



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 12:51 PM UTC

PDB ID : 7T12 / pdb_00007t12
Title : Hexameric HIV-1 (O-group) CA
Authors : Jacques, D.A.; James, L.C.
Deposited on : 2021-12-01
Resolution : 3.00 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

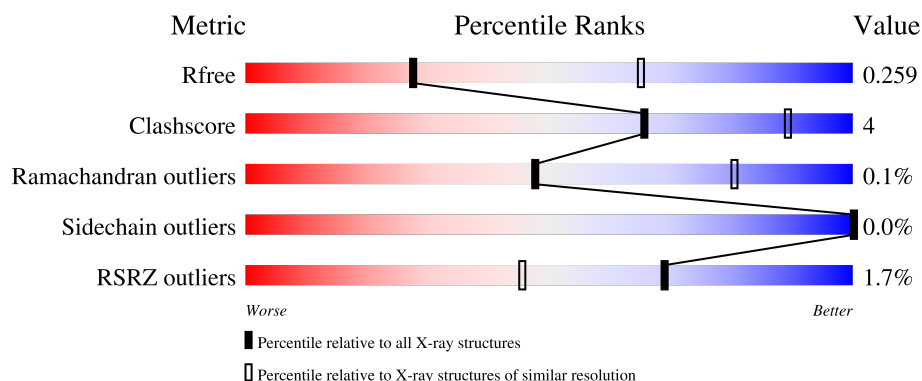
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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	232	0.2% 78% 12% 11%
1	B	232	0.2% 82% 8% 9%
1	C	232	74% 13% 13%
1	D	232	3% 78% 8% 15%
1	E	232	75% 10% 15%

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Mol	Chain	Length	Quality of chain
1	F	232	% 74% 15% 11%
1	G	232	% 80% 9% 12%
1	H	232	3% 80% 16%
1	I	232	% 84% 5% 12%
1	J	232	3% 80% 7% 13%
1	K	232	2% 72% 12% 16%
1	L	232	% 75% 9% 15%

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 18744 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 Capsid protein p24.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	207	Total	C	N	O	S	0	5	0
			1604	1012	277	303	12			
1	B	210	Total	C	N	O	S	0	6	0
			1616	1019	280	304	13			
1	C	202	Total	C	N	O	S	0	6	0
			1564	989	270	292	13			
1	D	198	Total	C	N	O	S	0	6	0
			1537	975	262	287	13			
1	E	198	Total	C	N	O	S	0	6	0
			1543	978	265	287	13			
1	F	206	Total	C	N	O	S	0	5	0
			1589	1003	275	299	12			
1	G	205	Total	C	N	O	S	0	6	0
			1583	1004	272	294	13			
1	H	196	Total	C	N	O	S	0	6	0
			1530	970	262	285	13			
1	I	205	Total	C	N	O	S	0	6	0
			1579	998	272	296	13			
1	J	201	Total	C	N	O	S	0	6	0
			1560	987	267	293	13			
1	K	194	Total	C	N	O	S	0	6	0
			1509	957	257	282	13			
1	L	197	Total	C	N	O	S	0	5	0
			1530	968	264	286	12			

There are 72 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	11	ILE	VAL	conflict	UNP Q79665
A	14	CYS	ALA	engineered mutation	UNP Q79665
A	45	CYS	GLU	engineered mutation	UNP Q79665
A	185	ALA	TRP	engineered mutation	UNP Q79665
A	186	ALA	MET	engineered mutation	UNP Q79665

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Chain	Residue	Modelled	Actual	Comment	Reference
A	209	GLY	GLU	conflict	UNP Q79665
B	11	ILE	VAL	conflict	UNP Q79665
B	14	CYS	ALA	engineered mutation	UNP Q79665
B	45	CYS	GLU	engineered mutation	UNP Q79665
B	185	ALA	TRP	engineered mutation	UNP Q79665
B	186	ALA	MET	engineered mutation	UNP Q79665
B	209	GLY	GLU	conflict	UNP Q79665
C	11	ILE	VAL	conflict	UNP Q79665
C	14	CYS	ALA	engineered mutation	UNP Q79665
C	45	CYS	GLU	engineered mutation	UNP Q79665
C	185	ALA	TRP	engineered mutation	UNP Q79665
C	186	ALA	MET	engineered mutation	UNP Q79665
C	209	GLY	GLU	conflict	UNP Q79665
D	11	ILE	VAL	conflict	UNP Q79665
D	14	CYS	ALA	engineered mutation	UNP Q79665
D	45	CYS	GLU	engineered mutation	UNP Q79665
D	185	ALA	TRP	engineered mutation	UNP Q79665
D	186	ALA	MET	engineered mutation	UNP Q79665
D	209	GLY	GLU	conflict	UNP Q79665
E	11	ILE	VAL	conflict	UNP Q79665
E	14	CYS	ALA	engineered mutation	UNP Q79665
E	45	CYS	GLU	engineered mutation	UNP Q79665
E	185	ALA	TRP	engineered mutation	UNP Q79665
E	186	ALA	MET	engineered mutation	UNP Q79665
E	209	GLY	GLU	conflict	UNP Q79665
F	11	ILE	VAL	conflict	UNP Q79665
F	14	CYS	ALA	engineered mutation	UNP Q79665
F	45	CYS	GLU	engineered mutation	UNP Q79665
F	185	ALA	TRP	engineered mutation	UNP Q79665
F	186	ALA	MET	engineered mutation	UNP Q79665
F	209	GLY	GLU	conflict	UNP Q79665
G	11	ILE	VAL	conflict	UNP Q79665
G	14	CYS	ALA	engineered mutation	UNP Q79665
G	45	CYS	GLU	engineered mutation	UNP Q79665
G	185	ALA	TRP	engineered mutation	UNP Q79665
G	186	ALA	MET	engineered mutation	UNP Q79665
G	209	GLY	GLU	conflict	UNP Q79665
H	11	ILE	VAL	conflict	UNP Q79665
H	14	CYS	ALA	engineered mutation	UNP Q79665
H	45	CYS	GLU	engineered mutation	UNP Q79665
H	185	ALA	TRP	engineered mutation	UNP Q79665
H	186	ALA	MET	engineered mutation	UNP Q79665

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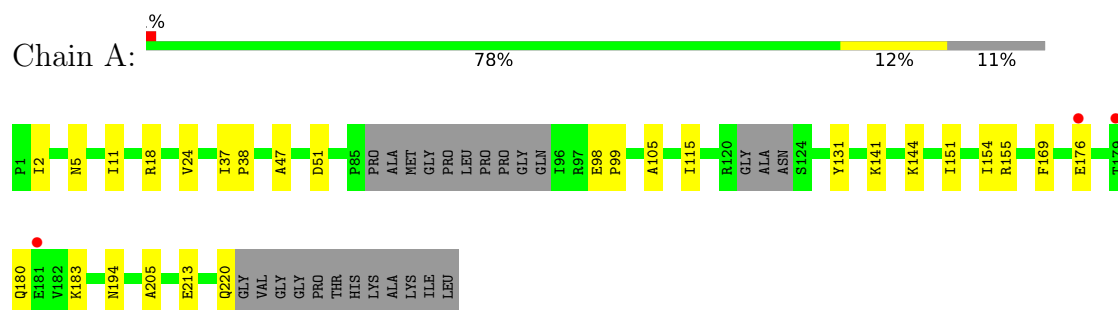
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Chain	Residue	Modelled	Actual	Comment	Reference
H	209	GLY	GLU	conflict	UNP Q79665
I	11	ILE	VAL	conflict	UNP Q79665
I	14	CYS	ALA	engineered mutation	UNP Q79665
I	45	CYS	GLU	engineered mutation	UNP Q79665
I	185	ALA	TRP	engineered mutation	UNP Q79665
I	186	ALA	MET	engineered mutation	UNP Q79665
I	209	GLY	GLU	conflict	UNP Q79665
J	11	ILE	VAL	conflict	UNP Q79665
J	14	CYS	ALA	engineered mutation	UNP Q79665
J	45	CYS	GLU	engineered mutation	UNP Q79665
J	185	ALA	TRP	engineered mutation	UNP Q79665
J	186	ALA	MET	engineered mutation	UNP Q79665
J	209	GLY	GLU	conflict	UNP Q79665
K	11	ILE	VAL	conflict	UNP Q79665
K	14	CYS	ALA	engineered mutation	UNP Q79665
K	45	CYS	GLU	engineered mutation	UNP Q79665
K	185	ALA	TRP	engineered mutation	UNP Q79665
K	186	ALA	MET	engineered mutation	UNP Q79665
K	209	GLY	GLU	conflict	UNP Q79665
L	11	ILE	VAL	conflict	UNP Q79665
L	14	CYS	ALA	engineered mutation	UNP Q79665
L	45	CYS	GLU	engineered mutation	UNP Q79665
L	185	ALA	TRP	engineered mutation	UNP Q79665
L	186	ALA	MET	engineered mutation	UNP Q79665
L	209	GLY	GLU	conflict	UNP Q79665

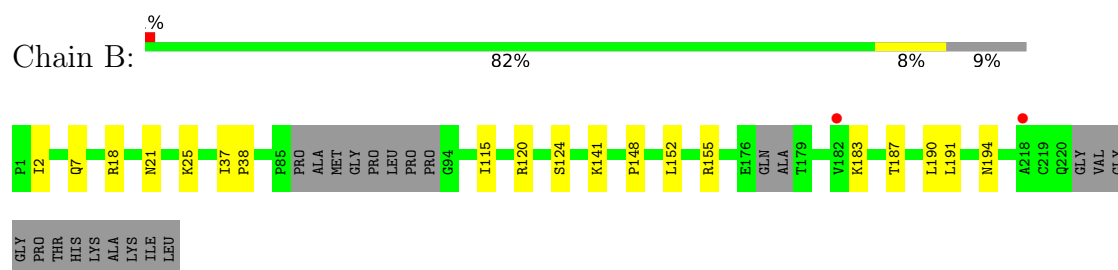
3 Residue-property plots [i](#)

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.

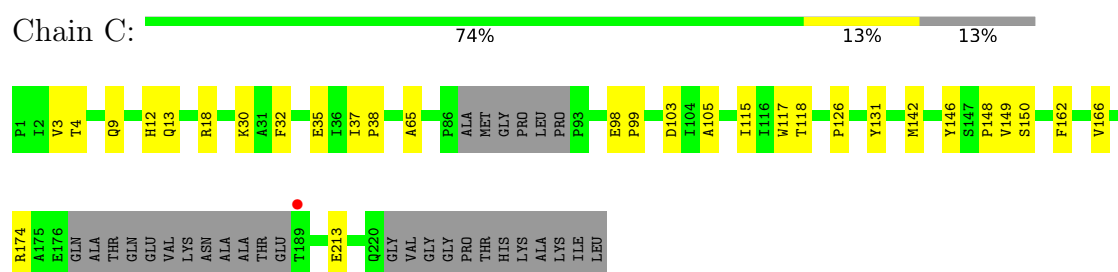
• Molecule 1: Capsid protein p24



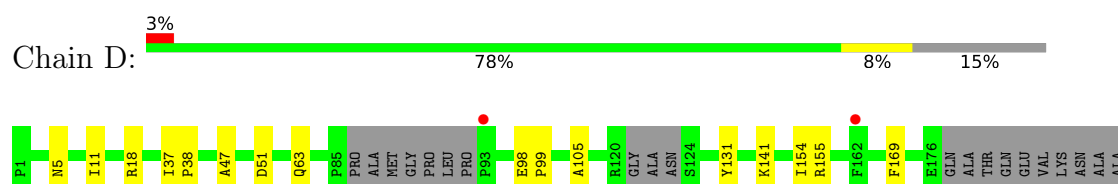
• Molecule 1: Capsid protein p24

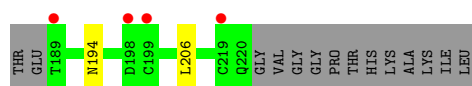


• Molecule 1: Capsid protein p24



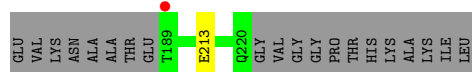
• Molecule 1: Capsid protein p24





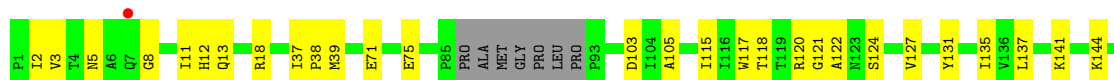
• Molecule 1: Capsid protein p24

Chain E: 75% 10% 15%



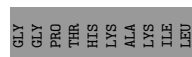
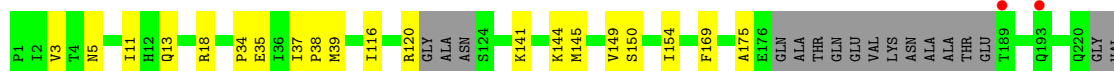
• Molecule 1: Capsid protein p24

Chain F: 74% 15% 11%



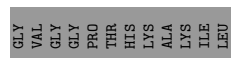
• Molecule 1: Capsid protein p24

Chain G: 80% 9% 12%



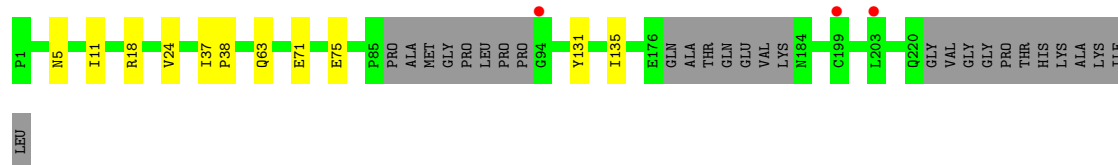
• Molecule 1: Capsid protein p24

Chain H: 80% 3% 16%

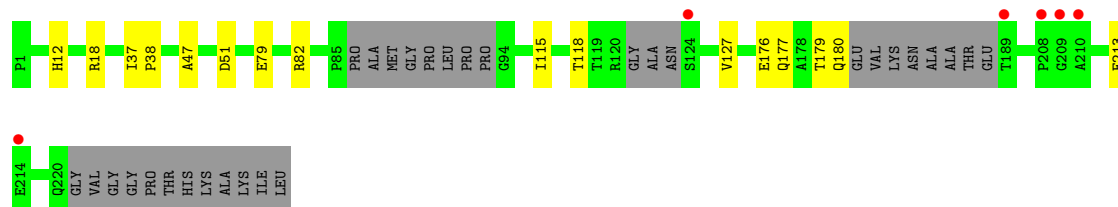
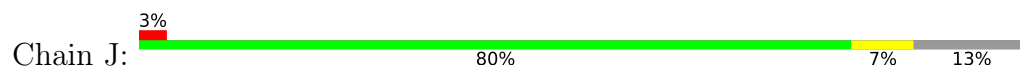


• Molecule 1: Capsid protein p24

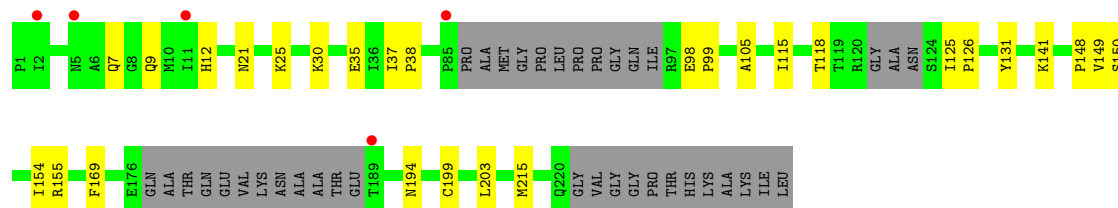
Chain I: 84% 5% 12%



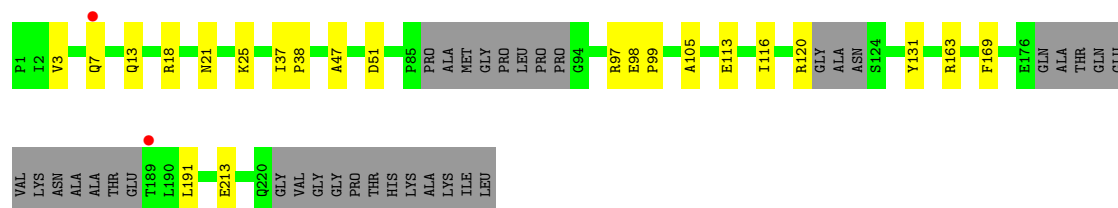
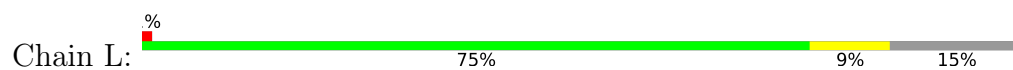
- Molecule 1: Capsid protein p24



- Molecule 1: Capsid protein p24



- Molecule 1: Capsid protein p24



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	87.20Å 151.73Å 120.42Å 90.00° 105.03° 90.00°	Depositor
Resolution (Å)	75.86 – 3.00 75.86 – 3.00	Depositor EDS
% Data completeness (in resolution range)	96.7 (75.86-3.00) 97.1 (75.86-3.00)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.85 (at 3.01Å)	Xtriage
Refinement program	PHENIX 1.14	Depositor
R, R_{free}	0.214 , 0.259 0.217 , 0.259	Depositor DCC
R_{free} test set	2952 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å ²)	79.3	Xtriage
Anisotropy	0.242	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 68.4	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	0.92	EDS
Total number of atoms	18744	wwPDB-VP
Average B, all atoms (Å ²)	95.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.51% 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	0.16	0/1634	0.39	0/2219
1	B	0.12	0/1649	0.34	0/2240
1	C	0.13	0/1599	0.35	0/2171
1	D	0.13	0/1570	0.34	0/2130
1	E	0.12	0/1576	0.33	0/2137
1	F	0.13	0/1620	0.34	0/2200
1	G	0.13	0/1620	0.35	0/2203
1	H	0.12	0/1562	0.34	0/2119
1	I	0.13	0/1612	0.35	0/2189
1	J	0.13	0/1592	0.35	0/2160
1	K	0.12	0/1541	0.33	0/2091
1	L	0.12	0/1559	0.34	0/2114
All	All	0.13	0/19134	0.35	0/25973

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	1604	0	1591	20	1
1	B	1616	0	1596	17	0
1	C	1564	0	1549	18	0
1	D	1537	0	1525	10	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	1543	0	1536	15	0
1	F	1589	0	1577	25	0
1	G	1583	0	1569	12	0
1	H	1530	0	1524	7	0
1	I	1579	0	1565	7	0
1	J	1560	0	1545	9	1
1	K	1509	0	1496	17	1
1	L	1530	0	1517	13	0
All	All	18744	0	18590	143	2

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 (143) 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:K:7:GLN:NE2	1:K:9:GLN:OE1	2.21	0.73
1:B:7:GLN:OE1	1:H:7:GLN:NE2	2.25	0.70
1:B:152:LEU:HD23	1:B:190:LEU:HD21	1.74	0.69
1:G:145:MET:O	1:L:163:ARG:NH2	2.26	0.68
1:A:180:GLN:O	1:A:183:LYS:NZ	2.29	0.66
1:A:220:GLN:HE21	1:B:148:PRO:HB3	1.63	0.64
1:K:7:GLN:HE21	1:K:9:GLN:HB2	1.61	0.64
1:F:152:LEU:HD23	1:F:190:LEU:HD21	1.82	0.62
1:K:155:ARG:HG2	1:K:194:ASN:HB3	1.81	0.61
1:E:213:GLU:OE2	1:F:141:LYS:HD3	2.03	0.59
1:F:121:GLY:N	1:K:7:GLN:OE1	2.22	0.58
1:H:39:MET:HE1	1:I:24:VAL:HG21	1.86	0.57
1:A:18:ARG:NH2	1:B:18:ARG:HH11	2.04	0.56
1:L:37:ILE:HB	1:L:38[A]:PRO:HD3	1.86	0.56
1:B:37:ILE:HB	1:B:38[A]:PRO:HD3	1.88	0.56
1:G:37:ILE:HB	1:G:38[A]:PRO:HD3	1.88	0.56
1:I:37:ILE:HB	1:I:38[A]:PRO:HD3	1.88	0.55
1:A:24:VAL:HG21	1:F:39:MET:HE1	1.87	0.55
1:B:120:ARG:O	1:B:124:SER:OG	2.23	0.55
1:A:144:LYS:HD2	1:A:176:GLU:HA	1.89	0.55
1:C:37:ILE:HB	1:C:38[A]:PRO:HD3	1.90	0.54
1:J:47:ALA:HB1	1:J:51:ASP:HB2	1.89	0.54
1:B:18:ARG:HH21	1:C:18:ARG:HG2	1.72	0.54
1:H:37:ILE:HB	1:H:38[A]:PRO:HD3	1.87	0.54
1:G:154:ILE:HG21	1:G:169:PHE:HA	1.90	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:118:THR:HG22	1:K:126:PRO:HA	1.89	0.54
1:A:220:GLN:NE2	1:B:148:PRO:HB3	2.22	0.54
1:D:37:ILE:HB	1:D:38[A]:PRO:HD3	1.89	0.53
1:L:47:ALA:HB1	1:L:51:ASP:HB2	1.90	0.53
1:D:98:GLU:HG3	1:D:99:PRO:HD2	1.91	0.52
1:E:37:ILE:HB	1:E:38[A]:PRO:HD3	1.92	0.52
1:A:151[A]:ILE:HB	1:A:176:GLU:OE2	2.08	0.52
1:B:155:ARG:HA	1:B:194:ASN:HB3	1.91	0.52
1:K:37:ILE:HB	1:K:38[A]:PRO:HD3	1.90	0.52
1:G:18:ARG:HG2	1:L:18:ARG:NH2	2.24	0.52
1:A:213:GLU:OE1	1:B:141:LYS:HD3	2.09	0.52
1:G:141:LYS:HD3	1:L:213:GLU:OE2	2.10	0.51
1:A:18:ARG:HH22	1:B:18:ARG:HH11	1.57	0.51
1:E:5:ASN:HB3	1:E:11:ILE:HD13	1.93	0.50
1:A:2:ILE:HG12	1:A:115:ILE:HG12	1.94	0.50
1:G:5:ASN:HB3	1:G:11:ILE:HD13	1.94	0.50
1:E:18:ARG:NH2	1:F:18:ARG:HH11	2.10	0.49
1:J:37:ILE:HB	1:J:38[A]:PRO:HD3	1.94	0.49
1:E:116:ILE:O	1:E:120:ARG:HG3	2.12	0.49
1:A:141:LYS:HD3	1:F:213:GLU:OE1	2.13	0.49
1:G:116:ILE:O	1:G:120:ARG:HG3	2.12	0.49
1:H:174:ARG:HD2	1:I:63:GLN:NE2	2.27	0.49
1:J:79:GLU:OE2	1:J:82:ARG:NH2	2.35	0.49
1:I:5:ASN:HB3	1:I:11:ILE:HD13	1.94	0.48
1:C:98:GLU:HG3	1:C:99:PRO:HD2	1.96	0.48
1:F:3:VAL:HG11	1:F:13:GLN:OE1	2.13	0.48
1:A:154:ILE:HG21	1:A:169:PHE:HA	1.96	0.47
1:A:155:ARG:HA	1:A:194:ASN:HB3	1.97	0.47
1:K:30:LYS:HD2	1:K:35:GLU:OE2	2.13	0.47
1:D:105:ALA:HA	1:D:131:TYR:CD1	2.49	0.47
1:F:118:THR:HG23	1:F:127:VAL:HG22	1.97	0.47
1:A:5:ASN:HB3	1:A:11:ILE:HD13	1.97	0.47
1:K:154:ILE:HG21	1:K:169:PHE:HA	1.96	0.46
1:F:154:ILE:HG21	1:F:169:PHE:HA	1.98	0.46
1:A:37:ILE:HB	1:A:38[A]:PRO:HD3	1.98	0.46
1:F:8:GLY:HA3	1:L:7:GLN:HG2	1.98	0.46
1:G:144:LYS:C	1:G:144:LYS:HD3	2.41	0.45
1:K:98:GLU:OE2	1:K:125:ILE:HD11	2.16	0.45
1:C:149:VAL:HG12	1:C:150:SER:O	2.16	0.45
1:D:5:ASN:HB3	1:D:11:ILE:HD13	1.99	0.45
1:C:213:GLU:OE1	1:D:141:LYS:HD3	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:141:LYS:HA	1:F:144:LYS:HE3	1.99	0.45
1:F:120:ARG:HD3	1:F:122:ALA:O	2.16	0.44
1:G:34:PRO:HG3	1:G:175:ALA:HA	1.99	0.44
1:E:154:ILE:HG21	1:E:169:PHE:HA	2.00	0.44
1:F:120:ARG:O	1:F:124:SER:HB3	2.17	0.44
1:L:169:PHE:CD2	1:L:191:LEU:HD13	2.52	0.44
1:A:18:ARG:HH22	1:B:18:ARG:NH1	2.16	0.44
1:A:105:ALA:HA	1:A:131:TYR:CE1	2.53	0.44
1:B:21:ASN:O	1:B:25:LYS:HG2	2.17	0.44
1:E:18:ARG:HH21	1:F:18:ARG:HG2	1.83	0.44
1:C:12:HIS:HB2	1:C:115:ILE:HD11	1.99	0.44
1:F:12:HIS:HB2	1:F:115:ILE:HD11	2.00	0.44
1:C:32:PHE:HD2	1:C:146:TYR:CE2	2.35	0.44
1:E:98:GLU:HG3	1:E:99:PRO:HD2	1.99	0.44
1:D:154:ILE:HG21	1:D:169:PHE:HA	1.98	0.44
1:F:37:ILE:HB	1:F:38[A]:PRO:HD3	1.99	0.44
1:I:131:TYR:CE2	1:I:135:ILE:HD11	2.53	0.44
1:K:149:VAL:HG12	1:K:150:SER:O	2.18	0.44
1:E:149:VAL:HG12	1:E:150:SER:O	2.18	0.43
1:C:105:ALA:HA	1:C:131:TYR:CD1	2.53	0.43
1:C:105:ALA:HA	1:C:131:TYR:CE1	2.53	0.43
1:F:105:ALA:HA	1:F:131:TYR:CD1	2.54	0.43
1:A:98:GLU:HG3	1:A:99:PRO:HD2	2.00	0.43
1:G:3:VAL:HG11	1:G:13:GLN:OE1	2.18	0.43
1:J:176:GLU:HA	1:J:176:GLU:OE1	2.19	0.43
1:J:213:GLU:OE1	1:K:141:LYS:HD3	2.18	0.43
1:C:3:VAL:HG11	1:C:13:GLN:OE1	2.19	0.43
1:D:155:ARG:HA	1:D:194:ASN:HB3	1.98	0.43
1:C:118:THR:HG22	1:C:126:PRO:HA	2.01	0.43
1:K:7:GLN:HE21	1:K:9:GLN:CB	2.31	0.43
1:D:47:ALA:HB1	1:D:51:ASP:HB2	2.00	0.43
1:F:2:ILE:HG12	1:F:115:ILE:HG12	2.01	0.43
1:C:103:ASP:HB3	1:C:117:TRP:CZ3	2.54	0.42
1:E:96:ILE:HD12	1:E:116:ILE:HG21	2.00	0.42
1:L:105:ALA:HA	1:L:131:TYR:CD1	2.54	0.42
1:F:149:VAL:HG12	1:F:150:SER:O	2.18	0.42
1:K:105:ALA:HA	1:K:131:TYR:CD1	2.54	0.42
1:L:116:ILE:O	1:L:120:ARG:HG3	2.18	0.42
1:A:18:ARG:HG2	1:F:18:ARG:NH2	2.35	0.42
1:B:2:ILE:HG12	1:B:115:ILE:HG12	2.02	0.42
1:E:161:PRO:HG2	1:E:164:ASP:OD2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:18:ARG:NH2	1:J:18:ARG:HG2	2.35	0.42
1:C:174:ARG:HD2	1:D:63:GLN:NE2	2.35	0.42
1:F:5:ASN:HB3	1:F:11:ILE:HD13	2.01	0.42
1:L:3:VAL:HG11	1:L:13:GLN:OE1	2.19	0.42
1:F:137:LEU:HD23	1:F:141:LYS:HE2	2.02	0.42
1:F:131:TYR:CE2	1:F:135:ILE:HD11	2.55	0.42
1:H:71:GLU:O	1:H:75:GLU:HG3	2.19	0.42
1:L:98:GLU:HG3	1:L:99:PRO:HD2	2.00	0.42
1:I:71:GLU:O	1:I:75:GLU:HG3	2.19	0.41
1:L:21:ASN:O	1:L:25:LYS:HG2	2.19	0.41
1:L:97:ARG:NH2	1:L:113:GLU:OE1	2.48	0.41
1:F:103:ASP:HB3	1:F:117:TRP:CZ3	2.55	0.41
1:E:47:ALA:HB1	1:E:51:ASP:HB2	2.01	0.41
1:J:118:THR:HG23	1:J:127:VAL:HG22	2.02	0.41
1:B:183:LYS:O	1:B:187:THR:HG23	2.21	0.41
1:G:35:GLU:O	1:G:39:MET:HG2	2.20	0.41
1:H:118:THR:HG22	1:H:126:PRO:HA	2.03	0.41
1:K:98:GLU:HG3	1:K:99:PRO:HD2	2.02	0.41
1:K:12:HIS:HB2	1:K:115:ILE:HD11	2.02	0.41
1:C:65:ALA:CB	1:C:142:MET:HE2	2.50	0.41
1:B:187:THR:O	1:B:191:LEU:HB3	2.21	0.41
1:C:4:THR:HA	1:C:9:GLN:O	2.21	0.41
1:D:18:ARG:NH2	1:E:18:ARG:HG2	2.35	0.41
1:G:149:VAL:HG12	1:G:150:SER:O	2.20	0.41
1:J:177:GLN:HG2	1:J:180:GLN:OE1	2.20	0.41
1:K:203:LEU:HD22	1:K:215[A]:MET:HG2	2.03	0.41
1:E:4:THR:HA	1:E:9:GLN:O	2.21	0.41
1:C:162:PHE:O	1:C:166:VAL:HG23	2.22	0.40
1:F:71:GLU:O	1:F:75:GLU:HG3	2.21	0.40
1:H:35:GLU:C	1:H:38[A]:PRO:HD2	2.46	0.40
1:J:12:HIS:HB2	1:J:115:ILE:HD11	2.03	0.40
1:B:18:ARG:NH2	1:C:18:ARG:HG2	2.36	0.40
1:E:2:ILE:HG12	1:E:115:ILE:HG12	2.03	0.40
1:C:30:LYS:HD2	1:C:35:GLU:OE2	2.22	0.40
1:K:21:ASN:O	1:K:25:LYS:HG2	2.21	0.40
1:A:47:ALA:HB1	1:A:51:ASP:HB2	2.03	0.40

All (2) 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)
1:D:206:LEU:O	1:K:155:ARG:NH2[2_556]	2.07	0.13
1:A:205:ALA:O	1:J:179:THR:OG1[1_556]	2.14	0.06

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	201/232 (87%)	199 (99%)	2 (1%)	0	100	100
1	B	205/232 (88%)	202 (98%)	3 (2%)	0	100	100
1	C	197/232 (85%)	195 (99%)	1 (0%)	1 (0%)	24	60
1	D	191/232 (82%)	189 (99%)	2 (1%)	0	100	100
1	E	191/232 (82%)	189 (99%)	1 (0%)	1 (0%)	24	60
1	F	200/232 (86%)	197 (98%)	3 (2%)	0	100	100
1	G	200/232 (86%)	196 (98%)	4 (2%)	0	100	100
1	H	189/232 (82%)	187 (99%)	2 (1%)	0	100	100
1	I	200/232 (86%)	198 (99%)	2 (1%)	0	100	100
1	J	194/232 (84%)	192 (99%)	2 (1%)	0	100	100
1	K	187/232 (81%)	185 (99%)	1 (0%)	1 (0%)	24	60
1	L	189/232 (82%)	186 (98%)	3 (2%)	0	100	100
All	All	2344/2784 (84%)	2315 (99%)	26 (1%)	3 (0%)	48	80

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	148	PRO
1	E	148	PRO
1	K	148	PRO

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	173/193 (90%)	173 (100%)	0	100	100
1	B	173/193 (90%)	173 (100%)	0	100	100
1	C	169/193 (88%)	169 (100%)	0	100	100
1	D	167/193 (86%)	167 (100%)	0	100	100
1	E	168/193 (87%)	168 (100%)	0	100	100
1	F	171/193 (89%)	171 (100%)	0	100	100
1	G	171/193 (89%)	171 (100%)	0	100	100
1	H	167/193 (86%)	167 (100%)	0	100	100
1	I	169/193 (88%)	169 (100%)	0	100	100
1	J	169/193 (88%)	169 (100%)	0	100	100
1	K	164/193 (85%)	162 (99%)	2 (1%)	63	82
1	L	165/193 (86%)	165 (100%)	0	100	100
All	All	2026/2316 (88%)	2024 (100%)	2 (0%)	100	93

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	199[A]	CYS
1	K	199[B]	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	140	ASN
1	B	7	GLN
1	C	62	HIS
1	C	84	HIS
1	D	62	HIS
1	D	63	GLN
1	G	62	HIS

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Mol	Chain	Res	Type
1	H	7	GLN
1	I	62	HIS
1	I	63	GLN
1	J	62	HIS
1	J	177	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 [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	207/232 (89%)	-0.05	3 (1%) 73 51	39, 77, 125, 149	0
1	B	210/232 (90%)	0.01	2 (0%) 79 59	39, 72, 142, 193	1 (0%)
1	C	202/232 (87%)	0.02	1 (0%) 87 72	36, 83, 147, 203	1 (0%)
1	D	198/232 (85%)	0.15	6 (3%) 52 30	48, 84, 150, 186	2 (1%)
1	E	198/232 (85%)	0.13	1 (0%) 87 72	44, 87, 157, 196	2 (1%)
1	F	206/232 (88%)	0.15	2 (0%) 79 59	53, 94, 150, 208	0
1	G	205/232 (88%)	0.14	2 (0%) 79 59	41, 87, 145, 184	1 (0%)
1	H	196/232 (84%)	0.26	7 (3%) 46 26	54, 97, 161, 194	2 (1%)
1	I	205/232 (88%)	0.21	3 (1%) 72 49	57, 98, 153, 199	2 (0%)
1	J	201/232 (86%)	0.10	6 (2%) 52 30	52, 94, 161, 212	1 (0%)
1	K	194/232 (83%)	0.19	5 (2%) 57 34	66, 103, 160, 222	1 (0%)
1	L	197/232 (84%)	0.13	2 (1%) 79 59	59, 104, 171, 223	0
All	All	2419/2784 (86%)	0.12	40 (1%) 69 45	36, 91, 154, 223	13 (0%)

All (40) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	J	209	GLY	4.8
1	G	189	THR	4.8
1	E	189	THR	4.7
1	K	189	THR	4.5
1	J	189	THR	3.6
1	H	188	GLU	3.4
1	D	198	ASP	3.4
1	D	189	THR	3.2
1	L	189	THR	3.2
1	C	189	THR	3.0
1	H	75	GLU	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	179	THR	2.9
1	D	219	CYS	2.9
1	J	214	GLU	2.9
1	A	181	GLU	2.9
1	I	199[A]	CYS	2.8
1	D	162	PHE	2.5
1	K	11	ILE	2.5
1	K	85	PRO	2.5
1	D	199[A]	CYS	2.5
1	J	210	ALA	2.5
1	A	176	GLU	2.4
1	H	151[A]	ILE	2.4
1	I	94	GLY	2.3
1	H	11	ILE	2.3
1	G	193	GLN	2.3
1	H	152	LEU	2.3
1	H	153	ASP	2.2
1	D	93	PRO	2.2
1	L	7	GLN	2.2
1	K	5	ASN	2.2
1	F	208	PRO	2.2
1	J	124	SER	2.1
1	J	208	PRO	2.1
1	B	182	VAL	2.1
1	I	203	LEU	2.1
1	H	176	GLU	2.1
1	F	7	GLN	2.0
1	B	218	ALA	2.0
1	K	2	ILE	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.