



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 12:16 PM UTC

PDB ID : 6H6T / pdb_00006h6t
Title : Binary crystal structure of positively and negatively supercharged variants Ftn(pos) and Ftn(neg) from human heavy chain ferritin (propandiol condition, coordination number 8)
Authors : Kuenzle, M.; Lach, M.; Beck, T.
Deposited on : 2018-07-30
Resolution : 1.90 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
Mogul : 2022.3.0, CSD as543be (2022)
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

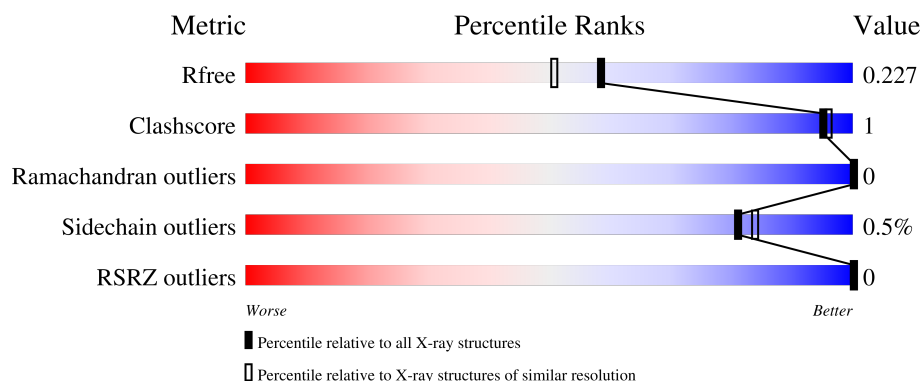
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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	183	 90% . . 6%
1	B	183	 89% 5% 6%
1	C	183	 90% . 6%
1	D	183	 85% 8% . 6%
1	E	183	 89% 5% 5%

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Mol	Chain	Length	Quality of chain
1	F	183	90% • 6%
2	G	183	90% • 6%
2	H	183	90% • 6%
2	I	183	87% 6% • 6%
2	J	183	89% 5% • 5%
2	K	183	92% •• 6%
2	L	183	90% 5% 5%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 17707 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 Ferritin heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	172	Total	C	N	O	S	0	0	0
			1432	903	258	266	5			
1	B	172	Total	C	N	O	S	0	0	0
			1432	903	258	266	5			
1	C	172	Total	C	N	O	S	0	0	0
			1432	903	258	266	5			
1	D	172	Total	C	N	O	S	0	0	0
			1432	903	258	266	5			
1	E	173	Total	C	N	O	S	0	0	0
			1437	906	259	267	5			
1	F	172	Total	C	N	O	S	0	0	0
			1432	903	258	266	5			

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	18	LYS	ALA	engineered mutation	UNP P02794
A	25	ARG	ASN	engineered mutation	UNP P02794
A	86	GLN	LYS	engineered mutation	UNP P02794
A	90	LYS	CYS	engineered mutation	UNP P02794
A	98	ARG	ASN	engineered mutation	UNP P02794
A	102	LYS	CYS	engineered mutation	UNP P02794
A	105	LYS	HIS	engineered mutation	UNP P02794
A	109	LYS	ASN	engineered mutation	UNP P02794
A	123	LYS	ASP	engineered mutation	UNP P02794
A	162	ARG	GLU	engineered mutation	UNP P02794
B	18	LYS	ALA	engineered mutation	UNP P02794
B	25	ARG	ASN	engineered mutation	UNP P02794
B	86	GLN	LYS	engineered mutation	UNP P02794
B	90	LYS	CYS	engineered mutation	UNP P02794
B	98	ARG	ASN	engineered mutation	UNP P02794
B	102	LYS	CYS	engineered mutation	UNP P02794
B	105	LYS	HIS	engineered mutation	UNP P02794

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Chain	Residue	Modelled	Actual	Comment	Reference
B	109	LYS	ASN	engineered mutation	UNP P02794
B	123	LYS	ASP	engineered mutation	UNP P02794
B	162	ARG	GLU	engineered mutation	UNP P02794
C	18	LYS	ALA	engineered mutation	UNP P02794
C	25	ARG	ASN	engineered mutation	UNP P02794
C	86	GLN	LYS	engineered mutation	UNP P02794
C	90	LYS	CYS	engineered mutation	UNP P02794
C	98	ARG	ASN	engineered mutation	UNP P02794
C	102	LYS	CYS	engineered mutation	UNP P02794
C	105	LYS	HIS	engineered mutation	UNP P02794
C	109	LYS	ASN	engineered mutation	UNP P02794
C	123	LYS	ASP	engineered mutation	UNP P02794
C	162	ARG	GLU	engineered mutation	UNP P02794
D	18	LYS	ALA	engineered mutation	UNP P02794
D	25	ARG	ASN	engineered mutation	UNP P02794
D	86	GLN	LYS	engineered mutation	UNP P02794
D	90	LYS	CYS	engineered mutation	UNP P02794
D	98	ARG	ASN	engineered mutation	UNP P02794
D	102	LYS	CYS	engineered mutation	UNP P02794
D	105	LYS	HIS	engineered mutation	UNP P02794
D	109	LYS	ASN	engineered mutation	UNP P02794
D	123	LYS	ASP	engineered mutation	UNP P02794
D	162	ARG	GLU	engineered mutation	UNP P02794
E	18	LYS	ALA	engineered mutation	UNP P02794
E	25	ARG	ASN	engineered mutation	UNP P02794
E	86	GLN	LYS	engineered mutation	UNP P02794
E	90	LYS	CYS	engineered mutation	UNP P02794
E	98	ARG	ASN	engineered mutation	UNP P02794
E	102	LYS	CYS	engineered mutation	UNP P02794
E	105	LYS	HIS	engineered mutation	UNP P02794
E	109	LYS	ASN	engineered mutation	UNP P02794
E	123	LYS	ASP	engineered mutation	UNP P02794
E	162	ARG	GLU	engineered mutation	UNP P02794
F	18	LYS	ALA	engineered mutation	UNP P02794
F	25	ARG	ASN	engineered mutation	UNP P02794
F	86	GLN	LYS	engineered mutation	UNP P02794
F	90	LYS	CYS	engineered mutation	UNP P02794
F	98	ARG	ASN	engineered mutation	UNP P02794
F	102	LYS	CYS	engineered mutation	UNP P02794
F	105	LYS	HIS	engineered mutation	UNP P02794
F	109	LYS	ASN	engineered mutation	UNP P02794
F	123	LYS	ASP	engineered mutation	UNP P02794

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Chain	Residue	Modelled	Actual	Comment	Reference
F	162	ARG	GLU	engineered mutation	UNP P02794

- Molecule 2 is a protein called Ferritin heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	G	172	Total	C	N	O	S	0	0	0
			1422	890	246	281	5			
2	H	172	Total	C	N	O	S	0	0	0
			1422	890	246	281	5			
2	I	172	Total	C	N	O	S	0	0	0
			1422	890	246	281	5			
2	J	173	Total	C	N	O	S	0	0	0
			1427	893	247	282	5			
2	K	172	Total	C	N	O	S	0	0	0
			1422	890	246	281	5			
2	L	173	Total	C	N	O	S	0	0	0
			1427	893	247	282	5			

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	18	GLU	ALA	engineered mutation	UNP P02794
G	86	GLN	LYS	engineered mutation	UNP P02794
G	90	GLU	CYS	engineered mutation	UNP P02794
G	102	GLU	CYS	engineered mutation	UNP P02794
G	105	GLU	HIS	engineered mutation	UNP P02794
H	18	GLU	ALA	engineered mutation	UNP P02794
H	86	GLN	LYS	engineered mutation	UNP P02794
H	90	GLU	CYS	engineered mutation	UNP P02794
H	102	GLU	CYS	engineered mutation	UNP P02794
H	105	GLU	HIS	engineered mutation	UNP P02794
I	18	GLU	ALA	engineered mutation	UNP P02794
I	86	GLN	LYS	engineered mutation	UNP P02794
I	90	GLU	CYS	engineered mutation	UNP P02794
I	102	GLU	CYS	engineered mutation	UNP P02794
I	105	GLU	HIS	engineered mutation	UNP P02794
J	18	GLU	ALA	engineered mutation	UNP P02794
J	86	GLN	LYS	engineered mutation	UNP P02794
J	90	GLU	CYS	engineered mutation	UNP P02794
J	102	GLU	CYS	engineered mutation	UNP P02794
J	105	GLU	HIS	engineered mutation	UNP P02794
K	18	GLU	ALA	engineered mutation	UNP P02794

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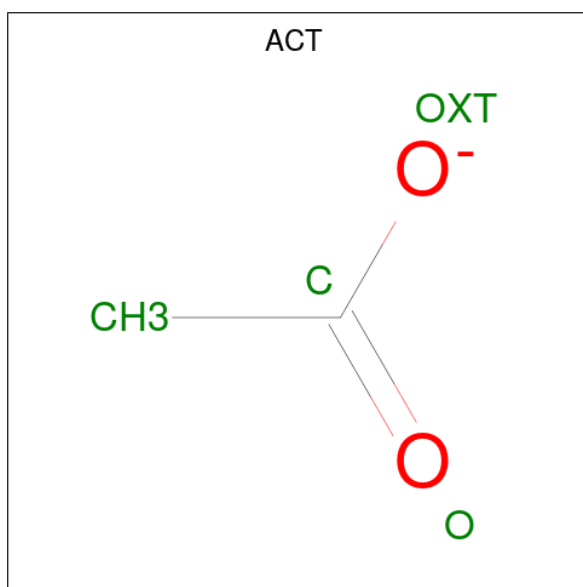
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Chain	Residue	Modelled	Actual	Comment	Reference
K	86	GLN	LYS	engineered mutation	UNP P02794
K	90	GLU	CYS	engineered mutation	UNP P02794
K	102	GLU	CYS	engineered mutation	UNP P02794
K	105	GLU	HIS	engineered mutation	UNP P02794
L	18	GLU	ALA	engineered mutation	UNP P02794
L	86	GLN	LYS	engineered mutation	UNP P02794
L	90	GLU	CYS	engineered mutation	UNP P02794
L	102	GLU	CYS	engineered mutation	UNP P02794
L	105	GLU	HIS	engineered mutation	UNP P02794

- Molecule 3 is FE (III) ION (CCD ID: FE) (formula: Fe).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Fe 1 1	0	0
3	B	1	Total Fe 1 1	0	0
3	C	1	Total Fe 1 1	0	0
3	D	1	Total Fe 1 1	0	0
3	E	1	Total Fe 1 1	0	0
3	F	1	Total Fe 1 1	0	0
3	G	1	Total Fe 1 1	0	0
3	H	1	Total Fe 1 1	0	0
3	I	1	Total Fe 1 1	0	0
3	J	1	Total Fe 1 1	0	0
3	K	1	Total Fe 1 1	0	0
3	L	1	Total Fe 1 1	0	0

- Molecule 4 is ACETATE ION (CCD ID: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		
4	G	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mg	0	0
			1	1		
5	B	1	Total	Mg	0	0
			1	1		

- Molecule 6 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	1	Total	Zn	0	0
			1	1		
6	E	1	Total	Zn	0	0
			1	1		
6	F	1	Total	Zn	0	0
			1	1		
6	J	1	Total	Zn	0	0
			1	1		
6	K	1	Total	Zn	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	L	1	Total 1	Zn 1	0	0

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	1	Total 1	Cl 1	0	0
7	E	1	Total 1	Cl 1	0	0
7	F	1	Total 1	Cl 1	0	0
7	G	1	Total 1	Cl 1	0	0
7	J	1	Total 1	Cl 1	0	0
7	L	1	Total 1	Cl 1	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	49	Total 49	O 49	0	0
8	B	45	Total 45	O 45	0	0
8	C	38	Total 38	O 38	0	0
8	D	31	Total 31	O 31	0	0
8	E	52	Total 52	O 52	0	0
8	F	25	Total 25	O 25	0	0
8	G	54	Total 54	O 54	0	0
8	H	53	Total 53	O 53	0	0
8	I	41	Total 41	O 41	0	0
8	J	59	Total 59	O 59	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	K	44	Total	O	0	0
			44	44		
8	L	43	Total	O	0	0
			43	43		

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: Ferritin heavy chain

Chain A:  90% . . 6%



- Molecule 1: Ferritin heavy chain

Chain B:  89% 5% 6%



- Molecule 1: Ferritin heavy chain

Chain C:  90% . 6%



- Molecule 1: Ferritin heavy chain

Chain D:  85% 8% . 6%



- Molecule 1: Ferritin heavy chain

Chain E:  89% 5% 5%



- Molecule 1: Ferritin heavy chain

Chain F:  90% . 6%



- Molecule 2: Ferritin heavy chain

Chain G: 90% 6%



- Molecule 2: Ferritin heavy chain

Chain H: 90% 6%



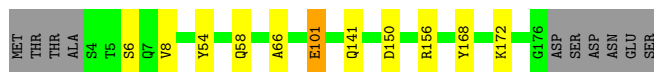
- Molecule 2: Ferritin heavy chain

Chain I: 87% 6% 6%



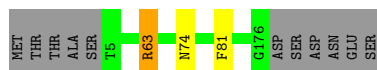
- Molecule 2: Ferritin heavy chain

Chain J: 89% 5% 5%



- Molecule 2: Ferritin heavy chain

Chain K: 92% 6% 2%



- Molecule 2: Ferritin heavy chain

Chain L: 90% 5% 5%



4 Data and refinement statistics

Property	Value	Source
Space group	P 4	Depositor
Cell constants a, b, c, α , β , γ	153.23Å 153.23Å 135.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.46 – 1.90 48.46 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.5 (48.46-1.90) 99.5 (48.46-1.90)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.86 (at 1.90Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.182 , 0.222 0.191 , 0.227	Depositor DCC
R_{free} test set	12224 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	24.5	Xtriage
Anisotropy	0.037	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 19.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.22$	Xtriage
Estimated twinning fraction	0.144 for h,-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	17707	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FE, MG, ZN, ACT, CL

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	1.27	1/1460 (0.1%)	1.18	1/1957 (0.1%)
1	B	1.28	1/1460 (0.1%)	1.15	0/1957
1	C	1.35	1/1460 (0.1%)	1.16	1/1957 (0.1%)
1	D	1.20	1/1460 (0.1%)	1.17	2/1957 (0.1%)
1	E	1.40	6/1465 (0.4%)	1.20	1/1964 (0.1%)
1	F	1.21	2/1460 (0.1%)	1.12	1/1957 (0.1%)
2	G	1.34	3/1450 (0.2%)	1.19	1/1953 (0.1%)
2	H	1.32	2/1450 (0.1%)	1.16	2/1953 (0.1%)
2	I	1.34	2/1450 (0.1%)	1.17	0/1953
2	J	1.36	3/1455 (0.2%)	1.14	1/1960 (0.1%)
2	K	1.27	2/1450 (0.1%)	1.10	0/1953
2	L	1.26	2/1455 (0.1%)	1.18	4/1960 (0.2%)
All	All	1.30	26/17475 (0.1%)	1.16	14/23481 (0.1%)

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	I	27	GLU	C-O	-7.70	1.15	1.24
2	G	151	HIS	C-O	-7.07	1.15	1.24
1	E	29	TYR	CA-C	6.43	1.60	1.52
2	H	46	VAL	N-CA	6.24	1.51	1.46
1	E	73	GLN	N-CA	6.01	1.53	1.46
2	L	128	HIS	N-CA	5.93	1.53	1.46
2	L	64	GLU	CA-C	5.77	1.60	1.52
2	K	81	PHE	CA-C	-5.75	1.46	1.52
2	J	150	ASP	CA-C	5.75	1.60	1.52
1	A	102	LYS	N-CA	5.68	1.53	1.46
2	G	120	LEU	C-O	5.63	1.30	1.24
1	E	40	TYR	C-O	5.50	1.30	1.24
1	D	67	GLU	C-O	5.40	1.30	1.24
2	G	37	MET	N-CA	5.35	1.52	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	25	ARG	CA-C	5.32	1.59	1.52
2	K	74	ASN	C-O	-5.29	1.17	1.24
2	J	66	ALA	C-O	5.28	1.30	1.24
1	F	26	LEU	N-CA	-5.23	1.40	1.46
2	I	146	LYS	CA-C	5.12	1.59	1.52
1	E	174	THR	CA-C	-5.12	1.48	1.52
2	J	101	GLU	C-O	-5.09	1.18	1.24
1	E	108	LYS	CA-C	5.08	1.59	1.52
1	C	56	LEU	C-O	5.06	1.30	1.24
1	E	79	ARG	C-O	-5.05	1.17	1.23
2	H	137	TYR	CA-C	-5.04	1.46	1.52
1	B	110	VAL	C-O	5.04	1.30	1.24

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	6	SER	N-CA-C	6.42	119.66	110.10
2	L	60	HIS	N-CA-C	-5.97	104.89	111.82
2	J	141	GLN	CB-CA-C	-5.95	101.50	110.90
1	F	73	GLN	N-CA-C	-5.82	104.85	111.07
1	A	55	PHE	N-CA-C	5.55	118.09	111.71
1	E	66	ALA	N-CA-C	-5.40	105.47	111.36
2	H	24	ILE	N-CA-C	-5.40	105.24	110.42
2	G	131	ASP	N-CA-C	5.39	117.16	111.28
1	D	89	ASP	N-CA-C	5.24	117.73	111.71
2	L	164	GLY	N-CA-C	-5.20	106.40	113.37
2	L	6	SER	N-CA-C	5.13	117.48	110.24
2	L	18	GLU	N-CA-C	5.11	116.84	111.28
2	H	139	ASN	N-CA-CB	5.09	118.18	110.28
1	C	139	ASN	N-CA-CB	5.00	118.00	110.30

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	1432	0	1419	5	0
1	B	1432	0	1419	4	0
1	C	1432	0	1419	5	0
1	D	1432	0	1419	9	0
1	E	1437	0	1421	2	0
1	F	1432	0	1419	2	0
2	G	1422	0	1354	2	0
2	H	1422	0	1354	3	0
2	I	1422	0	1354	7	0
2	J	1427	0	1356	4	0
2	K	1422	0	1354	1	0
2	L	1427	0	1356	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
3	I	1	0	0	0	0
3	J	1	0	0	0	0
3	K	1	0	0	0	0
3	L	1	0	0	0	0
4	A	4	0	3	1	0
4	G	4	0	3	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	C	1	0	0	0	0
6	E	1	0	0	0	0
6	F	1	0	0	0	0
6	J	1	0	0	0	0
6	K	1	0	0	0	0
6	L	1	0	0	0	0
7	C	1	0	0	0	0
7	E	1	0	0	0	0
7	F	1	0	0	0	0
7	G	1	0	0	0	0
7	J	1	0	0	0	0
7	L	1	0	0	0	0
8	A	49	0	0	0	0
8	B	45	0	0	0	0
8	C	38	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	D	31	0	0	0	0
8	E	52	0	0	0	0
8	F	25	0	0	0	0
8	G	54	0	0	0	0
8	H	53	0	0	0	0
8	I	41	0	0	0	0
8	J	59	0	0	0	0
8	K	44	0	0	0	0
8	L	43	0	0	0	0
All	All	17707	0	16650	41	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 1.

All (41) 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:A:63:ARG:NH1	1:C:63:ARG:HD3	1.98	0.78
2:H:63:ARG:NH2	2:I:63:ARG:HG2	2.10	0.65
2:G:72:LEU:HD22	2:G:132:PHE:CE2	2.35	0.62
1:A:72:LEU:C	1:A:72:LEU:HD13	2.30	0.57
1:D:6:SER:OG	1:D:8:VAL:HG22	2.08	0.54
2:G:72:LEU:HD22	2:G:132:PHE:CD2	2.42	0.54
2:I:20:ILE:HD13	2:I:117:LEU:HD21	1.91	0.53
1:A:63:ARG:HH11	1:C:63:ARG:HD3	1.70	0.51
1:D:14:GLN:O	1:D:18:LYS:HG2	2.10	0.51
2:J:6:SER:OG	2:J:8:VAL:HG22	2.11	0.51
1:C:72:LEU:C	1:C:72:LEU:HD13	2.38	0.48
2:K:63:ARG:HG3	2:L:63:ARG:HH11	1.79	0.48
1:D:6:SER:HB3	1:D:9:ARG:HB2	1.97	0.47
1:A:97:LEU:HD23	1:A:161:PRO:HD3	1.97	0.47
1:F:72:LEU:C	1:F:72:LEU:HD13	2.41	0.46
1:F:60:HIS:O	1:F:64:GLU:HG2	2.15	0.46
2:J:101:GLU:OE2	2:J:156:ARG:NH2	2.49	0.46
2:H:63:ARG:HH22	2:I:63:ARG:HG2	1.79	0.45
1:D:139:ASN:O	1:D:143:LYS:HG3	2.16	0.45
1:C:102:LYS:HD3	1:C:102:LYS:HA	1.73	0.44
1:E:72:LEU:C	1:E:72:LEU:HD13	2.43	0.43
1:B:153:THR:O	1:B:157:LYS:HG2	2.19	0.43
1:B:119:LYS:HG2	1:B:123:LYS:HE3	2.00	0.43
1:A:25:ARG:HD3	4:A:202:ACT:H3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:160:ALA:HB1	1:B:161:PRO:HA	2.00	0.43
2:J:168:TYR:CE2	2:J:172:LYS:NZ	2.87	0.43
2:H:23:GLN:O	2:H:27:GLU:HG2	2.19	0.42
2:L:161:PRO:HD2	2:L:162:GLU:OE1	2.20	0.42
1:D:54:TYR:O	1:D:58:GLN:HG2	2.18	0.42
1:B:23:GLN:O	1:B:27:GLU:HG2	2.19	0.42
2:I:72:LEU:HD22	2:I:132:PHE:CE2	2.55	0.41
1:D:72:LEU:C	1:D:72:LEU:HD13	2.45	0.41
1:E:6:SER:OG	1:E:8:VAL:HG22	2.20	0.41
2:I:114:LEU:HD13	2:I:137:TYR:HB3	2.02	0.41
2:I:72:LEU:HD22	2:I:132:PHE:CD2	2.55	0.41
1:C:27:GLU:OE1	1:C:62:GLU:OE1	2.39	0.41
1:D:57:HIS:NE2	1:D:61:GLU:OE1	2.54	0.40
2:I:97:LEU:HD23	2:I:161:PRO:HD3	2.03	0.40
1:D:57:HIS:CD2	1:D:61:GLU:OE1	2.74	0.40
1:D:95:SER:OG	1:D:98:ARG:HG2	2.22	0.40
2:J:54:TYR:O	2:J:58:GLN:HG2	2.21	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	170/183 (93%)	167 (98%)	3 (2%)	0	100	100
1	B	170/183 (93%)	166 (98%)	4 (2%)	0	100	100
1	C	170/183 (93%)	169 (99%)	1 (1%)	0	100	100
1	D	170/183 (93%)	167 (98%)	3 (2%)	0	100	100
1	E	171/183 (93%)	168 (98%)	3 (2%)	0	100	100
1	F	170/183 (93%)	166 (98%)	4 (2%)	0	100	100
2	G	170/183 (93%)	168 (99%)	2 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	H	170/183 (93%)	168 (99%)	2 (1%)	0	100	100
2	I	170/183 (93%)	166 (98%)	4 (2%)	0	100	100
2	J	171/183 (93%)	169 (99%)	2 (1%)	0	100	100
2	K	170/183 (93%)	167 (98%)	3 (2%)	0	100	100
2	L	171/183 (93%)	169 (99%)	2 (1%)	0	100	100
All	All	2043/2196 (93%)	2010 (98%)	33 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	154/164 (94%)	152 (99%)	2 (1%)	61	61
1	B	154/164 (94%)	154 (100%)	0	100	100
1	C	154/164 (94%)	153 (99%)	1 (1%)	78	81
1	D	154/164 (94%)	154 (100%)	0	100	100
1	E	154/164 (94%)	154 (100%)	0	100	100
1	F	154/164 (94%)	153 (99%)	1 (1%)	78	81
2	G	154/164 (94%)	153 (99%)	1 (1%)	78	81
2	H	154/164 (94%)	153 (99%)	1 (1%)	78	81
2	I	154/164 (94%)	152 (99%)	2 (1%)	61	61
2	J	154/164 (94%)	154 (100%)	0	100	100
2	K	154/164 (94%)	153 (99%)	1 (1%)	78	81
2	L	154/164 (94%)	154 (100%)	0	100	100
All	All	1848/1968 (94%)	1839 (100%)	9 (0%)	81	84

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	72	LEU
1	A	90	LYS
1	C	49	LYS
1	F	140	GLU
2	G	49	LYS
2	H	64	GLU
2	I	49	LYS
2	I	63	ARG
2	K	63	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	57	HIS
1	A	83	GLN
1	A	125	ASN
1	A	154	ASN
1	B	58	GLN
1	C	57	HIS
1	C	75	GLN
1	C	111	ASN
1	D	7	GLN
1	D	65	HIS
1	E	7	GLN
1	F	7	GLN
1	F	57	HIS
2	G	65	HIS
2	G	111	ASN
2	H	65	HIS
2	H	111	ASN
2	J	173	HIS

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](#)

Of 28 ligands modelled in this entry, 26 are monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	ACT	G	202	-	3,3,3	0.86	0	3,3,3	0.89	0
4	ACT	A	202	-	3,3,3	1.28	0	3,3,3	0.44	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	202	ACT	1	0

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 [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	172/183 (93%)	-1.26	0 100 100	21, 26, 39, 68	0
1	B	172/183 (93%)	-1.29	0 100 100	19, 24, 37, 63	0
1	C	172/183 (93%)	-1.30	0 100 100	20, 25, 36, 63	0
1	D	172/183 (93%)	-1.16	0 100 100	22, 30, 42, 66	0
1	E	173/183 (94%)	-1.31	0 100 100	17, 23, 36, 61	0
1	F	172/183 (93%)	-1.13	0 100 100	24, 30, 44, 63	0
2	G	172/183 (93%)	-1.36	0 100 100	17, 22, 34, 43	0
2	H	172/183 (93%)	-1.35	0 100 100	18, 24, 36, 42	0
2	I	172/183 (93%)	-1.34	0 100 100	19, 25, 36, 44	0
2	J	173/183 (94%)	-1.35	0 100 100	17, 22, 34, 53	0
2	K	172/183 (93%)	-1.31	0 100 100	19, 25, 36, 46	0
2	L	173/183 (94%)	-1.32	0 100 100	19, 25, 37, 56	0
All	All	2067/2196 (94%)	-1.29	0 100 100	17, 25, 38, 68	0

There are no RSRZ outliers to report.

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 ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	FE	A	201	1/1	0.97	0.08	76,76,76,76	0
4	ACT	A	202	4/4	0.97	0.07	41,45,48,50	0
3	FE	C	202	1/1	0.98	0.08	68,68,68,68	0
3	FE	D	201	1/1	0.98	0.10	76,76,76,76	0
3	FE	F	202	1/1	0.98	0.11	78,78,78,78	0
3	FE	B	201	1/1	0.98	0.09	70,70,70,70	0
4	ACT	G	202	4/4	0.98	0.05	33,34,42,47	0
5	MG	A	203	1/1	0.98	0.05	52,52,52,52	0
5	MG	B	202	1/1	0.98	0.05	43,43,43,43	0
3	FE	K	202	1/1	0.99	0.08	57,57,57,57	0
3	FE	L	202	1/1	0.99	0.07	62,62,62,62	0
3	FE	E	202	1/1	0.99	0.07	67,67,67,67	0
3	FE	G	201	1/1	0.99	0.07	60,60,60,60	0
3	FE	H	201	1/1	0.99	0.06	54,54,54,54	0
3	FE	I	201	1/1	0.99	0.05	55,55,55,55	0
3	FE	J	202	1/1	1.00	0.08	48,48,48,48	0
6	ZN	C	201	1/1	1.00	0.04	34,34,34,34	0
6	ZN	E	201	1/1	1.00	0.02	31,31,31,31	1
6	ZN	F	201	1/1	1.00	0.04	39,39,39,39	1
6	ZN	J	201	1/1	1.00	0.02	35,35,35,35	1
6	ZN	K	201	1/1	1.00	0.05	34,34,34,34	0
6	ZN	L	201	1/1	1.00	0.04	37,37,37,37	1
7	CL	C	203	1/1	1.00	0.07	30,30,30,30	0
7	CL	E	203	1/1	1.00	0.02	24,24,24,24	1
7	CL	F	203	1/1	1.00	0.04	31,31,31,31	1
7	CL	G	203	1/1	1.00	0.05	27,27,27,27	0
7	CL	J	203	1/1	1.00	0.07	22,22,22,22	1
7	CL	L	203	1/1	1.00	0.03	19,19,19,19	1

6.5 Other polymers ⓘ

There are no such residues in this entry.