



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 12:19 AM UTC

PDB ID : 3KYM / pdb_00003kym
Title : Crystal structure of Li33 IgG2 di-Fab
Authors : Silvian, L.F.; Pepinsky, R.B.; Walus, L.
Deposited on : 2009-12-06
Resolution : 2.62 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

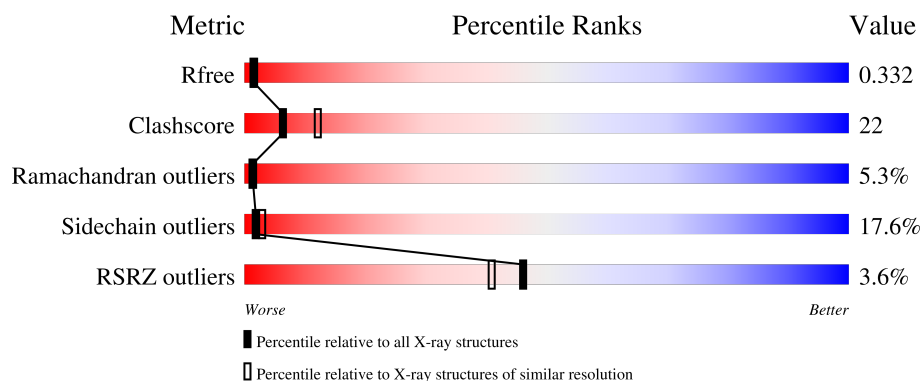
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

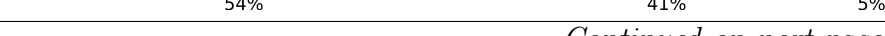
The reported resolution of this entry is 2.62 Å.

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	4951 (2.64-2.60)
Clashscore	190562	5303 (2.64-2.60)
Ramachandran outliers	187476	5217 (2.64-2.60)
Sidechain outliers	187428	5217 (2.64-2.60)
RSRZ outliers	180081	4950 (2.64-2.60)

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	214	
1	C	214	
1	E	214	
1	G	214	
1	I	214	

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Mol	Chain	Length	Quality of chain
1	K	214	
1	M	214	
1	O	214	
2	B	227	
2	D	227	
2	F	227	
2	H	227	
2	J	227	
2	L	227	
2	N	227	
2	P	227	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 26358 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 Light Chain Li33 IgG2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	213	Total	C	N	O	S	0	0	0
			1640	1026	277	332	5			
1	C	213	Total	C	N	O	S	0	0	0
			1640	1026	277	332	5			
1	E	213	Total	C	N	O	S	0	0	0
			1640	1026	277	332	5			
1	G	213	Total	C	N	O	S	0	0	0
			1640	1026	277	332	5			
1	I	213	Total	C	N	O	S	0	0	0
			1640	1026	277	332	5			
1	K	209	Total	C	N	O	S	0	0	0
			1605	1001	273	326	5			
1	M	208	Total	C	N	O	S	0	0	0
			1597	1000	268	324	5			
1	O	213	Total	C	N	O	S	0	0	0
			1640	1026	277	332	5			

- Molecule 2 is a protein called Heavy Chain Li33 IgG2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	220	Total	C	N	O	S	0	0	0
			1672	1057	283	325	7			
2	D	220	Total	C	N	O	S	0	0	0
			1672	1057	283	325	7			
2	F	219	Total	C	N	O	S	0	0	0
			1663	1051	281	324	7			
2	H	219	Total	C	N	O	S	0	0	0
			1663	1051	281	324	7			
2	J	219	Total	C	N	O	S	0	0	0
			1663	1051	281	324	7			
2	L	219	Total	C	N	O	S	0	0	0
			1663	1051	281	324	7			

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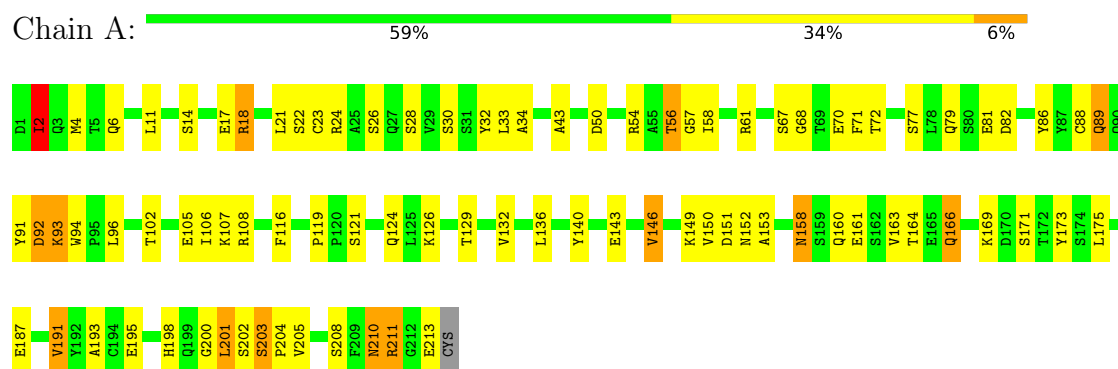
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	N	219	Total	C	N	O	S	0	0	0
			1663	1051	281	324	7			
2	P	219	Total	C	N	O	S	0	0	0
			1657	1048	278	324	7			

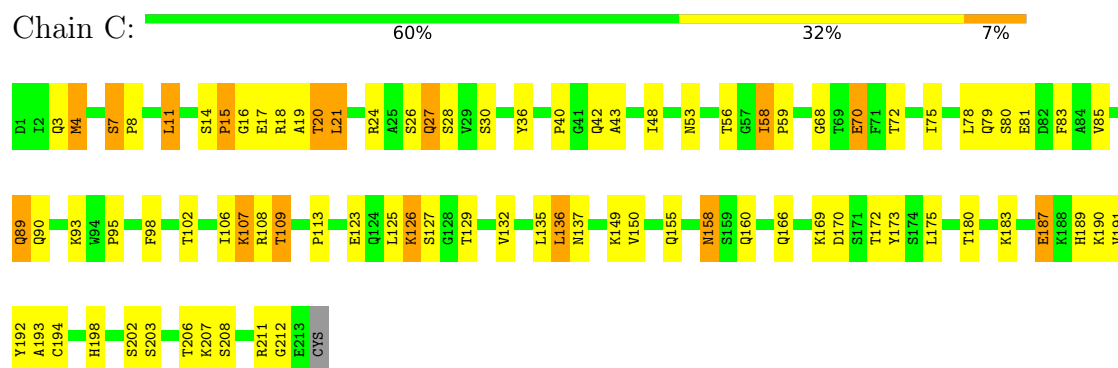
3 Residue-property plots [i](#)

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.

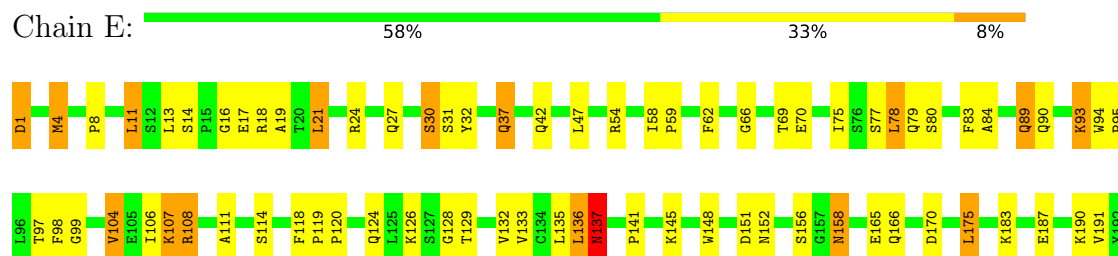
• Molecule 1: Light Chain Li33 IgG2



• Molecule 1: Light Chain Li33 IgG2



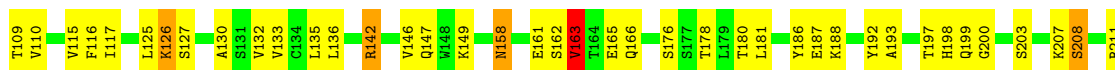
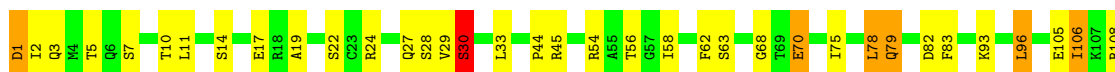
• Molecule 1: Light Chain Li33 IgG2





• Molecule 1: Light Chain Li33 IgG2

Chain G: 64% 30% 5% •



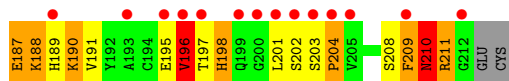
• Molecule 1: Light Chain Li33 IgG2

Chain I: 4% 54% 41% 5% •



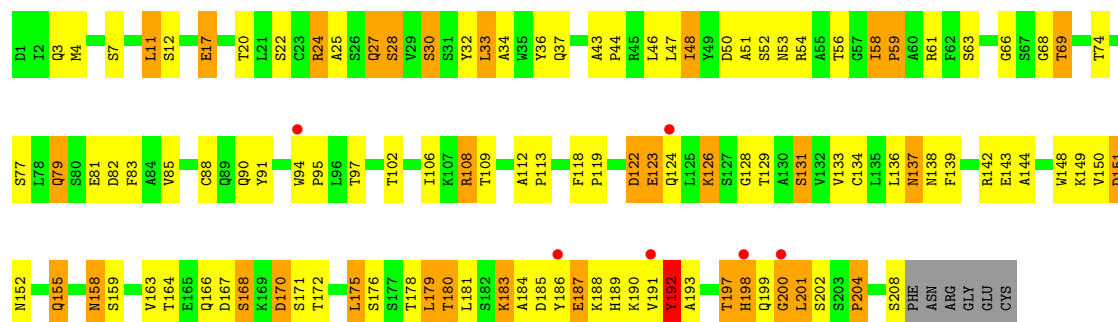
• Molecule 1: Light Chain Li33 IgG2

Chain K: 14% 50% 29% 14% • •

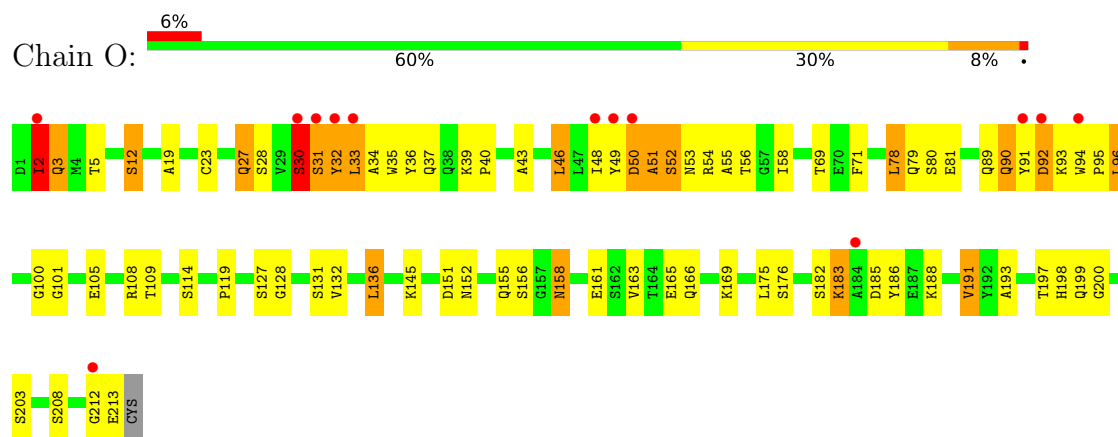


• Molecule 1: Light Chain Li33 IgG2

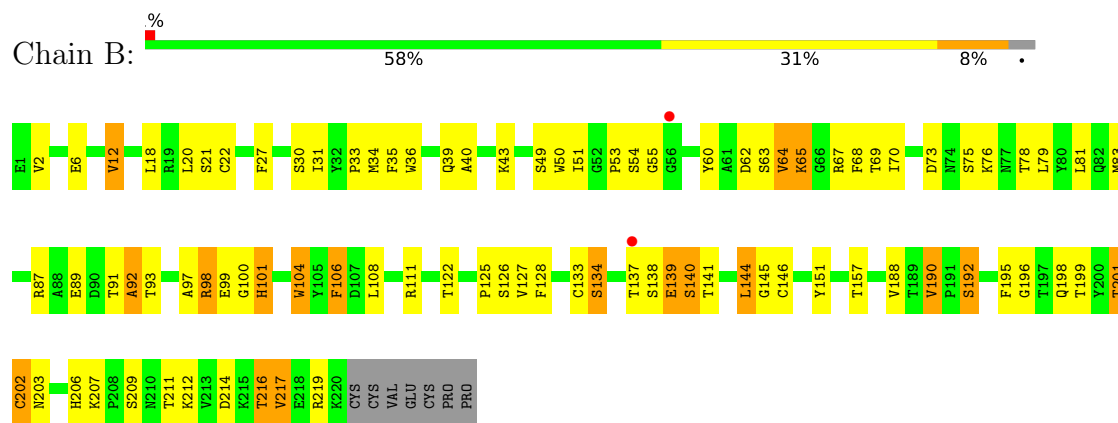
Chain M: 3% 44% 37% 15% •



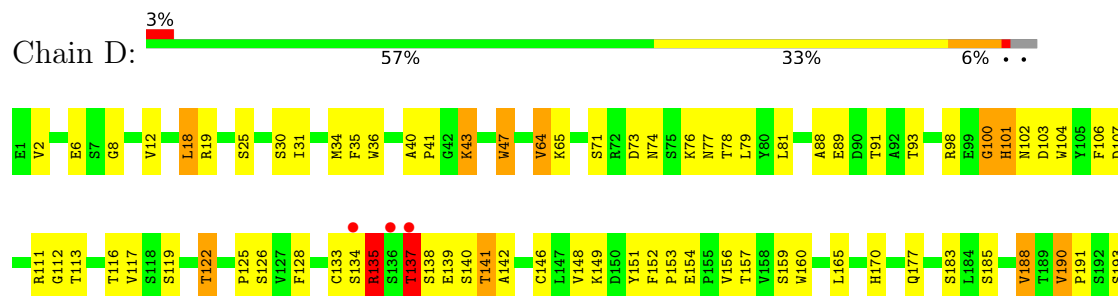
• Molecule 1: Light Chain Li33 IgG2



• Molecule 2: Heavy Chain Li33 IgG2



• Molecule 2: Heavy Chain Li33 IgG2

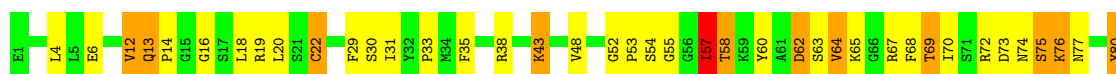




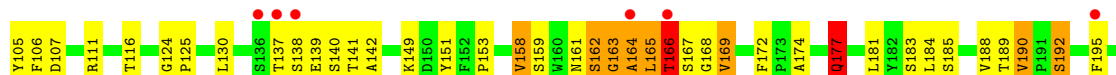
• Molecule 2: Heavy Chain Li33 IgG2



• Molecule 2: Heavy Chain Li33 IgG2

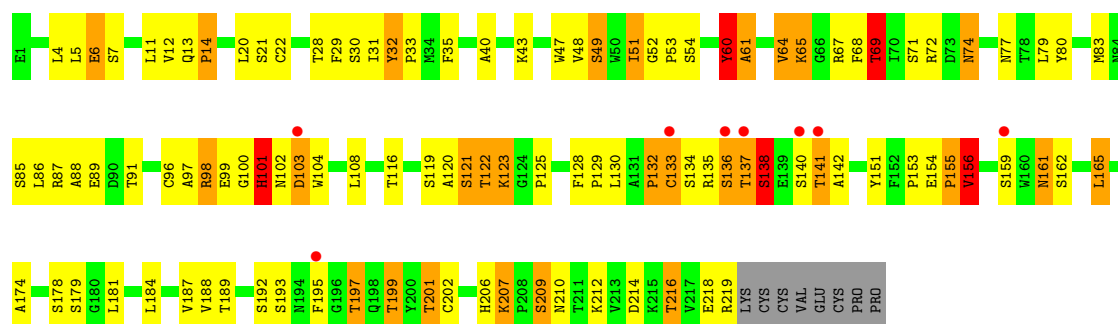


• Molecule 2: Heavy Chain Li33 IgG2

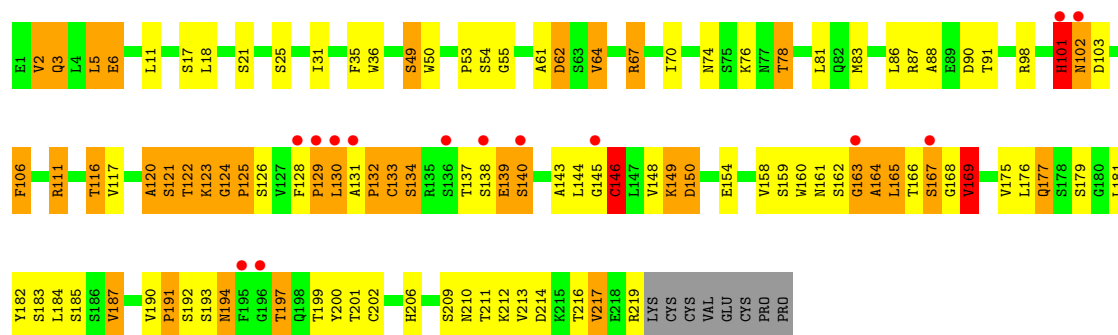


• Molecule 2: Heavy Chain Li33 IgG2

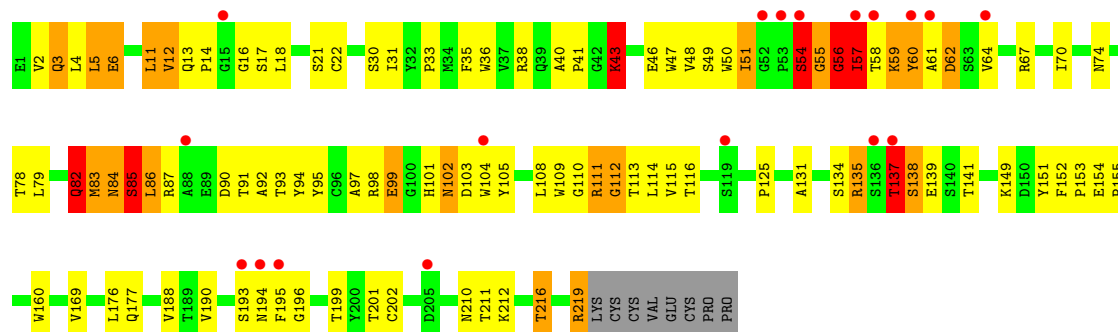




● Molecule 2: Heavy Chain Li33 IgG2



● Molecule 2: Heavy Chain Li33 IgG2



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	91.67Å 109.55Å 118.43Å 61.46° 79.29° 87.59°	Depositor
Resolution (Å)	19.96 – 2.62 19.96 – 2.62	Depositor EDS
% Data completeness (in resolution range)	97.0 (19.96-2.62) 96.8 (19.96-2.62)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.35 (at 2.63Å)	Xtriage
Refinement program	REFMAC 5.5.0088	Depositor
R, R_{free}	0.259 , 0.339 0.256 , 0.332	Depositor DCC
R_{free} test set	5749 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	42.2	Xtriage
Anisotropy	0.184	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 46.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.008 for -h,k,k-l	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	26358	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 18.80% 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	0.74	0/1676	1.07	6/2275 (0.3%)
1	C	0.69	0/1676	1.00	5/2275 (0.2%)
1	E	0.77	0/1676	1.03	3/2275 (0.1%)
1	G	0.81	0/1676	1.04	4/2275 (0.2%)
1	I	0.78	0/1676	1.09	7/2275 (0.3%)
1	K	0.84	2/1638 (0.1%)	1.17	10/2220 (0.5%)
1	M	0.74	0/1632	1.10	12/2217 (0.5%)
1	O	0.75	0/1676	1.05	3/2275 (0.1%)
2	B	0.75	0/1716	1.09	8/2338 (0.3%)
2	D	0.73	0/1716	1.00	5/2338 (0.2%)
2	F	0.78	0/1707	1.08	8/2327 (0.3%)
2	H	0.80	0/1707	1.08	3/2327 (0.1%)
2	J	0.80	0/1707	1.02	2/2327 (0.1%)
2	L	0.76	0/1707	1.09	7/2327 (0.3%)
2	N	0.75	2/1707 (0.1%)	1.09	5/2327 (0.2%)
2	P	0.81	0/1701	1.08	12/2320 (0.5%)
All	All	0.77	4/26994 (0.0%)	1.07	100/36718 (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	G	0	1
1	K	0	2
2	H	0	1
All	All	0	4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	N	101	HIS	CA-C	6.10	1.60	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	K	108	ARG	CA-C	5.48	1.60	1.52
1	K	107	LYS	N-CA	5.31	1.52	1.45
2	N	122	THR	CA-CB	5.06	1.61	1.53

The worst 5 of 100 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	P	13	GLN	CA-C-N	8.83	130.88	119.84
2	P	13	GLN	C-N-CA	8.83	130.88	119.84
2	B	207	LYS	CA-C-N	-8.60	110.88	119.56
2	B	207	LYS	C-N-CA	-8.60	110.88	119.56
2	D	100	GLY	N-CA-C	8.13	123.17	112.77

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	G	7	SER	Peptide
2	H	103	ASP	Peptide
1	K	109	THR	Peptide
1	K	114	SER	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	1640	0	1589	47	0
1	C	1640	0	1589	58	0
1	E	1640	0	1589	69	0
1	G	1640	0	1589	47	0
1	I	1640	0	1589	77	0
1	K	1605	0	1556	120	0
1	M	1597	0	1552	116	0
1	O	1640	0	1589	73	0
2	B	1672	0	1622	60	0
2	D	1672	0	1622	58	0
2	F	1663	0	1609	63	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	H	1663	0	1609	85	0
2	J	1663	0	1609	79	0
2	L	1663	0	1609	86	0
2	N	1663	0	1609	113	0
2	P	1657	0	1598	103	0
All	All	26358	0	25529	1146	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.

The worst 5 of 1146 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)
2:H:76:LYS:HE2	1:M:32:TYR:CE2	1.45	1.48
2:N:102:ASN:N	2:N:103:ASP:HB2	1.16	1.43
2:N:102:ASN:H	2:N:103:ASP:CB	1.45	1.28
2:H:76:LYS:HE2	1:M:32:TYR:CZ	1.74	1.23
2:P:56:GLY:CA	2:P:57:ILE:HG12	1.76	1.15

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	211/214 (99%)	190 (90%)	17 (8%)	4 (2%)	6	12
1	C	211/214 (99%)	183 (87%)	24 (11%)	4 (2%)	6	12
1	E	211/214 (99%)	195 (92%)	14 (7%)	2 (1%)	14	28
1	G	211/214 (99%)	190 (90%)	19 (9%)	2 (1%)	14	28
1	I	211/214 (99%)	183 (87%)	19 (9%)	9 (4%)	2	2

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	K	205/214 (96%)	151 (74%)	33 (16%)	21 (10%)	0	0
1	M	206/214 (96%)	173 (84%)	20 (10%)	13 (6%)	1	1
1	O	211/214 (99%)	178 (84%)	17 (8%)	16 (8%)	1	0
2	B	218/227 (96%)	185 (85%)	26 (12%)	7 (3%)	3	4
2	D	218/227 (96%)	187 (86%)	23 (11%)	8 (4%)	2	3
2	F	217/227 (96%)	191 (88%)	18 (8%)	8 (4%)	2	3
2	H	217/227 (96%)	184 (85%)	22 (10%)	11 (5%)	1	1
2	J	217/227 (96%)	178 (82%)	24 (11%)	15 (7%)	1	1
2	L	217/227 (96%)	175 (81%)	22 (10%)	20 (9%)	0	0
2	N	217/227 (96%)	169 (78%)	24 (11%)	24 (11%)	0	0
2	P	217/227 (96%)	170 (78%)	29 (13%)	18 (8%)	0	0
All	All	3415/3528 (97%)	2882 (84%)	351 (10%)	182 (5%)	1	1

5 of 182 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	202	SER
2	B	101	HIS
2	B	134	SER
2	B	140	SER
2	D	135	ARG

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	184/185 (100%)	149 (81%)	35 (19%)	1	2
1	C	184/185 (100%)	155 (84%)	29 (16%)	2	4
1	E	184/185 (100%)	151 (82%)	33 (18%)	2	3
1	G	184/185 (100%)	154 (84%)	30 (16%)	2	4
1	I	184/185 (100%)	159 (86%)	25 (14%)	3	6

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	K	180/185 (97%)	140 (78%)	40 (22%)	1	1
1	M	180/185 (97%)	142 (79%)	38 (21%)	1	1
1	O	184/185 (100%)	160 (87%)	24 (13%)	4	7
2	B	186/193 (96%)	155 (83%)	31 (17%)	2	3
2	D	186/193 (96%)	156 (84%)	30 (16%)	2	4
2	F	185/193 (96%)	154 (83%)	31 (17%)	2	3
2	H	185/193 (96%)	148 (80%)	37 (20%)	1	2
2	J	185/193 (96%)	153 (83%)	32 (17%)	2	3
2	L	185/193 (96%)	146 (79%)	39 (21%)	1	1
2	N	185/193 (96%)	151 (82%)	34 (18%)	1	2
2	P	184/193 (95%)	154 (84%)	30 (16%)	2	4
All	All	2945/3024 (97%)	2427 (82%)	518 (18%)	2	3

5 of 518 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	N	217	VAL
1	O	114	SER
2	N	216	THR
1	G	33	LEU
1	G	1	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 98 such sidechains are listed below:

Mol	Chain	Res	Type
1	K	53	ASN
1	M	38	GLN
1	K	147	GLN
2	L	101	HIS
1	M	137	ASN

5.3.3 RNA ⓘ

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 [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	213/214 (99%)	-0.02	0	100	100	27, 47, 64, 73	0
1	C	213/214 (99%)	0.20	0	100	100	40, 57, 68, 75	0
1	E	213/214 (99%)	-0.22	0	100	100	25, 39, 53, 64	0
1	G	213/214 (99%)	-0.34	0	100	100	18, 35, 49, 66	0
1	I	213/214 (99%)	0.20	8 (3%)	44	39	18, 41, 74, 83	0
1	K	209/214 (97%)	0.56	29 (13%)	6	5	26, 49, 89, 100	0
1	M	208/214 (97%)	0.36	6 (2%)	53	48	33, 55, 72, 78	0
1	O	213/214 (99%)	0.26	13 (6%)	27	22	27, 46, 73, 83	0
2	B	220/227 (96%)	-0.00	2 (0%)	81	78	29, 47, 67, 76	0
2	D	220/227 (96%)	0.13	6 (2%)	56	51	37, 47, 70, 81	0
2	F	219/227 (96%)	0.08	7 (3%)	50	45	25, 42, 61, 73	0
2	H	219/227 (96%)	-0.03	5 (2%)	61	56	28, 38, 65, 72	0
2	J	219/227 (96%)	0.08	8 (3%)	45	40	26, 44, 67, 77	0
2	L	219/227 (96%)	0.31	8 (3%)	45	40	31, 50, 71, 85	0
2	N	219/227 (96%)	0.53	14 (6%)	25	21	32, 56, 80, 86	0
2	P	219/227 (96%)	0.39	18 (8%)	17	14	35, 51, 74, 78	0
All	All	3449/3528 (97%)	0.15	124 (3%)	46	41	18, 47, 72, 100	0

The worst 5 of 124 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	N	195	PHE	6.4
1	K	209	PHE	6.2
2	H	137	THR	5.1
2	N	145	GLY	4.7
1	O	30	SER	4.6

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.