



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 7, 2023 – 10:00 AM EDT

PDB ID : 4FSH  
Title : Crystal Structure of Shikimate Dehydrogenase (aroE) Clinical Variant v2356 from *Helicobacter pylori* in Complex with Shikimate  
Authors : Cheng, W.C.; Chen, T.J.; Wang, W.C.  
Deposited on : 2012-06-27  
Resolution : 2.85 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.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35

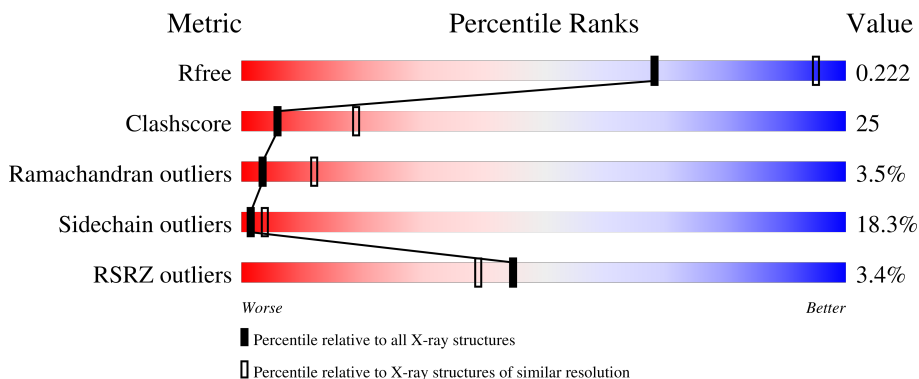
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.85 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	3168 (2.90-2.82)
Clashscore	141614	3438 (2.90-2.82)
Ramachandran outliers	138981	3348 (2.90-2.82)
Sidechain outliers	138945	3351 (2.90-2.82)
RSRZ outliers	127900	3103 (2.90-2.82)

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 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	271	
1	B	271	

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 4150 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 Shikimate dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	260	2036	1330	337	359	10	0	0	0
1	B	263	2061	1345	341	365	10	0	0	0

There are 52 discrepancies between the modelled and reference sequences:

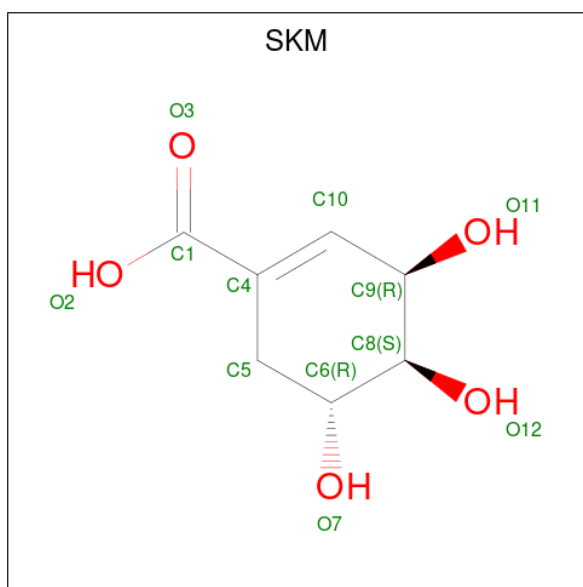
Chain	Residue	Modelled	Actual	Comment	Reference
A	32	LYS	GLU	conflict	UNP P56119
A	34	GLY	ARG	conflict	UNP P56119
A	40	ARG	HIS	conflict	UNP P56119
A	52	ASN	SER	conflict	UNP P56119
A	87	ALA	GLY	conflict	UNP P56119
A	88	SER	ALA	conflict	UNP P56119
A	89	ILE	VAL	conflict	UNP P56119
A	115	HIS	GLN	conflict	UNP P56119
A	116	GLN	LYS	conflict	UNP P56119
A	126	SER	ALA	conflict	UNP P56119
A	136	GLY	GLU	conflict	UNP P56119
A	143	LYS	GLN	conflict	UNP P56119
A	151	PRO	SER	conflict	UNP P56119
A	185	ASN	HIS	conflict	UNP P56119
A	202	ALA	GLY	conflict	UNP P56119
A	218	ALA	SER	conflict	UNP P56119
A	225	ILE	THR	conflict	UNP P56119
A	239	SER	ALA	conflict	UNP P56119
A	264	LEU	-	expression tag	UNP P56119
A	265	GLU	-	expression tag	UNP P56119
A	266	HIS	-	expression tag	UNP P56119
A	267	HIS	-	expression tag	UNP P56119
A	268	HIS	-	expression tag	UNP P56119
A	269	HIS	-	expression tag	UNP P56119
A	270	HIS	-	expression tag	UNP P56119

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Chain	Residue	Modelled	Actual	Comment	Reference
A	271	HIS	-	expression tag	UNP P56119
B	32	LYS	GLU	conflict	UNP P56119
B	34	GLY	ARG	conflict	UNP P56119
B	40	ARG	HIS	conflict	UNP P56119
B	52	ASN	SER	conflict	UNP P56119
B	87	ALA	GLY	conflict	UNP P56119
B	88	SER	ALA	conflict	UNP P56119
B	89	ILE	VAL	conflict	UNP P56119
B	115	HIS	GLN	conflict	UNP P56119
B	116	GLN	LYS	conflict	UNP P56119
B	126	SER	ALA	conflict	UNP P56119
B	136	GLY	GLU	conflict	UNP P56119
B	143	LYS	GLN	conflict	UNP P56119
B	151	PRO	SER	conflict	UNP P56119
B	185	ASN	HIS	conflict	UNP P56119
B	202	ALA	GLY	conflict	UNP P56119
B	218	ALA	SER	conflict	UNP P56119
B	225	ILE	THR	conflict	UNP P56119
B	239	SER	ALA	conflict	UNP P56119
B	264	LEU	-	expression tag	UNP P56119
B	265	GLU	-	expression tag	UNP P56119
B	266	HIS	-	expression tag	UNP P56119
B	267	HIS	-	expression tag	UNP P56119
B	268	HIS	-	expression tag	UNP P56119
B	269	HIS	-	expression tag	UNP P56119
B	270	HIS	-	expression tag	UNP P56119
B	271	HIS	-	expression tag	UNP P56119

- Molecule 2 is (3R,4S,5R)-3,4,5-TRIHIDROXYCYCLOHEX-1-ENE-1-CARBOXYLIC ACID (three-letter code: SKM) (formula: C<sub>7</sub>H<sub>10</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	C O	0	0
			12	7 5		

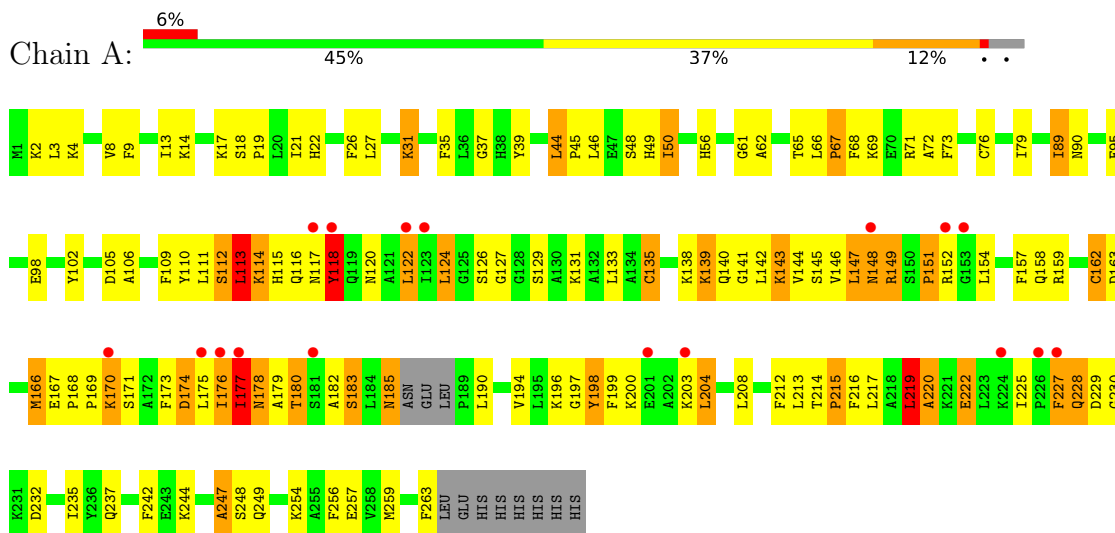
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	19	Total	O	0	0
			19	19		
3	B	22	Total	O	0	0
			22	22		

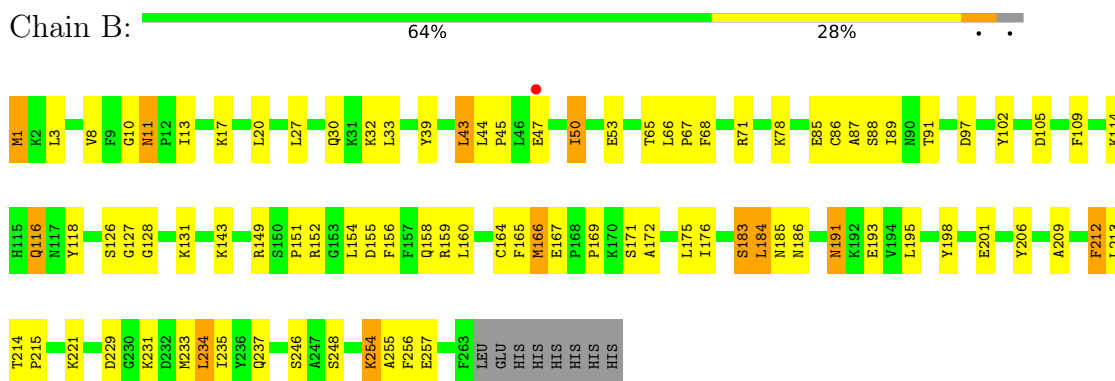
### 3 Residue-property plots

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: Shikimate dehydrogenase



- Molecule 1: Shikimate dehydrogenase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.12Å 71.87Å 176.39Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.85 25.49 – 2.85	Depositor EDS
% Data completeness (in resolution range)	99.5 (30.00-2.85) 99.6 (25.49-2.85)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.99 (at 2.85Å)	Xtrriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.214 , 0.260 0.211 , 0.222	Depositor DCC
$R_{free}$ test set	988 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	68.3	Xtrriage
Anisotropy	0.142	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 45.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	4150	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	67.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.84% 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: SKM

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	0.86	5/2082 (0.2%)	0.63	0/2800
1	B	0.87	1/2108 (0.0%)	0.65	0/2838
All	All	0.86	6/4190 (0.1%)	0.64	0/5638

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	118	TYR	CG-CD2	14.42	1.57	1.39
1	A	118	TYR	CE1-CZ	10.29	1.51	1.38
1	A	118	TYR	CE2-CZ	9.38	1.50	1.38
1	A	135	CYS	CB-SG	-7.39	1.69	1.82
1	A	118	TYR	CG-CD1	6.93	1.48	1.39
1	B	85	GLU	CG-CD	5.07	1.59	1.51

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2036	0	2091	148	0
1	B	2061	0	2114	61	0
2	A	12	0	9	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	19	0	0	10	0
3	B	22	0	0	2	0
All	All	4150	0	4214	207	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 25.

All (207) 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:147:LEU:C	1:A:148:ASN:HD22	1.47	1.17
1:A:50:ILE:HD11	1:A:72:ALA:HA	1.25	1.14
1:A:113:LEU:HA	1:A:114:LYS:CB	1.74	1.13
1:A:113:LEU:CA	1:A:114:LYS:HB3	1.91	1.00
1:A:113:LEU:HA	1:A:114:LYS:HB3	0.99	0.98
1:A:147:LEU:C	1:A:148:ASN:ND2	2.16	0.98
1:A:176:ILE:HD12	1:A:176:ILE:N	1.81	0.94
1:A:90:ASN:ND2	1:A:105:ASP:OD2	2.01	0.94
1:A:72:ALA:HB1	1:A:89:ILE:HD11	1.49	0.91
1:A:72:ALA:CB	1:A:89:ILE:HD11	2.01	0.90
1:A:113:LEU:HB3	1:A:114:LYS:HE3	1.54	0.90
1:A:203:LYS:O	1:A:204:LEU:HD23	1.70	0.88
1:A:50:ILE:CD1	1:A:72:ALA:HA	2.04	0.88
1:B:10:GLY:HA3	1:B:13:ILE:HD13	1.64	0.80
1:A:141:GLY:O	1:A:142:LEU:HD12	1.81	0.80
1:A:120:ASN:HB2	1:A:143:LYS:O	1.82	0.79
1:A:109:PHE:O	1:A:112:SER:HB3	1.83	0.79
1:A:44:LEU:CD2	1:A:45:PRO:HD2	2.15	0.77
1:B:166:MET:HA	1:B:166:MET:CE	2.14	0.77
1:A:147:LEU:HD12	1:A:148:ASN:N	2.00	0.76
1:A:176:ILE:N	1:A:176:ILE:CD1	2.49	0.76
1:A:168:PRO:HD3	3:A:615:HOH:O	1.85	0.75
1:A:111:LEU:C	1:A:113:LEU:H	1.92	0.73
1:A:148:ASN:ND2	1:A:148:ASN:N	2.36	0.72
1:A:175:LEU:C	1:A:176:ILE:HD12	2.09	0.72
1:A:115:HIS:O	1:A:115:HIS:HD2	1.73	0.71
1:A:203:LYS:C	1:A:204:LEU:HD23	2.11	0.71
1:A:147:LEU:C	1:A:147:LEU:HD12	2.12	0.69
1:A:71:ARG:HH11	1:A:71:ARG:HG3	1.57	0.69
1:A:113:LEU:CA	1:A:114:LYS:CB	2.58	0.69
1:B:105:ASP:HA	1:B:237:GLN:NE2	2.08	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:33:LEU:HD21	1:B:246:SER:HB2	1.74	0.68
1:A:110:TYR:CZ	1:A:140:GLN:HG2	2.28	0.68
1:A:222:GLU:HG2	3:A:609:HOH:O	1.91	0.68
1:B:10:GLY:HA2	1:B:65:THR:HG22	1.73	0.67
1:A:144:VAL:O	1:A:162:CYS:HB2	1.94	0.67
1:B:116:GLN:HE21	1:B:118:TYR:H	1.40	0.67
1:A:185:ASN:N	1:A:185:ASN:OD1	2.27	0.67
1:A:44:LEU:HD23	1:A:45:PRO:HD2	1.77	0.66
1:A:115:HIS:O	1:A:115:HIS:CD2	2.48	0.66
1:A:174:ASP:N	1:A:174:ASP:OD1	2.27	0.66
1:A:138:LYS:O	1:A:141:GLY:N	2.25	0.66
1:B:10:GLY:O	1:B:68:PHE:HE2	1.78	0.66
1:A:56:HIS:HE1	3:A:606:HOH:O	1.77	0.66
1:B:116:GLN:NE2	1:B:118:TYR:H	1.94	0.65
1:B:32:LYS:HG3	3:B:314:HOH:O	1.96	0.65
1:A:151:PRO:O	1:A:154:LEU:HB3	1.96	0.65
1:B:166:MET:HA	1:B:166:MET:HE3	1.78	0.65
1:A:44:LEU:HD22	1:A:45:PRO:HD2	1.79	0.64
1:A:122:LEU:HA	1:A:145:SER:O	1.97	0.64
1:B:212:PHE:H	1:B:212:PHE:HD1	1.45	0.64
1:A:196:LYS:HG2	1:A:197:GLY:N	2.13	0.64
1:A:9:PHE:O	1:A:65:THR:HG22	1.97	0.64
1:A:72:ALA:C	1:A:89:ILE:HD11	2.18	0.64
1:A:21:ILE:HB	1:A:259:MET:HG2	1.81	0.63
1:B:10:GLY:CA	1:B:13:ILE:HD13	2.28	0.63
1:A:149:ARG:HD2	1:A:149:ARG:N	2.13	0.63
1:A:72:ALA:CB	1:A:89:ILE:CD1	2.76	0.63
1:A:67:PRO:HD2	1:A:68:PHE:CE2	2.35	0.62
1:A:113:LEU:HA	1:A:114:LYS:CG	2.29	0.62
1:B:10:GLY:HA3	1:B:13:ILE:CD1	2.29	0.62
1:A:177:ILE:O	1:A:178:ASN:HB3	2.01	0.61
1:A:113:LEU:CB	1:A:114:LYS:HG2	2.30	0.61
1:B:172:ALA:HB2	1:B:201:GLU:OE1	2.01	0.61
1:A:149:ARG:HH22	1:A:180:THR:HG23	1.65	0.61
1:A:73:PHE:N	1:A:89:ILE:CD1	2.65	0.60
1:A:95:GLU:O	1:A:98:GLU:HB2	2.02	0.59
1:A:124:LEU:HD23	1:A:124:LEU:N	2.17	0.59
1:B:13:ILE:HG13	1:B:13:ILE:O	2.01	0.59
1:A:169:PRO:C	1:A:171:SER:H	2.05	0.59
1:A:217:LEU:HD23	1:A:217:LEU:O	2.01	0.59
1:A:166:MET:HB3	1:B:184:LEU:HD13	1.85	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:114:LYS:NZ	1:A:228:GLN:HE22	2.01	0.59
1:A:217:LEU:HA	1:A:220:ALA:HB3	1.85	0.59
1:A:72:ALA:C	1:A:89:ILE:CD1	2.71	0.59
1:A:176:ILE:C	1:A:177:ILE:HG12	2.23	0.58
1:A:111:LEU:O	1:A:113:LEU:N	2.34	0.58
1:A:167:GLU:HA	3:A:615:HOH:O	2.04	0.58
1:B:155:ASP:O	1:B:159:ARG:HG3	2.04	0.58
1:A:4:LYS:HD2	1:A:35:PHE:CG	2.40	0.57
1:B:10:GLY:O	1:B:68:PHE:CE2	2.56	0.57
1:A:177:ILE:O	1:A:178:ASN:CB	2.53	0.57
1:A:73:PHE:HA	1:A:89:ILE:HD12	1.87	0.57
1:A:235:ILE:HG22	1:A:256:PHE:CD1	2.40	0.56
1:B:166:MET:HA	1:B:166:MET:HE2	1.87	0.56
1:B:191:ASN:OD1	1:B:191:ASN:C	2.43	0.56
1:A:196:LYS:CG	1:A:197:GLY:N	2.68	0.56
1:B:11:ASN:ND2	1:B:45:PRO:HA	2.20	0.56
1:A:146:VAL:HG12	1:A:148:ASN:HD21	1.70	0.56
1:A:8:VAL:HB	1:A:39:TYR:OH	2.06	0.55
1:A:146:VAL:HG21	1:A:157:PHE:CD1	2.41	0.55
1:A:149:ARG:HG3	1:A:190:LEU:HD21	1.89	0.55
1:A:175:LEU:HD21	1:A:204:LEU:HD12	1.89	0.55
1:A:208:LEU:O	1:A:230:GLY:HA3	2.07	0.54
1:A:46:LEU:O	1:A:71:ARG:NH2	2.41	0.54
1:A:65:THR:HA	1:A:69:LYS:HE2	1.89	0.54
1:B:109:PHE:HA	1:B:233:MET:HG3	1.89	0.54
1:A:217:LEU:HA	1:A:220:ALA:CB	2.38	0.54
1:B:105:ASP:HA	1:B:237:GLN:HE21	1.72	0.54
1:A:196:LYS:HG2	1:A:197:GLY:H	1.73	0.53
1:A:213:LEU:HD11	1:A:217:LEU:HD22	1.89	0.53
1:A:111:LEU:C	1:A:113:LEU:N	2.61	0.53
1:A:71:ARG:HG3	1:A:71:ARG:NH1	2.19	0.53
1:B:8:VAL:HB	1:B:39:TYR:OH	2.09	0.53
1:A:31:LYS:H	1:A:31:LYS:HD2	1.73	0.52
1:A:124:LEU:HD21	1:A:176:ILE:CG2	2.40	0.52
1:A:247:ALA:O	1:A:248:SER:HB2	2.09	0.52
1:A:4:LYS:HB2	1:A:35:PHE:CD1	2.45	0.52
1:B:234:LEU:CD2	1:B:234:LEU:C	2.78	0.52
1:A:89:ILE:HB	1:A:102:TYR:O	2.10	0.51
1:A:173:PHE:CE2	1:A:198:TYR:OH	2.57	0.51
1:A:26:PHE:CD1	1:A:37:GLY:HA3	2.46	0.51
1:A:124:LEU:HD21	1:A:176:ILE:HG23	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:127:GLY:HA3	3:A:603:HOH:O	2.11	0.51
1:A:102:TYR:CE1	1:A:244:LYS:HE3	2.45	0.51
1:B:191:ASN:OD1	1:B:193:GLU:N	2.43	0.50
1:A:151:PRO:HD2	1:A:152:ARG:H	1.77	0.50
1:A:217:LEU:O	1:A:220:ALA:HB3	2.11	0.50
1:B:10:GLY:HA2	1:B:65:THR:CG2	2.41	0.50
1:A:170:LYS:N	1:A:170:LYS:HD2	2.27	0.50
1:B:234:LEU:C	1:B:234:LEU:HD22	2.32	0.50
1:A:169:PRO:C	1:A:171:SER:N	2.65	0.50
1:B:213:LEU:HD21	1:B:221:LYS:HD3	1.95	0.49
1:A:190:LEU:HB2	3:A:602:HOH:O	2.12	0.49
1:A:76:CYS:HB2	1:A:79:ILE:HD11	1.95	0.49
1:A:214:THR:O	1:A:215:PRO:C	2.52	0.49
1:A:110:TYR:CE1	1:A:140:GLN:HG2	2.48	0.48
1:A:219:LEU:C	1:A:219:LEU:HD12	2.33	0.48
1:A:146:VAL:CG1	1:A:148:ASN:HD21	2.27	0.48
1:B:154:LEU:CD1	1:B:164:CYS:HB3	2.43	0.48
1:A:120:ASN:ND2	1:A:173:PHE:CE1	2.82	0.48
1:A:219:LEU:O	1:A:220:ALA:C	2.52	0.48
1:A:169:PRO:O	1:A:171:SER:N	2.34	0.48
1:A:219:LEU:HG	1:A:220:ALA:N	2.29	0.47
1:A:227:PHE:N	1:A:227:PHE:CD1	2.82	0.47
1:A:113:LEU:CA	1:A:114:LYS:HG2	2.45	0.47
1:B:154:LEU:HD13	1:B:164:CYS:HB3	1.97	0.46
1:A:147:LEU:C	1:A:147:LEU:CD1	2.81	0.46
1:B:195:LEU:HD12	1:B:195:LEU:HA	1.71	0.46
1:A:113:LEU:HB2	1:A:114:LYS:HG2	1.96	0.46
1:B:86:CYS:O	1:B:87:ALA:C	2.53	0.46
1:A:170:LYS:N	1:A:170:LYS:CD	2.78	0.46
1:A:102:TYR:CD1	1:A:244:LYS:HE3	2.51	0.45
1:B:11:ASN:O	1:B:67:PRO:HD3	2.17	0.45
1:A:175:LEU:CD2	1:A:204:LEU:HD12	2.47	0.45
1:B:165:PHE:CZ	1:B:169:PRO:HB3	2.51	0.45
1:A:149:ARG:HA	1:A:166:MET:HG3	1.98	0.45
1:B:44:LEU:HD11	1:B:53:GLU:HG3	1.99	0.45
1:A:31:LYS:HD2	1:A:31:LYS:N	2.32	0.45
1:A:127:GLY:O	1:A:131:LYS:HG3	2.17	0.45
1:A:149:ARG:CD	1:A:149:ARG:H	2.28	0.45
1:A:22:HIS:HD2	1:A:242:PHE:HD1	1.65	0.45
1:B:235:ILE:HG22	1:B:256:PHE:CD1	2.51	0.45
1:B:254:LYS:O	1:B:255:ALA:C	2.55	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:120:ASN:ND2	1:A:173:PHE:HE1	2.15	0.44
1:B:149:ARG:O	1:B:149:ARG:HG3	2.16	0.44
1:A:139:LYS:HB3	1:A:139:LYS:HE2	1.51	0.44
1:B:89:ILE:HB	1:B:102:TYR:O	2.18	0.44
1:A:149:ARG:N	1:A:149:ARG:CD	2.75	0.44
1:A:49:HIS:HD2	3:A:614:HOH:O	2.00	0.44
1:B:11:ASN:HA	1:B:43:LEU:HD23	1.99	0.44
1:A:113:LEU:CA	1:A:114:LYS:CG	2.95	0.44
1:A:163:ASP:HB3	1:B:186:ASN:ND2	2.33	0.44
1:A:72:ALA:HB3	1:A:89:ILE:CD1	2.47	0.43
1:A:66:LEU:HA	1:A:67:PRO:HA	1.81	0.43
1:A:118:TYR:HB2	3:A:619:HOH:O	2.19	0.43
1:A:18:SER:N	1:A:19:PRO:CD	2.82	0.43
1:B:1:MET:HE3	1:B:30:GLN:HB2	2.00	0.43
1:B:78:LYS:HE2	1:B:78:LYS:HB2	1.62	0.43
1:B:214:THR:HB	1:B:215:PRO:HD2	2.01	0.43
1:A:143:LYS:HE3	1:A:143:LYS:HB2	1.58	0.43
1:A:127:GLY:CA	3:A:603:HOH:O	2.66	0.42
1:B:176:ILE:HD12	1:B:198:TYR:HB3	2.00	0.42
1:B:184:LEU:N	1:B:184:LEU:CD2	2.83	0.42
1:A:89:ILE:O	1:A:89:ILE:HG12	2.18	0.42
1:A:182:ALA:O	1:A:183:SER:CB	2.67	0.42
1:B:184:LEU:N	1:B:184:LEU:HD23	2.34	0.42
1:B:212:PHE:CD1	1:B:212:PHE:N	2.83	0.42
1:A:179:ALA:HB1	3:A:603:HOH:O	2.20	0.42
1:A:114:LYS:HG3	1:A:115:HIS:N	2.33	0.42
1:A:114:LYS:HZ1	1:A:228:GLN:HE22	1.66	0.42
1:A:151:PRO:O	1:A:154:LEU:CB	2.66	0.42
1:B:231:LYS:O	1:B:234:LEU:HB3	2.20	0.42
1:B:91:THR:HB	1:B:102:TYR:HB2	2.02	0.42
1:B:33:LEU:CD2	1:B:246:SER:HB2	2.46	0.42
1:A:67:PRO:HD2	1:A:68:PHE:CD2	2.55	0.42
1:B:10:GLY:O	1:B:11:ASN:CB	2.66	0.42
1:B:20:LEU:N	3:B:320:HOH:O	2.24	0.41
1:B:183:SER:C	1:B:185:ASN:H	2.24	0.41
1:B:234:LEU:HD22	1:B:234:LEU:O	2.20	0.41
1:A:61:GLY:O	1:A:62:ALA:HB2	2.21	0.41
1:A:217:LEU:HD21	1:A:227:PHE:CD2	2.56	0.41
1:A:26:PHE:CG	1:A:37:GLY:HA3	2.56	0.41
1:A:124:LEU:HB2	1:A:178:ASN:HA	2.03	0.41
1:B:50:ILE:H	1:B:50:ILE:HG12	1.53	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:127:GLY:HA2	1:B:128:GLY:HA2	1.80	0.41
1:A:44:LEU:HD23	1:A:44:LEU:HA	1.76	0.41
1:A:169:PRO:HB2	1:A:198:TYR:OH	2.21	0.41
1:A:72:ALA:HB1	1:A:89:ILE:CD1	2.35	0.40
1:A:147:LEU:O	1:A:148:ASN:ND2	2.27	0.40
1:B:209:ALA:O	1:B:229:ASP:HB2	2.21	0.40
1:B:229:ASP:C	1:B:229:ASP:OD1	2.60	0.40
1:A:149:ARG:NH2	1:A:180:THR:HG23	2.33	0.40
1:A:176:ILE:HG22	1:A:177:ILE:H	1.85	0.40
1:A:180:THR:HG22	1:A:182:ALA:H	1.86	0.40
1:A:199:PHE:CE2	1:A:225:ILE:HG21	2.57	0.40
1:B:131:LYS:HD3	1:B:156:PHE:CG	2.56	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	256/271 (94%)	213 (83%)	27 (10%)	16 (6%)	1	3
1	B	261/271 (96%)	240 (92%)	19 (7%)	2 (1%)	19	46
All	All	517/542 (95%)	453 (88%)	46 (9%)	18 (4%)	3	12

All (18) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	106	ALA
1	A	112	SER
1	A	151	PRO
1	A	216	PHE
1	A	220	ALA
1	A	113	LEU

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Mol	Chain	Res	Type
1	A	114	LYS
1	A	170	LYS
1	A	177	ILE
1	A	178	ASN
1	A	222	GLU
1	A	219	LEU
1	A	247	ALA
1	A	228	GLN
1	B	11	ASN
1	A	13	ILE
1	A	215	PRO
1	B	151	PRO

### 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	220/231 (95%)	170 (77%)	50 (23%)	1	2
1	B	223/231 (96%)	192 (86%)	31 (14%)	3	9
All	All	443/462 (96%)	362 (82%)	81 (18%)	1	4

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	LYS
1	A	3	LEU
1	A	14	LYS
1	A	17	LYS
1	A	27	LEU
1	A	31	LYS
1	A	44	LEU
1	A	48	SER
1	A	50	ILE
1	A	67	PRO
1	A	89	ILE

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	113	LEU
1	A	116	GLN
1	A	117	ASN
1	A	118	TYR
1	A	122	LEU
1	A	124	LEU
1	A	126	SER
1	A	129	SER
1	A	133	LEU
1	A	135	CYS
1	A	139	LYS
1	A	143	LYS
1	A	147	LEU
1	A	148	ASN
1	A	149	ARG
1	A	158	GLN
1	A	159	ARG
1	A	162	CYS
1	A	166	MET
1	A	174	ASP
1	A	176	ILE
1	A	177	ILE
1	A	180	THR
1	A	183	SER
1	A	185	ASN
1	A	194	VAL
1	A	198	TYR
1	A	200	LYS
1	A	204	LEU
1	A	212	PHE
1	A	219	LEU
1	A	227	PHE
1	A	229	ASP
1	A	232	ASP
1	A	237	GLN
1	A	249	GLN
1	A	254	LYS
1	A	257	GLU
1	A	263	PHE
1	B	1	MET
1	B	3	LEU
1	B	17	LYS

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Mol	Chain	Res	Type
1	B	27	LEU
1	B	43	LEU
1	B	47	GLU
1	B	50	ILE
1	B	66	LEU
1	B	71	ARG
1	B	88	SER
1	B	97	ASP
1	B	114	LYS
1	B	116	GLN
1	B	126	SER
1	B	143	LYS
1	B	152	ARG
1	B	158	GLN
1	B	160	LEU
1	B	166	MET
1	B	167	GLU
1	B	171	SER
1	B	175	LEU
1	B	183	SER
1	B	184	LEU
1	B	191	ASN
1	B	206	TYR
1	B	212	PHE
1	B	234	LEU
1	B	248	SER
1	B	254	LYS
1	B	257	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	HIS
1	A	63	ASN
1	A	115	HIS
1	A	148	ASN
1	A	228	GLN
1	A	237	GLN
1	B	15	HIS
1	B	38	HIS
1	B	63	ASN
1	B	116	GLN

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Mol	Chain	Res	Type
1	B	228	GLN
1	B	237	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](#)

1 ligand is modelled in this entry.

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
2	SKM	A	500	-	12,12,12	1.33	3 (25%)	16,17,17	0.78	0

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
2	SKM	A	500	-	-	0/4/20/20	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	500	SKM	C9-C10	2.45	1.53	1.50
2	A	500	SKM	O2-C1	-2.33	1.23	1.30
2	A	500	SKM	C10-C4	2.19	1.39	1.33

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 [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	260/271 (95%)	0.24	17 (6%) 18 14	42, 76, 127, 141	0
1	B	263/271 (97%)	-0.35	1 (0%) 92 92	36, 52, 71, 86	0
All	All	523/542 (96%)	-0.06	18 (3%) 45 39	36, 60, 123, 141	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	117	ASN	5.4
1	A	118	TYR	3.8
1	A	177	ILE	3.6
1	A	227	PHE	3.2
1	A	181	SER	3.2
1	A	153	GLY	3.0
1	A	176	ILE	2.8
1	A	175	LEU	2.6
1	A	148	ASN	2.5
1	A	226	PRO	2.5
1	A	203	LYS	2.4
1	A	170	LYS	2.4
1	A	122	LEU	2.3
1	B	47	GLU	2.3
1	A	152	ARG	2.3
1	A	224	LYS	2.1
1	A	123	ILE	2.1
1	A	201	GLU	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( $\text{\AA}^2$ )	Q<0.9
2	SKM	A	500	12/12	0.93	0.22	67,71,74,77	0

### 6.5 Other polymers [i](#)

There are no such residues in this entry.