



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 07:47 pm BST

PDB ID : 6ITO  
Title : Crystal structure of pyruvate kinase (PYK) from Mycobacterium tuberculosis  
in complex with Oxalate, AMP and inhibitor Ribose 5-Phosphate  
Authors : Zhong, W.; Cai, Q.; El Sahili, A.; Mu, Y.; Lescar, J.; Dedon, P.C.  
Deposited on : 2018-11-24  
Resolution : 2.55 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	:	2.11
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

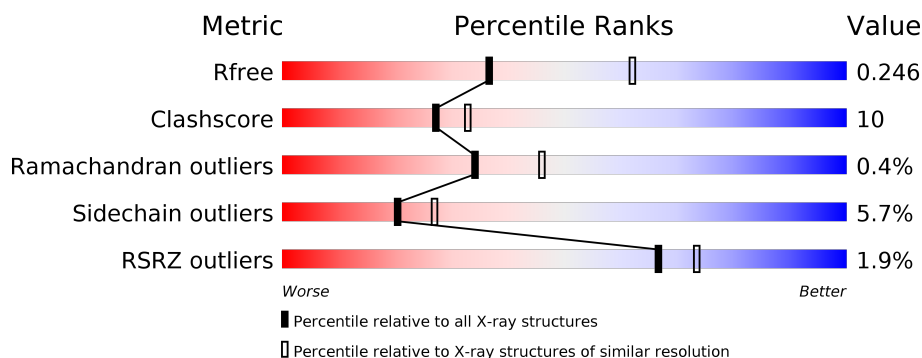
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.55 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	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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	475	<div> <div>0%</div> <div> <div></div> <div>73%</div> <div>23%</div> <div>0%</div> </div> <div>..</div> </div>
1	B	475	<div> <div>2%</div> <div> <div></div> <div>77%</div> <div>21%</div> <div>0%</div> </div> <div>..</div> </div>
1	C	475	<div> <div>2%</div> <div> <div></div> <div>76%</div> <div>21%</div> <div>0%</div> </div> <div>..</div> </div>
1	D	475	<div> <div>2%</div> <div> <div></div> <div>73%</div> <div>24%</div> <div>0%</div> </div> <div>..</div> </div>

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 14921 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 Pyruvate kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	471	Total	C	N	O	S	0	1	0
			3554	2212	644	680	18			
1	B	471	Total	C	N	O	S	0	0	0
			3543	2206	640	679	18			
1	C	471	Total	C	N	O	S	0	0	0
			3543	2206	640	679	18			
1	D	471	Total	C	N	O	S	0	2	0
			3565	2218	648	681	18			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP P9WKE5
A	-1	GLY	-	expression tag	UNP P9WKE5
A	0	HIS	-	expression tag	UNP P9WKE5
B	-2	GLY	-	expression tag	UNP P9WKE5
B	-1	GLY	-	expression tag	UNP P9WKE5
B	0	HIS	-	expression tag	UNP P9WKE5
C	-2	GLY	-	expression tag	UNP P9WKE5
C	-1	GLY	-	expression tag	UNP P9WKE5
C	0	HIS	-	expression tag	UNP P9WKE5
D	-2	GLY	-	expression tag	UNP P9WKE5
D	-1	GLY	-	expression tag	UNP P9WKE5
D	0	HIS	-	expression tag	UNP P9WKE5

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

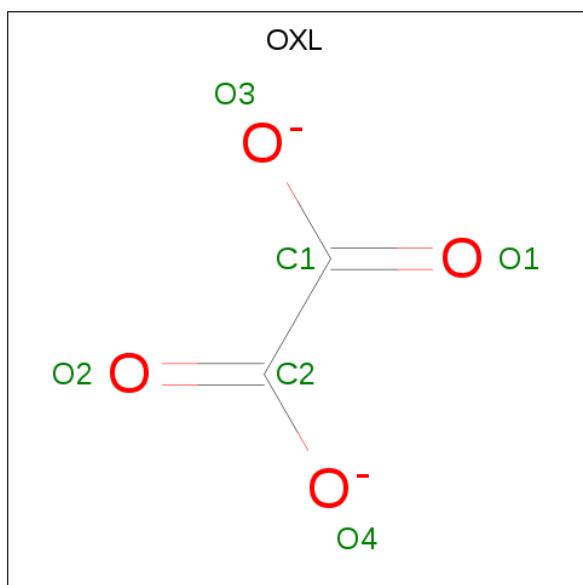
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Mg	0	0
			1	1		
2	A	1	Total	Mg	0	0
			1	1		

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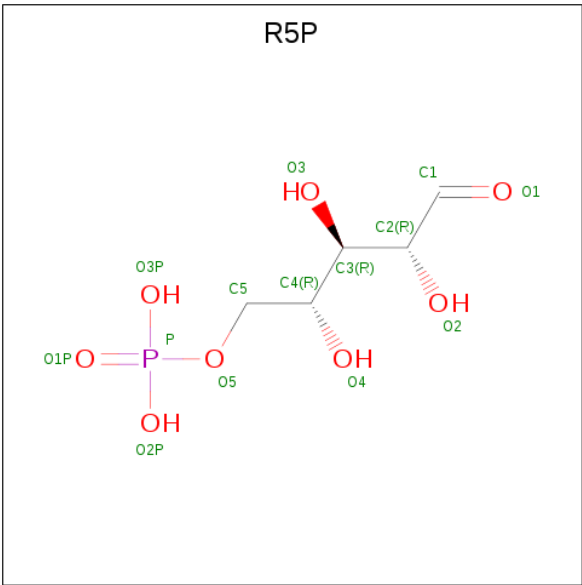
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	1	Total	Mg	0	0
			1	1		
2	C	1	Total	Mg	0	0
			1	1		

- Molecule 3 is OXALATE ION (three-letter code: OXL) (formula:  $C_2O_4$ ).



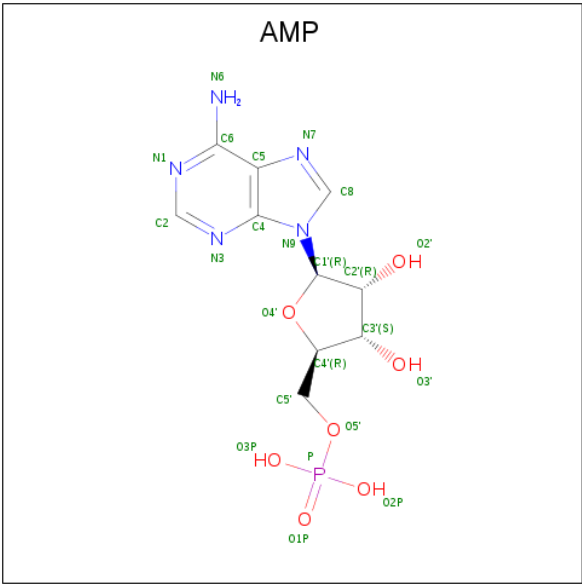
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	2	4		
3	B	1	Total	C	O	0	0
			6	2	4		
3	C	1	Total	C	O	0	0
			6	2	4		
3	D	1	Total	C	O	0	0
			6	2	4		

- Molecule 4 is RIBOSE-5-PHOSPHATE (three-letter code: R5P) (formula:  $C_5H_{11}O_8P$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	P	0	0
			14	5	8	1		
4	B	1	Total	C	O	P	0	0
			14	5	8	1		
4	C	1	Total	C	O	P	0	0
			14	5	8	1		
4	D	1	Total	C	O	P	0	0
			14	5	8	1		

- Molecule 5 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: C<sub>10</sub>H<sub>14</sub>N<sub>5</sub>O<sub>7</sub>P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			23	10	5	7	1		
5	B	1	Total	C	N	O	P	0	0
			23	10	5	7	1		
5	C	1	Total	C	N	O	P	0	0
			23	10	5	7	1		
5	D	1	Total	C	N	O	P	0	0
			23	10	5	7	1		

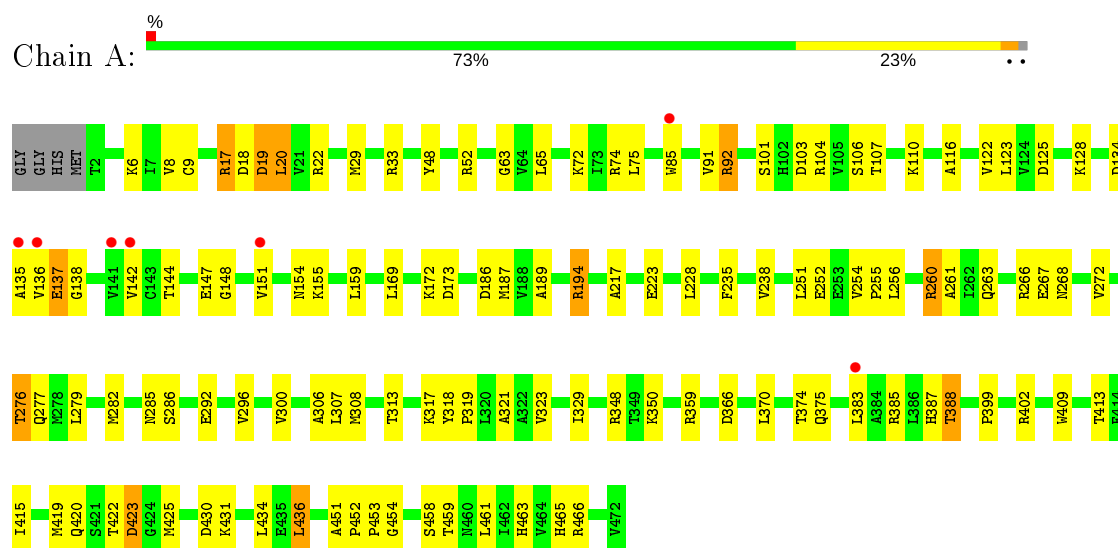
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	147	Total	O	0	0
			147	147		
6	B	111	Total	O	0	0
			111	111		
6	C	152	Total	O	0	0
			152	152		
6	D	130	Total	O	0	0
			130	130		

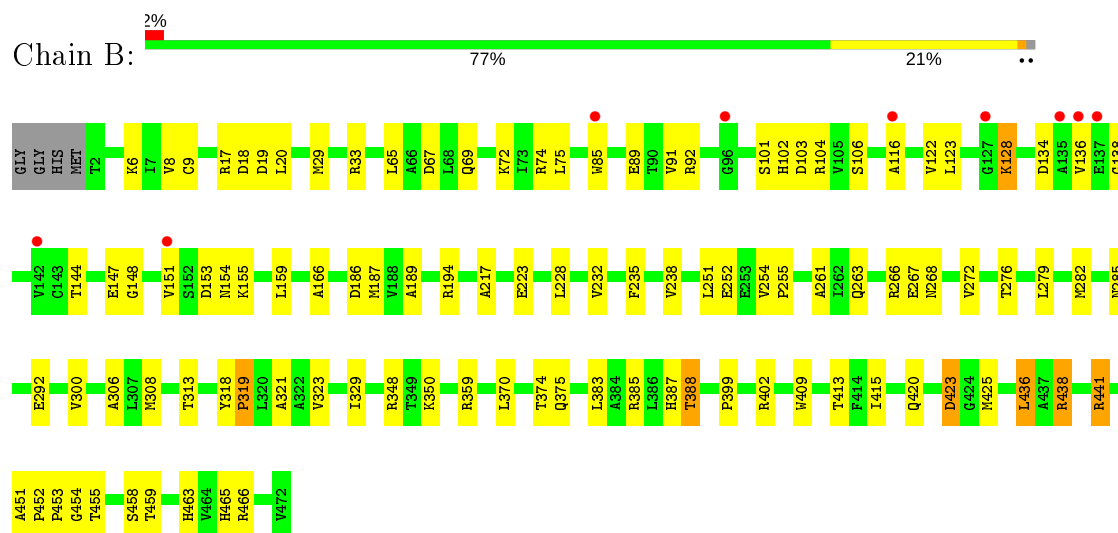
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

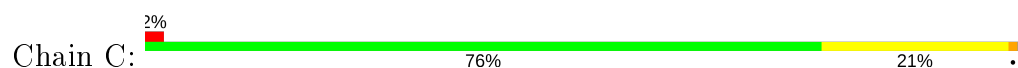
#### • Molecule 1: Pyruvate kinase

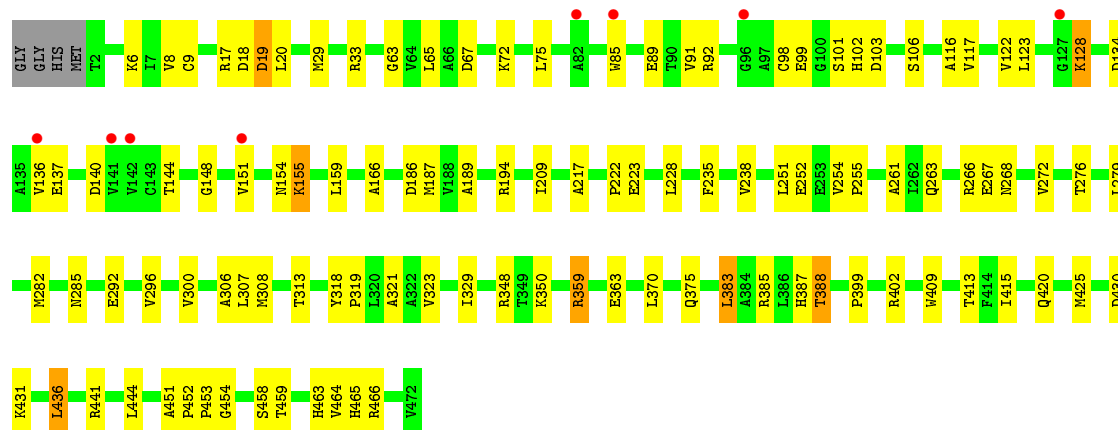


#### • Molecule 1: Pyruvate kinase

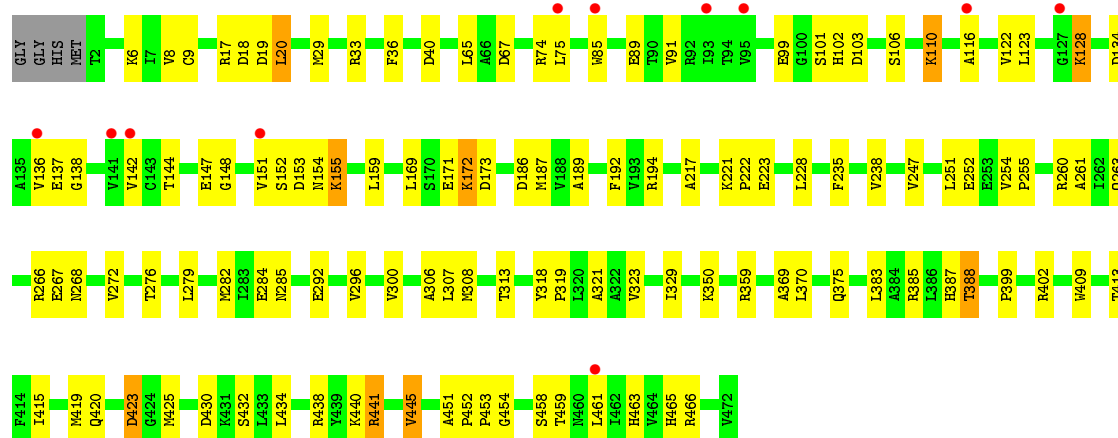
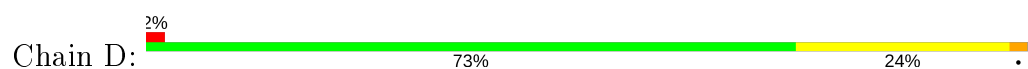


#### • Molecule 1: Pyruvate kinase





● Molecule 1: Pyruvate kinase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	125.55Å 125.55Å 143.82Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	62.77 – 2.55 62.78 – 2.55	Depositor EDS
% Data completeness (in resolution range)	100.0 (62.77-2.55) 100.0 (62.78-2.55)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.01 (at 2.55Å)	Xtriage
Refinement program	REFMAC 5.8.0232	Depositor
R, $R_{free}$	0.206 , 0.248 0.208 , 0.246	Depositor DCC
$R_{free}$ test set	4106 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	40.7	Xtriage
Anisotropy	0.762	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 31.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.468 for -h,-k,l 0.477 for h,-h-k,-l 0.469 for -k,-h,-l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	14921	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.90% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: OXL, AMP, R5P, MG

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	0.75	0/3604	0.72	0/4895
1	B	0.75	0/3593	0.72	0/4881
1	C	0.74	0/3593	0.72	0/4881
1	D	0.75	0/3615	0.72	0/4909
All	All	0.75	0/14405	0.72	0/19566

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3554	0	3620	81	2
1	B	3543	0	3608	67	2
1	C	3543	0	3608	70	2
1	D	3565	0	3632	81	2
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	6	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	6	0	0	0	0
3	C	6	0	0	0	0
3	D	6	0	0	0	0
4	A	14	0	9	1	0
4	B	14	0	9	1	0
4	C	14	0	9	1	0
4	D	14	0	9	1	0
5	A	23	0	12	2	0
5	B	23	0	12	3	0
5	C	23	0	12	1	0
5	D	23	0	12	1	0
6	A	147	0	0	7	0
6	B	111	0	0	7	0
6	C	152	0	0	11	0
6	D	130	0	0	11	0
All	All	14921	0	14552	292	4

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 10.

All (292) 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:D:441[A]:ARG:HH11	1:D:441[A]:ARG:HB3	1.29	0.97
1:D:441[A]:ARG:HD2	1:D:441[A]:ARG:H	1.39	0.84
1:D:350:LYS:HE3	1:D:459:THR:O	1.78	0.84
1:A:350:LYS:HE3	1:A:459:THR:O	1.77	0.84
1:B:350:LYS:HE3	1:B:459:THR:O	1.77	0.84
1:C:350:LYS:HE3	1:C:459:THR:O	1.78	0.84
1:C:128:LYS:HB3	6:C:684:HOH:O	1.80	0.81
1:D:441[A]:ARG:HH11	1:D:441[A]:ARG:CB	1.94	0.80
1:A:134:ASP:OD2	1:A:144:THR:OG1	2.02	0.77
1:D:441[A]:ARG:CD	1:D:441[A]:ARG:H	1.97	0.76
1:C:458:SER:OG	5:C:504:AMP:O3'	2.03	0.76
1:A:399:PRO:HA	1:A:415:ILE:HD12	1.69	0.75
1:B:399:PRO:HA	1:B:415:ILE:HD12	1.69	0.75
1:A:194:ARG:HG2	1:A:194:ARG:HH11	1.53	0.73
1:C:399:PRO:HA	1:C:415:ILE:HD12	1.69	0.73
1:A:256:LEU:O	1:A:260[B]:ARG:HG3	1.89	0.72
1:D:399:PRO:HA	1:D:415:ILE:HD12	1.70	0.72
1:C:383:LEU:HD12	1:C:383:LEU:O	1.92	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:107:THR:O	1:A:110:LYS:NZ	2.22	0.70
1:D:153:ASP:O	6:D:601:HOH:O	2.09	0.69
1:D:441[A]:ARG:HD2	1:D:441[A]:ARG:N	2.07	0.68
1:D:440:LYS:HE2	1:D:441[B]:ARG:HH12	1.59	0.66
1:D:440:LYS:HE2	1:D:441[B]:ARG:NH1	2.11	0.66
1:B:153:ASP:O	6:B:601:HOH:O	2.14	0.65
1:D:192:PHE:O	1:D:194:ARG:NH2	2.29	0.65
1:B:19:ASP:HA	6:B:686:HOH:O	1.97	0.65
1:A:52:ARG:NH1	1:A:186:ASP:OD2	2.30	0.64
1:B:134:ASP:OD2	1:B:144:THR:OG1	2.17	0.63
1:B:423:ASP:N	1:B:423:ASP:OD1	2.32	0.62
1:D:134:ASP:OD2	1:D:144:THR:OG1	2.16	0.62
1:A:85:TRP:CE3	1:A:151:VAL:HG11	2.35	0.62
1:C:134:ASP:OD2	1:C:144:THR:OG1	2.17	0.61
1:C:166:ALA:O	1:C:194:ARG:NH1	2.33	0.61
1:A:148:GLY:HA3	6:A:642:HOH:O	2.00	0.61
1:A:423:ASP:N	1:A:423:ASP:OD1	2.34	0.61
1:D:425:MET:CE	1:D:453:PRO:HB3	2.32	0.60
1:D:148:GLY:HA3	6:D:621:HOH:O	2.01	0.60
1:B:374:THR:HA	5:B:504:AMP:H5'2	1.84	0.59
1:B:74:ARG:HH21	1:B:74:ARG:HG2	1.67	0.59
1:A:92:ARG:HH22	1:A:137:GLU:HG3	1.66	0.59
1:C:425:MET:CE	1:C:453:PRO:HB3	2.33	0.59
1:D:423:ASP:N	1:D:423:ASP:OD1	2.33	0.59
1:D:65:LEU:HD11	1:D:189:ALA:HB2	1.85	0.59
1:B:85:TRP:CE3	1:B:151:VAL:HG11	2.38	0.58
1:C:85:TRP:CE3	1:C:151:VAL:HG11	2.38	0.58
1:D:155:LYS:HD2	6:D:627:HOH:O	2.03	0.58
1:D:441[A]:ARG:HH11	1:D:441[A]:ARG:CG	2.15	0.58
1:C:122:VAL:HG22	1:C:159:LEU:CD1	2.34	0.58
1:A:52:ARG:HH12	1:A:186:ASP:CG	2.07	0.58
1:B:166:ALA:O	1:B:194:ARG:NH2	2.36	0.58
1:D:36:PHE:O	1:D:172:LYS:NZ	2.36	0.58
1:D:463:HIS:HD2	1:D:465:HIS:HB2	1.69	0.57
1:A:286:SER:OG	1:B:147:GLU:OE2	2.18	0.57
1:C:65:LEU:HD11	1:C:189:ALA:HB2	1.87	0.57
1:D:85:TRP:CE3	1:D:151:VAL:HG11	2.39	0.57
1:A:458:SER:OG	5:A:504:AMP:O3'	2.21	0.57
1:C:463:HIS:HD2	1:C:465:HIS:HB2	1.69	0.57
1:A:374:THR:HA	5:A:504:AMP:H5'2	1.86	0.57
1:B:122:VAL:HG22	1:B:159:LEU:CD1	2.35	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:300:VAL:HG13	6:A:614:HOH:O	2.05	0.57
1:D:128:LYS:HB3	6:D:712:HOH:O	2.03	0.57
1:B:425:MET:CE	1:B:453:PRO:HB3	2.35	0.56
1:D:458:SER:OG	5:D:504:AMP:O3'	2.24	0.56
1:C:122:VAL:HG22	1:C:159:LEU:HD11	1.87	0.56
1:A:65:LEU:HD11	1:A:189:ALA:HB2	1.86	0.56
1:A:463:HIS:HD2	1:A:465:HIS:HB2	1.70	0.56
1:B:458:SER:OG	5:B:504:AMP:O3'	2.21	0.55
1:A:122:VAL:HG22	1:A:159:LEU:CD1	2.37	0.55
1:B:65:LEU:HD11	1:B:189:ALA:HB2	1.87	0.55
1:C:148:GLY:HA3	6:C:663:HOH:O	2.05	0.55
1:C:430:ASP:OD2	6:C:601:HOH:O	2.17	0.55
1:B:463:HIS:HD2	1:B:465:HIS:HB2	1.70	0.55
1:D:99:GLU:HG3	6:D:691:HOH:O	2.05	0.55
1:D:441[A]:ARG:HB3	1:D:441[A]:ARG:NH1	2.10	0.55
1:C:444:LEU:HD11	1:C:464:VAL:CG1	2.38	0.54
1:D:17:ARG:HB3	1:D:20:LEU:HD12	1.88	0.54
1:D:387:HIS:HE1	6:D:616:HOH:O	1.90	0.54
1:D:122:VAL:HG22	1:D:159:LEU:CD1	2.38	0.54
1:D:194:ARG:HB2	1:D:223:GLU:HB2	1.90	0.53
1:B:441:ARG:NH1	6:B:609:HOH:O	2.42	0.53
1:B:436:LEU:N	1:B:436:LEU:HD13	2.23	0.53
1:C:436:LEU:HD13	1:C:436:LEU:N	2.24	0.53
1:A:282:MET:HA	1:A:285:ASN:O	2.09	0.53
1:A:85:TRP:CZ2	1:A:91:VAL:HG11	2.44	0.53
1:B:122:VAL:HG22	1:B:159:LEU:HD11	1.91	0.53
1:B:148:GLY:HA3	6:B:636:HOH:O	2.08	0.53
1:D:75:LEU:O	1:D:154:ASN:HA	2.09	0.53
1:B:300:VAL:HG13	6:B:611:HOH:O	2.08	0.53
1:C:444:LEU:HD11	1:C:464:VAL:HG13	1.91	0.53
1:A:122:VAL:HG22	1:A:159:LEU:HD11	1.91	0.53
1:A:135:ALA:HB3	1:A:142:VAL:CG1	2.39	0.53
1:A:48:TYR:OH	1:A:52:ARG:NH2	2.42	0.53
1:A:123:LEU:N	1:A:123:LEU:HD23	2.23	0.53
1:B:75:LEU:O	1:B:154:ASN:HA	2.09	0.52
1:C:75:LEU:O	1:C:154:ASN:HA	2.09	0.52
1:A:75:LEU:O	1:A:154:ASN:HA	2.09	0.52
1:D:122:VAL:HG22	1:D:159:LEU:HD11	1.92	0.52
1:C:92:ARG:NH2	1:C:137:GLU:OE1	2.39	0.52
1:B:282:MET:HA	1:B:285:ASN:O	2.10	0.52
1:D:402:ARG:HG3	1:D:413:THR:HB	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:152:SER:OG	1:D:155:LYS:HE2	2.09	0.52
1:C:300:VAL:HG13	6:C:614:HOH:O	2.10	0.51
1:C:387:HIS:HE1	6:C:621:HOH:O	1.93	0.51
1:C:318:TYR:HB3	1:C:321:ALA:HB3	1.93	0.51
1:D:9:CYS:HB2	1:D:29:MET:SD	2.51	0.51
1:D:300:VAL:HG13	6:D:619:HOH:O	2.11	0.51
1:D:419:MET:CE	6:D:716:HOH:O	2.58	0.51
1:D:33:ARG:NH2	1:D:67:ASP:OD2	2.41	0.51
1:D:430:ASP:O	1:D:434:LEU:HD12	2.11	0.51
1:B:455:THR:O	5:B:504:AMP:H4'	2.10	0.51
1:A:318:TYR:HB3	1:A:321:ALA:HB3	1.93	0.51
1:B:228:LEU:HD21	1:B:261:ALA:HA	1.93	0.51
1:B:9:CYS:HB2	1:B:29:MET:SD	2.51	0.51
1:C:9:CYS:HB2	1:C:29:MET:SD	2.51	0.51
1:A:9:CYS:HB2	1:A:29:MET:SD	2.51	0.50
1:B:33:ARG:NH2	1:B:67:ASP:OD2	2.42	0.50
1:B:370:LEU:HD12	1:B:388:THR:HG21	1.91	0.50
1:C:33:ARG:NH2	1:C:67:ASP:OD2	2.42	0.50
1:D:370:LEU:HD12	1:D:388:THR:HG21	1.92	0.50
1:A:228:LEU:HD21	1:A:261:ALA:HA	1.94	0.50
1:C:402:ARG:HG3	1:C:413:THR:HB	1.94	0.50
1:A:419:MET:HA	1:A:419:MET:HE3	1.94	0.50
1:C:370:LEU:HD12	1:C:388:THR:HG21	1.93	0.50
1:B:69:GLN:O	6:B:602:HOH:O	2.20	0.50
1:D:282:MET:HA	1:D:285:ASN:O	2.10	0.50
1:D:318:TYR:HB3	1:D:321:ALA:HB3	1.94	0.50
1:A:402:ARG:HG3	1:A:413:THR:HB	1.93	0.49
1:B:402:ARG:HG3	1:B:413:THR:HB	1.93	0.49
1:C:282:MET:HA	1:C:285:ASN:O	2.10	0.49
1:C:228:LEU:HD21	1:C:261:ALA:HA	1.92	0.49
1:B:318:TYR:HB3	1:B:321:ALA:HB3	1.94	0.49
1:B:85:TRP:CZ2	1:B:91:VAL:HG11	2.47	0.49
1:C:98:CYS:HA	6:C:715:HOH:O	2.13	0.49
1:D:85:TRP:CZ2	1:D:91:VAL:HG11	2.48	0.49
1:C:155:LYS:HD3	1:C:155:LYS:HA	1.62	0.49
1:D:221:LYS:NZ	6:D:610:HOH:O	2.45	0.48
1:A:387:HIS:HE1	6:A:632:HOH:O	1.96	0.48
1:D:74:ARG:HG2	1:D:74:ARG:HH21	1.79	0.48
1:A:19:ASP:O	1:A:22:ARG:HB3	2.14	0.48
1:A:263:GLN:O	1:A:267:GLU:HG2	2.14	0.48
1:C:268:ASN:OD1	6:C:602:HOH:O	2.20	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:228:LEU:HD21	1:D:261:ALA:HA	1.94	0.48
1:D:279:LEU:HD23	1:D:292:GLU:HB3	1.96	0.48
1:D:441[B]:ARG:NH2	6:D:606:HOH:O	2.39	0.48
1:C:263:GLN:O	1:C:267:GLU:HG2	2.14	0.47
1:B:268:ASN:HA	4:B:503:R5P:O4	2.14	0.47
1:C:268:ASN:HA	4:C:503:R5P:O4	2.14	0.47
1:A:399:PRO:HA	1:A:415:ILE:CD1	2.42	0.47
1:A:194:ARG:NH1	1:A:194:ARG:HG2	2.26	0.47
1:A:20:LEU:HA	1:A:20:LEU:HD22	1.69	0.47
1:A:260[A]:ARG:NE	6:A:603:HOH:O	2.35	0.47
1:B:399:PRO:HA	1:B:415:ILE:CD1	2.43	0.47
1:C:387:HIS:HA	1:C:409:TRP:CZ3	2.50	0.47
1:C:19:ASP:HA	6:C:711:HOH:O	2.15	0.47
1:A:238:VAL:O	1:A:272:VAL:HA	2.15	0.47
1:B:238:VAL:O	1:B:272:VAL:HA	2.15	0.47
1:B:263:GLN:O	1:B:267:GLU:HG2	2.15	0.47
1:B:74:ARG:HG2	1:B:74:ARG:NH2	2.28	0.47
1:D:155:LYS:HA	1:D:155:LYS:HD3	1.65	0.47
1:C:85:TRP:CZ2	1:C:91:VAL:HG11	2.49	0.46
1:D:387:HIS:HA	1:D:409:TRP:CZ3	2.50	0.46
1:B:313:THR:HA	1:B:319:PRO:HB3	1.98	0.46
1:C:279:LEU:HD23	1:C:292:GLU:HB3	1.97	0.46
1:C:99:GLU:HG3	6:C:679:HOH:O	2.16	0.46
1:C:238:VAL:O	1:C:272:VAL:HA	2.15	0.46
1:D:116:ALA:O	1:D:136:VAL:HG21	2.14	0.46
1:D:266:ARG:O	1:D:385:ARG:HD2	2.16	0.46
1:A:251:LEU:HD12	1:A:251:LEU:C	2.36	0.46
1:B:387:HIS:HA	1:B:409:TRP:CZ3	2.50	0.46
1:A:387:HIS:HA	1:A:409:TRP:CZ3	2.50	0.46
1:C:128:LYS:CA	1:C:128:LYS:HE3	2.46	0.46
1:C:266:ARG:O	1:C:385:ARG:HD2	2.16	0.46
1:D:194:ARG:HD2	6:D:678:HOH:O	2.16	0.46
1:D:238:VAL:O	1:D:272:VAL:HA	2.15	0.46
1:D:169:LEU:HD22	1:D:173:ASP:HB3	1.97	0.46
1:A:92:ARG:HB3	1:A:104:ARG:HG3	1.99	0.46
1:A:17:ARG:HB3	1:A:17:ARG:HH11	1.81	0.46
1:A:279:LEU:HD23	1:A:292:GLU:HB3	1.97	0.46
1:A:125:ASP:O	1:A:128:LYS:HE3	2.16	0.45
1:C:266:ARG:NH1	6:C:609:HOH:O	2.35	0.45
1:C:313:THR:HA	1:C:319:PRO:HB3	1.98	0.45
1:A:313:THR:HA	1:A:319:PRO:HB3	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:116:ALA:O	1:B:136:VAL:HG21	2.16	0.45
1:A:135:ALA:O	1:A:142:VAL:HG12	2.16	0.45
1:B:128:LYS:HE3	1:B:128:LYS:CA	2.46	0.45
1:B:463:HIS:CD2	1:B:465:HIS:HB2	2.52	0.45
1:D:263:GLN:O	1:D:267:GLU:HG2	2.16	0.45
1:A:116:ALA:O	1:A:136:VAL:HG21	2.16	0.45
1:B:17:ARG:HG2	1:B:17:ARG:HH11	1.81	0.45
1:B:251:LEU:HD12	1:B:251:LEU:C	2.36	0.45
1:B:8:VAL:HB	1:B:308:MET:HG3	1.97	0.45
1:C:116:ALA:O	1:C:136:VAL:HG21	2.16	0.45
1:D:313:THR:HA	1:D:319:PRO:HB3	1.98	0.45
1:D:251:LEU:HD12	1:D:251:LEU:C	2.36	0.45
1:A:370:LEU:HD12	1:A:388:THR:HG21	1.97	0.45
1:C:194:ARG:HB2	1:C:223:GLU:HB2	1.98	0.45
1:B:438:ARG:HG2	1:B:438:ARG:H	1.40	0.45
1:B:463:HIS:ND1	1:D:461:LEU:HD12	2.32	0.45
1:A:461:LEU:HD12	1:C:463:HIS:ND1	2.32	0.44
1:D:375:GLN:OE1	1:D:454:GLY:HA2	2.17	0.44
1:D:463:HIS:CD2	1:D:465:HIS:HB2	2.51	0.44
1:B:266:ARG:O	1:B:385:ARG:HD2	2.17	0.44
1:C:251:LEU:HD12	1:C:251:LEU:C	2.37	0.44
1:A:194:ARG:HB2	1:A:223:GLU:HB2	2.00	0.44
1:A:268:ASN:HA	4:A:503:R5P:O4	2.18	0.44
1:C:399:PRO:HA	1:C:415:ILE:CD1	2.43	0.44
1:A:329:ILE:HA	1:B:252:GLU:HB2	2.00	0.44
1:D:440:LYS:HG2	1:D:441[B]:ARG:NH2	2.31	0.44
1:A:266:ARG:O	1:A:385:ARG:HD2	2.17	0.44
1:B:279:LEU:HD23	1:B:292:GLU:HB3	1.98	0.44
1:A:366:ASP:OD1	6:A:601:HOH:O	2.21	0.44
1:B:128:LYS:HE3	1:B:128:LYS:HA	2.00	0.44
1:C:217:ALA:HB2	1:C:235:PHE:CG	2.53	0.44
1:D:217:ALA:HB2	1:D:235:PHE:CG	2.53	0.44
1:C:463:HIS:CD2	1:C:465:HIS:HB2	2.52	0.44
1:C:63:GLY:HA3	1:C:187:MET:HE1	2.00	0.44
1:A:451:ALA:HA	1:A:452:PRO:C	2.39	0.44
1:B:186:ASP:C	1:B:187:MET:HG3	2.39	0.44
1:B:451:ALA:HA	1:B:452:PRO:C	2.39	0.44
1:D:8:VAL:HB	1:D:308:MET:HG3	2.00	0.44
1:C:254:VAL:N	1:C:255:PRO:CD	2.81	0.43
1:B:9:CYS:SG	1:B:323:VAL:HG22	2.59	0.43
1:B:436:LEU:N	1:B:436:LEU:CD1	2.81	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:110:LYS:HA	1:D:110:LYS:HD3	1.71	0.43
1:D:254:VAL:N	1:D:255:PRO:CD	2.82	0.43
1:B:254:VAL:N	1:B:255:PRO:CD	2.81	0.43
1:A:217:ALA:HB2	1:A:235:PHE:CG	2.53	0.43
1:B:217:ALA:HB2	1:B:235:PHE:CG	2.53	0.43
1:A:276:THR:HG22	1:A:277:GLN:HG3	2.00	0.43
1:B:89:GLU:OE1	1:B:102:HIS:NE2	2.46	0.43
1:D:399:PRO:HA	1:D:415:ILE:CD1	2.43	0.43
1:D:369:ALA:HB3	1:D:445:VAL:HG22	2.01	0.43
1:A:9:CYS:SG	1:A:323:VAL:HG22	2.59	0.43
1:D:9:CYS:SG	1:D:323:VAL:HG22	2.59	0.43
1:B:194:ARG:HB2	1:B:223:GLU:HB2	2.01	0.43
1:A:17:ARG:CG	1:A:17:ARG:HH11	2.32	0.43
1:C:92:ARG:HG2	1:C:140:ASP:HB3	2.01	0.43
1:C:117:VAL:HG22	6:C:745:HOH:O	2.19	0.43
1:A:128:LYS:HD3	1:A:128:LYS:N	2.33	0.42
1:A:74:ARG:HH21	1:A:74:ARG:HG2	1.84	0.42
1:A:419:MET:CE	1:A:419:MET:HA	2.49	0.42
1:B:6:LYS:O	1:B:306:ALA:HA	2.20	0.42
1:C:252:GLU:HB2	1:D:329:ILE:HA	2.00	0.42
1:A:17:ARG:CB	1:A:17:ARG:HH11	2.33	0.42
1:C:329:ILE:HA	1:D:252:GLU:HB2	2.00	0.42
1:D:451:ALA:HA	1:D:452:PRO:C	2.38	0.42
1:A:254:VAL:N	1:A:255:PRO:CD	2.82	0.42
1:A:122:VAL:C	1:A:123:LEU:HD23	2.40	0.42
1:C:8:VAL:HB	1:C:308:MET:HG3	2.01	0.42
1:D:268:ASN:HA	4:D:503:R5P:O4	2.19	0.42
1:C:194:ARG:HH21	1:C:194:ARG:HG2	1.85	0.42
1:C:451:ALA:HA	1:C:452:PRO:C	2.39	0.42
1:A:6:LYS:O	1:A:306:ALA:HA	2.20	0.42
1:C:9:CYS:SG	1:C:323:VAL:HG22	2.60	0.42
1:A:107:THR:O	1:A:110:LYS:CE	2.67	0.42
1:D:128:LYS:HG2	1:D:128:LYS:H	1.51	0.42
1:D:441[A]:ARG:NH1	1:D:441[A]:ARG:CG	2.78	0.42
1:B:375:GLN:OE1	1:B:454:GLY:HA2	2.20	0.41
1:D:296:VAL:HG13	1:D:307:LEU:CD1	2.50	0.41
1:A:8:VAL:HB	1:A:308:MET:HG3	2.01	0.41
1:A:422:THR:HA	1:A:425:MET:HG3	2.02	0.41
1:C:128:LYS:HA	1:C:128:LYS:HE3	2.01	0.41
1:C:296:VAL:HG13	1:C:307:LEU:CD1	2.51	0.41
1:D:6:LYS:O	1:D:306:ALA:HA	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:436:LEU:HD13	1:A:436:LEU:N	2.34	0.41
1:D:440:LYS:CE	1:D:441[B]:ARG:HH12	2.28	0.41
1:A:430:ASP:O	1:A:434:LEU:HD12	2.21	0.41
1:B:92:ARG:HB3	1:B:104:ARG:HG3	2.02	0.41
1:C:6:LYS:O	1:C:306:ALA:HA	2.20	0.41
1:C:89:GLU:OE1	1:C:102:HIS:NE2	2.45	0.41
1:A:63:GLY:HA3	1:A:187:MET:HE1	2.03	0.41
1:A:33:ARG:NH1	6:A:622:HOH:O	2.53	0.41
1:A:169:LEU:HD22	1:A:173:ASP:HB3	2.01	0.41
1:C:436:LEU:CD1	1:C:436:LEU:N	2.83	0.41
1:D:74:ARG:HG2	1:D:74:ARG:NH2	2.35	0.41
1:A:296:VAL:HG13	1:A:307:LEU:CD1	2.51	0.41
1:A:375:GLN:OE1	1:A:454:GLY:HA2	2.21	0.41
1:C:17:ARG:HG2	1:C:17:ARG:HH21	1.86	0.41
1:C:359:ARG:HD3	1:C:363:GLU:CD	2.41	0.41
1:D:123:LEU:HD12	1:D:247:VAL:HB	2.02	0.41
1:A:452:PRO:HA	1:A:453:PRO:HD3	1.96	0.41
1:A:186:ASP:C	1:A:187:MET:HG3	2.42	0.40
1:B:232:VAL:HG22	1:B:238:VAL:HG11	2.02	0.40
1:C:375:GLN:OE1	1:C:454:GLY:HA2	2.22	0.40
1:C:186:ASP:C	1:C:187:MET:HG3	2.41	0.40
1:D:186:ASP:C	1:D:187:MET:HG3	2.41	0.40
1:D:89:GLU:OE1	1:D:102:HIS:NE2	2.46	0.40
1:A:266:ARG:NH1	6:A:609:HOH:O	2.42	0.40
1:B:128:LYS:HG2	1:B:128:LYS:H	1.73	0.40
1:A:252:GLU:HB2	1:B:329:ILE:HA	2.04	0.40
1:B:423:ASP:HB3	6:B:662:HOH:O	2.20	0.40
1:B:452:PRO:HA	1:B:453:PRO:HD3	1.95	0.40

All (4) 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:101:SER:OG	1:D:103:ASP:OD2[1_655]	1.33	0.87
1:B:103:ASP:OD2	1:C:101:SER:OG[1_655]	1.80	0.40
1:B:101:SER:OG	1:C:103:ASP:OD1[1_655]	2.04	0.16
1:A:103:ASP:OD2	1:D:101:SER:OG[1_655]	2.11	0.09

## 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	470/475 (99%)	455 (97%)	13 (3%)	2 (0%)	34	46
1	B	469/475 (99%)	453 (97%)	14 (3%)	2 (0%)	34	46
1	C	469/475 (99%)	451 (96%)	17 (4%)	1 (0%)	47	60
1	D	471/475 (99%)	456 (97%)	13 (3%)	2 (0%)	34	46
All	All	1879/1900 (99%)	1815 (97%)	57 (3%)	7 (0%)	34	46

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	276	THR
1	B	276	THR
1	C	276	THR
1	D	276	THR
1	D	138	GLY
1	A	138	GLY
1	B	138	GLY

### 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	380/381 (100%)	356 (94%)	24 (6%)	18	23
1	B	379/381 (100%)	361 (95%)	18 (5%)	26	35
1	C	379/381 (100%)	360 (95%)	19 (5%)	24	33

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	381/381 (100%)	353 (93%)	28 (7%)	14	18
All	All	1519/1524 (100%)	1430 (94%)	89 (6%)	20	25

All (89) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	ARG
1	A	18	ASP
1	A	19	ASP
1	A	20	LEU
1	A	72	LYS
1	A	92	ARG
1	A	106	SER
1	A	137	GLU
1	A	147	GLU
1	A	155	LYS
1	A	172	LYS
1	A	194	ARG
1	A	260[A]	ARG
1	A	260[B]	ARG
1	A	317	LYS
1	A	348	ARG
1	A	359	ARG
1	A	383	LEU
1	A	388	THR
1	A	420	GLN
1	A	423	ASP
1	A	431	LYS
1	A	436	LEU
1	A	466	ARG
1	B	18	ASP
1	B	20	LEU
1	B	72	LYS
1	B	106	SER
1	B	123	LEU
1	B	128	LYS
1	B	155	LYS
1	B	319	PRO
1	B	348	ARG
1	B	359	ARG
1	B	383	LEU
1	B	388	THR

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Mol	Chain	Res	Type
1	B	420	GLN
1	B	423	ASP
1	B	436	LEU
1	B	438	ARG
1	B	441	ARG
1	B	466	ARG
1	C	18	ASP
1	C	19	ASP
1	C	20	LEU
1	C	72	LYS
1	C	106	SER
1	C	123	LEU
1	C	128	LYS
1	C	155	LYS
1	C	209	ILE
1	C	222	PRO
1	C	348	ARG
1	C	359	ARG
1	C	383	LEU
1	C	388	THR
1	C	420	GLN
1	C	431	LYS
1	C	436	LEU
1	C	441	ARG
1	C	466	ARG
1	D	18	ASP
1	D	19	ASP
1	D	20	LEU
1	D	40	ASP
1	D	106	SER
1	D	110	LYS
1	D	128	LYS
1	D	137	GLU
1	D	142	VAL
1	D	147	GLU
1	D	155	LYS
1	D	171	GLU
1	D	172	LYS
1	D	222	PRO
1	D	260[A]	ARG
1	D	260[B]	ARG
1	D	284	GLU

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Mol	Chain	Res	Type
1	D	359	ARG
1	D	383	LEU
1	D	388	THR
1	D	420	GLN
1	D	423	ASP
1	D	432	SER
1	D	438	ARG
1	D	441[A]	ARG
1	D	441[B]	ARG
1	D	445	VAL
1	D	466	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	44	HIS
1	A	387	HIS
1	A	404	GLN
1	B	404	GLN
1	C	44	HIS
1	C	114	GLN
1	C	404	GLN
1	D	44	HIS
1	D	404	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry

Of 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	AMP	D	504	-	22,25,25	1.89	8 (36%)	25,38,38	1.95	6 (24%)
4	R5P	A	503	-	12,13,13	3.11	5 (41%)	17,18,18	1.67	5 (29%)
5	AMP	A	504	-	22,25,25	1.80	7 (31%)	25,38,38	1.92	6 (24%)
5	AMP	B	504	-	22,25,25	1.81	7 (31%)	25,38,38	1.87	7 (28%)
4	R5P	C	503	-	12,13,13	2.66	3 (25%)	17,18,18	1.73	6 (35%)
3	OXL	A	502	2	0,5,5	0.00	-	0,6,6	0.00	-
3	OXL	B	502	2	0,5,5	0.00	-	0,6,6	0.00	-
4	R5P	D	503	-	12,13,13	3.31	4 (33%)	17,18,18	1.75	4 (23%)
3	OXL	D	502	2	0,5,5	0.00	-	0,6,6	0.00	-
4	R5P	B	503	-	12,13,13	2.79	4 (33%)	17,18,18	1.73	5 (29%)
3	OXL	C	502	2	0,5,5	0.00	-	0,6,6	0.00	-
5	AMP	C	504	-	22,25,25	1.88	5 (22%)	25,38,38	1.92	7 (28%)

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
5	AMP	D	504	-	-	0/6/26/26	0/3/3/3
4	R5P	A	503	-	-	2/14/16/16	-
5	AMP	A	504	-	-	5/6/26/26	0/3/3/3
5	AMP	B	504	-	-	1/6/26/26	0/3/3/3
4	R5P	C	503	-	-	5/14/16/16	-
3	OXL	A	502	2	-	0/0/4/4	-
3	OXL	B	502	2	-	0/0/4/4	-
4	R5P	D	503	-	-	2/14/16/16	-
3	OXL	D	502	2	-	0/0/4/4	-
4	R5P	B	503	-	-	1/14/16/16	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	OXL	C	502	2	-	0/0/4/4	-
5	AMP	C	504	-	-	0/6/26/26	0/3/3/3

All (43) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	503	R5P	P-O5	8.37	1.87	1.60
4	A	503	R5P	P-O5	7.63	1.84	1.60
4	B	503	R5P	P-O5	6.88	1.82	1.60
4	C	503	R5P	P-O5	6.29	1.80	1.60
4	D	503	R5P	C3-C2	6.00	1.62	1.53
4	A	503	R5P	C3-C2	5.64	1.62	1.53
4	C	503	R5P	C3-C2	5.22	1.61	1.53
4	B	503	R5P	C3-C2	5.15	1.61	1.53
5	C	504	AMP	C2-N3	4.83	1.39	1.32
5	D	504	AMP	C2-N3	4.82	1.39	1.32
5	A	504	AMP	C2-N3	4.28	1.39	1.32
5	B	504	AMP	C2-N3	4.21	1.38	1.32
5	C	504	AMP	C2-N1	3.85	1.41	1.33
5	D	504	AMP	C2-N1	3.83	1.41	1.33
5	B	504	AMP	C2-N1	3.82	1.41	1.33
5	A	504	AMP	C2-N1	3.73	1.40	1.33
4	D	503	R5P	O5-C5	-2.93	1.33	1.44
5	C	504	AMP	C2'-C1'	-2.90	1.49	1.53
4	B	503	R5P	O5-C5	-2.87	1.33	1.44
4	D	503	R5P	C5-C4	2.85	1.55	1.51
4	C	503	R5P	O5-C5	-2.61	1.34	1.44
5	B	504	AMP	C2'-C3'	-2.54	1.46	1.53
4	A	503	R5P	O4-C4	-2.53	1.38	1.43
5	A	504	AMP	C6-C5	-2.47	1.34	1.43
5	D	504	AMP	C6-C5	-2.37	1.34	1.43
5	D	504	AMP	C2'-C1'	-2.31	1.50	1.53
4	A	503	R5P	O5-C5	-2.28	1.36	1.44
5	A	504	AMP	C5-C4	-2.26	1.35	1.40
4	B	503	R5P	O2-C2	-2.23	1.39	1.43
5	B	504	AMP	C6-C5	-2.22	1.35	1.43
5	D	504	AMP	C5-N7	-2.19	1.31	1.39
5	D	504	AMP	P-O2P	-2.15	1.46	1.54
5	C	504	AMP	C6-C5	-2.14	1.35	1.43
5	D	504	AMP	P-O3P	-2.13	1.46	1.54
5	A	504	AMP	O4'-C4'	-2.11	1.40	1.45
5	C	504	AMP	C5-C4	-2.10	1.35	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	504	AMP	C4-N3	-2.09	1.32	1.35
5	B	504	AMP	C5-C4	-2.06	1.35	1.40
4	A	503	R5P	C4-C3	2.05	1.57	1.53
5	A	504	AMP	P-O2P	-2.04	1.47	1.54
5	B	504	AMP	C2'-C1'	-2.04	1.50	1.53
5	B	504	AMP	C5-N7	-2.04	1.32	1.39
5	A	504	AMP	C5-N7	-2.04	1.32	1.39

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	504	AMP	N3-C2-N1	-6.05	119.22	128.68
5	C	504	AMP	N3-C2-N1	-5.96	119.36	128.68
5	D	504	AMP	N3-C2-N1	-5.92	119.42	128.68
5	B	504	AMP	N3-C2-N1	-5.92	119.43	128.68
5	D	504	AMP	O4'-C1'-C2'	-4.22	100.76	106.93
5	C	504	AMP	O4'-C1'-C2'	-3.82	101.35	106.93
4	D	503	R5P	O2P-P-O5	-3.75	96.75	106.73
4	B	503	R5P	O2P-P-O5	-3.65	97.01	106.73
5	B	504	AMP	O4'-C1'-C2'	-3.47	101.85	106.93
5	A	504	AMP	O4'-C1'-C2'	-3.35	102.04	106.93
4	C	503	R5P	O5-P-O1P	-2.89	98.36	106.47
5	D	504	AMP	O2P-P-O5'	-2.77	99.36	106.73
4	A	503	R5P	O2P-P-O5	-2.75	99.42	106.73
4	A	503	R5P	O3P-P-O5	-2.73	99.47	106.73
5	B	504	AMP	O2P-P-O5'	-2.58	99.88	106.73
4	C	503	R5P	O3P-P-O2P	2.57	117.48	107.64
5	C	504	AMP	O5'-P-O1P	-2.56	99.28	106.47
5	B	504	AMP	O3P-P-O2P	2.55	117.38	107.64
5	D	504	AMP	O3P-P-O2P	2.48	117.11	107.64
4	D	503	R5P	O2-C2-C3	2.45	115.27	109.46
5	A	504	AMP	O5'-P-O1P	-2.38	99.80	106.47
4	B	503	R5P	O3P-P-O2P	2.35	116.63	107.64
4	A	503	R5P	O3-C3-C4	2.34	114.47	108.81
4	A	503	R5P	O3P-P-O2P	2.33	116.54	107.64
5	A	504	AMP	O3P-P-O5'	-2.32	100.55	106.73
4	C	503	R5P	O3P-P-O5	-2.30	100.60	106.73
4	D	503	R5P	O3-C3-C4	2.27	114.30	108.81
5	A	504	AMP	C5-C6-N6	-2.26	116.91	120.35
4	D	503	R5P	O3P-P-O2P	2.24	116.21	107.64
4	C	503	R5P	O2P-P-O5	-2.23	100.79	106.73
4	C	503	R5P	O2-C2-C3	2.23	114.76	109.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	503	R5P	O3P-P-O5	-2.22	100.83	106.73
4	C	503	R5P	O3-C3-C4	2.21	114.14	108.81
4	B	503	R5P	O3-C3-C4	2.19	114.11	108.81
5	B	504	AMP	O5'-P-O1P	-2.18	100.36	106.47
5	D	504	AMP	C5-C6-N6	-2.18	117.05	120.35
5	C	504	AMP	O3P-P-O2P	2.17	115.94	107.64
5	D	504	AMP	O5'-P-O1P	-2.17	100.39	106.47
5	C	504	AMP	O3P-P-O5'	-2.17	100.97	106.73
4	A	503	R5P	O2-C2-C3	2.17	114.60	109.46
5	B	504	AMP	C4-C5-N7	-2.13	107.18	109.40
5	C	504	AMP	C4-C5-N7	-2.11	107.20	109.40
4	B	503	R5P	O2-C2-C3	2.11	114.47	109.46
5	A	504	AMP	O3P-P-O2P	2.11	115.70	107.64
5	B	504	AMP	O3P-P-O5'	-2.09	101.16	106.73
5	C	504	AMP	C5-C6-N6	-2.03	117.26	120.35

There are no chirality outliers.

All (16) torsion outliers are listed below:

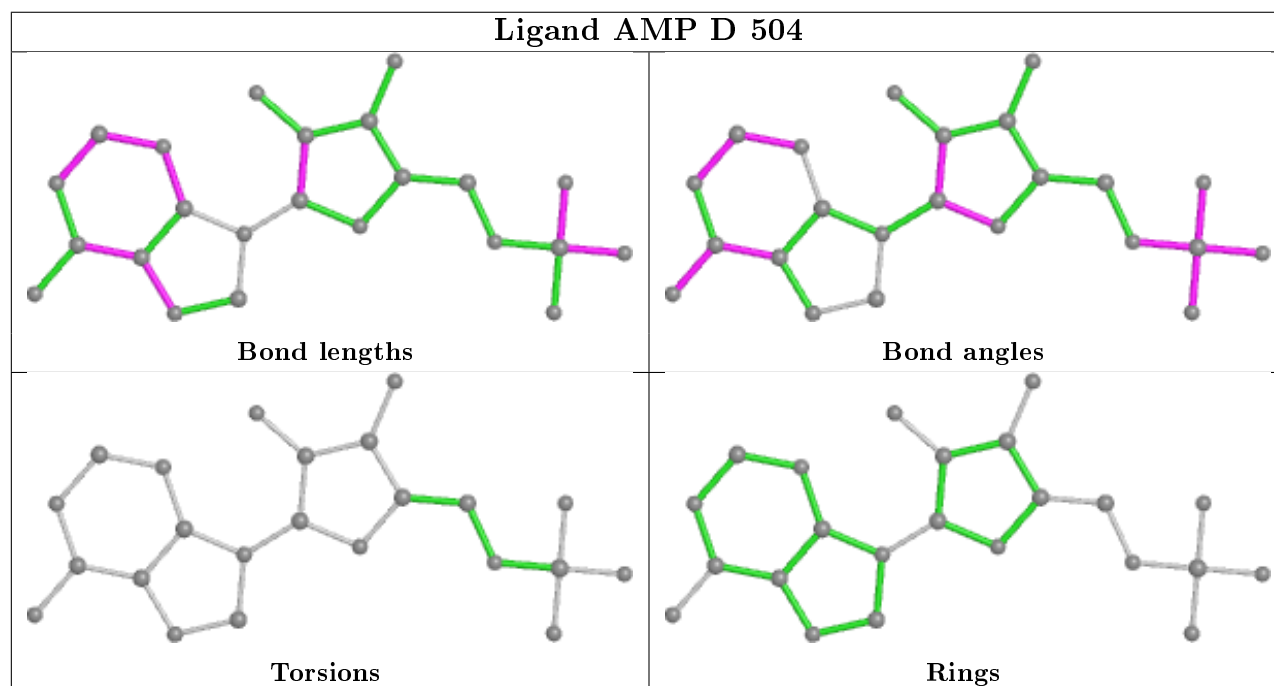
Mol	Chain	Res	Type	Atoms
5	A	504	AMP	C5'-O5'-P-O2P
5	A	504	AMP	C5'-O5'-P-O3P
4	C	503	R5P	C3-C4-C5-O5
4	C	503	R5P	O4-C4-C5-O5
4	C	503	R5P	C5-O5-P-O1P
4	C	503	R5P	C5-O5-P-O3P
5	A	504	AMP	C3'-C4'-C5'-O5'
5	A	504	AMP	O4'-C4'-C5'-O5'
4	A	503	R5P	O4-C4-C5-O5
4	D	503	R5P	C5-O5-P-O1P
4	A	503	R5P	C5-O5-P-O1P
4	D	503	R5P	C5-O5-P-O3P
4	C	503	R5P	C5-O5-P-O2P
4	B	503	R5P	O4-C4-C5-O5
5	A	504	AMP	C5'-O5'-P-O1P
5	B	504	AMP	C3'-C4'-C5'-O5'

There are no ring outliers.

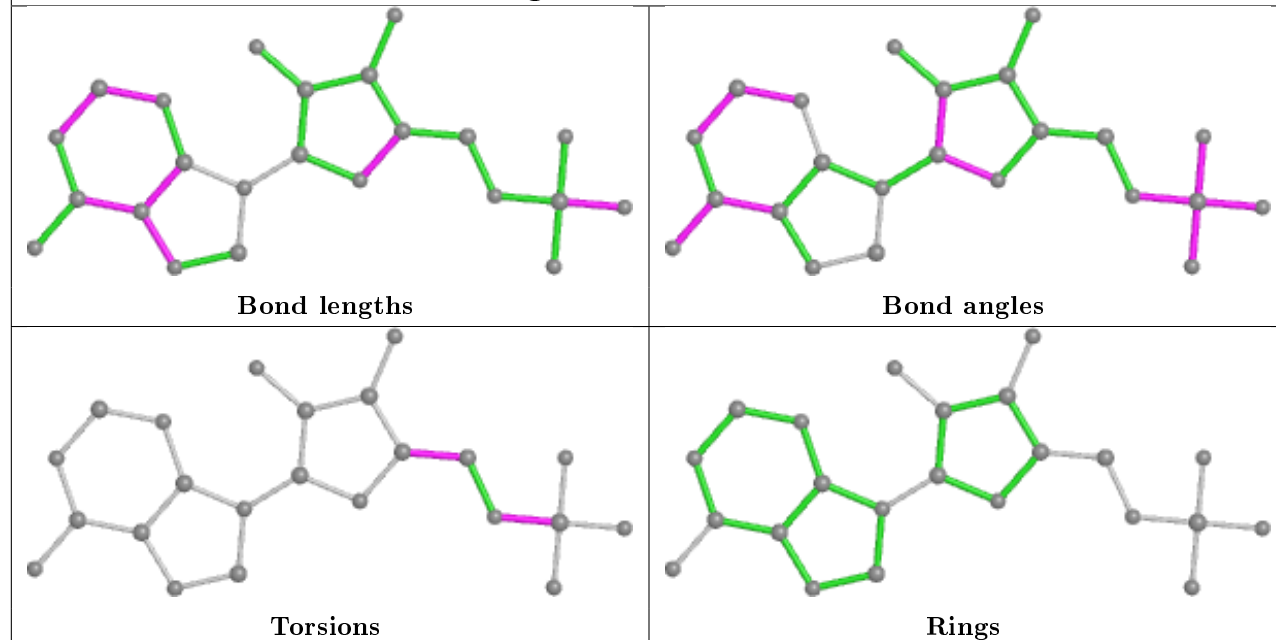
8 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	504	AMP	1	0
4	A	503	R5P	1	0
5	A	504	AMP	2	0
5	B	504	AMP	3	0
4	C	503	R5P	1	0
4	D	503	R5P	1	0
4	B	503	R5P	1	0
5	C	504	AMP	1	0

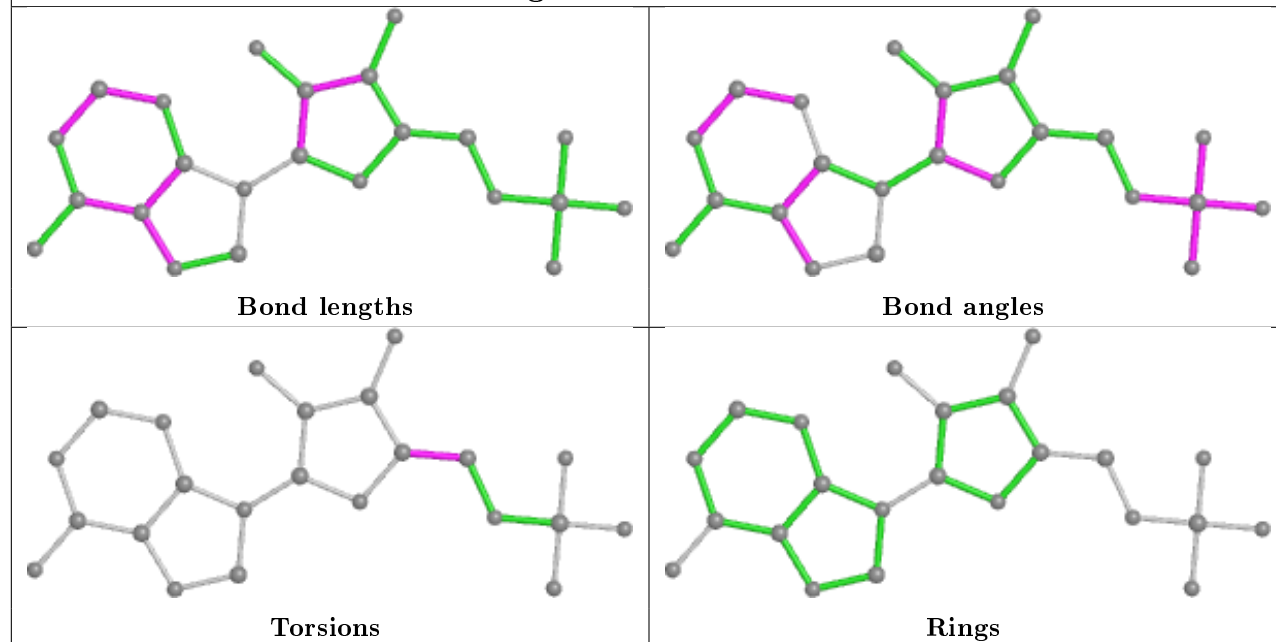
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

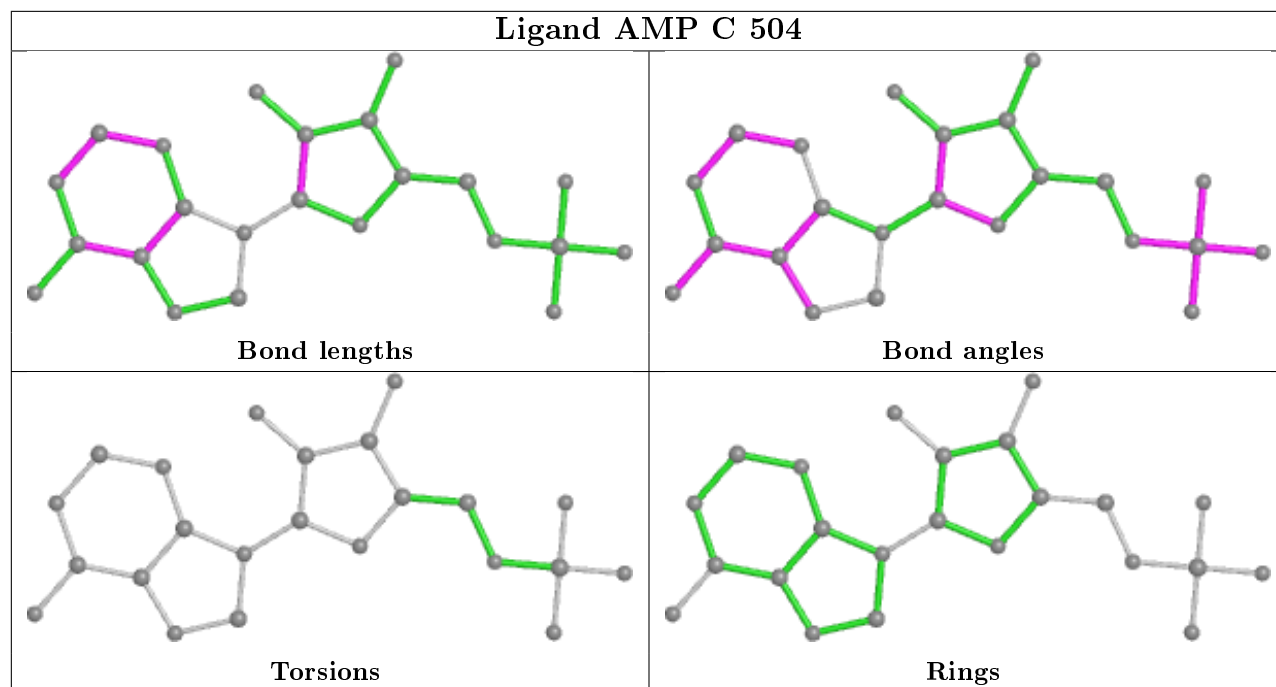


## Ligand AMP A 504



## Ligand AMP B 504





## 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(Å <sup>2</sup> )	Q<0.9
1	A	471/475 (99%)	0.08	7 (1%) 73 79	37, 55, 89, 106	0
1	B	471/475 (99%)	0.08	9 (1%) 66 73	36, 55, 91, 114	0
1	C	471/475 (99%)	0.09	8 (1%) 70 76	38, 55, 90, 108	0
1	D	471/475 (99%)	0.11	11 (2%) 60 67	36, 55, 89, 110	0
All	All	1884/1900 (99%)	0.09	35 (1%) 66 73	36, 55, 90, 114	0

All (35) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	85	TRP	4.8
1	A	85	TRP	4.8
1	B	135	ALA	4.0
1	D	116	ALA	4.0
1	B	127	GLY	4.0
1	D	93	ILE	3.9
1	D	136	VAL	3.7
1	B	85	TRP	3.4
1	C	136	VAL	3.1
1	C	85	TRP	3.1
1	C	82	ALA	3.0
1	D	141	VAL	2.9
1	A	142	VAL	2.8
1	C	127	GLY	2.7
1	D	95	VAL	2.7
1	D	142	VAL	2.7
1	A	151	VAL	2.6
1	D	75	LEU	2.6
1	C	96	GLY	2.6
1	A	135	ALA	2.5
1	A	383	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
1	D	127	GLY	2.5
1	B	116	ALA	2.4
1	B	136	VAL	2.4
1	B	142	VAL	2.4
1	C	142	VAL	2.3
1	D	151	VAL	2.3
1	C	151	VAL	2.2
1	A	136	VAL	2.2
1	D	461	LEU	2.2
1	B	137	GLU	2.2
1	B	151	VAL	2.2
1	C	141	VAL	2.2
1	A	141	VAL	2.0
1	B	96	GLY	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 6.3 Carbohydrates ⓘ

There are no carbohydrates 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.

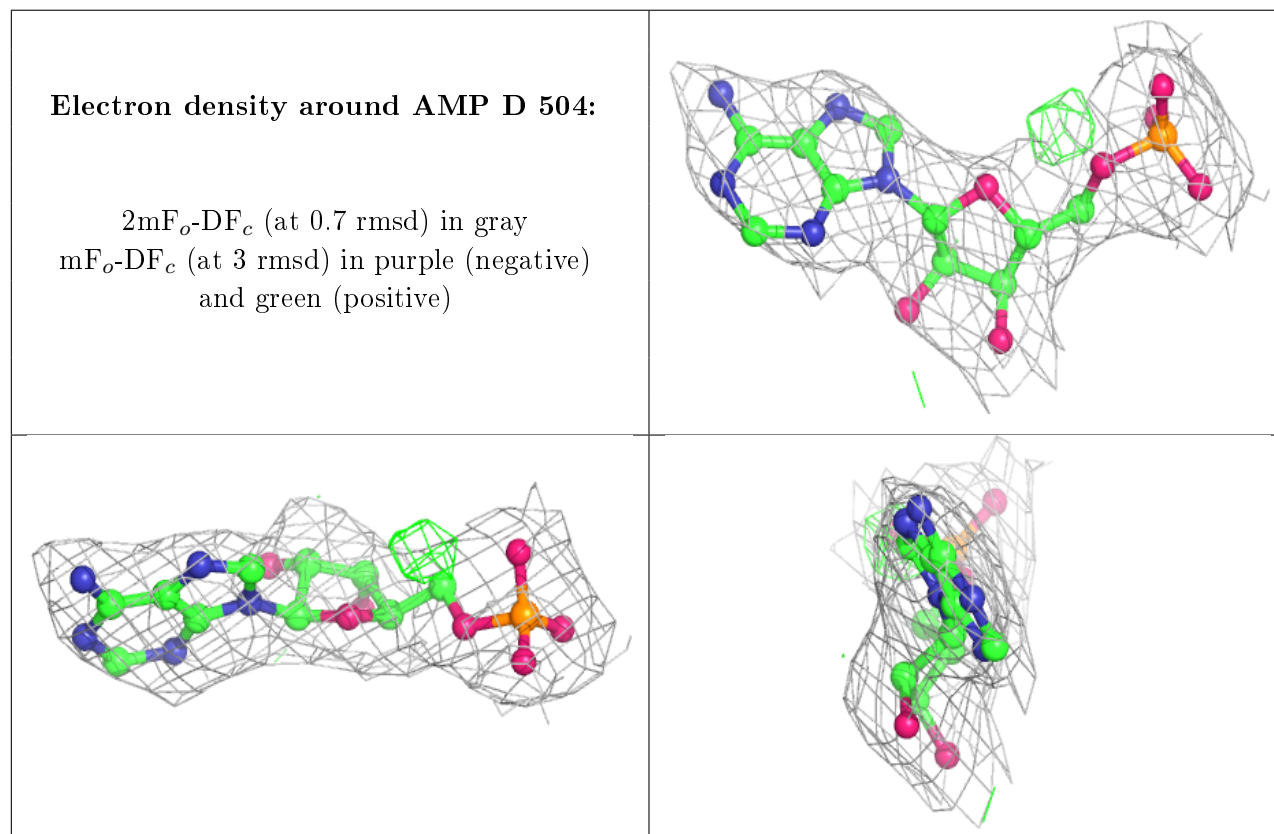
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	R5P	B	503	14/14	0.94	0.16	51,68,77,82	0
4	R5P	A	503	14/14	0.95	0.17	57,70,81,90	0
4	R5P	D	503	14/14	0.95	0.17	57,73,83,83	0
4	R5P	C	503	14/14	0.95	0.17	48,68,79,80	0
5	AMP	D	504	23/23	0.96	0.16	48,67,72,77	0
3	OXL	A	502	6/6	0.97	0.11	43,48,49,52	0
3	OXL	C	502	6/6	0.97	0.12	42,52,54,56	0
5	AMP	A	504	23/23	0.97	0.15	45,66,70,79	0
5	AMP	C	504	23/23	0.97	0.15	49,67,73,78	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	AMP	B	504	23/23	0.97	0.16	46,67,71,73	0
3	OXL	B	502	6/6	0.98	0.14	42,51,52,53	0
2	MG	C	501	1/1	0.98	0.14	40,40,40,40	0
3	OXL	D	502	6/6	0.98	0.13	44,50,51,53	0
2	MG	D	501	1/1	0.99	0.15	46,46,46,46	0
2	MG	B	501	1/1	0.99	0.12	41,41,41,41	0
2	MG	A	501	1/1	0.99	0.10	46,46,46,46	0

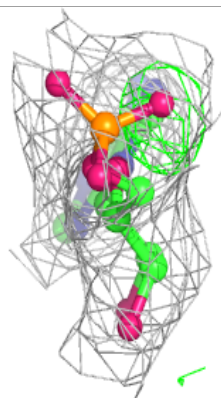
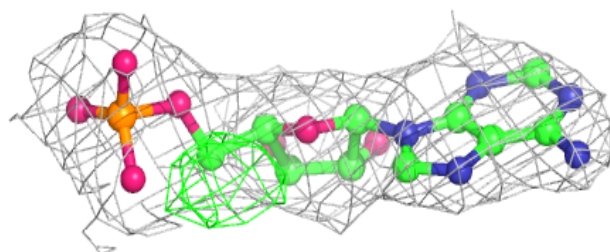
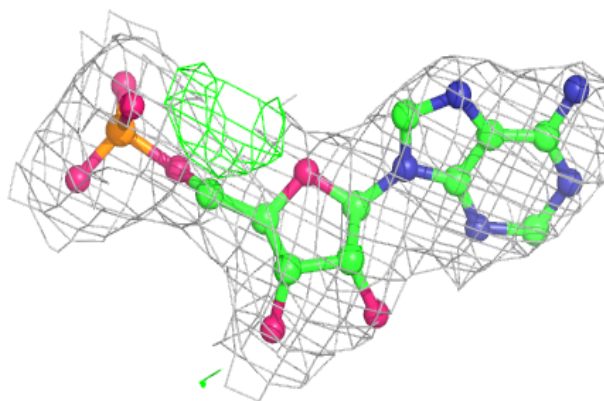
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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



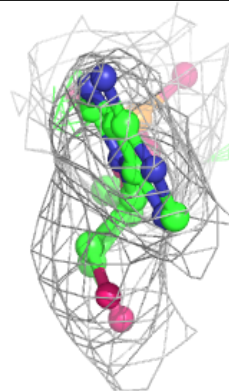
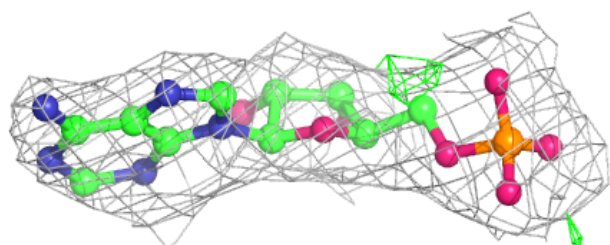
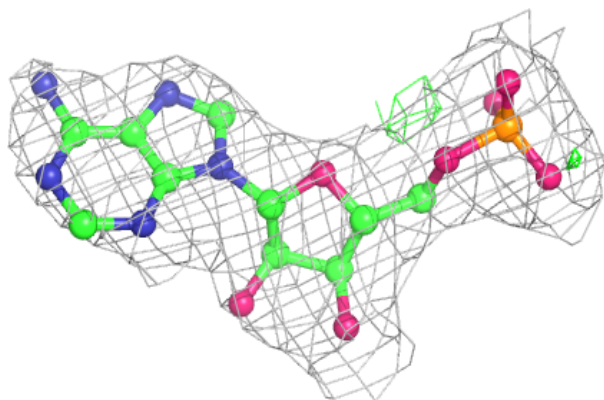


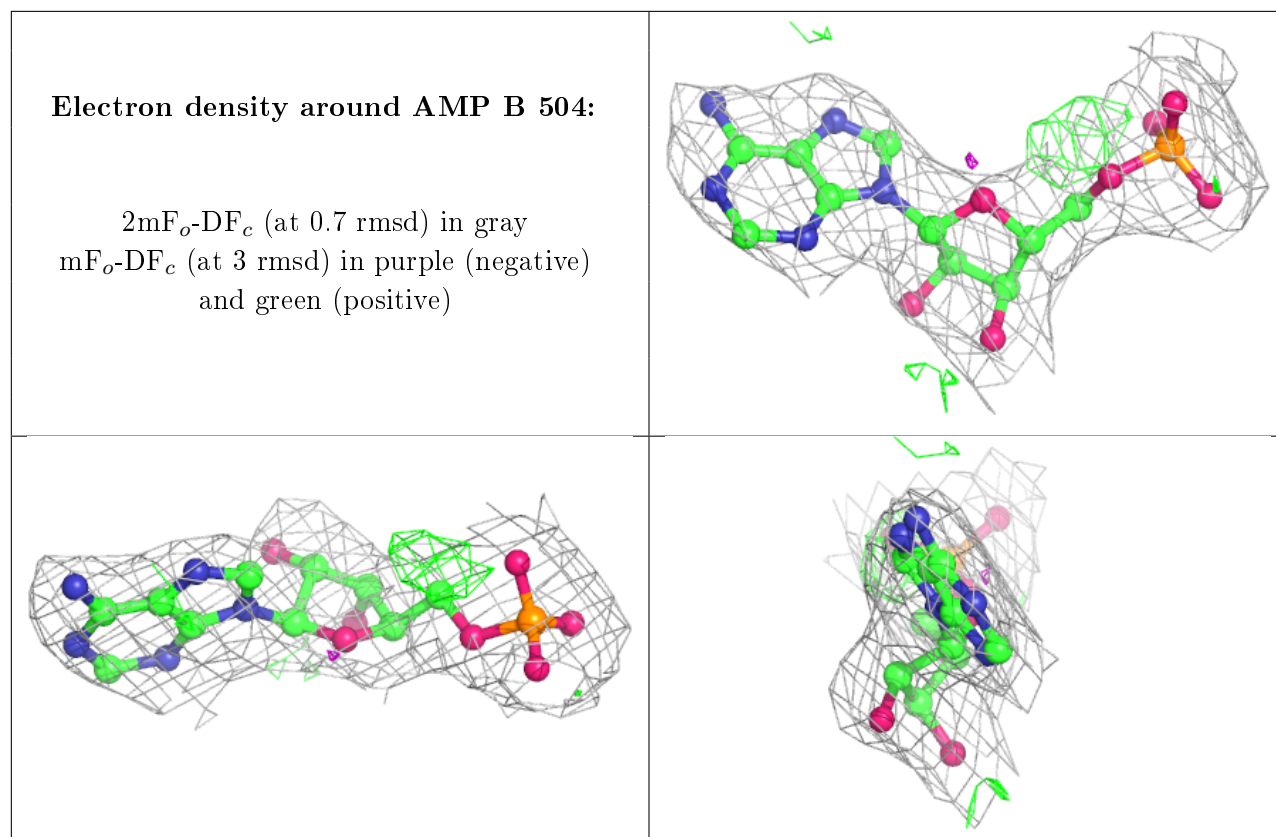
**Electron density around AMP A 504:**

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

**Electron density around AMP C 504:**

$2mF_o-DF_c$  (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.