



# Full wwPDB X-ray Structure Validation Report ⓘ

May 13, 2020 – 02:40 pm BST

PDB ID : 1MMI  
Title : E. COLI DNA POLYMERASE BETA SUBUNIT  
Authors : Oakley, A.J.; Prosselkov, P.; Wijffels, G.; Beck, J.L.; Wilce, M.C.J.; Dixon, N.E.  
Deposited on : 2002-09-04  
Resolution : 1.85 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

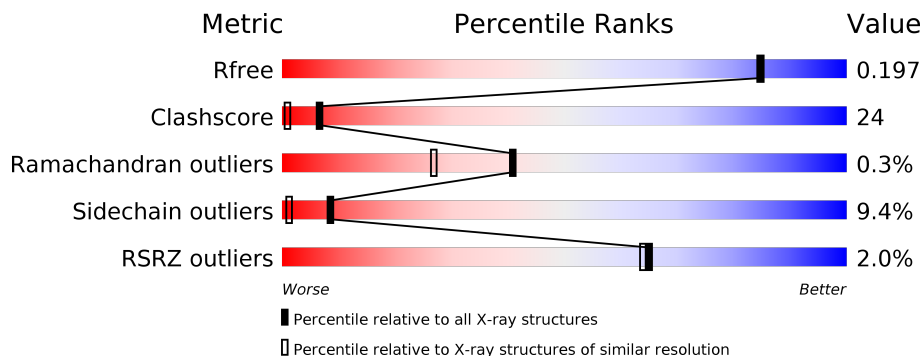
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.85 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	4003 (1.86-1.82)
Clashscore	141614	4233 (1.86-1.82)
Ramachandran outliers	138981	4185 (1.86-1.82)
Sidechain outliers	138945	4186 (1.86-1.82)
RSRZ outliers	127900	3957 (1.86-1.82)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	366	
1	B	366	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6530 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 DNA polymerase III, beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	366	2919	1829	518	553	19	0	8	0
1	B	366	2946	1844	524	556	22	0	11	0

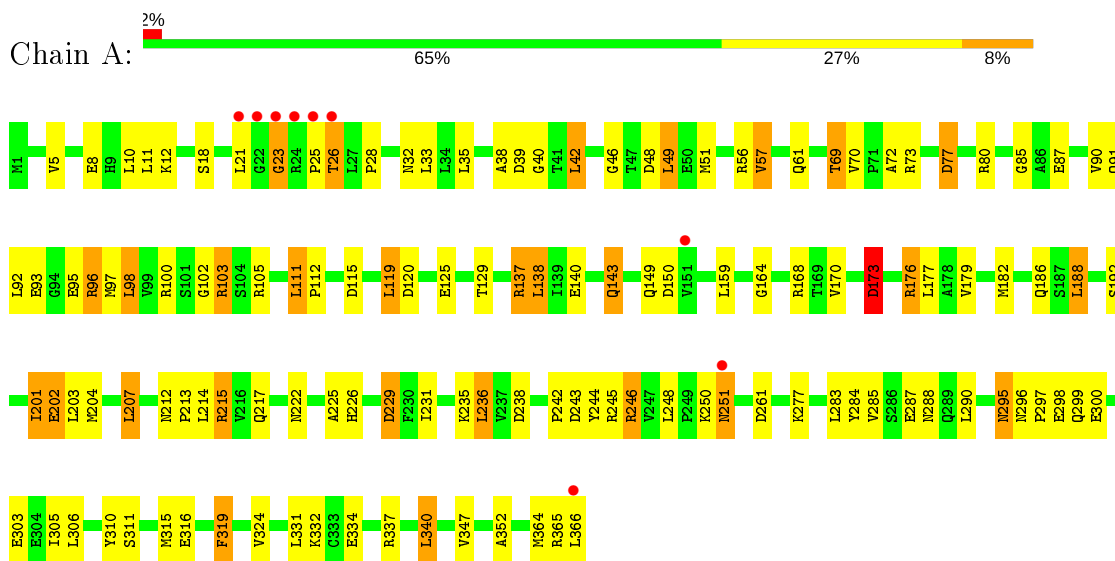
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	307	Total 307	O 307	0	0
2	B	358	Total 358	O 358	0	0

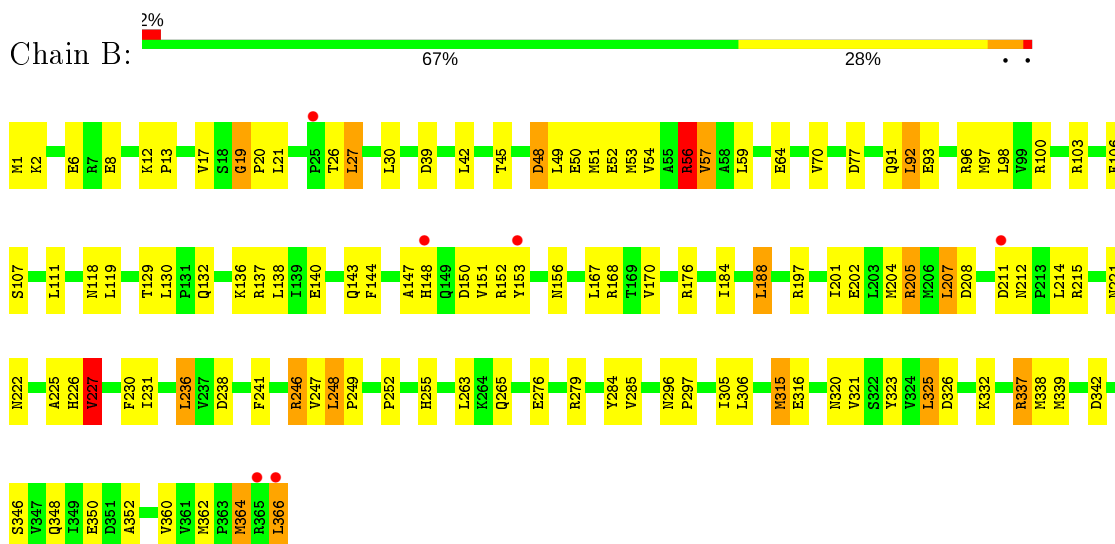
### 3 Residue-property plots i

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

- Molecule 1: DNA polymerase III, beta chain



- Molecule 1: DNA polymerase III, beta chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	80.01Å 66.59Å 80.78Å 90.00° 114.02° 90.00°	Depositor
Resolution (Å)	50.00 – 1.85 26.17 – 1.85	Depositor EDS
% Data completeness (in resolution range)	93.1 (50.00-1.85) 93.2 (26.17-1.85)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.62 (at 1.85Å)	Xtrriage
Refinement program	REFMAC 5.0	Depositor
R, $R_{free}$	0.188 , 0.245 0.197 , 0.197	Depositor DCC
$R_{free}$ test set	3176 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	21.4	Xtrriage
Anisotropy	0.456	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 63.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.019 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6530	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	30.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.01% 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

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	0.38	0/2968	0.81	8/4015 (0.2%)
1	B	0.39	0/2996	0.83	7/4049 (0.2%)
All	All	0.39	0/5964	0.82	15/8064 (0.2%)

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	A	0	8
1	B	0	9
All	All	0	17

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	168	ARG	NE-CZ-NH2	-7.39	116.60	120.30
1	B	208	ASP	CB-CG-OD2	6.21	123.89	118.30
1	A	243	ASP	CB-CG-OD2	6.07	123.76	118.30
1	B	48	ASP	CB-CG-OD2	5.64	123.38	118.30
1	A	120	ASP	CB-CG-OD2	5.61	123.35	118.30
1	B	342	ASP	CB-CG-OD2	5.39	123.16	118.30
1	A	77	ASP	CB-CG-OD2	5.31	123.08	118.30
1	A	115	ASP	CB-CG-OD2	5.21	122.99	118.30
1	B	211	ASP	CB-CG-OD2	5.18	122.97	118.30
1	A	150	ASP	CB-CG-OD2	5.15	122.93	118.30
1	A	229	ASP	CB-CG-OD2	5.14	122.93	118.30
1	A	173[A]	ASP	CB-CG-OD2	5.13	122.92	118.30
1	A	173[B]	ASP	CB-CG-OD2	5.13	122.92	118.30
1	B	77	ASP	CB-CG-OD2	5.13	122.92	118.30
1	B	227	VAL	CB-CA-C	-5.05	101.80	111.40

There are no chirality outliers.

All (17) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	102	GLY	Mainchain
1	A	168	ARG	Sidechain
1	A	23	GLY	Peptide
1	A	242	PRO	Mainchain
1	A	25	PRO	Peptide
1	A	306	LEU	Mainchain
1	A	8	GLU	Mainchain
1	A	98	LEU	Mainchain
1	B	106	PHE	Mainchain
1	B	151	VAL	Mainchain
1	B	156	ASN	Mainchain
1	B	227	VAL	Mainchain
1	B	246	ARG	Sidechain
1	B	332	LYS	Mainchain
1	B	364	MET	Peptide
1	B	56	ARG	Sidechain
1	B	92	LEU	Mainchain

## 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	2919	0	2934	156	2
1	B	2946	0	2964	127	2
2	A	307	0	0	30	3
2	B	358	0	0	24	2
All	All	6530	0	5898	278	5

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 24.

All (278) 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:A:140:GLU:HG3	1:A:204:MET:CE	1.55	1.35
1:A:90:VAL:HG11	1:A:97:MET:HE2	1.25	1.17
1:A:140:GLU:CG	1:A:204:MET:HE1	1.74	1.15
1:A:140:GLU:CG	1:A:204:MET:CE	2.27	1.11
1:A:51:MET:HE1	1:A:202:GLU:HG2	1.33	1.08
1:B:148:HIS:CD2	2:B:549:HOH:O	2.05	1.07
1:A:103[A]:ARG:CD	1:A:103[A]:ARG:H	1.68	1.07
1:A:61:GLN:NE2	1:A:87:GLU:OE2	1.87	1.07
1:A:103[A]:ARG:H	1:A:103[A]:ARG:HD2	1.19	1.06
1:A:93:GLU:OE2	1:A:98:LEU:HD22	1.57	1.04
1:A:93:GLU:CD	1:A:98:LEU:HD22	1.79	1.03
1:B:64[A]:GLU:HG3	2:B:416:HOH:O	1.59	1.02
1:A:90:VAL:CG1	1:A:97:MET:CE	2.38	1.02
1:A:90:VAL:CG1	1:A:97:MET:HE2	1.89	1.01
1:B:140:GLU:HG3	1:B:204:MET:HE1	1.44	0.98
1:A:90:VAL:HG11	1:A:97:MET:CE	1.91	0.98
1:B:362[B]:MET:HG3	2:B:446:HOH:O	1.63	0.97
1:A:244:TYR:O	1:A:248:LEU:HD22	1.64	0.97
1:A:177:LEU:HD21	1:A:179:VAL:HG23	1.47	0.94
1:B:96[B]:ARG:HG2	1:B:107:SER:OG	1.67	0.94
1:A:77:ASP:OD1	1:A:80:ARG:NH2	2.01	0.93
1:A:51:MET:CE	1:A:202:GLU:HG2	1.98	0.93
1:B:284:TYR:CE2	1:B:316:GLU:OE2	2.22	0.93
1:A:287:GLU:HG2	2:A:486:HOH:O	1.71	0.90
1:B:147:ALA:O	2:B:722:HOH:O	1.88	0.89
1:B:226:HIS:CD2	1:B:231:ILE:HG12	2.07	0.89
1:B:1:MET:CE	1:B:97[A]:MET:CE	2.52	0.88
1:A:32:ASN:HD22	1:A:69:THR:HG22	1.38	0.86
1:A:244:TYR:O	1:A:248:LEU:CD2	2.24	0.86
1:A:103[B]:ARG:NH2	1:B:305:ILE:HG22	1.90	0.86
1:A:299:GLN:HB2	1:B:96[A]:ARG:HH22	1.41	0.86
1:B:51:MET:HE3	1:B:202:GLU:HG3	1.58	0.86
1:B:148:HIS:NE2	2:B:549:HOH:O	2.04	0.85
1:A:32:ASN:HD22	1:A:69:THR:CG2	1.90	0.85
1:A:129:THR:H	1:A:186:GLN:HE22	1.20	0.83
1:B:263:LEU:HD21	1:B:338:MET:HE1	1.59	0.83
1:B:51:MET:CE	1:B:202:GLU:HG3	2.09	0.82
1:A:90:VAL:CG1	1:A:97:MET:HE3	2.10	0.81
1:B:140:GLU:CG	1:B:204:MET:HE1	2.11	0.81
1:B:214:LEU:CD1	1:B:227:VAL:HG22	2.11	0.81
1:A:69:THR:HB	1:A:111:LEU:O	1.81	0.80
1:B:362[B]:MET:CG	2:B:446:HOH:O	2.24	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:103[A]:ARG:N	1:A:103[A]:ARG:HD2	1.94	0.80
1:B:320:ASN:HB2	1:B:364:MET:CE	2.12	0.79
1:B:284:TYR:HE2	1:B:316:GLU:OE2	1.64	0.79
1:A:365:ARG:O	1:A:366:LEU:HD12	1.83	0.78
1:B:1:MET:HE1	1:B:97[A]:MET:CE	2.13	0.78
1:B:140:GLU:CG	1:B:204:MET:CE	2.60	0.78
1:B:1:MET:HE2	1:B:97[A]:MET:CE	2.13	0.78
1:A:93:GLU:CD	1:A:98:LEU:CD2	2.51	0.78
1:B:1:MET:CE	1:B:97[A]:MET:HE2	2.12	0.78
1:A:173[A]:ASP:OD2	2:A:459:HOH:O	1.99	0.78
1:A:26:THR:O	1:A:28:PRO:HD3	1.83	0.78
1:A:215:ARG:NH1	1:A:226:HIS:HB3	1.97	0.78
1:B:140:GLU:HG3	1:B:204:MET:CE	2.14	0.78
1:A:103[A]:ARG:CD	1:A:103[A]:ARG:N	2.41	0.77
1:B:1:MET:HE1	1:B:97[A]:MET:HE2	1.66	0.77
1:A:140:GLU:HG3	1:A:204:MET:HE1	0.81	0.77
1:A:215:ARG:HH12	1:A:226:HIS:CB	1.97	0.77
1:A:51:MET:SD	2:A:501:HOH:O	2.41	0.77
1:A:93:GLU:OE2	1:A:98:LEU:CD2	2.32	0.77
1:A:137[B]:ARG:NH2	2:A:411:HOH:O	2.17	0.76
1:A:48:ASP:O	1:A:49:LEU:HB2	1.84	0.75
1:A:299:GLN:HB2	1:B:96[A]:ARG:NH2	2.01	0.75
1:B:98:LEU:HD23	1:B:100:ARG:NH2	2.02	0.74
1:A:365:ARG:C	1:A:366:LEU:HD12	2.07	0.74
1:A:91:GLN:HB2	1:A:100:ARG:HH22	1.52	0.74
1:A:23:GLY:HA3	1:A:73:ARG:HH22	1.50	0.73
1:A:261:ASP:OD2	2:A:656:HOH:O	2.06	0.73
1:A:85:GLY:HA3	2:A:510:HOH:O	1.87	0.73
1:A:288:ASN:HD22	1:A:310:TYR:H	1.35	0.73
1:A:137[B]:ARG:HD2	2:A:519:HOH:O	1.90	0.72
1:A:203:LEU:O	1:A:207:LEU:HD13	1.88	0.71
1:A:364:MET:HB3	1:A:366:LEU:HD11	1.72	0.71
1:B:53[A]:MET:CE	1:B:230:PHE:HB3	2.20	0.71
1:A:319:PHE:CE1	1:A:324:VAL:HG21	2.25	0.71
1:B:64[A]:GLU:CG	2:B:416:HOH:O	2.29	0.70
1:A:186:GLN:OE1	2:A:538:HOH:O	2.09	0.70
1:A:215:ARG:HH11	1:A:215:ARG:HB3	1.57	0.70
1:B:129:THR:HG22	1:B:215:ARG:HG3	1.74	0.70
1:A:177:LEU:HD21	1:A:179:VAL:CG2	2.22	0.70
1:A:51:MET:CE	1:A:202:GLU:CG	2.70	0.69
1:B:118:ASN:OD1	2:B:399:HOH:O	2.09	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:184:ILE:HD11	1:B:188:LEU:HD21	1.73	0.69
1:B:320:ASN:HB2	1:B:364:MET:HE1	1.73	0.69
1:B:56:ARG:HD3	2:B:489:HOH:O	1.93	0.69
1:B:148:HIS:ND1	2:B:681:HOH:O	2.25	0.68
1:B:226:HIS:CD2	1:B:231:ILE:CG1	2.76	0.68
1:A:140:GLU:HG2	1:A:204:MET:CE	2.23	0.68
1:A:226:HIS:CD2	1:A:231:ILE:HG12	2.29	0.67
1:A:365:ARG:O	2:A:475:HOH:O	2.11	0.67
1:A:215:ARG:HH12	1:A:226:HIS:HB2	1.58	0.67
1:A:298:GLU:HG3	2:A:532:HOH:O	1.94	0.67
1:A:129:THR:N	1:A:186:GLN:HE22	1.91	0.67
1:A:39:ASP:CG	1:A:40:GLY:H	1.98	0.67
1:B:98:LEU:HD23	1:B:100:ARG:CZ	2.25	0.66
1:B:214:LEU:HD12	1:B:227:VAL:HG22	1.76	0.66
1:B:48:ASP:O	1:B:49:LEU:HB2	1.95	0.66
1:A:340:LEU:HD13	1:A:347:VAL:HG13	1.78	0.66
1:A:300:GLU:HA	1:B:96[B]:ARG:HH12	1.61	0.65
1:A:214:LEU:HD11	1:A:225:ALA:HB1	1.77	0.65
1:B:140:GLU:HG2	1:B:204:MET:HE2	1.77	0.65
1:A:229:ASP:OD1	2:A:614:HOH:O	2.14	0.65
1:B:130:LEU:N	1:B:130:LEU:HD23	2.11	0.65
1:B:215:ARG:HG2	2:B:660:HOH:O	1.96	0.64
1:B:92:LEU:HD12	1:B:96[B]:ARG:O	1.97	0.64
1:B:215:ARG:NH2	2:B:421:HOH:O	2.30	0.64
1:A:287:GLU:CG	2:A:486:HOH:O	2.37	0.64
1:A:215:ARG:NH1	1:A:226:HIS:CB	2.58	0.64
1:A:364:MET:CB	1:A:366:LEU:HD11	2.26	0.63
1:B:170:VAL:HG22	1:B:241:PHE:HE1	1.64	0.63
1:A:251:ASN:CG	1:A:251:ASN:O	2.37	0.62
1:B:53[A]:MET:HE3	1:B:230:PHE:HB3	1.80	0.62
1:B:285:VAL:HG12	1:B:315:MET:O	1.99	0.62
1:A:177:LEU:CD2	1:A:179:VAL:HG23	2.26	0.62
1:B:27:LEU:C	1:B:27:LEU:HD22	2.20	0.62
1:B:98:LEU:HD23	1:B:100:ARG:NH1	2.15	0.61
1:B:249:PRO:HD2	1:B:348:GLN:HE21	1.65	0.61
1:B:265[B]:GLN:OE1	1:B:265[B]:GLN:HA	2.01	0.61
1:B:263:LEU:HD21	1:B:338:MET:CE	2.28	0.61
1:A:129:THR:O	1:A:186:GLN:NE2	2.34	0.61
1:A:105:ARG:HG2	1:A:105:ARG:HH11	1.66	0.61
1:A:277:LYS:HE2	2:A:673:HOH:O	2.00	0.60
1:A:244:TYR:HD1	1:A:248:LEU:HD21	1.66	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:140:GLU:CG	1:A:204:MET:HE3	2.29	0.60
1:A:5[A]:VAL:HG21	1:A:10:LEU:HD13	1.84	0.60
1:B:247:VAL:HG13	1:B:362[B]:MET:HE1	1.83	0.60
1:A:5[B]:VAL:HG11	1:A:10:LEU:HD13	1.85	0.59
1:B:53[A]:MET:HE1	1:B:230:PHE:HB3	1.84	0.59
1:B:153:TYR:CE2	1:B:238:ASP:O	2.56	0.59
1:A:296:ASN:HB2	1:A:297:PRO:CD	2.32	0.59
1:A:119:LEU:HB2	2:A:513:HOH:O	2.02	0.59
1:B:12:LYS:HB3	1:B:13:PRO:HD3	1.85	0.59
1:A:103[B]:ARG:NH1	2:A:574:HOH:O	2.36	0.59
1:A:96:ARG:NH1	2:A:645:HOH:O	2.35	0.59
1:B:19:GLY:HA3	1:B:205[B]:ARG:HH12	1.68	0.58
1:B:360:VAL:HG11	1:B:362[B]:MET:HE1	1.86	0.58
1:A:38:ALA:O	1:A:39:ASP:HB3	2.02	0.58
1:B:51:MET:HE1	1:B:202:GLU:CG	2.34	0.58
1:B:140:GLU:CG	1:B:204:MET:HE2	2.32	0.58
1:A:305:ILE:HD12	2:A:439:HOH:O	2.04	0.56
1:A:129:THR:HG23	2:A:534:HOH:O	2.05	0.56
1:B:320:ASN:CB	1:B:364:MET:HE1	2.36	0.56
1:B:346[A]:SER:OG	2:B:446:HOH:O	2.18	0.56
1:B:226:HIS:CD2	1:B:231:ILE:CD1	2.88	0.56
1:B:52:GLU:OE2	2:B:442:HOH:O	2.18	0.56
1:B:214:LEU:HD13	1:B:227:VAL:HG22	1.87	0.56
1:A:103[A]:ARG:H	1:A:103[A]:ARG:HD3	1.67	0.55
1:A:299:GLN:O	1:B:96[B]:ARG:NH2	2.39	0.55
1:A:32:ASN:HB3	1:A:69:THR:HG23	1.87	0.55
1:B:247:VAL:HG13	1:B:362[B]:MET:CE	2.37	0.55
1:B:226:HIS:CD2	1:B:231:ILE:HD11	2.42	0.54
1:B:255:HIS:CE1	1:B:339:MET:HG2	2.43	0.54
1:B:93:GLU:OE1	1:B:98:LEU:CD2	2.56	0.54
1:A:26:THR:O	1:A:28:PRO:CD	2.54	0.54
1:B:51:MET:CE	1:B:202:GLU:CG	2.82	0.54
1:A:105:ARG:NH1	1:A:105:ARG:HG2	2.24	0.53
1:A:244:TYR:CD1	1:A:248:LEU:HD21	2.44	0.53
1:A:215:ARG:NH2	1:A:217:GLN:OE1	2.41	0.53
1:A:51:MET:HE3	1:A:202:GLU:CG	2.38	0.53
1:B:170:VAL:HG22	1:B:241:PHE:CE1	2.44	0.53
1:B:284:TYR:CD2	1:B:316:GLU:HG3	2.44	0.53
1:A:340:LEU:CD1	1:A:347:VAL:HG13	2.39	0.52
1:B:296:ASN:HB2	1:B:297:PRO:CD	2.39	0.52
1:A:90:VAL:HG12	1:A:97:MET:HE3	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:143:GLN:OE1	1:A:201:ILE:HD12	2.10	0.52
1:B:56:ARG:NH2	2:B:646:HOH:O	2.42	0.52
1:A:337:ARG:NH1	2:A:472:HOH:O	2.43	0.52
1:B:320:ASN:CA	1:B:364:MET:HE1	2.40	0.52
1:B:143:GLN:OE1	1:B:201:ILE:CD1	2.58	0.51
1:B:1:MET:HE2	1:B:97[A]:MET:HE3	1.90	0.51
1:A:366:LEU:CD1	1:A:366:LEU:N	2.74	0.51
1:B:98:LEU:HD23	1:B:100:ARG:HH22	1.73	0.51
1:A:170:VAL:HG13	1:A:179:VAL:HG22	1.93	0.50
1:B:296:ASN:HB2	1:B:297:PRO:HD2	1.93	0.50
1:A:284:TYR:CD2	1:A:316:GLU:HG2	2.46	0.50
1:A:288:ASN:ND2	1:A:310:TYR:H	2.06	0.49
1:A:42:LEU:HB3	1:A:57:VAL:HG22	1.94	0.49
1:A:90:VAL:HG13	1:A:97:MET:CE	2.36	0.49
1:B:252:PRO:HB2	1:B:339:MET:HB3	1.94	0.49
1:A:303:GLU:OE2	1:A:305:ILE:HD11	2.13	0.49
1:A:365:ARG:C	1:A:366:LEU:CD1	2.79	0.49
1:B:20:PRO:HG2	1:B:53[B]:MET:HE1	1.94	0.49
1:A:21:LEU:HD11	1:A:46:GLY:HA3	1.93	0.49
1:A:91:GLN:HB2	1:A:100:ARG:NH2	2.24	0.49
1:B:1:MET:CE	1:B:97[A]:MET:HE1	2.42	0.49
1:B:276:GLU:HA	1:B:279[A]:ARG:HH21	1.78	0.49
1:B:285:VAL:O	1:B:285:VAL:HG13	2.13	0.49
1:A:283:LEU:HG	1:A:290:LEU:HD11	1.95	0.48
1:B:1:MET:HE1	1:B:97[A]:MET:HE1	1.93	0.48
1:B:2:LYS:HD2	2:B:685:HOH:O	2.13	0.48
1:B:255:HIS:ND1	1:B:339:MET:HG2	2.28	0.48
1:A:32:ASN:HA	1:A:70:VAL:O	2.14	0.48
1:B:284:TYR:CE2	1:B:316:GLU:HG3	2.49	0.48
1:A:32:ASN:CB	1:A:69:THR:HG23	2.44	0.48
1:A:39:ASP:CG	1:A:40:GLY:N	2.67	0.47
1:B:2:LYS:HG3	2:B:615:HOH:O	2.13	0.47
1:A:98:LEU:CB	1:A:100:ARG:NH2	2.77	0.47
1:B:130:LEU:HD23	1:B:130:LEU:H	1.79	0.47
1:B:320:ASN:N	1:B:364:MET:HE3	2.29	0.47
1:B:93:GLU:OE1	1:B:98:LEU:HD21	2.13	0.47
1:A:91:GLN:CB	1:A:100:ARG:HH22	2.25	0.47
1:A:98:LEU:HB3	1:A:100:ARG:NH2	2.29	0.47
1:B:130:LEU:N	1:B:130:LEU:CD2	2.77	0.47
1:A:18:SER:HA	1:A:21:LEU:HD13	1.96	0.47
1:A:298:GLU:CD	2:A:532:HOH:O	2.53	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:90:VAL:HG13	1:A:97:MET:HE2	1.90	0.47
1:B:321:VAL:HG22	1:B:325:LEU:HD22	1.97	0.47
1:B:360:VAL:CG1	1:B:362[B]:MET:HE1	2.44	0.47
1:A:334:GLU:OE1	2:A:580:HOH:O	2.20	0.47
1:B:51:MET:HE1	1:B:202:GLU:HG3	1.88	0.46
1:B:6:GLU:OE1	1:B:8:GLU:HB2	2.16	0.46
1:A:238:ASP:HA	2:A:530:HOH:O	2.16	0.46
1:B:362[A]:MET:HG2	2:B:446:HOH:O	2.15	0.46
1:A:226:HIS:CD2	2:A:477:HOH:O	2.69	0.46
1:A:143:GLN:OE1	1:A:201:ILE:CD1	2.63	0.46
1:A:226:HIS:HD2	2:A:477:HOH:O	1.99	0.45
1:A:159:LEU:HD11	1:A:192:SER:HB3	1.97	0.45
1:A:222:ASN:N	1:A:236:LEU:HD22	2.31	0.45
1:A:176[B]:ARG:HD2	1:A:176[B]:ARG:O	2.17	0.45
1:A:33:LEU:HG	1:A:72:ALA:HB2	1.98	0.45
1:B:226:HIS:HB2	2:B:421:HOH:O	2.15	0.45
1:A:32:ASN:HD22	1:A:69:THR:HG23	1.77	0.45
1:A:366:LEU:N	1:A:366:LEU:HD12	2.31	0.45
1:A:251:ASN:ND2	1:A:251:ASN:O	2.50	0.45
1:A:245:ARG:HA	1:A:248:LEU:HD23	1.99	0.44
1:A:364:MET:HB3	1:A:366:LEU:CD1	2.44	0.44
1:B:366:LEU:HD13	1:B:366:LEU:HA	1.84	0.44
1:B:132:GLN:HG3	1:B:212:ASN:O	2.17	0.44
1:A:337:ARG:NH1	1:A:352:ALA:HA	2.33	0.44
1:A:319:PHE:CD1	1:A:324:VAL:HG21	2.53	0.44
1:B:222:ASN:N	1:B:236:LEU:HD22	2.33	0.44
1:B:197:ARG:NH2	2:B:722:HOH:O	2.51	0.43
1:A:295:ASN:ND2	2:A:414:HOH:O	2.51	0.43
1:B:45:THR:HG23	1:B:54:VAL:HG22	2.00	0.43
1:B:27:LEU:CD2	2:B:718:HOH:O	2.66	0.43
1:A:138:LEU:CD1	1:A:182:MET:HG2	2.48	0.43
1:B:132:GLN:OE1	1:B:207:LEU:HA	2.18	0.43
1:B:70:VAL:HG11	1:B:97[A]:MET:SD	2.58	0.43
1:B:51:MET:HE1	1:B:202:GLU:HG2	2.01	0.43
1:A:92:LEU:HA	1:A:92:LEU:HD12	1.81	0.43
1:A:111:LEU:HA	1:A:112:PRO:HD3	1.88	0.43
1:A:207:LEU:N	1:A:207:LEU:CD1	2.81	0.43
1:A:129:THR:H	1:A:186:GLN:NE2	2.02	0.42
1:A:250:LYS:HB2	2:A:448:HOH:O	2.18	0.42
1:A:298:GLU:CG	2:A:532:HOH:O	2.58	0.42
1:A:311:SER:HB3	2:A:571:HOH:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:35:LEU:HD23	1:A:97:MET:HE1	2.01	0.42
1:B:247:VAL:O	1:B:248:LEU:C	2.58	0.42
1:A:246:ARG:HA	1:A:246:ARG:HD2	1.56	0.42
1:B:150:ASP:OD1	1:B:152:ARG:HD3	2.20	0.42
1:B:42:LEU:HB3	1:B:57:VAL:HG22	2.01	0.42
1:B:70:VAL:HG11	1:B:97[B]:MET:SD	2.59	0.42
1:B:153:TYR:HE2	1:B:238:ASP:O	2.02	0.42
1:A:285:VAL:CG2	1:A:315:MET:HG2	2.50	0.42
1:B:320:ASN:CB	1:B:364:MET:CE	2.90	0.42
1:A:364:MET:HB2	1:A:366:LEU:HD11	2.01	0.42
1:B:320:ASN:HA	1:B:364:MET:HE1	2.00	0.42
1:A:226:HIS:CD2	1:A:231:ILE:CD1	3.03	0.42
1:B:197:ARG:NE	2:B:722:HOH:O	2.51	0.42
1:A:149:GLN:NE2	2:A:558:HOH:O	2.52	0.41
1:B:221:ASN:HB3	2:B:454:HOH:O	2.20	0.41
1:A:212:ASN:HA	1:A:213:PRO:HD2	1.95	0.41
1:B:337:ARG:NH2	1:B:352:ALA:O	2.54	0.41
1:A:331:LEU:HA	1:A:331:LEU:HD23	1.91	0.41
1:A:5[A]:VAL:HG21	1:A:10:LEU:CD1	2.50	0.41
1:A:33:LEU:HG	1:A:72:ALA:CB	2.50	0.41
1:A:93:GLU:HB2	1:A:98:LEU:HD13	2.03	0.41
1:B:320:ASN:HB3	1:B:323:TYR:CD2	2.56	0.41
1:A:250:LYS:O	1:A:251:ASN:C	2.58	0.40
1:A:248:LEU:HD22	1:A:248:LEU:H	1.86	0.40
1:B:136:LYS:HG3	1:B:204:MET:HE1	2.02	0.40
1:B:13:PRO:O	1:B:17:VAL:HG22	2.21	0.40
1:B:214:LEU:HD11	1:B:225:ALA:HB1	2.04	0.40
1:B:27:LEU:HD22	2:B:718:HOH:O	2.21	0.40
1:A:164:GLY:O	1:A:188:LEU:HB2	2.21	0.40
1:A:235:LYS:CE	2:A:578:HOH:O	2.63	0.40
1:B:144:PHE:CD2	1:B:326:ASP:HB3	2.57	0.40

All (5) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:215:ARG:NE	1:B:39:ASP:OD1[1_455]	1.82	0.38
2:A:588:HOH:O	2:A:593:HOH:O[2_757]	1.92	0.28
2:A:638:HOH:O	2:B:566:HOH:O[2_746]	2.04	0.16
2:A:467:HOH:O	2:B:465:HOH:O[1_556]	2.04	0.16
1:A:215:ARG:NE	1:B:39:ASP:OD2[1_455]	2.14	0.06

## 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	372/366 (102%)	355 (95%)	16 (4%)	1 (0%)	41	27
1	B	375/366 (102%)	367 (98%)	7 (2%)	1 (0%)	41	27
All	All	747/732 (102%)	722 (97%)	23 (3%)	2 (0%)	41	27

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	26	THR
1	B	19	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	321/313 (103%)	287 (89%)	34 (11%)	6	1
1	B	324/313 (104%)	293 (90%)	31 (10%)	8	1
All	All	645/626 (103%)	580 (90%)	65 (10%)	8	1

All (65) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	11	LEU
1	A	12	LYS
1	A	42	LEU
1	A	49	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	56	ARG
1	A	57	VAL
1	A	69	THR
1	A	95	GLU
1	A	96	ARG
1	A	103[A]	ARG
1	A	103[B]	ARG
1	A	111	LEU
1	A	119	LEU
1	A	125	GLU
1	A	137[A]	ARG
1	A	137[B]	ARG
1	A	138	LEU
1	A	143	GLN
1	A	173[A]	ASP
1	A	173[B]	ASP
1	A	176[A]	ARG
1	A	176[B]	ARG
1	A	188	LEU
1	A	201	ILE
1	A	202	GLU
1	A	207	LEU
1	A	215	ARG
1	A	236	LEU
1	A	246	ARG
1	A	251	ASN
1	A	295	ASN
1	A	319	PHE
1	A	332	LYS
1	A	340	LEU
1	B	21	LEU
1	B	26	THR
1	B	27	LEU
1	B	30	LEU
1	B	50	GLU
1	B	56	ARG
1	B	57	VAL
1	B	59	LEU
1	B	91	GLN
1	B	103[A]	ARG
1	B	103[B]	ARG
1	B	111	LEU

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Mol	Chain	Res	Type
1	B	119	LEU
1	B	137	ARG
1	B	138	LEU
1	B	167	LEU
1	B	176	ARG
1	B	188	LEU
1	B	205[A]	ARG
1	B	205[B]	ARG
1	B	207	LEU
1	B	227	VAL
1	B	236	LEU
1	B	246	ARG
1	B	248	LEU
1	B	306	LEU
1	B	315	MET
1	B	325	LEU
1	B	337	ARG
1	B	350	GLU
1	B	366	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	ASN
1	A	36	GLN
1	A	123	GLN
1	A	186	GLN
1	A	191	HIS
1	A	226	HIS
1	A	288	ASN
1	A	295	ASN
1	B	36	GLN
1	B	148	HIS
1	B	226	HIS
1	B	348	GLN
1	B	355	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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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	366/366 (100%)	-0.15	9 (2%) 57 55	16, 28, 47, 94	0
1	B	366/366 (100%)	-0.29	6 (1%) 72 71	16, 27, 44, 62	0
All	All	732/732 (100%)	-0.22	15 (2%) 65 64	16, 27, 46, 94	0

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	22	GLY	9.9
1	A	23	GLY	8.0
1	B	366	LEU	6.7
1	A	25	PRO	4.1
1	A	24	ARG	4.1
1	A	21	LEU	3.9
1	A	26	THR	3.8
1	A	366	LEU	3.8
1	B	365[A]	ARG	3.5
1	B	211	ASP	3.2
1	B	148	HIS	2.6
1	A	151	VAL	2.5
1	B	153	TYR	2.3
1	A	251	ASN	2.3
1	B	25	PRO	2.1

### 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 carbohydrates in this entry.

## 6.4 Ligands

There are no ligands in this entry.

## 6.5 Other polymers

There are no such residues in this entry.