



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 09:13 PM UTC

PDB ID : 3PJA / pdb_00003pja
Title : Crystal structure of human C3PO complex
Authors : Huang, N.; Zhang, H.
Deposited on : 2010-11-09
Resolution : 3.00 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

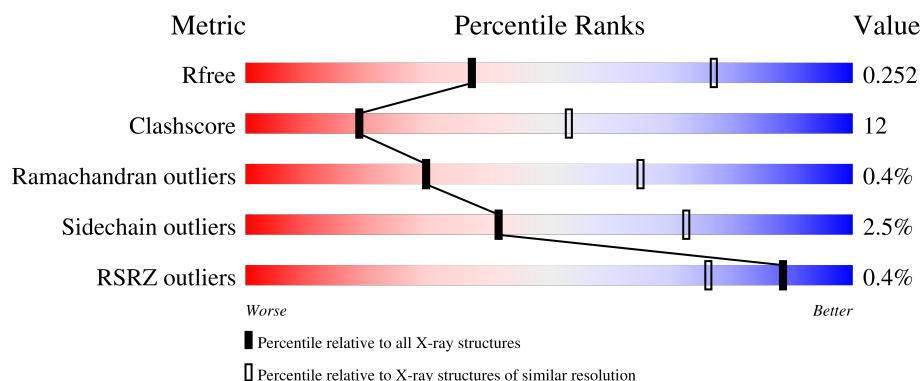
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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	228	 69% 24% 7%
1	B	228	 64% 30% • 5%
1	C	228	 69% 22% • 6%
1	D	228	 69% 23% • 7%
1	E	228	 61% 31% • 6%

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Mol	Chain	Length	Quality of chain
1	F	228	 68% 24% 7%
1	G	228	 65% 26% 7%
1	H	228	 64% 29% 5%
1	I	228	 71% 19% 8%
2	J	290	 55% 18% 24%
2	K	290	 57% 18% 23%
2	L	290	 55% 21% 23%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 21233 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 Translin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	212	Total	C	N	O	S	0	0	0
			1737	1113	300	323	1			
1	B	217	Total	C	N	O	S	0	0	0
			1770	1134	306	329	1			
1	C	214	Total	C	N	O	S	0	0	0
			1754	1124	303	325	2			
1	D	212	Total	C	N	O	S	0	0	0
			1737	1113	300	323	1			
1	E	215	Total	C	N	O	S	0	0	0
			1758	1125	304	327	2			
1	F	213	Total	C	N	O	S	0	0	0
			1745	1119	301	323	2			
1	G	212	Total	C	N	O	S	0	0	0
			1736	1113	299	322	2			
1	H	216	Total	C	N	O	S	0	0	0
			1762	1130	304	327	1			
1	I	210	Total	C	N	O	S	0	0	0
			1720	1103	296	320	1			

- Molecule 2 is a protein called Translin-associated protein X.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	J	219	Total	C	N	O	S	0	0	0
			1756	1116	298	333	9			
2	K	222	Total	C	N	O	S	0	0	0
			1788	1137	305	337	9			
2	L	223	Total	C	N	O	S	0	0	0
			1793	1140	306	338	9			

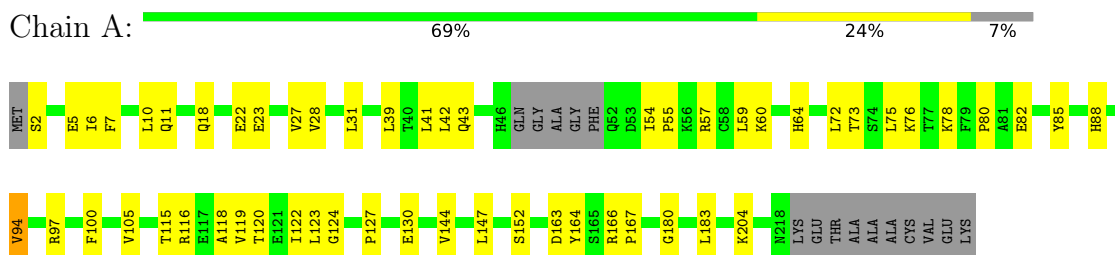
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	16	Total 16	O 16	0	0
3	B	10	Total 10	O 10	0	0
3	C	27	Total 27	O 27	0	0
3	D	16	Total 16	O 16	0	0
3	E	9	Total 9	O 9	0	0
3	F	13	Total 13	O 13	0	0
3	G	6	Total 6	O 6	0	0
3	H	12	Total 12	O 12	0	0
3	I	4	Total 4	O 4	0	0
3	J	6	Total 6	O 6	0	0
3	K	26	Total 26	O 26	0	0
3	L	32	Total 32	O 32	0	0

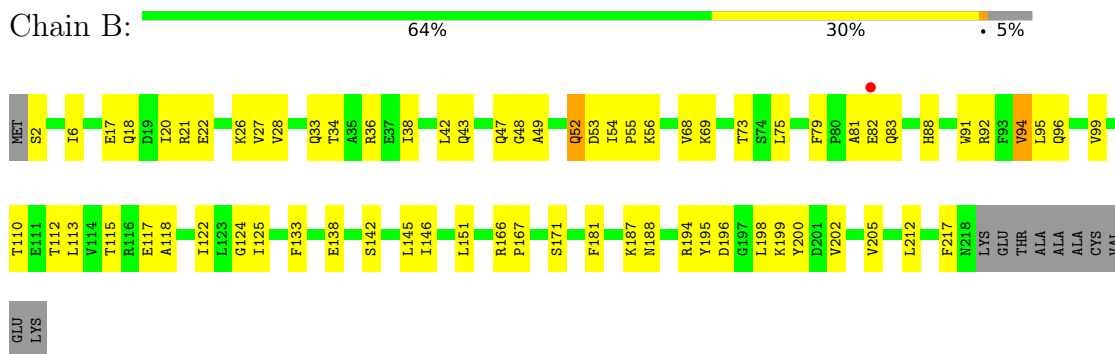
3 Residue-property plots

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 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.

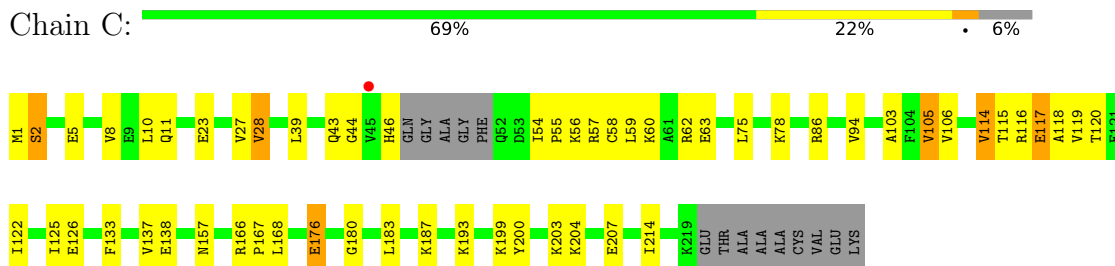
• Molecule 1: Translin



• Molecule 1: Translin

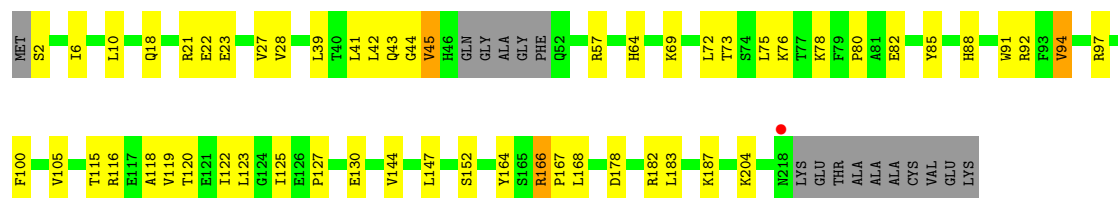


• Molecule 1: Translin

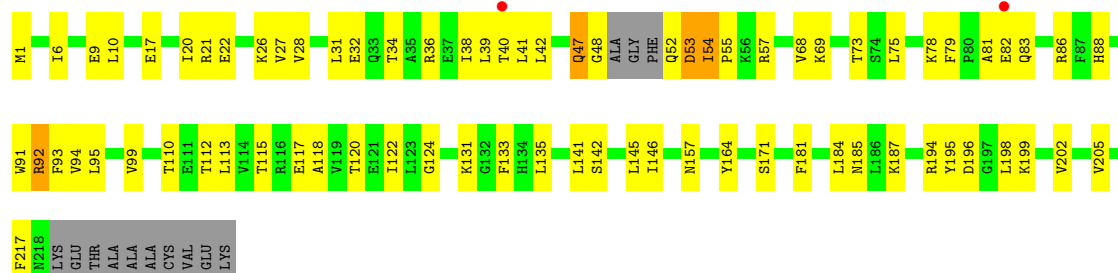


• Molecule 1: Translin

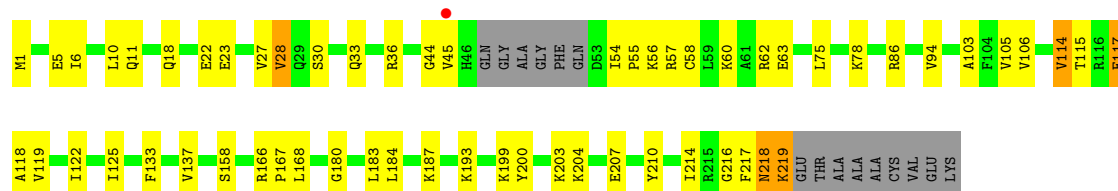




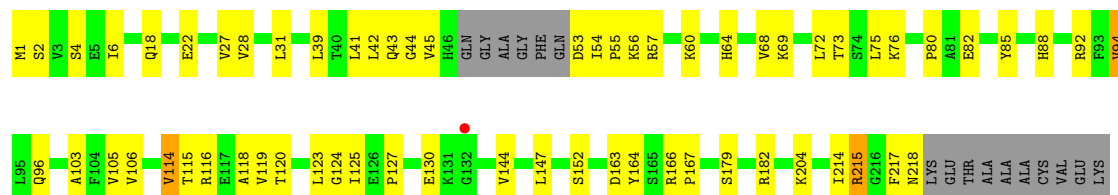
• Molecule 1: Translin



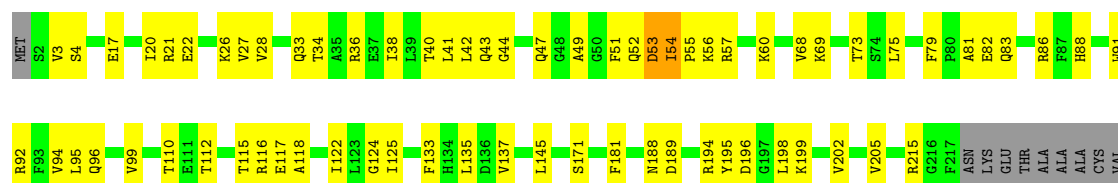
• Molecule 1: Translin



• Molecule 1: Translin

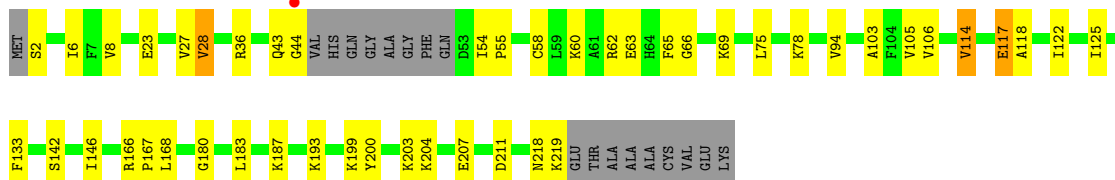


• Molecule 1: Translin

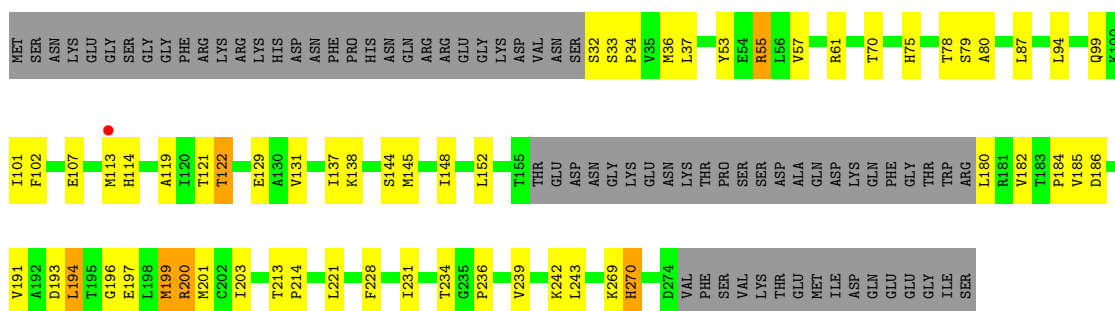


GLU
LYS

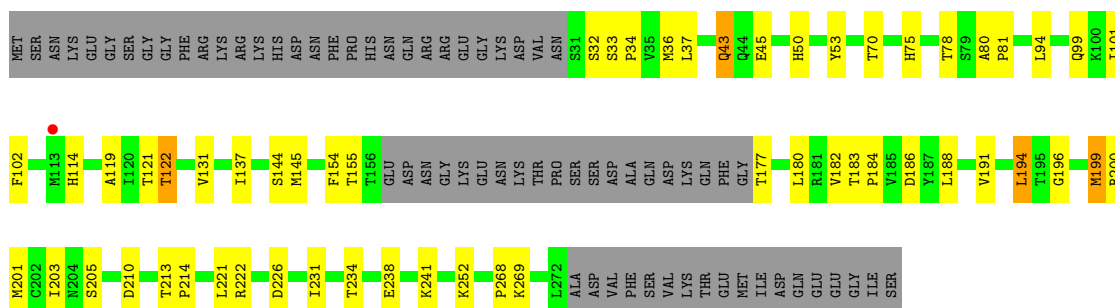
- Molecule 1: Translin

Chain I:  71% 19% 8%

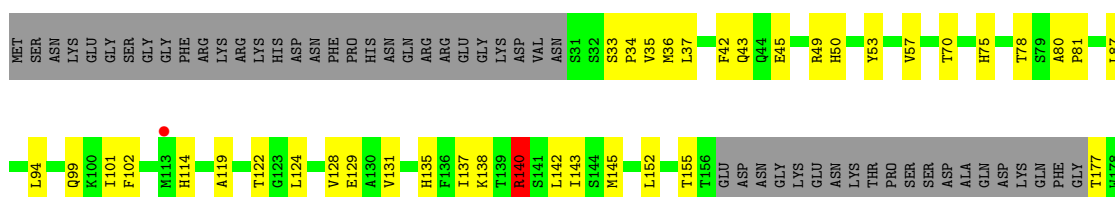
- Molecule 2: Translin-associated protein X

Chain J:  55% 18% 24%

- Molecule 2: Translin-associated protein X

Chain K:  57% 18% 23%

- Molecule 2: Translin-associated protein X

Chain L:  55% 21% 23%

R179	L180	R181	V182	T183	D186	V191	A192	D193	L194	T195	G196	M199	R200	M201	C202	I203	T213	P214	F215	E216	L221	F230	I231	T234	L243	L246	K252	V253	E254	A273	ASP	VAL	PHE	SER	VAL	VAL	LYS	THR	GLU	MET	ILE	ASP	GLN	GLU	GLY	ILE	SER
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4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	171.25Å 95.83Å 232.88Å 90.00° 104.58° 90.00°	Depositor
Resolution (Å)	29.92 – 3.00 29.92 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.7 (29.92-3.00) 99.6 (29.92-3.00)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.10 (at 3.00Å)	Xtriage
Refinement program	PHENIX (phenix.refine: dev_555)	Depositor
R, R_{free}	0.206 , 0.254 0.201 , 0.252	Depositor DCC
R_{free} test set	3681 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	64.4	Xtriage
Anisotropy	0.190	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 66.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.002 for 1/2*h-3/2*k,-1/2*h-1/2*k,-1/2*h +1/2*k-l 0.000 for 1/2*h+3/2*k,1/2*h-1/2*k,-1/2*h- 1/2*k-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	21233	wwPDB-VP
Average B, all atoms (Å ²)	72.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.01% 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	0.38	0/1768	0.71	0/2386
1	B	0.38	0/1803	0.74	0/2434
1	C	0.42	0/1785	0.75	0/2407
1	D	0.39	0/1768	0.79	3/2386 (0.1%)
1	E	0.38	0/1789	0.73	0/2413
1	F	0.39	0/1776	0.74	0/2395
1	G	0.38	0/1767	0.72	0/2384
1	H	0.37	0/1795	0.73	2/2423 (0.1%)
1	I	0.37	0/1750	0.71	0/2360
2	J	0.37	0/1785	0.78	3/2403 (0.1%)
2	K	0.39	0/1819	0.77	1/2450 (0.0%)
2	L	0.42	0/1824	0.80	3/2457 (0.1%)
All	All	0.39	0/21429	0.75	12/28898 (0.0%)

There are no bond length outliers.

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	166	ARG	NE-CZ-NH2	10.40	128.56	119.20
2	L	140	ARG	NE-CZ-NH2	9.75	127.97	119.20
1	D	166	ARG	NE-CZ-NH1	-9.61	111.89	121.50
2	J	55	ARG	NE-CZ-NH2	9.49	127.74	119.20
2	L	140	ARG	NE-CZ-NH1	-9.32	112.18	121.50

There are no chirality outliers.

There are no planarity outliers.

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	1737	0	1752	37	0
1	B	1770	0	1781	49	0
1	C	1754	0	1777	64	0
1	D	1737	0	1752	39	0
1	E	1758	0	1775	55	0
1	F	1745	0	1769	52	0
1	G	1736	0	1756	52	0
1	H	1762	0	1775	46	0
1	I	1720	0	1741	34	0
2	J	1756	0	1768	36	0
2	K	1788	0	1801	45	0
2	L	1793	0	1806	54	0
3	A	16	0	0	1	0
3	B	10	0	0	0	0
3	C	27	0	0	0	0
3	D	16	0	0	0	0
3	E	9	0	0	0	0
3	F	13	0	0	0	0
3	G	6	0	0	0	0
3	H	12	0	0	0	0
3	I	4	0	0	0	0
3	J	6	0	0	0	0
3	K	26	0	0	0	0
3	L	32	0	0	1	0
All	All	21233	0	21253	504	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 12.

The worst 5 of 504 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:F:103:ALA:HA	1:F:114:VAL:HG21	1.42	1.01
1:G:73:THR:HA	1:G:76:LYS:HE2	1.46	0.97
1:A:73:THR:HA	1:A:76:LYS:HE2	1.46	0.95
1:G:214:ILE:HD11	1:I:211:ASP:HB3	1.50	0.93
1:C:103:ALA:HA	1:C:114:VAL:HG21	1.50	0.93

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	208/228 (91%)	199 (96%)	9 (4%)	0	100	100
1	B	215/228 (94%)	205 (95%)	9 (4%)	1 (0%)	24	60
1	C	210/228 (92%)	201 (96%)	8 (4%)	1 (0%)	24	60
1	D	208/228 (91%)	198 (95%)	9 (4%)	1 (0%)	24	60
1	E	211/228 (92%)	195 (92%)	13 (6%)	3 (1%)	9	36
1	F	209/228 (92%)	201 (96%)	7 (3%)	1 (0%)	24	60
1	G	208/228 (91%)	195 (94%)	12 (6%)	1 (0%)	24	60
1	H	214/228 (94%)	205 (96%)	8 (4%)	1 (0%)	24	60
1	I	206/228 (90%)	193 (94%)	13 (6%)	0	100	100
2	J	215/290 (74%)	200 (93%)	13 (6%)	2 (1%)	14	48
2	K	218/290 (75%)	207 (95%)	11 (5%)	0	100	100
2	L	219/290 (76%)	206 (94%)	13 (6%)	0	100	100
All	All	2541/2922 (87%)	2405 (95%)	125 (5%)	11 (0%)	30	65

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	48	GLY
1	C	2	SER
1	D	44	GLY
1	E	53	ASP
1	F	218	ASN

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	192/202 (95%)	190 (99%)	2 (1%)	68	84
1	B	194/202 (96%)	190 (98%)	4 (2%)	47	75
1	C	194/202 (96%)	188 (97%)	6 (3%)	35	68
1	D	192/202 (95%)	188 (98%)	4 (2%)	47	75
1	E	194/202 (96%)	191 (98%)	3 (2%)	57	80
1	F	193/202 (96%)	187 (97%)	6 (3%)	35	68
1	G	192/202 (95%)	188 (98%)	4 (2%)	47	75
1	H	193/202 (96%)	188 (97%)	5 (3%)	40	72
1	I	190/202 (94%)	185 (97%)	5 (3%)	40	72
2	J	197/260 (76%)	191 (97%)	6 (3%)	36	69
2	K	201/260 (77%)	195 (97%)	6 (3%)	36	69
2	L	201/260 (77%)	193 (96%)	8 (4%)	28	62
All	All	2333/2598 (90%)	2274 (98%)	59 (2%)	42	72

5 of 59 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	215	ARG
2	L	194	LEU
1	I	28	VAL
2	L	179	ARG
2	K	199	MET

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	H	47	GLN
2	J	223	GLN
2	L	135	HIS
2	J	125	GLN
2	J	255	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	212/228 (92%)	-0.39	0 100 100	34, 66, 106, 124	0
1	B	217/228 (95%)	-0.43	1 (0%) 87 72	34, 67, 109, 139	0
1	C	214/228 (93%)	-0.52	1 (0%) 87 72	30, 56, 97, 141	0
1	D	212/228 (92%)	-0.45	1 (0%) 87 72	35, 65, 103, 133	0
1	E	215/228 (94%)	-0.21	2 (0%) 81 61	39, 73, 112, 154	0
1	F	213/228 (93%)	-0.36	1 (0%) 87 72	33, 67, 120, 169	0
1	G	212/228 (92%)	-0.31	1 (0%) 87 72	49, 77, 110, 136	0
1	H	216/228 (94%)	-0.35	0 100 100	40, 73, 116, 141	0
1	I	210/228 (92%)	-0.26	1 (0%) 87 72	49, 83, 132, 162	0
2	J	219/290 (75%)	-0.35	1 (0%) 87 72	43, 79, 130, 174	0
2	K	222/290 (76%)	-0.53	1 (0%) 87 72	36, 61, 103, 139	0
2	L	223/290 (76%)	-0.60	1 (0%) 88 76	31, 51, 94, 150	0
All	All	2585/2922 (88%)	-0.40	11 (0%) 88 76	30, 69, 114, 174	0

The worst 5 of 11 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	45	VAL	3.1
1	I	44	GLY	3.0
2	K	113	MET	2.9
1	C	45	VAL	2.7
1	B	82	GLU	2.4

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 [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.