



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 4, 2023 – 08:34 PM EDT

PDB ID : 3TY9  
Title : Crystal Structure of C. Thermocellum PNKP Ligase Domain AMP-Adenylate  
Authors : Smith, P.; Wang, L.; Shuman, S.  
Deposited on : 2011-09-24  
Resolution : 3.12 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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 : 2.35  
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) : 2.35

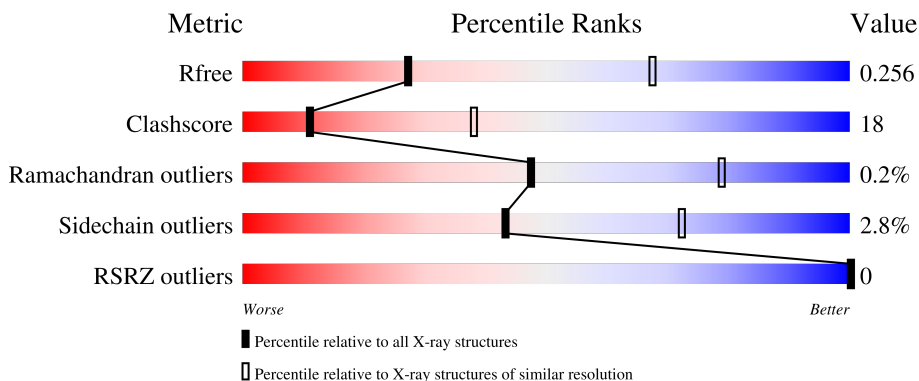
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.12 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	1292 (3.14-3.10)
Clashscore	141614	1389 (3.14-3.10)
Ramachandran outliers	138981	1337 (3.14-3.10)
Sidechain outliers	138945	1337 (3.14-3.10)
RSRZ outliers	127900	1260 (3.14-3.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	393	
1	B	393	
1	C	393	
1	D	393	

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 criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	MPD	D	906	-	-	X	-
4	MRD	A	909	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 12300 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 Polynucleotide 2',3'-cyclic phosphate phosphodiesterase / polynucleotide 5'-hydroxyl-kinase / polynucleotide 3'-phosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	376	Total	C	N	O	S	0	0	0
			3024	1918	524	559	23			
1	B	374	Total	C	N	O	S	0	0	0
			2973	1886	514	550	23			
1	C	376	Total	C	N	O	S	0	0	0
			3020	1917	522	558	23			
1	D	374	Total	C	N	O	S	0	0	0
			3005	1908	519	555	23			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	478	SER	-	expression tag	UNP A3DJ38
B	478	SER	-	expression tag	UNP A3DJ38
C	478	SER	-	expression tag	UNP A3DJ38
D	478	SER	-	expression tag	UNP A3DJ38

- Molecule 2 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).



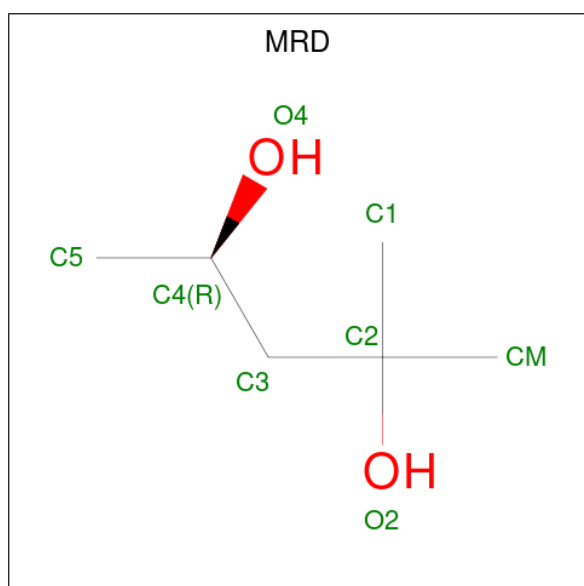
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	B	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	C	1	Total	C	N	O	P	0	0
			22	10	5	6	1		
2	D	1	Total	C	N	O	P	0	0
			22	10	5	6	1		

- Molecule 3 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 8 6 2	0	0
3	A	1	Total C O 8 6 2	0	0
3	A	1	Total C O 8 6 2	0	0
3	B	1	Total C O 8 6 2	0	0
3	C	1	Total C O 8 6 2	0	0
3	C	1	Total C O 8 6 2	0	0
3	C	1	Total C O 8 6 2	0	0
3	D	1	Total C O 8 6 2	0	0
3	D	1	Total C O 8 6 2	0	0
3	D	1	Total C O 8 6 2	0	0

- Molecule 4 is (4R)-2-METHYLPENTANE-2,4-DIOL (three-letter code: MRD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



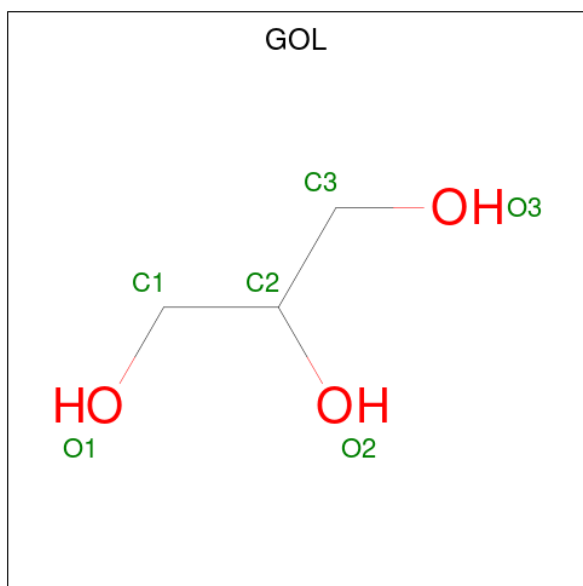
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 8 6 2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		
4	D	1	Total	C	O	0	0
			8	6	2		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	1	Total	Mg	0	0
			1	1		

- Molecule 7 is water.

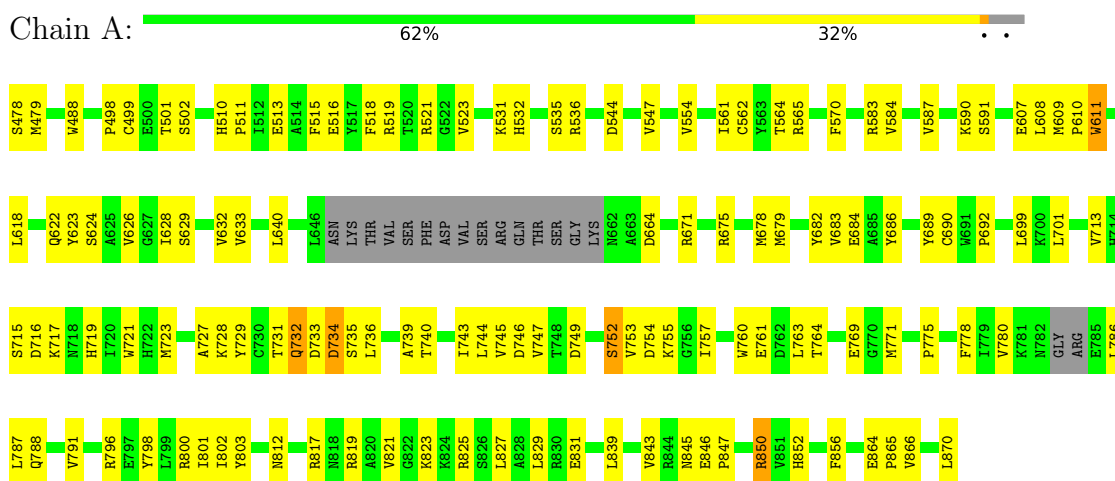
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	22	Total	O	0	0
			22	22		
7	B	8	Total	O	0	0
			8	8		
7	C	13	Total	O	0	0
			13	13		
7	D	9	Total	O	0	0
			9	9		



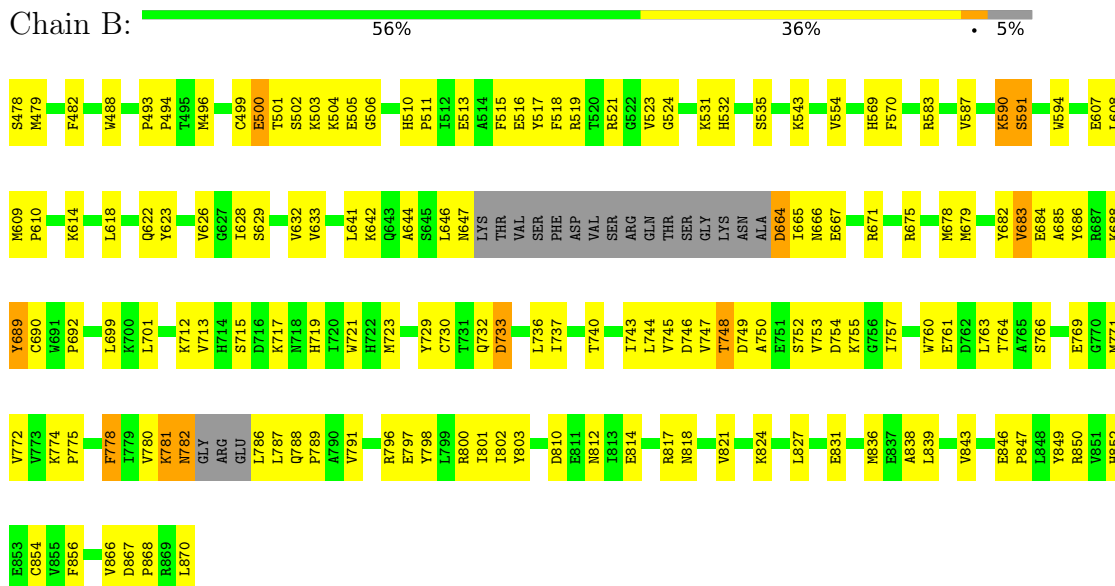
### 3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Polynucleotide 2',3'-cyclic phosphate phosphodiesterase / polynucleotide 5'-hydroxyl-kinase / polynucleotide 3'-phosphatase

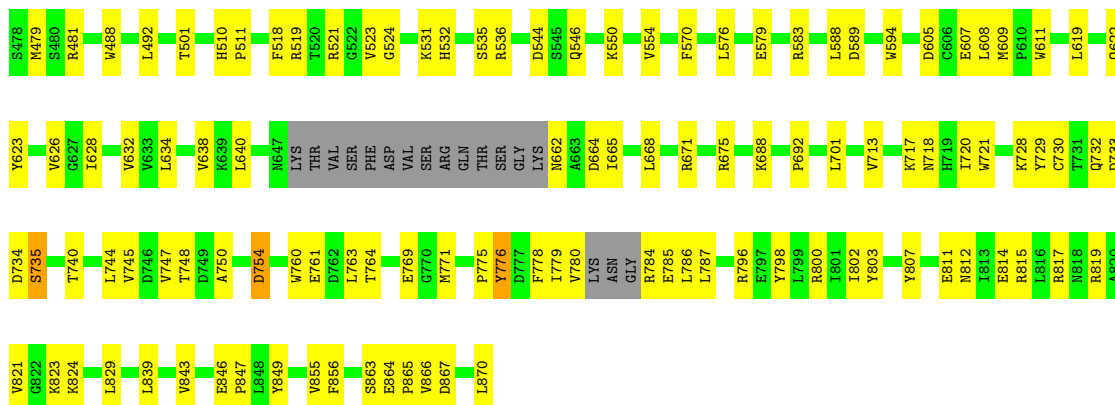


- Molecule 1: Polynucleotide 2',3'-cyclic phosphate phosphodiesterase / polynucleotide 5'-hydroxyl-kinase / polynucleotide 3'-phosphatase



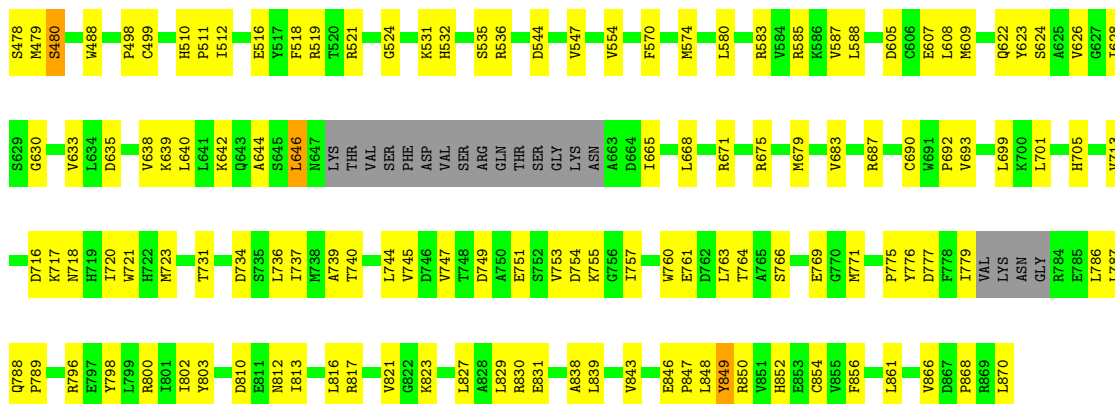
- Molecule 1: Polynucleotide 2',3'-cyclic phosphate phosphodiesterase / polynucleotide 5'-hydroxyl-kinase / polynucleotide 3'-phosphatase

Chain C:  67% 28%



- Molecule 1: Polynucleotide 2',3'-cyclic phosphate phosphodiesterase / polynucleotide 5'-hydroxyl-kinase / polynucleotide 3'-phosphatase

Chain D:  63% 32% 5%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	95.50Å 132.76Å 162.77Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.19 – 3.12 41.18 – 3.12	Depositor EDS
% Data completeness (in resolution range)	99.8 (41.19-3.12) 99.9 (41.18-3.12)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.17 (at 3.12Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.7_650)	Depositor
R, $R_{free}$	0.219 , 0.266 0.212 , 0.256	Depositor DCC
$R_{free}$ test set	1671 reflections (4.46%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	75.4	Xtrriage
Anisotropy	0.653	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.26 , 55.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	12300	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	82.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 38.51 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.6497e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: MPD, GOL, MRD, AMP, 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	0.31	0/3088	0.47	0/4166
1	B	0.31	0/3037	0.47	0/4105
1	C	0.29	0/3084	0.45	0/4162
1	D	0.28	0/3069	0.45	0/4141
All	All	0.30	0/12278	0.46	0/16574

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	3024	0	2986	106	0
1	B	2973	0	2897	140	0
1	C	3020	0	2980	85	0
1	D	3005	0	2965	104	0
2	A	22	0	12	1	0
2	B	22	0	12	0	0
2	C	22	0	12	1	0
2	D	22	0	12	2	0
3	A	24	0	42	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	8	0	14	0	0
3	C	24	0	42	4	0
3	D	24	0	42	9	0
4	A	16	0	28	4	0
4	B	24	0	42	7	0
4	D	8	0	14	0	0
5	A	6	0	8	1	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	A	22	0	0	5	0
7	B	8	0	0	0	0
7	C	13	0	0	0	0
7	D	9	0	0	0	0
All	All	12300	0	12108	439	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 18.

All (439) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:478:SER:N	1:B:690:CYS:HG	1.61	0.99
1:A:501:THR:HG22	1:A:817:ARG:HE	1.32	0.92
1:A:743:ILE:HD11	1:A:755:LYS:HE3	1.59	0.85
1:D:693:VAL:HG21	1:D:699:LEU:HD21	1.57	0.84
1:C:479:MET:HG3	1:C:692:PRO:HG3	1.60	0.83
1:B:678:MET:HG3	1:B:682:TYR:CE1	2.14	0.82
1:A:479:MET:HG3	1:A:692:PRO:HG3	1.61	0.82
1:B:665:ILE:HD12	1:B:665:ILE:H	1.43	0.81
1:B:479:MET:HG3	1:B:692:PRO:HG3	1.63	0.79
1:B:518:PHE:CZ	1:B:775:PRO:HD3	2.18	0.78
1:B:646:LEU:HA	1:B:647:ASN:C	2.05	0.77
1:B:715:SER:HA	1:B:778:PHE:HD2	1.50	0.77
1:D:532:HIS:HB2	1:D:607:GLU:HG2	1.66	0.77
1:C:532:HIS:HB2	1:C:607:GLU:HG2	1.67	0.76
1:D:716:ASP:OD1	1:D:717:LYS:HD2	1.85	0.76
1:B:504:LYS:O	4:B:907:MRD:H3C1	1.87	0.75
1:B:532:HIS:HB2	1:B:607:GLU:HG2	1.69	0.75
1:B:506:GLY:H	4:B:907:MRD:H1C1	1.53	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:532:HIS:HB2	1:A:607:GLU:HG2	1.70	0.73
1:C:634:LEU:O	1:C:638:VAL:HG23	1.88	0.73
1:B:583:ARG:HG2	1:B:736:LEU:HD22	1.70	0.72
1:B:583:ARG:HG2	1:B:736:LEU:CD2	2.19	0.72
4:B:908:MRD:H5C3	4:B:908:MRD:H1C2	1.71	0.71
1:A:817:ARG:O	1:A:821:VAL:HG23	1.90	0.71
1:A:716:ASP:OD1	1:A:717:LYS:HD2	1.91	0.70
1:B:867:ASP:HB3	1:B:870:LEU:HD13	1.74	0.70
1:D:671:ARG:HD3	1:D:675:ARG:NH2	2.06	0.70
1:A:825:ARG:O	1:A:829:LEU:HD13	1.92	0.70
1:B:746:ASP:OD1	1:B:748:THR:HG23	1.92	0.70
1:C:544:ASP:OD1	1:C:546:GLN:HG2	1.93	0.69
1:A:775:PRO:HB2	1:A:780:VAL:HG21	1.75	0.67
1:A:565:ARG:HG2	7:A:36:HOH:O	1.95	0.67
1:A:734:ASP:HA	4:A:909:MRD:H1C1	1.75	0.67
1:B:824:LYS:HD2	1:B:866:VAL:HG11	1.77	0.67
1:D:731:THR:HG21	1:D:739:ALA:HB2	1.75	0.67
1:C:671:ARG:HD3	1:C:675:ARG:NH2	2.11	0.66
1:C:779:ILE:HG22	1:C:780:VAL:HG23	1.78	0.66
1:A:671:ARG:HD3	1:A:675:ARG:NH2	2.11	0.66
1:B:715:SER:HA	1:B:778:PHE:CD2	2.31	0.66
1:C:856:PHE:HB3	1:D:856:PHE:HB3	1.77	0.65
1:C:671:ARG:O	1:C:675:ARG:HG2	1.96	0.65
1:B:590:LYS:HD2	1:B:590:LYS:C	2.17	0.65
1:A:671:ARG:O	1:A:675:ARG:HG2	1.96	0.65
1:A:719:HIS:HE1	7:A:22:HOH:O	1.79	0.65
1:A:845:ASN:HB3	3:A:907:MPD:HM1	1.79	0.65
1:B:671:ARG:HD3	1:B:675:ARG:NH2	2.11	0.65
1:B:817:ARG:O	1:B:821:VAL:HG23	1.97	0.64
1:D:671:ARG:O	1:D:675:ARG:HG2	1.97	0.64
1:B:618:LEU:HG	1:B:682:TYR:CE2	2.31	0.64
1:A:735:SER:H	4:A:909:MRD:H1C1	1.62	0.64
1:B:517:TYR:CE1	1:B:787:LEU:HD11	2.32	0.64
1:D:817:ARG:O	1:D:821:VAL:HG23	1.98	0.63
1:B:760:TRP:CD1	1:B:771:MET:HG2	2.34	0.62
1:D:734:ASP:OD1	1:D:736:LEU:HB3	1.98	0.62
3:D:906:MPD:H11	3:D:906:MPD:H53	1.81	0.62
1:B:671:ARG:O	1:B:675:ARG:HG2	1.98	0.62
1:A:519:ARG:HB2	1:A:747:VAL:HG12	1.80	0.62
1:C:763:LEU:HD12	1:C:764:THR:N	2.15	0.62
1:D:671:ARG:HD3	1:D:675:ARG:HH21	1.64	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:587:VAL:O	1:B:590:LYS:HG3	1.99	0.61
1:A:518:PHE:CZ	1:A:775:PRO:HD3	2.36	0.61
1:D:803:TYR:OH	1:D:817:ARG:HD2	2.01	0.61
1:A:618:LEU:HG	1:A:682:TYR:CE2	2.34	0.61
1:B:521:ARG:HG2	1:B:787:LEU:HD13	1.82	0.61
1:C:518:PHE:CZ	1:C:775:PRO:HD3	2.35	0.61
1:A:610:PRO:HG2	1:A:686:TYR:CE1	2.37	0.60
1:B:505:GLU:HA	4:B:907:MRD:H1C1	1.82	0.60
1:A:679:MET:O	1:A:683:VAL:HG23	2.00	0.60
1:B:678:MET:HG3	1:B:682:TYR:HE1	1.66	0.60
1:D:479:MET:HG3	1:D:692:PRO:HG3	1.82	0.60
1:A:515:PHE:O	1:A:747:VAL:HG11	2.01	0.60
1:A:488:TRP:CE2	1:A:554:VAL:HG21	2.37	0.60
1:C:796:ARG:O	1:C:800:ARG:HG2	2.02	0.60
1:B:500:GLU:HB3	1:B:818:ASN:OD1	2.01	0.59
1:A:501:THR:HG22	1:A:817:ARG:NE	2.10	0.59
1:A:717:LYS:HG2	1:A:721:TRP:CD2	2.37	0.59
1:B:587:VAL:HG21	1:B:737:ILE:HD12	1.84	0.59
1:A:622:GLN:O	1:A:626:VAL:HG13	2.02	0.59
1:C:518:PHE:HD1	1:C:523:VAL:HG21	1.66	0.59
1:C:524:GLY:O	1:C:747:VAL:HG22	2.02	0.59
1:B:839:LEU:O	1:B:843:VAL:HG23	2.02	0.59
1:D:796:ARG:O	1:D:800:ARG:HG2	2.02	0.59
1:B:796:ARG:O	1:B:800:ARG:HG2	2.02	0.59
1:A:583:ARG:HG2	1:A:736:LEU:HD22	1.84	0.58
1:A:671:ARG:HD3	1:A:675:ARG:HH21	1.68	0.58
1:B:543:LYS:HE2	1:B:594:TRP:HB3	1.85	0.58
1:C:488:TRP:CE2	1:C:554:VAL:HG21	2.37	0.58
1:A:678:MET:HG3	1:A:682:TYR:CE1	2.38	0.58
1:B:671:ARG:HD3	1:B:675:ARG:HH21	1.69	0.58
1:C:803:TYR:OH	1:C:817:ARG:HD2	2.04	0.58
1:D:846:GLU:HB3	1:D:847:PRO:HD2	1.85	0.58
1:B:502:SER:HB2	1:B:513:GLU:OE1	2.04	0.58
1:A:763:LEU:HD12	1:A:764:THR:N	2.18	0.57
1:C:519:ARG:HD3	1:C:748:THR:HG22	1.86	0.57
1:A:780:VAL:CG1	1:A:787:LEU:HD22	2.33	0.57
1:C:481:ARG:HH12	1:D:574:MET:HE2	1.68	0.57
1:B:665:ILE:H	1:B:665:ILE:CD1	2.14	0.57
1:B:763:LEU:HD12	1:B:764:THR:N	2.19	0.57
1:C:662:ASN:O	1:C:665:ILE:HG22	2.05	0.57
1:C:817:ARG:O	1:C:821:VAL:HG23	2.05	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:866:VAL:HG22	1:C:867:ASP:N	2.20	0.57
1:A:519:ARG:HB2	1:A:747:VAL:CG1	2.34	0.57
1:B:749:ASP:O	1:B:750:ALA:HB3	2.05	0.57
1:B:866:VAL:HG12	1:B:867:ASP:N	2.19	0.57
1:A:516:GLU:CD	1:A:519:ARG:HH12	2.07	0.56
1:A:689:TYR:HA	7:A:14:HOH:O	2.04	0.56
1:A:760:TRP:CD1	1:A:771:MET:HG2	2.40	0.56
3:D:906:MPD:H11	3:D:906:MPD:C5	2.35	0.56
1:A:629:SER:O	1:A:633:VAL:HG23	2.04	0.56
1:B:500:GLU:H	1:B:500:GLU:CD	2.07	0.56
1:B:763:LEU:HA	1:B:766:SER:OG	2.06	0.56
1:B:591:SER:OG	1:B:729:TYR:HA	2.04	0.56
1:D:583:ARG:HG2	1:D:736:LEU:HD23	1.87	0.56
1:A:684:GLU:OE1	5:A:910:GOL:H32	2.06	0.56
1:C:717:LYS:HG2	1:C:721:TRP:CE2	2.41	0.56
1:D:498:PRO:HG3	1:D:870:LEU:HD22	1.88	0.56
1:B:517:TYR:O	1:B:521:ARG:HD3	2.05	0.56
1:C:718:ASN:HD22	1:C:720:ILE:H	1.54	0.56
1:C:846:GLU:HB3	1:C:847:PRO:HD2	1.87	0.56
1:A:717:LYS:HG2	1:A:721:TRP:CE2	2.41	0.56
1:B:665:ILE:HD12	1:B:665:ILE:N	2.16	0.56
1:C:717:LYS:HG2	1:C:721:TRP:CD2	2.39	0.56
1:C:866:VAL:HG22	1:C:867:ASP:H	1.69	0.56
1:C:867:ASP:HB3	1:C:870:LEU:HD12	1.87	0.56
1:B:629:SER:O	1:B:633:VAL:HG23	2.05	0.56
1:A:839:LEU:O	1:A:843:VAL:HG23	2.06	0.56
1:B:518:PHE:O	1:B:523:VAL:HG23	2.06	0.56
1:A:796:ARG:O	1:A:800:ARG:HG2	2.06	0.55
1:C:479:MET:HG3	1:C:692:PRO:CG	2.35	0.55
1:D:524:GLY:O	1:D:747:VAL:HG22	2.05	0.55
1:D:622:GLN:O	1:D:626:VAL:HG13	2.06	0.55
1:A:502:SER:HB2	1:A:513:GLU:OE1	2.06	0.55
1:C:671:ARG:HD3	1:C:675:ARG:HH21	1.71	0.55
1:B:618:LEU:HG	1:B:682:TYR:HE2	1.70	0.55
1:C:824:LYS:HD2	1:C:866:VAL:HG21	1.88	0.55
1:B:780:VAL:CG1	1:B:787:LEU:HB3	2.36	0.55
1:B:688:LYS:HE3	1:B:690:CYS:SG	2.47	0.55
1:A:518:PHE:HD1	1:A:523:VAL:HG21	1.72	0.55
1:B:587:VAL:CG1	1:B:730:CYS:HA	2.37	0.55
1:B:685:ALA:HA	1:B:688:LYS:HE2	1.87	0.55
1:B:847:PRO:HG2	1:B:850:ARG:CG	2.35	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:488:TRP:CE2	1:B:554:VAL:HG21	2.42	0.54
1:D:478:SER:N	1:D:690:CYS:HG	2.05	0.54
1:D:519:ARG:HB3	1:D:747:VAL:HG23	1.87	0.54
1:D:802:ILE:HD13	3:D:906:MPD:H32	1.89	0.54
1:A:618:LEU:HG	1:A:682:TYR:HE2	1.73	0.54
1:D:640:LEU:HD23	1:D:640:LEU:O	2.07	0.54
1:B:846:GLU:HB3	1:B:847:PRO:HD2	1.90	0.54
1:B:847:PRO:O	1:B:850:ARG:HB2	2.08	0.54
1:C:760:TRP:CD1	1:C:771:MET:HG2	2.43	0.54
1:C:622:GLN:O	1:C:626:VAL:HG13	2.07	0.54
1:D:580:LEU:CD1	1:D:736:LEU:HD21	2.38	0.54
1:D:753:VAL:O	1:D:757:ILE:HG13	2.08	0.54
1:B:772:VAL:CG1	1:B:774:LYS:HE2	2.37	0.53
1:B:788:GLN:HG3	1:B:789:PRO:CD	2.38	0.53
1:B:628:ILE:O	1:B:632:VAL:HG13	2.08	0.53
1:D:693:VAL:HG21	1:D:699:LEU:CD2	2.34	0.53
1:D:521:ARG:HD3	1:D:787:LEU:HD12	1.90	0.53
1:D:583:ARG:HG2	1:D:736:LEU:CD2	2.39	0.53
1:A:780:VAL:HG12	1:A:787:LEU:HD22	1.91	0.53
1:D:480:SER:HB3	1:D:570:PHE:O	2.09	0.53
1:D:488:TRP:CE2	1:D:554:VAL:HG21	2.44	0.53
1:A:583:ARG:HH11	4:A:909:MRD:H1C2	1.73	0.53
1:D:717:LYS:HG2	1:D:721:TRP:CE2	2.44	0.53
1:A:591:SER:OG	1:A:729:TYR:CD1	2.61	0.53
1:A:798:TYR:CE2	1:A:802:ILE:HD12	2.44	0.53
1:B:781:LYS:O	1:B:781:LYS:HG2	2.08	0.53
1:D:510:HIS:CE1	1:D:512:ILE:HG23	2.44	0.53
1:D:717:LYS:HG2	1:D:721:TRP:CD2	2.45	0.52
1:A:628:ILE:O	1:A:632:VAL:HG23	2.10	0.52
1:A:735:SER:H	4:A:909:MRD:C1	2.22	0.52
1:B:717:LYS:HG2	1:B:721:TRP:CD2	2.43	0.52
1:A:510:HIS:ND1	1:A:511:PRO:HD2	2.25	0.52
1:A:611:TRP:HA	1:A:611:TRP:CE3	2.43	0.52
1:A:864:GLU:HG3	1:A:865:PRO:HD2	1.90	0.52
1:A:623:TYR:O	1:A:626:VAL:HG22	2.09	0.52
1:C:728:LYS:HE2	1:C:729:TYR:CE2	2.45	0.52
1:D:687:ARG:HH11	3:D:906:MPD:H4	1.75	0.52
1:B:752:SER:O	1:B:755:LYS:HG2	2.09	0.52
1:C:536:ARG:HH21	1:C:605:ASP:CG	2.13	0.52
1:A:532:HIS:HB3	1:A:609:MET:SD	2.50	0.51
1:B:501:THR:HG22	1:B:818:ASN:HD21	1.75	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:788:GLN:HG3	1:B:789:PRO:HD2	1.92	0.51
1:D:687:ARG:HD3	3:D:906:MPD:C4	2.40	0.51
1:B:772:VAL:HG11	1:B:774:LYS:HE2	1.92	0.51
1:A:521:ARG:HB3	1:A:787:LEU:HD21	1.92	0.51
1:A:846:GLU:HB3	1:A:847:PRO:HD2	1.93	0.51
1:B:717:LYS:HG2	1:B:721:TRP:CE2	2.46	0.51
1:A:732:GLN:O	1:A:733:ASP:HB2	2.11	0.51
1:A:761:GLU:O	1:A:764:THR:HG22	2.11	0.51
1:B:761:GLU:O	1:B:764:THR:HG22	2.10	0.51
1:D:580:LEU:HD13	1:D:736:LEU:HD21	1.91	0.51
1:D:608:LEU:HD13	1:D:701:LEU:HD13	1.93	0.51
1:D:679:MET:O	1:D:683:VAL:HG23	2.11	0.51
1:D:798:TYR:CE2	1:D:802:ILE:HD12	2.46	0.51
1:A:699:LEU:O	1:A:736:LEU:HD12	2.11	0.50
1:D:518:PHE:CE1	1:D:775:PRO:HG3	2.46	0.50
1:B:679:MET:O	1:B:683:VAL:HG12	2.11	0.50
1:A:498:PRO:HG3	1:A:870:LEU:HD22	1.92	0.50
1:B:516:GLU:CD	1:B:519:ARG:HH12	2.15	0.50
1:B:761:GLU:HA	1:B:764:THR:HG22	1.94	0.50
1:C:519:ARG:HG3	1:C:747:VAL:HG23	1.93	0.50
1:C:798:TYR:HD1	3:C:906:MPD:H51	1.76	0.50
1:A:715:SER:HA	1:A:778:PHE:CD2	2.46	0.50
1:B:503:LYS:O	4:B:907:MRD:H4	2.12	0.50
1:C:798:TYR:CE2	1:C:802:ILE:HD12	2.46	0.50
1:D:521:ARG:HD3	1:D:787:LEU:CD1	2.41	0.50
1:B:810:ASP:OD1	1:B:812:ASN:ND2	2.45	0.50
1:B:847:PRO:HG2	1:B:850:ARG:HG3	1.92	0.50
1:A:544:ASP:OD1	1:A:547:VAL:HG23	2.12	0.50
1:A:683:VAL:HG21	1:A:801:ILE:HG21	1.94	0.50
1:D:665:ILE:HA	1:D:668:LEU:HD12	1.92	0.49
1:D:802:ILE:CD1	3:D:906:MPD:H32	2.42	0.49
1:B:723:MET:HA	1:B:723:MET:CE	2.41	0.49
1:B:750:ALA:HA	1:B:753:VAL:HB	1.93	0.49
1:A:510:HIS:CG	1:A:511:PRO:HD2	2.47	0.49
1:B:678:MET:O	1:B:682:TYR:HD1	1.95	0.49
1:C:863:SER:HB3	1:D:848:LEU:HD23	1.94	0.49
1:D:635:ASP:O	1:D:638:VAL:HG12	2.12	0.49
1:A:590:LYS:HE3	1:A:733:ASP:OD2	2.13	0.49
1:A:624:SER:O	1:A:628:ILE:HG12	2.13	0.49
1:D:624:SER:O	1:D:628:ILE:HD13	2.12	0.49
1:B:798:TYR:CE2	1:B:802:ILE:HD12	2.48	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:532:HIS:HB3	1:C:609:MET:SD	2.53	0.48
1:C:811:GLU:HG3	1:C:812:ASN:N	2.28	0.48
1:B:532:HIS:NE2	1:B:740:THR:HG23	2.28	0.48
1:A:519:ARG:HA	7:A:28:HOH:O	2.12	0.48
1:B:587:VAL:HG12	1:B:730:CYS:HA	1.95	0.48
1:B:664:ASP:O	1:B:667:GLU:HB3	2.13	0.48
1:C:521:ARG:HD3	1:C:787:LEU:CD1	2.43	0.48
1:D:761:GLU:O	1:D:764:THR:HG22	2.13	0.48
1:D:868:PRO:O	3:D:906:MPD:O2	2.30	0.48
1:D:763:LEU:HD12	1:D:764:THR:N	2.29	0.48
1:A:564:THR:HB	7:A:36:HOH:O	2.14	0.48
1:B:684:GLU:O	1:B:688:LYS:HG3	2.13	0.48
1:C:780:VAL:HG13	1:C:784:ARG:CB	2.44	0.48
1:D:642:LYS:C	1:D:644:ALA:H	2.17	0.48
1:D:646:LEU:O	1:D:646:LEU:HD23	2.13	0.48
1:D:687:ARG:HD3	3:D:906:MPD:H51	1.94	0.48
1:A:727:ALA:O	1:A:731:THR:HB	2.14	0.48
1:A:746:ASP:H	1:A:752:SER:HB3	1.78	0.48
1:D:544:ASP:OD1	1:D:547:VAL:HG23	2.14	0.48
1:B:629:SER:O	1:B:632:VAL:HG22	2.13	0.48
1:C:823:LYS:NZ	1:C:866:VAL:HA	2.29	0.48
1:D:510:HIS:CG	1:D:511:PRO:HD2	2.49	0.48
1:D:587:VAL:HG11	1:D:737:ILE:HD12	1.95	0.48
1:D:760:TRP:CD1	1:D:771:MET:HG2	2.49	0.48
1:D:839:LEU:O	1:D:843:VAL:HG23	2.14	0.48
1:B:814:GLU:O	1:B:818:ASN:ND2	2.46	0.47
1:D:718:ASN:OD1	1:D:720:ILE:HB	2.13	0.47
1:B:478:SER:N	1:B:690:CYS:SG	2.76	0.47
1:B:824:LYS:HD2	1:B:866:VAL:CG1	2.43	0.47
1:C:608:LEU:HD13	1:C:701:LEU:HD13	1.96	0.47
1:C:501:THR:HG21	1:C:814:GLU:HG3	1.96	0.47
1:D:519:ARG:HB3	1:D:747:VAL:CG2	2.44	0.47
1:B:608:LEU:HD13	1:B:701:LEU:HD13	1.95	0.47
1:A:819:ARG:O	1:A:823:LYS:HG2	2.15	0.47
1:A:847:PRO:O	1:A:850:ARG:HB2	2.15	0.47
1:C:761:GLU:O	1:C:764:THR:HG22	2.14	0.47
1:D:718:ASN:HB2	1:D:776:TYR:O	2.15	0.47
1:A:723:MET:CE	1:A:723:MET:HA	2.45	0.47
1:B:852:HIS:HB3	1:B:856:PHE:CE2	2.50	0.47
1:D:787:LEU:O	1:D:829:LEU:HD21	2.15	0.47
1:A:608:LEU:HD13	1:A:701:LEU:HD13	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:753:VAL:O	1:B:757:ILE:HG13	2.14	0.47
1:D:536:ARG:HH21	1:D:605:ASP:CG	2.18	0.47
1:A:731:THR:HG21	1:A:739:ALA:HB2	1.96	0.46
1:B:760:TRP:HD1	1:B:771:MET:HG2	1.75	0.46
1:C:532:HIS:NE2	1:C:740:THR:HG23	2.31	0.46
1:C:640:LEU:O	1:C:640:LEU:HD23	2.14	0.46
1:C:713:VAL:CG2	1:C:843:VAL:HG21	2.45	0.46
1:D:623:TYR:O	1:D:626:VAL:HG22	2.15	0.46
1:C:510:HIS:CG	1:C:511:PRO:HD2	2.50	0.46
1:A:761:GLU:HA	1:A:764:THR:HG22	1.97	0.46
1:B:496:MET:O	1:B:824:LYS:HE2	2.15	0.46
1:B:678:MET:O	1:B:682:TYR:CD1	2.69	0.46
1:D:713:VAL:CG2	1:D:843:VAL:HG21	2.45	0.46
1:B:782:ASN:C	1:B:782:ASN:OD1	2.53	0.46
1:B:622:GLN:O	1:B:626:VAL:HG13	2.16	0.46
1:B:713:VAL:HG11	1:B:836:MET:HE1	1.98	0.46
1:D:532:HIS:HB3	1:D:609:MET:SD	2.56	0.46
1:A:535:SER:HB2	1:A:570:PHE:HE2	1.81	0.46
1:B:500:GLU:O	1:B:501:THR:C	2.53	0.46
1:B:847:PRO:HB2	1:B:849:TYR:CD1	2.50	0.46
3:C:906:MPD:H11	3:C:906:MPD:H4	1.72	0.46
1:D:639:LYS:O	1:D:642:LYS:HB2	2.15	0.46
1:B:531:LYS:HE3	1:B:769:GLU:OE2	2.16	0.46
1:B:780:VAL:HG13	1:B:780:VAL:O	2.15	0.46
1:C:623:TYR:O	1:C:626:VAL:HG22	2.16	0.46
1:D:731:THR:HG21	1:D:739:ALA:CB	2.45	0.46
1:A:584:VAL:O	1:A:587:VAL:HG12	2.15	0.45
1:B:623:TYR:O	1:B:626:VAL:HG22	2.16	0.45
1:B:803:TYR:OH	1:B:817:ARG:HD2	2.16	0.45
1:B:532:HIS:HB3	1:B:609:MET:SD	2.56	0.45
1:B:715:SER:O	1:B:778:PHE:HB3	2.16	0.45
1:C:761:GLU:HA	1:C:764:THR:HG22	1.98	0.45
1:A:744:LEU:HD12	1:A:745:VAL:N	2.30	0.45
1:C:579:GLU:O	1:C:583:ARG:HG2	2.15	0.45
1:C:713:VAL:HG23	1:C:843:VAL:HG21	1.97	0.45
1:D:751:GLU:O	1:D:755:LYS:HG3	2.15	0.45
1:A:565:ARG:HB2	1:A:565:ARG:CZ	2.46	0.45
1:A:780:VAL:HG11	1:A:787:LEU:HD22	1.98	0.45
1:C:492:LEU:HG	1:C:855:VAL:HG13	1.98	0.45
1:B:699:LEU:O	1:B:736:LEU:HD12	2.17	0.45
1:B:744:LEU:HD12	1:B:745:VAL:N	2.31	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:866:VAL:HG12	1:B:867:ASP:H	1.82	0.45
1:C:588:LEU:CD2	1:C:730:CYS:HB3	2.47	0.45
1:C:718:ASN:ND2	1:C:720:ILE:HB	2.32	0.45
1:D:810:ASP:OD2	1:D:812:ASN:HB3	2.17	0.45
1:D:852:HIS:HB3	1:D:856:PHE:CE2	2.52	0.45
1:B:712:LYS:N	1:B:843:VAL:HG11	2.32	0.45
1:C:744:LEU:HD12	1:C:745:VAL:N	2.32	0.45
1:C:829:LEU:HD23	1:C:829:LEU:HA	1.83	0.45
1:D:744:LEU:HD12	1:D:745:VAL:N	2.32	0.45
1:A:531:LYS:HE3	1:A:769:GLU:OE2	2.18	0.44
1:C:718:ASN:ND2	1:C:721:TRP:H	2.14	0.44
1:D:713:VAL:HG23	1:D:843:VAL:HG21	1.99	0.44
1:D:830:ARG:HG2	1:D:861:LEU:HD11	2.00	0.44
1:A:713:VAL:HG23	1:A:843:VAL:HG21	1.98	0.44
1:B:517:TYR:OH	1:B:788:GLN:HB2	2.17	0.44
1:B:749:ASP:O	1:B:750:ALA:CB	2.66	0.44
1:B:499:CYS:SG	1:B:791:VAL:HG11	2.57	0.44
1:D:605:ASP:HB2	1:D:705:HIS:HB2	2.00	0.44
1:C:732:GLN:OE1	1:C:732:GLN:HA	2.18	0.44
1:C:769:GLU:HG3	1:C:798:TYR:CD1	2.52	0.44
1:D:622:GLN:HA	1:D:622:GLN:OE1	2.17	0.44
1:D:827:LEU:O	1:D:831:GLU:HG3	2.18	0.44
1:B:838:ALA:HB2	1:B:854:CYS:HB2	1.99	0.44
1:C:589:ASP:OD1	1:C:594:TRP:NE1	2.51	0.44
1:C:775:PRO:O	1:C:776:TYR:C	2.56	0.44
1:C:785:GLU:HB2	1:C:786:LEU:H	1.62	0.44
1:D:849:TYR:CD1	1:D:849:TYR:C	2.91	0.44
1:D:510:HIS:ND1	1:D:511:PRO:HD2	2.33	0.44
1:D:829:LEU:HD23	1:D:829:LEU:HA	1.81	0.44
1:A:715:SER:HB2	1:A:778:PHE:HD2	1.83	0.43
1:D:531:LYS:NZ	2:D:900:AMP:O4'	2.50	0.43
1:B:780:VAL:HG13	1:B:787:LEU:HB3	2.00	0.43
1:B:847:PRO:HB2	1:B:849:TYR:CE1	2.53	0.43
1:D:512:ILE:O	1:D:516:GLU:HG2	2.19	0.43
1:B:583:ARG:HG2	1:B:736:LEU:HD23	1.98	0.43
1:C:576:LEU:O	1:C:579:GLU:HB2	2.18	0.43
3:C:907:MPD:H4	3:C:907:MPD:HM1	1.71	0.43
1:D:585:ARG:O	1:D:588:LEU:HB2	2.18	0.43
1:B:642:LYS:C	1:B:644:ALA:H	2.22	0.43
1:D:786:LEU:O	1:D:829:LEU:HD11	2.18	0.43
1:D:838:ALA:HB2	1:D:854:CYS:HB2	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:736:LEU:O	1:A:736:LEU:HG	2.19	0.43
1:B:713:VAL:HG23	1:B:843:VAL:HG21	1.99	0.43
1:B:827:LEU:O	1:B:831:GLU:HG3	2.18	0.43
1:C:750:ALA:O	1:C:754:ASP:HB2	2.19	0.43
1:D:749:ASP:OD2	1:D:751:GLU:HB2	2.18	0.43
1:D:798:TYR:OH	3:D:906:MPD:H4	2.17	0.43
1:A:561:ILE:HG12	1:A:562:CYS:N	2.33	0.43
1:A:713:VAL:CG2	1:A:843:VAL:HG21	2.48	0.43
1:A:753:VAL:O	1:A:757:ILE:HG13	2.18	0.43
1:A:763:LEU:HD12	1:A:763:LEU:C	2.39	0.43
3:A:907:MPD:H52	3:A:907:MPD:H12	2.01	0.43
1:B:688:LYS:O	1:B:689:TYR:HB3	2.18	0.43
1:C:535:SER:HB2	1:C:570:PHE:HE1	1.84	0.43
1:D:532:HIS:NE2	1:D:740:THR:HG23	2.34	0.43
1:C:802:ILE:CD1	3:C:907:MPD:HM2	2.48	0.43
1:A:521:ARG:CB	1:A:787:LEU:HD21	2.48	0.43
1:B:493:PRO:HA	1:B:494:PRO:HD2	1.73	0.43
1:A:827:LEU:O	1:A:831:GLU:HG3	2.18	0.42
1:B:590:LYS:HD2	1:B:591:SER:N	2.34	0.42
1:B:719:HIS:CE1	1:B:774:LYS:HB3	2.54	0.42
1:C:784:ARG:HA	1:C:785:GLU:HA	1.65	0.42
1:C:734:ASP:OD1	1:C:735:SER:N	2.51	0.42
1:D:498:PRO:CG	1:D:870:LEU:HD22	2.49	0.42
1:D:531:LYS:HE3	1:D:769:GLU:OE2	2.19	0.42
1:A:752:SER:O	1:A:755:LYS:HG2	2.20	0.42
1:B:524:GLY:O	1:B:747:VAL:HG22	2.19	0.42
1:B:641:LEU:C	1:B:641:LEU:HD23	2.40	0.42
1:C:531:LYS:HE3	1:C:769:GLU:OE2	2.19	0.42
1:D:536:ARG:HB2	2:D:900:AMP:O2'	2.20	0.42
1:A:478:SER:CB	1:A:690:CYS:SG	3.08	0.42
1:B:500:GLU:N	1:B:500:GLU:OE1	2.53	0.42
1:B:518:PHE:CE1	1:B:775:PRO:HG3	2.55	0.42
1:C:628:ILE:O	1:C:632:VAL:HG23	2.20	0.42
1:B:664:ASP:OD1	1:B:664:ASP:C	2.58	0.42
1:D:630:GLY:O	1:D:633:VAL:CG1	2.68	0.42
1:A:611:TRP:HA	1:A:611:TRP:HE3	1.85	0.42
1:B:763:LEU:HD12	1:B:763:LEU:C	2.39	0.42
1:D:846:GLU:OE1	1:D:850:ARG:HG2	2.20	0.42
1:C:798:TYR:OH	1:C:802:ILE:HD11	2.20	0.42
1:A:803:TYR:OH	1:A:817:ARG:NH1	2.45	0.41
1:B:506:GLY:N	4:B:907:MRD:H1C1	2.28	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:760:TRP:O	1:B:764:THR:HB	2.19	0.41
1:B:769:GLU:HG3	1:B:798:TYR:CD1	2.55	0.41
1:B:797:GLU:O	1:B:801:ILE:HG12	2.19	0.41
1:D:813:ILE:O	1:D:816:LEU:HB2	2.20	0.41
1:B:511:PRO:O	1:B:515:PHE:CD2	2.73	0.41
1:B:482:PHE:HB2	1:B:569:HIS:HB2	2.01	0.41
1:B:713:VAL:CG2	1:B:843:VAL:HG21	2.50	0.41
1:B:780:VAL:HG11	1:B:787:LEU:HB3	2.03	0.41
1:C:510:HIS:ND1	1:C:511:PRO:HD2	2.35	0.41
1:C:812:ASN:O	1:C:815:ARG:HB2	2.21	0.41
1:D:535:SER:HB2	1:D:570:PHE:HE2	1.85	0.41
1:D:638:VAL:HG13	1:D:639:LYS:N	2.35	0.41
1:D:777:ASP:C	1:D:779:ILE:N	2.73	0.41
1:A:536:ARG:HB2	2:A:900:AMP:O2'	2.21	0.41
1:D:788:GLN:HA	1:D:789:PRO:HD3	1.84	0.41
1:A:744:LEU:HD12	1:A:745:VAL:H	1.85	0.41
1:A:760:TRP:O	1:A:764:THR:HB	2.20	0.41
1:C:760:TRP:O	1:C:764:THR:HB	2.21	0.41
1:A:780:VAL:O	1:A:786:LEU:HD12	2.20	0.41
1:B:510:HIS:CG	1:B:511:PRO:HD2	2.56	0.41
1:D:763:LEU:HA	1:D:766:SER:HB2	2.02	0.41
1:A:746:ASP:HB3	1:A:749:ASP:HB3	2.03	0.41
1:A:787:LEU:O	1:A:788:GLN:C	2.59	0.41
1:B:732:GLN:C	1:B:733:ASP:CG	2.80	0.41
1:C:531:LYS:NZ	2:C:900:AMP:O4'	2.54	0.41
1:A:532:HIS:NE2	1:A:740:THR:HG23	2.35	0.41
1:A:803:TYR:OH	1:A:817:ARG:HD2	2.20	0.41
1:B:761:GLU:HA	1:B:764:THR:CG2	2.50	0.41
1:B:847:PRO:HG2	1:B:850:ARG:HG2	2.03	0.41
1:C:588:LEU:HD21	1:C:730:CYS:HB3	2.02	0.41
1:C:823:LYS:HE2	1:C:823:LYS:HB3	1.83	0.41
1:B:867:ASP:OD1	1:B:868:PRO:HD2	2.21	0.41
1:C:664:ASP:O	1:C:668:LEU:HD13	2.21	0.41
1:C:800:ARG:HD2	1:C:807:TYR:CD2	2.56	0.41
1:C:864:GLU:HA	1:C:865:PRO:HD3	1.79	0.41
1:B:610:PRO:HD2	1:B:686:TYR:CZ	2.56	0.40
1:C:611:TRP:CZ3	1:C:619:LEU:HD12	2.56	0.40
1:D:699:LEU:O	1:D:736:LEU:HD12	2.21	0.40
1:A:499:CYS:SG	1:A:791:VAL:HG11	2.61	0.40
1:A:747:VAL:HG12	1:A:747:VAL:O	2.22	0.40
1:B:535:SER:HB2	1:B:570:PHE:HE2	1.86	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:852:HIS:HB3	1:A:856:PHE:CE2	2.56	0.40
1:B:743:ILE:HD11	1:B:755:LYS:HG3	2.03	0.40
1:C:550:LYS:HE3	1:C:550:LYS:HB3	1.92	0.40
1:D:723:MET:CE	1:D:723:MET:HA	2.51	0.40
4:B:908:MRD:O2	4:B:908:MRD:C5	2.69	0.40
1:D:761:GLU:HA	1:D:764:THR:HG22	2.04	0.40
1:D:823:LYS:O	1:D:823:LYS:HG2	2.21	0.40
1:A:728:LYS:HE2	1:A:729:TYR:CE2	2.57	0.40
1:C:839:LEU:O	1:C:843:VAL:HG23	2.20	0.40
1:D:630:GLY:O	1:D:633:VAL:HG13	2.21	0.40
1:D:830:ARG:HG2	1:D:861:LEU:CD1	2.51	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	370/393 (94%)	347 (94%)	23 (6%)	0	100	100
1	B	368/393 (94%)	338 (92%)	29 (8%)	1 (0%)	41	73
1	C	370/393 (94%)	351 (95%)	18 (5%)	1 (0%)	41	73
1	D	368/393 (94%)	340 (92%)	27 (7%)	1 (0%)	41	73
All	All	1476/1572 (94%)	1376 (93%)	97 (7%)	3 (0%)	47	79

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	480	SER
1	B	689	TYR
1	C	776	TYR



### 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	327/344 (95%)	317 (97%)	10 (3%)	40	69
1	B	317/344 (92%)	303 (96%)	14 (4%)	28	60
1	C	326/344 (95%)	319 (98%)	7 (2%)	53	78
1	D	324/344 (94%)	319 (98%)	5 (2%)	65	85
All	All	1294/1376 (94%)	1258 (97%)	36 (3%)	43	72

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	611	TRP
1	A	640	LEU
1	A	664	ASP
1	A	732	GLN
1	A	734	ASP
1	A	752	SER
1	A	754	ASP
1	A	812	ASN
1	A	850	ARG
1	A	866	VAL
1	B	500	GLU
1	B	590	LYS
1	B	591	SER
1	B	614	LYS
1	B	664	ASP
1	B	666	ASN
1	B	683	VAL
1	B	733	ASP
1	B	748	THR
1	B	754	ASP
1	B	778	PHE
1	B	781	LYS
1	B	782	ASN
1	B	786	LEU

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Mol	Chain	Res	Type
1	C	688	LYS
1	C	733	ASP
1	C	735	SER
1	C	754	ASP
1	C	778	PHE
1	C	819	ARG
1	C	849	TYR
1	D	499	CYS
1	D	646	LEU
1	D	754	ASP
1	D	849	TYR
1	D	866	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	718	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](#)

Of 25 ligands modelled in this entry, 4 are monoatomic - leaving 21 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$
3	MPD	C	906	-	7,7,7	0.31	0	9,10,10	0.46	0
2	AMP	B	900	1	18,24,25	0.93	1 (5%)	18,35,38	1.23	2 (11%)
3	MPD	C	905	-	7,7,7	0.30	0	9,10,10	0.28	0
3	MPD	D	907	-	7,7,7	0.31	0	9,10,10	0.36	0
4	MRD	B	907	-	7,7,7	0.33	0	9,10,10	0.44	0
5	GOL	A	910	-	5,5,5	0.37	0	5,5,5	0.28	0
4	MRD	D	908	-	7,7,7	0.31	0	9,10,10	0.27	0
4	MRD	A	908	-	7,7,7	0.30	0	9,10,10	0.24	0
3	MPD	D	906	-	7,7,7	0.32	0	9,10,10	0.50	0
3	MPD	C	907	-	7,7,7	0.30	0	9,10,10	0.34	0
4	MRD	B	908	-	7,7,7	0.30	0	9,10,10	0.47	0
3	MPD	A	906	-	7,7,7	0.33	0	9,10,10	0.23	0
3	MPD	B	905	-	7,7,7	0.31	0	9,10,10	0.26	0
4	MRD	B	906	-	7,7,7	0.30	0	9,10,10	0.23	0
4	MRD	A	909	-	7,7,7	0.27	0	9,10,10	0.28	0
3	MPD	A	905	-	7,7,7	0.34	0	9,10,10	0.53	0
2	AMP	C	900	1	18,24,25	0.95	1 (5%)	18,35,38	1.27	1 (5%)
3	MPD	A	907	-	7,7,7	0.38	0	9,10,10	0.36	0
2	AMP	A	900	1	18,24,25	0.92	1 (5%)	18,35,38	1.30	2 (11%)
3	MPD	D	905	-	7,7,7	0.27	0	9,10,10	0.28	0
2	AMP	D	900	1	18,24,25	0.97	1 (5%)	18,35,38	1.21	2 (11%)

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
3	MPD	C	906	-	-	0/5/5/5	-
2	AMP	B	900	1	-	3/3/25/26	0/3/3/3
3	MPD	C	905	-	-	3/5/5/5	-
3	MPD	D	907	-	-	2/5/5/5	-
4	MRD	B	907	-	-	2/5/5/5	-
5	GOL	A	910	-	-	2/4/4/4	-
4	MRD	D	908	-	-	3/5/5/5	-
4	MRD	A	908	-	-	2/5/5/5	-
3	MPD	D	906	-	-	1/5/5/5	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	MPD	C	907	-	-	3/5/5/5	-
4	MRD	B	908	-	-	2/5/5/5	-
3	MPD	A	906	-	-	3/5/5/5	-
3	MPD	B	905	-	-	3/5/5/5	-
4	MRD	B	906	-	-	2/5/5/5	-
4	MRD	A	909	-	-	3/5/5/5	-
3	MPD	A	905	-	-	0/5/5/5	-
2	AMP	C	900	1	-	3/3/25/26	0/3/3/3
3	MPD	A	907	-	-	3/5/5/5	-
2	AMP	A	900	1	-	3/3/25/26	0/3/3/3
3	MPD	D	905	-	-	3/5/5/5	-
2	AMP	D	900	1	-	3/3/25/26	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	900	AMP	C5-C4	2.60	1.47	1.40
2	C	900	AMP	C5-C4	2.54	1.47	1.40
2	B	900	AMP	C5-C4	2.49	1.47	1.40
2	A	900	AMP	C5-C4	2.49	1.47	1.40

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	900	AMP	N3-C2-N1	-3.50	123.21	128.68
2	C	900	AMP	N3-C2-N1	-3.27	123.56	128.68
2	B	900	AMP	N3-C2-N1	-3.06	123.90	128.68
2	D	900	AMP	N3-C2-N1	-2.91	124.13	128.68
2	B	900	AMP	C4-C5-N7	-2.47	106.82	109.40
2	D	900	AMP	C4-C5-N7	-2.44	106.85	109.40
2	A	900	AMP	C4-C5-N7	-2.13	107.18	109.40

There are no chirality outliers.

All (49) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	900	AMP	C4'-C5'-O5'-P
2	B	900	AMP	C4'-C5'-O5'-P
2	C	900	AMP	C4'-C5'-O5'-P

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Mol	Chain	Res	Type	Atoms
2	D	900	AMP	C4'-C5'-O5'-P
3	A	907	MPD	C2-C3-C4-O4
4	A	908	MRD	C2-C3-C4-O4
4	A	909	MRD	C2-C3-C4-O4
4	B	906	MRD	C2-C3-C4-O4
4	B	907	MRD	C2-C3-C4-C5
4	B	908	MRD	C2-C3-C4-O4
4	B	908	MRD	C2-C3-C4-C5
5	A	910	GOL	O1-C1-C2-C3
2	A	900	AMP	C3'-C4'-C5'-O5'
2	B	900	AMP	C3'-C4'-C5'-O5'
2	C	900	AMP	C3'-C4'-C5'-O5'
2	D	900	AMP	C3'-C4'-C5'-O5'
5	A	910	GOL	O1-C1-C2-O2
2	A	900	AMP	O4'-C4'-C5'-O5'
2	B	900	AMP	O4'-C4'-C5'-O5'
2	C	900	AMP	O4'-C4'-C5'-O5'
2	D	900	AMP	O4'-C4'-C5'-O5'
3	A	906	MPD	O2-C2-C3-C4
3	B	905	MPD	O2-C2-C3-C4
3	D	905	MPD	O2-C2-C3-C4
4	B	907	MRD	O2-C2-C3-C4
3	A	906	MPD	C2-C3-C4-C5
3	B	905	MPD	C2-C3-C4-C5
3	D	906	MPD	C2-C3-C4-C5
3	D	907	MPD	C2-C3-C4-C5
4	A	909	MRD	C2-C3-C4-C5
4	B	906	MRD	C2-C3-C4-C5
3	C	905	MPD	C1-C2-C3-C4
3	C	907	MPD	CM-C2-C3-C4
3	D	905	MPD	C1-C2-C3-C4
3	D	905	MPD	CM-C2-C3-C4
4	A	909	MRD	C1-C2-C3-C4
4	D	908	MRD	CM-C2-C3-C4
3	A	907	MPD	O2-C2-C3-C4
4	D	908	MRD	O2-C2-C3-C4
3	A	907	MPD	C2-C3-C4-C5
3	C	905	MPD	C2-C3-C4-C5
3	C	907	MPD	C2-C3-C4-C5
4	A	908	MRD	C2-C3-C4-C5
3	A	906	MPD	C2-C3-C4-O4
3	B	905	MPD	C2-C3-C4-O4

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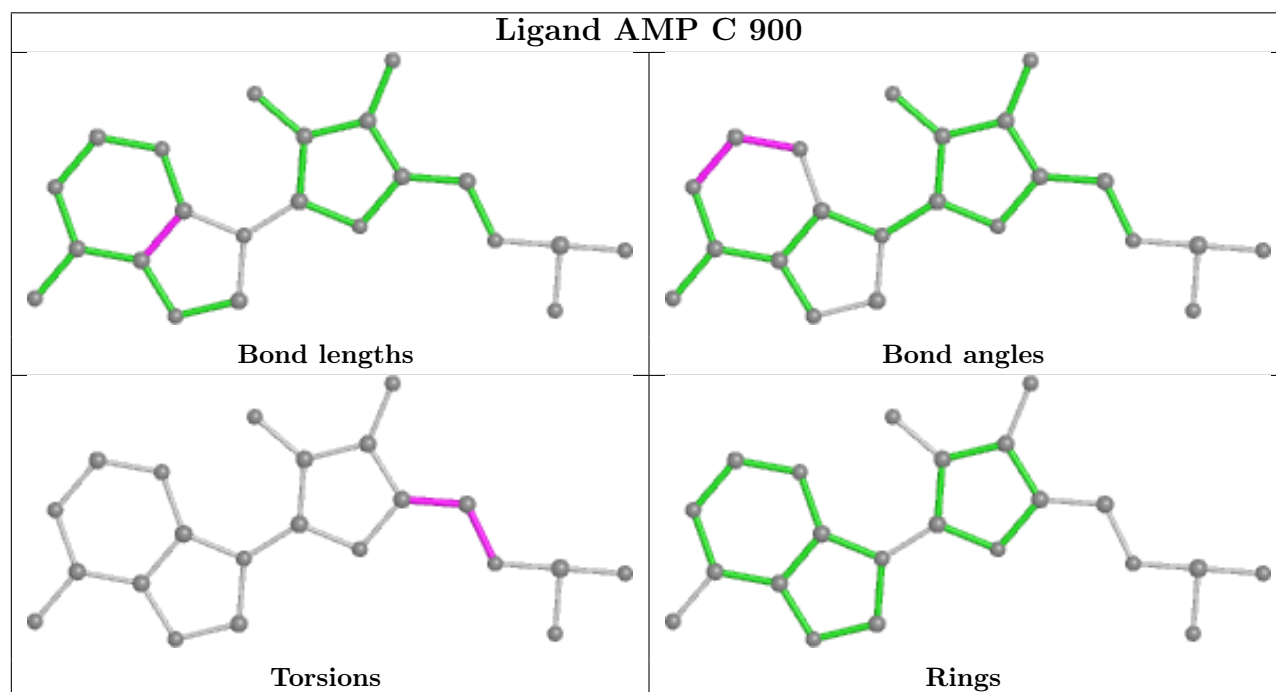
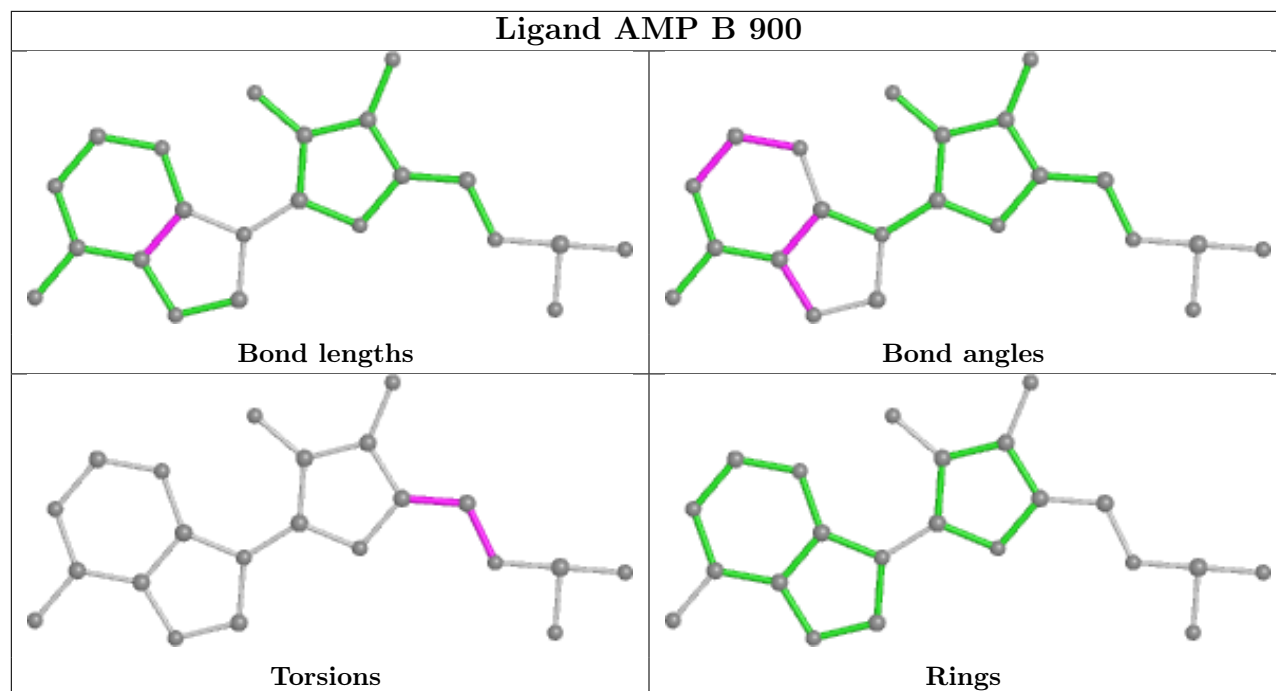
Mol	Chain	Res	Type	Atoms
3	C	905	MPD	C2-C3-C4-O4
3	C	907	MPD	C2-C3-C4-O4
3	D	907	MPD	C2-C3-C4-O4
4	D	908	MRD	C2-C3-C4-O4

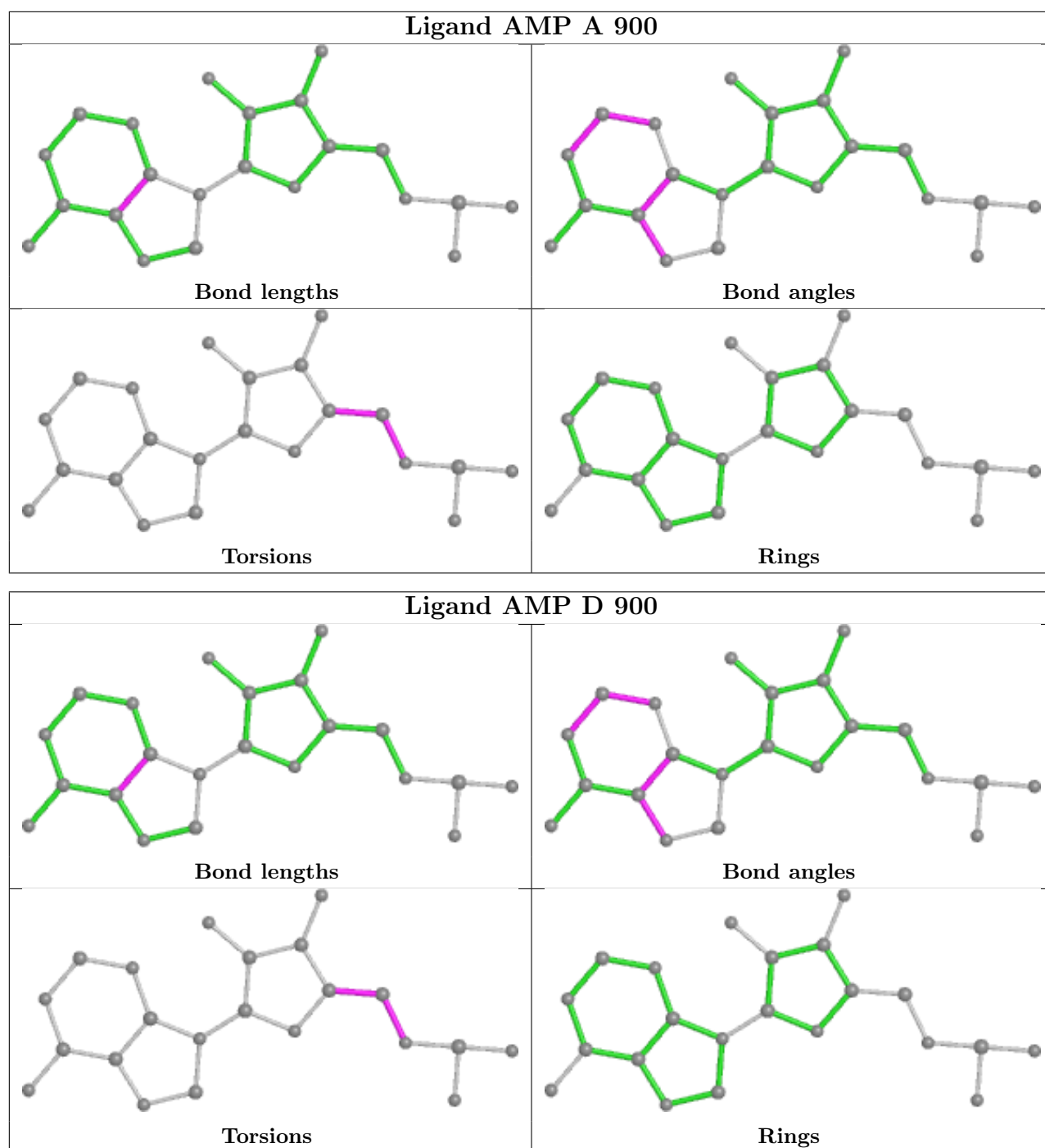
There are no ring outliers.

11 monomers are involved in 31 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	906	MPD	2	0
4	B	907	MRD	5	0
5	A	910	GOL	1	0
3	D	906	MPD	9	0
3	C	907	MPD	2	0
4	B	908	MRD	2	0
4	A	909	MRD	4	0
2	C	900	AMP	1	0
3	A	907	MPD	2	0
2	A	900	AMP	1	0
2	D	900	AMP	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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	376/393 (95%)	-0.51	0 100 100	47, 72, 95, 127	0
1	B	374/393 (95%)	-0.35	0 100 100	51, 83, 110, 131	0
1	C	376/393 (95%)	-0.48	0 100 100	59, 78, 102, 131	0
1	D	374/393 (95%)	-0.34	0 100 100	61, 90, 111, 131	0
All	All	1500/1572 (95%)	-0.42	0 100 100	47, 81, 108, 131	0

There are no RSRZ outliers to report.

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<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
6	MG	D	1000	1/1	0.65	0.20	90,90,90,90	0
4	MRD	A	908	8/8	0.69	0.39	89,113,120,120	0
4	MRD	A	909	8/8	0.72	0.55	78,94,99,114	0
3	MPD	D	906	8/8	0.73	0.39	93,98,104,104	0

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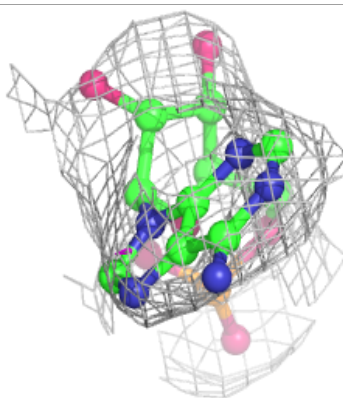
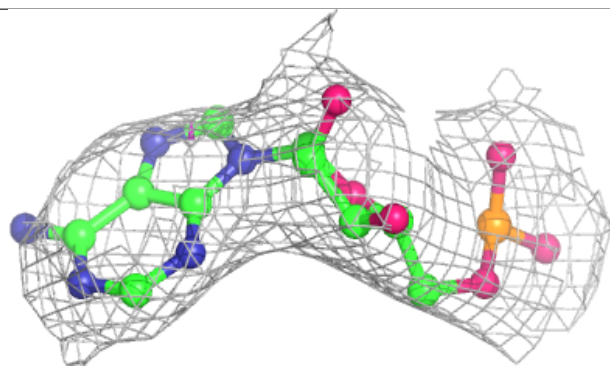
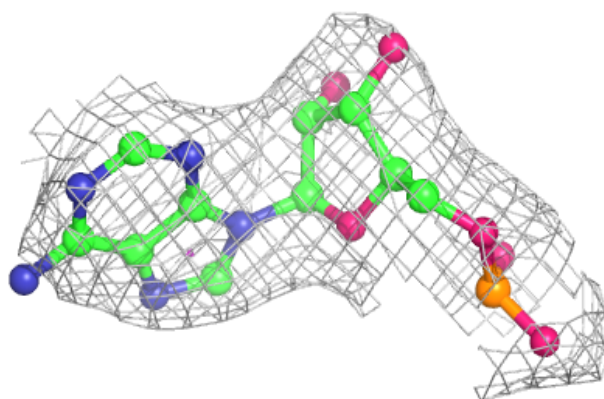
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
5	GOL	A	910	6/6	0.81	0.45	89,96,102,104	0
4	MRD	D	908	8/8	0.81	0.33	84,93,94,98	0
4	MRD	B	907	8/8	0.82	0.23	105,109,113,119	0
3	MPD	A	907	8/8	0.85	0.38	76,93,97,99	0
3	MPD	C	907	8/8	0.86	0.28	83,90,102,108	0
3	MPD	B	905	8/8	0.87	0.25	93,105,111,111	0
3	MPD	A	906	8/8	0.88	0.28	74,77,84,89	0
4	MRD	B	906	8/8	0.88	0.27	86,97,108,112	0
3	MPD	D	907	8/8	0.89	0.25	68,82,89,91	0
2	AMP	B	900	22/23	0.92	0.16	75,82,87,87	0
3	MPD	C	905	8/8	0.92	0.36	64,70,79,83	0
6	MG	A	1000	1/1	0.93	0.07	75,75,75,75	0
6	MG	C	1000	1/1	0.93	0.11	75,75,75,75	0
4	MRD	B	908	8/8	0.93	0.48	83,89,91,92	0
3	MPD	C	906	8/8	0.94	0.27	55,63,68,74	0
3	MPD	A	905	8/8	0.94	0.33	60,67,70,72	0
3	MPD	D	905	8/8	0.94	0.23	58,71,75,81	0
6	MG	B	1000	1/1	0.95	0.12	73,73,73,73	0
2	AMP	D	900	22/23	0.96	0.17	84,89,92,95	0
2	AMP	A	900	22/23	0.96	0.17	59,66,74,76	0
2	AMP	C	900	22/23	0.97	0.16	69,75,82,84	0

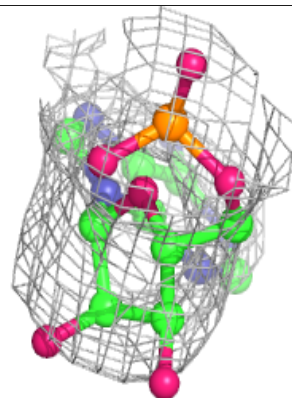
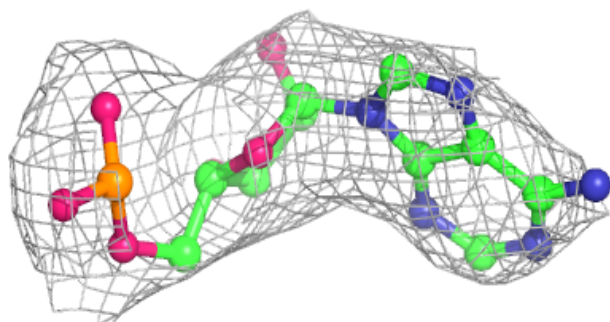
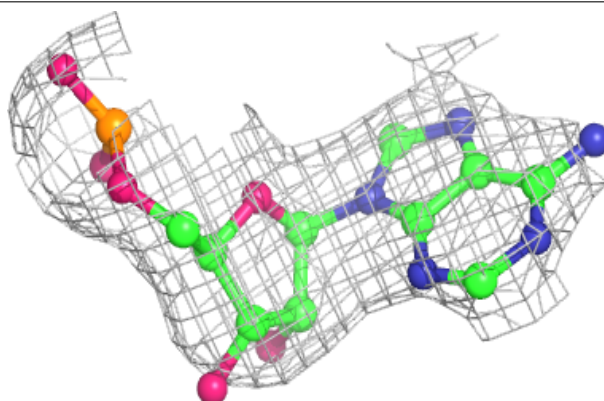
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around AMP B 900:**

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

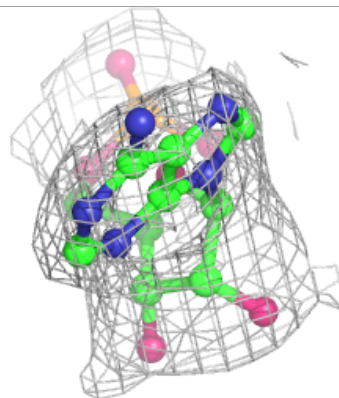
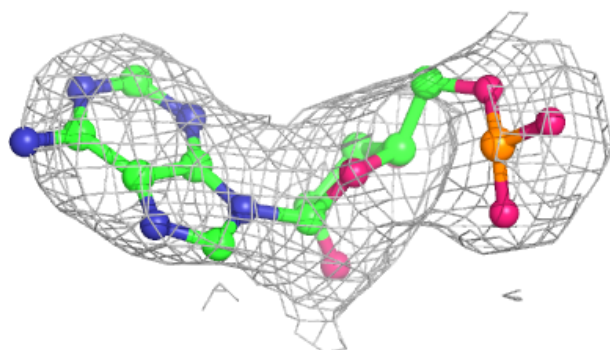
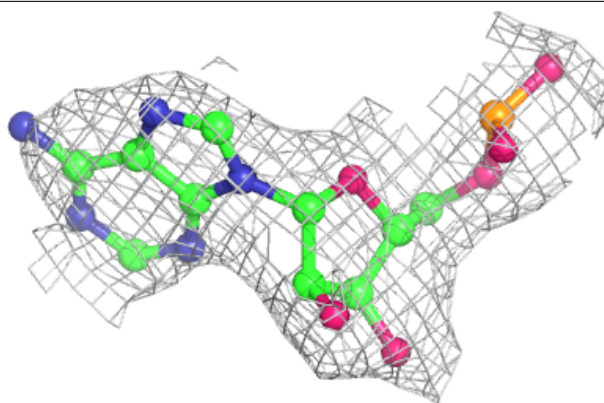
**Electron density around AMP D 900:**

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

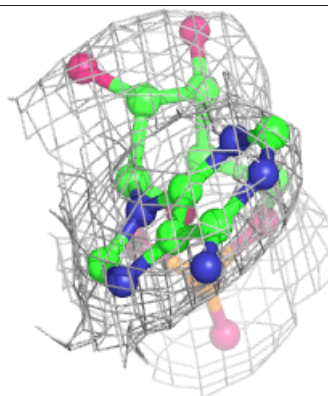
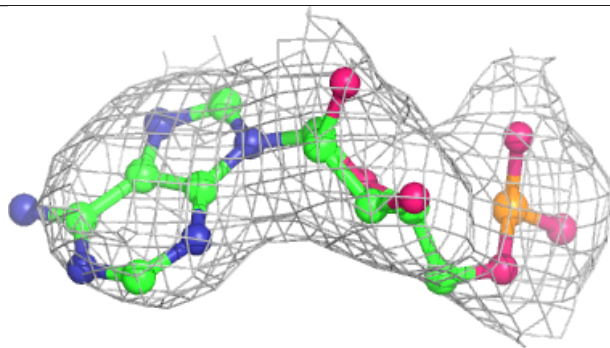


**Electron density around AMP A 900:**

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

**Electron density around AMP C 900:**

$2mF_o-DF_c$  (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.