



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 01:58 PM UTC

PDB ID : 6KMU / pdb_00006kmu
Title : P22/P10 complex of caspase-11 mutant C254A
Authors : Ding, J.; Sun, Q.
Deposited on : 2019-08-01
Resolution : 2.10 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

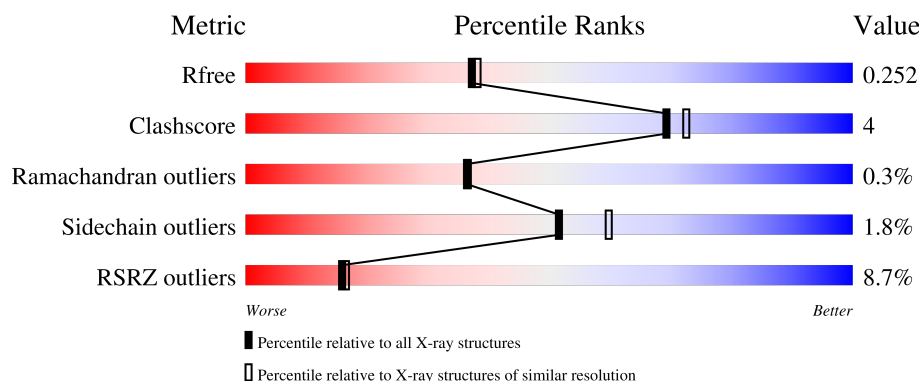
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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.



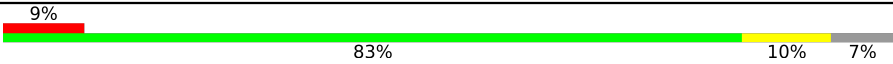
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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	184	
1	E	184	
2	B	86	
2	F	86	
2	H	86	

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Mol	Chain	Length	Quality of chain
3	C	185	
4	D	87	
5	G	154	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8405 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 Caspase-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	172	Total	C	N	O	S	0	0	0
			1359	851	235	260	13			
1	E	171	Total	C	N	O	S	0	0	0
			1348	845	231	259	13			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	254	ALA	CYS	engineered mutation	UNP P70343
E	254	ALA	CYS	engineered mutation	UNP P70343

- Molecule 2 is a protein called Caspase-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	86	Total	C	N	O	S	0	0	0
			714	463	123	124	4			
2	F	83	Total	C	N	O	S	0	0	0
			691	448	119	120	4			
2	H	77	Total	C	N	O	S	0	0	0
			639	417	108	110	4			

- Molecule 3 is a protein called Caspase-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	172	Total	C	N	O	S	0	0	0
			1355	849	232	261	13			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	254	ALA	CYS	engineered mutation	UNP P70343

- Molecule 4 is a protein called Caspase-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	87	Total	C	N	O	S	0	0	0
			721	468	124	125	4			

- Molecule 5 is a protein called Caspase-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	G	154	Total	C	N	O	S	0	0	0
			1214	765	205	233	11			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	254	ALA	CYS	engineered mutation	UNP P70343

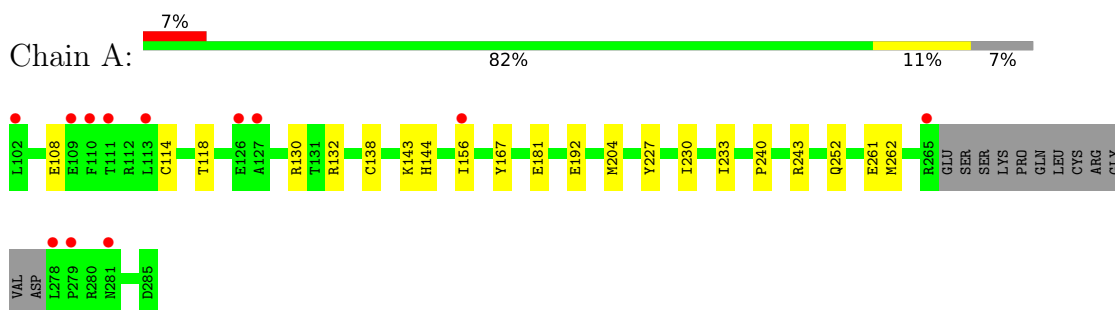
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	70	Total	O	0	0
			70	70		
6	B	40	Total	O	0	0
			40	40		
6	C	79	Total	O	0	0
			79	79		
6	D	41	Total	O	0	0
			41	41		
6	E	61	Total	O	0	0
			61	61		
6	F	21	Total	O	0	0
			21	21		
6	G	37	Total	O	0	0
			37	37		
6	H	15	Total	O	0	0
			15	15		

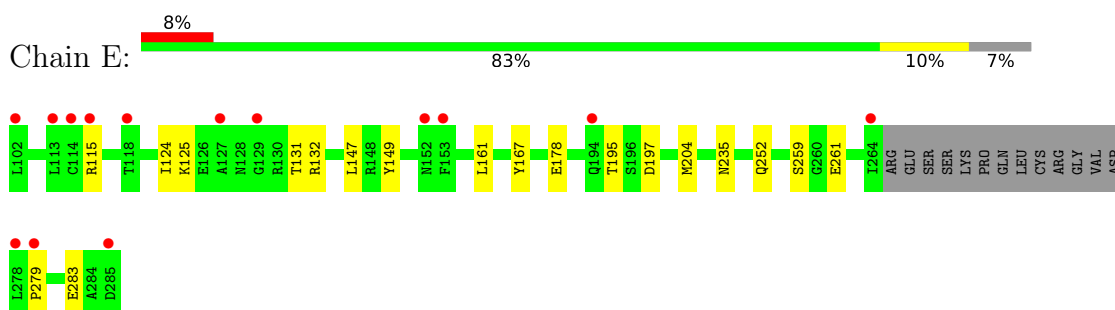
3 Residue-property plots [i](#)

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.

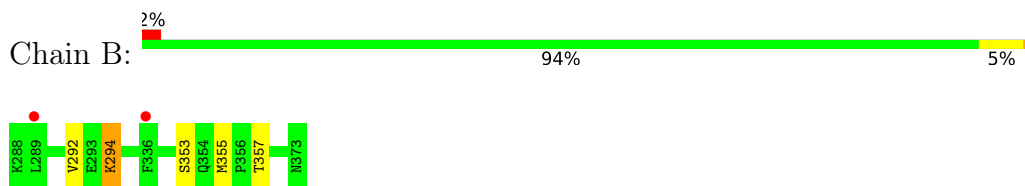
- Molecule 1: Caspase-4



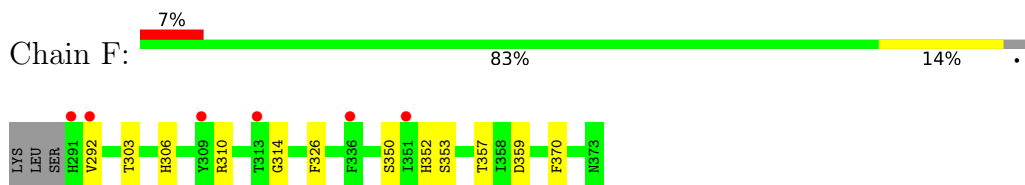
- Molecule 1: Caspase-4



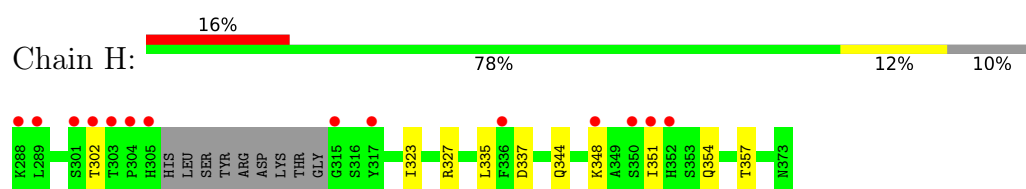
- Molecule 2: Caspase-4



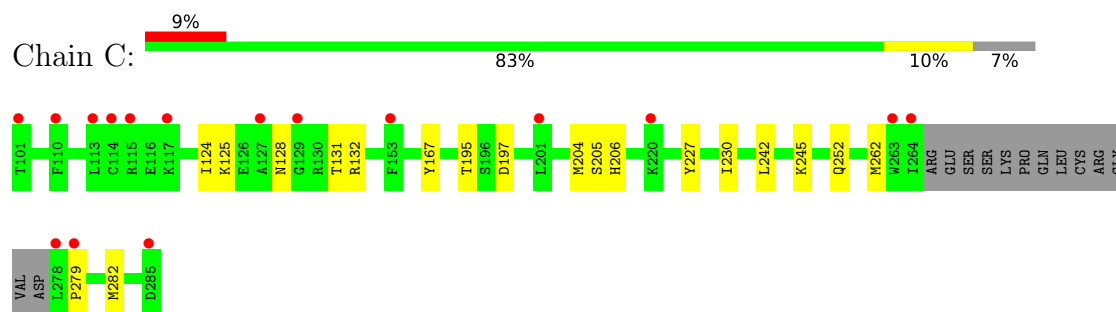
- Molecule 2: Caspase-4



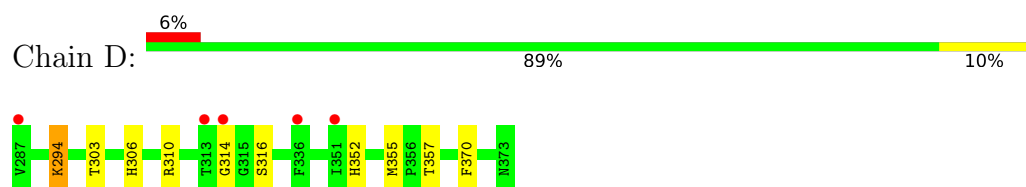
- Molecule 2: Caspase-4



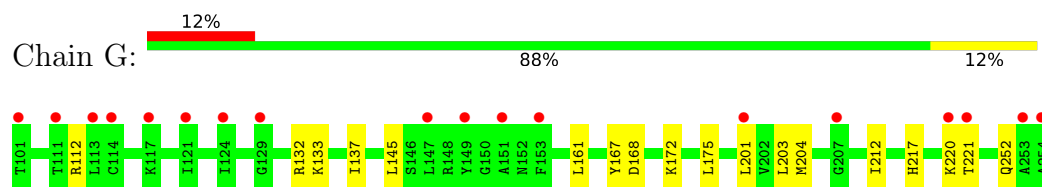
• Molecule 3: Caspase-4



• Molecule 4: Caspase-4



• Molecule 5: Caspase-4



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	61.97Å 102.00Å 99.74Å 90.00° 93.52° 90.00°	Depositor
Resolution (Å)	49.78 – 2.10 49.78 – 2.10	Depositor EDS
% Data completeness (in resolution range)	98.8 (49.78-2.10) 98.9 (49.78-2.10)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.58 (at 2.10Å)	Xtriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.210 , 0.251 0.212 , 0.252	Depositor DCC
R_{free} test set	2020 reflections (2.82%)	wwPDB-VP
Wilson B-factor (Å ²)	40.7	Xtriage
Anisotropy	0.562	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 37.5	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	8405	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.73% 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 [i](#)

5.1 Standard geometry [i](#)

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	0.09	0/1382	0.28	0/1857
1	E	0.09	0/1371	0.26	0/1843
2	B	0.10	0/736	0.31	0/990
2	F	0.09	0/713	0.28	0/960
2	H	0.23	0/658	0.38	0/884
3	C	0.09	0/1378	0.27	0/1853
4	D	0.10	0/743	0.30	0/1000
5	G	0.07	0/1235	0.26	0/1664
All	All	0.11	0/8216	0.28	0/11051

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1359	0	1346	12	0
1	E	1348	0	1333	11	0
2	B	714	0	697	5	0
2	F	691	0	668	7	0
2	H	639	0	624	7	0
3	C	1355	0	1340	11	0
4	D	721	0	706	7	0
5	G	1214	0	1211	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	70	0	0	1	0
6	B	40	0	0	1	0
6	C	79	0	0	1	0
6	D	41	0	0	0	0
6	E	61	0	0	0	0
6	F	21	0	0	0	0
6	G	37	0	0	0	0
6	H	15	0	0	1	0
All	All	8405	0	7925	56	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 4.

All (56) 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:204:MET:HG2	1:E:252:GLN:HB3	1.70	0.74
1:A:204:MET:HG2	1:A:252:GLN:HB3	1.74	0.69
3:C:204:MET:HG2	3:C:252:GLN:HB3	1.72	0.69
2:B:355:MET:HE3	4:D:294:LYS:HD2	1.76	0.67
3:C:131:THR:HG1	3:C:195:THR:HG1	1.41	0.64
5:G:204:MET:HG2	5:G:252:GLN:HB3	1.81	0.60
5:G:133:LYS:NZ	5:G:168:ASP:OD2	2.34	0.60
2:H:327:ARG:NH1	6:H:401:HOH:O	2.33	0.60
1:A:227:TYR:HA	1:A:230:ILE:HD12	1.84	0.59
2:B:292:VAL:HG22	3:C:262:MET:HE3	1.84	0.59
2:H:351:ILE:HG22	2:H:351:ILE:O	2.02	0.59
1:E:259:SER:OG	1:E:261:GLU:OE1	2.23	0.57
2:B:294:LYS:HD2	4:D:355:MET:HE3	1.88	0.55
3:C:279:PRO:HD3	4:D:352:HIS:CE1	2.42	0.55
5:G:137:ILE:HB	5:G:203:LEU:HD23	1.89	0.54
1:A:114:CYS:O	1:A:118:THR:OG1	2.23	0.54
2:B:294:LYS:NZ	6:B:402:HOH:O	2.41	0.54
1:A:192:GLU:N	1:A:192:GLU:OE1	2.43	0.52
1:E:147:LEU:HD23	1:E:149:TYR:CZ	2.46	0.50
3:C:125:LYS:HG3	3:C:197:ASP:HB3	1.93	0.49
1:E:131:THR:HG1	1:E:195:THR:HG1	1.57	0.49
5:G:145:LEU:HD11	5:G:217:HIS:HD2	1.77	0.49
6:C:303:HOH:O	4:D:294:LYS:NZ	2.46	0.49
3:C:227:TYR:HA	3:C:230:ILE:HD12	1.96	0.47
3:C:132:ARG:HB3	3:C:167:TYR:CD2	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:G:220:LYS:HG3	5:G:221:THR:HG23	1.96	0.46
1:A:261:GLU:HB3	2:B:353:SER:HB2	1.97	0.46
2:F:303:THR:OG1	2:F:306:HIS:ND1	2.27	0.46
5:G:172:LYS:HB3	5:G:175:LEU:HD11	1.98	0.46
1:A:181:GLU:HG3	1:A:233:ILE:HD11	1.98	0.46
1:A:130:ARG:HD3	1:A:132:ARG:HG3	1.98	0.45
5:G:132:ARG:HB3	5:G:167:TYR:CD2	2.52	0.45
2:H:344:GLN:O	2:H:348:LYS:HG3	2.17	0.45
1:E:125:LYS:HG3	1:E:197:ASP:HB3	1.99	0.44
3:C:124:ILE:HG13	4:D:370:PHE:HD2	1.82	0.44
1:E:283:GLU:OE1	2:F:310:ARG:NH1	2.40	0.44
2:H:344:GLN:HB3	2:H:348:LYS:NZ	2.32	0.44
1:A:240:PRO:HA	1:A:243:ARG:HG3	2.00	0.44
1:E:279:PRO:HD3	2:F:352:HIS:NE2	2.32	0.44
2:H:344:GLN:HB3	2:H:348:LYS:HZ3	1.82	0.43
5:G:161:LEU:HD22	2:H:323:ILE:HA	2.00	0.43
1:A:156:ILE:N	6:A:301:HOH:O	2.50	0.43
3:C:279:PRO:HD2	3:C:282:MET:HB3	2.01	0.42
4:D:303:THR:OG1	4:D:306:HIS:ND1	2.41	0.42
3:C:242:LEU:HA	3:C:245:LYS:HD2	2.00	0.42
1:E:124:ILE:HG13	2:F:370:PHE:HD2	1.83	0.42
1:E:132:ARG:HB3	1:E:167:TYR:CD2	2.54	0.42
2:F:350:SER:O	2:F:353:SER:OG	2.36	0.42
1:A:143:LYS:HE3	1:A:144:HIS:NE2	2.35	0.42
2:H:302:THR:HG22	2:H:354:GLN:HG3	2.01	0.42
1:A:132:ARG:HB3	1:A:167:TYR:CD2	2.55	0.41
4:D:310:ARG:HA	4:D:316:SER:HA	2.02	0.41
1:E:235:ASN:HB2	2:F:292:VAL:O	2.21	0.41
1:A:138:CYS:HA	1:A:204:MET:O	2.21	0.40
3:C:205:SER:OG	3:C:206:HIS:N	2.54	0.40
1:E:161:LEU:HD11	2:F:326:PHE:HB3	2.03	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	168/184 (91%)	163 (97%)	5 (3%)	0	100	100
1	E	167/184 (91%)	162 (97%)	5 (3%)	0	100	100
2	B	84/86 (98%)	82 (98%)	2 (2%)	0	100	100
2	F	81/86 (94%)	78 (96%)	2 (2%)	1 (1%)	10	7
2	H	73/86 (85%)	72 (99%)	1 (1%)	0	100	100
3	C	168/185 (91%)	161 (96%)	6 (4%)	1 (1%)	21	18
4	D	85/87 (98%)	83 (98%)	1 (1%)	1 (1%)	10	7
5	G	152/154 (99%)	144 (95%)	8 (5%)	0	100	100
All	All	978/1052 (93%)	945 (97%)	30 (3%)	3 (0%)	36	36

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	128	ASN
4	D	314	GLY
2	F	314	GLY

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	150/161 (93%)	148 (99%)	2 (1%)	61	69
1	E	149/161 (92%)	147 (99%)	2 (1%)	61	69
2	B	79/79 (100%)	77 (98%)	2 (2%)	42	48
2	F	76/79 (96%)	74 (97%)	2 (3%)	40	46
2	H	71/79 (90%)	68 (96%)	3 (4%)	26	28
3	C	150/162 (93%)	150 (100%)	0	100	100
4	D	80/80 (100%)	78 (98%)	2 (2%)	42	48
5	G	136/136 (100%)	133 (98%)	3 (2%)	45	53

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	891/937 (95%)	875 (98%)	16 (2%)	51 60

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	108	GLU
1	A	262	MET
2	B	294	LYS
2	B	357	THR
4	D	294	LYS
4	D	357	THR
1	E	115	ARG
1	E	178	GLU
2	F	357	THR
2	F	359	ASP
5	G	112	ARG
5	G	201	LEU
5	G	212	ILE
2	H	335	LEU
2	H	337	ASP
2	H	357	THR

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	252	GLN
3	C	252	GLN
1	E	252	GLN
2	F	373	ASN
2	H	329	HIS
2	H	334	HIS
2	H	354	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 [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 [i](#)

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	172/184 (93%)	0.62	12 (6%) 22 24	32, 45, 81, 94	0
1	E	171/184 (92%)	0.87	14 (8%) 17 18	36, 52, 89, 108	0
2	B	86/86 (100%)	0.37	2 (2%) 61 64	29, 41, 61, 79	0
2	F	83/86 (96%)	0.87	6 (7%) 21 23	37, 54, 81, 90	0
2	H	77/86 (89%)	1.17	14 (18%) 3 3	38, 59, 92, 95	0
3	C	172/185 (92%)	0.63	16 (9%) 14 15	31, 47, 79, 106	0
4	D	87/87 (100%)	0.39	5 (5%) 29 31	29, 43, 67, 75	0
5	G	154/154 (100%)	1.05	18 (11%) 9 9	40, 54, 82, 96	0
All	All	1002/1052 (95%)	0.75	87 (8%) 16 16	29, 50, 82, 108	0

All (87) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
5	G	254	ALA	6.1
1	E	278	LEU	4.8
1	A	278	LEU	4.8
2	H	315	GLY	4.7
5	G	149	TYR	4.4
2	H	305	HIS	4.0
2	F	336	PHE	4.0
1	A	156	ILE	3.7
1	E	127	ALA	3.7
3	C	264	ILE	3.6
5	G	114	CYS	3.6
2	F	292	VAL	3.5
2	H	304	PRO	3.5
3	C	117	LYS	3.2
2	B	336	PHE	3.2
4	D	351	ILE	3.1

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Mol	Chain	Res	Type	RSRZ
5	G	124	ILE	3.0
1	E	153	PHE	3.0
2	F	291	HIS	3.0
2	F	351	ILE	3.0
1	A	111	THR	3.0
5	G	101	THR	3.0
3	C	279	PRO	3.0
2	H	303	THR	2.9
2	H	336	PHE	2.9
5	G	221	THR	2.9
2	H	317	TYR	2.9
1	E	113	LEU	2.8
5	G	201	LEU	2.8
2	H	351	ILE	2.8
5	G	113	LEU	2.8
5	G	220	LYS	2.8
1	A	279	PRO	2.8
1	E	279	PRO	2.7
4	D	287	VAL	2.7
5	G	117	LYS	2.7
1	A	113	LEU	2.7
1	A	127	ALA	2.6
5	G	111	THR	2.6
2	H	289	LEU	2.6
3	C	113	LEU	2.6
1	E	102	LEU	2.6
5	G	121	ILE	2.6
4	D	336	PHE	2.5
1	A	102	LEU	2.5
1	E	264	ILE	2.5
1	E	118	THR	2.5
3	C	127	ALA	2.5
5	G	207	GLY	2.5
2	B	289	LEU	2.4
3	C	278	LEU	2.4
2	H	350	SER	2.4
1	E	194	GLN	2.4
5	G	153	PHE	2.4
3	C	101	THR	2.4
1	A	110	PHE	2.3
1	E	114	CYS	2.3
1	E	152	ASN	2.3

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Mol	Chain	Res	Type	RSRZ
3	C	110	PHE	2.3
2	F	313	THR	2.3
1	A	281	ASN	2.3
3	C	114	CYS	2.3
2	F	309	TYR	2.3
4	D	313	THR	2.3
1	E	129	GLY	2.3
1	A	109	GLU	2.2
2	H	352	HIS	2.2
3	C	220	LYS	2.2
5	G	147	LEU	2.2
3	C	153	PHE	2.1
5	G	253	ALA	2.1
2	H	348	LYS	2.1
5	G	151	ALA	2.1
1	A	126	GLU	2.1
3	C	285	ASP	2.1
4	D	314	GLY	2.1
3	C	263	TRP	2.1
2	H	301	SER	2.1
3	C	201	LEU	2.0
1	A	265	ARG	2.0
5	G	129	GLY	2.0
1	E	285	ASP	2.0
1	E	115	ARG	2.0
3	C	115	ARG	2.0
2	H	288	LYS	2.0
2	H	302	THR	2.0
3	C	129	GLY	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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.