



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 19, 2024 – 12:09 AM EST

PDB ID : 4IL2  
Title : Crystal structure of D-mannonate dehydratase (rspA) from E. coli CFT073 (EFI TARGET EFI-501585)  
Authors : Lukk, T.; Wichelecki, D.; Imker, H.J.; Gerlt, J.A.; Nair, S.K.  
Deposited on : 2012-12-28  
Resolution : 1.95 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  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

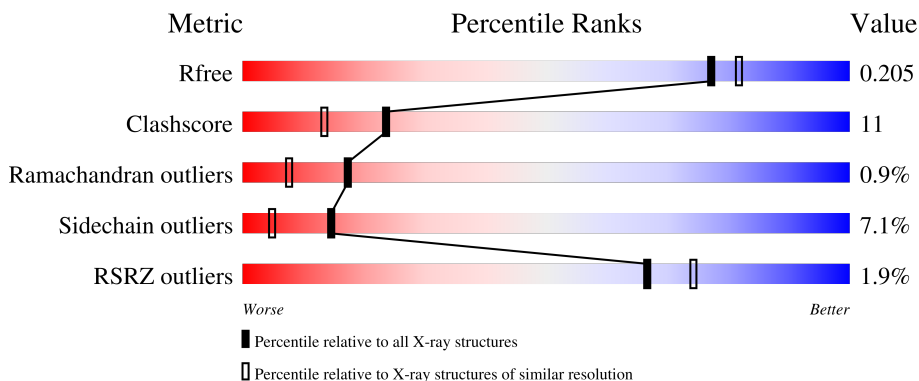
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.95 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	2580 (1.96-1.96)
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)
RSRZ outliers	127900	2539 (1.96-1.96)

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	426	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 68%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 11%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 30px;">3%      68%      19%      •      11%</p>
1	B	426	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 69%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 30px;">%      69%      20%      5%      5%</p>
1	C	426	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 67%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 11%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 30px;">%      67%      19%      •      11%</p>
1	D	426	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 65%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 11%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 30px;">3%      65%      20%      •      11%</p>

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 12840 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 Starvation sensing protein rspA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	380	Total 3031	C 1942	N 515	O 554	S 20	0	0	0
1	B	404	Total 3230	C 2070	N 547	O 590	S 23	0	0	0
1	C	381	Total 3062	C 1963	N 520	O 558	S 21	0	0	0
1	D	380	Total 3041	C 1947	N 518	O 556	S 20	0	0	0

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-10	MET	-	expression tag	UNP Q8FHC7
A	-9	HIS	-	expression tag	UNP Q8FHC7
A	-8	HIS	-	expression tag	UNP Q8FHC7
A	-7	HIS	-	expression tag	UNP Q8FHC7
A	-6	HIS	-	expression tag	UNP Q8FHC7
A	-5	HIS	-	expression tag	UNP Q8FHC7
A	-4	HIS	-	expression tag	UNP Q8FHC7
A	-3	HIS	-	expression tag	UNP Q8FHC7
A	-2	HIS	-	expression tag	UNP Q8FHC7
A	-1	HIS	-	expression tag	UNP Q8FHC7
A	0	HIS	-	expression tag	UNP Q8FHC7
B	-10	MET	-	expression tag	UNP Q8FHC7
B	-9	HIS	-	expression tag	UNP Q8FHC7
B	-8	HIS	-	expression tag	UNP Q8FHC7
B	-7	HIS	-	expression tag	UNP Q8FHC7
B	-6	HIS	-	expression tag	UNP Q8FHC7
B	-5	HIS	-	expression tag	UNP Q8FHC7
B	-4	HIS	-	expression tag	UNP Q8FHC7
B	-3	HIS	-	expression tag	UNP Q8FHC7
B	-2	HIS	-	expression tag	UNP Q8FHC7
B	-1	HIS	-	expression tag	UNP Q8FHC7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	0	HIS	-	expression tag	UNP Q8FHC7
C	-10	MET	-	expression tag	UNP Q8FHC7
C	-9	HIS	-	expression tag	UNP Q8FHC7
C	-8	HIS	-	expression tag	UNP Q8FHC7
C	-7	HIS	-	expression tag	UNP Q8FHC7
C	-6	HIS	-	expression tag	UNP Q8FHC7
C	-5	HIS	-	expression tag	UNP Q8FHC7
C	-4	HIS	-	expression tag	UNP Q8FHC7
C	-3	HIS	-	expression tag	UNP Q8FHC7
C	-2	HIS	-	expression tag	UNP Q8FHC7
C	-1	HIS	-	expression tag	UNP Q8FHC7
C	0	HIS	-	expression tag	UNP Q8FHC7
D	-10	MET	-	expression tag	UNP Q8FHC7
D	-9	HIS	-	expression tag	UNP Q8FHC7
D	-8	HIS	-	expression tag	UNP Q8FHC7
D	-7	HIS	-	expression tag	UNP Q8FHC7
D	-6	HIS	-	expression tag	UNP Q8FHC7
D	-5	HIS	-	expression tag	UNP Q8FHC7
D	-4	HIS	-	expression tag	UNP Q8FHC7
D	-3	HIS	-	expression tag	UNP Q8FHC7
D	-2	HIS	-	expression tag	UNP Q8FHC7
D	-1	HIS	-	expression tag	UNP Q8FHC7
D	0	HIS	-	expression tag	UNP Q8FHC7

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

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

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	100	Total O 100 100	0	0

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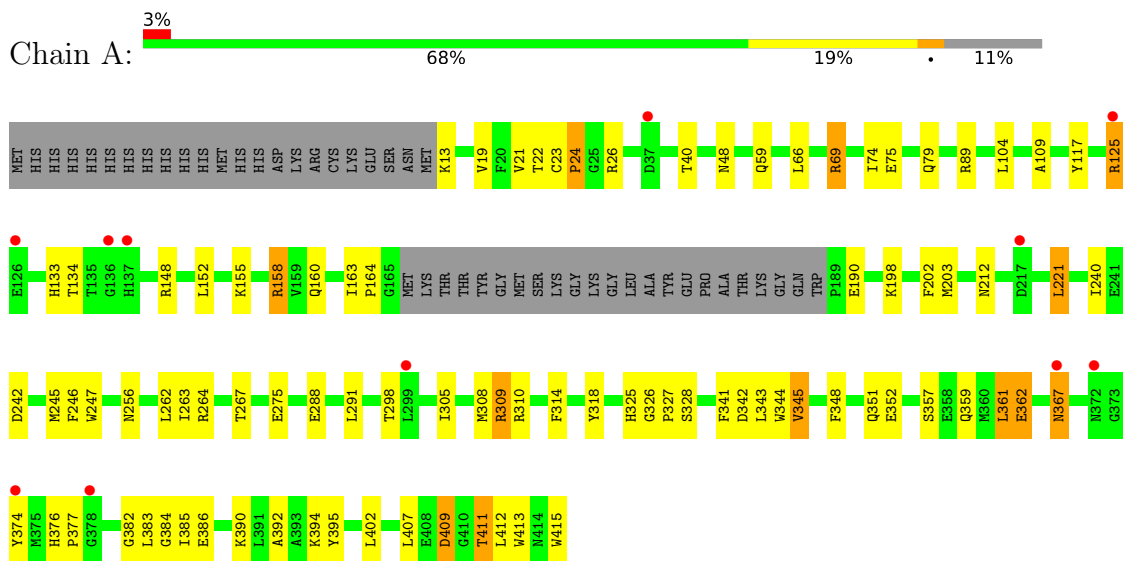
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
3	B	152	Total 152	O 152	0	0
3	C	142	Total 142	O 142	0	0
3	D	78	Total 78	O 78	0	0

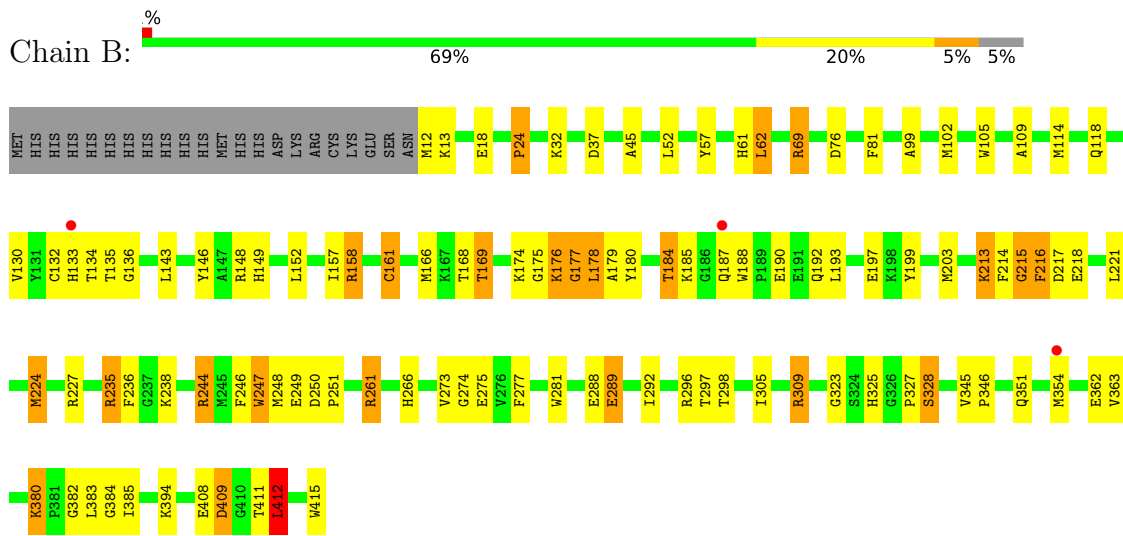
### 3 Residue-property plots [i](#)

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

- Molecule 1: Starvation sensing protein *rspA*

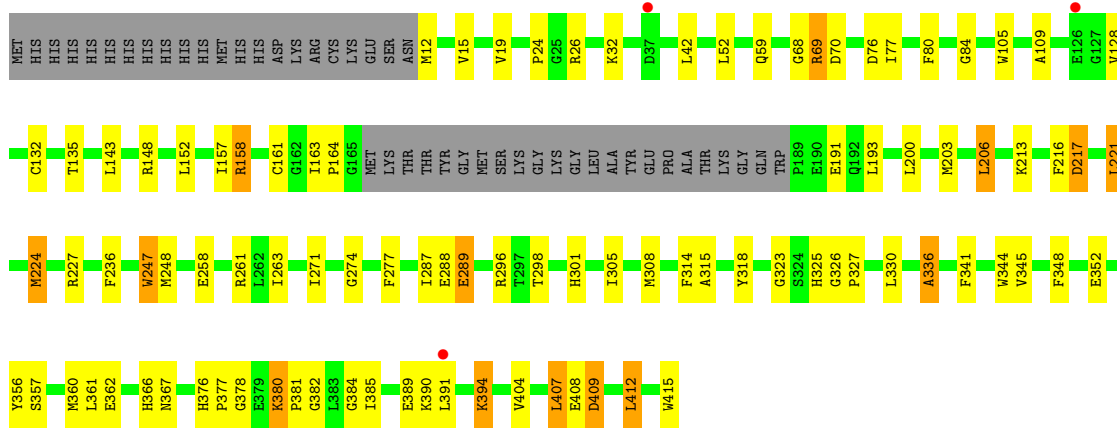


- Molecule 1: Starvation sensing protein *rspA*

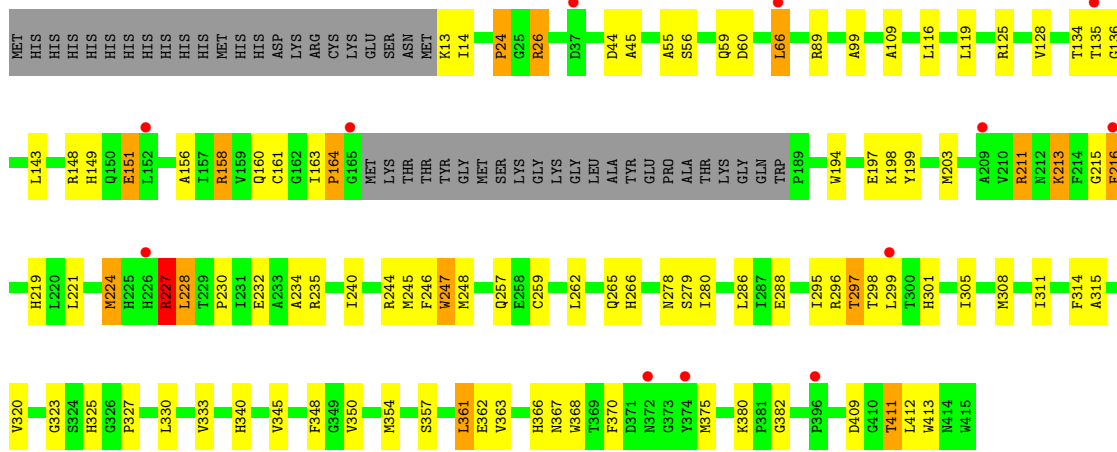


- Molecule 1: Starvation sensing protein *rspA*





• Molecule 1: Starvation sensing protein *rspA*



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 4	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	123.78Å 123.78Å 112.21Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.83 – 1.95 29.83 – 1.95	Depositor EDS
% Data completeness (in resolution range)	100.0 (29.83-1.95) 100.0 (29.83-1.95)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.75 (at 1.95Å)	Xtrriage
Refinement program	PHENIX 1.7.3_928	Depositor
R, $R_{free}$	0.178 , 0.209 0.174 , 0.205	Depositor DCC
$R_{free}$ test set	6076 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	17.9	Xtrriage
Anisotropy	0.065	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 39.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	0.044 for h,-k,-l	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	12840	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.50% 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

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	0.46	0/3118	0.68	0/4232
1	B	0.53	1/3324 (0.0%)	0.76	5/4510 (0.1%)
1	C	0.49	1/3150 (0.0%)	0.74	2/4272 (0.0%)
1	D	0.44	0/3128	0.71	2/4244 (0.0%)
All	All	0.49	2/12720 (0.0%)	0.72	9/17258 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1
1	D	0	1
All	All	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	289	GLU	CD-OE1	-5.51	1.19	1.25
1	C	336	ALA	CA-CB	-5.34	1.41	1.52

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	224	MET	CG-SD-CE	-6.51	89.79	100.20
1	B	158	ARG	CG-CD-NE	6.43	125.30	111.80
1	B	261	ARG	NE-CZ-NH1	6.08	123.34	120.30
1	B	224	MET	CG-SD-CE	-5.97	90.64	100.20
1	D	224	MET	CG-SD-CE	-5.63	91.20	100.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	412	LEU	CA-CB-CG	-5.61	102.41	115.30
1	B	216	PHE	CB-CA-C	5.40	121.19	110.40
1	D	247	TRP	CB-CA-C	-5.38	99.64	110.40
1	B	412	LEU	CA-CB-CG	-5.26	103.21	115.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	68	GLY	Peptide
1	D	247	TRP	Peptide

## 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	3031	0	2898	65	0
1	B	3230	0	3103	83	0
1	C	3062	0	2947	68	0
1	D	3041	0	2913	62	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	100	0	0	3	0
3	B	152	0	0	8	0
3	C	142	0	0	1	0
3	D	78	0	0	3	0
All	All	12840	0	11861	272	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 11.

All (272) 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:224:MET:HE3	1:B:248:MET:HB2	1.34	1.08
1:C:224:MET:HE3	1:C:248:MET:HB2	1.36	1.03
1:A:22:THR:HG21	1:A:392:ALA:HB1	1.55	0.87
1:D:14:ILE:HD13	1:D:66:LEU:HD11	1.56	0.87
1:B:380:LYS:HG2	1:B:384:GLY:HA2	1.58	0.85
1:B:133:HIS:NE2	1:B:354:MET:SD	2.54	0.81
1:A:158:ARG:NH1	1:A:158:ARG:O	2.14	0.80
1:A:367:ASN:OD1	1:A:367:ASN:N	2.16	0.78
1:B:193:LEU:HD11	1:B:408:GLU:HA	1.66	0.77
1:D:295:ILE:HG13	1:D:297:THR:HG22	1.66	0.76
1:B:177:GLY:O	1:B:179:ALA:N	2.16	0.75
1:A:134:THR:H	1:A:158:ARG:HH12	1.35	0.74
1:B:133:HIS:CD2	1:B:354:MET:SD	2.81	0.74
1:C:261:ARG:HH22	1:C:289:GLU:HG2	1.52	0.73
1:C:224:MET:SD	3:C:728:HOH:O	2.46	0.73
1:A:163:ILE:HD12	1:A:164:PRO:HD2	1.70	0.72
1:D:240:ILE:HD12	1:D:245:MET:HG3	1.70	0.72
1:C:261:ARG:NH2	1:C:289:GLU:OE2	2.24	0.71
1:C:69:ARG:HH11	1:C:69:ARG:HB3	1.54	0.70
1:A:298:THR:CG2	1:A:325:HIS:HB3	2.20	0.70
1:D:194:TRP:CE2	1:D:227:ARG:HG2	2.27	0.70
1:C:224:MET:CE	1:C:248:MET:HB2	2.19	0.70
1:A:221:LEU:HD11	1:A:246:PHE:CD2	2.27	0.69
1:B:261:ARG:HH12	1:B:289:GLU:HG2	1.58	0.69
1:C:158:ARG:HB2	1:C:221:LEU:HD22	1.75	0.68
1:B:221:LEU:HD21	1:B:246:PHE:CD2	2.29	0.67
1:B:61:HIS:O	1:B:62:LEU:HB2	1.94	0.66
1:A:407:LEU:HD13	1:A:411:THR:HG23	1.76	0.66
1:D:224:MET:CE	1:D:248:MET:HB2	2.25	0.66
1:B:187:GLN:HE22	1:C:148:ARG:HH11	1.44	0.66
1:D:221:LEU:HD21	1:D:246:PHE:HD2	1.61	0.65
1:B:134:THR:HG22	1:B:149:HIS:CD2	2.32	0.65
1:D:224:MET:HE3	1:D:248:MET:HB2	1.78	0.65
1:A:407:LEU:HD11	1:A:413:TRP:CE3	2.32	0.64
1:C:376:HIS:ND1	1:C:377:PRO:O	2.29	0.64
1:D:109:ALA:HB3	1:D:382:GLY:HA2	1.80	0.64
1:D:357:SER:O	1:D:361:LEU:HD12	1.98	0.64
1:A:155:LYS:NZ	1:A:374:TYR:OH	2.27	0.64
1:B:244:ARG:NH2	3:B:664:HOH:O	2.29	0.64
1:A:221:LEU:CD1	1:A:246:PHE:HB3	2.28	0.63
1:B:325:HIS:CE1	1:B:327:PRO:HG3	2.33	0.63
1:D:55:ALA:O	1:D:59:GLN:HG3	1.98	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:299:LEU:HD22	1:D:305:ILE:HD13	1.80	0.62
1:C:336:ALA:HB2	1:C:385:ILE:CG1	2.30	0.62
1:C:341:PHE:O	1:C:345:VAL:HG23	1.99	0.61
1:B:69:ARG:NH2	1:B:76:ASP:OD2	2.33	0.61
1:A:409:ASP:OD2	1:A:411:THR:HG22	2.01	0.61
1:D:143:LEU:HD13	1:D:213:LYS:HE3	1.82	0.61
1:B:133:HIS:ND1	1:B:158:ARG:HD3	2.16	0.61
1:C:357:SER:HB3	1:C:360:MET:HG3	1.82	0.61
1:A:342:ASP:OD2	1:A:351:GLN:NE2	2.33	0.60
1:A:89:ARG:NH1	3:A:646:HOH:O	2.33	0.60
1:B:132:CYS:SG	1:B:157:ILE:HG22	2.41	0.60
1:A:203:MET:HA	1:A:203:MET:HE2	1.83	0.59
1:C:258:GLU:O	1:C:261:ARG:HG3	2.01	0.59
1:C:301:HIS:CE1	1:C:330:LEU:HD21	2.37	0.59
1:C:336:ALA:HB2	1:C:385:ILE:HG13	1.83	0.59
1:D:14:ILE:HD13	1:D:66:LEU:CD1	2.31	0.59
1:B:238:LYS:NZ	1:B:266:HIS:O	2.35	0.58
1:B:288:GLU:OE2	3:B:638:HOH:O	2.17	0.58
1:C:143:LEU:HD13	1:C:213:LYS:HE3	1.84	0.58
1:B:45:ALA:HB2	1:B:99:ALA:HB2	1.85	0.58
1:B:288:GLU:CG	1:B:289:GLU:OE1	2.52	0.58
1:A:367:ASN:OD1	1:A:384:GLY:O	2.21	0.58
1:A:409:ASP:HB3	1:A:411:THR:H	1.69	0.58
1:D:315:ALA:HB1	1:D:320:VAL:HB	1.85	0.58
1:B:227:ARG:NH2	3:B:705:HOH:O	2.36	0.57
1:B:199:TYR:CE1	1:B:203:MET:HG3	2.39	0.57
1:D:134:THR:HG22	1:D:149:HIS:CD2	2.40	0.57
1:A:109:ALA:HB3	1:A:382:GLY:HA2	1.85	0.57
1:C:158:ARG:O	1:C:158:ARG:NH1	2.38	0.57
1:A:288:GLU:HG3	1:A:314:PHE:HZ	1.70	0.57
1:B:146:TYR:CZ	1:B:157:ILE:HD11	2.41	0.56
1:C:380:LYS:NZ	1:C:381:PRO:O	2.27	0.56
1:B:174:LYS:HE3	1:B:184:THR:HG22	1.88	0.56
1:B:221:LEU:HD23	1:B:246:PHE:HB3	1.88	0.56
1:B:288:GLU:HG2	1:B:289:GLU:OE1	2.05	0.56
1:A:125:ARG:CZ	1:A:348:PHE:CD2	2.89	0.56
1:D:24:PRO:HG3	1:D:363:VAL:HG21	1.88	0.55
1:D:327:PRO:HA	1:D:354:MET:HB3	1.87	0.55
1:A:69:ARG:HH11	1:A:69:ARG:HB3	1.71	0.55
1:A:325:HIS:CE1	1:A:327:PRO:HG3	2.42	0.55
1:B:235:ARG:NH1	3:B:613:HOH:O	2.39	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:32:LYS:NZ	3:B:693:HOH:O	2.39	0.54
1:B:275:GLU:HG3	1:B:325:HIS:CG	2.42	0.54
1:A:298:THR:HG21	1:A:325:HIS:HB3	1.89	0.54
1:D:224:MET:HE1	1:D:248:MET:SD	2.47	0.54
1:A:376:HIS:ND1	1:A:377:PRO:O	2.32	0.54
1:B:143:LEU:HD13	1:B:213:LYS:HE2	1.89	0.54
1:C:356:TYR:HB2	1:C:361:LEU:HD11	1.90	0.54
1:D:325:HIS:CE1	1:D:327:PRO:HG3	2.42	0.54
1:B:146:TYR:CE2	1:B:157:ILE:HD11	2.43	0.53
1:C:203:MET:HE2	1:C:203:MET:HA	1.91	0.53
1:A:164:PRO:O	1:A:198:LYS:HE2	2.08	0.53
1:A:305:ILE:O	1:A:309:ARG:HB2	2.08	0.53
1:B:176:LYS:NZ	1:C:378:GLY:HA2	2.23	0.53
1:D:370:PHE:HD1	1:D:375:MET:HE2	1.73	0.53
1:A:23:CYS:HA	1:A:26:ARG:O	2.09	0.53
1:C:357:SER:O	1:C:361:LEU:HD12	2.09	0.53
1:C:384:GLY:O	1:C:385:ILE:HD13	2.08	0.52
1:A:367:ASN:HD21	1:A:384:GLY:HA3	1.74	0.52
1:B:24:PRO:HG3	1:B:363:VAL:HG21	1.91	0.52
1:A:202:PHE:CE2	1:A:203:MET:HE3	2.45	0.52
1:B:224:MET:HE1	1:B:236:PHE:HD2	1.74	0.52
1:A:275:GLU:HG2	1:A:325:HIS:CE1	2.44	0.52
1:D:298:THR:CG2	1:D:325:HIS:HB3	2.40	0.52
1:B:133:HIS:CE1	1:B:354:MET:SD	3.02	0.52
1:A:357:SER:O	1:A:361:LEU:HD12	2.10	0.51
1:B:57:TYR:O	1:B:61:HIS:O	2.28	0.51
1:C:298:THR:CG2	1:C:325:HIS:HB3	2.40	0.51
1:B:221:LEU:CD2	1:B:246:PHE:HB3	2.41	0.51
1:A:24:PRO:HB3	1:A:395:TYR:CD2	2.46	0.51
1:A:326:GLY:N	1:A:352:GLU:HB3	2.27	0.50
1:D:45:ALA:HB2	1:D:99:ALA:HB2	1.93	0.50
1:D:148:ARG:HA	1:D:151:GLU:OE1	2.10	0.50
1:B:105:TRP:CD1	1:B:305:ILE:HB	2.47	0.50
1:B:192:GLN:OE1	1:B:415:TRP:HZ3	1.93	0.50
1:B:309:ARG:NH2	3:B:723:HOH:O	2.30	0.50
1:B:133:HIS:CE1	1:B:354:MET:HE3	2.47	0.50
1:D:13:LYS:N	3:D:603:HOH:O	2.45	0.50
1:C:19:VAL:HB	1:C:59:GLN:HG3	1.93	0.49
1:D:135:THR:HG22	1:D:136:GLY:N	2.27	0.49
1:B:109:ALA:HB3	1:B:382:GLY:HA2	1.93	0.49
1:C:224:MET:HE1	1:C:248:MET:SD	2.52	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:261:ARG:HH22	1:C:289:GLU:CG	2.24	0.49
1:B:158:ARG:NE	3:B:617:HOH:O	2.42	0.49
1:C:344:TRP:CE3	1:C:345:VAL:HG22	2.47	0.49
1:C:362:GLU:HG3	1:C:391:LEU:HD21	1.95	0.49
1:C:407:LEU:HB3	1:C:409:ASP:HB2	1.95	0.49
1:D:323:GLY:HA2	1:D:350:VAL:O	2.13	0.49
1:A:117:TYR:CG	1:A:343:LEU:HD23	2.47	0.49
1:A:148:ARG:O	1:A:152:LEU:HD13	2.12	0.48
1:A:158:ARG:HA	1:A:221:LEU:HB2	1.94	0.48
1:A:256:ASN:HB2	1:B:281:TRP:CH2	2.48	0.48
1:A:407:LEU:HD12	1:A:411:THR:O	2.13	0.48
1:D:227:ARG:HA	1:D:413:TRP:HE1	1.79	0.48
1:B:383:LEU:HB2	1:B:385:ILE:HG22	1.95	0.48
1:C:325:HIS:CE1	1:C:327:PRO:HG3	2.49	0.48
1:D:228:LEU:HA	1:D:232:GLU:OE1	2.13	0.48
1:B:148:ARG:O	1:B:152:LEU:HD13	2.13	0.48
1:D:288:GLU:HG3	1:D:314:PHE:HZ	1.78	0.48
1:D:296:ARG:HG2	1:D:296:ARG:HH11	1.79	0.48
1:B:296:ARG:HG2	1:B:323:GLY:O	2.14	0.48
1:D:199:TYR:CE1	1:D:203:MET:HG3	2.48	0.48
1:D:296:ARG:HG2	1:D:323:GLY:O	2.14	0.48
1:A:341:PHE:O	1:A:345:VAL:HG22	2.14	0.47
1:D:279:SER:OG	1:D:280:ILE:N	2.47	0.47
1:D:211:ARG:HH21	1:D:216:PHE:HA	1.80	0.47
1:B:169:THR:O	1:B:169:THR:OG1	2.31	0.47
1:A:385:ILE:HG13	1:A:386:GLU:N	2.30	0.47
1:C:191:GLU:HG3	1:C:404:VAL:HG23	1.95	0.47
1:C:158:ARG:HA	1:C:221:LEU:HB3	1.96	0.47
1:A:344:TRP:CZ3	1:A:345:VAL:HG13	2.49	0.47
1:A:275:GLU:HG2	1:A:325:HIS:ND1	2.29	0.47
1:B:327:PRO:HA	1:B:354:MET:CG	2.45	0.46
1:D:288:GLU:HG3	1:D:314:PHE:CZ	2.51	0.46
1:A:158:ARG:CB	1:A:158:ARG:HH11	2.28	0.46
1:D:44:ASP:HB2	1:D:333:VAL:HB	1.97	0.46
1:A:288:GLU:HG2	1:A:318:TYR:OH	2.16	0.46
1:A:288:GLU:HG3	1:A:314:PHE:CZ	2.49	0.46
1:B:274:GLY:HA2	1:B:277:PHE:CD2	2.51	0.46
1:B:13:LYS:HA	1:B:13:LYS:HD3	1.77	0.46
1:D:89:ARG:HD2	3:D:611:HOH:O	2.16	0.46
1:D:297:THR:HG21	1:D:311:ILE:HG21	1.97	0.46
1:B:247:TRP:NE1	1:B:249:GLU:HB2	2.31	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:409:ASP:HB3	1:B:411:THR:H	1.81	0.46
1:C:296:ARG:HG2	1:C:323:GLY:O	2.15	0.46
1:B:273:VAL:HG12	1:B:292:ILE:HG21	1.98	0.45
1:C:12:MET:N	1:C:70:ASP:OD1	2.49	0.45
1:C:109:ALA:HB3	1:C:382:GLY:HA2	1.98	0.45
1:D:198:LYS:HB3	1:D:198:LYS:HE3	1.43	0.45
1:B:174:LYS:HG2	1:B:178:LEU:HD13	1.98	0.45
1:D:361:LEU:HD23	1:D:366:HIS:CE1	2.51	0.45
1:A:275:GLU:HG2	1:A:325:HIS:CG	2.51	0.45
1:C:361:LEU:HD23	1:C:366:HIS:ND1	2.31	0.45
1:D:156:ALA:HA	1:D:219:HIS:HB2	1.98	0.45
1:D:163:ILE:HA	1:D:164:PRO:HD2	1.61	0.45
1:D:234:ALA:HB1	1:D:266:HIS:HB2	1.99	0.45
3:A:606:HOH:O	1:B:415:TRP:HB3	2.16	0.45
1:B:275:GLU:HB2	3:B:614:HOH:O	2.17	0.45
1:D:56:SER:O	1:D:60:ASP:HB2	2.17	0.45
1:C:224:MET:HE2	1:C:236:PHE:CE2	2.51	0.45
1:D:224:MET:HE1	1:D:248:MET:HB2	1.99	0.45
1:A:75:GLU:CD	1:A:310:ARG:HH22	2.20	0.45
1:A:342:ASP:HB3	1:A:348:PHE:CE1	2.53	0.44
1:B:130:VAL:HA	1:B:351:GLN:O	2.17	0.44
1:C:288:GLU:HG3	1:C:314:PHE:HZ	1.82	0.44
1:C:344:TRP:CZ3	1:C:345:VAL:HG22	2.52	0.44
1:C:362:GLU:HG3	1:C:391:LEU:CD2	2.47	0.44
1:D:128:VAL:HG13	1:D:348:PHE:CZ	2.52	0.44
1:D:211:ARG:NH2	1:D:216:PHE:HA	2.33	0.44
1:B:166:MET:HE1	1:B:193:LEU:HD23	1.99	0.44
1:D:224:MET:HE3	1:D:248:MET:CB	2.47	0.44
1:D:257:GLN:HB3	1:D:286:LEU:HG	1.99	0.44
1:C:298:THR:HG21	1:C:330:LEU:HD11	1.99	0.44
1:C:326:GLY:N	1:C:352:GLU:HB3	2.32	0.44
1:B:180:TYR:CZ	1:B:328:SER:OG	2.70	0.44
1:C:394:LYS:HB3	1:C:394:LYS:HE3	1.53	0.44
1:B:277:PHE:HB2	1:B:297:THR:HG22	2.00	0.44
1:D:409:ASP:CB	1:D:411:THR:HG23	2.48	0.44
1:A:390:LYS:HE2	1:A:390:LYS:HB3	1.62	0.44
1:B:224:MET:HE2	1:B:236:PHE:CE2	2.53	0.44
1:D:262:LEU:HD12	1:D:265:GLN:OE1	2.18	0.44
1:B:176:LYS:H	1:B:176:LYS:HG3	1.39	0.44
1:C:390:LYS:HB3	1:C:390:LYS:HE2	1.64	0.44
1:B:214:PHE:O	1:B:215:GLY:O	2.36	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:216:PHE:O	1:C:217:ASP:CB	2.66	0.43
1:C:247:TRP:CD1	1:C:247:TRP:C	2.92	0.43
1:A:240:ILE:HD12	1:A:245:MET:HG3	2.00	0.43
1:A:298:THR:HG22	1:A:325:HIS:HB3	1.98	0.43
1:C:163:ILE:HA	1:C:164:PRO:HD2	1.81	0.43
1:A:133:HIS:HA	1:A:158:ARG:NH1	2.33	0.43
1:C:287:ILE:HG21	1:C:315:ALA:HA	2.00	0.43
1:C:80:PHE:O	1:C:84:GLY:HA3	2.18	0.43
1:C:200:LEU:HD23	1:C:236:PHE:HD1	1.84	0.43
1:A:13:LYS:HA	1:A:13:LYS:HD3	1.84	0.43
1:B:166:MET:CE	1:B:193:LEU:HD23	2.49	0.43
1:B:216:PHE:O	1:B:218:GLU:N	2.52	0.43
1:B:345:VAL:HA	1:B:346:PRO:HD3	1.95	0.43
1:C:128:VAL:HG13	1:C:348:PHE:CZ	2.54	0.43
1:C:193:LEU:HD11	1:C:408:GLU:HA	2.01	0.43
1:D:89:ARG:NH2	3:D:619:HOH:O	2.51	0.43
1:B:146:TYR:OH	1:B:218:GLU:HG3	2.19	0.43
1:B:250:ASP:N	1:B:251:PRO:HD3	2.34	0.43
1:A:212:ASN:OD1	3:A:688:HOH:O	2.21	0.42
1:C:105:TRP:CD1	1:C:305:ILE:HB	2.54	0.42
1:C:132:CYS:SG	1:C:157:ILE:HG12	2.60	0.42
1:D:26:ARG:HB3	1:D:26:ARG:NH1	2.34	0.42
1:D:301:HIS:CE1	1:D:330:LEU:HD21	2.53	0.42
1:A:48:ASN:ND2	1:A:402:LEU:HD21	2.35	0.42
1:B:136:GLY:O	1:B:161:CYS:HB2	2.19	0.42
1:B:176:LYS:HZ3	1:C:378:GLY:HA2	1.85	0.42
1:C:163:ILE:HD12	1:C:164:PRO:HD2	2.02	0.42
1:C:318:TYR:OH	1:D:288:GLU:OE2	2.37	0.42
1:A:263:ILE:O	1:A:267:THR:HG22	2.20	0.42
1:A:264:ARG:HG2	1:A:291:LEU:HA	2.01	0.42
1:B:157:ILE:HD13	1:B:157:ILE:HG21	1.62	0.42
1:B:158:ARG:HA	1:B:221:LEU:HB2	2.00	0.42
1:D:158:ARG:NH2	1:D:160:GLN:HG3	2.34	0.42
1:B:394:LYS:HB3	1:B:394:LYS:HE2	1.42	0.42
1:C:203:MET:CE	1:C:206:LEU:HB2	2.50	0.42
1:D:221:LEU:HD23	1:D:221:LEU:HA	1.62	0.42
1:B:133:HIS:CE1	1:B:158:ARG:HD3	2.54	0.42
1:C:216:PHE:O	1:C:217:ASP:HB2	2.20	0.42
1:A:359:GLN:O	1:A:362:GLU:OE1	2.38	0.41
1:B:102:MET:HE3	1:B:102:MET:HB2	1.97	0.41
1:B:288:GLU:HG3	1:B:289:GLU:OE1	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:109:ALA:HB1	1:B:114:MET:O	2.20	0.41
1:C:407:LEU:HA	1:C:407:LEU:HD12	1.80	0.41
1:C:69:ARG:NH1	1:C:77:ILE:HG13	2.36	0.41
1:C:227:ARG:NH2	1:C:415:TRP:CD1	2.89	0.41
1:A:66:LEU:HD12	1:A:66:LEU:HA	1.92	0.41
1:B:118:GLN:OE1	1:B:118:GLN:HA	2.20	0.41
1:D:230:PRO:HG3	1:D:259:CYS:HB3	2.02	0.41
1:A:79:GLN:C	1:B:412:LEU:HD22	2.41	0.41
1:A:383:LEU:HD23	1:A:383:LEU:HA	1.88	0.41
1:C:32:LYS:HE3	1:C:42:LEU:HD21	2.02	0.41
1:D:116:LEU:HB3	1:D:340:HIS:CG	2.56	0.41
1:D:125:ARG:CZ	1:D:348:PHE:HB3	2.51	0.41
1:B:244:ARG:HH11	1:B:244:ARG:CG	2.34	0.41
1:C:274:GLY:HA2	1:C:277:PHE:CD2	2.56	0.41
1:B:62:LEU:HG	1:B:81:PHE:CE1	2.56	0.40
1:C:69:ARG:NH2	1:C:76:ASP:OD2	2.54	0.40
1:A:221:LEU:HD11	1:A:246:PHE:HB3	2.02	0.40
1:C:341:PHE:CE2	1:C:345:VAL:HG21	2.56	0.40
1:D:244:ARG:HG2	1:D:244:ARG:HH11	1.86	0.40
1:A:19:VAL:HB	1:A:59:GLN:HG2	2.03	0.40
1:B:298:THR:CG2	1:B:325:HIS:HB3	2.52	0.40
1:A:74:ILE:HG12	1:A:104:LEU:HB3	2.03	0.40
1:A:133:HIS:NE2	1:A:352:GLU:OE2	2.48	0.40
1:C:263:ILE:HG22	1:C:271:ILE:HD11	2.03	0.40
1:D:135:THR:HA	1:D:160:GLN:O	2.22	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	376/426 (88%)	355 (94%)	20 (5%)	1 (0%)	41 30

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	402/426 (94%)	383 (95%)	13 (3%)	6 (2%)	10	3
1	C	377/426 (88%)	358 (95%)	17 (4%)	2 (0%)	29	17
1	D	376/426 (88%)	349 (93%)	22 (6%)	5 (1%)	12	3
All	All	1531/1704 (90%)	1445 (94%)	72 (5%)	14 (1%)	17	8

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	24	PRO
1	B	24	PRO
1	B	215	GLY
1	C	24	PRO
1	D	24	PRO
1	D	164	PRO
1	B	62	LEU
1	C	217	ASP
1	D	228	LEU
1	D	227	ARG
1	B	175	GLY
1	B	178	LEU
1	D	215	GLY
1	B	177	GLY

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	315/360 (88%)	292 (93%)	23 (7%)	14	4
1	B	336/360 (93%)	310 (92%)	26 (8%)	13	4
1	C	321/360 (89%)	301 (94%)	20 (6%)	18	7
1	D	317/360 (88%)	294 (93%)	23 (7%)	14	4
All	All	1289/1440 (90%)	1197 (93%)	92 (7%)	14	5

All (92) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	VAL
1	A	40	THR
1	A	69	ARG
1	A	125	ARG
1	A	158	ARG
1	A	160	GLN
1	A	190	GLU
1	A	221	LEU
1	A	242	ASP
1	A	247	TRP
1	A	262	LEU
1	A	308	MET
1	A	309	ARG
1	A	328	SER
1	A	345	VAL
1	A	361	LEU
1	A	362	GLU
1	A	367	ASN
1	A	394	LYS
1	A	409	ASP
1	A	411	THR
1	A	412	LEU
1	A	415	TRP
1	B	12	MET
1	B	18	GLU
1	B	37	ASP
1	B	52	LEU
1	B	69	ARG
1	B	135	THR
1	B	161	CYS
1	B	168	THR
1	B	169	THR
1	B	176	LYS
1	B	184	THR
1	B	185	LYS
1	B	188	TRP
1	B	190	GLU
1	B	197	GLU
1	B	213	LYS
1	B	217	ASP
1	B	235	ARG
1	B	244	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B	247	TRP
1	B	309	ARG
1	B	328	SER
1	B	362	GLU
1	B	380	LYS
1	B	409	ASP
1	B	412	LEU
1	C	15	VAL
1	C	26	ARG
1	C	52	LEU
1	C	69	ARG
1	C	135	THR
1	C	152	LEU
1	C	158	ARG
1	C	161	CYS
1	C	206	LEU
1	C	221	LEU
1	C	247	TRP
1	C	289	GLU
1	C	308	MET
1	C	367	ASN
1	C	380	LYS
1	C	389	GLU
1	C	394	LYS
1	C	407	LEU
1	C	409	ASP
1	C	412	LEU
1	D	26	ARG
1	D	66	LEU
1	D	119	LEU
1	D	151	GLU
1	D	158	ARG
1	D	161	CYS
1	D	197	GLU
1	D	211	ARG
1	D	213	LYS
1	D	216	PHE
1	D	227	ARG
1	D	235	ARG
1	D	278	ASN
1	D	297	THR
1	D	308	MET

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Mol	Chain	Res	Type
1	D	345	VAL
1	D	361	LEU
1	D	362	GLU
1	D	367	ASN
1	D	368	TRP
1	D	380	LYS
1	D	411	THR
1	D	412	LEU

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

Mol	Chain	Res	Type
1	A	150	GLN
1	B	149	HIS
1	B	187	GLN
1	B	367	ASN
1	C	150	GLN
1	C	226	HIS
1	C	325	HIS
1	D	149	HIS
1	D	285	GLN

### 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 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	380/426 (89%)	0.26	11 (2%) 51 60	8, 18, 34, 52	0
1	B	404/426 (94%)	0.09	3 (0%) 87 92	5, 14, 27, 44	0
1	C	381/426 (89%)	0.04	3 (0%) 86 90	6, 13, 25, 47	0
1	D	380/426 (89%)	0.33	12 (3%) 47 57	9, 19, 36, 47	0
All	All	1545/1704 (90%)	0.18	29 (1%) 66 74	5, 16, 33, 52	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	126	GLU	5.2
1	D	152	LEU	4.6
1	A	125	ARG	4.4
1	A	126	GLU	4.0
1	D	135	THR	4.0
1	A	367	ASN	3.6
1	A	137	HIS	3.3
1	A	37	ASP	3.3
1	A	374	TYR	3.3
1	B	354	MET	3.3
1	D	374	TYR	3.1
1	B	187	GLN	3.1
1	B	133	HIS	2.9
1	D	66	LEU	2.8
1	D	216	PHE	2.7
1	D	165	GLY	2.6
1	A	136	GLY	2.5
1	C	37	ASP	2.4
1	D	37	ASP	2.3
1	D	209	ALA	2.3
1	D	372	ASN	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	378	GLY	2.2
1	D	299	LEU	2.2
1	C	391	LEU	2.1
1	A	217	ASP	2.1
1	A	372	ASN	2.1
1	D	226	HIS	2.1
1	D	396	PRO	2.1
1	A	299	LEU	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [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
2	MG	D	501	1/1	0.49	0.29	35,35,35,35	0
2	MG	C	501	1/1	0.88	0.20	11,11,11,11	0
2	MG	A	501	1/1	0.91	0.20	19,19,19,19	0
2	MG	B	501	1/1	0.95	0.18	11,11,11,11	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.