W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

Full wwPDB X-ray Structure Validation Report ⓘ

Oct 10, 2021 – 09:02 PM EDT

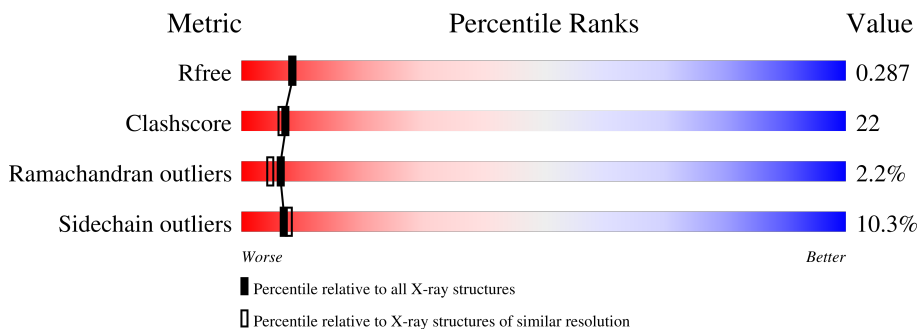|		
PDB ID	:	3F72
Title	:	Crystal Structure of the Staphylococcus aureus pI258 CadC Metal Binding Site 2 Mutant
Authors	:	Kandegedara, A.; Thiyagarajan, S.; Kondapalli, K.C.; Stemmler, T.L.; Rosen, B.P.
Deposited on	:	2008-11-07
Resolution	:	2.31 Å(reported)

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 2.31 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		0.287
Clashscore		22
Ramachandran outliers		2.2%
Sidechain outliers		10.3%

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	5974 (2.34-2.30)
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)

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%

Mol	Chain	Length	Quality of chain
1	A	122	60% · 25% · 12%
1	B	122	56% · 23% · 10% · 11%
1	C	122	46% · 30% · 8% · 16%
1	D	122	42% · 36% · · 18%
1	E	122	34% · 39% · 8% · 17%
1	F	122	49% · 26% · 8% · 16%

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 4843 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 Cadmium efflux system accessory protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	107	Total	C	N	O	S	0	0	0
			821	517	145	154	5			
1	B	108	Total	C	N	O	S	0	0	0
			832	521	147	159	5			
1	C	103	Total	C	N	O	S	0	0	0
			797	500	142	150	5			
1	D	100	Total	C	N	O	S	0	0	0
			761	479	130	147	5			
1	E	101	Total	C	N	O	S	0	0	0
			737	459	126	147	5			
1	F	102	Total	C	N	O	S	0	0	0
			748	465	130	148	5			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	11	GLY	CYS	engineered mutation	UNP P20047
A	101	GLY	ASP	engineered mutation	UNP P20047
A	103	ALA	HIS	engineered mutation	UNP P20047
B	11	GLY	CYS	engineered mutation	UNP P20047
B	101	GLY	ASP	engineered mutation	UNP P20047
B	103	ALA	HIS	engineered mutation	UNP P20047
C	11	GLY	CYS	engineered mutation	UNP P20047
C	101	GLY	ASP	engineered mutation	UNP P20047
C	103	ALA	HIS	engineered mutation	UNP P20047
D	11	GLY	CYS	engineered mutation	UNP P20047
D	101	GLY	ASP	engineered mutation	UNP P20047
D	103	ALA	HIS	engineered mutation	UNP P20047
E	11	GLY	CYS	engineered mutation	UNP P20047
E	101	GLY	ASP	engineered mutation	UNP P20047
E	103	ALA	HIS	engineered mutation	UNP P20047
F	11	GLY	CYS	engineered mutation	UNP P20047
F	101	GLY	ASP	engineered mutation	UNP P20047

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Chain	Residue	Modelled	Actual	Comment	Reference
F	103	ALA	HIS	engineered mutation	UNP P20047

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total 2	Na 2	0	0
2	B	2	Total 2	Na 2	0	0
2	F	1	Total 1	Na 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	26	Total 26	O 26	0	0
3	B	27	Total 27	O 27	0	0
3	C	25	Total 25	O 25	0	0
3	D	24	Total 24	O 24	0	0
3	E	24	Total 24	O 24	0	0
3	F	16	Total 16	O 16	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. Residues are color-coded according to the number o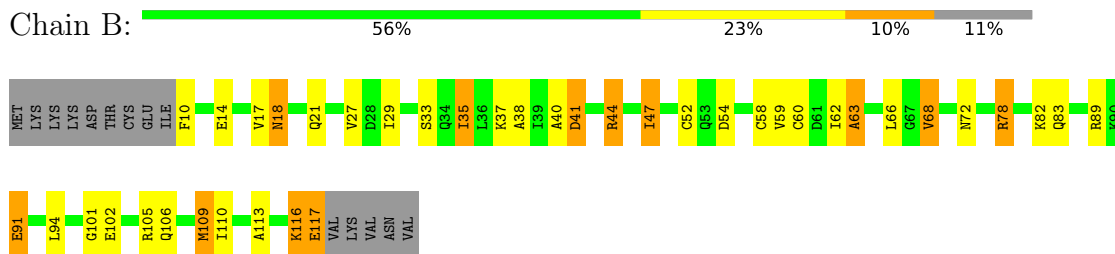f geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
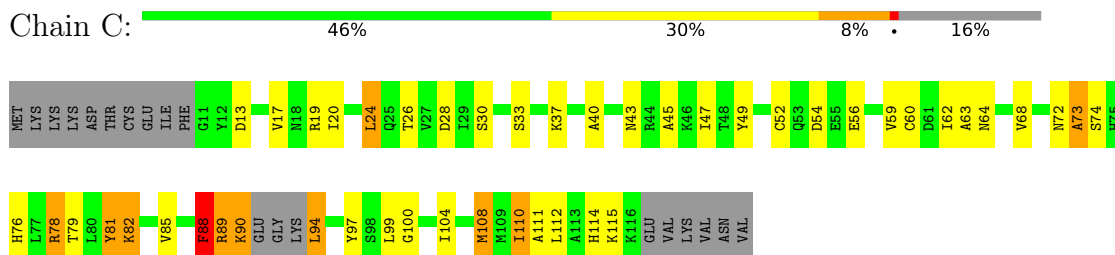
- Molecule 1: Cadmium efflux system accessory protein

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L80 Q83 N87 F88 R89 LYS GLU GLY LYS LEU ALA L96 Y97 E102 A103 I104 R105 Q106 I107 I110 K115 LYS GLU VAL LYS VAL ASN VAL

• Molecule 1: Cadmium efflux system accessory protein

Chain E:

34% 39% 8% • 17%

MET LYS LYS LYS ASP THR CYS GLU ILE PHE G11 Y12 D13 E14 E15 K16 V17 N18 R19 I20 Q21 G22 D23 L24 Q25 T26 V27 D28 I29 S30 G31 V32 S33 Q34 I35 L36 A40 D41 E42 N43 R44 A45 K46 Y49 A50 L51 D54 E55 E56 L57 C58 V59 C60 D61 I62 A63

L66 G67 V68 T69 I70 A71 N72 A73 S74 H75 H76 K82 Q83 G84 N87 F88 ARG LYS GLU GLY LYS LEU A95 L96 Y97 S98 L99 G100 R105 M108 M109 L112 K115 K116 E117 VAL LYS VAL ASN VAL

• Molecule 1: Cadmium efflux system accessory protein

Chain F:

49% 26% 8% 16%

MET LYS LYS LYS ASP THR CYS GLU ILE F10 E15 K16 V27 D28 I29 S33 Q34 I35 L36 K37 A38 I39 E42 N43 R44 A45 K46 I47 T48 Y49 Q53 D54 C58 V59 C60 A63 N64 I65 L66 G67 V68 T69 I70 A73 L77 L80 Y81 K82 Q83 G84

V85 V86 N87 F88 R89 K90 GLU GLY LYS LEU ALA LEU Y97 G100 I104 R105 Q106 M109 I110 A111 E117 VAL LYS VAL ASN VAL

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α, β, γ	89.47Å 89.47Å 148.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.30 – 2.31 34.30 – 2.31	Depositor EDS
% Data completeness (in resolution range)	97.3 (34.30-2.31) 97.3 (34.30-2.31)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.39 (at 2.31Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.237 , 0.288 0.235 , 0.287	Depositor DCC
R_{free} test set	2539 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å^2)	49.6	Xtriage
Anisotropy	0.031	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 41.6	EDS
L-test for twinning[2]	$< |L| > = 0.42, < L^2 > = 0.25$	Xtriage
Estimated twinning fraction	0.366 for h,-k,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	4843	wwPDB-VP
Average B, all atoms (Å^2)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.68% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: NA

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	1.46	5/828 (0.6%)	1.18	1/1114 (0.1%)
1	B	1.60	9/840 (1.1%)	1.38	6/1130 (0.5%)
1	C	1.59	7/803 (0.9%)	1.37	7/1079 (0.6%)
1	D	1.36	3/768 (0.4%)	1.18	3/1037 (0.3%)
1	E	1.32	2/742 (0.3%)	1.17	3/1006 (0.3%)
1	F	1.22	2/754 (0.3%)	1.23	4/1021 (0.4%)
All	All	1.44	28/4735 (0.6%)	1.26	24/6387 (0.4%)

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	B	0	1
1	E	0	2
All	All	0	3

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	81	TYR	CD2-CE2	7.92	1.51	1.39
1	C	81	TYR	CD1-CE1	7.09	1.50	1.39
1	A	42	GLU	CG-CD	7.03	1.62	1.51
1	B	63	ALA	CA-CB	6.48	1.66	1.52
1	A	86	VAL	CB-CG1	-6.25	1.39	1.52
1	D	87	ASN	CB-CG	6.13	1.65	1.51
1	F	16	LYS	CD-CE	6.06	1.66	1.51
1	B	102	GLU	CD-OE1	6.03	1.32	1.25
1	B	109	MET	CB-CG	5.88	1.70	1.51
1	C	45	ALA	CA-CB	5.82	1.64	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	37	LYS	CD-CE	5.81	1.65	1.51
1	D	15	GLU	CG-CD	5.79	1.60	1.51
1	E	49	TYR	CD2-CE2	5.73	1.48	1.39
1	C	88	PHE	CB-CG	5.66	1.60	1.51
1	B	52	CYS	CB-SG	-5.58	1.72	1.81
1	B	37	LYS	CE-NZ	5.58	1.62	1.49
1	D	29	ILE	CB-CG2	5.55	1.70	1.52
1	B	68	VAL	CB-CG1	5.43	1.64	1.52
1	B	37	LYS	CD-CE	5.42	1.64	1.51
1	C	78	ARG	CB-CG	5.34	1.67	1.52
1	C	52	CYS	CB-SG	-5.25	1.73	1.81
1	E	63	ALA	CA-CB	5.19	1.63	1.52
1	F	15	GLU	CB-CG	5.17	1.61	1.52
1	A	63	ALA	CA-CB	-5.08	1.41	1.52
1	C	59	VAL	CB-CG2	-5.08	1.42	1.52
1	A	17	VAL	C-O	5.04	1.32	1.23
1	B	44	ARG	CB-CG	5.04	1.66	1.52
1	B	59	VAL	CB-CG2	5.01	1.63	1.52

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	44	ARG	NE-CZ-NH1	11.39	125.99	120.30
1	C	28	ASP	CB-CG-OD2	-8.62	110.54	118.30
1	F	66	LEU	CA-CB-CG	8.14	134.02	115.30
1	F	80	LEU	CA-CB-CG	8.05	133.81	115.30
1	F	16	LYS	CD-CE-NZ	6.95	127.67	111.70
1	B	35	ILE	CG1-CB-CG2	-6.86	96.30	111.40
1	B	41	ASP	CB-CG-OD1	6.65	124.28	118.30
1	C	28	ASP	CB-CG-OD1	6.64	124.28	118.30
1	C	108	MET	CG-SD-CE	-6.56	89.71	100.20
1	B	44	ARG	NE-CZ-NH2	-6.43	117.08	120.30
1	D	28	ASP	CB-CG-OD1	6.02	123.72	118.30
1	E	54	ASP	CB-CG-OD1	5.90	123.61	118.30
1	E	19	ARG	NE-CZ-NH1	5.68	123.14	120.30
1	F	89	ARG	N-CA-C	-5.67	95.69	111.00
1	C	110	ILE	CG1-CB-CG2	-5.61	99.06	111.40
1	C	78	ARG	NE-CZ-NH2	5.59	123.10	120.30
1	B	101	GLY	N-CA-C	-5.55	99.23	113.10
1	E	108	MET	CG-SD-CE	-5.30	91.72	100.20
1	C	89	ARG	NE-CZ-NH2	5.27	122.93	120.30
1	D	89	ARG	NE-CZ-NH1	5.21	122.91	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	48	THR	CA-CB-CG2	-5.18	105.15	112.40
1	B	105	ARG	NE-CZ-NH2	-5.18	117.71	120.30
1	C	24	LEU	CB-CG-CD2	-5.12	102.29	111.00
1	A	61	ASP	CB-CG-OD1	5.10	122.89	118.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	91	GLU	Peptide
1	E	26	THR	Peptide
1	E	87	ASN	Peptide

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	821	0	834	31	0
1	B	832	0	838	38	0
1	C	797	0	820	47	0
1	D	761	0	754	43	0
1	E	737	0	701	54	0
1	F	748	0	707	33	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	F	1	0	0	0	0
3	A	26	0	0	6	0
3	B	27	0	0	0	0
3	C	25	0	0	1	0
3	D	24	0	0	3	0
3	E	24	0	0	1	0
3	F	16	0	0	3	0
All	All	4843	0	4654	210	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 22.

All (210) 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:E:24:LEU:N	1:E:25:GLN:HA	1.36	1.23
1:E:23:ASP:HB3	1:E:25:GLN:CA	1.70	1.20
1:B:47:ILE:HD11	1:B:66:LEU:HD11	1.25	1.18
1:E:20:ILE:HD11	1:F:54:ASP:OD1	1.51	1.11
1:E:23:ASP:HB3	1:E:25:GLN:CB	1.80	1.10
1:E:24:LEU:N	1:E:25:GLN:CA	2.21	1.03
1:B:27:VAL:HG13	1:B:29:ILE:HD11	1.37	1.02
1:C:40:ALA:O	1:D:33:SER:HB2	1.65	0.97
1:B:27:VAL:HG13	1:B:29:ILE:CD1	1.94	0.96
1:C:88:PHE:HD1	1:C:88:PHE:O	1.47	0.95
1:F:106:GLN:O	1:F:110:ILE:HG12	1.67	0.94
1:F:49:TYR:HE1	1:F:53:GLN:OE1	1.50	0.94
1:B:27:VAL:CG1	1:B:29:ILE:HD11	1.98	0.94
1:E:23:ASP:HB3	1:E:25:GLN:HA	1.51	0.91
1:E:112:LEU:HD22	1:F:27:VAL:HG22	1.54	0.90
1:A:44:ARG:HH11	1:A:76:HIS:HD2	1.18	0.89
1:E:24:LEU:H	1:E:25:GLN:HA	0.98	0.88
1:E:23:ASP:CB	1:E:25:GLN:CB	2.54	0.86
1:B:116:LYS:O	1:B:117:GLU:HB3	1.78	0.84
1:E:23:ASP:C	1:E:26:THR:H	1.82	0.83
1:F:43:ASN:ND2	1:F:66:LEU:HD13	1.95	0.82
1:E:24:LEU:H	1:E:25:GLN:CA	1.89	0.81
1:C:88:PHE:O	1:C:88:PHE:CD1	2.33	0.81
1:E:27:VAL:HG23	1:E:29:ILE:HG12	1.62	0.78
1:A:115:LYS:HB2	3:A:146:HOH:O	1.82	0.78
1:E:17:VAL:O	1:E:21:GLN:HB3	1.84	0.77
1:E:62:ILE:O	1:E:66:LEU:HB2	1.85	0.76
1:C:81:TYR:OH	1:C:88:PHE:CE2	2.37	0.76
1:C:20:ILE:HD13	1:C:20:ILE:N	2.00	0.76
1:C:33:SER:HB3	1:D:40:ALA:O	1.84	0.76
1:A:115:LYS:HD3	1:B:35:ILE:HG13	1.69	0.74
1:C:54:ASP:OD2	1:D:16:LYS:HE3	1.87	0.74
1:A:17:VAL:O	1:A:21:GLN:HG3	1.88	0.74
1:E:23:ASP:HB3	1:E:25:GLN:C	2.08	0.74
1:E:36:LEU:HD13	1:F:39:ILE:HG13	1.70	0.74
1:C:81:TYR:HH	1:C:88:PHE:HE2	1.34	0.72
1:F:105:ARG:HH11	1:F:105:ARG:HG3	1.56	0.70
1:B:47:ILE:CD1	1:B:66:LEU:HD11	2.14	0.69
1:B:91:GLU:N	1:B:94:LEU:O	2.27	0.68
1:E:23:ASP:CB	1:E:25:GLN:HA	2.22	0.68
1:E:27:VAL:CG2	1:E:29:ILE:HG12	2.23	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:116:LYS:O	1:B:117:GLU:CB	2.41	0.67
1:F:70:ILE:HD12	3:F:130:HOH:O	1.95	0.67
1:E:42:GLU:O	1:E:46:LYS:HG3	1.95	0.66
1:F:83:GLN:HA	1:F:83:GLN:OE1	1.94	0.66
1:E:15:GLU:H	1:E:15:GLU:CD	1.98	0.66
1:E:23:ASP:C	1:E:25:GLN:HA	2.12	0.66
1:D:115:LYS:HA	3:D:132:HOH:O	1.95	0.65
1:C:33:SER:CB	1:D:40:ALA:O	2.45	0.65
1:A:115:LYS:HD3	1:B:35:ILE:CG1	2.27	0.64
1:F:33:SER:O	1:F:37:LYS:HB2	1.98	0.64
1:A:105:ARG:O	1:A:109:MET:HG2	1.96	0.63
1:B:14:GLU:O	1:B:18:ASN:HB2	1.98	0.63
1:B:17:VAL:O	1:B:21:GLN:HG3	1.97	0.63
1:F:49:TYR:CE1	1:F:53:GLN:OE1	2.42	0.63
1:D:102:GLU:O	1:D:106:GLN:HG3	1.99	0.63
1:A:44:ARG:HH11	1:A:76:HIS:CD2	2.08	0.63
1:A:44:ARG:NH1	1:A:76:HIS:HD2	1.93	0.62
1:E:18:ASN:O	1:E:22:GLY:HA3	1.99	0.62
1:C:26:THR:HG22	1:E:88:PHE:HZ	1.64	0.62
1:E:23:ASP:CB	1:E:25:GLN:CA	2.63	0.62
1:C:33:SER:O	1:C:37:LYS:HB2	1.99	0.62
1:A:112:LEU:HD22	1:B:27:VAL:CG2	2.29	0.61
1:E:55:GLU:O	1:E:98:SER:HB3	1.99	0.61
1:F:44:ARG:HB3	1:F:80:LEU:HD21	1.82	0.61
1:C:97:TYR:N	1:C:97:TYR:CD2	2.68	0.61
1:E:56:GLU:HA	1:E:97:TYR:O	2.00	0.60
1:B:116:LYS:HZ3	1:B:116:LYS:HB3	1.66	0.60
1:D:44:ARG:HB3	1:D:80:LEU:HD21	1.83	0.59
1:F:49:TYR:HD1	1:F:49:TYR:O	1.85	0.59
1:A:112:LEU:HD22	1:B:27:VAL:HG22	1.85	0.59
1:D:10:PHE:HD2	1:D:11:GLY:N	2.00	0.59
1:D:75:HIS:CD2	3:D:136:HOH:O	2.56	0.59
1:E:51:LEU:HD23	1:E:57:LEU:HD12	1.83	0.59
1:C:63:ALA:HB1	1:C:68:VAL:O	2.03	0.58
1:F:43:ASN:HD22	1:F:66:LEU:HD13	1.68	0.58
1:C:17:VAL:HG13	1:D:65:ILE:HD13	1.84	0.58
1:C:85:VAL:O	1:C:100:GLY:N	2.30	0.58
1:A:52:CYS:O	1:A:105:ARG:NH1	2.35	0.58
1:B:38:ALA:O	1:B:44:ARG:HD2	2.04	0.58
1:D:35:ILE:HG22	1:D:36:LEU:N	2.19	0.58
1:B:113:ALA:HB1	1:D:25:GLN:HG3	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:24:LEU:CD2	1:D:49:TYR:HD2	2.16	0.57
1:E:23:ASP:C	1:E:26:THR:N	2.55	0.57
1:A:15:GLU:HB3	3:A:126:HOH:O	2.03	0.57
1:A:29:ILE:O	1:A:32:VAL:HG12	2.05	0.56
1:C:111:ALA:HB1	1:D:32:VAL:HG13	1.87	0.56
1:C:111:ALA:CB	1:D:32:VAL:HG13	2.36	0.56
1:E:32:VAL:HG13	1:F:111:ALA:HB1	1.88	0.56
1:C:88:PHE:CD1	1:C:90:LYS:HE3	2.41	0.56
1:C:110:ILE:CG2	1:D:103:ALA:HB1	2.36	0.56
1:B:66:LEU:HB2	1:B:68:VAL:HG22	1.88	0.56
1:E:30:SER:O	1:E:34:GLN:HG3	2.06	0.55
1:B:106:GLN:O	1:B:110:ILE:HG12	2.06	0.55
1:B:38:ALA:HB2	1:B:83:GLN:HG3	1.89	0.55
1:C:24:LEU:HD21	1:D:49:TYR:HD2	1.70	0.55
1:F:70:ILE:HD12	1:F:70:ILE:H	1.73	0.54
1:E:28:ASP:O	1:E:31:GLY:N	2.38	0.54
1:F:63:ALA:HB1	1:F:68:VAL:O	2.08	0.54
1:C:56:GLU:HA	1:C:97:TYR:O	2.07	0.54
1:A:9:ILE:HG13	3:A:143:HOH:O	2.08	0.53
1:E:59:VAL:CG2	1:E:73:ALA:O	2.57	0.53
1:E:115:LYS:HA	3:F:135:HOH:O	2.08	0.53
1:A:14:GLU:O	1:A:18:ASN:CG	2.47	0.53
1:E:20:ILE:HG21	1:F:65:ILE:HD13	1.91	0.52
1:C:43:ASN:O	1:C:47:ILE:HG13	2.08	0.52
1:A:66:LEU:HB2	1:A:68:VAL:HG22	1.91	0.52
1:E:44:ARG:NH1	3:E:129:HOH:O	2.42	0.52
1:D:41:ASP:HB2	1:D:44:ARG:NH1	2.24	0.52
1:D:10:PHE:HD2	1:D:11:GLY:H	1.57	0.52
1:D:44:ARG:NH2	3:D:131:HOH:O	2.40	0.52
1:D:106:GLN:O	1:D:110:ILE:HG12	2.10	0.52
1:C:30:SER:HB2	3:C:143:HOH:O	2.10	0.51
1:E:84:GLY:O	1:E:100:GLY:HA3	2.11	0.51
1:C:115:LYS:NZ	1:D:83:GLN:OE1	2.43	0.51
1:D:35:ILE:CG2	1:D:36:LEU:N	2.74	0.51
1:E:51:LEU:CD2	1:E:57:LEU:HD12	2.41	0.51
1:A:56:GLU:HA	1:A:97:TYR:O	2.11	0.51
1:A:112:LEU:CD2	1:B:27:VAL:HG22	2.40	0.51
1:C:108:MET:HE3	1:C:112:LEU:HG	1.93	0.50
1:C:94:LEU:HD23	1:C:94:LEU:N	2.26	0.50
1:C:78:ARG:O	1:C:79:THR:C	2.48	0.50
1:F:66:LEU:HB2	1:F:68:VAL:HG22	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:73:ALA:O	1:F:77:LEU:HD12	2.13	0.49
1:C:72:ASN:O	1:C:73:ALA:C	2.50	0.49
1:E:58:CYS:O	1:E:61:ASP:HB2	2.12	0.49
1:F:105:ARG:HG3	1:F:105:ARG:NH1	2.26	0.49
1:B:35:ILE:HD12	1:B:83:GLN:HB3	1.95	0.49
1:C:19:ARG:HG2	1:C:20:ILE:HD13	1.94	0.49
1:D:61:ASP:O	1:D:65:ILE:HG12	2.13	0.49
1:A:116:LYS:NZ	3:A:146:HOH:O	2.35	0.48
1:C:88:PHE:CD1	1:C:88:PHE:C	2.87	0.48
1:B:47:ILE:N	1:B:47:ILE:HD13	2.28	0.48
1:D:60:CYS:SG	1:D:70:ILE:HD13	2.54	0.48
1:E:44:ARG:HG3	1:E:76:HIS:HD2	1.79	0.48
1:B:110:ILE:N	1:B:110:ILE:HD13	2.28	0.48
1:A:44:ARG:NH1	1:A:76:HIS:CD2	2.76	0.48
1:B:27:VAL:HG13	1:B:29:ILE:HD13	1.89	0.48
1:B:10:PHE:CD2	1:B:14:GLU:HG3	2.49	0.47
1:C:60:CYS:HB2	1:D:12:TYR:CE2	2.49	0.47
1:D:38:ALA:O	1:D:44:ARG:HD2	2.14	0.47
1:C:13:ASP:O	1:C:17:VAL:HG23	2.14	0.47
1:E:20:ILE:O	1:E:23:ASP:HB2	2.14	0.47
1:F:49:TYR:C	1:F:49:TYR:CD1	2.87	0.47
1:D:14:GLU:O	1:D:18:ASN:HB2	2.15	0.47
1:B:58:CYS:O	1:B:62:ILE:HD12	2.15	0.47
1:F:58:CYS:SG	1:F:60:CYS:HB2	2.54	0.47
1:B:78:ARG:HD3	1:B:82:LYS:HD2	1.97	0.47
1:C:88:PHE:CE1	1:C:90:LYS:HE3	2.50	0.46
1:E:30:SER:HA	1:F:42:GLU:OE1	2.15	0.46
1:E:44:ARG:HG3	1:E:76:HIS:CD2	2.51	0.46
1:C:24:LEU:HD23	1:D:49:TYR:CD2	2.51	0.46
1:D:88:PHE:C	1:D:88:PHE:CD2	2.89	0.46
1:D:56:GLU:HA	1:D:97:TYR:O	2.16	0.46
1:E:63:ALA:O	1:E:67:GLY:N	2.49	0.46
1:E:55:GLU:O	1:E:98:SER:CB	2.63	0.46
1:B:10:PHE:CE2	1:B:14:GLU:HG3	2.51	0.45
1:E:70:ILE:HG22	1:E:70:ILE:O	2.16	0.45
1:A:9:ILE:HA	3:A:136:HOH:O	2.17	0.45
1:E:17:VAL:O	1:E:21:GLN:CB	2.59	0.45
1:E:29:ILE:CG2	1:E:29:ILE:O	2.65	0.45
1:C:24:LEU:CD2	1:D:49:TYR:CD2	2.99	0.45
1:A:39:ILE:HG22	1:A:39:ILE:O	2.16	0.45
1:E:27:VAL:HG21	1:F:49:TYR:CE2	2.52	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:85:VAL:HA	1:C:104:ILE:HD13	1.99	0.44
1:A:108:MET:HE3	1:A:112:LEU:HG	2.00	0.44
1:B:29:ILE:HG23	1:B:29:ILE:HD12	1.67	0.44
1:E:87:ASN:OD1	1:E:88:PHE:N	2.50	0.44
1:B:63:ALA:HB1	1:B:68:VAL:O	2.18	0.44
1:C:79:THR:O	1:C:82:LYS:HB3	2.17	0.44
1:C:114:HIS:CE1	1:D:104:ILE:HD11	2.52	0.44
1:E:59:VAL:HG23	1:E:73:ALA:O	2.18	0.44
1:E:63:ALA:HB1	1:E:68:VAL:O	2.18	0.44
1:C:62:ILE:H	1:C:62:ILE:HG12	1.59	0.43
1:E:40:ALA:O	1:E:41:ASP:C	2.55	0.43
1:B:89:ARG:O	1:B:89:ARG:HG3	2.18	0.43
1:C:108:MET:HE1	1:D:29:ILE:HD13	2.01	0.43
1:F:34:GLN:HG2	3:F:134:HOH:O	2.17	0.43
1:C:81:TYR:OH	1:C:88:PHE:HE2	1.91	0.43
1:D:35:ILE:O	1:D:38:ALA:HB3	2.19	0.43
1:F:38:ALA:HB2	1:F:83:GLN:HG3	2.01	0.42
1:A:35:ILE:HG13	1:A:83:GLN:HB3	2.00	0.42
3:A:149:HOH:O	1:B:27:VAL:HG23	2.19	0.42
1:C:115:LYS:HG2	1:D:31:GLY:HA3	2.01	0.42
1:D:42:GLU:O	1:D:46:LYS:HG3	2.19	0.42
1:B:58:CYS:SG	1:B:60:CYS:HB2	2.59	0.42
1:E:105:ARG:O	1:E:109:MET:HE2	2.19	0.42
1:D:106:GLN:O	1:D:107:ILE:C	2.57	0.42
1:A:108:MET:O	1:A:112:LEU:HG	2.19	0.42
1:F:35:ILE:O	1:F:35:ILE:HG13	2.19	0.42
1:A:88:PHE:HA	1:A:96:LEU:O	2.20	0.42
1:B:116:LYS:HB3	1:B:116:LYS:NZ	2.34	0.42
1:C:49:TYR:CD2	1:D:24:LEU:HD23	2.54	0.42
1:C:76:HIS:C	1:C:78:ARG:N	2.73	0.42
1:F:46:LYS:O	1:F:47:ILE:C	2.55	0.41
1:A:41:ASP:HB3	1:A:44:ARG:HB2	2.02	0.41
1:B:47:ILE:HD12	1:B:62:ILE:HG23	2.03	0.41
1:E:15:GLU:O	1:E:17:VAL:N	2.53	0.41
1:C:112:LEU:CD2	1:D:32:VAL:CG2	2.98	0.41
1:F:43:ASN:O	1:F:47:ILE:HD12	2.20	0.41
1:F:49:TYR:HD1	1:F:49:TYR:C	2.23	0.41
1:A:33:SER:HB3	1:B:40:ALA:O	2.20	0.41
1:A:115:LYS:HE2	1:B:35:ILE:HD11	2.03	0.41
1:F:85:VAL:HG13	1:F:104:ILE:HG21	2.03	0.41
1:D:10:PHE:CD2	1:D:11:GLY:N	2.86	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:105:ARG:O	1:F:109:MET:HG2	2.22	0.40
1:A:14:GLU:O	1:A:18:ASN:ND2	2.54	0.40
1:A:108:MET:CE	1:A:112:LEU:HG	2.52	0.40
1:C:64:ASN:HB3	1:D:17:VAL:HG21	2.04	0.40
1:D:33:SER:O	1:D:37:LYS:HB2	2.21	0.40

There are no symmetry-related clashes.

5.3　Torsion angles ⓘ

5.3.1　Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	103/122 (84%)	96 (93%)	7 (7%)	0	100	100
1	B	106/122 (87%)	100 (94%)	6 (6%)	0	100	100
1	C	99/122 (81%)	91 (92%)	7 (7%)	1 (1%)	15	17
1	D	96/122 (79%)	88 (92%)	7 (7%)	1 (1%)	15	17
1	E	97/122 (80%)	83 (86%)	7 (7%)	7 (7%)	1	0
1	F	98/122 (80%)	85 (87%)	9 (9%)	4 (4%)	3	1
All	All	599/732 (82%)	543 (91%)	43 (7%)	13 (2%)	6	5

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	23	ASP
1	E	24	LEU
1	E	73	ALA
1	E	16	LYS
1	F	65	ILE
1	F	100	GLY
1	E	72	ASN

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Mol	Chain	Res	Type
1	F	89	ARG
1	D	51	LEU
1	E	74	SER
1	E	115	LYS
1	F	82	LYS
1	C	73	ALA

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	86/103 (84%)	82 (95%)	4 (5%)	26	36
1	B	87/103 (84%)	77 (88%)	10 (12%)	5	6
1	C	85/103 (82%)	78 (92%)	7 (8%)	11	14
1	D	80/103 (78%)	72 (90%)	8 (10%)	7	8
1	E	73/103 (71%)	62 (85%)	11 (15%)	3	2
1	F	74/103 (72%)	64 (86%)	10 (14%)	4	3
All	All	485/618 (78%)	435 (90%)	50 (10%)	7	8

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	ILE
1	A	32	VAL
1	A	54	ASP
1	A	116	LYS
1	B	18	ASN
1	B	33	SER
1	B	41	ASP
1	B	47	ILE
1	B	54	ASP
1	B	72	ASN
1	B	78	ARG
1	B	109	MET

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Mol	Chain	Res	Type
1	B	116	LYS
1	B	117	GLU
1	C	74	SER
1	C	82	LYS
1	C	88	PHE
1	C	89	ARG
1	C	90	LYS
1	C	94	LEU
1	C	99	LEU
1	D	10	PHE
1	D	18	ASN
1	D	20	ILE
1	D	27	VAL
1	D	29	ILE
1	D	35	ILE
1	D	56	GLU
1	D	96	LEU
1	E	13	ASP
1	E	15	GLU
1	E	23	ASP
1	E	26	THR
1	E	54	ASP
1	E	72	ASN
1	E	74	SER
1	E	82	LYS
1	E	99	LEU
1	E	109	MET
1	E	117	GLU
1	F	10	PHE
1	F	16	LYS
1	F	27	VAL
1	F	29	ILE
1	F	35	ILE
1	F	39	ILE
1	F	49	TYR
1	F	53	GLN
1	F	87	ASN
1	F	117	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	76	HIS
1	B	72	ASN
1	C	114	HIS
1	D	43	ASN
1	E	76	HIS
1	F	43	ASN
1	F	53	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 5 ligands modelled in this entry, 5 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 (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 ⓘ

6.1 Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.