



wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 4, 2024 – 05:48 PM EST

PDB ID : 2IJC
Title : Structure of a Conserved Protein of Unknown Function PA0269 from *Pseudomonas aeruginosa*
Authors : Binkowski, T.A.; Xu, X.; Savchenko, A.; Edwards, A.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2006-09-29
Resolution : 2.05 Å(reported)

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

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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>.

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

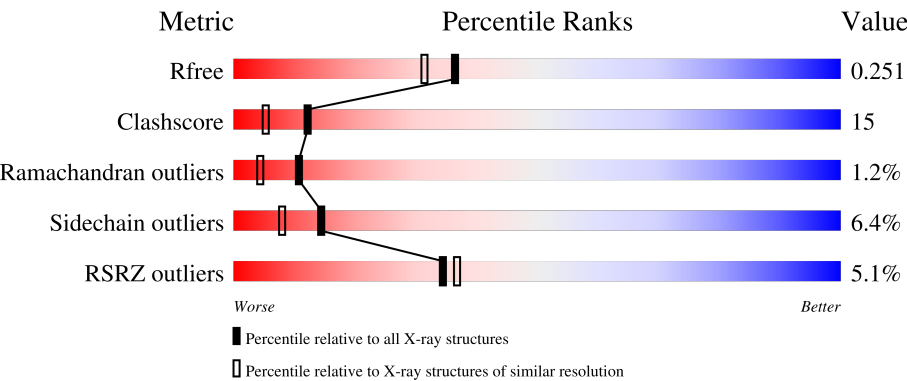
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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 2.05 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}	164625	2096 (2.04-2.04)
Clashscore	180529	2229 (2.04-2.04)
Ramachandran outliers	177936	2217 (2.04-2.04)
Sidechain outliers	177891	2217 (2.04-2.04)
RSRZ outliers	164620	2096 (2.04-2.04)

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 $\leq 5\%$. 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	145	<div><div>3%</div><div><div></div><div>74%</div><div>19%</div><div></div></div><div></div></div>
1	B	145	<div><div>3%</div><div><div></div><div>76%</div><div>20%</div><div></div></div><div></div></div>
1	C	145	<div><div>3%</div><div><div></div><div>72%</div><div>23%</div><div></div></div><div></div></div>
1	D	145	<div><div>4%</div><div><div></div><div>71%</div><div>20%</div><div></div></div><div></div></div>
1	E	145	<div><div>2%</div><div><div></div><div>79%</div><div>13%</div><div></div></div><div></div></div>

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Mol	Chain	Length	Quality of chain
1	F	145	
1	G	145	
1	H	145	
1	I	145	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 10887 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 Hypothetical protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	143	Total	C	N	O	S	Se	0	0	0
			1119	705	200	207	3	4			
1	B	142	Total	C	N	O	S	Se	0	0	0
			1112	701	199	205	3	4			
1	C	142	Total	C	N	O	S	Se	0	0	0
			1112	701	199	205	3	4			
1	D	142	Total	C	N	O	S	Se	0	0	0
			1112	701	199	205	3	4			
1	E	142	Total	C	N	O	S	Se	0	0	0
			1112	701	199	205	3	4			
1	F	144	Total	C	N	O	S	Se	0	0	0
			1127	710	201	208	3	5			
1	G	142	Total	C	N	O	S	Se	0	0	0
			1112	701	199	205	3	4			
1	H	142	Total	C	N	O	S	Se	0	0	0
			1112	701	199	205	3	4			
1	I	145	Total	C	N	O	S	Se	0	0	0
			1136	715	202	211	3	5			

There are 45 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	MET	modified residue	UNP Q9I6M1
A	18	MSE	MET	modified residue	UNP Q9I6M1
A	54	MSE	MET	modified residue	UNP Q9I6M1
A	140	MSE	MET	modified residue	UNP Q9I6M1
A	142	MSE	MET	modified residue	UNP Q9I6M1
B	1	MSE	MET	modified residue	UNP Q9I6M1
B	18	MSE	MET	modified residue	UNP Q9I6M1
B	54	MSE	MET	modified residue	UNP Q9I6M1
B	140	MSE	MET	modified residue	UNP Q9I6M1
B	142	MSE	MET	modified residue	UNP Q9I6M1
C	1	MSE	MET	modified residue	UNP Q9I6M1

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Chain	Residue	Modelled	Actual	Comment	Reference
C	18	MSE	MET	modified residue	UNP Q9I6M1
C	54	MSE	MET	modified residue	UNP Q9I6M1
C	140	MSE	MET	modified residue	UNP Q9I6M1
C	142	MSE	MET	modified residue	UNP Q9I6M1
D	1	MSE	MET	modified residue	UNP Q9I6M1
D	18	MSE	MET	modified residue	UNP Q9I6M1
D	54	MSE	MET	modified residue	UNP Q9I6M1
D	140	MSE	MET	modified residue	UNP Q9I6M1
D	142	MSE	MET	modified residue	UNP Q9I6M1
E	1	MSE	MET	modified residue	UNP Q9I6M1
E	18	MSE	MET	modified residue	UNP Q9I6M1
E	54	MSE	MET	modified residue	UNP Q9I6M1
E	140	MSE	MET	modified residue	UNP Q9I6M1
E	142	MSE	MET	modified residue	UNP Q9I6M1
F	1	MSE	MET	modified residue	UNP Q9I6M1
F	18	MSE	MET	modified residue	UNP Q9I6M1
F	54	MSE	MET	modified residue	UNP Q9I6M1
F	140	MSE	MET	modified residue	UNP Q9I6M1
F	142	MSE	MET	modified residue	UNP Q9I6M1
G	1	MSE	MET	modified residue	UNP Q9I6M1
G	18	MSE	MET	modified residue	UNP Q9I6M1
G	54	MSE	MET	modified residue	UNP Q9I6M1
G	140	MSE	MET	modified residue	UNP Q9I6M1
G	142	MSE	MET	modified residue	UNP Q9I6M1
H	1	MSE	MET	modified residue	UNP Q9I6M1
H	18	MSE	MET	modified residue	UNP Q9I6M1
H	54	MSE	MET	modified residue	UNP Q9I6M1
H	140	MSE	MET	modified residue	UNP Q9I6M1
H	142	MSE	MET	modified residue	UNP Q9I6M1
I	1	MSE	MET	modified residue	UNP Q9I6M1
I	18	MSE	MET	modified residue	UNP Q9I6M1
I	54	MSE	MET	modified residue	UNP Q9I6M1
I	140	MSE	MET	modified residue	UNP Q9I6M1
I	142	MSE	MET	modified residue	UNP Q9I6M1

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	98	Total O 98 98	0	0
2	B	88	Total O 88 88	0	0

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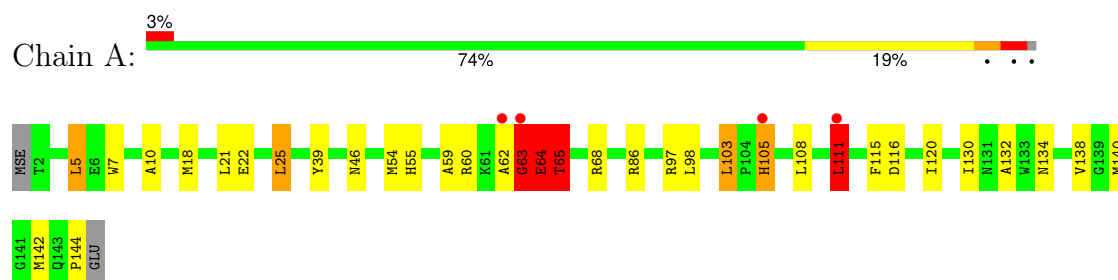
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	C	85	Total 85	O 85	0	0
2	D	120	Total 120	O 120	0	0
2	E	102	Total 102	O 102	0	0
2	F	106	Total 106	O 106	0	0
2	G	79	Total 79	O 79	0	0
2	H	80	Total 80	O 80	0	0
2	I	75	Total 75	O 75	0	0

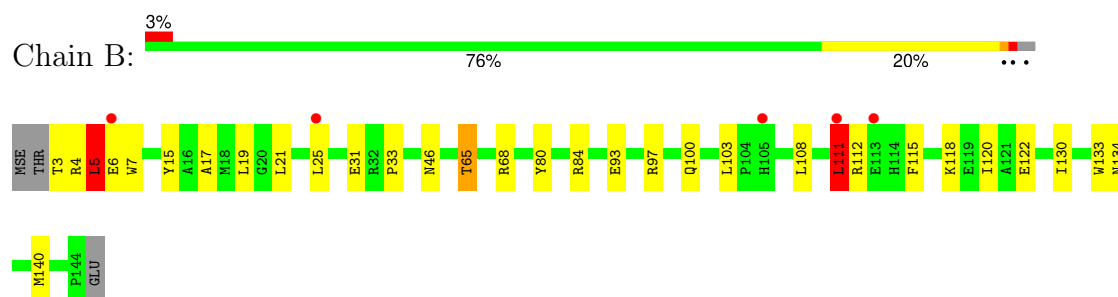
3 Residue-property plots [i](#)

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.

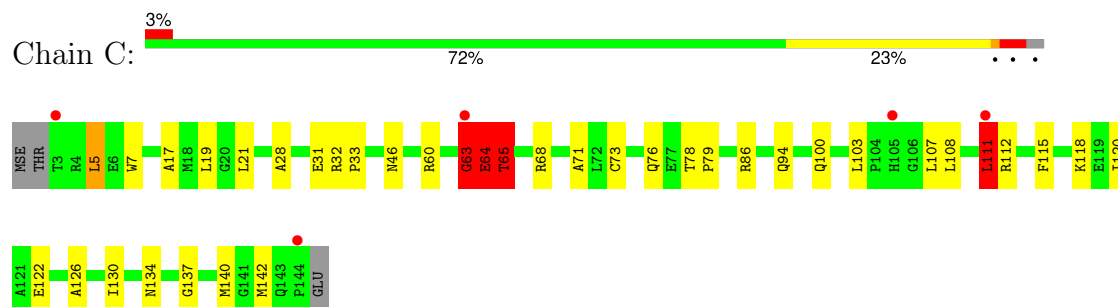
- Molecule 1: Hypothetical protein



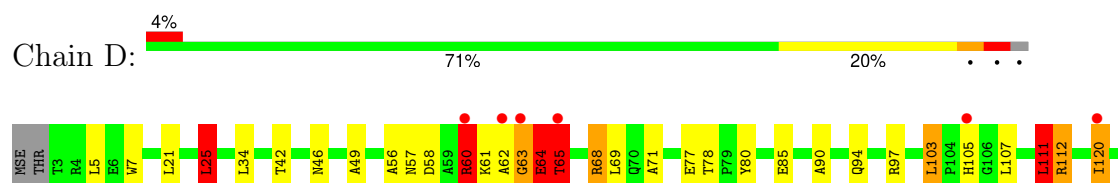
- Molecule 1: Hypothetical protein

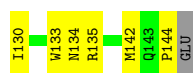


- Molecule 1: Hypothetical protein

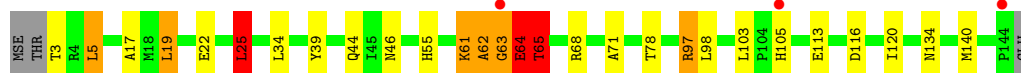
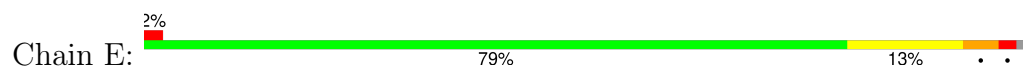


- Molecule 1: Hypothetical protein

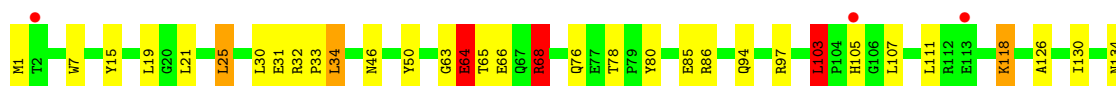




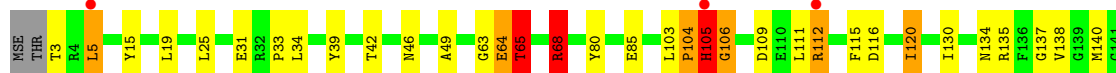
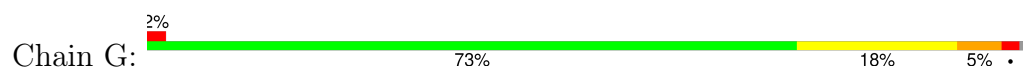
- Molecule 1: Hypothetical protein



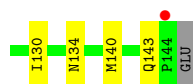
- Molecule 1: Hypothetical protein



- Molecule 1: Hypothetical protein

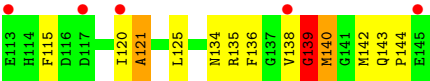


- Molecule 1: Hypothetical protein



- Molecule 1: Hypothetical protein





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	183.51Å 76.72Å 109.01Å 90.00° 119.30° 90.00°	Depositor
Resolution (Å)	34.59 – 2.05 34.59 – 2.05	Depositor EDS
% Data completeness (in resolution range)	97.2 (34.59-2.05) 97.5 (34.59-2.05)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.43 (at 2.05Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.190 , 0.253 0.196 , 0.251	Depositor DCC
R_{free} test set	4068 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	23.8	Xtriage
Anisotropy	0.905	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 44.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	10887	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 19.21% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

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	0.75	0/1138	0.89	6/1537 (0.4%)
1	B	0.80	0/1131	0.77	2/1527 (0.1%)
1	C	0.70	0/1131	0.84	6/1527 (0.4%)
1	D	0.81	0/1131	0.94	7/1527 (0.5%)
1	E	0.85	0/1131	0.88	7/1527 (0.5%)
1	F	0.84	0/1146	0.89	5/1547 (0.3%)
1	G	0.83	1/1131 (0.1%)	0.89	6/1527 (0.4%)
1	H	0.69	0/1131	0.80	2/1527 (0.1%)
1	I	0.81	1/1155 (0.1%)	0.91	5/1559 (0.3%)
All	All	0.79	2/10225 (0.0%)	0.87	46/13805 (0.3%)

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	3
1	C	0	2
1	D	0	3
1	E	0	1
1	F	0	2
1	G	0	2
1	H	0	1
1	I	3	5
All	All	3	19

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	8	ALA	CA-CB	7.57	1.68	1.52
1	G	142	MSE	CG-SE	-5.34	1.77	1.95

The worst 5 of 46 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	68	ARG	NE-CZ-NH2	-11.00	114.80	120.30
1	G	65	THR	N-CA-C	-10.47	82.72	111.00
1	C	65	THR	N-CA-C	-10.22	83.40	111.00
1	I	8	ALA	N-CA-C	9.21	135.88	111.00
1	F	68	ARG	NE-CZ-NH2	-8.76	115.92	120.30

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	I	9	LYS	CA
1	I	10	ALA	CA
1	I	140	MSE	CA

5 of 19 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	62	ALA	Peptide
1	A	63	GLY	Peptide
1	A	64	GLU	Peptide
1	C	63	GLY	Peptide
1	C	64	GLU	Peptide

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	1119	0	1106	35	0
1	B	1112	0	1099	27	0
1	C	1112	0	1099	34	0
1	D	1112	0	1099	60	0
1	E	1112	0	1099	27	0
1	F	1127	0	1118	35	0
1	G	1112	0	1099	42	0
1	H	1112	0	1099	35	0
1	I	1136	0	1124	43	0
2	A	98	0	0	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	88	0	0	1	0
2	C	85	0	0	3	0
2	D	120	0	0	6	0
2	E	102	0	0	6	0
2	F	106	0	0	3	0
2	G	79	0	0	2	0
2	H	80	0	0	5	0
2	I	75	0	0	2	0
All	All	10887	0	9942	306	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 15.

The worst 5 of 306 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:G:105:HIS:CB	1:G:106:GLY:HA3	1.45	1.41
1:D:60:ARG:NH2	1:F:66:GLU:HB3	1.33	1.39
1:A:25:LEU:HB3	2:A:201:HOH:O	1.42	1.14
1:D:7:TRP:NE1	1:D:142:MSE:HE1	1.63	1.11
1:G:105:HIS:CB	1:G:106:GLY:CA	2.30	1.09

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	141/145 (97%)	138 (98%)	2 (1%)	1 (1%)	19	11
1	B	140/145 (97%)	135 (96%)	5 (4%)	0	100	100
1	C	140/145 (97%)	136 (97%)	2 (1%)	2 (1%)	9	3

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	140/145 (97%)	131 (94%)	8 (6%)	1 (1%)	19	11
1	E	140/145 (97%)	136 (97%)	1 (1%)	3 (2%)	5	1
1	F	142/145 (98%)	139 (98%)	2 (1%)	1 (1%)	19	11
1	G	140/145 (97%)	137 (98%)	2 (1%)	1 (1%)	19	11
1	H	140/145 (97%)	130 (93%)	9 (6%)	1 (1%)	19	11
1	I	143/145 (99%)	125 (87%)	13 (9%)	5 (4%)	3	0
All	All	1266/1305 (97%)	1207 (95%)	44 (4%)	15 (1%)	11	4

5 of 15 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	64	GLU
1	C	64	GLU
1	E	62	ALA
1	H	102	ALA
1	I	9	LYS

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	112/109 (103%)	106 (95%)	6 (5%)	18	11
1	B	111/109 (102%)	105 (95%)	6 (5%)	18	11
1	C	111/109 (102%)	107 (96%)	4 (4%)	30	25
1	D	111/109 (102%)	102 (92%)	9 (8%)	9	4
1	E	111/109 (102%)	104 (94%)	7 (6%)	15	8
1	F	113/109 (104%)	105 (93%)	8 (7%)	12	6
1	G	111/109 (102%)	103 (93%)	8 (7%)	12	6
1	H	111/109 (102%)	103 (93%)	8 (7%)	12	6
1	I	114/109 (105%)	106 (93%)	8 (7%)	12	6
All	All	1005/981 (102%)	941 (94%)	64 (6%)	14	8

5 of 64 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	I	9	LYS
1	I	64	GLU
1	D	120	ILE
1	D	112	ARG
1	I	103	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 26 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	143	GLN
1	F	143	GLN
1	I	134	ASN
1	F	134	ASN
1	G	67	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	139/145 (95%)	-0.06	4 (2%) 54 55	17, 28, 47, 54	0
1	B	138/145 (95%)	0.12	5 (3%) 46 48	19, 30, 48, 55	0
1	C	138/145 (95%)	0.14	5 (3%) 46 48	19, 30, 50, 57	0
1	D	138/145 (95%)	-0.07	6 (4%) 40 43	15, 24, 41, 53	0
1	E	138/145 (95%)	-0.08	3 (2%) 62 64	18, 27, 42, 49	0
1	F	139/145 (95%)	-0.19	3 (2%) 62 64	15, 24, 40, 55	0
1	G	138/145 (95%)	-0.03	3 (2%) 62 64	15, 25, 46, 55	0
1	H	138/145 (95%)	0.65	17 (12%) 9 9	20, 35, 59, 66	0
1	I	140/145 (96%)	0.53	18 (12%) 9 9	18, 32, 55, 61	0
All	All	1246/1305 (95%)	0.11	64 (5%) 34 37	15, 28, 51, 66	0

The worst 5 of 64 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	63	GLY	4.6
1	A	63	GLY	4.5
1	D	120	ILE	4.3
1	H	64	GLU	4.0
1	I	10	ALA	3.9

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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.