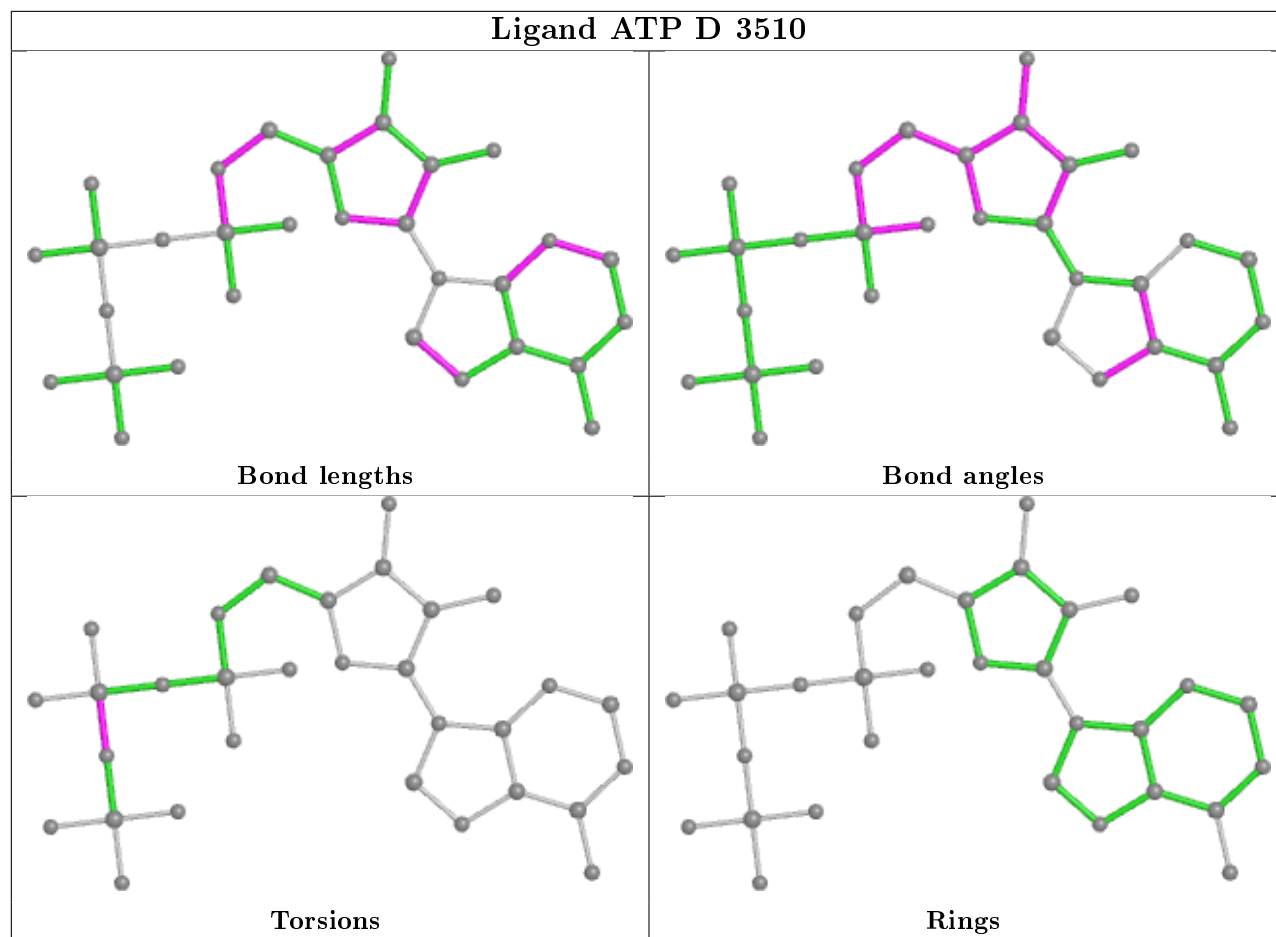
There are no ring outliers.

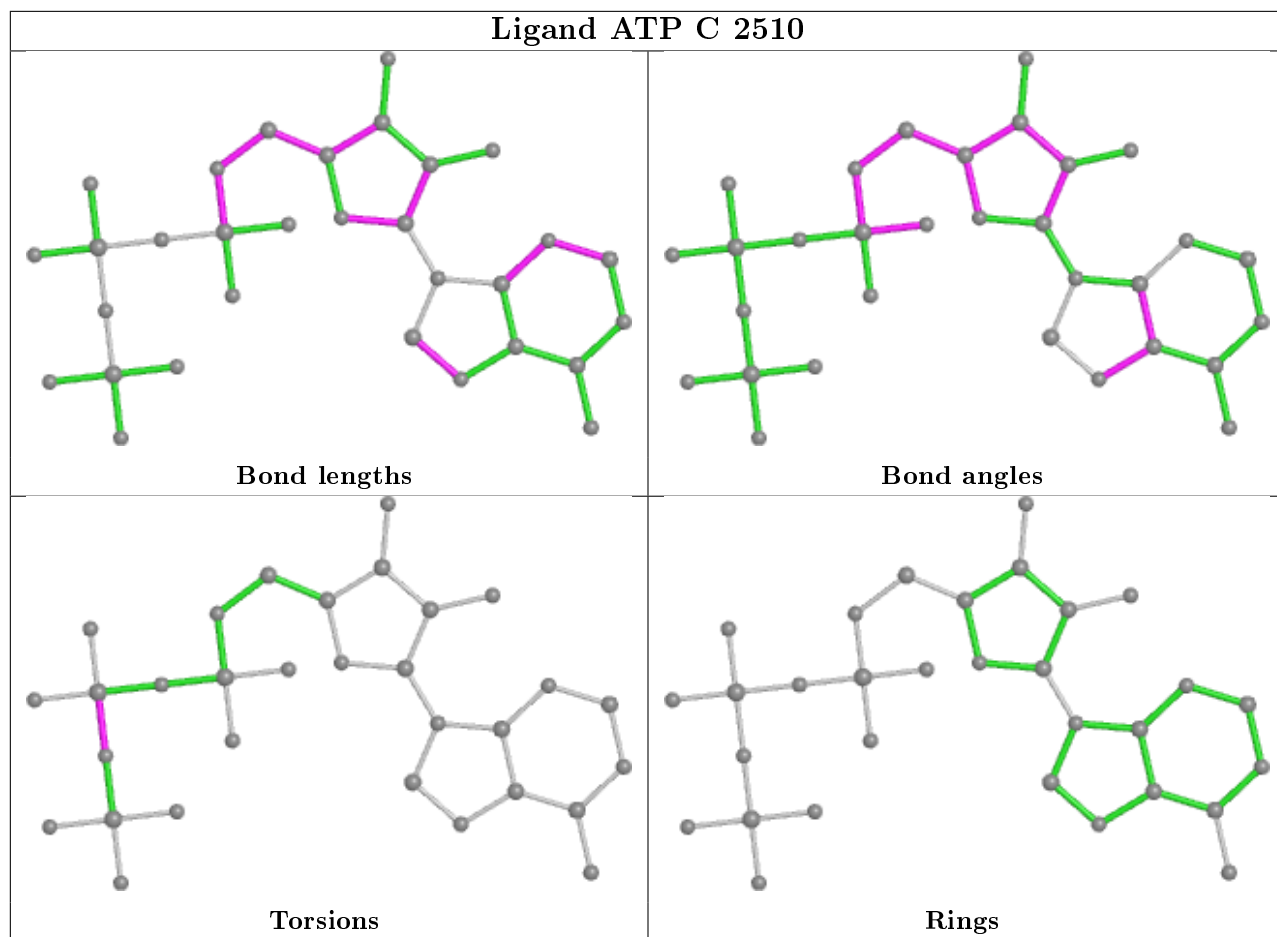
4 monomers are involved in 16 short contacts:

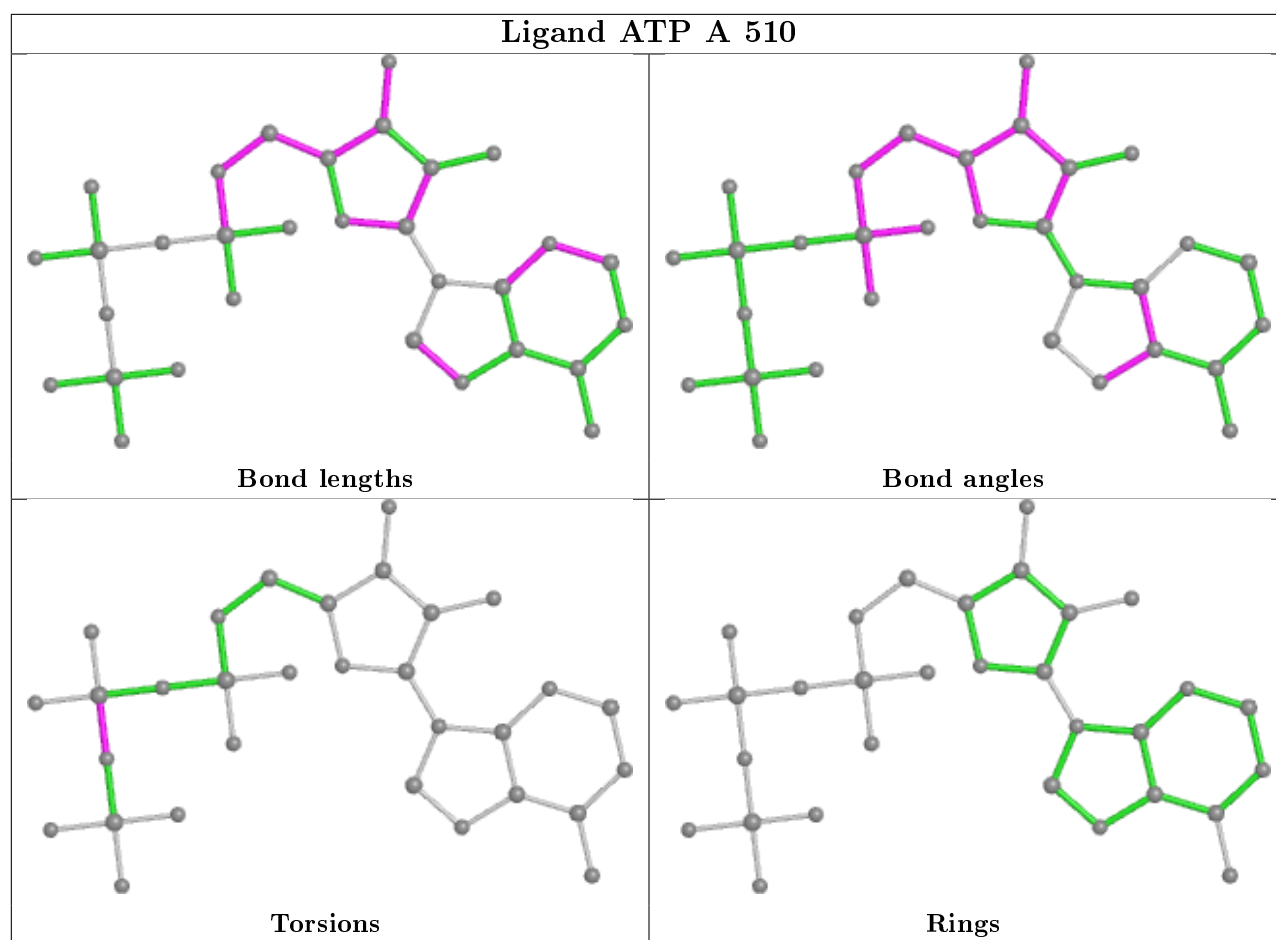
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1510	ATP	3	0
2	D	3510	ATP	4	0
2	C	2510	ATP	4	0
2	A	510	ATP	5	0

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 than 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.









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(Å ²)	Q<0.9
1	A	380/400 (95%)	-0.31	9 (2%) 59 66	19, 30, 54, 76	0
1	B	382/400 (95%)	-0.33	7 (1%) 68 74	20, 29, 48, 83	0
1	C	386/400 (96%)	-0.14	18 (4%) 31 38	20, 33, 61, 91	0
1	D	385/400 (96%)	-0.13	17 (4%) 34 41	19, 33, 63, 98	0
All	All	1533/1600 (95%)	-0.23	51 (3%) 46 53	19, 31, 57, 98	0

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	361	ASP	9.4
1	D	364	SER	7.6
1	D	362	LEU	7.5
1	D	363	VAL	7.3
1	C	365	PHE	7.0
1	B	360	GLN	5.9
1	D	360	GLN	5.8
1	C	165	PRO	5.7
1	C	364	SER	4.5
1	D	165	PRO	4.4
1	D	361	ASP	4.3
1	A	165	PRO	3.9
1	C	370	GLY	3.8
1	C	361	ASP	3.4
1	D	38	GLY	3.4
1	D	159	ALA	3.4
1	D	201	ARG	2.9
1	A	38	GLY	2.9
1	C	360	GLN	2.9
1	D	395	ARG	2.9
1	B	165	PRO	2.8

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Mol	Chain	Res	Type	RSRZ
1	C	40	GLU	2.8
1	A	149	GLY	2.7
1	C	392	LEU	2.6
1	D	161	GLY	2.6
1	D	371	TYR	2.6
1	A	171	PRO	2.5
1	B	373	GLN	2.5
1	C	395	ARG	2.5
1	A	395	ARG	2.4
1	B	118	LYS	2.4
1	A	370	GLY	2.4
1	A	197	LYS	2.4
1	C	43	GLU	2.4
1	B	173	SER	2.3
1	C	39	GLU	2.3
1	D	40	GLU	2.2
1	A	159	ALA	2.2
1	D	359	ARG	2.2
1	B	38	GLY	2.2
1	C	50	ARG	2.2
1	C	362	LEU	2.2
1	D	171	PRO	2.1
1	C	164	VAL	2.1
1	C	394	GLU	2.1
1	A	5	LEU	2.1
1	C	371	TYR	2.1
1	C	150	ARG	2.1
1	D	39	GLU	2.1
1	D	164	VAL	2.1
1	C	25	ARG	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](#)

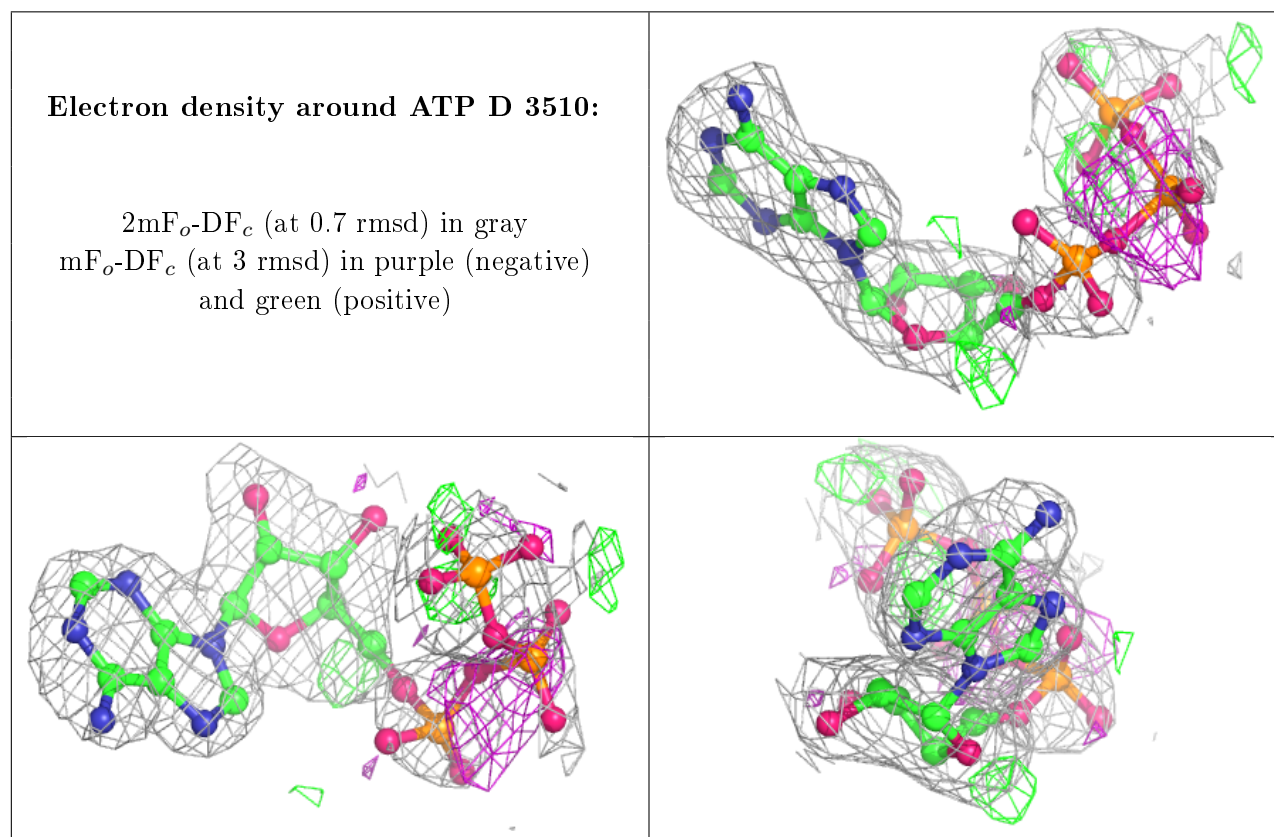
There are no carbohydrates in this entry.

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.

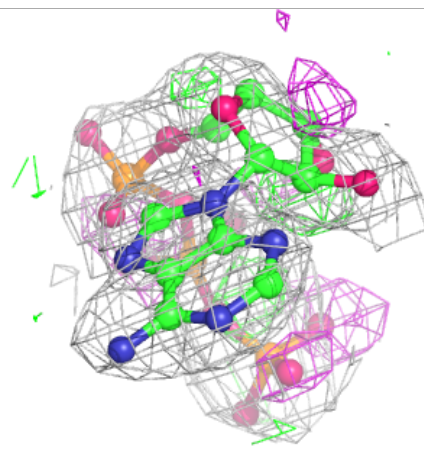
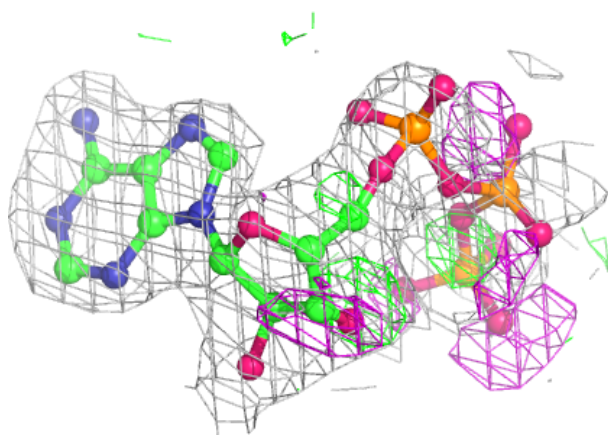
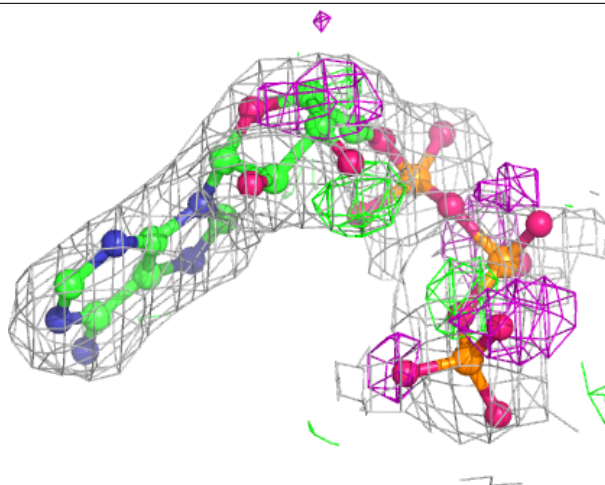
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	ATP	D	3510	31/31	0.76	0.24	37,54,100,100	0
2	ATP	A	510	31/31	0.81	0.22	30,50,100,100	0
2	ATP	C	2510	31/31	0.82	0.20	32,45,100,100	0
2	ATP	B	1510	31/31	0.84	0.18	23,42,100,100	0

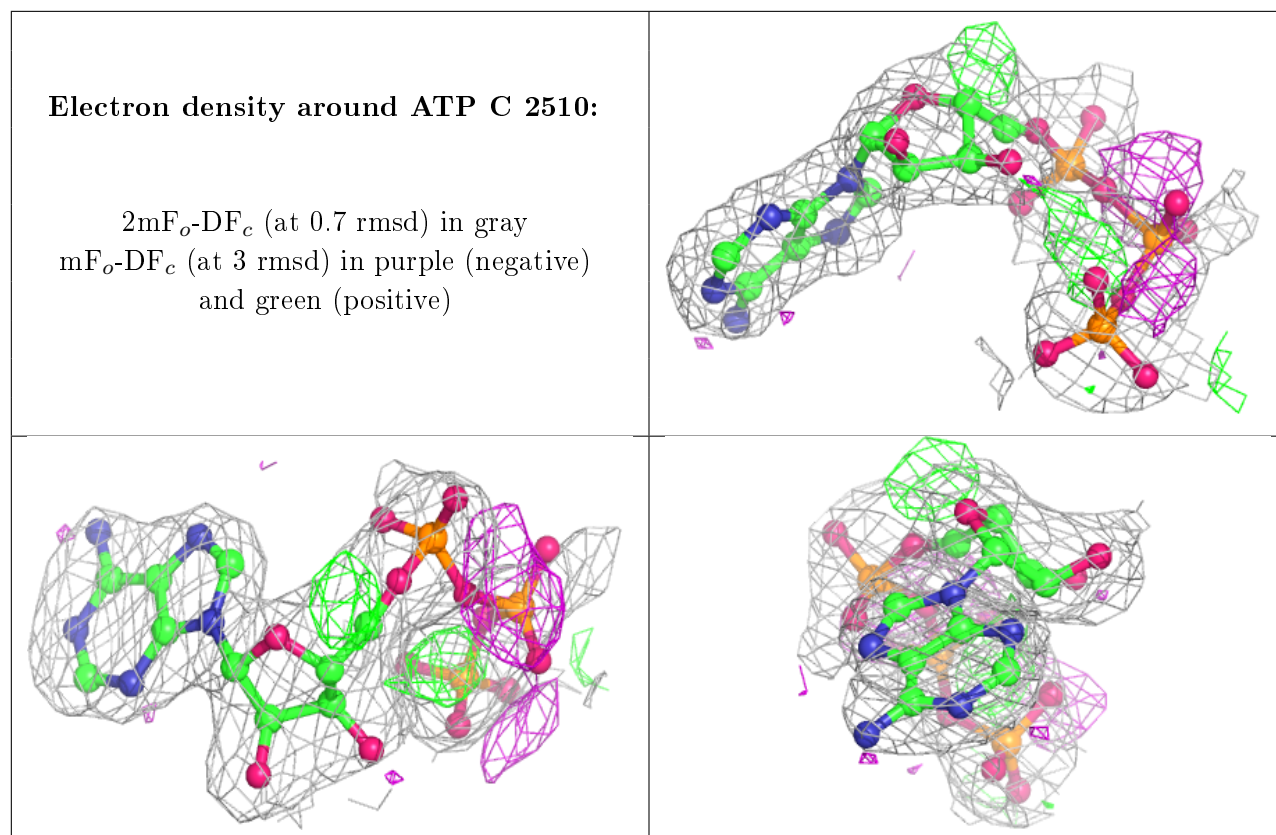
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

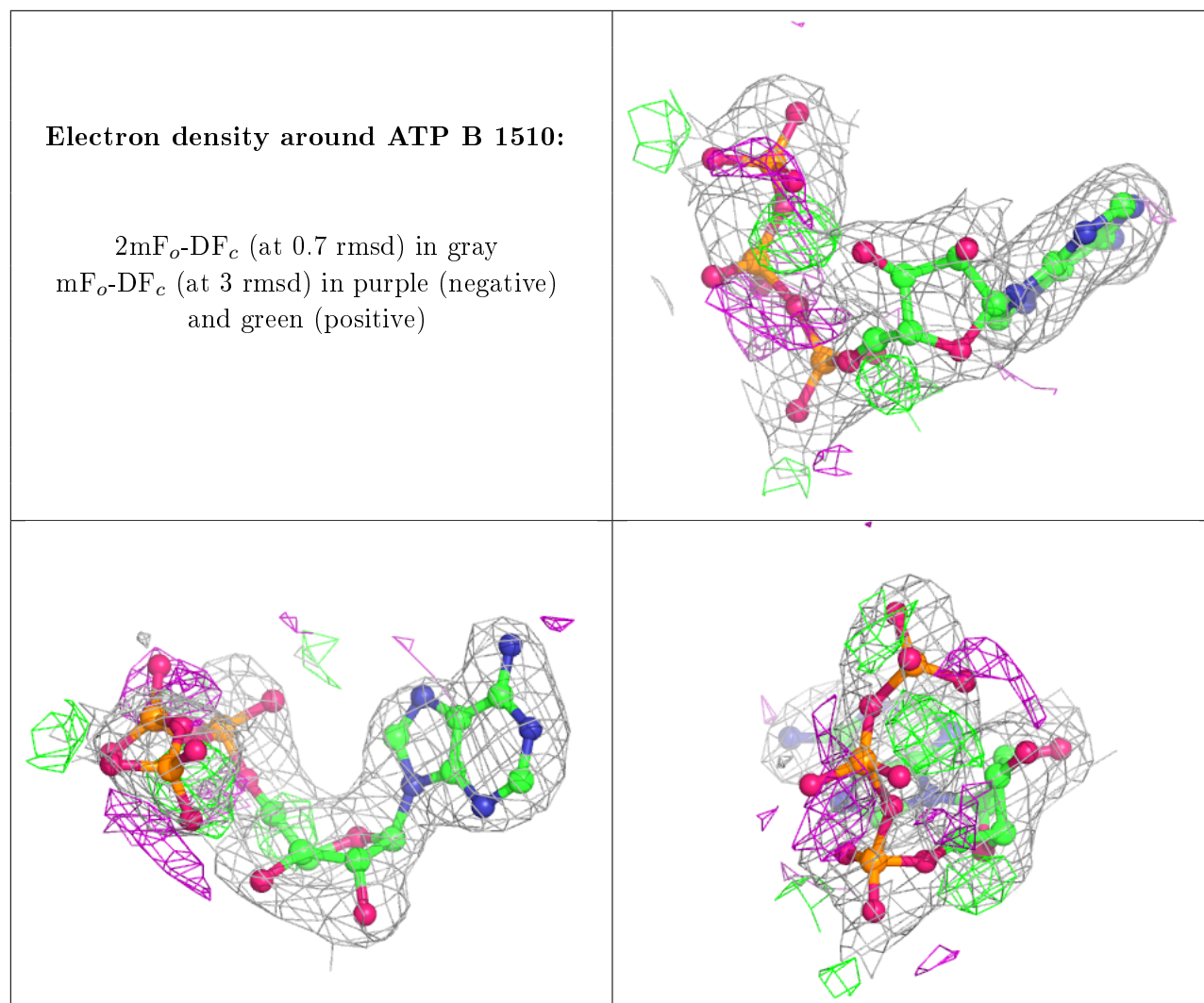


Electron density around ATP A 510:

$2mF_o-DF_c$ (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.