Full wwPDB X-ray Structure Validation Report ⓘ

Aug 29, 2023 – 03:41 AM EDT

PDB ID : 3PGJ

Title : 2.49 Angstrom resolution crystal structure of shikimate 5-dehydrogenase (aroE) from Vibrio cholerae O1 biovar eltor str. N16961 in complex with shikimate

Authors : Halavaty, A.S.; Light, S.H.; Shuvalova, L.; Papazisi, L.; Anderson, W.F.; Center for Structural Genomics of Infectious Diseases (CSGID)

Deposited on : 2010-11-02

Resolution : 2.49 Å(reported)

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

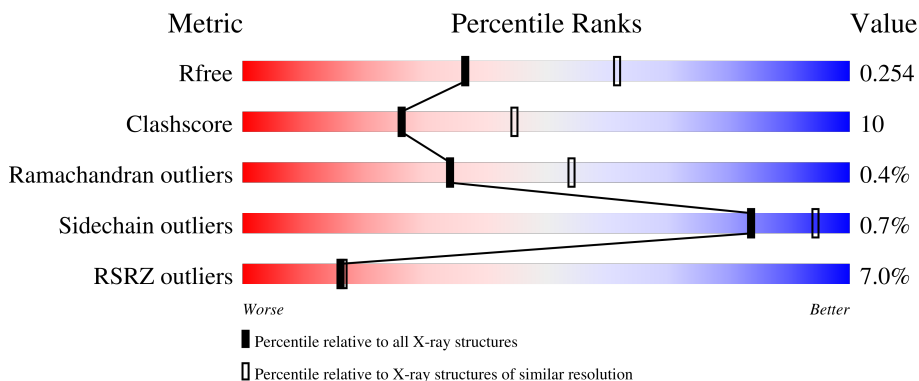|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry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

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.49 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	Percentile Ranks	Value
Rfree		0.254
Clashscore		10
Ramachandran outliers		0.4%
Sidechain outliers		0.7%
RSRZ outliers		7.0%

Worse *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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 >=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 <=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	302	3% / 74% 16% · 10%
1	B	302	4% / 70% 19% 11%
1	C	302	11% / 68% 19% · 13%
1	D	302	6% / 69% 21% 10%

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 8441 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
1	A	272	Total	C	N	O	S	0	1	0
			2092	1322	367	393	10			
1	B	268	Total	C	N	O	S	0	1	0
			2070	1308	365	388	9			
1	C	264	Total	C	N	O	S	0	0	0
			2034	1288	358	379	9			
1	D	271	Total	C	N	O	S	0	0	0
			2082	1317	365	391	9			

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-23	MET	-	expression tag	UNP Q9KVT3
A	-22	HIS	-	expression tag	UNP Q9KVT3
A	-21	HIS	-	expression tag	UNP Q9KVT3
A	-20	HIS	-	expression tag	UNP Q9KVT3
A	-19	HIS	-	expression tag	UNP Q9KVT3
A	-18	HIS	-	expression tag	UNP Q9KVT3
A	-17	HIS	-	expression tag	UNP Q9KVT3
A	-16	SER	-	expression tag	UNP Q9KVT3
A	-15	SER	-	expression tag	UNP Q9KVT3
A	-14	GLY	-	expression tag	UNP Q9KVT3
A	-13	VAL	-	expression tag	UNP Q9KVT3
A	-12	ASP	-	expression tag	UNP Q9KVT3
A	-11	LEU	-	expression tag	UNP Q9KVT3
A	-10	GLY	-	expression tag	UNP Q9KVT3
A	-9	THR	-	expression tag	UNP Q9KVT3
A	-8	GLU	-	expression tag	UNP Q9KVT3
A	-7	ASN	-	expression tag	UNP Q9KVT3
A	-6	LEU	-	expression tag	UNP Q9KVT3
A	-5	TYR	-	expression tag	UNP Q9KVT3
A	-4	PHE	-	expression tag	UNP Q9KVT3
A	-3	GLN	-	expression tag	UNP Q9KVT3

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP Q9KVT3
A	-1	ASN	-	expression tag	UNP Q9KVT3
A	0	ALA	-	expression tag	UNP Q9KVT3
B	-23	MET	-	expression tag	UNP Q9KVT3
B	-22	HIS	-	expression tag	UNP Q9KVT3
B	-21	HIS	-	expression tag	UNP Q9KVT3
B	-20	HIS	-	expression tag	UNP Q9KVT3
B	-19	HIS	-	expression tag	UNP Q9KVT3
B	-18	HIS	-	expression tag	UNP Q9KVT3
B	-17	HIS	-	expression tag	UNP Q9KVT3
B	-16	SER	-	expression tag	UNP Q9KVT3
B	-15	SER	-	expression tag	UNP Q9KVT3
B	-14	GLY	-	expression tag	UNP Q9KVT3
B	-13	VAL	-	expression tag	UNP Q9KVT3
B	-12	ASP	-	expression tag	UNP Q9KVT3
B	-11	LEU	-	expression tag	UNP Q9KVT3
B	-10	GLY	-	expression tag	UNP Q9KVT3
B	-9	THR	-	expression tag	UNP Q9KVT3
B	-8	GLU	-	expression tag	UNP Q9KVT3
B	-7	ASN	-	expression tag	UNP Q9KVT3
B	-6	LEU	-	expression tag	UNP Q9KVT3
B	-5	TYR	-	expression tag	UNP Q9KVT3
B	-4	PHE	-	expression tag	UNP Q9KVT3
B	-3	GLN	-	expression tag	UNP Q9KVT3
B	-2	SER	-	expression tag	UNP Q9KVT3
B	-1	ASN	-	expression tag	UNP Q9KVT3
B	0	ALA	-	expression tag	UNP Q9KVT3
C	-23	MET	-	expression tag	UNP Q9KVT3
C	-22	HIS	-	expression tag	UNP Q9KVT3
C	-21	HIS	-	expression tag	UNP Q9KVT3
C	-20	HIS	-	expression tag	UNP Q9KVT3
C	-19	HIS	-	expression tag	UNP Q9KVT3
C	-18	HIS	-	expression tag	UNP Q9KVT3
C	-17	HIS	-	expression tag	UNP Q9KVT3
C	-16	SER	-	expression tag	UNP Q9KVT3
C	-15	SER	-	expression tag	UNP Q9KVT3
C	-14	GLY	-	expression tag	UNP Q9KVT3
C	-13	VAL	-	expression tag	UNP Q9KVT3
C	-12	ASP	-	expression tag	UNP Q9KVT3
C	-11	LEU	-	expression tag	UNP Q9KVT3
C	-10	GLY	-	expression tag	UNP Q9KVT3
C	-9	THR	-	expression tag	UNP Q9KVT3

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
C	-8	GLU	-	expression tag	UNP Q9KVT3
C	-7	ASN	-	expression tag	UNP Q9KVT3
C	-6	LEU	-	expression tag	UNP Q9KVT3
C	-5	TYR	-	expression tag	UNP Q9KVT3
C	-4	PHE	-	expression tag	UNP Q9KVT3
C	-3	GLN	-	expression tag	UNP Q9KVT3
C	-2	SER	-	expression tag	UNP Q9KVT3
C	-1	ASN	-	expression tag	UNP Q9KVT3
C	0	ALA	-	expression tag	UNP Q9KVT3
D	-23	MET	-	expression tag	UNP Q9KVT3
D	-22	HIS	-	expression tag	UNP Q9KVT3
D	-21	HIS	-	expression tag	UNP Q9KVT3
D	-20	HIS	-	expression tag	UNP Q9KVT3
D	-19	HIS	-	expression tag	UNP Q9KVT3
D	-18	HIS	-	expression tag	UNP Q9KVT3
D	-17	HIS	-	expression tag	UNP Q9KVT3
D	-16	SER	-	expression tag	UNP Q9KVT3
D	-15	SER	-	expression tag	UNP Q9KVT3
D	-14	GLY	-	expression tag	UNP Q9KVT3
D	-13	VAL	-	expression tag	UNP Q9KVT3
D	-12	ASP	-	expression tag	UNP Q9KVT3
D	-11	LEU	-	expression tag	UNP Q9KVT3
D	-10	GLY	-	expression tag	UNP Q9KVT3
D	-9	THR	-	expression tag	UNP Q9KVT3
D	-8	GLU	-	expression tag	UNP Q9KVT3
D	-7	ASN	-	expression tag	UNP Q9KVT3
D	-6	LEU	-	expression tag	UNP Q9KVT3
D	-5	TYR	-	expression tag	UNP Q9KVT3
D	-4	PHE	-	expression tag	UNP Q9KVT3
D	-3	GLN	-	expression tag	UNP Q9KVT3
D	-2	SER	-	expression tag	UNP Q9KVT3
D	-1	ASN	-	expression tag	UNP Q9KVT3
D	0	ALA	-	expression tag	UNP Q9KVT3

- Molecule 2 is (3R,4S,5R)-3,4,5-TRIHYDROXYCYCLOHEX-1-ENE-1-CARBOXYLIC ACID (three-letter code: SKM) (formula: $C_7H_{10}O_5$).
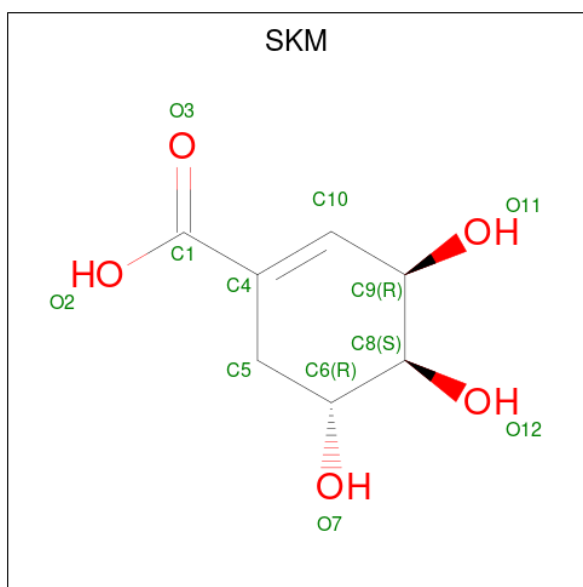
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 12	C 7	O 5	0	0
2	B	1	Total 12	C 7	O 5	0	0
2	C	1	Total 12	C 7	O 5	0	0
2	D	1	Total 12	C 7	O 5	0	0

- Molecule 3 is water.

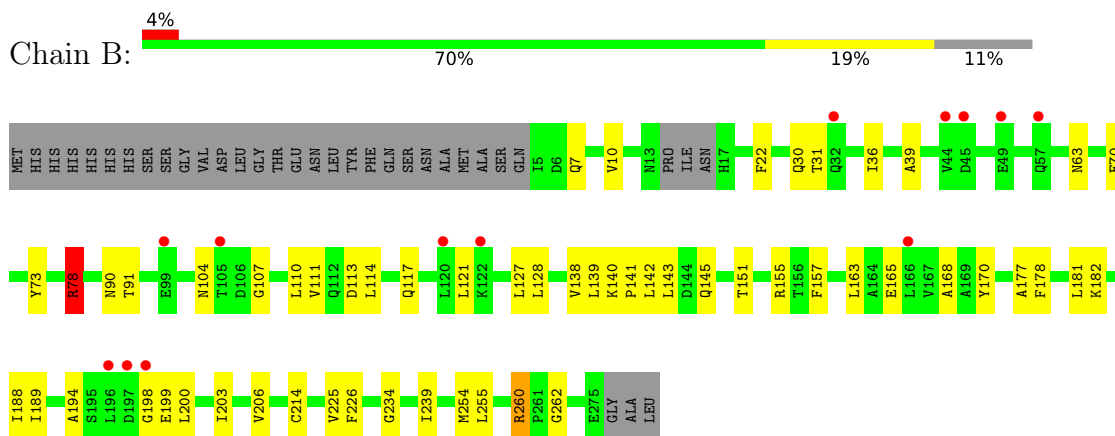| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	33	Total 33	O 33	0	0
3	B	24	Total 24	O 24	0	0
3	C	26	Total 26	O 26	0	0
3	D	32	Total 32	O 32	0	0

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.
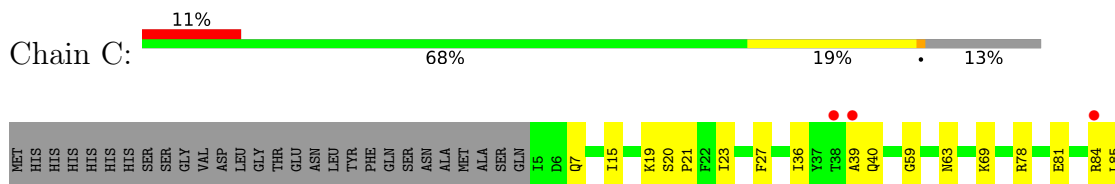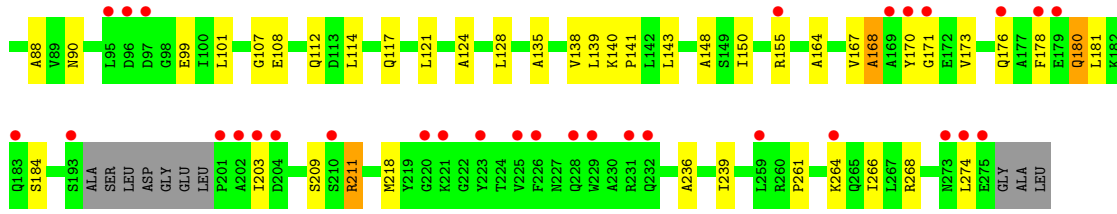
• Molecule 1: Shikimate dehydrogenase
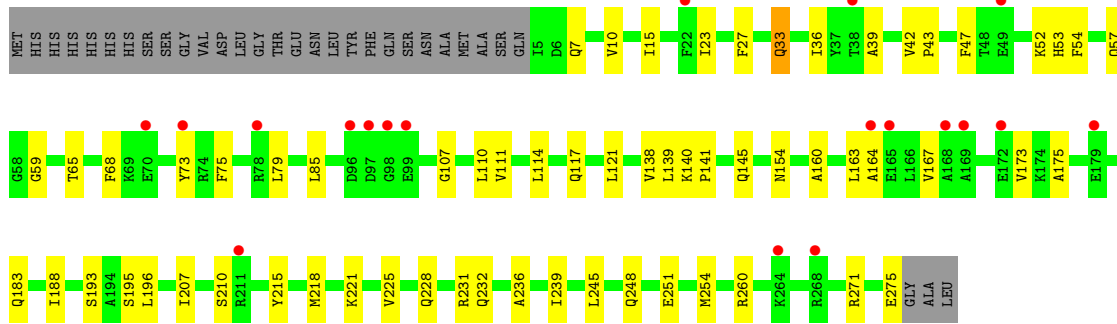

• Molecule 1: Shikimate dehydrogenase

• Molecule 1: Shikimate dehydrogenase

A88 V89 N90 L95 D96 D97 G98 E99 I100 L101 G107 E108 Q112 D113 L114 Q117 L121 A124 L128 A135 V138 L139 K140 P141 L142 L143 A148 S149 I150 R155 A164 V167 A168 A169 Y170 G171 E172 V173 Q176 A177 F178 E179 Q180 L181 K182

Q183 S184 S193 ALA SER LEU ASP GLY GLU LEU P201 A202 I203 D204 S209 S210 R211 M218 Y219 G220 K221 G222 Y223 T224 V225 F226 N227 Q228 W229 A230 R231 Q232 A236 I239 L259 R260 P261 K264 Q265 I266 L267 R268 N273 L274 E275 GLY ALA LEU

• Molecule 1: Shikimate dehydrogenase

Chain D:

6%

69% 21% 10%

MET HIS HIS HIS HIS HIS SER SER GLY VAL ASP LEU GLY THR GLU ASN LEU TYR PHE GLN SER ASN ALA MET ALA SER GLN I5 D6 Q7 V10 I15 F22 I23 F27 Q33 I36 Y37 T38 A39 V42 P43 F47 T48 E49 K52 H53 F54 Q57

G58 G59 T65 F68 K69 E70 Y73 R74 F75 R78 L79 L85 D96 D97 G98 E99 G107 L110 V111 L114 Q117 L121 V138 L139 K140 P141 Q145 N154 A160 L163 A164 E165 L166 V167 A168 A169 E172 V173 K174 A175 E179

Q183 I188 S193 A194 S195 L196 I207 S210 R211 Y215 M218 K221 V225 Q228 R231 Q232 A236 I239 L245 Q248 E251 M254 R260 K264 R268 R271 E275 GLY ALA LEU

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	75.53Å 83.66Å 79.58Å 90.00° 93.51° 90.00°	Depositor
Resolution (Å)	28.80 – 2.49 28.80 – 2.49	Depositor EDS
% Data completeness (in resolution range)	98.7 (28.80-2.49) 98.7 (28.80-2.49)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.40 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.193 , 0.247 0.204 , 0.254	Depositor DCC
R_{free} test set	1723 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	53.7	Xtriage
Anisotropy	0.396	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 62.7	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.024 for l,-k,h	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	8441	wwPDB-VP
Average B, all atoms (Å^2)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.34% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	0.40	0/2129	0.68	0/2878
1	B	0.37	0/2105	0.69	2/2842 (0.1%)
1	C	0.35	0/2070	0.65	0/2796
1	D	0.35	0/2119	0.67	0/2865
All	All	0.37	0/8423	0.67	2/11381 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	78	ARG	NE-CZ-NH2	5.40	123.00	120.30
1	B	234	GLY	N-CA-C	5.19	126.07	113.10

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	2092	0	2085	38	0
1	B	2070	0	2065	40	0
1	C	2034	0	2033	46	0
1	D	2082	0	2078	56	0
2	A	12	0	9	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	12	0	9	0	0
2	C	12	0	9	0	0
2	D	12	0	9	1	0
3	A	33	0	0	1	0
3	B	24	0	0	0	0
3	C	26	0	0	0	0
3	D	32	0	0	0	0
All	All	8441	0	8297	173	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 10.

All (173) 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:14:PRO:HA	1:A:15:ILE:CG2	1.79	1.11
1:D:15:ILE:HG21	1:D:39:ALA:HB1	1.36	1.07
1:A:14:PRO:CA	1:A:15:ILE:HG22	1.84	1.06
1:B:107:GLY:HA2	1:B:138:VAL:HG12	1.48	0.94
1:D:196:LEU:HD21	1:D:218:MET:SD	2.08	0.93
1:B:254:MET:SD	1:B:260:ARG:NH2	2.45	0.88
1:D:254:MET:HE2	1:D:260:ARG:HB2	1.54	0.87
1:D:15:ILE:CG2	1:D:39:ALA:HB1	2.05	0.86
1:A:193:SER:HA	1:A:218:MET:HE3	1.58	0.85
1:A:13:ASN:HB2	1:A:42:VAL:HG12	1.58	0.85
1:D:33:GLN:HE21	1:D:33:GLN:HA	1.45	0.82
1:A:13:ASN:HB2	1:A:42:VAL:CG1	2.11	0.80
1:D:254:MET:CE	1:D:260:ARG:HB2	2.12	0.79
1:A:14:PRO:HA	1:A:15:ILE:HG22	0.89	0.78
1:A:15:ILE:HD11	1:A:39:ALA:HB1	1.67	0.75
1:C:184:SER:HB2	1:C:209:SER:HB2	1.70	0.73
1:D:114:LEU:HD13	1:D:121:LEU:HD21	1.71	0.72
1:D:107:GLY:HA2	1:D:138:VAL:HG12	1.70	0.71
1:B:22:PHE:CD1	1:C:36:ILE:HD11	2.29	0.68
1:C:211:ARG:HA	1:C:236:ALA:HB2	1.76	0.67
1:B:143:LEU:HD13	1:B:170:TYR:O	1.96	0.66
1:D:33:GLN:HA	1:D:33:GLN:NE2	2.10	0.66
1:A:186:ASP:OD1	1:A:211:ARG:NH2	2.28	0.66
1:C:23:ILE:HG22	1:C:27:PHE:CE2	2.31	0.65
1:C:117:GLN:HG3	1:C:239:ILE:HD13	1.77	0.65
1:B:157:PHE:HB2	1:B:177:ALA:HB2	1.78	0.64

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:117:GLN:HG3	1:D:239:ILE:HD13	1.78	0.64
1:D:110:LEU:CD1	1:D:215:TYR:CE1	2.81	0.63
1:D:15:ILE:HG22	1:D:15:ILE:O	1.97	0.63
1:A:117:GLN:HG3	1:A:239:ILE:HD13	1.81	0.63
1:D:110:LEU:HD13	1:D:215:TYR:CE1	2.34	0.62
1:B:7:GLN:NE2	1:B:36:ILE:HG23	2.14	0.62
1:C:108:GLU:OE2	1:C:112:GLN:NE2	2.24	0.62
1:D:196:LEU:HD21	1:D:218:MET:CG	2.30	0.61
1:B:200:LEU:HD21	1:B:225:VAL:HG12	1.83	0.60
1:D:195:SER:HB2	1:D:225:VAL:CG2	2.32	0.60
1:A:42:VAL:HG11	1:A:68:PHE:CZ	2.37	0.59
1:B:78:ARG:HH21	1:B:78:ARG:HG2	1.68	0.58
1:C:114:LEU:HD13	1:C:121:LEU:HD21	1.86	0.58
1:C:176:GLN:NE2	1:C:181:LEU:HD23	2.18	0.57
1:D:111:VAL:HG11	1:D:145:GLN:HE21	1.70	0.57
1:A:140:LYS:HB3	1:A:141:PRO:HD3	1.86	0.57
1:D:139:LEU:HD11	1:D:163:LEU:HG	1.87	0.56
1:B:78:ARG:HH21	1:B:78:ARG:CG	2.18	0.56
1:B:181:LEU:HD12	1:B:203:ILE:HG23	1.88	0.56
1:D:188:ILE:HD12	1:D:188:ILE:N	2.22	0.55
1:D:140:LYS:HB3	1:D:141:PRO:HD3	1.89	0.55
1:A:32:GLN:NE2	3:A:296:HOH:O	2.39	0.55
1:A:107:GLY:HA3	1:A:141:PRO:HG2	1.87	0.55
1:C:69:LYS:HB3	1:C:88:ALA:HB1	1.89	0.54
1:A:154:ASN:ND2	1:A:159:LYS:HD3	2.22	0.54
1:B:139:LEU:HD11	1:B:163:LEU:HG	1.88	0.54
1:D:164:ALA:CB	1:D:175:ALA:HB2	2.37	0.54
1:A:69:LYS:HB3	1:A:88:ALA:HB1	1.89	0.54
1:C:107:GLY:HA3	1:C:141:PRO:HG2	1.90	0.54
1:B:22:PHE:HD1	1:C:36:ILE:HD11	1.73	0.53
1:D:110:LEU:CD1	1:D:215:TYR:CZ	2.92	0.53
1:D:23:ILE:HG22	1:D:27:PHE:CE2	2.44	0.53
1:D:196:LEU:HD21	1:D:218:MET:HG3	1.91	0.53
1:D:196:LEU:HD22	1:D:196:LEU:H	1.73	0.53
1:D:15:ILE:CG2	1:D:15:ILE:O	2.57	0.53
1:D:33:GLN:HE21	1:D:33:GLN:CA	2.19	0.53
1:C:140:LYS:HB3	1:C:141:PRO:HD3	1.91	0.52
1:A:25:THR:HB	1:D:36:ILE:HD11	1.89	0.52
1:C:27:PHE:CE1	1:C:266:ILE:HD12	2.44	0.52
1:A:260:ARG:HD2	1:B:206:VAL:HA	1.91	0.52
1:B:113:ASP:O	1:B:117:GLN:HG2	2.10	0.52

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:78:ARG:HD2	1:A:99:GLU:OE2	2.10	0.51
1:C:176:GLN:HE21	1:C:181:LEU:HD23	1.75	0.51
1:B:214:CYS:SG	1:B:226:PHE:HE2	2.34	0.51
1:C:176:GLN:NE2	1:C:180:GLN:OE1	2.43	0.51
1:D:10:VAL:HG12	1:D:39:ALA:HA	1.92	0.51
1:D:42:VAL:HG13	1:D:43:PRO:HD2	1.92	0.51
1:B:188:ILE:N	1:B:188:ILE:HD12	2.26	0.51
1:D:193:SER:O	1:D:196:LEU:HD23	2.11	0.51
1:B:140:LYS:HB3	1:B:141:PRO:HD3	1.94	0.50
1:A:14:PRO:HB2	1:A:16:ASN:N	2.26	0.50
1:C:184:SER:CB	1:C:209:SER:HB2	2.38	0.50
1:C:7:GLN:HG3	1:C:59:GLY:HA2	1.94	0.50
1:A:210:SER:O	1:A:236:ALA:HB2	2.11	0.50
1:C:78:ARG:O	1:C:101:LEU:HD12	2.12	0.49
1:B:110:LEU:HD21	1:B:189:ILE:HD13	1.93	0.49
1:C:78:ARG:NH2	1:C:99:GLU:OE2	2.39	0.49
1:C:19:LYS:NZ	1:C:274:LEU:HD21	2.26	0.49
1:B:194:ALA:HB1	1:B:199:GLU:O	2.13	0.49
1:D:47:PHE:HB2	1:D:68:PHE:CD1	2.48	0.49
1:B:214:CYS:SG	1:B:226:PHE:CE2	3.06	0.48
1:C:139:LEU:HD13	1:C:167:VAL:HG21	1.95	0.48
1:C:218:MET:HE2	1:C:218:MET:HA	1.94	0.48
1:C:81:GLU:O	1:C:84:ARG:HB3	2.14	0.48
1:A:265:GLN:H	1:A:265:GLN:CD	2.18	0.47
1:C:78:ARG:HH22	1:C:99:GLU:CD	2.15	0.47
1:C:178:PHE:CD1	1:C:203:ILE:HG12	2.49	0.47
1:B:128:LEU:HD23	1:B:139:LEU:HD21	1.96	0.47
1:D:195:SER:HB2	1:D:225:VAL:HG23	1.96	0.47
1:C:63:ASN:HA	1:C:90:ASN:O	2.15	0.47
1:B:111:VAL:HG11	1:B:145:GLN:NE2	2.31	0.46
1:C:128:LEU:HD21	1:C:135:ALA:HB1	1.96	0.46
1:C:23:ILE:CG2	1:C:27:PHE:CE2	2.99	0.46
1:D:196:LEU:HD22	1:D:196:LEU:N	2.31	0.46
1:A:122:LYS:NZ	1:A:146:GLN:OE1	2.49	0.46
1:A:63:ASN:HA	1:A:90:ASN:O	2.16	0.46
1:C:164:ALA:O	1:C:168:ALA:HB2	2.16	0.45
1:B:181:LEU:HD12	1:B:203:ILE:CG2	2.47	0.45
1:D:73:TYR:CE1	1:D:79:LEU:HD13	2.52	0.45
1:D:254:MET:HE2	1:D:260:ARG:CB	2.37	0.45
1:C:15:ILE:HG12	1:C:39:ALA:HB1	1.99	0.45
1:C:27:PHE:CD1	1:C:266:ILE:HD12	2.52	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:254:MET:HA	1:A:259:LEU:O	2.16	0.45
1:B:30:GLN:HG3	1:B:31:THR:HG23	1.97	0.45
1:D:164:ALA:HB3	1:D:175:ALA:HB2	1.99	0.45
1:A:214[B]:CYS:SG	1:A:226:PHE:CE2	3.10	0.45
1:B:127:LEU:HD12	1:B:151:THR:O	2.15	0.45
1:B:198:GLY:HA2	1:B:225:VAL:HG21	1.99	0.45
1:D:251:GLU:O	1:D:254:MET:HB3	2.15	0.45
1:C:85:LEU:HD12	1:C:140:LYS:HG2	1.98	0.45
1:C:181:LEU:HD12	1:C:203:ILE:HG23	1.99	0.45
1:D:114:LEU:HD12	1:D:121:LEU:HD11	1.99	0.45
1:A:274:LEU:C	1:A:276:GLY:H	2.20	0.45
1:A:224:THR:O	1:A:228:GLN:HG3	2.17	0.44
1:B:30:GLN:OE1	1:B:262:GLY:N	2.50	0.44
1:B:90:ASN:OD1	1:B:104:ASN:HA	2.18	0.44
1:D:65:THR:HG22	2:D:279:SKM:C4	2.47	0.44
1:A:273:ASN:ND2	1:D:7:GLN:OE1	2.50	0.44
1:B:165:GLU:HA	1:B:168:ALA:HB2	1.98	0.44
1:D:271:ARG:O	1:D:275:GLU:HG2	2.18	0.44
1:D:254:MET:HE1	1:D:260:ARG:HB2	1.97	0.44
1:B:117:GLN:HG3	1:B:239:ILE:HD13	2.00	0.44
1:B:7:GLN:NE2	1:B:36:ILE:CG2	2.81	0.43
1:C:264:LYS:O	1:C:268:ARG:HG3	2.18	0.43
1:A:154:ASN:HD21	1:A:159:LYS:HD3	1.84	0.43
1:C:107:GLY:HA2	1:C:138:VAL:HG12	2.00	0.43
1:C:143:LEU:HD21	1:C:150:ILE:HD12	2.01	0.43
1:C:143:LEU:HD13	1:C:170:TYR:HB2	2.01	0.43
1:D:110:LEU:HD11	1:D:215:TYR:CE1	2.52	0.43
1:A:70:GLU:O	1:A:73:TYR:HB3	2.19	0.42
1:C:178:PHE:CE1	1:C:203:ILE:HD11	2.54	0.42
1:D:53:HIS:NE2	1:D:57:GLN:OE1	2.51	0.42
1:C:27:PHE:CD1	1:C:261:PRO:CG	3.02	0.42
1:A:188:ILE:HD12	1:A:188:ILE:N	2.34	0.42
1:D:167:VAL:HG23	1:D:173:VAL:HG21	2.00	0.42
1:B:70:GLU:O	1:B:73:TYR:HB3	2.19	0.42
1:C:20:SER:N	1:C:21:PRO:CD	2.83	0.42
1:D:221:LYS:HG3	1:D:275:GLU:OE1	2.19	0.42
1:B:91:THR:HG21	1:B:255:LEU:HD23	2.01	0.42
1:B:36:ILE:HD11	1:C:21:PRO:HB2	2.01	0.42
1:A:10:VAL:O	1:A:10:VAL:HG13	2.19	0.42
1:D:183:GLN:O	1:D:207:ILE:HA	2.20	0.42
1:A:67:PRO:HD2	1:A:68:PHE:CE1	2.55	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:154:ASN:ND2	1:A:159:LYS:HB3	2.36	0.41
1:B:114:LEU:HD13	1:B:121:LEU:HD21	2.02	0.41
1:D:54:PHE:CE2	1:D:59:GLY:HA3	2.55	0.41
1:A:14:PRO:HB2	1:A:16:ASN:HB2	2.03	0.41
1:D:52:LYS:HG3	1:D:75:PHE:HE1	1.85	0.41
1:B:63:ASN:HA	1:B:90:ASN:O	2.20	0.41
1:C:15:ILE:CG1	1:C:39:ALA:HB1	2.50	0.41
1:D:111:VAL:HG11	1:D:145:GLN:NE2	2.36	0.41
1:D:154:ASN:HB2	1:D:160:ALA:HB2	2.02	0.41
1:A:193:SER:CA	1:A:218:MET:HE3	2.39	0.41
1:B:39:ALA:HB3	1:C:40:GLN:HA	2.02	0.41
1:A:110:LEU:HD21	1:A:189:ILE:HD13	2.03	0.41
1:C:155:ARG:HA	1:C:178:PHE:CE2	2.55	0.41
1:A:113:ASP:O	1:A:117:GLN:HG2	2.21	0.41
1:B:111:VAL:HG22	1:B:142:LEU:HD23	2.03	0.41
1:B:155:ARG:HA	1:B:178:PHE:CD2	2.56	0.41
1:D:245:LEU:O	1:D:248:GLN:HG3	2.21	0.41
1:D:85:LEU:HD12	1:D:140:LYS:HB2	2.03	0.40
1:D:210:SER:O	1:D:236:ALA:HB2	2.21	0.40
1:B:10:VAL:O	1:B:10:VAL:HG13	2.22	0.40
1:C:124:ALA:O	1:C:148:ALA:N	2.50	0.40
1:C:171:GLY:O	1:C:173:VAL:HG23	2.21	0.40
1:D:228:GLN:O	1:D:232:GLN:HG3	2.21	0.40
1:D:231:ARG:NH2	1:D:236:ALA:O	2.54	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	271/302 (90%)	256 (94%)	13 (5%)	2 (1%)	22	39

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	265/302 (88%)	254 (96%)	11 (4%)	0	100	100
1	C	260/302 (86%)	246 (95%)	12 (5%)	2 (1%)	19	35
1	D	269/302 (89%)	261 (97%)	8 (3%)	0	100	100
All	All	1065/1208 (88%)	1017 (96%)	44 (4%)	4 (0%)	34	54

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	168	ALA
1	A	275	GLU
1	C	180	GLN
1	A	15	ILE

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	216/240 (90%)	215 (100%)	1 (0%)	88	96
1	B	213/240 (89%)	210 (99%)	3 (1%)	67	86
1	C	210/240 (88%)	209 (100%)	1 (0%)	88	96
1	D	215/240 (90%)	214 (100%)	1 (0%)	88	96
All	All	854/960 (89%)	848 (99%)	6 (1%)	84	94

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	265	GLN
1	B	78	ARG
1	B	182	LYS
1	B	260	ARG
1	C	211	ARG
1	D	33	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	154	ASN
1	A	183	GLN
1	A	273	ASN
1	B	7	GLN
1	B	40	GLN
1	B	190	ASN
1	B	265	GLN
1	C	176	GLN
1	C	183	GLN
1	D	7	GLN
1	D	33	GLN
1	D	145	GLN
1	D	146	GLN
1	D	154	ASN
1	D	183	GLN
1	D	265	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

4 ligands are 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	D	279	-	12,12,12	0.80	1 (8%)	16,17,17	0.76	0
2	SKM	C	279	-	12,12,12	0.81	0	16,17,17	0.83	0
2	SKM	B	279	-	12,12,12	0.74	0	16,17,17	1.11	2 (12%)
2	SKM	A	279	-	12,12,12	0.78	0	16,17,17	0.76	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	D	279	-	-	0/4/20/20	0/1/1/1
2	SKM	C	279	-	-	0/4/20/20	0/1/1/1
2	SKM	B	279	-	-	0/4/20/20	0/1/1/1
2	SKM	A	279	-	-	0/4/20/20	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	279	SKM	O2-C1	-2.01	1.24	1.30

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	279	SKM	O2-C1-C4	2.68	121.17	115.49
2	B	279	SKM	O3-C1-C4	-2.44	117.38	121.59

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	279	SKM	1	0

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, 95th 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^2)	Q<0.9
1	A	272/302 (90%)	0.13	9 (3%)	46	50	33, 50, 76, 90	0
1	B	268/302 (88%)	0.36	13 (4%)	29	31	34, 55, 82, 101	0
1	C	264/302 (87%)	0.68	34 (12%)	3	3	35, 62, 113, 132	0
1	D	271/302 (89%)	0.43	19 (7%)	16	16	37, 59, 89, 99	0
All	All	1075/1208 (88%)	0.40	75 (6%)	16	16	33, 56, 93, 132	0

All (75) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	228	GLN	7.0
1	C	274	LEU	6.5
1	C	178	PHE	5.9
1	C	210	SER	5.3
1	C	221	LYS	4.9
1	C	232	GLN	4.6
1	D	211	ARG	4.3
1	C	229	TRP	4.0
1	A	96	ASP	3.9
1	C	275	GLU	3.8
1	C	225	VAL	3.7
1	A	44	VAL	3.7
1	D	172	GLU	3.5
1	D	78	ARG	3.4
1	C	179	GLU	3.4
1	D	164	ALA	3.4
1	C	95	LEU	3.3
1	C	259	LEU	3.3
1	C	155	ARG	3.3
1	C	176	GLN	3.3
1	B	198	GLY	3.2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	D	96	ASP	3.2
1	C	220	GLY	3.1
1	A	95	LEU	3.1
1	C	273	ASN	3.0
1	C	231	ARG	2.9
1	B	122	LYS	2.9
1	D	97	ASP	2.9
1	B	32	GLN	2.8
1	C	170	TYR	2.8
1	D	99	GLU	2.8
1	C	223	TYR	2.8
1	C	264	LYS	2.8
1	D	168	ALA	2.7
1	D	179	GLU	2.7
1	B	105	THR	2.7
1	B	49	GLU	2.7
1	B	44	VAL	2.6
1	D	73	TYR	2.6
1	C	202	ALA	2.6
1	D	38	THR	2.5
1	C	201	PRO	2.5
1	B	197	ASP	2.5
1	C	97	ASP	2.5
1	D	98	GLY	2.4
1	C	203	ILE	2.4
1	A	45	ASP	2.4
1	D	268	ARG	2.4
1	A	194	ALA	2.4
1	C	183	GLN	2.4
1	B	196	LEU	2.3
1	D	264	LYS	2.3
1	C	96	ASP	2.3
1	B	57	GLN	2.3
1	A	276	GLY	2.3
1	C	84	ARG	2.3
1	D	165	GLU	2.3
1	C	193	SER	2.3
1	B	45	ASP	2.3
1	C	39	ALA	2.3
1	A	156	THR	2.3
1	D	70	GLU	2.2
1	D	22	PHE	2.2

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	99	GLU	2.2
1	C	38	THR	2.2
1	B	120	LEU	2.1
1	D	169	ALA	2.1
1	C	204	ASP	2.1
1	C	169	ALA	2.1
1	A	17	HIS	2.1
1	B	166	LEU	2.0
1	A	58	GLY	2.0
1	C	226	PHE	2.0
1	C	171	GLY	2.0
1	D	49	GLU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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, 95th 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^2)	Q<0.9
2	SKM	A	279	12/12	0.94	0.20	50,53,56,60	0
2	SKM	D	279	12/12	0.94	0.29	65,67,68,68	0
2	SKM	C	279	12/12	0.96	0.23	58,60,61,64	0
2	SKM	B	279	12/12	0.96	0.21	44,48,50,55	0

6.5 Other polymers ⓘ

There are no such residues in this entry.

W O R L D W I D E
wwPDB
PROTEIN DATA BANK