



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 17, 2026 – 10:55 PM UTC

PDB ID : 3QC9 / pdb\_00003qc9  
Title : Crystal structure of cross-linked bovine GRK1 T8C/N480C double mutant complexed with ADP and Mg  
Authors : Huang, C.-C.; Tesmer, J.J.G.  
Deposited on : 2011-01-15  
Resolution : 2.70 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

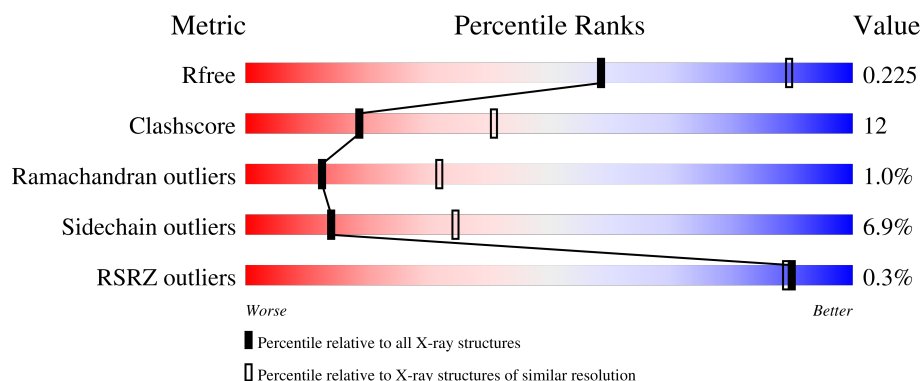
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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))
$R_{free}$	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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	543	<div> <div>64%</div> <div>22%</div> <div>•</div> <div>10%</div> </div>
1	B	543	<div> <div>63%</div> <div>23%</div> <div>•</div> <div>11%</div> </div>
1	C	543	<div> <div>64%</div> <div>22%</div> <div>•</div> <div>11%</div> </div>
1	D	543	<div> <div>%</div> <div>62%</div> <div>25%</div> <div>•</div> <div>10%</div> </div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 15806 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 Rhodopsin kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	486	Total	C	N	O	S	0	0	0
			3904	2507	673	705	19			
1	B	481	Total	C	N	O	S	0	0	0
			3872	2486	667	700	19			
1	C	482	Total	C	N	O	S	0	0	0
			3885	2497	669	700	19			
1	D	486	Total	C	N	O	S	0	0	0
			3904	2507	673	705	19			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	8	CYS	THR	engineered mutation	UNP P28327
A	480	CYS	ASN	engineered mutation	UNP P28327
A	536	VAL	-	expression tag	UNP P28327
A	537	ASP	-	expression tag	UNP P28327
A	538	HIS	-	expression tag	UNP P28327
A	539	HIS	-	expression tag	UNP P28327
A	540	HIS	-	expression tag	UNP P28327
A	541	HIS	-	expression tag	UNP P28327
A	542	HIS	-	expression tag	UNP P28327
A	543	HIS	-	expression tag	UNP P28327
B	8	CYS	THR	engineered mutation	UNP P28327
B	480	CYS	ASN	engineered mutation	UNP P28327
B	536	VAL	-	expression tag	UNP P28327
B	537	ASP	-	expression tag	UNP P28327
B	538	HIS	-	expression tag	UNP P28327
B	539	HIS	-	expression tag	UNP P28327
B	540	HIS	-	expression tag	UNP P28327
B	541	HIS	-	expression tag	UNP P28327
B	542	HIS	-	expression tag	UNP P28327
B	543	HIS	-	expression tag	UNP P28327
C	8	CYS	THR	engineered mutation	UNP P28327

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Chain	Residue	Modelled	Actual	Comment	Reference
C	480	CYS	ASN	engineered mutation	UNP P28327
C	536	VAL	-	expression tag	UNP P28327
C	537	ASP	-	expression tag	UNP P28327
C	538	HIS	-	expression tag	UNP P28327
C	539	HIS	-	expression tag	UNP P28327
C	540	HIS	-	expression tag	UNP P28327
C	541	HIS	-	expression tag	UNP P28327
C	542	HIS	-	expression tag	UNP P28327
C	543	HIS	-	expression tag	UNP P28327
D	8	CYS	THR	engineered mutation	UNP P28327
D	480	CYS	ASN	engineered mutation	UNP P28327
D	536	VAL	-	expression tag	UNP P28327
D	537	ASP	-	expression tag	UNP P28327
D	538	HIS	-	expression tag	UNP P28327
D	539	HIS	-	expression tag	UNP P28327
D	540	HIS	-	expression tag	UNP P28327
D	541	HIS	-	expression tag	UNP P28327
D	542	HIS	-	expression tag	UNP P28327
D	543	HIS	-	expression tag	UNP P28327

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula:  $C_{10}H_{15}N_5O_{10}P_2$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

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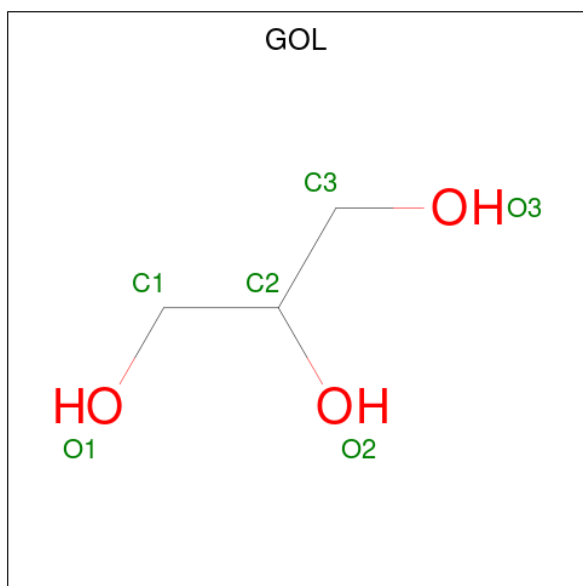
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Mg	0	0
			2	2		
3	B	2	Total	Mg	0	0
			2	2		
3	C	2	Total	Mg	0	0
			2	2		
3	D	2	Total	Mg	0	0
			2	2		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

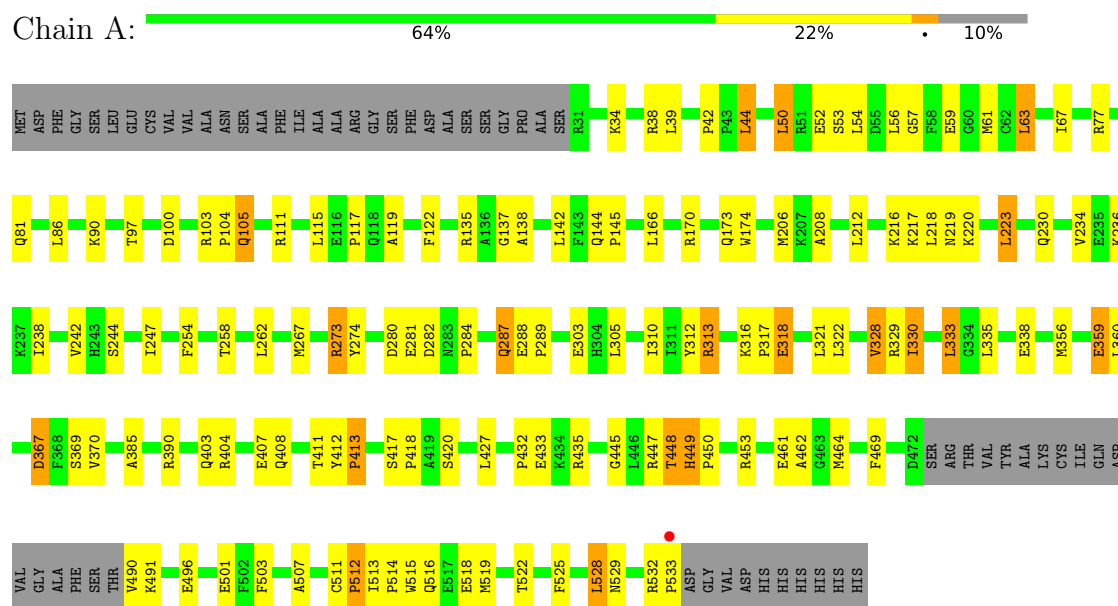
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	30	Total 30	O 30	0	0
5	B	32	Total 32	O 32	0	0
5	C	26	Total 26	O 26	0	0
5	D	25	Total 25	O 25	0	0

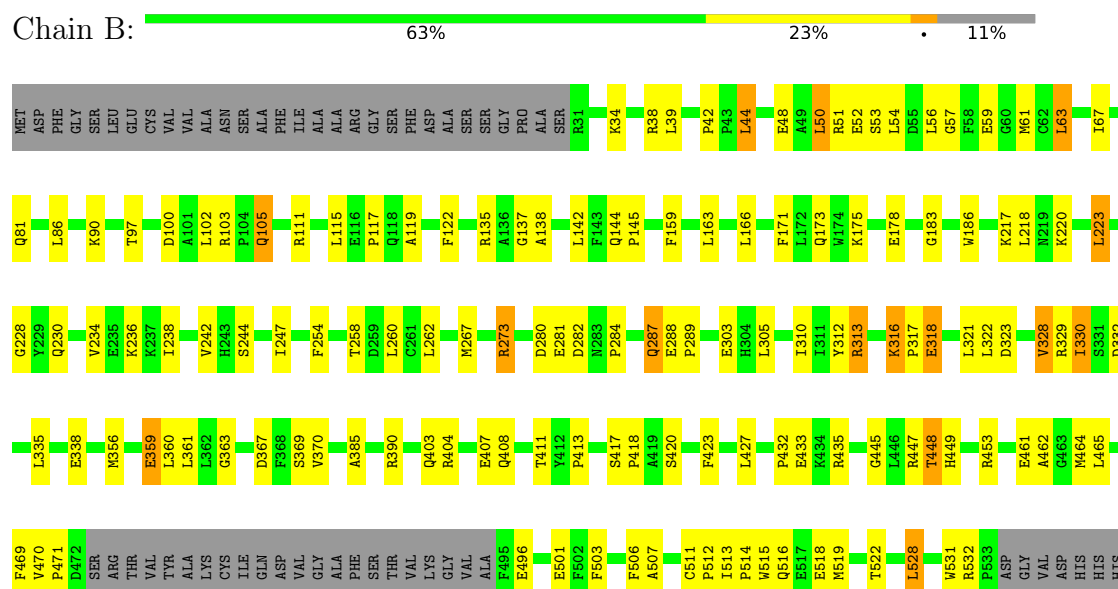
### 3 Residue-property plots

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: Rhodopsin kinase



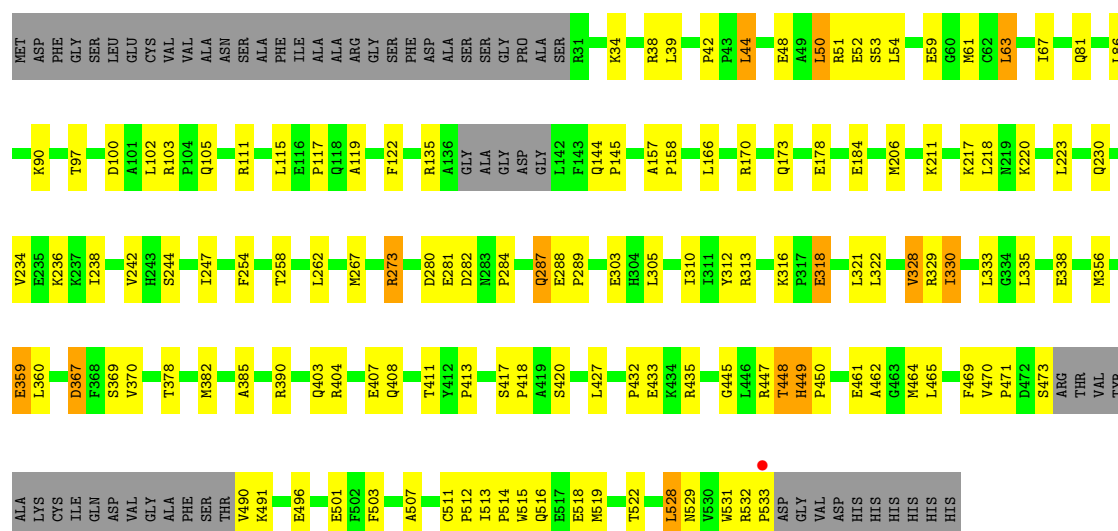
#### • Molecule 1: Rhodopsin kinase



HIS  
HIS  
HIS

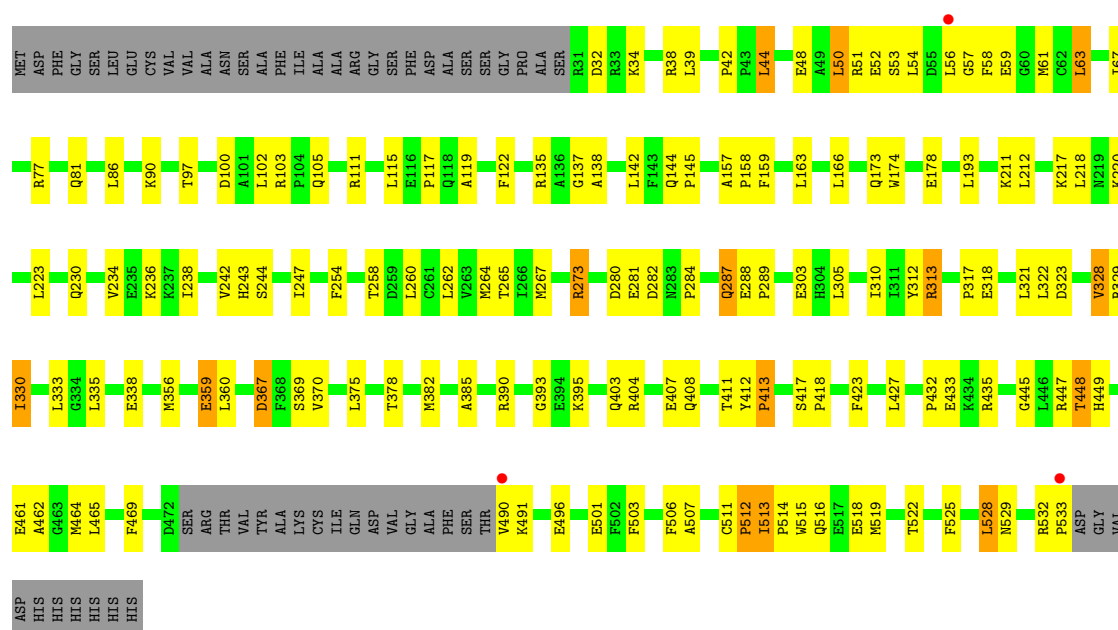
• Molecule 1: Rhodopsin kinase

Chain C:  64% 22% 11%



• Molecule 1: Rhodopsin kinase

Chain D:  62% 25% 10%





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	58.70Å 89.97Å 122.64Å 88.07° 90.26° 68.78°	Depositor
Resolution (Å)	29.60 – 2.70 29.60 – 2.70	Depositor EDS
% Data completeness (in resolution range)	89.2 (29.60-2.70) 89.2 (29.60-2.70)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.02 (at 2.68Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.6.4_486)	Depositor
R, $R_{free}$	0.192 , 0.229 0.190 , 0.225	Depositor DCC
$R_{free}$ test set	3089 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	50.0	Xtriage
Anisotropy	0.570	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 49.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.125 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	15806	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.75% 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: MG, ADP, GOL

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	0.51	0/3997	0.85	3/5391 (0.1%)
1	B	0.51	0/3965	0.86	3/5348 (0.1%)
1	C	0.50	0/3977	0.85	5/5363 (0.1%)
1	D	0.52	0/3997	0.87	5/5391 (0.1%)
All	All	0.51	0/15936	0.86	16/21493 (0.1%)

There are no bond length outliers.

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	449	HIS	CA-C-N	7.04	128.65	119.84
1	D	449	HIS	C-N-CA	7.04	128.65	119.84
1	A	449	HIS	CA-C-N	7.03	128.63	119.84
1	A	449	HIS	C-N-CA	7.03	128.63	119.84
1	B	449	HIS	CA-C-N	6.98	128.56	119.84
1	B	449	HIS	C-N-CA	6.98	128.56	119.84
1	C	449	HIS	CA-C-N	6.79	128.33	119.84
1	C	449	HIS	C-N-CA	6.79	128.33	119.84
1	B	316	LYS	N-CA-C	5.49	113.07	108.13
1	D	58	PHE	N-CA-C	5.29	116.73	110.97
1	D	513	ILE	N-CA-CB	5.20	114.00	110.52
1	C	316	LYS	N-CA-C	5.16	112.77	108.13
1	A	367	ASP	CB-CA-C	-5.15	105.08	113.37
1	C	184	GLU	N-CA-C	5.12	116.86	111.28
1	D	367	ASP	CB-CA-C	-5.08	105.18	113.37
1	C	367	ASP	CB-CA-C	-5.04	105.25	113.37

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3904	0	3874	93	0
1	B	3872	0	3835	101	0
1	C	3885	0	3860	84	0
1	D	3904	0	3874	102	0
2	A	27	0	12	3	0
2	B	27	0	12	3	0
2	C	27	0	12	1	0
2	D	27	0	12	2	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	6	0	8	1	0
4	B	6	0	8	0	0
5	A	30	0	0	3	0
5	B	32	0	0	4	0
5	C	26	0	0	3	0
5	D	25	0	0	2	0
All	All	15806	0	15507	372	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 12.

All (372) 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:359:GLU:HG2	1:D:432:PRO:HG3	1.42	0.98
1:A:359:GLU:HG2	1:A:432:PRO:HG3	1.48	0.94
1:B:359:GLU:HG2	1:B:432:PRO:HG3	1.46	0.94
1:C:359:GLU:HG2	1:C:432:PRO:HG3	1.49	0.93
1:B:166:LEU:HD23	1:C:44:LEU:HD21	1.56	0.87
1:D:238:ILE:HD12	1:D:310:ILE:HD13	1.56	0.87
1:D:97:THR:HA	1:D:464:MET:HE1	1.57	0.86
1:B:97:THR:HA	1:B:464:MET:HE1	1.57	0.86
1:C:238:ILE:HD12	1:C:310:ILE:HD13	1.58	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:322:LEU:HD23	1:B:328:VAL:HG23	1.57	0.85
1:B:238:ILE:HD12	1:B:310:ILE:HD13	1.60	0.83
1:A:322:LEU:HD23	1:A:328:VAL:HG23	1.59	0.83
1:C:322:LEU:HD23	1:C:328:VAL:HG23	1.61	0.82
1:B:111:ARG:HA	1:B:115:LEU:HD12	1.62	0.82
1:C:97:THR:HA	1:C:464:MET:HE1	1.62	0.81
1:A:97:THR:HA	1:A:464:MET:HE1	1.63	0.80
1:A:111:ARG:HA	1:A:115:LEU:HD12	1.61	0.80
1:D:111:ARG:HA	1:D:115:LEU:HD12	1.63	0.80
1:A:238:ILE:HD12	1:A:310:ILE:HD13	1.62	0.80
1:C:111:ARG:HA	1:C:115:LEU:HD12	1.64	0.80
1:D:322:LEU:HD23	1:D:328:VAL:HG23	1.63	0.78
1:A:518:GLU:O	1:A:522:THR:HG22	1.86	0.74
1:B:234:VAL:O	1:B:238:ILE:HG12	1.87	0.74
1:D:518:GLU:O	1:D:522:THR:HG22	1.87	0.74
1:D:34:LYS:HE2	1:D:38:ARG:HH21	1.53	0.73
1:C:322:LEU:CD2	1:C:328:VAL:HG23	2.17	0.73
1:B:34:LYS:HE2	1:B:38:ARG:HH21	1.53	0.73
1:D:234:VAL:O	1:D:238:ILE:HG12	1.89	0.73
1:A:234:VAL:O	1:A:238:ILE:HG12	1.88	0.73
1:D:511:CYS:O	1:D:514:PRO:HD2	1.90	0.72
1:B:511:CYS:O	1:B:514:PRO:HD2	1.90	0.72
1:C:234:VAL:O	1:C:238:ILE:HG12	1.90	0.72
1:A:322:LEU:CD2	1:A:328:VAL:HG23	2.19	0.71
1:B:322:LEU:CD2	1:B:328:VAL:HG23	2.20	0.71
1:D:367:ASP:HB3	1:D:369:SER:H	1.55	0.71
1:C:367:ASP:HB3	1:C:369:SER:H	1.56	0.71
1:C:518:GLU:O	1:C:522:THR:HG22	1.91	0.71
1:C:34:LYS:HE2	1:C:38:ARG:HH21	1.54	0.71
1:B:44:LEU:HD21	1:C:166:LEU:HD23	1.72	0.70
1:B:518:GLU:O	1:B:522:THR:HG22	1.91	0.70
1:C:511:CYS:O	1:C:514:PRO:HD2	1.92	0.69
1:A:511:CYS:O	1:A:514:PRO:HD2	1.91	0.69
1:A:34:LYS:HE2	1:A:38:ARG:HH21	1.57	0.69
1:D:39:LEU:O	1:D:528:LEU:HD11	1.93	0.69
1:B:39:LEU:O	1:B:528:LEU:HD11	1.92	0.69
1:A:44:LEU:HD21	1:D:166:LEU:HD23	1.75	0.69
1:D:322:LEU:CD2	1:D:328:VAL:HG23	2.23	0.68
1:B:111:ARG:HH22	1:B:137:GLY:HA3	1.58	0.67
1:D:111:ARG:HH22	1:D:137:GLY:HA3	1.60	0.67
1:B:367:ASP:HB3	1:B:369:SER:H	1.58	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:367:ASP:HB3	1:A:369:SER:H	1.59	0.67
1:A:39:LEU:O	1:A:528:LEU:HD11	1.95	0.66
2:A:700:ADP:O2B	5:A:548:HOH:O	2.12	0.66
1:C:39:LEU:O	1:C:528:LEU:HD11	1.95	0.66
1:A:97:THR:HG22	1:A:97:THR:O	1.96	0.65
1:A:166:LEU:HD23	1:D:44:LEU:HD21	1.79	0.65
1:A:453:ARG:HH12	1:B:105:GLN:HB3	1.62	0.64
1:A:111:ARG:HH22	1:A:137:GLY:HA3	1.62	0.64
1:D:50:LEU:HD23	1:D:50:LEU:C	2.23	0.63
1:A:59:GLU:HA	1:A:63:LEU:HD22	1.81	0.63
1:B:59:GLU:HA	1:B:63:LEU:HD22	1.81	0.63
1:C:50:LEU:C	1:C:50:LEU:HD23	2.24	0.62
1:D:303:GLU:CD	1:D:447:ARG:HH21	2.07	0.62
1:A:490:VAL:HG22	1:A:491:LYS:H	1.65	0.62
2:B:700:ADP:H5'2	5:B:545:HOH:O	1.99	0.62
1:A:50:LEU:HD23	1:A:50:LEU:C	2.25	0.62
2:D:700:ADP:H5'2	5:D:544:HOH:O	1.99	0.62
1:B:303:GLU:CD	1:B:447:ARG:HH21	2.07	0.61
1:D:59:GLU:HA	1:D:63:LEU:HD22	1.80	0.61
1:A:220:LYS:HE2	1:A:503:PHE:CD1	2.35	0.61
1:B:230:GLN:O	1:B:234:VAL:HG23	2.00	0.61
1:B:42:PRO:HD2	1:B:173:GLN:HB3	1.82	0.61
1:A:267:MET:HE2	1:A:329:ARG:HB2	1.83	0.60
1:C:490:VAL:HG22	1:C:491:LYS:H	1.64	0.60
1:A:105:GLN:HB3	1:B:453:ARG:HH12	1.64	0.60
1:C:59:GLU:HA	1:C:63:LEU:HD22	1.82	0.60
1:D:490:VAL:HG22	1:D:491:LYS:H	1.66	0.60
1:D:305:LEU:HD11	1:D:330:ILE:HD11	1.83	0.60
1:B:50:LEU:C	1:B:50:LEU:HD23	2.27	0.60
1:B:217:LYS:O	1:B:218:LEU:HD23	2.02	0.60
1:C:42:PRO:HD2	1:C:173:GLN:HB3	1.83	0.59
1:C:513:ILE:HD13	5:C:559:HOH:O	2.02	0.59
1:A:303:GLU:CD	1:A:447:ARG:HH21	2.10	0.59
1:D:230:GLN:O	1:D:234:VAL:HG23	2.01	0.59
1:C:220:LYS:HE2	1:C:503:PHE:CD1	2.38	0.59
1:D:97:THR:HG22	1:D:97:THR:O	2.01	0.59
1:D:117:PRO:HA	1:D:122:PHE:CD1	2.38	0.59
1:C:97:THR:HG22	1:C:97:THR:O	2.03	0.59
2:A:700:ADP:PB	5:A:548:HOH:O	2.59	0.58
1:D:220:LYS:HE2	1:D:503:PHE:CD1	2.38	0.58
1:B:220:LYS:HE2	1:B:503:PHE:CD1	2.39	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:230:GLN:HG2	5:B:565:HOH:O	2.03	0.58
1:A:42:PRO:HD2	1:A:173:GLN:HB3	1.87	0.57
1:C:230:GLN:O	1:C:234:VAL:HG23	2.03	0.57
1:A:230:GLN:O	1:A:234:VAL:HG23	2.05	0.57
1:D:42:PRO:HD2	1:D:173:GLN:HB3	1.87	0.57
1:B:117:PRO:HA	1:B:122:PHE:CD1	2.40	0.57
1:D:462:ALA:HB3	1:D:464:MET:HE3	1.87	0.57
1:C:303:GLU:CD	1:C:447:ARG:HH21	2.12	0.56
1:A:117:PRO:HA	1:A:122:PHE:CD1	2.40	0.55
1:D:404:ARG:O	1:D:408:GLN:HB3	2.07	0.55
1:A:67:ILE:HG13	1:A:516:GLN:HB3	1.87	0.55
1:A:462:ALA:HB3	1:A:464:MET:HE3	1.88	0.55
1:B:305:LEU:HD11	1:B:330:ILE:HD11	1.89	0.55
1:C:267:MET:HE2	1:C:329:ARG:HB2	1.89	0.55
1:B:97:THR:O	1:B:97:THR:HG22	2.06	0.54
1:B:462:ALA:HB3	1:B:464:MET:HE3	1.87	0.54
1:A:282:ASP:C	1:A:284:PRO:HD3	2.32	0.54
1:B:282:ASP:C	1:B:284:PRO:HD3	2.32	0.54
1:B:267:MET:HE2	1:B:329:ARG:HB2	1.90	0.54
1:D:50:LEU:O	1:D:54:LEU:HG	2.08	0.54
1:C:513:ILE:HB	1:C:514:PRO:HD3	1.90	0.54
1:A:97:THR:O	1:A:97:THR:CG2	2.55	0.53
1:A:404:ARG:O	1:A:408:GLN:HB3	2.09	0.53
1:C:403:GLN:O	1:C:407:GLU:HG2	2.09	0.53
1:B:321:LEU:O	1:B:328:VAL:HA	2.09	0.53
1:C:117:PRO:HA	1:C:122:PHE:CD1	2.44	0.53
1:D:67:ILE:HG13	1:D:516:GLN:HB3	1.89	0.53
1:D:178:GLU:HB2	1:D:515:TRP:CZ3	2.44	0.53
1:C:305:LEU:HD11	1:C:330:ILE:HD11	1.91	0.53
1:B:111:ARG:NH2	1:B:137:GLY:HA3	2.23	0.52
1:D:97:THR:O	1:D:97:THR:CG2	2.57	0.52
1:D:282:ASP:C	1:D:284:PRO:HD3	2.34	0.52
1:A:533:PRO:HG2	1:D:77:ARG:HG3	1.90	0.52
1:C:404:ARG:O	1:C:408:GLN:HB3	2.09	0.52
1:C:462:ALA:HB3	1:C:464:MET:HE3	1.91	0.52
1:A:445:GLY:O	1:A:448:THR:HB	2.10	0.52
1:A:100:ASP:HA	1:A:103:ARG:HG3	1.92	0.51
1:C:282:ASP:C	1:C:284:PRO:HD3	2.34	0.51
1:D:403:GLN:O	1:D:407:GLU:HG2	2.10	0.51
1:B:359:GLU:CG	1:B:432:PRO:HG3	2.31	0.51
1:D:445:GLY:O	1:D:448:THR:HB	2.10	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:313:ARG:HD3	1:C:335:LEU:O	2.10	0.51
1:B:50:LEU:O	1:B:54:LEU:HG	2.10	0.51
1:B:86:LEU:HD11	1:B:90:LYS:HE3	1.92	0.51
1:B:178:GLU:HB2	1:B:515:TRP:CZ3	2.45	0.51
1:C:50:LEU:O	1:C:54:LEU:HG	2.11	0.51
1:A:313:ARG:HD3	1:A:335:LEU:O	2.11	0.50
1:A:321:LEU:O	1:A:328:VAL:HA	2.10	0.50
1:B:403:GLN:O	1:B:407:GLU:HG2	2.10	0.50
1:B:417:SER:O	1:B:418:PRO:C	2.51	0.50
1:D:321:LEU:O	1:D:328:VAL:HA	2.11	0.50
1:A:77:ARG:HG3	1:D:533:PRO:HG2	1.93	0.50
1:B:67:ILE:HG13	1:B:516:GLN:HB3	1.93	0.50
1:C:97:THR:O	1:C:97:THR:CG2	2.59	0.50
1:C:417:SER:O	1:C:418:PRO:C	2.54	0.50
1:C:528:LEU:HD23	1:C:528:LEU:N	2.27	0.50
1:A:403:GLN:O	1:A:407:GLU:HG2	2.12	0.50
1:D:111:ARG:NH2	1:D:137:GLY:HA3	2.25	0.50
1:D:267:MET:HE2	1:D:329:ARG:HB2	1.94	0.50
1:D:359:GLU:CG	1:D:432:PRO:HG3	2.28	0.50
1:C:321:LEU:O	1:C:328:VAL:HA	2.11	0.50
1:A:515:TRP:NE1	1:A:519:MET:HE3	2.27	0.50
1:B:50:LEU:HA	1:B:53:SER:OG	2.11	0.49
1:B:404:ARG:O	1:B:408:GLN:HB3	2.11	0.49
1:A:453:ARG:HH12	1:B:105:GLN:CB	2.25	0.49
1:D:313:ARG:HD3	1:D:335:LEU:O	2.12	0.49
1:D:518:GLU:O	1:D:522:THR:CG2	2.59	0.49
1:A:305:LEU:HD11	1:A:330:ILE:HD11	1.93	0.49
1:A:111:ARG:NH2	1:A:137:GLY:HA3	2.26	0.49
1:A:528:LEU:HD23	1:A:528:LEU:N	2.27	0.49
1:B:445:GLY:O	1:B:448:THR:HB	2.13	0.49
1:C:445:GLY:O	1:C:448:THR:HB	2.13	0.49
2:A:700:ADP:H5'2	5:A:545:HOH:O	2.11	0.49
1:D:50:LEU:HA	1:D:53:SER:OG	2.12	0.49
1:B:513:ILE:HB	1:B:514:PRO:HD3	1.95	0.49
1:C:67:ILE:HG13	1:C:516:GLN:HB3	1.94	0.49
2:C:700:ADP:PB	5:C:547:HOH:O	2.71	0.49
1:A:137:GLY:HA2	1:A:142:LEU:HD11	1.94	0.48
1:A:513:ILE:HB	1:A:514:PRO:HD3	1.94	0.48
1:B:137:GLY:HA2	1:B:142:LEU:HD11	1.94	0.48
1:D:217:LYS:O	1:D:218:LEU:HD23	2.13	0.48
1:A:217:LYS:O	1:A:218:LEU:HD23	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:217:LYS:C	1:B:218:LEU:HD23	2.38	0.48
1:A:50:LEU:HA	1:A:53:SER:OG	2.14	0.48
1:A:86:LEU:HD11	1:A:90:LYS:HE3	1.94	0.48
1:D:193:LEU:HD13	2:D:700:ADP:C2	2.49	0.48
1:B:273:ARG:HB3	1:B:317:PRO:HB2	1.95	0.48
1:B:531:TRP:HB2	1:C:531:TRP:CG	2.48	0.48
1:D:513:ILE:HB	1:D:514:PRO:HD3	1.95	0.48
1:A:515:TRP:CE2	1:A:519:MET:HE3	2.49	0.48
1:A:219:ASN:HD22	4:A:544:GOL:H2	1.79	0.48
1:B:313:ARG:HD3	1:B:335:LEU:O	2.14	0.47
1:C:217:LYS:O	1:C:218:LEU:HD23	2.14	0.47
1:C:449:HIS:CG	1:C:450:PRO:HD2	2.49	0.47
1:A:417:SER:O	1:A:418:PRO:C	2.57	0.47
1:A:50:LEU:O	1:A:54:LEU:HG	2.15	0.47
1:A:322:LEU:HD23	1:A:328:VAL:CG2	2.39	0.47
1:B:236:LYS:HG3	1:B:262:LEU:HD21	1.96	0.47
1:A:236:LYS:HG3	1:A:262:LEU:HD21	1.95	0.47
1:C:312:TYR:O	1:C:313:ARG:HB2	2.15	0.47
1:A:312:TYR:O	1:A:313:ARG:HB2	2.14	0.47
1:D:417:SER:O	1:D:418:PRO:C	2.58	0.47
2:B:700:ADP:H8	2:B:700:ADP:O5'	1.98	0.47
1:C:144:GLN:N	1:C:145:PRO:HD2	2.30	0.47
1:B:254:PHE:HA	1:B:507:ALA:HB1	1.97	0.46
1:C:86:LEU:HD11	1:C:90:LYS:HE3	1.97	0.46
1:C:490:VAL:HG22	1:C:491:LYS:N	2.30	0.46
1:A:254:PHE:HA	1:A:507:ALA:HB1	1.97	0.46
1:B:159:PHE:CZ	1:B:163:LEU:HD21	2.49	0.46
1:B:423:PHE:CE2	1:B:427:LEU:HD11	2.50	0.46
1:C:50:LEU:HA	1:C:53:SER:OG	2.15	0.46
1:D:236:LYS:HG3	1:D:262:LEU:HD21	1.98	0.46
1:B:97:THR:O	1:B:97:THR:CG2	2.63	0.46
1:A:356:MET:HB3	1:A:360:LEU:HD22	1.96	0.46
1:D:287:GLN:HE21	1:D:287:GLN:HA	1.81	0.46
1:C:322:LEU:HD23	1:C:328:VAL:CG2	2.39	0.46
1:D:144:GLN:N	1:D:145:PRO:HD2	2.30	0.46
1:A:287:GLN:HE21	1:A:287:GLN:HA	1.80	0.46
1:C:496:GLU:OE1	1:C:496:GLU:HA	2.16	0.46
1:D:86:LEU:HD11	1:D:90:LYS:HE3	1.97	0.46
1:C:287:GLN:HE21	1:C:287:GLN:HA	1.79	0.46
1:D:34:LYS:CE	1:D:38:ARG:HH21	2.27	0.46
1:D:137:GLY:HA2	1:D:142:LEU:HD11	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:211:LYS:HD3	1:D:518:GLU:HG3	1.97	0.46
1:D:356:MET:HB3	1:D:360:LEU:HD22	1.98	0.46
1:B:287:GLN:HE21	1:B:287:GLN:HA	1.80	0.46
1:D:412:TYR:HA	1:D:413:PRO:HD2	1.85	0.45
1:D:469:PHE:C	1:D:469:PHE:CD2	2.94	0.45
1:B:531:TRP:CB	1:C:531:TRP:CB	2.94	0.45
1:B:260:LEU:HB3	1:B:506:PHE:CE2	2.51	0.45
1:B:228:GLY:HA2	5:B:565:HOH:O	2.16	0.45
1:C:254:PHE:HA	1:C:507:ALA:HB1	1.98	0.45
1:D:254:PHE:HA	1:D:507:ALA:HB1	1.98	0.45
1:B:56:LEU:O	1:B:57:GLY:C	2.60	0.45
1:B:288:GLU:CD	1:B:420:SER:HG	2.24	0.45
1:D:423:PHE:CE2	1:D:427:LEU:HD11	2.51	0.45
1:A:238:ILE:HG21	1:A:333:LEU:HD22	1.98	0.45
1:A:273:ARG:HG3	1:A:274:TYR:N	2.31	0.45
1:B:111:ARG:NH2	1:B:137:GLY:CA	2.80	0.45
1:B:427:LEU:O	1:B:435:ARG:HD3	2.17	0.45
1:D:159:PHE:CZ	1:D:163:LEU:HD21	2.52	0.45
1:D:427:LEU:O	1:D:435:ARG:HD3	2.17	0.45
1:B:312:TYR:O	1:B:313:ARG:HB2	2.16	0.44
1:A:312:TYR:CE2	1:A:330:ILE:HD12	2.52	0.44
1:A:518:GLU:O	1:A:522:THR:CG2	2.60	0.44
1:B:100:ASP:HA	1:B:103:ARG:HG3	1.98	0.44
1:B:469:PHE:C	1:B:469:PHE:CD2	2.95	0.44
1:B:518:GLU:O	1:B:522:THR:CG2	2.63	0.44
1:A:137:GLY:HA2	1:A:142:LEU:CD1	2.48	0.44
1:B:531:TRP:CG	1:C:531:TRP:HB2	2.53	0.44
1:C:238:ILE:HG21	1:C:333:LEU:HD22	1.99	0.44
1:C:288:GLU:HB2	1:C:289:PRO:HD3	2.00	0.44
1:D:465:LEU:HD23	1:D:465:LEU:HA	1.83	0.44
1:B:144:GLN:N	1:B:145:PRO:HD2	2.33	0.44
1:C:100:ASP:HA	1:C:103:ARG:HG3	1.99	0.44
1:C:157:ALA:N	1:C:158:PRO:CD	2.80	0.44
1:A:469:PHE:C	1:A:469:PHE:CD2	2.95	0.44
1:A:490:VAL:HG22	1:A:491:LYS:N	2.30	0.44
1:C:356:MET:HB3	1:C:360:LEU:HD22	2.00	0.44
1:C:359:GLU:CG	1:C:432:PRO:HG3	2.33	0.44
1:C:469:PHE:CD2	1:C:469:PHE:C	2.96	0.44
1:D:244:SER:HB3	1:D:247:ILE:HG12	1.99	0.44
1:B:322:LEU:HD23	1:B:328:VAL:CG2	2.38	0.44
1:D:288:GLU:HB2	1:D:289:PRO:HD3	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:515:TRP:CE2	1:D:519:MET:HE3	2.53	0.44
1:A:144:GLN:N	1:A:145:PRO:HD2	2.32	0.43
1:A:244:SER:HB3	1:A:247:ILE:HG12	2.00	0.43
1:A:359:GLU:CG	1:A:432:PRO:HG3	2.33	0.43
1:D:157:ALA:N	1:D:158:PRO:CD	2.81	0.43
1:D:312:TYR:O	1:D:313:ARG:HB2	2.17	0.43
1:A:56:LEU:O	1:A:57:GLY:C	2.60	0.43
1:A:449:HIS:CG	1:A:450:PRO:HD2	2.53	0.43
1:C:427:LEU:O	1:C:435:ARG:HD3	2.18	0.43
1:C:513:ILE:CD1	5:C:559:HOH:O	2.61	0.43
1:D:52:GLU:C	1:D:54:LEU:H	2.27	0.43
1:D:211:LYS:CD	1:D:518:GLU:HG3	2.48	0.43
1:A:288:GLU:CD	1:A:420:SER:HG	2.26	0.43
1:B:284:PRO:HB2	1:B:385:ALA:CB	2.48	0.43
1:A:496:GLU:HA	1:A:496:GLU:OE1	2.19	0.43
1:B:244:SER:HB3	1:B:247:ILE:HG12	2.01	0.43
1:D:217:LYS:C	1:D:218:LEU:HD23	2.43	0.43
1:C:515:TRP:NE1	1:C:519:MET:HE3	2.34	0.43
1:B:288:GLU:HB2	1:B:289:PRO:HD3	2.00	0.43
1:B:137:GLY:HA2	1:B:142:LEU:CD1	2.49	0.43
1:B:318:GLU:H	1:B:318:GLU:CD	2.27	0.43
1:B:470:VAL:HA	1:B:471:PRO:HD3	1.87	0.43
1:C:244:SER:HB3	1:C:247:ILE:HG12	1.99	0.43
1:C:287:GLN:HE21	1:C:287:GLN:CA	2.32	0.43
1:A:217:LYS:C	1:A:218:LEU:HD23	2.44	0.42
1:C:288:GLU:CD	1:C:420:SER:HG	2.27	0.42
1:D:212:LEU:HA	1:D:212:LEU:HD23	1.71	0.42
1:D:303:GLU:CD	1:D:447:ARG:NH2	2.75	0.42
1:D:264:MET:O	1:D:265:THR:C	2.62	0.42
1:D:393:GLY:O	1:D:395:LYS:HG2	2.19	0.42
1:B:238:ILE:HD11	1:B:338:GLU:HG2	2.00	0.42
1:B:356:MET:HB3	1:B:360:LEU:HD22	2.00	0.42
1:B:361:LEU:C	1:B:363:GLY:H	2.28	0.42
1:C:52:GLU:C	1:C:54:LEU:H	2.27	0.42
1:C:211:LYS:CD	1:C:518:GLU:HG3	2.49	0.42
1:C:465:LEU:HD23	1:C:465:LEU:HA	1.91	0.42
1:C:449:HIS:HA	1:C:450:PRO:HD3	1.87	0.42
1:D:56:LEU:O	1:D:57:GLY:C	2.62	0.42
1:B:496:GLU:OE1	1:B:496:GLU:HA	2.20	0.42
1:D:48:GLU:O	1:D:51:ARG:HB3	2.20	0.42
1:D:322:LEU:HD23	1:D:328:VAL:CG2	2.42	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:378:THR:HG22	1:D:382:MET:HE2	2.00	0.42
1:D:496:GLU:HA	1:D:496:GLU:OE1	2.19	0.42
1:D:512:PRO:O	1:D:516:GLN:HG3	2.20	0.42
1:C:178:GLU:HB2	1:C:515:TRP:CZ3	2.55	0.42
1:D:515:TRP:NE1	1:D:519:MET:HE3	2.35	0.42
1:A:316:LYS:HB2	1:A:317:PRO:HD2	2.02	0.42
1:A:318:GLU:H	1:A:318:GLU:CD	2.27	0.42
1:A:532:ARG:NH2	1:D:529:ASN:HB3	2.35	0.42
1:B:48:GLU:O	1:B:51:ARG:HB3	2.20	0.42
1:C:236:LYS:HG3	1:C:262:LEU:HD21	2.00	0.42
1:C:515:TRP:CE2	1:C:519:MET:HE3	2.54	0.42
1:D:238:ILE:CD1	1:D:310:ILE:HD13	2.38	0.42
1:D:260:LEU:HB3	1:D:506:PHE:CE2	2.55	0.42
1:A:512:PRO:O	1:A:516:GLN:HG3	2.20	0.42
1:B:52:GLU:C	1:B:54:LEU:H	2.27	0.42
1:B:223:LEU:HD23	1:B:223:LEU:HA	1.87	0.42
1:B:462:ALA:CB	1:B:464:MET:HE3	2.50	0.42
1:C:238:ILE:HD11	1:C:338:GLU:HG2	2.02	0.42
1:C:284:PRO:HB2	1:C:385:ALA:CB	2.49	0.42
1:D:238:ILE:HG21	1:D:333:LEU:HD22	2.02	0.42
1:A:284:PRO:HB2	1:A:385:ALA:CB	2.50	0.41
1:B:515:TRP:CE2	1:B:519:MET:HE3	2.54	0.41
1:A:174:TRP:CZ2	1:A:525:PHE:CD1	3.07	0.41
1:B:273:ARG:HG2	1:B:318:GLU:HB3	2.02	0.41
1:C:144:GLN:N	1:C:145:PRO:CD	2.83	0.41
1:D:243:HIS:HB3	5:D:566:HOH:O	2.20	0.41
1:A:52:GLU:C	1:A:54:LEU:H	2.29	0.41
1:B:34:LYS:CE	1:B:38:ARG:HH21	2.27	0.41
1:D:238:ILE:HD11	1:D:338:GLU:HG2	2.02	0.41
1:D:273:ARG:HB3	1:D:317:PRO:HB2	2.02	0.41
1:A:111:ARG:NH2	1:A:137:GLY:CA	2.84	0.41
1:A:287:GLN:HE21	1:A:287:GLN:CA	2.33	0.41
1:A:427:LEU:O	1:A:435:ARG:HD3	2.19	0.41
1:B:59:GLU:HG2	5:B:573:HOH:O	2.20	0.41
1:B:303:GLU:CD	1:B:447:ARG:NH2	2.76	0.41
1:B:528:LEU:N	1:B:528:LEU:HD23	2.34	0.41
1:D:490:VAL:HG22	1:D:491:LYS:N	2.33	0.41
1:B:316:LYS:HB2	1:B:317:PRO:HD2	2.02	0.41
1:B:332:ASP:OD2	2:B:700:ADP:O2A	2.39	0.41
1:C:378:THR:HG22	1:C:382:MET:HE2	2.01	0.41
1:D:100:ASP:HA	1:D:103:ARG:HG3	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:287:GLN:HE21	1:D:287:GLN:CA	2.34	0.41
1:A:216:LYS:HE2	1:A:218:LEU:HD21	2.03	0.41
1:A:238:ILE:HD11	1:A:338:GLU:HG2	2.02	0.41
1:D:528:LEU:N	1:D:528:LEU:HD23	2.36	0.41
1:C:312:TYR:CE2	1:C:330:ILE:HD12	2.56	0.41
1:C:330:ILE:HG21	1:C:330:ILE:HD13	1.79	0.41
1:D:111:ARG:NH2	1:D:137:GLY:CA	2.83	0.41
1:D:144:GLN:N	1:D:145:PRO:CD	2.84	0.41
1:A:206:MET:SD	1:A:208:ALA:HB3	2.61	0.41
1:A:212:LEU:HA	1:A:212:LEU:HD23	1.77	0.41
1:A:529:ASN:HB3	1:D:532:ARG:HH22	1.86	0.41
1:B:532:ARG:HH22	1:C:529:ASN:HB3	1.86	0.41
1:C:470:VAL:HA	1:C:471:PRO:HD3	1.85	0.41
1:B:515:TRP:NE1	1:B:519:MET:HE3	2.35	0.41
1:D:174:TRP:CZ2	1:D:525:PHE:CD1	3.09	0.41
1:D:284:PRO:HB2	1:D:385:ALA:CB	2.50	0.41
1:B:465:LEU:HD23	1:B:465:LEU:HA	1.88	0.40
1:A:223:LEU:HA	1:A:223:LEU:HD23	1.82	0.40
1:A:412:TYR:HA	1:A:413:PRO:HD2	1.87	0.40
1:B:323:ASP:OD1	1:B:323:ASP:C	2.64	0.40
1:C:273:ARG:HG2	1:C:318:GLU:HB3	2.03	0.40
1:D:32:ASP:C	1:D:32:ASP:OD1	2.65	0.40
1:B:183:GLY:O	1:B:186:TRP:HB2	2.21	0.40
1:D:375:LEU:O	1:D:378:THR:HB	2.21	0.40
1:B:238:ILE:HG23	1:B:310:ILE:HD13	2.04	0.40
1:C:48:GLU:O	1:C:51:ARG:HB3	2.22	0.40
1:C:532:ARG:HA	1:C:533:PRO:HD3	1.86	0.40
1:D:54:LEU:HD23	1:D:54:LEU:HA	1.88	0.40
1:D:137:GLY:HA2	1:D:142:LEU:CD1	2.52	0.40
1:D:323:ASP:OD1	1:D:323:ASP:C	2.65	0.40
1:A:103:ARG:N	1:A:104:PRO:CD	2.84	0.40
1:A:288:GLU:HB2	1:A:289:PRO:HD3	2.02	0.40
1:B:171:PHE:O	1:B:175:LYS:HG2	2.21	0.40
1:B:220:LYS:HG2	1:B:503:PHE:CZ	2.56	0.40
1:B:287:GLN:HA	1:B:287:GLN:NE2	2.36	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	482/543 (89%)	447 (93%)	30 (6%)	5 (1%)	12	32
1	B	477/543 (88%)	443 (93%)	29 (6%)	5 (1%)	12	32
1	C	476/543 (88%)	444 (93%)	28 (6%)	4 (1%)	16	37
1	D	482/543 (89%)	449 (93%)	28 (6%)	5 (1%)	12	32
All	All	1917/2172 (88%)	1783 (93%)	115 (6%)	19 (1%)	12	32

All (19) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	281	GLU
1	B	281	GLU
1	C	281	GLU
1	D	281	GLU
1	A	138	ALA
1	B	119	ALA
1	B	138	ALA
1	B	413	PRO
1	C	119	ALA
1	D	138	ALA
1	A	413	PRO
1	C	413	PRO
1	D	119	ALA
1	D	413	PRO
1	A	119	ALA
1	B	512	PRO
1	A	512	PRO
1	D	512	PRO
1	C	512	PRO

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	405/449 (90%)	377 (93%)	28 (7%)	14	34
1	B	402/449 (90%)	375 (93%)	27 (7%)	15	36
1	C	405/449 (90%)	376 (93%)	29 (7%)	13	32
1	D	405/449 (90%)	378 (93%)	27 (7%)	15	36
All	All	1617/1796 (90%)	1506 (93%)	111 (7%)	14	34

All (111) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	44	LEU
1	A	50	LEU
1	A	61	MET
1	A	63	LEU
1	A	81	GLN
1	A	105	GLN
1	A	135	ARG
1	A	170	ARG
1	A	223	LEU
1	A	242	VAL
1	A	258	THR
1	A	273	ARG
1	A	280	ASP
1	A	287	GLN
1	A	313	ARG
1	A	318	GLU
1	A	328	VAL
1	A	330	ILE
1	A	333	LEU
1	A	359	GLU
1	A	370	VAL
1	A	390	ARG
1	A	411	THR
1	A	433	GLU

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Mol	Chain	Res	Type
1	A	448	THR
1	A	461	GLU
1	A	501	GLU
1	A	528	LEU
1	B	44	LEU
1	B	50	LEU
1	B	61	MET
1	B	63	LEU
1	B	81	GLN
1	B	102	LEU
1	B	105	GLN
1	B	135	ARG
1	B	223	LEU
1	B	242	VAL
1	B	258	THR
1	B	273	ARG
1	B	280	ASP
1	B	287	GLN
1	B	313	ARG
1	B	318	GLU
1	B	328	VAL
1	B	330	ILE
1	B	359	GLU
1	B	370	VAL
1	B	390	ARG
1	B	411	THR
1	B	433	GLU
1	B	448	THR
1	B	461	GLU
1	B	501	GLU
1	B	528	LEU
1	C	44	LEU
1	C	50	LEU
1	C	61	MET
1	C	63	LEU
1	C	81	GLN
1	C	102	LEU
1	C	105	GLN
1	C	135	ARG
1	C	170	ARG
1	C	206	MET
1	C	223	LEU

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Mol	Chain	Res	Type
1	C	242	VAL
1	C	258	THR
1	C	273	ARG
1	C	280	ASP
1	C	287	GLN
1	C	318	GLU
1	C	328	VAL
1	C	330	ILE
1	C	359	GLU
1	C	370	VAL
1	C	390	ARG
1	C	411	THR
1	C	433	GLU
1	C	448	THR
1	C	461	GLU
1	C	473	SER
1	C	501	GLU
1	C	528	LEU
1	D	44	LEU
1	D	50	LEU
1	D	61	MET
1	D	63	LEU
1	D	81	GLN
1	D	102	LEU
1	D	105	GLN
1	D	135	ARG
1	D	223	LEU
1	D	242	VAL
1	D	258	THR
1	D	273	ARG
1	D	280	ASP
1	D	287	GLN
1	D	313	ARG
1	D	318	GLU
1	D	328	VAL
1	D	330	ILE
1	D	359	GLU
1	D	370	VAL
1	D	390	ARG
1	D	411	THR
1	D	433	GLU
1	D	448	THR

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Mol	Chain	Res	Type
1	D	461	GLU
1	D	501	GLU
1	D	528	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	GLN
1	A	105	GLN
1	A	118	GLN
1	A	160	GLN
1	A	243	HIS
1	A	268	ASN
1	A	287	GLN
1	A	309	ASN
1	B	81	GLN
1	B	105	GLN
1	B	118	GLN
1	B	160	GLN
1	B	243	HIS
1	B	268	ASN
1	B	287	GLN
1	B	309	ASN
1	C	81	GLN
1	C	105	GLN
1	C	118	GLN
1	C	160	GLN
1	C	243	HIS
1	C	268	ASN
1	C	287	GLN
1	C	309	ASN
1	D	81	GLN
1	D	105	GLN
1	D	118	GLN
1	D	160	GLN
1	D	243	HIS
1	D	268	ASN
1	D	287	GLN
1	D	309	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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 8 are monoatomic - leaving 6 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$
4	GOL	A	544	-	5,5,5	0.49	0	5,5,5	0.72	0
2	ADP	A	700	3	28,29,29	1.50	4 (14%)	43,45,45	1.86	8 (18%)
4	GOL	B	544	-	5,5,5	0.38	0	5,5,5	0.29	0
2	ADP	D	700	3	28,29,29	1.46	5 (17%)	43,45,45	1.87	8 (18%)
2	ADP	C	700	3	28,29,29	1.43	4 (14%)	43,45,45	1.87	10 (23%)
2	ADP	B	700	3	28,29,29	1.43	4 (14%)	43,45,45	1.80	10 (23%)

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
4	GOL	A	544	-	-	4/4/4/4	-
2	ADP	A	700	3	-	0/16/32/32	0/3/3/3
4	GOL	B	544	-	-	4/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ADP	D	700	3	-	0/16/32/32	0/3/3/3
2	ADP	C	700	3	-	0/16/32/32	0/3/3/3
2	ADP	B	700	3	-	0/16/32/32	0/3/3/3

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	700	ADP	C5-C4	5.04	1.48	1.39
2	A	700	ADP	C5-C4	5.03	1.48	1.39
2	B	700	ADP	C5-C4	4.99	1.48	1.39
2	C	700	ADP	C5-C4	4.59	1.47	1.39
2	C	700	ADP	PA-O3A	2.98	1.62	1.59
2	A	700	ADP	PA-O3A	2.81	1.62	1.59
2	B	700	ADP	C8-N7	2.68	1.36	1.31
2	A	700	ADP	C5-C6	2.61	1.48	1.41
2	C	700	ADP	C8-N7	2.51	1.36	1.31
2	D	700	ADP	C5-N7	-2.50	1.34	1.39
2	C	700	ADP	C5-C6	2.44	1.47	1.41
2	B	700	ADP	C5-C6	2.44	1.47	1.41
2	A	700	ADP	C8-N7	2.43	1.36	1.31
2	D	700	ADP	C8-N7	2.40	1.36	1.31
2	D	700	ADP	PA-O3A	2.22	1.61	1.59
2	B	700	ADP	C5-N7	-2.21	1.35	1.39
2	D	700	ADP	C5-C6	2.20	1.47	1.41

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	700	ADP	C5-C4-N3	-6.01	118.44	126.72
2	B	700	ADP	C5-C4-N3	-5.64	118.95	126.72
2	D	700	ADP	C5-C4-N3	-5.55	119.07	126.72
2	C	700	ADP	C5-C4-N3	-5.49	119.16	126.72
2	D	700	ADP	N3-C4-N9	5.08	135.80	127.17
2	A	700	ADP	N3-C4-N9	5.02	135.71	127.17
2	B	700	ADP	N3-C4-N9	4.84	135.40	127.17
2	C	700	ADP	N3-C4-N9	4.46	134.75	127.17
2	C	700	ADP	C2-N3-C4	3.86	121.27	111.83
2	C	700	ADP	N3-C2-N1	-3.84	122.77	128.58
2	D	700	ADP	C2'-C1'-N9	-3.62	104.32	113.30
2	D	700	ADP	C2-N3-C4	3.54	120.48	111.83
2	A	700	ADP	C2-N3-C4	3.53	120.44	111.83
2	B	700	ADP	C2-N3-C4	3.42	120.19	111.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	700	ADP	N3-C2-N1	-3.37	123.47	128.58
2	A	700	ADP	C2'-C1'-N9	-3.12	105.55	113.30
2	A	700	ADP	C4-C5-N7	-3.08	107.06	110.58
2	C	700	ADP	C2'-C1'-N9	-2.94	106.01	113.30
2	D	700	ADP	C4-N9-C8	2.86	108.74	105.74
2	A	700	ADP	C4-N9-C8	2.78	108.66	105.74
2	A	700	ADP	N3-C2-N1	-2.77	124.39	128.58
2	B	700	ADP	N3-C2-N1	-2.69	124.50	128.58
2	B	700	ADP	C2'-C1'-N9	-2.60	106.83	113.30
2	B	700	ADP	C4-N9-C8	2.58	108.45	105.74
2	C	700	ADP	C4-C5-N7	-2.58	107.63	110.58
2	D	700	ADP	N6-C6-N1	2.51	123.96	118.38
2	B	700	ADP	O3A-PB-O1B	-2.49	97.95	111.04
2	C	700	ADP	O4'-C1'-N9	2.33	112.56	108.09
2	B	700	ADP	C4-C5-N7	-2.30	107.95	110.58
2	A	700	ADP	C5-N7-C8	2.27	107.02	103.45
2	C	700	ADP	C2-N1-C6	2.24	122.42	118.73
2	C	700	ADP	O3A-PB-O1B	-2.19	99.51	111.04
2	B	700	ADP	N6-C6-N1	2.18	123.23	118.38
2	C	700	ADP	C4-N9-C8	2.17	108.02	105.74
2	D	700	ADP	C4-C5-N7	-2.07	108.21	110.58
2	B	700	ADP	C5-C6-N6	-2.02	118.30	123.29

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	544	GOL	O1-C1-C2-C3
4	B	544	GOL	O1-C1-C2-C3
4	A	544	GOL	C1-C2-C3-O3
4	B	544	GOL	C1-C2-C3-O3
4	A	544	GOL	O2-C2-C3-O3
4	B	544	GOL	O1-C1-C2-O2
4	A	544	GOL	O1-C1-C2-O2
4	B	544	GOL	O2-C2-C3-O3

There are no ring outliers.

5 monomers are involved in 10 short contacts:

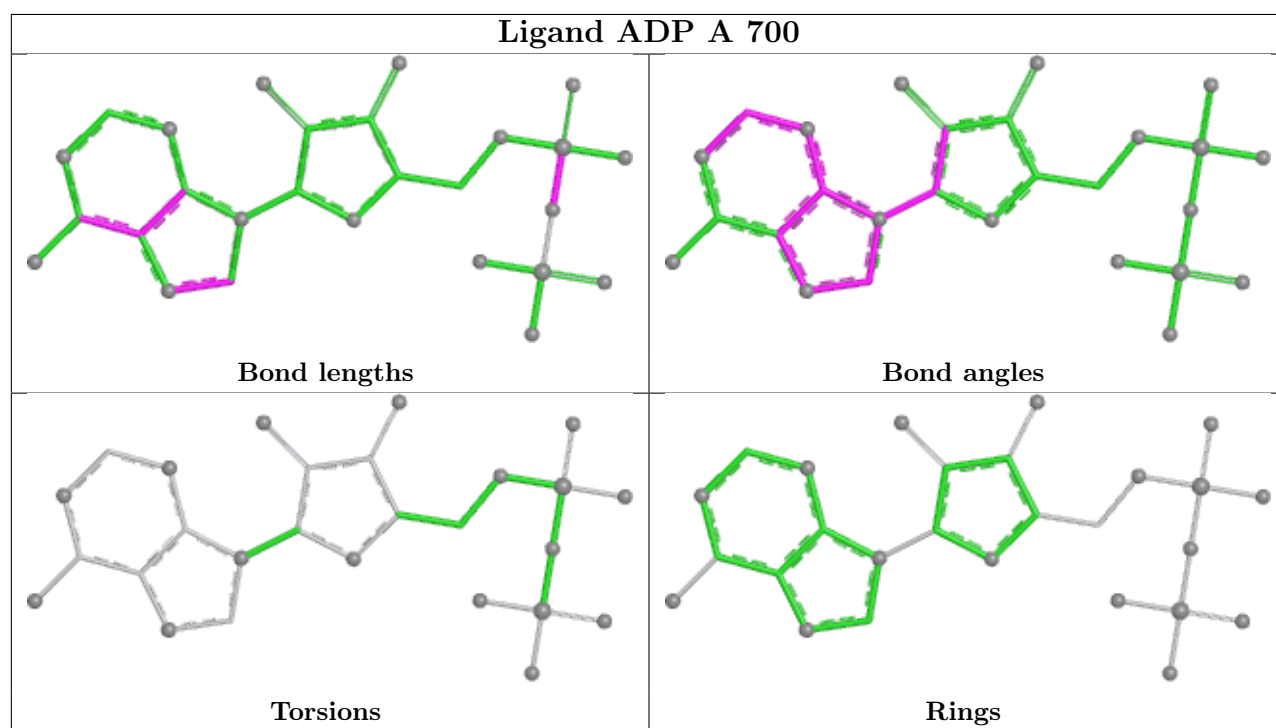
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	544	GOL	1	0

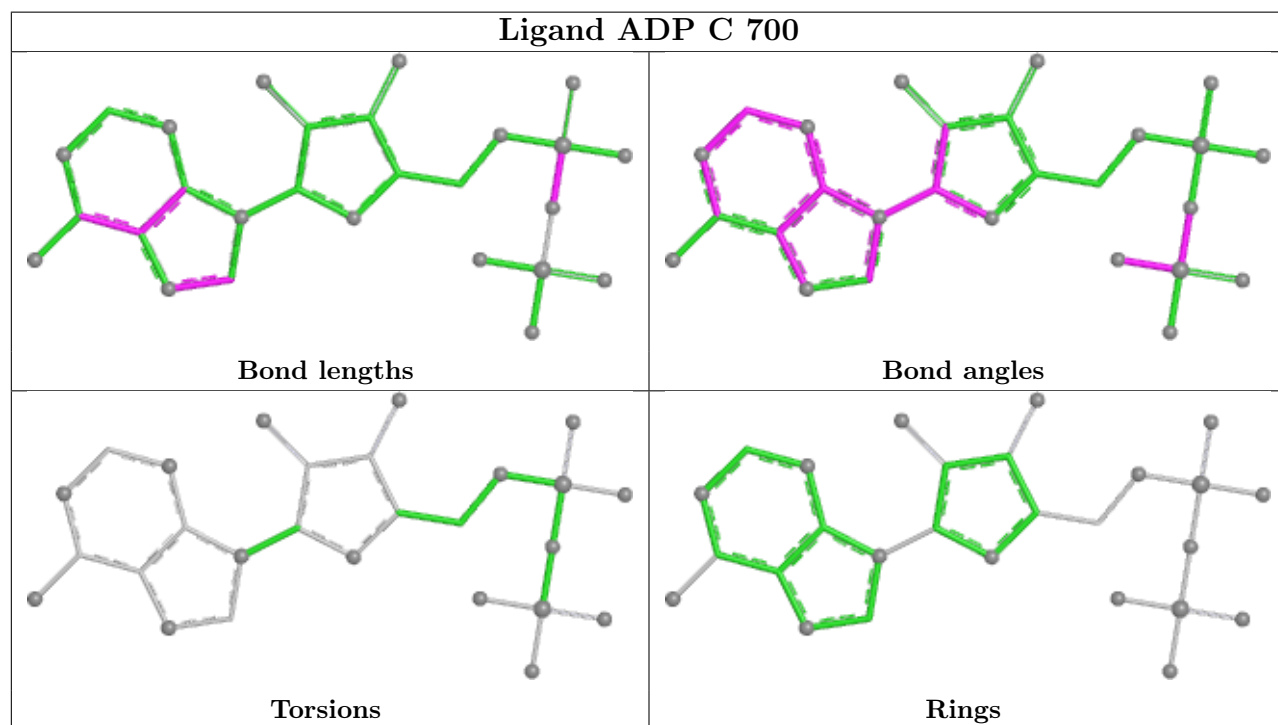
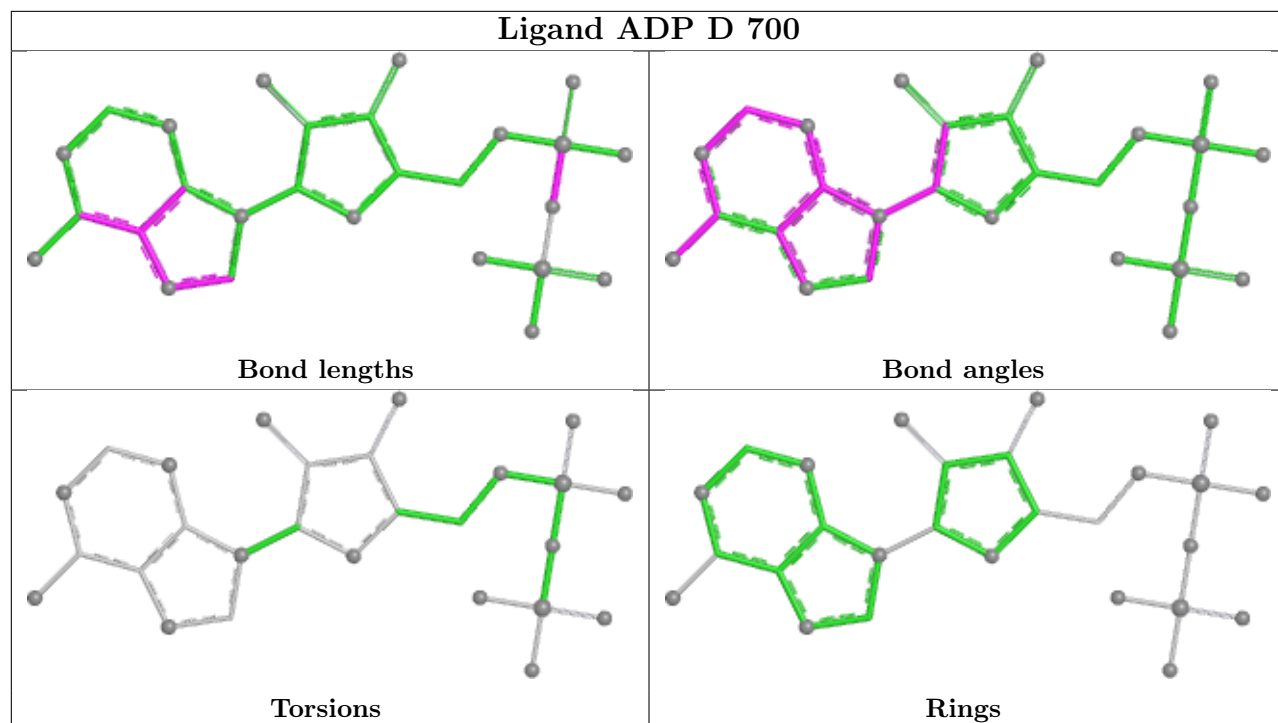
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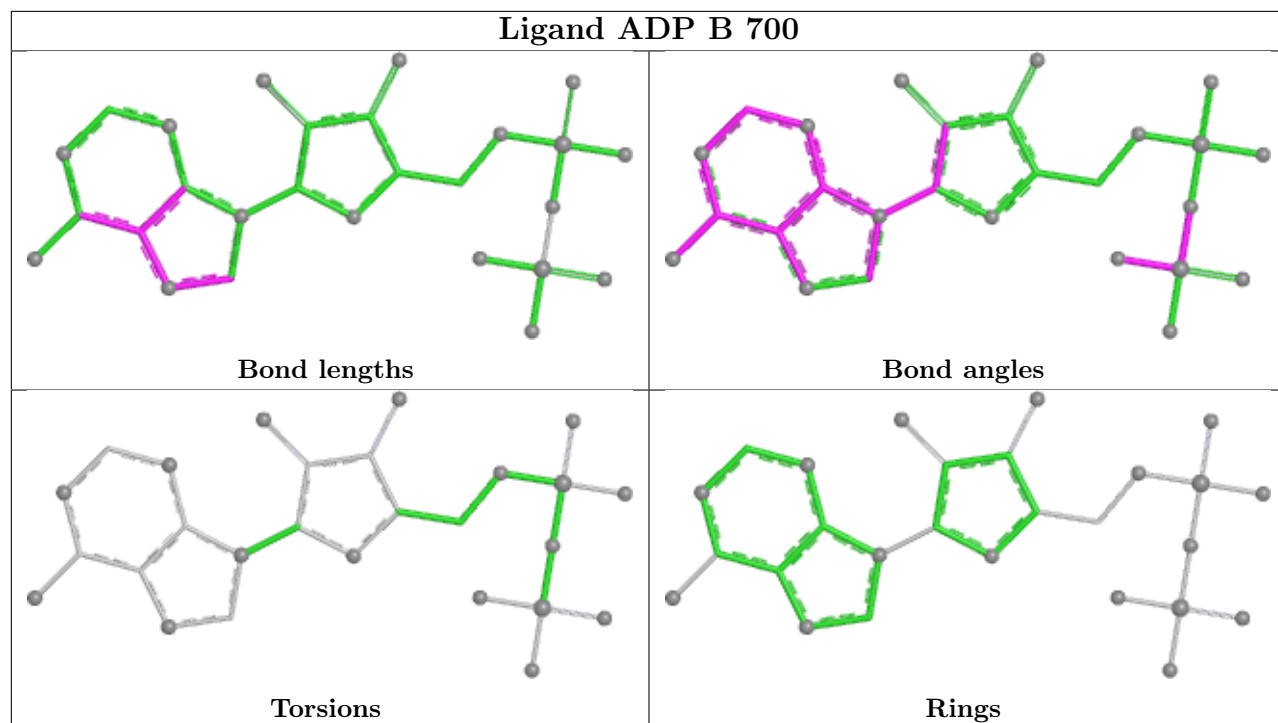
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	700	ADP	3	0
2	D	700	ADP	2	0
2	C	700	ADP	1	0
2	B	700	ADP	3	0

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	486/543 (89%)	-0.15	1 (0%) 91 90	31, 59, 110, 132	1 (0%)
1	B	481/543 (88%)	-0.22	0 100 100	31, 60, 97, 126	1 (0%)
1	C	482/543 (88%)	-0.27	1 (0%) 91 90	31, 58, 93, 123	1 (0%)
1	D	486/543 (89%)	-0.24	3 (0%) 85 85	29, 56, 95, 120	1 (0%)
All	All	1935/2172 (89%)	-0.22	5 (0%) 90 89	29, 58, 98, 132	4 (0%)

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	533	PRO	2.5
1	D	490	VAL	2.3
1	C	533	PRO	2.0
1	D	56	LEU	2.0
1	D	533	PRO	2.0

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

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

### 6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

### 6.4 Ligands [i](#)

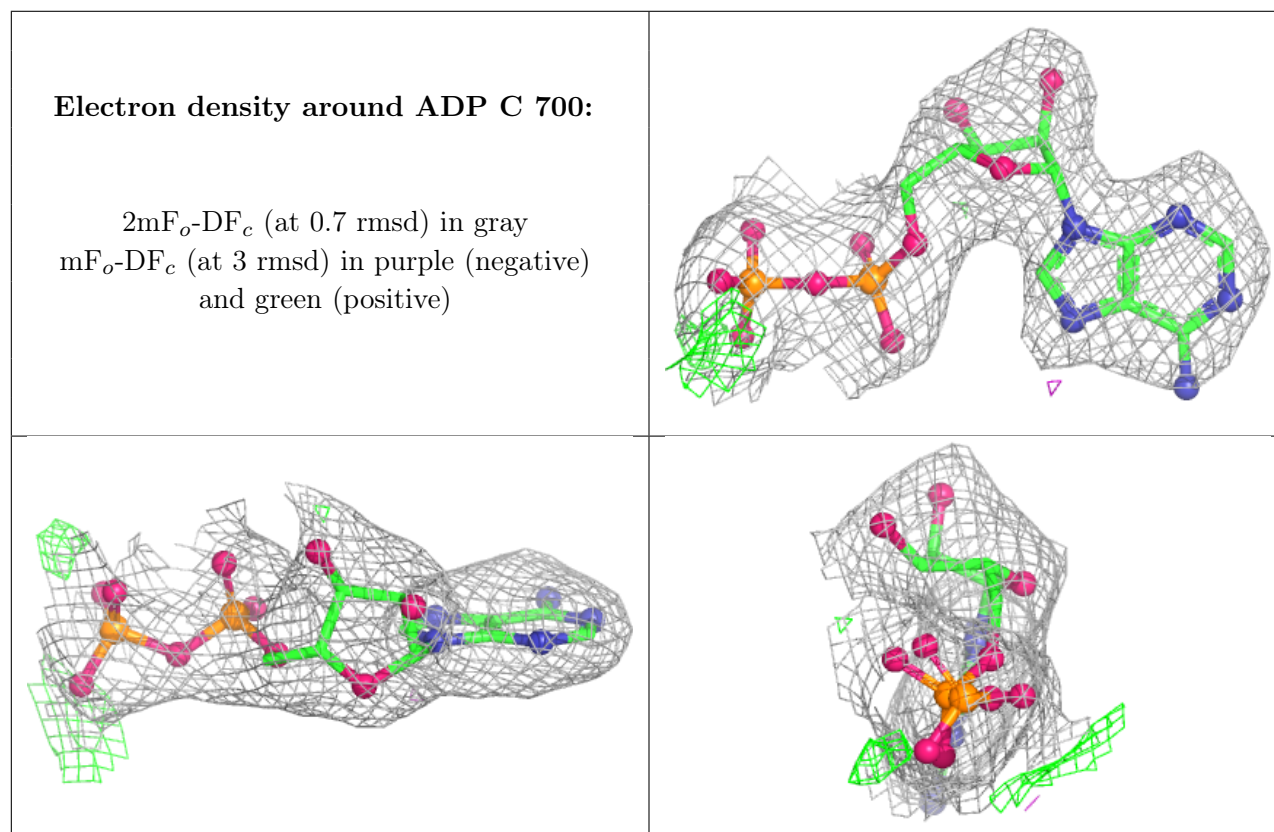
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,



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.

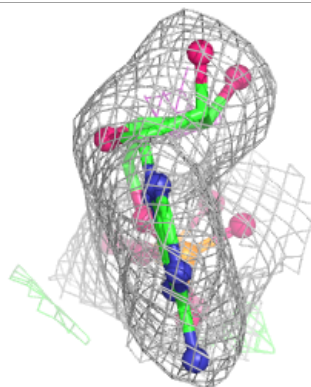
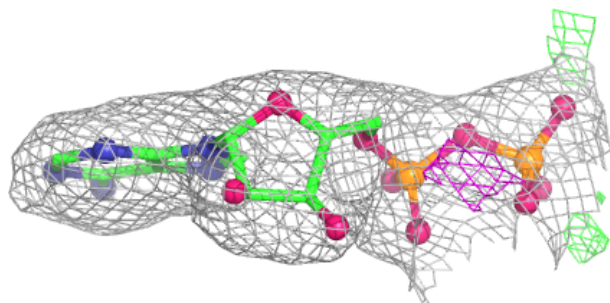
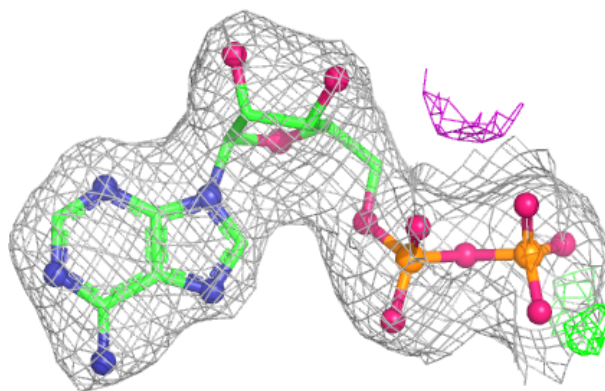
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	GOL	A	544	6/6	0.81	0.11	50,58,72,74	0
4	GOL	B	544	6/6	0.89	0.11	53,61,81,92	0
3	MG	C	801	1/1	0.96	0.06	38,38,38,38	0
3	MG	D	800	1/1	0.96	0.04	31,31,31,31	0
3	MG	A	800	1/1	0.96	0.05	23,23,23,23	0
3	MG	B	800	1/1	0.96	0.06	43,43,43,43	0
2	ADP	C	700	27/27	0.97	0.06	29,42,53,65	0
3	MG	C	800	1/1	0.97	0.04	29,29,29,29	0
2	ADP	A	700	27/27	0.97	0.06	25,40,51,53	0
3	MG	B	801	1/1	0.98	0.04	51,51,51,51	0
2	ADP	B	700	27/27	0.98	0.04	35,46,55,59	0
3	MG	D	801	1/1	0.99	0.06	44,44,44,44	0
3	MG	A	801	1/1	0.99	0.08	28,28,28,28	0
2	ADP	D	700	27/27	0.99	0.04	34,41,47,53	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.

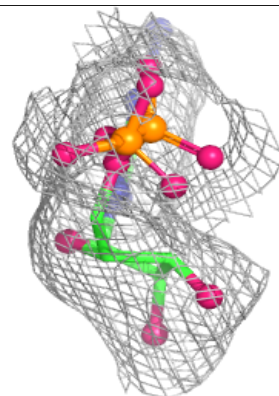
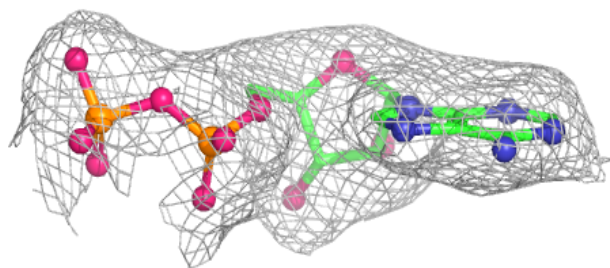
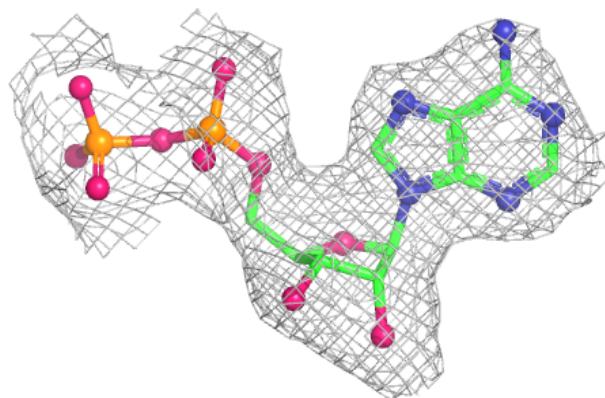


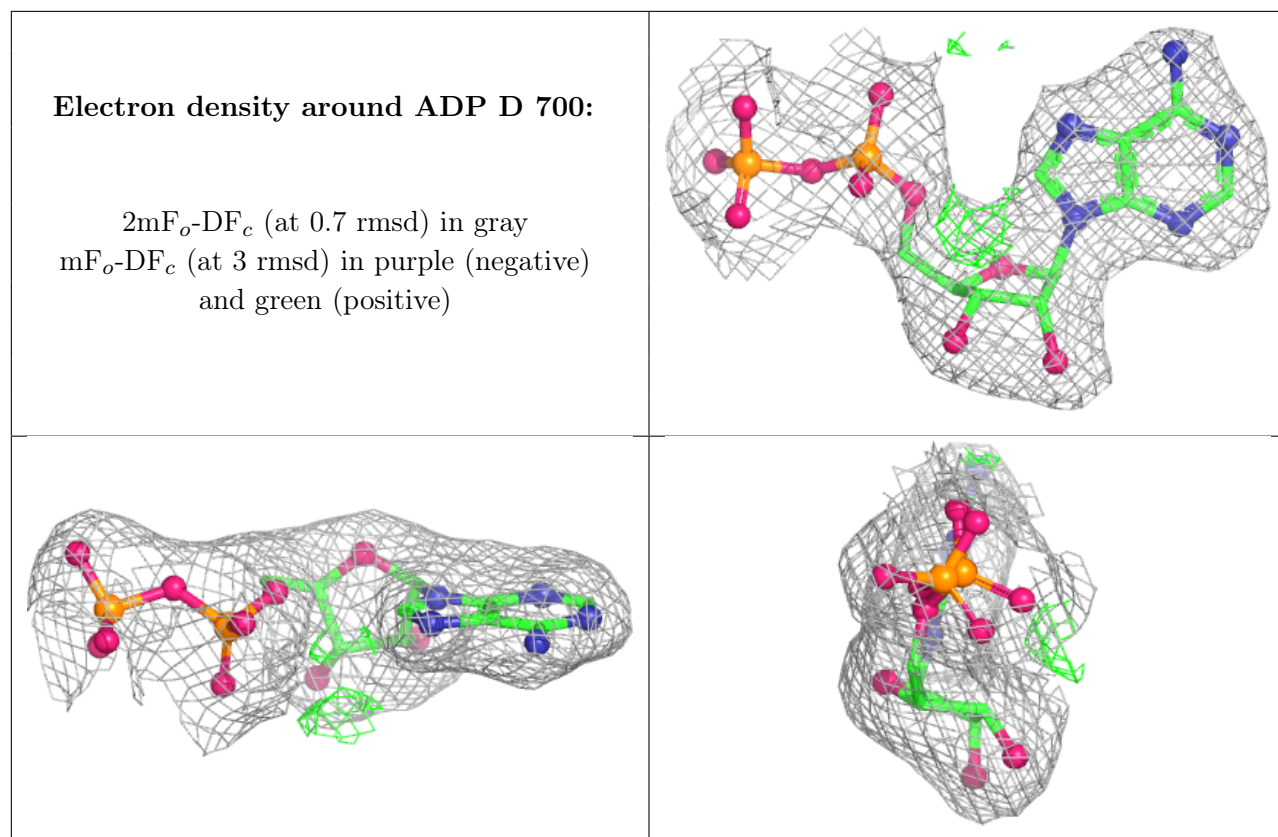
**Electron density around ADP A 700:**

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

**Electron density around ADP B 700:**

$2mF_o-DF_c$  (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.