



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 20, 2024 – 01:43 AM EST

PDB ID : 4LW9  
Title : Crystal structure of Vibrio cholera major pseudopilin EpsG  
Authors : Vago, F.S.; Raghunathan, K.; Jens, J.C.; Wedemeyer, W.J.; Bagdasarian, M.;  
Brunzelle, J.S.; Arvidson, D.N.  
Deposited on : 2013-07-26  
Resolution : 1.90 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

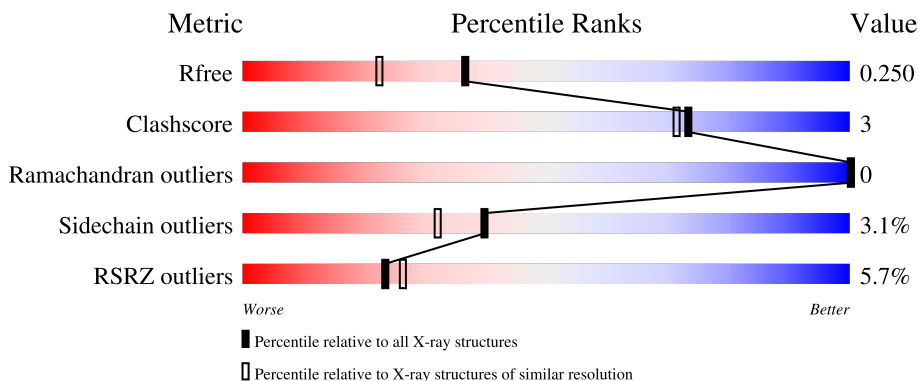
MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:  
*X-RAY DIFFRACTION*

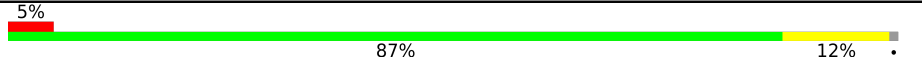
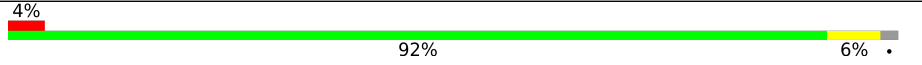
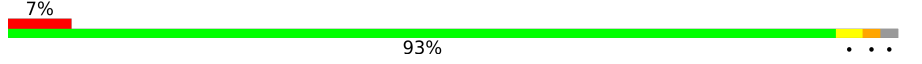


The reported resolution of this entry is 1.90 Å.

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))
$R_{free}$	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (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  $\geq 3$ , 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	120	 5% 87% 12% .
1	B	120	 4% 92% 6% .
1	C	120	 7% 93% . . .
1	D	120	 5% 88% 12% .
1	E	120	 2% 88% 11% .

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Mol	Chain	Length	Quality of chain
1	F	120	
1	I	120	
1	J	120	
1	K	120	
1	L	120	
1	Q	120	
1	R	120	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	CL	B	207	-	-	-	X
5	CL	E	207	-	-	-	X

## 2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 11720 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 Type II secretion system protein G.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	119	Total 925	C 576	N 160	O 188	S 1	0	0	0
1	B	118	Total 924	C 575	N 160	O 188	S 1	0	0	0
1	C	118	Total 908	C 569	N 157	O 181	S 1	0	0	0
1	D	119	Total 912	C 568	N 156	O 187	S 1	0	0	0
1	E	118	Total 916	C 572	N 160	O 183	S 1	0	0	0
1	F	114	Total 868	C 542	N 152	O 173	S 1	0	0	0
1	I	117	Total 896	C 559	N 153	O 183	S 1	0	0	0
1	J	119	Total 912	C 568	N 157	O 186	S 1	0	0	0
1	K	117	Total 887	C 556	N 151	O 179	S 1	0	0	0
1	L	118	Total 920	C 573	N 160	O 186	S 1	0	0	0
1	Q	119	Total 927	C 577	N 160	O 189	S 1	0	0	0
1	R	118	Total 918	C 572	N 158	O 187	S 1	0	0	0

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	138	LEU	-	expression tag	UNP P45773
A	139	GLU	-	expression tag	UNP P45773
A	140	HIS	-	expression tag	UNP P45773
A	141	HIS	-	expression tag	UNP P45773
A	142	HIS	-	expression tag	UNP P45773

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Chain	Residue	Modelled	Actual	Comment	Reference
A	143	HIS	-	expression tag	UNP P45773
A	144	HIS	-	expression tag	UNP P45773
A	145	HIS	-	expression tag	UNP P45773
B	138	LEU	-	expression tag	UNP P45773
B	139	GLU	-	expression tag	UNP P45773
B	140	HIS	-	expression tag	UNP P45773
B	141	HIS	-	expression tag	UNP P45773
B	142	HIS	-	expression tag	UNP P45773
B	143	HIS	-	expression tag	UNP P45773
B	144	HIS	-	expression tag	UNP P45773
B	145	HIS	-	expression tag	UNP P45773
C	138	LEU	-	expression tag	UNP P45773
C	139	GLU	-	expression tag	UNP P45773
C	140	HIS	-	expression tag	UNP P45773
C	141	HIS	-	expression tag	UNP P45773
C	142	HIS	-	expression tag	UNP P45773
C	143	HIS	-	expression tag	UNP P45773
C	144	HIS	-	expression tag	UNP P45773
C	145	HIS	-	expression tag	UNP P45773
D	138	LEU	-	expression tag	UNP P45773
D	139	GLU	-	expression tag	UNP P45773
D	140	HIS	-	expression tag	UNP P45773
D	141	HIS	-	expression tag	UNP P45773
D	142	HIS	-	expression tag	UNP P45773
D	143	HIS	-	expression tag	UNP P45773
D	144	HIS	-	expression tag	UNP P45773
D	145	HIS	-	expression tag	UNP P45773
E	138	LEU	-	expression tag	UNP P45773
E	139	GLU	-	expression tag	UNP P45773
E	140	HIS	-	expression tag	UNP P45773
E	141	HIS	-	expression tag	UNP P45773
E	142	HIS	-	expression tag	UNP P45773
E	143	HIS	-	expression tag	UNP P45773
E	144	HIS	-	expression tag	UNP P45773
E	145	HIS	-	expression tag	UNP P45773
F	138	LEU	-	expression tag	UNP P45773
F	139	GLU	-	expression tag	UNP P45773
F	140	HIS	-	expression tag	UNP P45773
F	141	HIS	-	expression tag	UNP P45773
F	142	HIS	-	expression tag	UNP P45773
F	143	HIS	-	expression tag	UNP P45773
F	144	HIS	-	expression tag	UNP P45773

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Chain	Residue	Modelled	Actual	Comment	Reference
F	145	HIS	-	expression tag	UNP P45773
I	138	LEU	-	expression tag	UNP P45773
I	139	GLU	-	expression tag	UNP P45773
I	140	HIS	-	expression tag	UNP P45773
I	141	HIS	-	expression tag	UNP P45773
I	142	HIS	-	expression tag	UNP P45773
I	143	HIS	-	expression tag	UNP P45773
I	144	HIS	-	expression tag	UNP P45773
I	145	HIS	-	expression tag	UNP P45773
J	138	LEU	-	expression tag	UNP P45773
J	139	GLU	-	expression tag	UNP P45773
J	140	HIS	-	expression tag	UNP P45773
J	141	HIS	-	expression tag	UNP P45773
J	142	HIS	-	expression tag	UNP P45773
J	143	HIS	-	expression tag	UNP P45773
J	144	HIS	-	expression tag	UNP P45773
J	145	HIS	-	expression tag	UNP P45773
K	138	LEU	-	expression tag	UNP P45773
K	139	GLU	-	expression tag	UNP P45773
K	140	HIS	-	expression tag	UNP P45773
K	141	HIS	-	expression tag	UNP P45773
K	142	HIS	-	expression tag	UNP P45773
K	143	HIS	-	expression tag	UNP P45773
K	144	HIS	-	expression tag	UNP P45773
K	145	HIS	-	expression tag	UNP P45773
L	138	LEU	-	expression tag	UNP P45773
L	139	GLU	-	expression tag	UNP P45773
L	140	HIS	-	expression tag	UNP P45773
L	141	HIS	-	expression tag	UNP P45773
L	142	HIS	-	expression tag	UNP P45773
L	143	HIS	-	expression tag	UNP P45773
L	144	HIS	-	expression tag	UNP P45773
L	145	HIS	-	expression tag	UNP P45773
Q	138	LEU	-	expression tag	UNP P45773
Q	139	GLU	-	expression tag	UNP P45773
Q	140	HIS	-	expression tag	UNP P45773
Q	141	HIS	-	expression tag	UNP P45773
Q	142	HIS	-	expression tag	UNP P45773
Q	143	HIS	-	expression tag	UNP P45773
Q	144	HIS	-	expression tag	UNP P45773
Q	145	HIS	-	expression tag	UNP P45773
R	138	LEU	-	expression tag	UNP P45773

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Chain	Residue	Modelled	Actual	Comment	Reference
R	139	GLU	-	expression tag	UNP P45773
R	140	HIS	-	expression tag	UNP P45773
R	141	HIS	-	expression tag	UNP P45773
R	142	HIS	-	expression tag	UNP P45773
R	143	HIS	-	expression tag	UNP P45773
R	144	HIS	-	expression tag	UNP P45773
R	145	HIS	-	expression tag	UNP P45773

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	3	Total Zn 3 3	0	0
2	B	1	Total Zn 1 1	0	0
2	C	3	Total Zn 3 3	0	0
2	D	3	Total Zn 3 3	0	0
2	E	4	Total Zn 4 4	0	0
2	F	2	Total Zn 2 2	0	0
2	I	3	Total Zn 3 3	0	0
2	J	2	Total Zn 2 2	0	0
2	K	4	Total Zn 4 4	0	0
2	L	3	Total Zn 3 3	0	0
2	Q	3	Total Zn 3 3	0	0
2	R	1	Total Zn 1 1	0	0

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total Na 2 2	0	0
3	B	3	Total Na 3 3	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	D	1	Total Na 1 1	0	0

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Ca 1 1	0	0
4	B	1	Total Ca 1 1	0	0
4	C	1	Total Ca 1 1	0	0
4	D	1	Total Ca 1 1	0	0
4	E	1	Total Ca 1 1	0	0
4	F	2	Total Ca 2 2	0	0
4	I	1	Total Ca 1 1	0	0
4	J	1	Total Ca 1 1	0	0
4	K	1	Total Ca 1 1	0	0
4	L	1	Total Ca 1 1	0	0
4	Q	2	Total Ca 2 2	0	0
4	R	1	Total Ca 1 1	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Cl 1 1	0	0
5	B	1	Total Cl 1 1	0	0
5	D	1	Total Cl 1 1	0	0
5	E	2	Total Cl 2 2	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	K	1	Total Cl 1 1	0	0
5	L	1	Total Cl 1 1	0	0
5	R	2	Total Cl 2 2	0	0

- Molecule 6 is PLATINUM (II) ION (three-letter code: PT) (formula: Pt).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Pt 1 1	0	0
6	B	1	Total Pt 1 1	0	0
6	C	1	Total Pt 1 1	0	0
6	D	1	Total Pt 1 1	0	0
6	E	1	Total Pt 1 1	0	0
6	F	1	Total Pt 1 1	0	0
6	I	1	Total Pt 1 1	0	0
6	J	1	Total Pt 1 1	0	0
6	K	1	Total Pt 1 1	0	0
6	L	1	Total Pt 1 1	0	0
6	Q	1	Total Pt 1 1	0	0
6	R	1	Total Pt 1 1	0	0

- Molecule 7 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	S	0	0
			5	4	1		
7	B	1	Total	O	S	0	0
			5	4	1		
7	C	1	Total	O	S	0	0
			5	4	1		
7	D	1	Total	O	S	0	0
			5	4	1		
7	D	1	Total	O	S	0	0
			5	4	1		
7	E	1	Total	O	S	0	0
			5	4	1		
7	F	1	Total	O	S	0	0
			5	4	1		
7	I	1	Total	O	S	0	0
			5	4	1		
7	I	1	Total	O	S	0	0
			5	4	1		
7	J	1	Total	O	S	0	0
			5	4	1		
7	K	1	Total	O	S	0	0
			5	4	1		
7	K	1	Total	O	S	0	0
			5	4	1		
7	Q	1	Total	O	S	0	0
			5	4	1		
7	R	1	Total	O	S	0	0
			5	4	1		

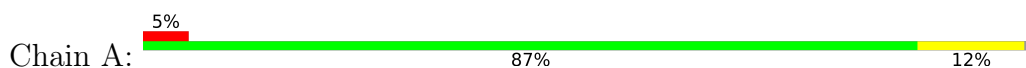
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	56	Total O 56 56	0	0
8	B	59	Total O 59 59	0	0
8	C	53	Total O 53 53	0	0
8	D	72	Total O 72 72	0	0
8	E	58	Total O 58 58	0	0
8	F	34	Total O 34 34	0	0
8	I	67	Total O 67 67	0	0
8	J	54	Total O 54 54	0	0
8	K	44	Total O 44 44	0	0
8	L	60	Total O 60 60	0	0
8	Q	56	Total O 56 56	0	0
8	R	51	Total O 51 51	0	0

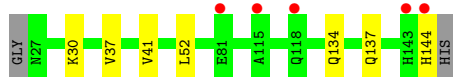
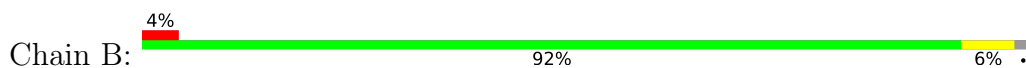
### 3 Residue-property plots [i](#)

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.

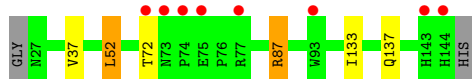
- Molecule 1: Type II secretion system protein G



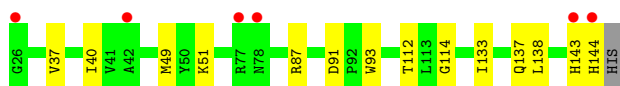
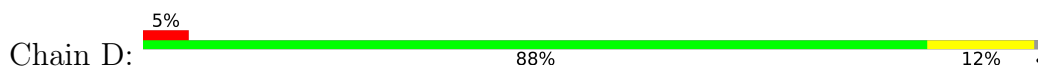
- Molecule 1: Type II secretion system protein G



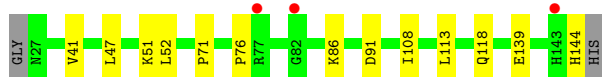
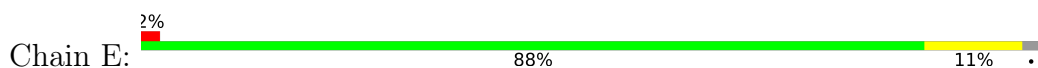
- Molecule 1: Type II secretion system protein G



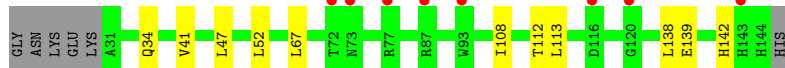
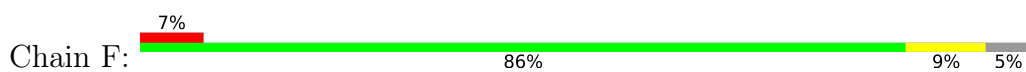
- Molecule 1: Type II secretion system protein G



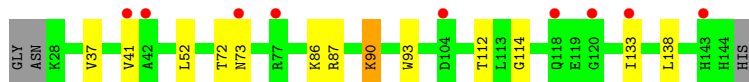
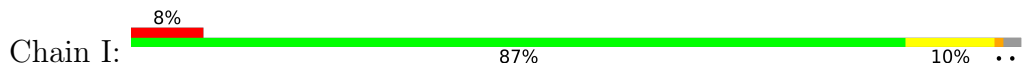
- Molecule 1: Type II secretion system protein G



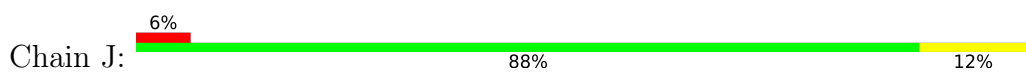
- Molecule 1: Type II secretion system protein G



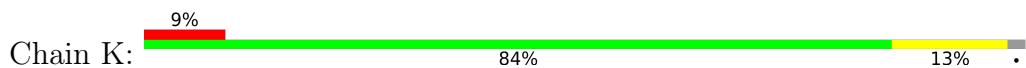
- Molecule 1: Type II secretion system protein G



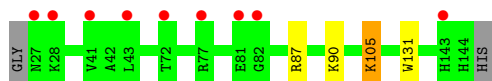
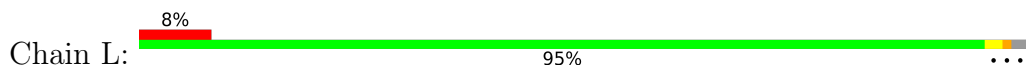
- Molecule 1: Type II secretion system protein G



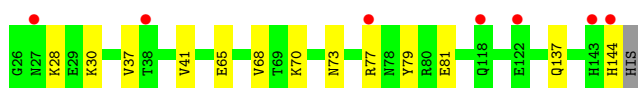
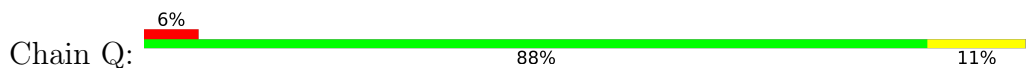
- Molecule 1: Type II secretion system protein G



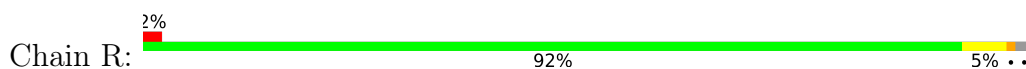
- Molecule 1: Type II secretion system protein G



- Molecule 1: Type II secretion system protein G



- Molecule 1: Type II secretion system protein G



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	88.61Å 70.02Å 131.54Å 90.00° 103.29° 90.00°	Depositor
Resolution (Å)	29.54 – 1.90 29.54 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.8 (29.54-1.90) 99.8 (29.54-1.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.04 (at 1.91Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.202 , 0.245 0.209 , 0.250	Depositor DCC
$R_{free}$ test set	6178 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.7	Xtrriage
Anisotropy	0.008	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.41 , 56.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	11720	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.48% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: CA, ZN, PT, SO4, NA, 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	0.64	0/948	0.77	2/1289 (0.2%)
1	B	0.56	0/947	0.67	0/1288
1	C	0.55	0/931	0.65	0/1267
1	D	0.53	0/934	0.67	0/1272
1	E	0.49	0/939	0.67	1/1277 (0.1%)
1	F	0.46	0/891	0.59	0/1218
1	I	0.55	0/918	0.68	0/1252
1	J	0.51	0/934	0.66	1/1272 (0.1%)
1	K	0.50	0/909	0.65	0/1240
1	L	0.50	0/943	0.66	0/1283
1	Q	0.54	0/949	0.68	0/1289
1	R	0.64	0/941	0.69	0/1281
All	All	0.54	0/11184	0.67	4/15228 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	44	GLU	OE1-CD-OE2	-11.16	109.90	123.30
1	A	44	GLU	CG-CD-OE1	5.96	130.22	118.30
1	E	91	ASP	CB-CG-OD1	5.45	123.20	118.30
1	J	91	ASP	CB-CG-OD1	5.08	122.87	118.30

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	925	0	854	10	0
1	B	924	0	851	7	0
1	C	908	0	837	6	0
1	D	912	0	831	9	0
1	E	916	0	848	7	0
1	F	868	0	784	6	0
1	I	896	0	813	11	0
1	J	912	0	834	7	0
1	K	887	0	808	11	1
1	L	920	0	847	1	0
1	Q	927	0	860	6	0
1	R	918	0	841	6	0
2	A	3	0	0	0	0
2	B	1	0	0	0	0
2	C	3	0	0	0	0
2	D	3	0	0	0	0
2	E	4	0	0	0	0
2	F	2	0	0	0	0
2	I	3	0	0	0	0
2	J	2	0	0	0	0
2	K	4	0	0	0	0
2	L	3	0	0	0	0
2	Q	3	0	0	0	0
2	R	1	0	0	0	0
3	A	2	0	0	0	0
3	B	3	0	0	0	0
3	D	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	2	0	0	0	0
4	I	1	0	0	0	0
4	J	1	0	0	0	0
4	K	1	0	0	0	0
4	L	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	Q	2	0	0	0	0
4	R	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	D	1	0	0	1	0
5	E	2	0	0	0	0
5	K	1	0	0	0	0
5	L	1	0	0	0	0
5	R	2	0	0	1	1
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
6	E	1	0	0	0	0
6	F	1	0	0	0	0
6	I	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
6	Q	1	0	0	0	0
6	R	1	0	0	0	0
7	A	5	0	0	1	0
7	B	5	0	0	0	0
7	C	5	0	0	0	0
7	D	10	0	0	0	0
7	E	5	0	0	0	0
7	F	5	0	0	0	0
7	I	10	0	0	0	0
7	J	5	0	0	0	0
7	K	10	0	0	0	0
7	Q	5	0	0	0	0
7	R	5	0	0	0	0
8	A	56	0	0	0	0
8	B	59	0	0	1	0
8	C	53	0	0	0	0
8	D	72	0	0	1	0
8	E	58	0	0	0	0
8	F	34	0	0	0	0
8	I	67	0	0	2	0
8	J	54	0	0	0	0
8	K	44	0	0	1	0
8	L	60	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	Q	56	0	0	0	0
8	R	51	0	0	0	0
All	All	11720	0	10008	69	1

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 3.

The worst 5 of 69 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:D:143:HIS:HA	1:D:144:HIS:C	2.07	0.74
1:B:37:VAL:HG11	1:B:137:GLN:HG2	1.71	0.72
1:I:37:VAL:HA	1:I:133:ILE:HD11	1.87	0.56
1:K:113:LEU:HD12	1:K:119:GLU:HA	1.88	0.56
1:E:52:LEU:HD21	1:F:138:LEU:HD21	1.87	0.55

All (1) 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:K:143:HIS:NE2	5:R:203:CL:CL[2_757]	2.16	0.04

## 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	117/120 (98%)	114 (97%)	3 (3%)	0	100	100
1	B	116/120 (97%)	115 (99%)	1 (1%)	0	100	100
1	C	116/120 (97%)	113 (97%)	3 (3%)	0	100	100
1	D	117/120 (98%)	116 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	116/120 (97%)	113 (97%)	3 (3%)	0	100	100
1	F	112/120 (93%)	110 (98%)	2 (2%)	0	100	100
1	I	115/120 (96%)	112 (97%)	3 (3%)	0	100	100
1	J	117/120 (98%)	114 (97%)	3 (3%)	0	100	100
1	K	115/120 (96%)	113 (98%)	2 (2%)	0	100	100
1	L	116/120 (97%)	113 (97%)	3 (3%)	0	100	100
1	Q	117/120 (98%)	115 (98%)	2 (2%)	0	100	100
1	R	116/120 (97%)	113 (97%)	3 (3%)	0	100	100
All	All	1390/1440 (96%)	1361 (98%)	29 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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	96/99 (97%)	93 (97%)	3 (3%)	40	32
1	B	96/99 (97%)	95 (99%)	1 (1%)	76	76
1	C	92/99 (93%)	89 (97%)	3 (3%)	38	29
1	D	93/99 (94%)	91 (98%)	2 (2%)	52	47
1	E	94/99 (95%)	92 (98%)	2 (2%)	53	48
1	F	87/99 (88%)	83 (95%)	4 (5%)	27	17
1	I	91/99 (92%)	86 (94%)	5 (6%)	21	12
1	J	93/99 (94%)	90 (97%)	3 (3%)	39	30
1	K	89/99 (90%)	88 (99%)	1 (1%)	73	73
1	L	95/99 (96%)	92 (97%)	3 (3%)	39	30
1	Q	96/99 (97%)	90 (94%)	6 (6%)	18	8
1	R	95/99 (96%)	93 (98%)	2 (2%)	53	48
All	All	1117/1188 (94%)	1082 (97%)	35 (3%)	40	32

5 of 35 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	Q	30	LYS
1	Q	73	ASN
1	Q	144	HIS
1	F	52	LEU
1	F	34	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 87 ligands modelled in this entry, 73 are monoatomic - leaving 14 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	$\# Z  > 2$
7	SO4	I	207	-	4,4,4	0.13	0	6,6,6	0.17	0
7	SO4	F	206	-	4,4,4	0.13	0	6,6,6	0.19	0
7	SO4	J	205	-	4,4,4	0.24	0	6,6,6	0.24	0
7	SO4	D	208	-	4,4,4	0.14	0	6,6,6	0.13	0
7	SO4	D	209	-	4,4,4	0.13	0	6,6,6	0.29	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
7	SO4	K	208	-	4,4,4	0.15	0	6,6,6	0.09	0
7	SO4	B	208	-	4,4,4	0.14	0	6,6,6	0.18	0
7	SO4	C	206	-	4,4,4	0.19	0	6,6,6	0.28	0
7	SO4	K	209	-	4,4,4	0.14	0	6,6,6	0.26	0
7	SO4	R	206	-	4,4,4	0.25	0	6,6,6	0.21	0
7	SO4	Q	207	-	4,4,4	0.09	0	6,6,6	0.23	0
7	SO4	A	209	-	4,4,4	0.09	0	6,6,6	0.44	0
7	SO4	I	206	-	4,4,4	0.16	0	6,6,6	0.45	0
7	SO4	E	209	-	4,4,4	0.17	0	6,6,6	0.26	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
7	A	209	SO4	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	119/120 (99%)	0.35	6 (5%) 28 32	16, 28, 48, 54	0
1	B	118/120 (98%)	0.11	5 (4%) 36 39	16, 27, 44, 50	0
1	C	118/120 (98%)	0.44	8 (6%) 17 19	16, 31, 50, 60	0
1	D	119/120 (99%)	0.41	6 (5%) 28 32	17, 31, 48, 53	0
1	E	118/120 (98%)	0.20	3 (2%) 57 60	21, 30, 45, 52	0
1	F	114/120 (95%)	0.58	8 (7%) 16 18	23, 38, 60, 62	0
1	I	117/120 (97%)	0.42	9 (7%) 13 15	17, 32, 53, 57	0
1	J	119/120 (99%)	0.45	7 (5%) 22 25	20, 33, 54, 59	0
1	K	117/120 (97%)	0.52	11 (9%) 8 9	20, 37, 53, 58	0
1	L	118/120 (98%)	0.39	9 (7%) 13 15	19, 35, 48, 54	0
1	Q	119/120 (99%)	0.35	7 (5%) 22 25	15, 29, 46, 56	0
1	R	118/120 (98%)	0.06	2 (1%) 70 72	16, 25, 38, 46	0
All	All	1414/1440 (98%)	0.36	81 (5%) 23 26	15, 31, 51, 62	0

The worst 5 of 81 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	74	PRO	5.7
1	D	78	ASN	5.2
1	C	143	HIS	4.7
1	C	72	THR	4.5
1	K	143	HIS	4.1

### 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 monosaccharides in this entry.

### 6.4 Ligands [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
2	ZN	J	202	1/1	0.70	0.15	64,64,64,64	0
5	CL	B	207	1/1	0.76	0.96	33,33,33,33	1
7	SO4	E	209	5/5	0.76	0.18	62,63,64,64	0
7	SO4	J	205	5/5	0.77	0.23	70,71,71,71	0
5	CL	E	207	1/1	0.80	0.63	34,34,34,34	1
7	SO4	R	206	5/5	0.80	0.17	64,65,65,66	0
6	PT	K	207	1/1	0.81	0.07	45,45,45,45	1
7	SO4	D	209	5/5	0.82	0.19	69,70,70,70	0
5	CL	R	205	1/1	0.83	0.75	25,25,25,25	1
7	SO4	C	206	5/5	0.83	0.21	69,69,70,70	0
7	SO4	Q	207	5/5	0.84	0.17	62,63,64,64	0
7	SO4	D	208	5/5	0.86	0.21	82,82,83,83	0
2	ZN	D	202	1/1	0.86	0.07	49,49,49,49	0
2	ZN	F	201	1/1	0.86	0.07	47,47,47,47	0
5	CL	R	203	1/1	0.87	0.08	45,45,45,45	0
7	SO4	K	209	5/5	0.87	0.16	70,70,71,71	0
7	SO4	A	209	5/5	0.87	0.22	54,54,55,56	0
7	SO4	F	206	5/5	0.87	0.14	69,69,69,70	0
6	PT	C	205	1/1	0.88	0.14	38,38,38,38	1
7	SO4	I	207	5/5	0.88	0.13	69,69,70,70	0
6	PT	F	204	1/1	0.89	0.12	46,46,46,46	1
3	NA	A	207	1/1	0.91	0.20	38,38,38,38	0
5	CL	L	206	1/1	0.91	0.76	30,30,30,30	1
2	ZN	K	204	1/1	0.91	0.05	68,68,68,68	0
6	PT	L	205	1/1	0.91	0.06	38,38,38,38	1
5	CL	D	207	1/1	0.91	1.23	34,34,34,34	1
6	PT	J	204	1/1	0.92	0.05	52,52,52,52	1
7	SO4	B	208	5/5	0.92	0.13	48,50,51,52	0
6	PT	I	205	1/1	0.93	0.12	30,30,30,30	1
5	CL	A	206	1/1	0.93	0.06	40,40,40,40	0
2	ZN	L	204	1/1	0.94	0.07	61,61,61,61	0
2	ZN	C	203	1/1	0.94	0.08	51,51,51,51	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	CA	F	202	1/1	0.94	0.06	54,54,54,54	0
6	PT	B	206	1/1	0.94	0.07	37,37,37,37	1
4	CA	I	204	1/1	0.94	0.04	45,45,45,45	0
6	PT	Q	206	1/1	0.94	0.10	39,39,39,39	1
5	CL	K	205	1/1	0.95	0.07	44,44,44,44	0
7	SO4	K	208	5/5	0.95	0.13	79,80,80,80	0
4	CA	F	203	1/1	0.95	0.06	38,38,38,38	0
3	NA	D	204	1/1	0.95	0.06	43,43,43,43	0
2	ZN	D	203	1/1	0.95	0.07	62,62,62,62	0
2	ZN	K	202	1/1	0.96	0.11	31,31,31,31	0
6	PT	D	206	1/1	0.96	0.06	37,37,37,37	1
6	PT	E	206	1/1	0.96	0.17	32,32,32,32	1
4	CA	A	205	1/1	0.96	0.07	42,42,42,42	0
4	CA	D	205	1/1	0.96	0.04	40,40,40,40	0
2	ZN	Q	201	1/1	0.96	0.09	33,33,33,33	0
3	NA	A	204	1/1	0.96	0.19	41,41,41,41	0
2	ZN	E	203	1/1	0.96	0.12	53,53,53,53	0
4	CA	L	203	1/1	0.96	0.07	33,33,33,33	0
4	CA	Q	204	1/1	0.96	0.06	33,33,33,33	0
4	CA	Q	205	1/1	0.96	0.09	29,29,29,29	0
4	CA	K	206	1/1	0.97	0.04	44,44,44,44	0
2	ZN	I	202	1/1	0.97	0.07	32,32,32,32	0
4	CA	B	202	1/1	0.97	0.07	34,34,34,34	0
4	CA	C	204	1/1	0.97	0.09	39,39,39,39	0
2	ZN	A	202	1/1	0.97	0.08	26,26,26,26	0
3	NA	B	201	1/1	0.97	0.04	33,33,33,33	0
3	NA	B	204	1/1	0.97	0.09	37,37,37,37	0
2	ZN	D	201	1/1	0.97	0.10	27,27,27,27	0
5	CL	E	208	1/1	0.97	0.58	30,30,30,30	1
4	CA	E	205	1/1	0.98	0.10	25,25,25,25	0
2	ZN	E	204	1/1	0.98	0.06	29,29,29,29	0
4	CA	R	202	1/1	0.98	0.07	23,23,23,23	0
2	ZN	L	202	1/1	0.98	0.07	29,29,29,29	0
7	SO4	I	206	5/5	0.98	0.07	38,38,39,40	0
6	PT	A	208	1/1	0.98	0.15	27,27,27,27	1
2	ZN	E	202	1/1	0.98	0.11	27,27,27,27	0
6	PT	R	204	1/1	0.98	0.14	27,27,27,27	1
4	CA	J	203	1/1	0.98	0.06	28,28,28,28	0
2	ZN	F	205	1/1	0.98	0.08	30,30,30,30	0
3	NA	B	205	1/1	0.98	0.10	27,27,27,27	0
2	ZN	K	201	1/1	0.99	0.12	24,24,24,24	0
2	ZN	B	203	1/1	0.99	0.07	29,29,29,29	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	ZN	I	201	1/1	0.99	0.07	29,29,29,29	0
2	ZN	L	201	1/1	0.99	0.11	31,31,31,31	0
2	ZN	E	201	1/1	0.99	0.10	29,29,29,29	0
2	ZN	I	203	1/1	0.99	0.11	25,25,25,25	0
2	ZN	J	201	1/1	0.99	0.06	27,27,27,27	0
2	ZN	R	201	1/1	0.99	0.09	28,28,28,28	0
2	ZN	A	201	1/1	0.99	0.10	21,21,21,21	0
2	ZN	K	203	1/1	1.00	0.08	26,26,26,26	0
2	ZN	C	202	1/1	1.00	0.10	23,23,23,23	0
2	ZN	Q	202	1/1	1.00	0.11	21,21,21,21	0
2	ZN	Q	203	1/1	1.00	0.11	22,22,22,22	0
2	ZN	A	203	1/1	1.00	0.11	20,20,20,20	0
2	ZN	C	201	1/1	1.00	0.11	22,22,22,22	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.