WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Oct 25, 2023 – 12:11 AM EDT

PDB ID : 2Z5C

Title : Crystal Structure of a Novel Chaperone Complex for Yeast 20S Proteasome Assembly

Authors : Yashiroda, H.; Mizushima, T.; Okamoto, K.; Kameyama, T.; Hayashi, H.; Kishimoto, T.; Kasahara, M.; Kurimoto, E.; Sakata, E.; Suzuki, A.; Hirano, Y.; Murata, S.; Kato, K.; Yamane, T.; Tanaka, K.

Deposited on : 2007-07-03

Resolution : 2.90 Å(reported)

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

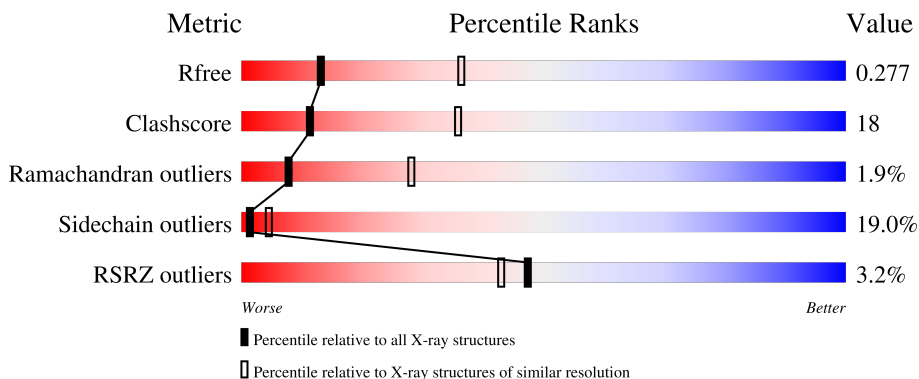|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.90 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.
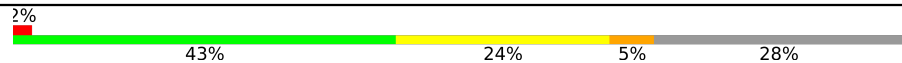
Metric	Percentile Ranks	Value
Rfree		0.277
Clashscore		18
Ramachandran outliers		1.9%
Sidechain outliers		19.0%
RSRZ outliers		3.2%

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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	151	3% / 44% 28% 8% • 18%
1	D	151	2% / 44% 27% 9% • 18%
2	B	149	3% / 36% 30% 5% 29%
2	E	149	3% / 40% 26% 5% 29%
3	C	262	2% / 42% 25% 5% 28%

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Mol	Chain	Length	Quality of chain
3	F	262	2% 43% 24% 5% 28%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 6598 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 Protein YPL144W.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	124	Total	C	N	O	S	0	0	0
			980	623	166	184	7			
1	D	124	Total	C	N	O	S	0	0	0
			980	623	166	184	7			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q12245
A	-1	SER	-	expression tag	UNP Q12245
A	0	HIS	-	expression tag	UNP Q12245
D	-2	GLY	-	expression tag	UNP Q12245
D	-1	SER	-	expression tag	UNP Q12245
D	0	HIS	-	expression tag	UNP Q12245

- Molecule 2 is a protein called Uncharacterized protein YLR021W.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	106	Total	C	N	O	S	0	0	0
			856	557	138	156	5			
2	E	106	Total	C	N	O	S	0	0	0
			856	557	138	156	5			

- Molecule 3 is a protein called Proteasome component PUP2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	189	Total	C	N	O	S	0	0	0
			1463	915	247	295	6			
3	F	189	Total	C	N	O	S	0	0	0
			1463	915	247	295	6			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-1	GLY	-	expression tag	UNP P32379
C	0	SER	-	expression tag	UNP P32379
F	-1	GLY	-	expression tag	UNP P32379
F	0	SER	-	expression tag	UNP P32379

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: Protein YPL144W

- Molecule 1: Protein YPL144W

- Molecule 2: Uncharacterized protein YLR021W

M176 Y177 A178 LYS

• Molecule 2: Uncharacterized protein YLR021W

Chain E:

3%

40%   26%   5%   29%

MET I2 S3 Y4 E5 F6 Q7 T8 H9 LEU PRO LYS GLY LYS ASP SER SER LEU ASN ALA SER SER GLU ASN K25 E26 L27 Y28 V29 Q30 A31 T32 H33 F34 N35 I38 L39 L40 Q41 L44 N45 S50 K57 G58 L59 ASN HIS LEU SER ASP Y95 Q96 T99 K108

V109 P110 V114 Q115 E118 L119 Y120 R121 R122 V123 I124 L125 P126 GLU VAL SER GLY THR MET ALA GLN ASP ASN MET G138 L141 L142 I143 S144 M145 K148 I149 W150 ARG ALA THR LYS GLU GLN SER ALA ASP ASP N161 K165 L166 V169 C172 I173 K174 D175 M176 Y177

A178 LYS

• Molecule 3: Proteasome component PUP2

Chain C:

2%

42%   25%   5%   28%

GLY SER MET PHE LEU THR ARG SER GLU TYR ASP ARG GLY VAL SER THR PHE SER PRO GLU GLY ARG LEU PHE GLN VAL GLU TYR SER LEU GLU ALA ILE LYS L33 G39 K43 E44 V47 L48 E51 K52 R53 ALA THR SER PRO LEU LEU GLU SER ASP SER ILE E65 K66
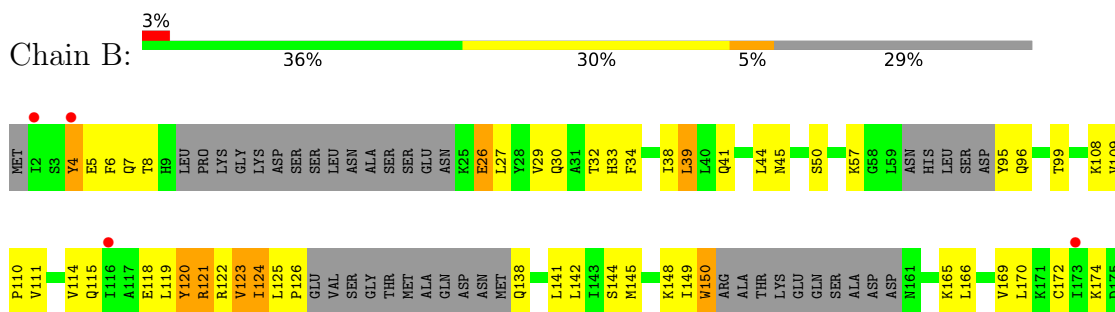
I67 V68 D71 R72 H73 I74 G75 C76 A77 M78 S79 GLY LEU T82 A83 D84 A85 R86 S87 M88 R93 V97 Y102 D106 S111 Q114 S115 V116 C117 D118 L119 A120 L121 R122 F123 GLY GLU GLY ALA SER GLY GLU GLU ARG LEU MET SER ARG PRO PHE GLY V140 A141

L142 H147 Q154 A158 E159 P160 Y165 R166 K170 A171 E182 L183 L184 N185 L193 K194 L198 L199 V200 L201 K202 I203 L204 K205 Q206 V207 M208 E209 E210 K211 L212 D213 E214 N215 N216 A217 Q218 L219 S220 C221 I222 T223 K224 F228 K229 N233 E234 K235 T236 A237

K241 E250 SER PRO GLU GLU ALA ASP VAL GLU MET SER

• Molecule 3: Proteasome component PUP2

Chain F:

2%

43%   24%   5%   28%

GLY SER MET PHE LEU THR ARG SER GLU TYR ASP ARG GLY VAL SER THR PHE SER PRO GLU GLY ARG LEU PHE GLN VAL GLU TYR SER LEU GLU ALA ILE LYS L33 G39 K43 E44 V47 L48 R53 ALA THR SER PRO LEU LEU GLU ASP SER ILE E65 K66 I67 V68

R72 H73 I74 G75 C76 A77 M78 S79 GLY LEU T82 A83 D84 A85 R86 S87 M88 I89 R93 V97 Y102 D106 V109 E110 S111 L112 T113 Q114 S115 V116 C117 D118 L119 A120 L121 R122 F123 GLY GLU GLY ALA SER GLY GLU GLU ARG LEU MET SER ARG PRO PHE GLY V140

A141 L142 L143 I144 H147 Q154 A158 E159 P160 F164 Y165 R166 E182 L183 L184 N185 L193 K194 L198 L199 V200 L201 K202 I203 L204 K205 Q206 V207 M208 E209 E210 K211 L212 D213 E214 N215 Q218 L219 S220 C221 I222 T223 K224 F228 K229 I230 Y231 D232 N233 E234 K235

T236 A237 K241 E250 SER PRO GLU GLU ALA ASP VAL GLU MET SER

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	158.69Å　　159.18Å　　65.03Å 90.00°　　　90.00°　　　90.00°	Depositor
Resolution (Å)	50.38　–　2.90 50.36　–　2.90	Depositor EDS
% Data completeness (in resolution range)	99.4 (50.38-2.90) 98.8 (50.36-2.90)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	5.81 (at 2.91Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.250　,　0.283 0.245　,　0.277	Depositor DCC
R_{free} test set	1859 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	66.1	Xtriage
Anisotropy	0.673	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 41.0	EDS
L-test for twinning [2]	$<|L|> = 0.47, <L^2> = 0.30$	Xtriage
Estimated twinning fraction	0.458 for k,h,-l	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	6598	wwPDB-VP
Average B, all atoms (Å^2)	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.72% 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 ⓘ

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	0.80	0/994	1.06	6/1341 (0.4%)
1	D	0.79	0/994	1.07	6/1341 (0.4%)
2	B	0.59	0/869	0.70	0/1169
2	E	0.60	0/869	0.70	0/1169
3	C	0.70	0/1478	0.80	0/1987
3	F	0.70	0/1478	0.81	0/1987
All	All	0.71	0/6682	0.87	12/8994 (0.1%)

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

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

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	67	ARG	NE-CZ-NH1	11.95	126.27	120.30
1	A	67	ARG	NE-CZ-NH2	9.56	125.08	120.30
1	A	67	ARG	NE-CZ-NH1	-8.47	116.06	120.30
1	D	67	ARG	NE-CZ-NH2	-7.27	116.66	120.30
1	A	67	ARG	CD-NE-CZ	6.27	132.38	123.60
1	A	27	LEU	CA-CB-CG	6.01	129.12	115.30
1	D	27	LEU	CA-CB-CG	5.94	128.96	115.30
1	A	146	LEU	CA-CB-CG	5.88	128.84	115.30
1	D	146	LEU	CA-CB-CG	5.79	128.61	115.30
1	D	56	LEU	CA-CB-CG	5.29	127.46	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	67	ARG	CD-NE-CZ	5.23	130.92	123.60
1	A	56	LEU	CA-CB-CG	5.21	127.29	115.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	53	SER	Peptide
1	D	53	SER	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	980	0	1011	35	0
1	D	980	0	1011	38	1
2	B	856	0	872	36	0
2	E	856	0	872	33	0
3	C	1463	0	1448	50	1
3	F	1463	0	1448	50	0
All	All	6598	0	6662	236	1

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 18.

All (236) 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:D:68:ASP:OD1	1:D:68:ASP:O	1.72	1.08
1:A:68:ASP:OD1	1:A:68:ASP:O	1.74	1.05
3:F:154:GLN:HE21	3:F:166:ARG:HH22	0.99	0.99
3:C:154:GLN:HE21	3:C:166:ARG:HH22	1.05	0.98
3:C:182:GLU:HG2	3:C:206:GLN:HE22	1.31	0.94
1:A:68:ASP:O	1:A:69:ARG:HG3	1.65	0.94
3:F:182:GLU:HG2	3:F:206:GLN:HE22	1.34	0.92

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:68:ASP:O	1:D:69:ARG:HG3	1.71	0.91
3:F:154:GLN:HE21	3:F:166:ARG:NH2	1.69	0.90
3:C:154:GLN:HE21	3:C:166:ARG:NH2	1.71	0.88
1:D:96:MET:HE1	1:D:131:HIS:HA	1.53	0.87
1:A:96:MET:HE1	1:A:131:HIS:HA	1.57	0.87
3:F:201:LEU:HD12	3:F:212:LEU:HD21	1.57	0.87
3:C:201:LEU:HD12	3:C:212:LEU:HD21	1.58	0.85
3:C:154:GLN:NE2	3:C:166:ARG:HH22	1.79	0.80
3:F:154:GLN:NE2	3:F:166:ARG:HH22	1.78	0.80
3:F:43:LYS:HD3	3:F:43:LYS:H	1.48	0.79
1:D:27:LEU:HB2	1:D:28:PRO:CD	2.13	0.78
3:C:43:LYS:H	3:C:43:LYS:HD3	1.50	0.77
1:A:27:LEU:HB2	1:A:28:PRO:CD	2.14	0.77
2:E:95:TYR:HD1	2:E:114:VAL:HG13	1.51	0.76
2:B:95:TYR:HD1	2:B:114:VAL:HG13	1.51	0.74
1:A:116:TRP:CZ2	1:A:127:LEU:HD11	2.22	0.74
1:D:96:MET:CE	1:D:131:HIS:HA	2.18	0.74
2:E:148:LYS:NZ	3:F:102:TYR:O	2.20	0.74
1:A:9:THR:HG22	1:A:22:ASP:OD2	1.89	0.73
2:B:148:LYS:NZ	3:C:102:TYR:O	2.22	0.72
1:A:96:MET:CE	1:A:131:HIS:HA	2.19	0.72
2:E:8:THR:HG21	2:E:172:CYS:SG	2.30	0.71
1:D:116:TRP:CZ2	1:D:127:LEU:HD11	2.25	0.71
2:B:8:THR:HG21	2:B:172:CYS:SG	2.30	0.70
3:C:73:HIS:CD2	3:C:106:ASP:HB3	2.27	0.70
3:F:73:HIS:CD2	3:F:106:ASP:HB3	2.26	0.70
1:D:9:THR:HG22	1:D:22:ASP:OD2	1.92	0.69
2:E:38:ILE:HG22	2:E:39:LEU:N	2.08	0.69
3:F:199:LEU:O	3:F:203:ILE:HG12	1.93	0.68
1:D:68:ASP:O	1:D:68:ASP:CG	2.31	0.68
2:B:8:THR:CG2	2:B:172:CYS:SG	2.82	0.67
2:E:8:THR:CG2	2:E:172:CYS:SG	2.82	0.67
1:D:27:LEU:HB2	1:D:28:PRO:HD2	1.75	0.67
2:B:38:ILE:HG22	2:B:39:LEU:N	2.10	0.67
3:C:44:GLU:HG3	3:C:193:LEU:HB2	1.76	0.66
1:A:68:ASP:O	1:A:68:ASP:CG	2.34	0.66
3:F:44:GLU:HG3	3:F:193:LEU:HB2	1.78	0.66
3:C:199:LEU:O	3:C:203:ILE:HG12	1.96	0.65
1:A:27:LEU:HB2	1:A:28:PRO:HD2	1.76	0.65
2:E:109:VAL:HB	2:E:110:PRO:HD3	1.79	0.64
2:E:38:ILE:HG22	2:E:39:LEU:H	1.63	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:38:ILE:HG22	2:B:39:LEU:H	1.64	0.63
1:D:58:CYS:HB2	1:D:88:THR:HG21	1.81	0.63
3:C:185:ASN:HD22	3:C:185:ASN:C	2.02	0.62
2:B:109:VAL:HB	2:B:110:PRO:HD3	1.80	0.62
2:E:95:TYR:CD1	2:E:114:VAL:HG13	2.34	0.62
3:F:75:GLY:HA3	3:F:228:PHE:CE1	2.35	0.61
1:A:58:CYS:HB2	1:A:88:THR:HG21	1.82	0.61
1:A:99:HIS:ND1	1:A:135:LEU:HD11	2.15	0.60
1:A:4:LYS:HE3	1:A:29:ALA:H	1.65	0.60
3:F:185:ASN:C	3:F:185:ASN:HD22	2.03	0.60
3:F:83:ALA:HB2	3:F:86:ARG:HH21	1.66	0.60
3:C:75:GLY:HA3	3:C:228:PHE:CE1	2.37	0.60
2:E:118:GLU:OE2	2:E:118:GLU:HA	2.02	0.59
2:B:95:TYR:CD1	2:B:114:VAL:HG13	2.35	0.59
3:C:182:GLU:HG2	3:C:206:GLN:NE2	2.11	0.59
2:B:118:GLU:HA	2:B:118:GLU:OE2	2.03	0.59
3:C:83:ALA:HB2	3:C:86:ARG:HH21	1.68	0.59
1:D:4:LYS:HE3	1:D:29:ALA:H	1.67	0.58
3:F:147:HIS:CE1	3:F:224:LYS:HG3	2.38	0.58
1:D:99:HIS:ND1	1:D:135:LEU:HD11	2.19	0.58
1:D:58:CYS:HB2	1:D:88:THR:CG2	2.34	0.58
3:F:142:LEU:HB2	3:F:158:ALA:HB3	1.85	0.58
2:E:6:PHE:HB2	2:E:176:MET:HB3	1.85	0.58
3:C:147:HIS:CE1	3:C:224:LYS:HG3	2.39	0.58
3:C:118:ASP:O	3:C:122:ARG:HG3	2.05	0.57
1:A:58:CYS:HB2	1:A:88:THR:CG2	2.34	0.57
1:A:99:HIS:CE1	1:A:103:ILE:HD13	2.39	0.57
1:D:99:HIS:CE1	1:D:103:ILE:HD13	2.40	0.57
3:F:88:MET:HG2	3:F:116:VAL:HG13	1.86	0.57
2:B:6:PHE:HB2	2:B:176:MET:HB3	1.86	0.57
2:E:120:TYR:O	2:E:122:ARG:N	2.38	0.57
1:A:4:LYS:HB3	1:A:27:LEU:O	2.05	0.57
3:F:118:ASP:O	3:F:122:ARG:HG3	2.05	0.56
3:F:182:GLU:HG2	3:F:206:GLN:NE2	2.13	0.56
3:F:84:ASP:OD1	3:F:84:ASP:N	2.39	0.55
2:E:26:GLU:H	2:E:45:ASN:ND2	2.04	0.55
3:C:83:ALA:HA	3:C:86:ARG:HE	1.72	0.55
2:B:120:TYR:O	2:B:122:ARG:N	2.40	0.55
1:D:4:LYS:HB3	1:D:27:LEU:O	2.06	0.55
1:D:68:ASP:OD1	1:D:68:ASP:C	2.45	0.55
3:C:142:LEU:HB2	3:C:158:ALA:HB3	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:88:MET:HG2	3:C:116:VAL:HG13	1.90	0.54
1:A:56:LEU:C	1:A:56:LEU:HD12	2.28	0.54
1:A:55:SER:HA	2:B:34:PHE:HB3	1.90	0.53
3:C:84:ASP:OD1	3:C:84:ASP:N	2.40	0.53
1:D:108:PHE:CD1	1:D:146:LEU:HD23	2.43	0.53
2:E:141:LEU:HD12	2:E:142:LEU:N	2.24	0.53
3:F:220:SER:HB2	3:F:229:LYS:O	2.10	0.52
3:F:123:PHE:CD2	3:F:123:PHE:N	2.73	0.52
1:D:56:LEU:HD12	1:D:56:LEU:C	2.30	0.52
2:E:38:ILE:CG2	2:E:39:LEU:N	2.73	0.52
3:F:93:ARG:O	3:F:97:VAL:HG23	2.10	0.52
2:B:123:VAL:O	2:B:123:VAL:HG13	2.10	0.51
2:E:123:VAL:O	2:E:123:VAL:HG13	2.11	0.51
2:B:26:GLU:H	2:B:45:ASN:ND2	2.08	0.51
2:E:38:ILE:CG2	2:E:39:LEU:H	2.22	0.51
1:A:108:PHE:CD1	1:A:146:LEU:HD23	2.45	0.51
3:C:123:PHE:H	3:C:123:PHE:HD2	1.57	0.51
1:D:63:ILE:HG13	1:D:64:PRO:HD2	1.92	0.51
1:A:45:LYS:HG3	1:A:46:GLN:H	1.75	0.51
2:B:141:LEU:HD12	2:B:142:LEU:N	2.25	0.51
1:D:55:SER:HA	2:E:34:PHE:HB3	1.91	0.51
1:A:83:ILE:HG12	1:A:84:PRO:HD2	1.93	0.51
1:A:68:ASP:OD1	1:A:68:ASP:C	2.47	0.50
2:E:99:THR:O	3:F:122:ARG:NH1	2.45	0.50
1:D:99:HIS:ND1	1:D:103:ILE:HD13	2.25	0.50
3:C:123:PHE:CD2	3:C:123:PHE:N	2.72	0.50
2:B:8:THR:HG22	2:B:172:CYS:SG	2.52	0.50
3:F:83:ALA:HA	3:F:86:ARG:HE	1.76	0.50
2:B:99:THR:O	3:C:122:ARG:NH1	2.45	0.49
3:C:72:ARG:O	3:C:228:PHE:N	2.43	0.49
1:A:45:LYS:HG3	1:A:46:GLN:N	2.28	0.49
2:E:8:THR:HG22	2:E:172:CYS:SG	2.52	0.49
2:B:32:THR:HG22	2:B:34:PHE:CE2	2.47	0.49
2:E:115:GLN:HG3	2:E:166:LEU:HD21	1.94	0.49
3:C:93:ARG:O	3:C:97:VAL:HG23	2.12	0.49
1:A:63:ILE:HG13	1:A:64:PRO:HD2	1.93	0.49
3:C:220:SER:HB2	3:C:229:LYS:O	2.11	0.49
1:D:83:ILE:HG12	1:D:84:PRO:HD2	1.95	0.49
3:F:67:ILE:HD12	3:F:218:GLN:HE21	1.78	0.48
3:F:213:ASP:C	3:F:215:ASN:H	2.17	0.48
3:C:205:LYS:HB2	3:C:212:LEU:HD22	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:34:LYS:O	1:D:34:LYS:HG3	2.13	0.48
2:B:38:ILE:CG2	2:B:39:LEU:H	2.24	0.48
2:B:38:ILE:CG2	2:B:39:LEU:N	2.74	0.48
3:F:73:HIS:NE2	3:F:106:ASP:HB3	2.28	0.48
3:F:78:MET:HE2	3:F:142:LEU:HD21	1.96	0.48
1:D:45:LYS:HG3	1:D:46:GLN:H	1.77	0.48
1:A:34:LYS:O	1:A:34:LYS:HG3	2.13	0.48
1:A:6:ILE:HG13	1:A:6:ILE:O	2.13	0.48
1:D:61:TYR:HB2	1:D:85:LEU:HD22	1.95	0.48
1:A:116:TRP:CE2	1:A:127:LEU:HD11	2.49	0.48
3:F:72:ARG:O	3:F:228:PHE:N	2.44	0.48
3:F:83:ALA:CB	3:F:86:ARG:HH21	2.26	0.47
3:C:83:ALA:CB	3:C:86:ARG:HH21	2.27	0.47
2:E:44:LEU:HD13	2:E:149:ILE:HG12	1.96	0.47
3:F:204:LEU:O	3:F:208:MET:HB2	2.14	0.47
2:E:32:THR:HG22	2:E:34:PHE:CE2	2.50	0.47
2:E:119:LEU:HG	2:E:124:ILE:HD12	1.96	0.47
3:F:205:LYS:HB2	3:F:212:LEU:HD22	1.96	0.47
3:C:213:ASP:C	3:C:215:ASN:H	2.18	0.47
1:A:92:ARG:HD2	1:A:128:VAL:HG22	1.97	0.47
2:B:119:LEU:HG	2:B:124:ILE:HD12	1.97	0.47
1:D:6:ILE:O	1:D:6:ILE:HG13	2.13	0.47
1:D:116:TRP:CE2	1:D:127:LEU:HD11	2.50	0.47
3:C:204:LEU:O	3:C:208:MET:HB2	2.15	0.47
3:C:73:HIS:NE2	3:C:106:ASP:HB3	2.30	0.47
1:D:42:VAL:O	1:D:116:TRP:CE3	2.67	0.46
3:C:67:ILE:HD12	3:C:218:GLN:HE21	1.80	0.46
1:D:92:ARG:HD2	1:D:128:VAL:HG22	1.97	0.46
1:A:99:HIS:ND1	1:A:103:ILE:HD13	2.30	0.46
2:B:119:LEU:HD11	2:B:174:LYS:HD2	1.98	0.46
3:F:123:PHE:H	3:F:123:PHE:HD2	1.59	0.46
2:E:141:LEU:HD12	2:E:142:LEU:H	1.80	0.46
1:A:61:TYR:HB2	1:A:85:LEU:HD22	1.97	0.46
1:A:45:LYS:CG	1:A:46:GLN:N	2.79	0.45
1:D:45:LYS:HG3	1:D:46:GLN:N	2.31	0.45
3:F:219:LEU:HB3	3:F:231:TYR:CD2	2.51	0.45
3:F:43:LYS:HD3	3:F:43:LYS:N	2.24	0.45
3:F:213:ASP:O	3:F:215:ASN:N	2.50	0.45
3:F:78:MET:CE	3:F:142:LEU:HD21	2.46	0.45
1:A:85:LEU:HD12	1:A:85:LEU:HA	1.81	0.45
2:B:115:GLN:HG3	2:B:166:LEU:HD21	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:45:LYS:CG	1:D:46:GLN:N	2.79	0.45
2:E:145:MET:CE	2:E:150:TRP:HE1	2.29	0.45
3:F:185:ASN:C	3:F:185:ASN:ND2	2.70	0.45
1:A:130:ASN:O	1:A:134:ILE:HG13	2.16	0.44
2:B:29:VAL:HG21	2:B:172:CYS:HB3	1.99	0.44
3:C:71:ASP:OD1	3:C:72:ARG:N	2.45	0.44
1:A:42:VAL:O	1:A:116:TRP:CE3	2.70	0.44
1:A:27:LEU:CB	1:A:28:PRO:CD	2.89	0.44
2:B:141:LEU:HD12	2:B:142:LEU:H	1.82	0.44
3:C:222:ILE:HG22	3:C:228:PHE:HD1	1.82	0.44
1:D:105:SER:OG	1:D:110:ARG:O	2.23	0.44
3:C:185:ASN:C	3:C:185:ASN:ND2	2.69	0.43
2:B:4:TYR:CD2	2:B:4:TYR:N	2.87	0.43
2:E:119:LEU:HD11	2:E:174:LYS:HD2	2.00	0.43
2:B:145:MET:CE	2:B:150:TRP:HE1	2.32	0.43
3:C:213:ASP:O	3:C:215:ASN:N	2.51	0.43
2:E:50:SER:O	2:E:144:SER:HA	2.19	0.43
3:C:78:MET:CE	3:C:142:LEU:HD21	2.47	0.43
3:C:233:ASN:O	3:C:237:ALA:HB2	2.18	0.43
2:E:4:TYR:N	2:E:4:TYR:CD2	2.86	0.43
3:F:89:ILE:O	3:F:93:ARG:HG3	2.18	0.43
3:C:211:LYS:HG2	3:C:212:LEU:H	1.84	0.43
3:C:170:LYS:HG3	3:C:171:ALA:N	2.33	0.42
3:F:233:ASN:O	3:F:237:ALA:HB2	2.19	0.42
2:E:27:LEU:HD21	2:E:169:VAL:HG22	2.01	0.42
2:E:29:VAL:HG21	2:E:172:CYS:HB3	2.00	0.42
2:E:30:GLN:OE1	2:E:41:GLN:NE2	2.52	0.42
1:D:80:VAL:HG21	1:D:105:SER:HB3	2.01	0.42
3:F:234:GLU:O	3:F:235:LYS:C	2.58	0.42
2:B:123:VAL:O	2:B:123:VAL:CG1	2.66	0.42
1:D:85:LEU:HD12	1:D:85:LEU:HA	1.84	0.42
3:C:78:MET:HE2	3:C:142:LEU:HD21	2.01	0.42
3:C:201:LEU:HD13	3:C:201:LEU:HA	1.82	0.42
1:D:66:MET:H	1:D:69:ARG:HH21	1.67	0.42
1:D:99:HIS:CE1	1:D:103:ILE:CD1	3.02	0.42
3:F:113:THR:HG23	3:F:144:ILE:HD12	2.02	0.42
3:C:52:LYS:HB3	3:C:216:ASN:HA	2.02	0.42
3:C:234:GLU:O	3:C:235:LYS:C	2.58	0.41
1:D:7:SER:O	1:D:8:ARG:HG2	2.19	0.41
3:F:222:ILE:HG22	3:F:228:PHE:HD1	1.84	0.41
2:B:125:LEU:HA	2:B:126:PRO:HA	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:F:39:GLY:HA2	3:F:47:VAL:O	2.20	0.41
2:B:30:GLN:OE1	2:B:41:GLN:NE2	2.53	0.41
3:C:44:GLU:O	3:C:193:LEU:HB2	2.21	0.41
3:F:203:ILE:HG12	3:F:203:ILE:H	1.59	0.41
3:F:201:LEU:HD13	3:F:201:LEU:HA	1.83	0.41
1:A:80:VAL:HG21	1:A:105:SER:HB3	2.02	0.41
3:C:154:GLN:HG2	3:C:166:ARG:HH21	1.84	0.41
3:F:117:CYS:SG	3:F:164:PHE:HB3	2.61	0.41
2:B:50:SER:O	2:B:144:SER:HA	2.21	0.41
2:E:33:HIS:CE1	2:E:38:ILE:HG12	2.56	0.41
1:D:27:LEU:CB	1:D:28:PRO:CD	2.88	0.41
2:B:44:LEU:HD13	2:B:149:ILE:HG12	2.03	0.41
3:C:39:GLY:HA2	3:C:47:VAL:O	2.21	0.41
2:B:27:LEU:HD21	2:B:169:VAL:HG22	2.02	0.41
2:B:111:VAL:O	2:B:115:GLN:HG2	2.20	0.41
2:B:119:LEU:HD22	2:B:170:LEU:HG	2.03	0.41
3:C:51:GLU:HG3	3:C:208:MET:SD	2.61	0.41
3:C:140:VAL:HG22	3:C:160:PRO:HB3	2.02	0.41
3:F:44:GLU:O	3:F:193:LEU:HB2	2.21	0.41
3:F:140:VAL:HG22	3:F:160:PRO:HB3	2.02	0.41
2:B:33:HIS:CE1	2:B:38:ILE:HG12	2.56	0.40
3:F:194:LYS:O	3:F:198:LEU:HD12	2.21	0.40
2:E:123:VAL:O	2:E:123:VAL:CG1	2.67	0.40
3:C:194:LYS:O	3:C:198:LEU:HD12	2.22	0.40

All (1) 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)
3:C:106:ASP:OD2	1:D:67:ARG:NH2[1_554]	2.06	0.14

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	114/151 (76%)	100 (88%)	11 (10%)	3 (3%)	5	20
1	D	114/151 (76%)	100 (88%)	11 (10%)	3 (3%)	5	20
2	B	96/149 (64%)	83 (86%)	10 (10%)	3 (3%)	4	16
2	E	96/149 (64%)	80 (83%)	13 (14%)	3 (3%)	4	16
3	C	181/262 (69%)	167 (92%)	12 (7%)	2 (1%)	14	42
3	F	181/262 (69%)	166 (92%)	14 (8%)	1 (1%)	25	58
All	All	782/1124 (70%)	696 (89%)	71 (9%)	15 (2%)	8	28

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	121	ARG
2	B	123	VAL
2	E	121	ARG
2	E	123	VAL
1	A	29	ALA
2	B	120	TYR
1	D	29	ALA
2	E	120	TYR
1	A	122	GLU
3	C	214	GLU
3	F	214	GLU
1	A	120	PRO
1	D	120	PRO
1	D	122	GLU
3	C	74	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	115/137 (84%)	85 (74%)	30 (26%)	0	1

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles		
1	D	115/137 (84%)	86 (75%)	29 (25%)	0	2	
2	B	98/135 (73%)	85 (87%)	13 (13%)	4	11	
2	E	98/135 (73%)	86 (88%)	12 (12%)	5	15	
3	C	155/216 (72%)	126 (81%)	29 (19%)	1	5	
3	F	155/216 (72%)	128 (83%)	27 (17%)	2	6	
All	All	736/976 (75%)	596 (81%)	140 (19%)	1	4	

All (140) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	LYS
1	A	5	THR
1	A	10	ILE
1	A	21	LEU
1	A	27	LEU
1	A	39	SER
1	A	47	GLU
1	A	54	SER
1	A	56	LEU
1	A	66	MET
1	A	67	ARG
1	A	68	ASP
1	A	78	SER
1	A	80	VAL
1	A	81	VAL
1	A	83	ILE
1	A	85	LEU
1	A	88	THR
1	A	105	SER
1	A	107	ARG
1	A	112	CYS
1	A	118	SER
1	A	119	LEU
1	A	120	PRO
1	A	125	SER
1	A	127	LEU
1	A	135	LEU
1	A	139	LEU
1	A	142	LEU
1	A	146	LEU

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Mol	Chain	Res	Type
2	B	4	TYR
2	B	5	GLU
2	B	7	GLN
2	B	26	GLU
2	B	39	LEU
2	B	57	LYS
2	B	96	GLN
2	B	108	LYS
2	B	121	ARG
2	B	124	ILE
2	B	138	GLN
2	B	150	TRP
2	B	165	LYS
3	C	43	LYS
3	C	48	LEU
3	C	53	ARG
3	C	68	VAL
3	C	72	ARG
3	C	76	CYS
3	C	79	SER
3	C	84	ASP
3	C	87	SER
3	C	111	SER
3	C	114	GLN
3	C	115	SER
3	C	118	ASP
3	C	119	LEU
3	C	121	LEU
3	C	123	PHE
3	C	184	LEU
3	C	185	ASN
3	C	198	LEU
3	C	199	LEU
3	C	201	LEU
3	C	208	MET
3	C	210	GLU
3	C	215	ASN
3	C	219	LEU
3	C	222	ILE
3	C	223	THR
3	C	234	GLU
3	C	241	LYS

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Mol	Chain	Res	Type
1	D	4	LYS
1	D	5	THR
1	D	10	ILE
1	D	21	LEU
1	D	27	LEU
1	D	39	SER
1	D	47	GLU
1	D	54	SER
1	D	56	LEU
1	D	66	MET
1	D	68	ASP
1	D	78	SER
1	D	80	VAL
1	D	81	VAL
1	D	83	ILE
1	D	85	LEU
1	D	88	THR
1	D	105	SER
1	D	107	ARG
1	D	112	CYS
1	D	119	LEU
1	D	120	PRO
1	D	125	SER
1	D	127	LEU
1	D	128	VAL
1	D	135	LEU
1	D	139	LEU
1	D	142	LEU
1	D	146	LEU
2	E	4	TYR
2	E	5	GLU
2	E	26	GLU
2	E	39	LEU
2	E	57	LYS
2	E	96	GLN
2	E	108	LYS
2	E	121	ARG
2	E	124	ILE
2	E	138	GLN
2	E	150	TRP
2	E	165	LYS
3	F	43	LYS

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Mol	Chain	Res	Type
3	F	48	LEU
3	F	53	ARG
3	F	68	VAL
3	F	72	ARG
3	F	76	CYS
3	F	79	SER
3	F	84	ASP
3	F	87	SER
3	F	111	SER
3	F	114	GLN
3	F	115	SER
3	F	119	LEU
3	F	121	LEU
3	F	123	PHE
3	F	184	LEU
3	F	185	ASN
3	F	198	LEU
3	F	199	LEU
3	F	201	LEU
3	F	208	MET
3	F	210	GLU
3	F	219	LEU
3	F	222	ILE
3	F	223	THR
3	F	234	GLU
3	F	241	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	7	GLN
2	B	45	ASN
3	C	114	GLN
3	C	154	GLN
3	C	185	ASN
3	C	206	GLN
3	C	218	GLN
2	E	7	GLN
2	E	45	ASN
2	E	96	GLN
3	F	114	GLN
3	F	154	GLN

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Mol	Chain	Res	Type
3	F	185	ASN
3	F	206	GLN
3	F	218	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 ⓘ

There are no ligands in this entry.

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 (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, 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	124/151 (82%)	0.41	4 (3%)	47	43	39, 59, 74, 84	0
1	D	124/151 (82%)	0.38	3 (2%)	59	56	39, 59, 74, 84	0
2	B	106/149 (71%)	0.60	5 (4%)	31	28	53, 73, 99, 102	0
2	E	106/149 (71%)	0.64	4 (3%)	40	36	53, 73, 99, 102	0
3	C	189/262 (72%)	0.41	5 (2%)	56	52	39, 61, 97, 109	0
3	F	189/262 (72%)	0.40	6 (3%)	47	43	39, 61, 97, 109	0
All	All	838/1124 (74%)	0.46	27 (3%)	47	43	39, 64, 97, 109	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	E	178	ALA	6.3
1	A	78	SER	5.7
2	B	178	ALA	5.1
1	D	78	SER	3.3
3	C	88	MET	2.7
2	E	35	ASN	2.6
2	E	173	ILE	2.5
2	B	173	ILE	2.5
3	F	88	MET	2.3
2	B	116	ILE	2.3
1	A	135	LEU	2.3
3	F	116	VAL	2.3
3	F	219	LEU	2.2
1	A	23	VAL	2.2
1	D	23	VAL	2.1
2	E	2	ILE	2.1
3	C	76	CYS	2.1
2	B	2	ILE	2.1
3	C	117	CYS	2.1

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Mol	Chain	Res	Type	RSRZ
3	F	109	VAL	2.1
1	D	80	VAL	2.0
3	F	140	VAL	2.0
3	C	116	VAL	2.0
2	B	4	TYR	2.0
3	C	165	TYR	2.0
1	A	80	VAL	2.0
3	F	68	VAL	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 ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.