



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 14, 2020 – 01:37 PM BST

PDB ID : 6WA8  
Title : Crystal structure of the E. coli transcription termination factor Rho  
Authors : Fan, C.; Rees, D.C.  
Deposited on : 2020-03-24  
Resolution : 3.30 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](mailto: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.

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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 : 2.14.4.dev1  
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) : 2.14.4.dev1

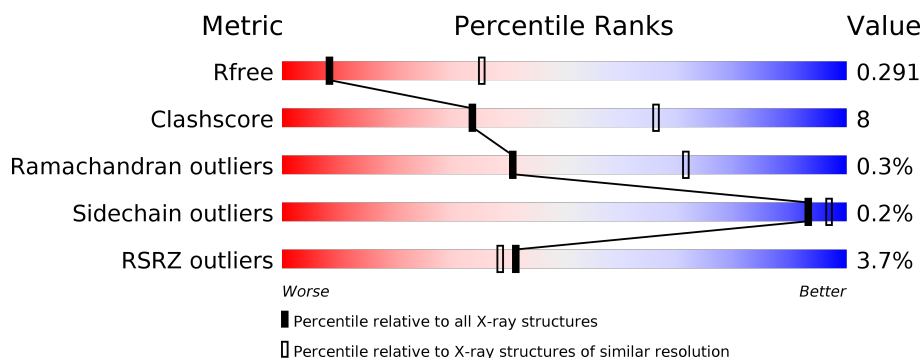
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.30 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	1149 (3.34-3.26)
Clashscore	141614	1205 (3.34-3.26)
Ramachandran outliers	138981	1183 (3.34-3.26)
Sidechain outliers	138945	1182 (3.34-3.26)
RSRZ outliers	127900	1115 (3.34-3.26)

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  $\geq 3$ , 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	419	<div> <div>6%</div> <div> <div></div> <div>81%</div> <div>19%</div> </div> </div>
1	B	419	<div> <div></div> <div> <div>73%</div> <div>25%</div> <div></div> </div> </div>
1	C	419	<div> <div></div> <div> <div></div> <div>79%</div> <div>20%</div> </div> </div>
1	D	419	<div> <div>3%</div> <div> <div></div> <div>75%</div> <div>24%</div> </div> </div>
1	E	419	<div> <div>2%</div> <div> <div></div> <div>76%</div> <div>22%</div> </div> </div>
1	F	419	<div> <div>11%</div> <div> <div></div> <div>81%</div> <div>18%</div> </div> </div>

## 2 Entry composition [i](#)

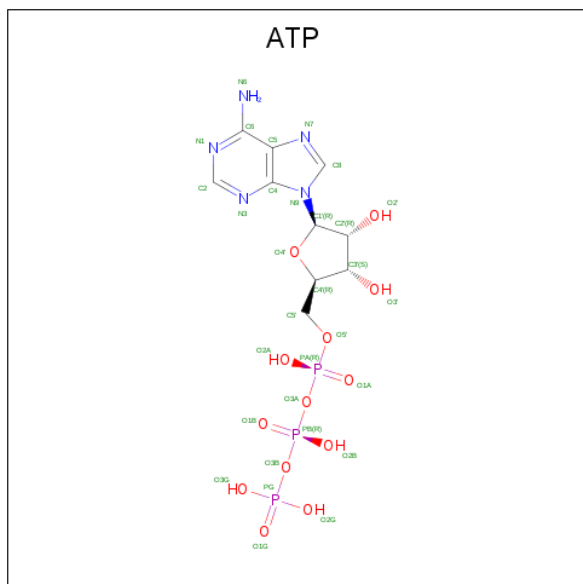
There are 2 unique types of molecules in this entry. The entry contains 19776 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Transcription termination factor Rho.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	417	Total	C	N	O	S	0	0	0
			3280	2065	581	617	17			
1	B	412	Total	C	N	O	S	0	0	0
			3235	2035	575	610	15			
1	C	417	Total	C	N	O	S	0	0	0
			3280	2065	581	617	17			
1	D	417	Total	C	N	O	S	0	0	0
			3280	2065	581	617	17			
1	E	412	Total	C	N	O	S	0	0	0
			3235	2035	575	610	15			
1	F	417	Total	C	N	O	S	0	0	0
			3280	2065	581	617	17			

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula:  $C_{10}H_{16}N_5O_{13}P_3$ ) (labeled as "Ligand of Interest" by author).

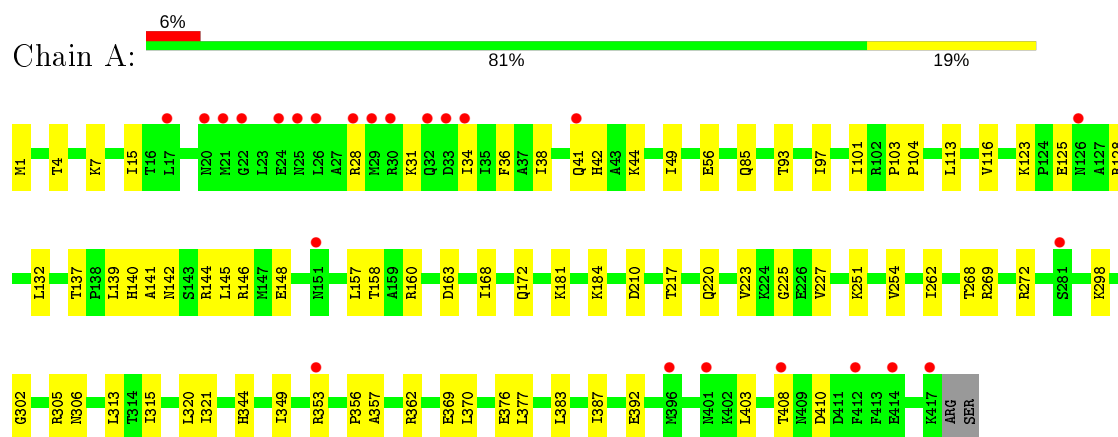


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	D	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	E	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
2	F	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

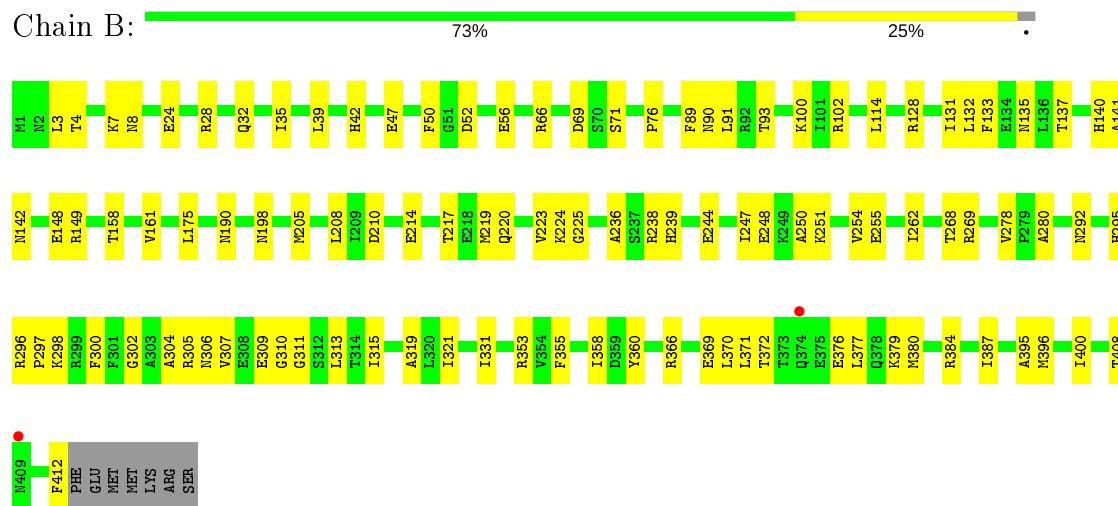
### 3 Residue-property plots [i](#)

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.

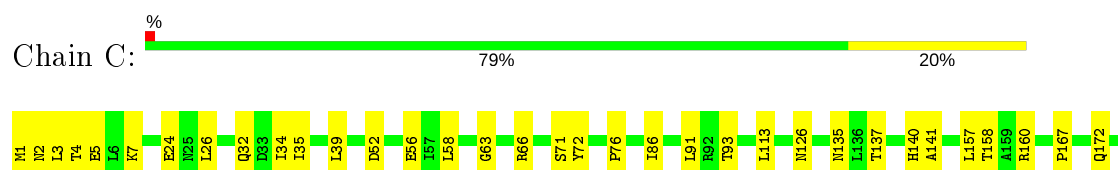
#### • Molecule 1: Transcription termination factor Rho

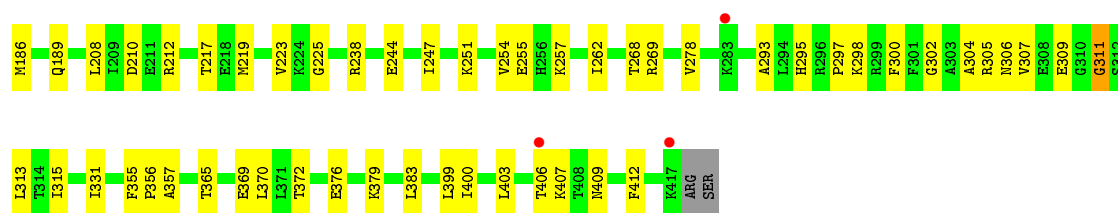


#### • Molecule 1: Transcription termination factor Rho

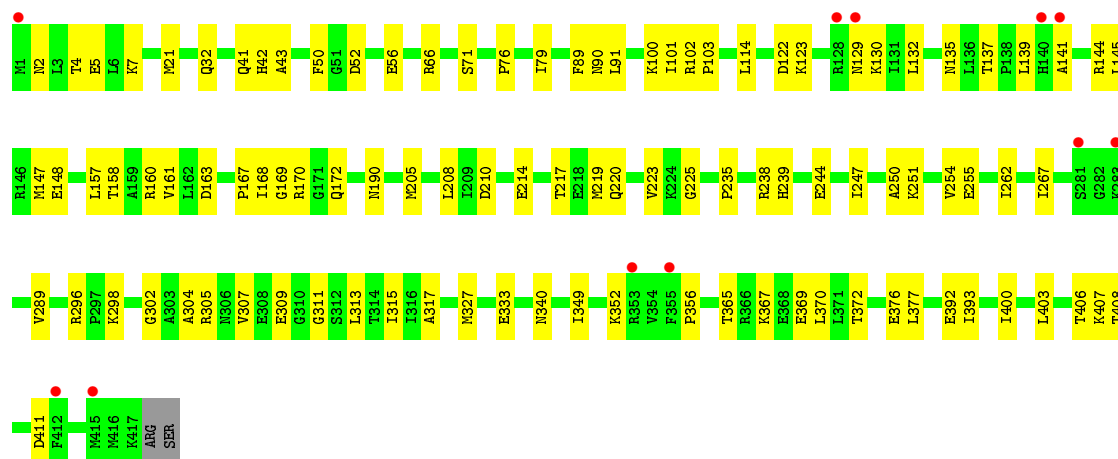
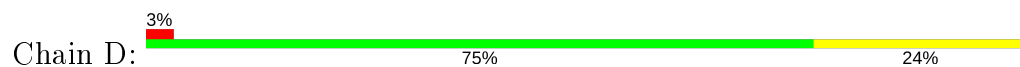


#### • Molecule 1: Transcription termination factor Rho

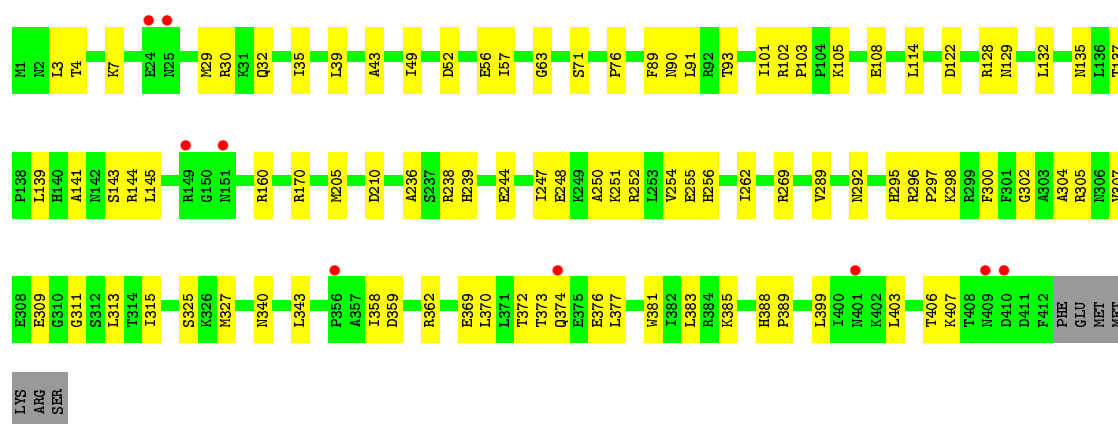
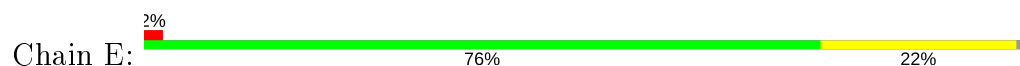




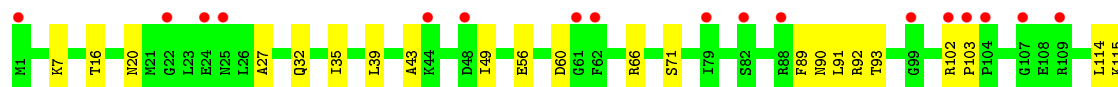
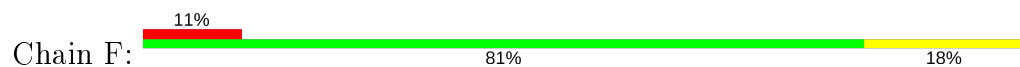
• Molecule 1: Transcription termination factor Rho

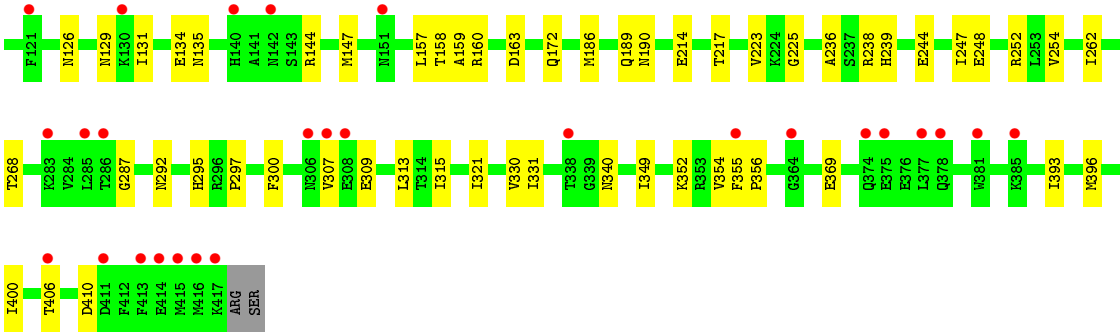


• Molecule 1: Transcription termination factor Rho



• Molecule 1: Transcription termination factor Rho





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	161.75Å 101.90Å 184.02Å 90.00° 107.77° 90.00°	Depositor
Resolution (Å)	39.79 – 3.30 39.79 – 3.30	Depositor EDS
% Data completeness (in resolution range)	99.7 (39.79-3.30) 99.7 (39.79-3.30)	Depositor EDS
$R_{merge}$	0.21	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.82 (at 3.32Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, $R_{free}$	0.252 , 0.296 0.248 , 0.291	Depositor DCC
$R_{free}$ test set	2098 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	90.4	Xtriage
Anisotropy	0.088	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 51.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	19776	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	101.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.53% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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

### 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	0.24	0/3329	0.41	0/4483
1	B	0.24	0/3283	0.43	0/4424
1	C	0.24	0/3329	0.43	0/4483
1	D	0.24	0/3329	0.43	0/4483
1	E	0.24	0/3283	0.42	0/4424
1	F	0.24	0/3329	0.41	0/4483
All	All	0.24	0/19882	0.42	0/26780

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	3280	0	3359	52	0
1	B	3235	0	3313	65	0
1	C	3280	0	3359	55	0
1	D	3280	0	3359	66	0
1	E	3235	0	3313	62	0
1	F	3280	0	3359	50	0
2	A	31	0	12	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	31	0	12	2	0
2	C	31	0	12	1	0
2	D	31	0	12	0	0
2	E	31	0	12	1	0
2	F	31	0	12	0	0
All	All	19776	0	20134	338	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 8.

All (338) 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:E:102:ARG:HB3	1:E:114:LEU:HG	1.67	0.76
1:F:102:ARG:HB3	1:F:114:LEU:HG	1.67	0.76
1:B:3:LEU:HD13	1:B:39:LEU:HD11	1.69	0.75
1:B:102:ARG:HB3	1:B:114:LEU:HG	1.70	0.74
1:C:3:LEU:HD13	1:C:39:LEU:HD11	1.72	0.71
1:A:132:LEU:HD22	1:A:251:LYS:HG2	1.73	0.69
1:C:379:LYS:HD3	1:C:412:PHE:HB3	1.74	0.69
1:C:210:ASP:HB3	1:C:269:ARG:HD2	1.74	0.69
1:E:141:ALA:HB1	1:E:370:LEU:HB2	1.75	0.68
1:C:137:THR:HG23	1:C:305:ARG:HB2	1.75	0.67
2:B:501:ATP:H8	2:B:501:ATP:H5'1	1.60	0.67
1:A:392:GLU:OE1	1:F:292:ASN:ND2	2.27	0.66
1:C:254:VAL:HG21	1:C:313:LEU:HB2	1.76	0.66
1:B:376:GLU:HG3	1:B:379:LYS:HE2	1.79	0.66
1:C:141:ALA:HB1	1:C:370:LEU:HB2	1.78	0.66
1:B:132:LEU:HD12	1:B:251:LYS:HG2	1.77	0.65
1:D:129:ASN:HD21	1:E:29:MET:H	1.43	0.65
1:E:56:GLU:HA	1:E:93:THR:HG23	1.77	0.65
1:B:210:ASP:HB3	1:B:269:ARG:HD2	1.77	0.65
1:B:56:GLU:HA	1:B:93:THR:HG23	1.78	0.65
1:F:43:ALA:HB1	1:F:103:PRO:HG3	1.78	0.65
1:F:254:VAL:HG21	1:F:313:LEU:HB2	1.78	0.64
1:F:158:THR:OG1	1:F:190:ASN:ND2	2.30	0.64
1:B:278:VAL:HG12	1:B:280:ALA:H	1.63	0.64
1:B:7:LYS:HG2	1:B:35:ILE:HD13	1.79	0.63
1:E:144:ARG:NH1	1:E:376:GLU:OE1	2.30	0.63
1:F:114:LEU:HB3	1:F:115:LYS:HD2	1.80	0.63
1:A:262:ILE:HB	1:A:315:ILE:HG12	1.81	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:372:THR:HB	1:D:376:GLU:HB3	1.81	0.62
1:D:137:THR:HG23	1:D:305:ARG:HB2	1.81	0.62
2:E:501:ATP:H5'1	2:E:501:ATP:H8	1.63	0.62
1:E:7:LYS:HG2	1:E:35:ILE:HD13	1.81	0.62
1:D:223:VAL:HG12	1:D:225:GLY:H	1.63	0.62
1:E:4:THR:OG1	1:E:52:ASP:OD1	2.17	0.62
1:B:4:THR:OG1	1:B:52:ASP:OD1	2.18	0.62
1:D:158:THR:OG1	1:D:190:ASN:ND2	2.33	0.62
1:B:158:THR:OG1	1:B:190:ASN:ND2	2.33	0.61
1:F:158:THR:HG22	1:F:356:PRO:HG3	1.82	0.61
1:E:210:ASP:HB3	1:E:269:ARG:HD2	1.83	0.61
1:E:369:GLU:HA	1:E:377:LEU:HD21	1.84	0.60
1:A:160:ARG:HD3	1:A:408:THR:HA	1.83	0.60
1:E:236:ALA:HA	1:E:239:HIS:HD2	1.65	0.60
1:B:8:ASN:ND2	1:B:69:ASP:OD2	2.34	0.60
1:F:236:ALA:HA	1:F:239:HIS:HD2	1.66	0.60
1:D:145:LEU:HD11	1:D:170:ARG:HG2	1.83	0.60
1:B:223:VAL:HG12	1:B:225:GLY:H	1.67	0.60
1:F:223:VAL:HG12	1:F:225:GLY:H	1.66	0.60
1:F:39:LEU:HD22	1:F:49:ILE:HD12	1.83	0.59
1:E:254:VAL:HG21	1:E:313:LEU:HB2	1.83	0.59
1:A:254:VAL:HG21	1:A:313:LEU:HB2	1.84	0.59
1:E:372:THR:HB	1:E:376:GLU:HB3	1.83	0.59
1:E:244:GLU:OE1	1:E:296:ARG:NH2	2.36	0.59
1:A:160:ARG:HB3	1:A:403:LEU:HD21	1.84	0.59
1:D:132:LEU:HD22	1:D:251:LYS:HG2	1.83	0.59
1:F:89:PHE:HB2	1:F:91:LEU:HG	1.85	0.58
1:B:254:VAL:HG21	1:B:313:LEU:HB2	1.84	0.58
1:F:16:THR:O	1:F:20:ASN:ND2	2.34	0.58
1:C:383:LEU:HD21	1:C:399:LEU:HD21	1.85	0.58
1:C:4:THR:OG1	1:C:52:ASP:OD1	2.19	0.58
1:D:139:LEU:HD23	1:D:367:LYS:HG3	1.85	0.58
1:F:172:GLN:HB2	1:F:340:ASN:HD21	1.67	0.58
1:A:137:THR:HG23	1:A:305:ARG:HB2	1.86	0.58
1:D:158:THR:HG22	1:D:356:PRO:HG3	1.86	0.58
1:E:160:ARG:NH1	1:E:403:LEU:O	2.36	0.58
1:A:34:ILE:HG13	1:A:36:PHE:H	1.69	0.57
1:C:257:LYS:HA	1:C:311:GLY:H	1.69	0.57
1:A:144:ARG:NH1	1:A:376:GLU:OE1	2.37	0.57
1:F:56:GLU:OE1	1:F:66:ARG:NE	2.37	0.57
1:B:236:ALA:HA	1:B:239:HIS:HD2	1.70	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:137:THR:HG23	1:E:305:ARG:HB2	1.87	0.57
1:F:160:ARG:NH1	1:F:406:THR:O	2.38	0.57
1:C:157:LEU:HD21	1:C:400:ILE:HG23	1.85	0.57
1:A:223:VAL:HG12	1:A:225:GLY:H	1.70	0.56
1:C:24:GLU:OE1	1:C:24:GLU:N	2.38	0.56
1:D:254:VAL:HG21	1:D:313:LEU:HB2	1.87	0.56
1:E:71:SER:O	1:E:238:ARG:NH2	2.39	0.56
1:A:181:LYS:NZ	1:F:60:ASP:O	2.37	0.56
1:D:4:THR:OG1	1:D:52:ASP:OD1	2.24	0.55
1:F:126:ASN:OD1	1:F:129:ASN:ND2	2.40	0.55
1:C:262:ILE:HB	1:C:315:ILE:HG12	1.87	0.55
1:E:160:ARG:HB3	1:E:403:LEU:HD21	1.88	0.55
1:D:168:ILE:HA	1:D:172:GLN:HE22	1.72	0.55
1:E:132:LEU:HD13	1:E:251:LYS:HG2	1.87	0.55
1:E:383:LEU:HD21	1:E:399:LEU:HD21	1.89	0.55
1:C:158:THR:HG22	1:C:356:PRO:HG3	1.88	0.54
1:C:407:LYS:HE3	1:C:409:ASN:HB3	1.88	0.54
1:D:210:ASP:OD1	1:D:239:HIS:NE2	2.41	0.54
1:E:135:ASN:HB3	1:E:307:VAL:HG13	1.89	0.54
1:D:244:GLU:OE1	1:D:296:ARG:NH1	2.41	0.54
1:A:210:ASP:HB3	1:A:269:ARG:HD2	1.89	0.54
1:B:71:SER:O	1:B:238:ARG:NH2	2.37	0.54
1:D:4:THR:HA	1:D:7:LYS:HE2	1.88	0.54
1:B:360:TYR:HE1	1:B:384:ARG:HG2	1.73	0.54
1:D:102:ARG:HB3	1:D:114:LEU:HG	1.89	0.54
1:F:71:SER:O	1:F:238:ARG:NH2	2.40	0.54
1:E:406:THR:HG22	1:E:407:LYS:H	1.73	0.53
1:A:141:ALA:HB1	1:A:370:LEU:HB2	1.90	0.53
1:F:297:PRO:O	1:F:300:PHE:HB3	2.08	0.53
1:A:85:GLN:NE2	1:A:113:LEU:O	2.37	0.53
1:F:369:GLU:OE1	1:F:369:GLU:N	2.42	0.53
1:B:24:GLU:N	1:B:24:GLU:OE1	2.41	0.53
1:F:89:PHE:O	1:F:91:LEU:N	2.42	0.53
1:A:15:ILE:HD11	1:A:38:ILE:HD13	1.91	0.53
1:C:355:PHE:O	1:C:357:ALA:N	2.42	0.53
1:D:56:GLU:OE1	1:D:66:ARG:NE	2.41	0.53
1:F:355:PHE:HB2	1:F:356:PRO:HD3	1.91	0.53
1:C:135:ASN:HB3	1:C:307:VAL:HG13	1.90	0.53
1:C:369:GLU:N	1:C:369:GLU:OE1	2.41	0.53
1:A:369:GLU:HA	1:A:377:LEU:HD11	1.91	0.53
1:B:42:HIS:CE1	1:B:47:GLU:HB3	2.43	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:158:THR:HG22	1:A:356:PRO:HB3	1.90	0.52
1:B:372:THR:HB	1:B:376:GLU:HB3	1.91	0.52
1:E:373:THR:HG22	1:E:374:GLN:N	2.24	0.52
1:A:298:LYS:O	1:A:302:GLY:N	2.37	0.52
1:B:396:MET:O	1:B:400:ILE:HG13	2.09	0.52
1:F:135:ASN:HB3	1:F:307:VAL:HG13	1.92	0.51
1:D:262:ILE:HB	1:D:315:ILE:HG12	1.90	0.51
1:D:352:LYS:HD2	1:D:393:ILE:HD11	1.91	0.51
1:B:161:VAL:HG12	1:B:358:ILE:HD12	1.93	0.51
1:E:43:ALA:HB1	1:E:103:PRO:HB3	1.92	0.51
1:F:287:GLY:HA3	1:F:330:VAL:HG21	1.91	0.51
1:C:26:LEU:HD13	1:C:34:ILE:HG23	1.93	0.51
1:D:369:GLU:OE1	1:D:369:GLU:N	2.43	0.50
1:D:160:ARG:NH1	1:D:403:LEU:HG	2.26	0.50
1:B:360:TYR:CE1	1:B:384:ARG:HG2	2.46	0.50
1:E:369:GLU:OE1	1:E:369:GLU:N	2.42	0.50
1:B:369:GLU:N	1:B:369:GLU:OE1	2.42	0.50
1:E:122:ASP:OD2	1:E:128:ARG:NH1	2.44	0.50
1:A:56:GLU:HA	1:A:93:THR:HG23	1.94	0.50
1:D:172:GLN:HG3	1:D:340:ASN:HD21	1.77	0.50
1:F:7:LYS:HG2	1:F:35:ILE:HD13	1.93	0.50
1:C:71:SER:O	1:C:238:ARG:NH2	2.39	0.50
1:D:147:MET:N	1:D:163:ASP:OD2	2.44	0.50
1:D:251:LYS:O	1:D:255:GLU:HG3	2.11	0.50
1:D:43:ALA:HB1	1:D:103:PRO:HG3	1.94	0.50
1:E:32:GLN:HB3	1:E:76:PRO:HD2	1.94	0.49
1:F:352:LYS:HB3	1:F:354:VAL:HG23	1.95	0.49
1:D:369:GLU:HA	1:D:377:LEU:HD11	1.93	0.49
1:E:343:LEU:HD21	1:E:358:ILE:HD13	1.93	0.49
1:B:89:PHE:O	1:B:91:LEU:N	2.46	0.49
1:D:89:PHE:O	1:D:91:LEU:N	2.45	0.49
1:D:71:SER:O	1:D:238:ARG:NH2	2.43	0.49
2:B:501:ATP:C8	2:B:501:ATP:H5'1	2.47	0.49
1:D:135:ASN:HB3	1:D:307:VAL:HG13	1.95	0.49
1:E:298:LYS:O	1:E:302:GLY:N	2.44	0.49
1:B:353:ARG:HD3	1:B:355:PHE:CE2	2.48	0.49
1:A:148:GLU:N	1:A:163:ASP:OD2	2.46	0.49
1:A:383:LEU:O	1:A:387:ILE:HG12	2.13	0.49
1:F:92:ARG:HB2	1:F:252:ARG:HD2	1.94	0.49
1:B:369:GLU:HA	1:B:377:LEU:HD11	1.96	0.48
1:F:144:ARG:NH2	1:F:163:ASP:O	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:349:ILE:HG12	1:F:393:ILE:HG12	1.94	0.48
1:C:58:LEU:HD23	1:C:63:GLY:HA2	1.95	0.48
1:D:42:HIS:O	1:D:42:HIS:ND1	2.45	0.48
1:E:369:GLU:HA	1:E:377:LEU:HD11	1.95	0.48
1:C:372:THR:HB	1:C:376:GLU:HB3	1.95	0.48
1:B:268:THR:HA	1:B:331:ILE:HG21	1.95	0.48
1:C:2:ASN:ND2	1:C:5:GLU:OE1	2.33	0.48
1:D:406:THR:HG21	1:D:411:ASP:HA	1.94	0.48
1:B:142:ASN:HB2	1:B:306:ASN:HD21	1.77	0.48
1:C:186:MET:HA	1:C:189:GLN:HG2	1.95	0.48
1:F:292:ASN:O	1:F:295:HIS:HB3	2.14	0.48
1:B:148:GLU:HB3	1:B:408:THR:HB	1.95	0.48
1:D:130:LYS:O	1:D:255:GLU:HG2	2.14	0.48
1:D:2:ASN:HB3	1:D:5:GLU:HG3	1.94	0.48
1:D:160:ARG:NH1	1:D:406:THR:O	2.47	0.47
1:D:50:PHE:CE1	1:D:100:LYS:HG2	2.49	0.47
1:E:57:ILE:HA	1:E:63:GLY:HA3	1.97	0.47
1:A:4:THR:HA	1:A:7:LYS:HE2	1.97	0.47
1:C:167:PRO:O	1:C:365:THR:HG21	2.13	0.47
1:D:172:GLN:HG3	1:D:340:ASN:ND2	2.29	0.47
1:D:298:LYS:O	1:D:302:GLY:N	2.43	0.47
1:B:251:LYS:O	1:B:255:GLU:HG3	2.14	0.47
1:B:297:PRO:O	1:B:300:PHE:HB3	2.14	0.47
1:C:160:ARG:NH2	1:C:406:THR:O	2.48	0.47
1:D:309:GLU:N	1:D:309:GLU:OE1	2.45	0.47
1:E:139:LEU:HD23	1:F:214:GLU:HG3	1.95	0.47
1:A:142:ASN:HB2	1:A:306:ASN:HD21	1.79	0.47
1:A:49:ILE:HG13	1:A:101:ILE:HG13	1.96	0.47
1:B:262:ILE:HB	1:B:315:ILE:HG12	1.96	0.47
1:E:381:TRP:CD1	1:E:385:LYS:HE3	2.50	0.47
1:A:42:HIS:O	1:A:42:HIS:ND1	2.47	0.47
1:A:157:LEU:HD12	1:A:403:LEU:HD23	1.97	0.47
1:F:147:MET:HG3	1:F:159:ALA:HB1	1.97	0.47
1:A:268:THR:O	1:A:272:ARG:HG3	2.15	0.46
1:E:359:ASP:OD2	1:E:362:ARG:NH2	2.47	0.46
1:D:144:ARG:NH1	1:D:376:GLU:OE1	2.48	0.46
1:E:297:PRO:O	1:E:300:PHE:HB3	2.15	0.46
1:E:304:ALA:HB2	1:E:315:ILE:HB	1.96	0.46
1:A:146:ARG:HG2	1:A:148:GLU:HB3	1.96	0.46
1:E:292:ASN:O	1:E:295:HIS:HB3	2.15	0.46
1:E:49:ILE:HG13	1:E:101:ILE:HG13	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:137:THR:HG22	1:D:214:GLU:HB3	1.98	0.46
1:C:251:LYS:O	1:C:255:GLU:HG3	2.15	0.46
1:B:304:ALA:HB2	1:B:315:ILE:HB	1.96	0.46
1:D:21:MET:O	1:D:41:GLN:NE2	2.41	0.46
1:F:396:MET:O	1:F:400:ILE:HG12	2.15	0.46
1:A:101:ILE:HG22	1:A:113:LEU:HA	1.96	0.46
1:A:353:ARG:HD2	1:F:92:ARG:NH1	2.30	0.46
1:E:262:ILE:HB	1:E:315:ILE:HG12	1.97	0.46
1:C:304:ALA:HB2	1:C:315:ILE:HB	1.96	0.46
1:D:157:LEU:HD21	1:D:400:ILE:HG23	1.97	0.46
1:A:145:LEU:N	1:A:168:ILE:O	2.49	0.46
1:A:140:HIS:CE1	1:A:172:GLN:HE21	2.34	0.46
1:B:142:ASN:HB2	1:B:306:ASN:ND2	2.30	0.46
1:C:278:VAL:HG21	1:C:293:ALA:HA	1.97	0.46
1:F:157:LEU:HD21	1:F:400:ILE:HG23	1.97	0.46
1:C:309:GLU:N	1:C:309:GLU:OE1	2.48	0.46
1:B:135:ASN:HB3	1:B:307:VAL:HG13	1.97	0.46
1:C:298:LYS:O	1:C:302:GLY:N	2.46	0.46
1:E:3:LEU:HD13	1:E:39:LEU:HD11	1.97	0.46
1:D:32:GLN:HB3	1:D:76:PRO:HD2	1.98	0.45
1:F:268:THR:HA	1:F:331:ILE:HG21	1.97	0.45
1:A:220:GLN:HA	1:A:227:VAL:HG21	1.96	0.45
1:C:56:GLU:HA	1:C:93:THR:HG23	1.98	0.45
1:A:103:PRO:HA	1:A:104:PRO:HD3	1.88	0.45
1:E:247:ILE:HB	1:E:300:PHE:CE2	2.51	0.45
1:B:141:ALA:HB1	1:B:371:LEU:HG	1.98	0.45
1:B:247:ILE:HB	1:B:300:PHE:CE2	2.51	0.45
1:B:93:THR:O	1:B:248:GLU:HB3	2.17	0.45
1:D:406:THR:OG1	1:D:407:LYS:N	2.48	0.45
1:D:129:ASN:ND2	1:E:29:MET:H	2.11	0.45
1:F:93:THR:O	1:F:248:GLU:HB3	2.16	0.45
1:F:410:ASP:N	1:F:410:ASP:OD1	2.42	0.45
1:A:160:ARG:HD2	1:A:403:LEU:HD11	1.98	0.45
1:C:355:PHE:CZ	2:C:501:ATP:H1'	2.52	0.45
1:C:160:ARG:HB3	1:C:403:LEU:HD21	1.98	0.45
1:A:97:ILE:HG23	1:A:116:VAL:HG13	1.98	0.45
1:D:160:ARG:HD2	1:D:408:THR:HG23	1.98	0.45
1:D:349:ILE:HD11	1:D:392:GLU:HB3	1.98	0.45
1:A:41:GLN:O	1:A:44:LYS:HG2	2.17	0.45
1:D:217:THR:HA	1:D:220:GLN:HG2	1.99	0.45
1:D:139:LEU:CD2	1:D:367:LYS:HG3	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:123:LYS:NZ	1:A:125:GLU:OE2	2.44	0.44
1:E:128:ARG:HD3	1:E:256:HIS:CD2	2.52	0.44
1:F:32:GLN:OE1	1:F:32:GLN:N	2.45	0.44
1:E:89:PHE:O	1:E:91:LEU:N	2.50	0.44
1:A:181:LYS:HA	2:A:501:ATP:O2B	2.17	0.44
1:A:392:GLU:OE2	1:A:392:GLU:N	2.50	0.44
1:B:149:ARG:HB2	1:B:198:ASN:OD1	2.17	0.44
1:E:289:VAL:HG13	1:E:327:MET:HG3	2.00	0.44
1:C:7:LYS:HG2	1:C:35:ILE:HD13	1.99	0.44
1:D:289:VAL:HG13	1:D:327:MET:HG3	1.99	0.44
1:B:137:THR:O	1:C:217:THR:OG1	2.24	0.44
1:A:369:GLU:OE1	1:A:369:GLU:N	2.44	0.44
1:C:223:VAL:HG12	1:C:225:GLY:H	1.83	0.44
1:D:244:GLU:HA	1:D:247:ILE:HG22	2.00	0.44
1:D:304:ALA:HB2	1:D:315:ILE:HB	1.99	0.44
1:E:30:ARG:NH2	1:E:32:GLN:OE1	2.50	0.44
1:C:56:GLU:OE1	1:C:66:ARG:NE	2.47	0.44
1:C:268:THR:HA	1:C:331:ILE:HG21	2.00	0.44
1:E:145:LEU:HD11	1:E:170:ARG:HG2	1.99	0.44
1:B:137:THR:HG23	1:B:305:ARG:HB2	2.00	0.43
1:B:42:HIS:HE1	1:B:47:GLU:HB3	1.83	0.43
1:F:321:ILE:HD12	1:F:321:ILE:HA	1.92	0.43
1:D:169:GLY:H	1:D:172:GLN:NE2	2.15	0.43
1:E:160:ARG:NH1	1:E:406:THR:O	2.52	0.43
1:B:372:THR:HG21	1:B:380:MET:HE1	1.99	0.43
1:C:1:MET:HB3	1:C:2:ASN:H	1.61	0.43
1:E:340:ASN:N	1:E:340:ASN:OD1	2.49	0.43
1:D:168:ILE:HA	1:D:172:GLN:NE2	2.32	0.43
1:E:251:LYS:O	1:E:255:GLU:HG3	2.18	0.43
1:F:244:GLU:HA	1:F:247:ILE:HG22	2.01	0.43
1:B:298:LYS:O	1:B:302:GLY:N	2.45	0.43
1:E:105:LYS:N	1:E:108:GLU:OE1	2.35	0.43
1:A:128:ARG:HE	1:B:28:ARG:HH21	1.67	0.43
1:D:141:ALA:HB1	1:D:370:LEU:HB2	2.00	0.43
1:D:157:LEU:O	1:D:161:VAL:HG23	2.19	0.43
1:E:309:GLU:OE1	1:E:309:GLU:N	2.48	0.43
1:B:32:GLN:HB3	1:B:76:PRO:HD2	2.00	0.42
1:C:113:LEU:HD23	1:C:113:LEU:H	1.83	0.42
1:C:297:PRO:O	1:C:300:PHE:HB3	2.19	0.42
1:E:137:THR:O	1:F:217:THR:OG1	2.31	0.42
1:E:129:ASN:HB3	1:F:27:ALA:HB1	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:217:THR:HA	1:A:220:GLN:HG2	2.01	0.42
1:D:205:MET:HE1	1:D:250:ALA:HB2	2.01	0.42
1:E:248:GLU:O	1:E:252:ARG:HG2	2.18	0.42
1:A:15:ILE:HG13	1:A:31:LYS:NZ	2.35	0.42
1:B:208:LEU:HD11	1:B:219:MET:HG2	2.01	0.42
1:D:79:ILE:HD13	1:D:101:ILE:HG21	2.02	0.42
1:A:184:LYS:HE2	1:A:320:LEU:HD21	2.00	0.42
1:B:175:LEU:HD11	1:B:319:ALA:HB2	2.01	0.42
1:B:56:GLU:OE1	1:B:66:ARG:NE	2.48	0.42
1:C:244:GLU:HA	1:C:247:ILE:HG22	2.02	0.42
1:C:247:ILE:HB	1:C:300:PHE:CE2	2.54	0.42
1:E:407:LYS:HE2	1:E:407:LYS:HB2	1.85	0.42
1:B:244:GLU:OE2	1:B:296:ARG:NH1	2.52	0.42
1:D:148:GLU:HG3	1:D:163:ASP:OD2	2.20	0.42
1:F:247:ILE:HB	1:F:300:PHE:CE2	2.55	0.42
1:F:309:GLU:N	1:F:309:GLU:OE1	2.50	0.42
1:B:131:ILE:HD12	1:B:133:PHE:HD2	1.84	0.42
1:D:167:PRO:O	1:D:365:THR:HG21	2.19	0.42
1:C:32:GLN:HB3	1:C:76:PRO:HD2	2.02	0.42
1:E:388:HIS:HB3	1:E:389:PRO:HD3	2.02	0.42
1:B:141:ALA:O	1:B:370:LEU:HB2	2.19	0.41
1:D:208:LEU:HD11	1:D:219:MET:HG2	2.02	0.41
1:B:205:MET:HE1	1:B:250:ALA:HB2	2.01	0.41
1:B:387:ILE:HG23	1:B:395:ALA:HB1	2.02	0.41
1:C:140:HIS:HA	1:C:306:ASN:HB2	2.03	0.41
1:F:262:ILE:HB	1:F:315:ILE:HG12	2.02	0.41
1:A:1:MET:SD	1:A:42:HIS:HE1	2.44	0.41
1:B:50:PHE:CE1	1:B:100:LYS:HG2	2.55	0.41
1:E:205:MET:HE1	1:E:250:ALA:HB2	2.01	0.41
1:A:148:GLU:HG3	1:A:408:THR:HB	2.03	0.41
1:A:344:HIS:ND1	1:A:362:ARG:O	2.54	0.41
1:B:309:GLU:OE1	1:B:309:GLU:N	2.48	0.41
1:C:307:VAL:HB	1:C:311:GLY:O	2.20	0.41
1:B:307:VAL:HB	1:B:310:GLY:O	2.21	0.41
1:B:379:LYS:HD3	1:B:412:PHE:CD1	2.55	0.41
1:E:236:ALA:HA	1:E:239:HIS:CD2	2.50	0.41
1:E:39:LEU:HD23	1:E:39:LEU:HA	1.92	0.41
1:B:224:LYS:HA	1:B:224:LYS:HD2	1.74	0.41
1:C:295:HIS:CE1	1:D:235:PRO:HD3	2.55	0.41
1:C:66:ARG:HB3	1:C:72:TYR:HA	2.03	0.41
1:A:28:ARG:NH1	1:A:31:LYS:HE3	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:407:LYS:HB3	1:C:407:LYS:HE2	1.87	0.41
1:E:244:GLU:HA	1:E:247:ILE:HG22	2.02	0.41
1:B:366:ARG:HD2	1:C:212:ARG:HH12	1.86	0.41
1:F:186:MET:HG3	1:F:189:GLN:OE1	2.21	0.41
1:D:122:ASP:OD1	1:D:123:LYS:N	2.54	0.41
1:F:131:ILE:HG13	1:F:134:GLU:HG2	2.03	0.41
1:A:321:ILE:HA	1:A:321:ILE:HD12	1.93	0.41
1:D:50:PHE:HE1	1:D:100:LYS:HG2	1.85	0.41
1:E:143:SER:HB3	1:E:170:ARG:HG3	2.03	0.41
1:D:333:GLU:OE2	1:E:325:SER:HB3	2.21	0.41
1:B:140:HIS:HA	1:B:306:ASN:HB2	2.01	0.40
1:C:86:ILE:HG23	1:C:91:LEU:HB2	2.03	0.40
1:B:217:THR:HA	1:B:220:GLN:HG2	2.03	0.40
1:D:267:ILE:HB	1:D:317:ALA:HB1	2.04	0.40
1:F:56:GLU:HA	1:F:93:THR:HG23	2.04	0.40
1:B:321:ILE:HD12	1:B:321:ILE:HA	1.93	0.40
1:C:208:LEU:HD11	1:C:219:MET:HG2	2.04	0.40
1:A:349:ILE:HB	1:A:357:ALA:HB1	2.03	0.40
1:C:247:ILE:HA	1:C:247:ILE:HD12	1.97	0.40
1:F:248:GLU:O	1:F:252:ARG:HG2	2.21	0.40
1:A:139:LEU:HD23	1:B:214:GLU:HG3	2.04	0.40
1:B:292:ASN:O	1:B:295:HIS:HB3	2.22	0.40
1:C:257:LYS:CA	1:C:311:GLY:H	2.35	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	415/419 (99%)	404 (97%)	11 (3%)	0	100	100
1	B	410/419 (98%)	392 (96%)	16 (4%)	2 (0%)	29	61

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	415/419 (99%)	399 (96%)	15 (4%)	1 (0%)	47	77
1	D	415/419 (99%)	393 (95%)	20 (5%)	2 (0%)	29	61
1	E	410/419 (98%)	388 (95%)	20 (5%)	2 (0%)	29	61
1	F	415/419 (99%)	393 (95%)	21 (5%)	1 (0%)	47	77
All	All	2480/2514 (99%)	2369 (96%)	103 (4%)	8 (0%)	41	71

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	90	ASN
1	B	311	GLY
1	D	311	GLY
1	E	311	GLY
1	D	90	ASN
1	F	90	ASN
1	E	90	ASN
1	C	311	GLY

### 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	357/359 (99%)	356 (100%)	1 (0%)	92	96
1	B	352/359 (98%)	351 (100%)	1 (0%)	92	96
1	C	357/359 (99%)	355 (99%)	2 (1%)	86	91
1	D	357/359 (99%)	357 (100%)	0	100	100
1	E	352/359 (98%)	352 (100%)	0	100	100
1	F	357/359 (99%)	357 (100%)	0	100	100
All	All	2132/2154 (99%)	2128 (100%)	4 (0%)	93	97

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	410	ASP
1	B	128	ARG
1	C	126	ASN
1	C	172	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	8	ASN
1	B	190	ASN
1	D	2	ASN
1	D	129	ASN
1	D	172	GLN
1	D	190	ASN
1	D	340	ASN
1	F	190	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](#)

6 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	E	501	-	26,33,33	0.95	1 (3%)	31,52,52	1.46	5 (16%)
2	ATP	C	501	-	26,33,33	0.93	1 (3%)	31,52,52	1.47	4 (12%)
2	ATP	A	501	-	26,33,33	0.96	1 (3%)	31,52,52	1.54	4 (12%)
2	ATP	D	501	-	26,33,33	0.94	1 (3%)	31,52,52	1.46	5 (16%)
2	ATP	B	501	-	26,33,33	0.95	1 (3%)	31,52,52	1.54	5 (16%)
2	ATP	F	501	-	26,33,33	0.96	1 (3%)	31,52,52	1.42	5 (16%)

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	E	501	-	-	7/18/38/38	0/3/3/3
2	ATP	C	501	-	-	0/18/38/38	0/3/3/3
2	ATP	A	501	-	-	3/18/38/38	0/3/3/3
2	ATP	D	501	-	-	7/18/38/38	0/3/3/3
2	ATP	B	501	-	-	3/18/38/38	0/3/3/3
2	ATP	F	501	-	-	6/18/38/38	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	501	ATP	C5-C4	2.61	1.47	1.40
2	E	501	ATP	C5-C4	2.56	1.47	1.40
2	B	501	ATP	C5-C4	2.56	1.47	1.40
2	A	501	ATP	C5-C4	2.56	1.47	1.40
2	D	501	ATP	C5-C4	2.53	1.47	1.40
2	C	501	ATP	C5-C4	2.40	1.47	1.40

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	ATP	PB-O3B-PG	-4.14	118.63	132.83
2	A	501	ATP	PA-O3A-PB	-3.72	120.06	132.83
2	C	501	ATP	N3-C2-N1	-3.43	123.32	128.68
2	E	501	ATP	PB-O3B-PG	-3.33	121.39	132.83
2	F	501	ATP	N3-C2-N1	-3.29	123.53	128.68
2	A	501	ATP	N3-C2-N1	-3.24	123.61	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	501	ATP	C3'-C2'-C1'	3.19	105.78	100.98
2	D	501	ATP	PB-O3B-PG	-3.18	121.91	132.83
2	A	501	ATP	PB-O3B-PG	-3.17	121.95	132.83
2	D	501	ATP	N3-C2-N1	-3.15	123.76	128.68
2	F	501	ATP	PB-O3B-PG	-3.10	122.18	132.83
2	C	501	ATP	C4-C5-N7	-3.09	106.18	109.40
2	B	501	ATP	N3-C2-N1	-3.08	123.87	128.68
2	E	501	ATP	N3-C2-N1	-3.07	123.87	128.68
2	C	501	ATP	PB-O3B-PG	-3.01	122.48	132.83
2	C	501	ATP	PA-O3A-PB	-2.95	122.72	132.83
2	B	501	ATP	C3'-C2'-C1'	2.93	105.38	100.98
2	D	501	ATP	PA-O3A-PB	-2.82	123.14	132.83
2	D	501	ATP	C3'-C2'-C1'	2.80	105.19	100.98
2	B	501	ATP	PA-O3A-PB	-2.71	123.51	132.83
2	A	501	ATP	C4-C5-N7	-2.71	106.58	109.40
2	F	501	ATP	C4-C5-N7	-2.50	106.80	109.40
2	F	501	ATP	PA-O3A-PB	-2.50	124.26	132.83
2	E	501	ATP	C4-C5-N7	-2.48	106.81	109.40
2	D	501	ATP	C4-C5-N7	-2.38	106.92	109.40
2	B	501	ATP	C4-C5-N7	-2.38	106.92	109.40
2	F	501	ATP	C3'-C2'-C1'	2.30	104.45	100.98
2	E	501	ATP	PA-O3A-PB	-2.16	125.40	132.83

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	501	ATP	PB-O3A-PA-O5'
2	E	501	ATP	C5'-O5'-PA-O1A
2	E	501	ATP	C5'-O5'-PA-O2A
2	D	501	ATP	C5'-O5'-PA-O1A
2	B	501	ATP	PB-O3A-PA-O5'
2	B	501	ATP	O4'-C4'-C5'-O5'
2	F	501	ATP	C5'-O5'-PA-O3A
2	D	501	ATP	C3'-C4'-C5'-O5'
2	D	501	ATP	O4'-C4'-C5'-O5'
2	B	501	ATP	C3'-C4'-C5'-O5'
2	F	501	ATP	C4'-C5'-O5'-PA
2	A	501	ATP	C4'-C5'-O5'-PA
2	D	501	ATP	C5'-O5'-PA-O3A
2	F	501	ATP	PB-O3A-PA-O2A
2	D	501	ATP	C5'-O5'-PA-O2A

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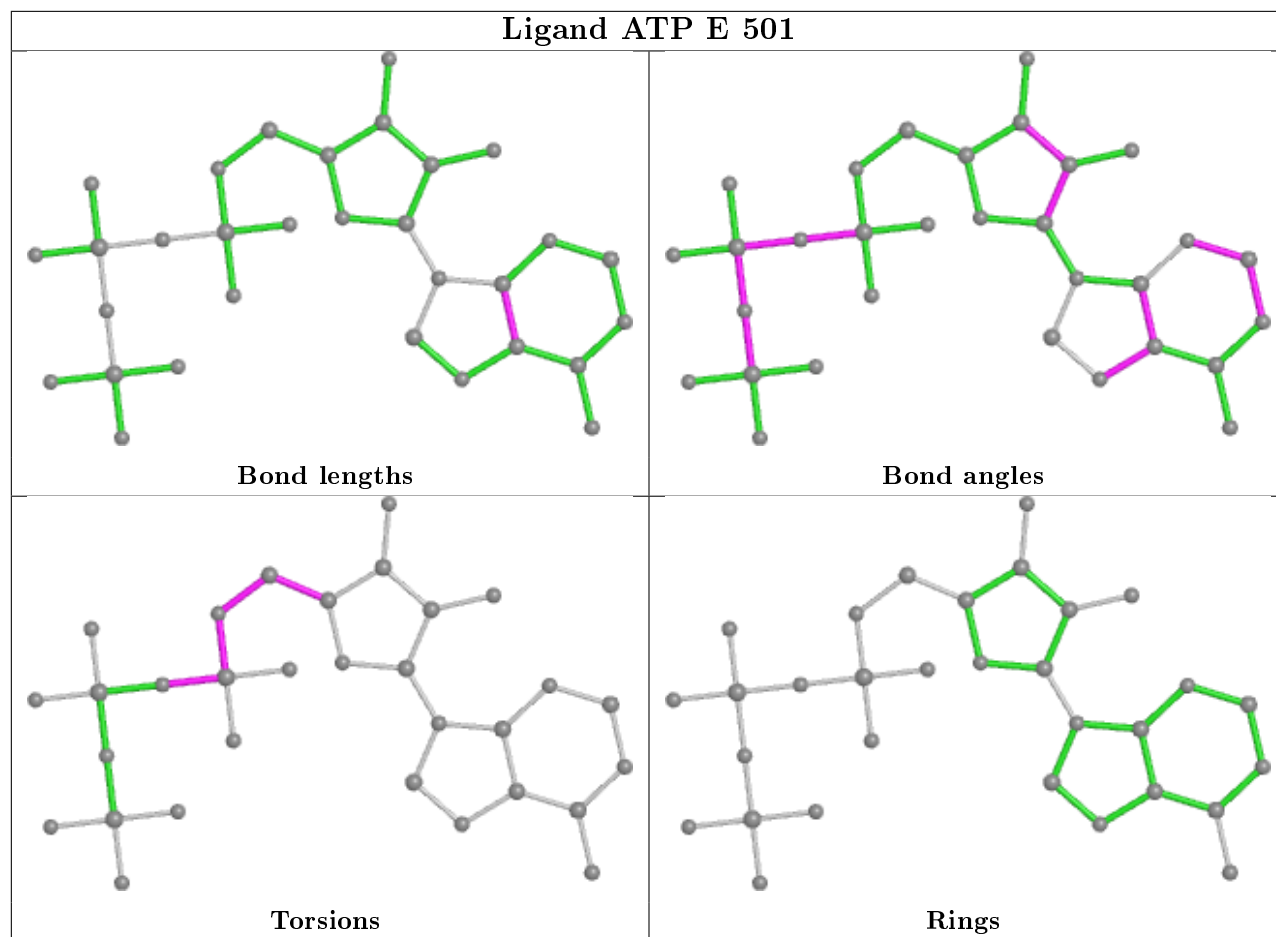
Mol	Chain	Res	Type	Atoms
2	F	501	ATP	C5'-O5'-PA-O2A
2	F	501	ATP	C3'-C4'-C5'-O5'
2	E	501	ATP	C4'-C5'-O5'-PA
2	D	501	ATP	PA-O3A-PB-O2B
2	E	501	ATP	O4'-C4'-C5'-O5'
2	E	501	ATP	C5'-O5'-PA-O3A
2	A	501	ATP	C5'-O5'-PA-O3A
2	E	501	ATP	PB-O3A-PA-O1A
2	D	501	ATP	PA-O3A-PB-O1B
2	F	501	ATP	PB-O3A-PA-O1A
2	A	501	ATP	O4'-C4'-C5'-O5'

There are no ring outliers.

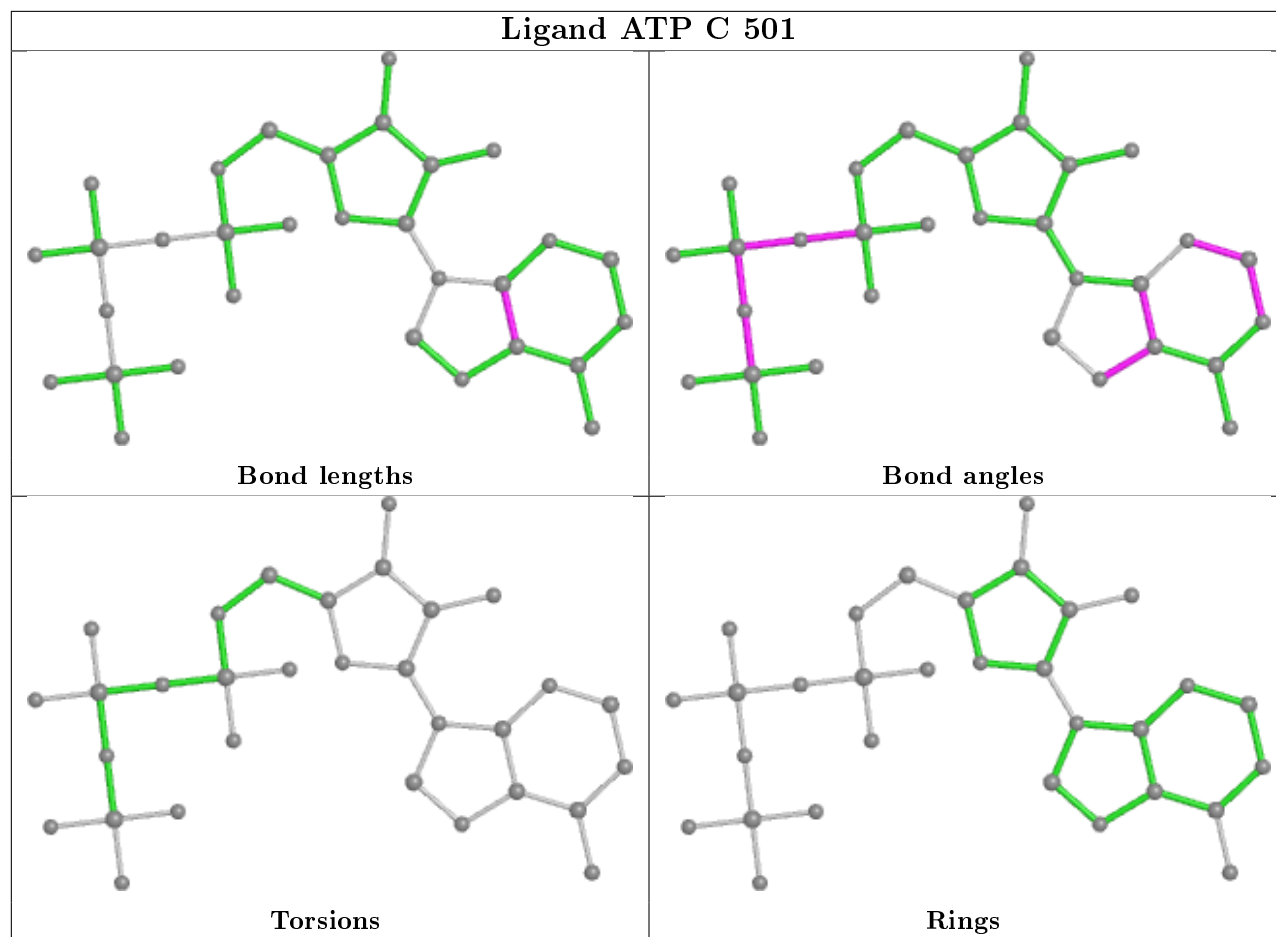
4 monomers are involved in 5 short contacts:

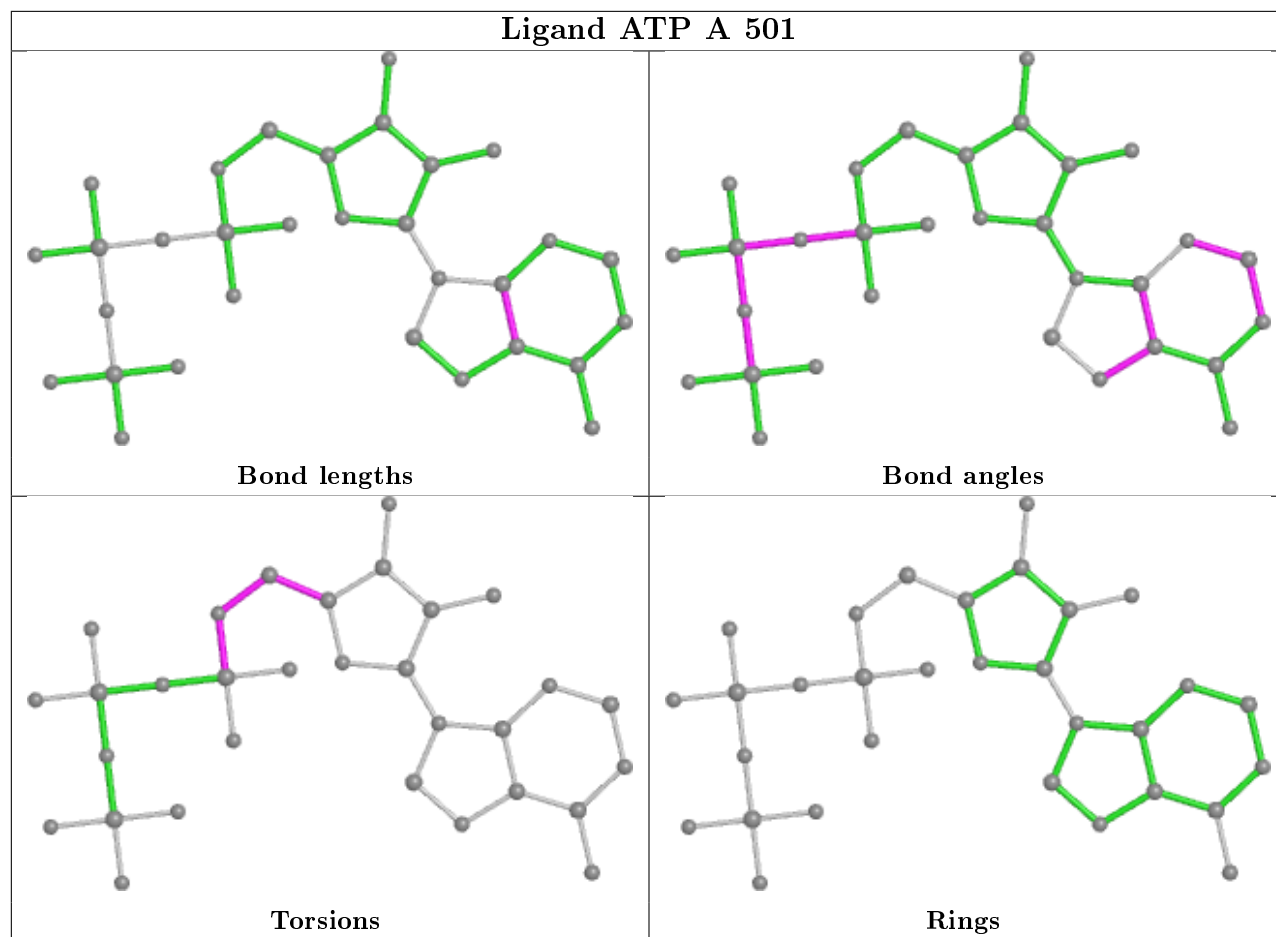
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	501	ATP	1	0
2	C	501	ATP	1	0
2	A	501	ATP	1	0
2	B	501	ATP	2	0

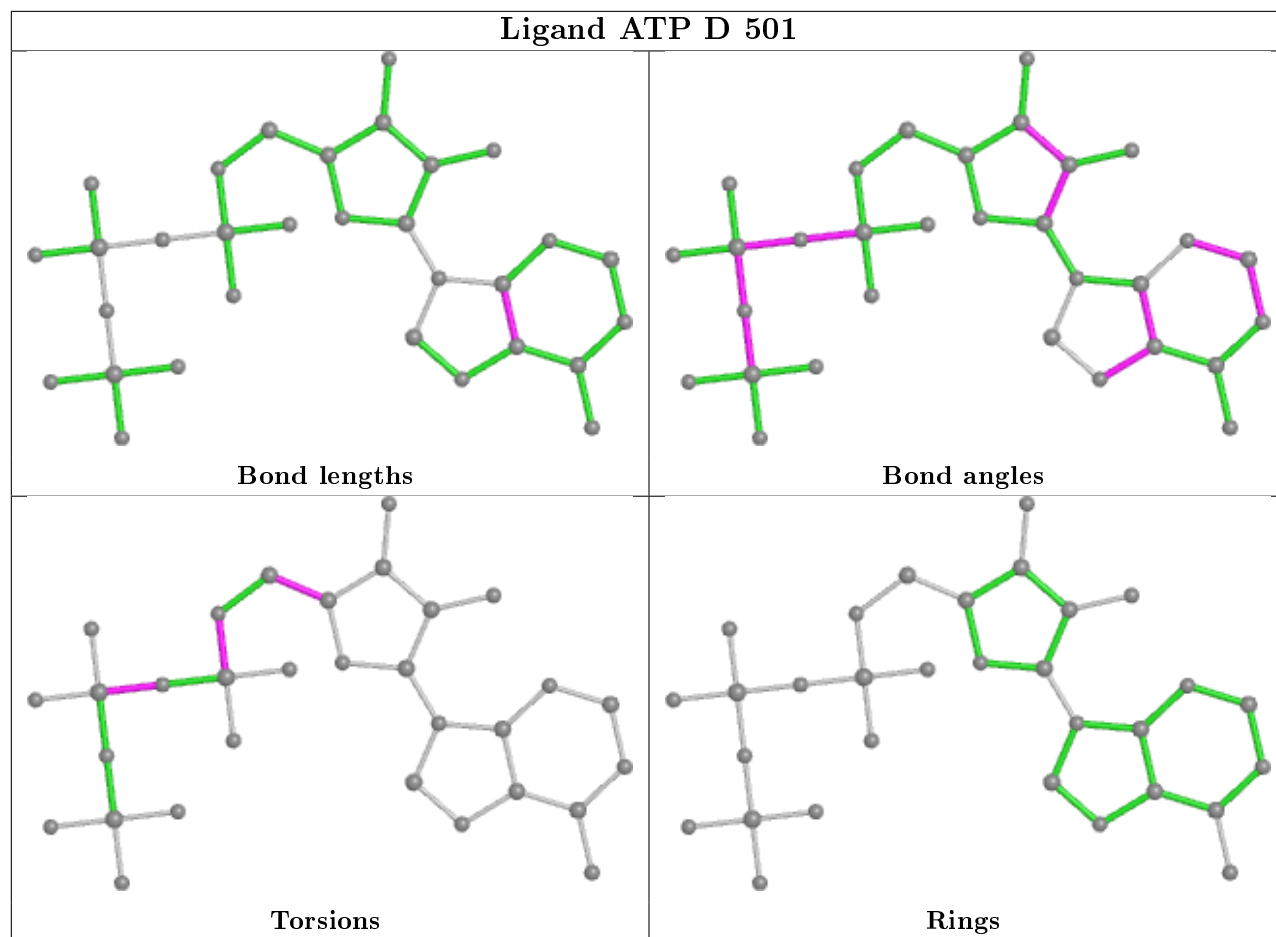
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

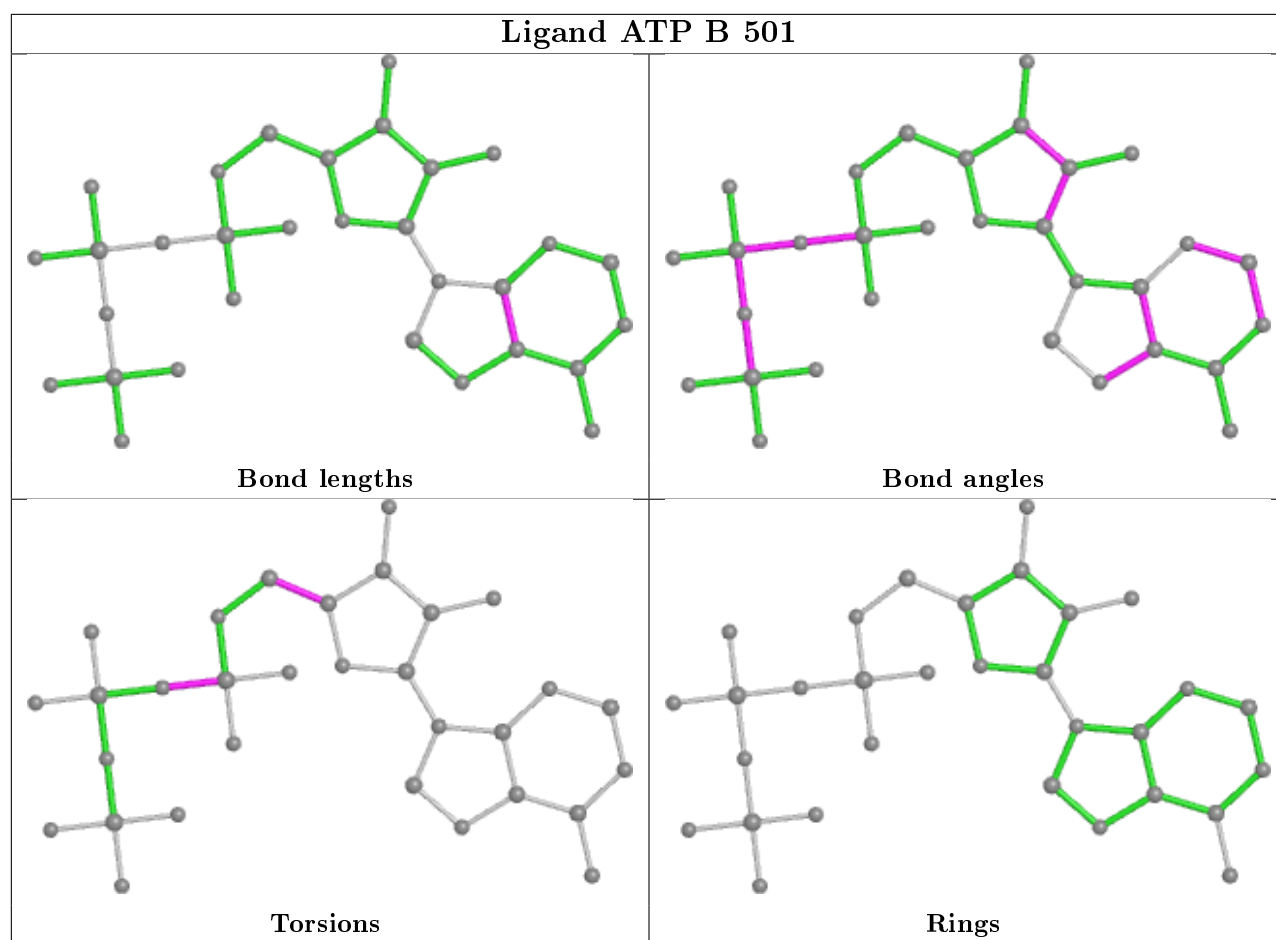


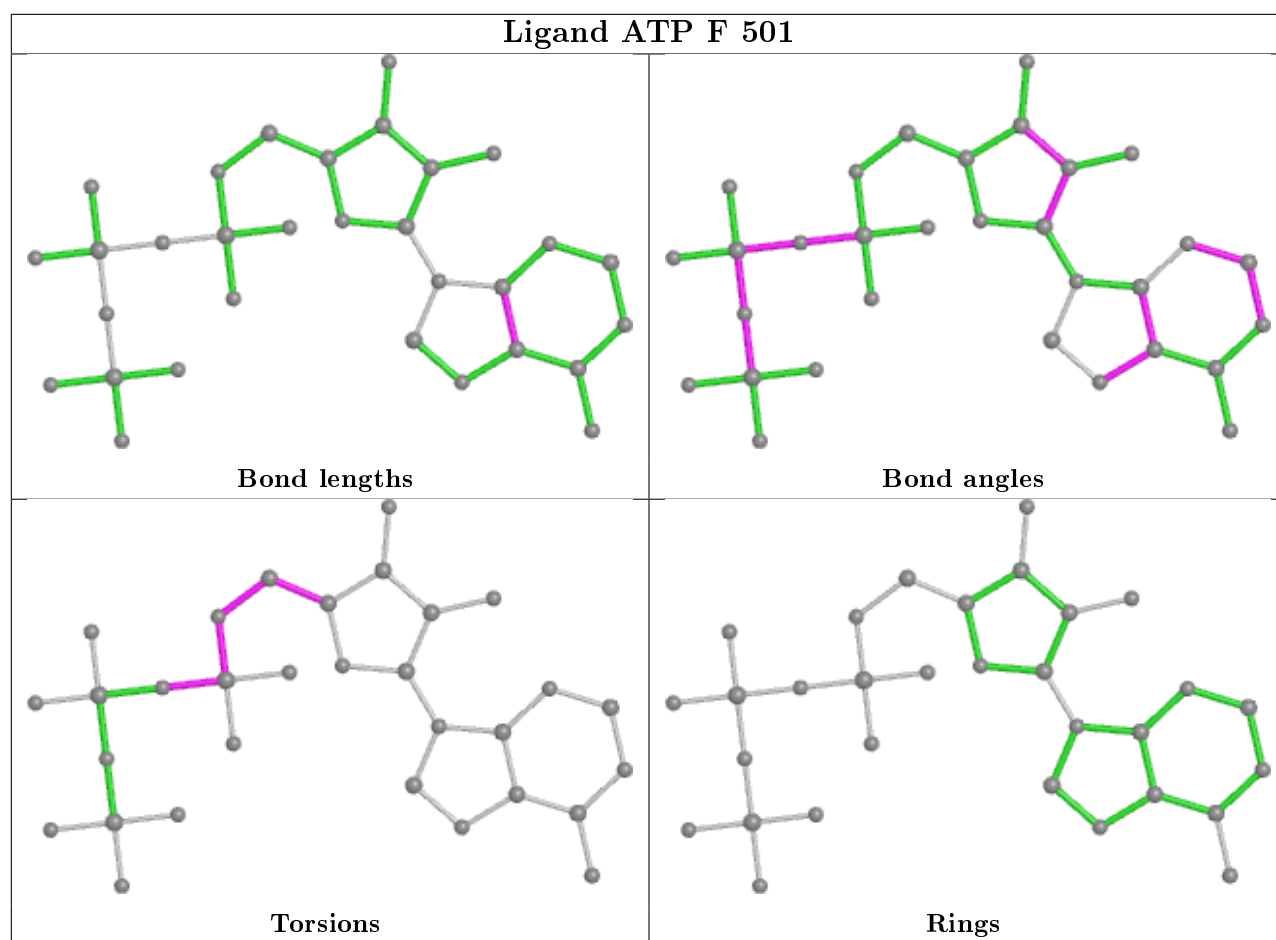












## 5.7 Other polymers [i](#)

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, 95<sup>th</sup> 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	417/419 (99%)	0.29	24 (5%)	2322	56, 99, 182, 322	0
1	B	412/419 (98%)	-0.04	2 (0%)	9191	44, 81, 142, 208	0
1	C	417/419 (99%)	-0.09	3 (0%)	8788	45, 74, 130, 175	0
1	D	417/419 (99%)	0.06	11 (2%)	5653	49, 88, 150, 229	0
1	E	412/419 (98%)	0.12	9 (2%)	6260	53, 92, 165, 218	0
1	F	417/419 (99%)	0.53	44 (10%)	66	61, 129, 188, 273	0
All	All	2492/2514 (99%)	0.15	93 (3%)	4138	44, 94, 166, 322	0

All (93) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	33	ASP	14.7
1	A	26	LEU	5.8
1	F	374	GLN	5.6
1	F	415	MET	5.5
1	B	374	GLN	5.4
1	E	401	ASN	5.1
1	F	414	GLU	5.0
1	F	48	ASP	5.0
1	A	29	MET	5.0
1	A	21	MET	4.8
1	A	32	GLN	4.8
1	D	281	SER	4.5
1	A	28	ARG	4.1
1	D	129	ASN	4.1
1	C	283	LYS	3.9
1	E	151	ASN	3.8
1	E	374	GLN	3.8
1	F	130	LYS	3.8
1	F	140	HIS	3.7

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Mol	Chain	Res	Type	RSRZ
1	F	24	GLU	3.7
1	F	375	GLU	3.6
1	A	34	ILE	3.6
1	F	142	ASN	3.5
1	A	24	GLU	3.4
1	A	281	SER	3.3
1	F	385	LYS	3.2
1	F	378	GLN	3.2
1	A	41	GLN	3.2
1	F	286	THR	3.2
1	F	411	ASP	3.1
1	F	306	ASN	3.1
1	F	79	ILE	3.1
1	A	17	LEU	3.0
1	F	416	MET	3.0
1	F	417	LYS	3.0
1	A	20	ASN	3.0
1	F	121	PHE	2.9
1	E	149	ARG	2.9
1	D	1	MET	2.8
1	B	409	ASN	2.8
1	C	417	LYS	2.8
1	F	355	PHE	2.8
1	F	88	ARG	2.7
1	D	415	MET	2.7
1	F	1	MET	2.7
1	A	414	GLU	2.7
1	D	141	ALA	2.7
1	F	285	LEU	2.6
1	A	22	GLY	2.6
1	F	308	GLU	2.6
1	F	283	LYS	2.6
1	F	413	PHE	2.6
1	D	283	LYS	2.5
1	F	307	VAL	2.5
1	D	140	HIS	2.5
1	F	109	ARG	2.5
1	F	381	TRP	2.4
1	A	353	ARG	2.4
1	F	107	GLY	2.4
1	E	24	GLU	2.4
1	A	408	THR	2.4

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Mol	Chain	Res	Type	RSRZ
1	F	377	LEU	2.4
1	F	102	ARG	2.4
1	D	353	ARG	2.3
1	F	62	PHE	2.3
1	A	25	ASN	2.3
1	F	22	GLY	2.3
1	E	409	ASN	2.3
1	A	126	ASN	2.2
1	A	151	ASN	2.2
1	A	412	PHE	2.2
1	F	104	PRO	2.2
1	F	25	ASN	2.2
1	F	338	THR	2.2
1	A	30	ARG	2.2
1	F	406	THR	2.1
1	F	99	GLY	2.1
1	E	356	PRO	2.1
1	D	355	PHE	2.1
1	F	364	GLY	2.1
1	F	103	PRO	2.1
1	F	44	LYS	2.1
1	A	401	ASN	2.1
1	F	82	SER	2.1
1	D	128	ARG	2.0
1	E	25	ASN	2.0
1	F	151	ASN	2.0
1	F	61	GLY	2.0
1	E	410	ASP	2.0
1	D	412	PHE	2.0
1	C	406	THR	2.0
1	A	396	MET	2.0
1	A	417	LYS	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 ⓘ

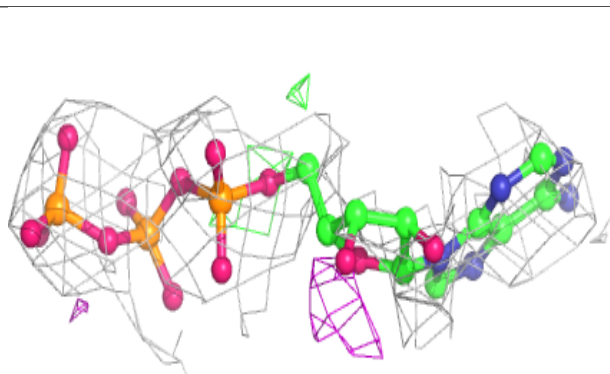
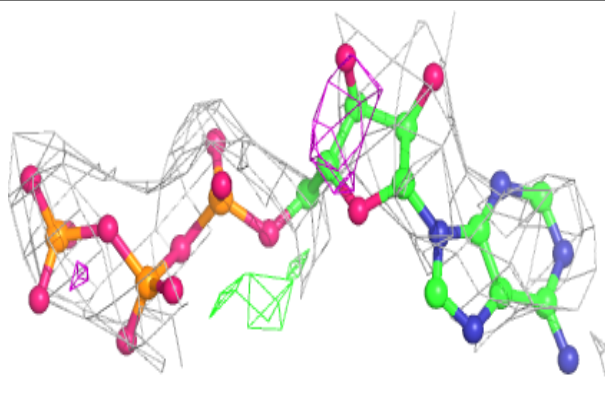
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	ATP	F	501	31/31	0.65	0.34	148,164,178,178	0
2	ATP	A	501	31/31	0.73	0.33	166,176,214,220	0
2	ATP	E	501	31/31	0.82	0.28	142,163,181,183	0
2	ATP	D	501	31/31	0.85	0.21	100,111,121,122	0
2	ATP	C	501	31/31	0.87	0.19	79,109,143,145	0
2	ATP	B	501	31/31	0.89	0.20	109,122,128,130	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.

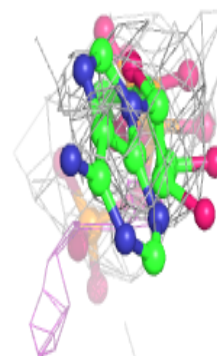
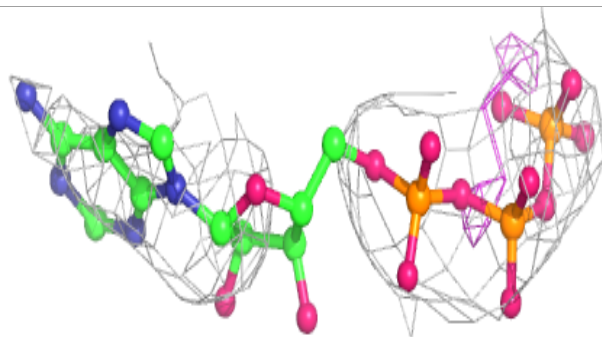
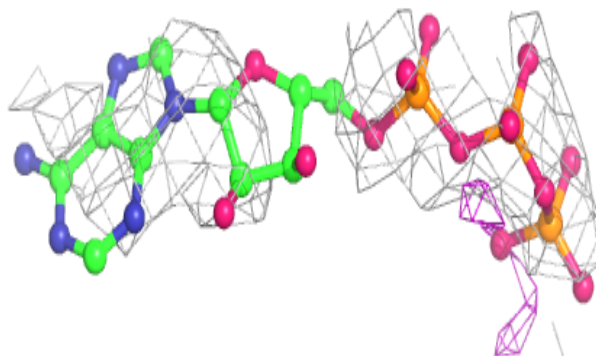
### Electron density around ATP F 501:

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)

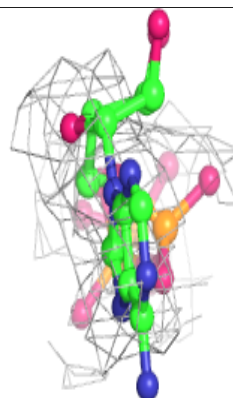
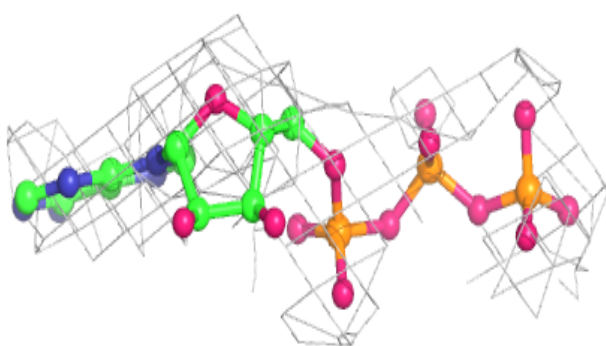
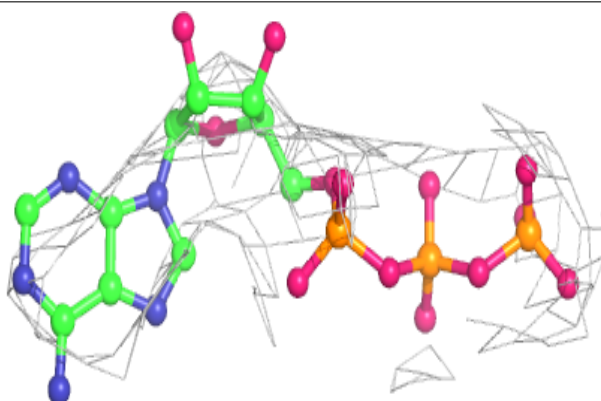


**Electron density around ATP A 501:**

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

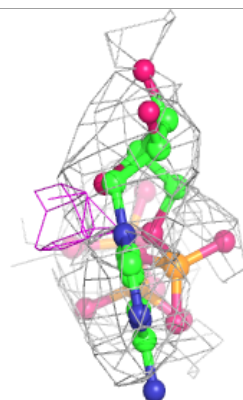
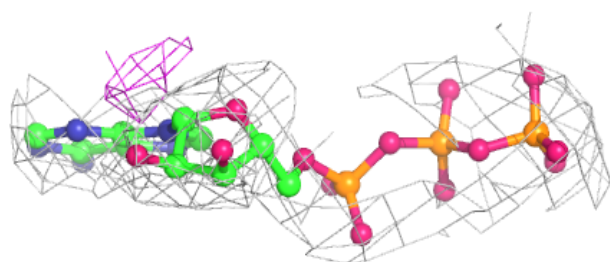
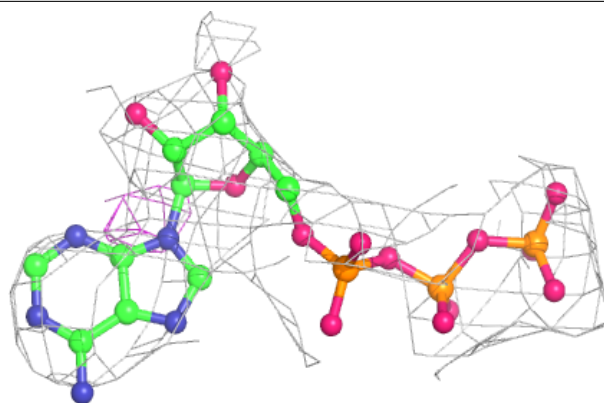
**Electron density around ATP E 501:**

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

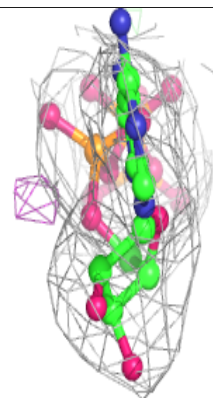
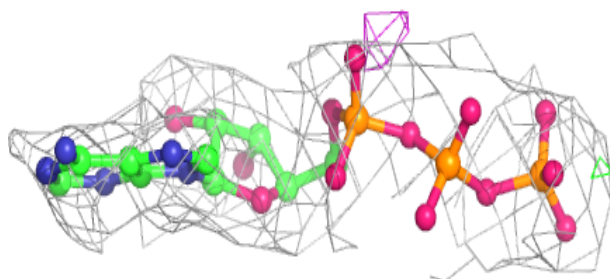
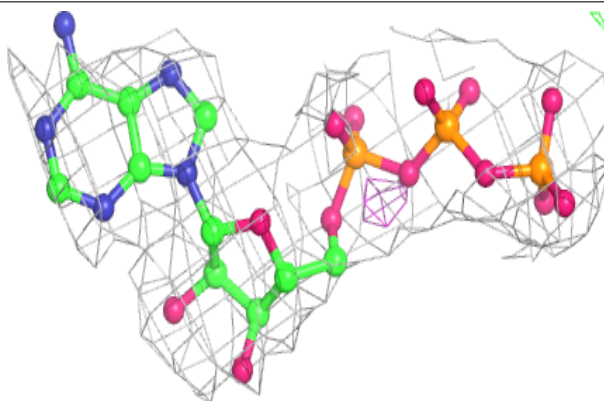


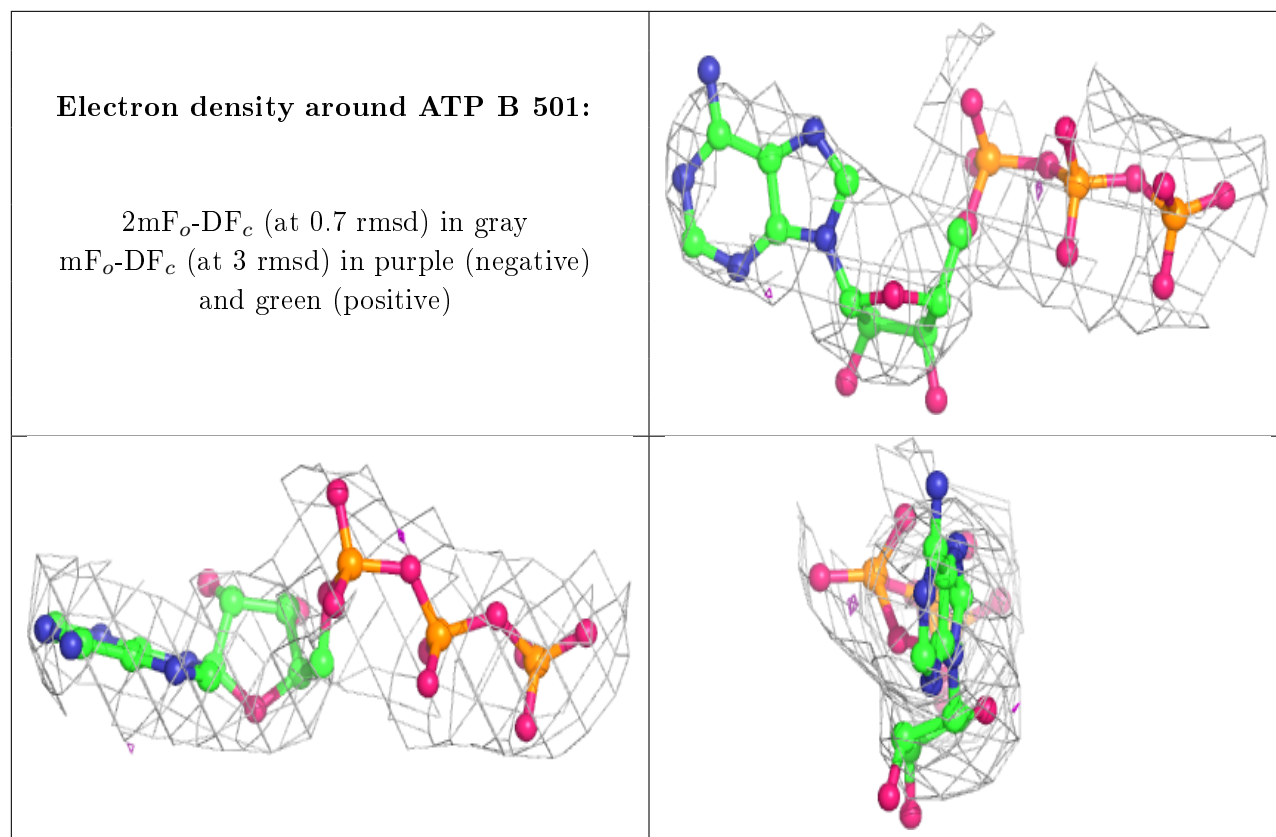
**Electron density around ATP D 501:**

$2mF_o-DF_c$  (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.