



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 15, 2017 – 02:14 am GMT

PDB ID : 4FPI  
Title : Crystal Structure of 5-chloromuconolactone isomerase from *Rhodococcus opacus* 1CP  
Authors : Ferraroni, M.; Kolomytseva, M.; Briganti, F.; Golovleva, L.A.; Scozzafava, A.  
Deposited on : 2012-06-22  
Resolution : 2.20 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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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  
Xtriage (Phenix) : 1.9-1692  
EDS : trunk28620  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc28949

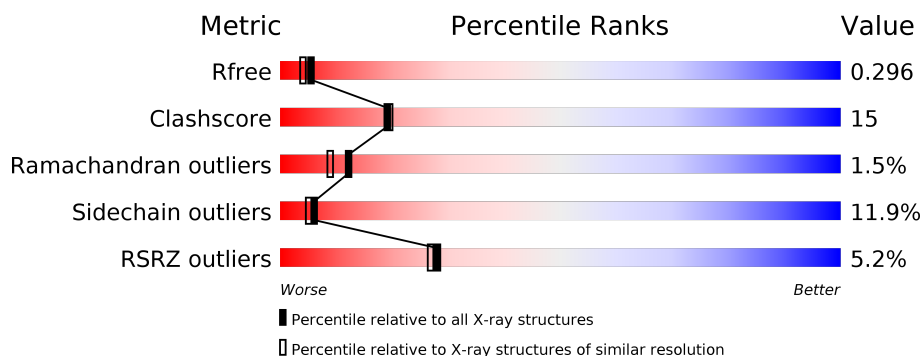
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.20 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))
$R_{free}$	100719	4002 (2.20-2.20)
Clashscore	112137	4730 (2.20-2.20)
Ramachandran outliers	110173	4656 (2.20-2.20)
Sidechain outliers	110143	4657 (2.20-2.20)
RSRZ outliers	101464	4033 (2.20-2.20)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	94	<div> <div>77%</div> <div>20%</div> <div>.</div> </div>
1	B	94	<div> <div>3%</div> <div>67%</div> <div>27%</div> <div>5%</div> <div>.</div> </div>
1	C	94	<div> <div>2%</div> <div>65%</div> <div>30%</div> <div>5%</div> </div>
1	D	94	<div> <div>%</div> <div>69%</div> <div>29%</div> <div>.</div> </div>
1	E	94	<div> <div>9%</div> <div>57%</div> <div>34%</div> <div>.</div> <div>.</div> </div>
1	F	94	<div> <div>3%</div> <div>65%</div> <div>30%</div> <div>5%</div> </div>

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Mol	Chain	Length	Quality of chain
1	G	94	 4% 73% 20% 6%
1	H	94	 3% 72% 21% 6%
1	I	94	 5% 76% 21% •
1	J	94	 5% 71% 24% •
1	K	94	 4% 59% 35% 6%
1	L	94	 3% 69% 27% •
1	M	94	 7% 65% 28% 7%
1	N	94	 10% 59% 32% 10%
1	O	94	 2% 74% 19% 5% •
1	P	94	 9% 70% 27% •
1	R	94	 6% 73% 24% •
1	S	94	 3% 69% 28% •
1	T	94	 11% 56% 40% •
1	U	94	 13% 57% 38% •

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 15940 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 5-chloromuconolactone dehalogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	94	Total	C	N	O	S	0	0	0
			783	499	140	142	2			
1	B	94	Total	C	N	O	S	0	0	0
			764	490	136	136	2			
1	C	94	Total	C	N	O	S	0	0	0
			771	493	136	140	2			
1	D	94	Total	C	N	O	S	0	0	0
			780	497	140	141	2			
1	E	90	Total	C	N	O	S	0	0	0
			728	470	128	128	2			
1	F	94	Total	C	N	O	S	0	0	0
			761	485	133	141	2			
1	G	94	Total	C	N	O	S	0	0	0
			758	485	134	137	2			
1	H	94	Total	C	N	O	S	0	0	0
			771	491	137	141	2			
1	I	94	Total	C	N	O	S	0	0	0
			769	491	136	140	2			
1	J	94	Total	C	N	O	S	0	0	0
			760	486	134	138	2			
1	K	94	Total	C	N	O	S	0	1	0
			772	492	138	140	2			
1	L	94	Total	C	N	O	S	0	0	0
			750	482	132	134	2			
1	M	94	Total	C	N	O	S	0	0	0
			771	491	137	141	2			
1	N	94	Total	C	N	O	S	0	1	0
			769	491	141	135	2			
1	O	94	Total	C	N	O	S	0	1	0
			767	492	133	140	2			
1	P	94	Total	C	N	O	S	0	0	0
			771	491	137	141	2			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	R	94	Total	C	N	O	S	0	1	0
			798	505	147	144	2			
1	S	94	Total	C	N	O	S	0	0	0
			759	485	132	140	2			
1	T	94	Total	C	N	O	S	0	1	0
			755	482	135	136	2			
1	U	94	Total	C	N	O	S	0	0	0
			769	490	138	139	2			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	17	SER	PRO	see remark 999	UNP Q8G9L0
B	17	SER	PRO	see remark 999	UNP Q8G9L0
C	17	SER	PRO	see remark 999	UNP Q8G9L0
D	17	SER	PRO	see remark 999	UNP Q8G9L0
E	17	SER	PRO	see remark 999	UNP Q8G9L0
F	17	SER	PRO	see remark 999	UNP Q8G9L0
G	17	SER	PRO	see remark 999	UNP Q8G9L0
H	17	SER	PRO	see remark 999	UNP Q8G9L0
I	17	SER	PRO	see remark 999	UNP Q8G9L0
J	17	SER	PRO	see remark 999	UNP Q8G9L0
K	17	SER	PRO	see remark 999	UNP Q8G9L0
L	17	SER	PRO	see remark 999	UNP Q8G9L0
M	17	SER	PRO	see remark 999	UNP Q8G9L0
N	17	SER	PRO	see remark 999	UNP Q8G9L0
O	17	SER	PRO	see remark 999	UNP Q8G9L0
P	17	SER	PRO	see remark 999	UNP Q8G9L0
R	17	SER	PRO	see remark 999	UNP Q8G9L0
S	17	SER	PRO	see remark 999	UNP Q8G9L0
T	17	SER	PRO	see remark 999	UNP Q8G9L0
U	17	SER	PRO	see remark 999	UNP Q8G9L0

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	52	Total	O	0	0
			52	52		
2	B	28	Total	O	0	0
			28	28		
2	C	25	Total	O	0	0
			25	25		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	38	Total 38	O 38	0	0
2	E	25	Total 25	O 25	0	0
2	F	20	Total 20	O 20	0	0
2	G	29	Total 29	O 29	0	0
2	H	41	Total 41	O 41	0	0
2	I	26	Total 26	O 26	0	0
2	J	34	Total 34	O 34	0	0
2	K	18	Total 18	O 18	0	0
2	L	23	Total 23	O 23	0	0
2	M	18	Total 18	O 18	0	0
2	N	31	Total 31	O 31	0	0
2	O	40	Total 40	O 40	0	0
2	P	33	Total 33	O 33	0	0
2	R	39	Total 39	O 39	0	0
2	S	40	Total 40	O 40	0	0
2	T	33	Total 33	O 33	0	0
2	U	21	Total 21	O 21	0	0

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

These plots are drawn for all protein, RNA and DNA 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: 5-chloromuconolactone dehalogenase

Chain A: 



- Molecule 1: 5-chloromuconolactone dehalogenase

Chain B: 



- Molecule 1: 5-chloromuconolactone dehalogenase

Chain C: 



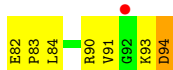
- Molecule 1: 5-chloromuconolactone dehalogenase

Chain D: 

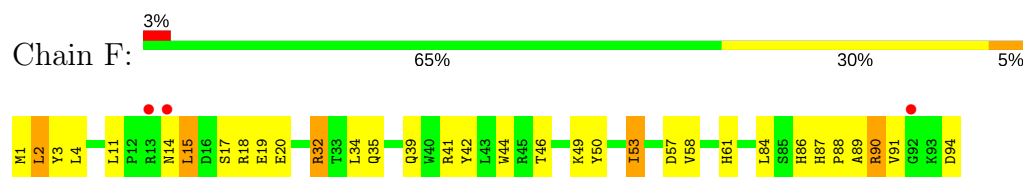


- Molecule 1: 5-chloromuconolactone dehalogenase

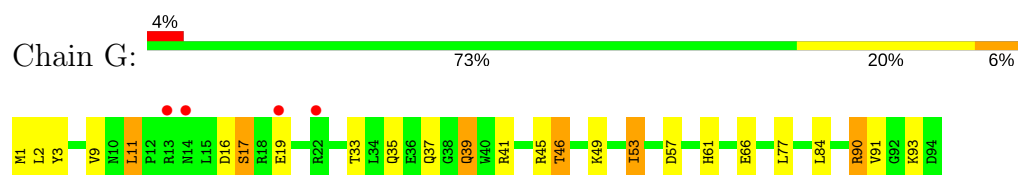
Chain E: 



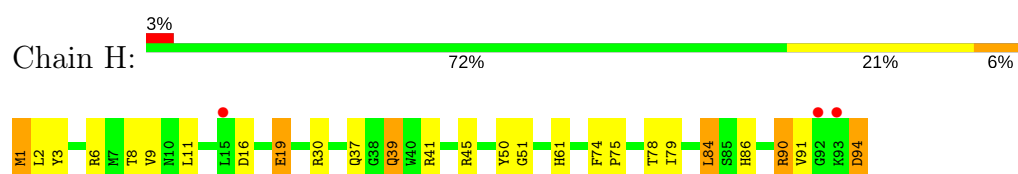
- Molecule 1: 5-chloromuconolactone dehalogenase



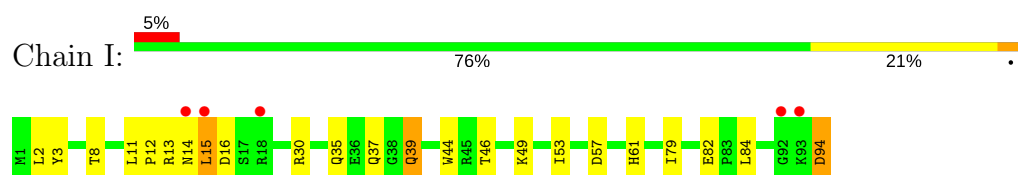
- Molecule 1: 5-chloromuconolactone dehalogenase



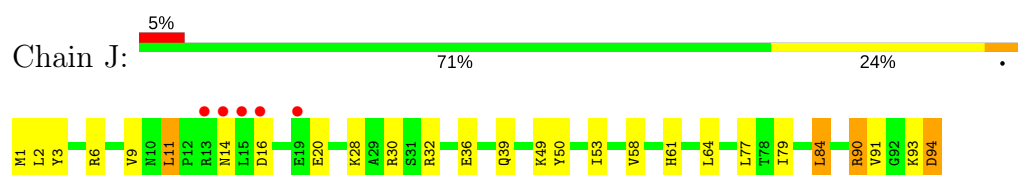
- Molecule 1: 5-chloromuconolactone dehalogenase



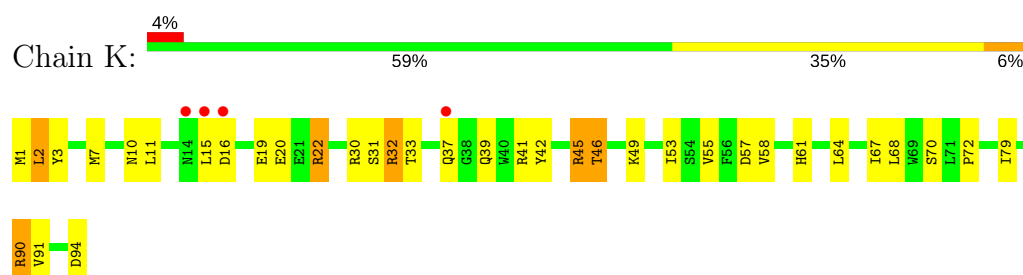
- Molecule 1: 5-chloromuconolactone dehalogenase



- Molecule 1: 5-chloromuconolactone dehalogenase



- Molecule 1: 5-chloromuconolactone dehalogenase



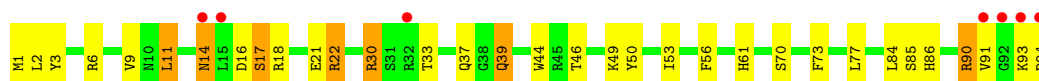
- Molecule 1: 5-chloromuconolactone dehalogenase



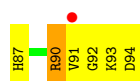




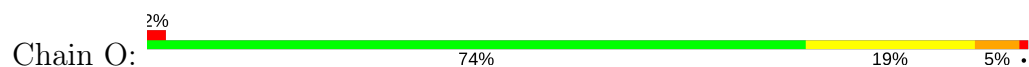
- Molecule 1: 5-chloromuconolactone dehalogenase



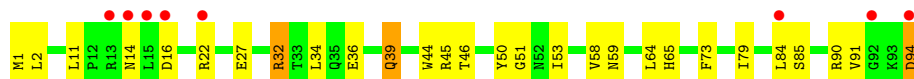
- Molecule 1: 5-chloromuconolactone dehalogenase



- Molecule 1: 5-chloromuconolactone dehalogenase



- Molecule 1: 5-chloromuconolactone dehalogenase



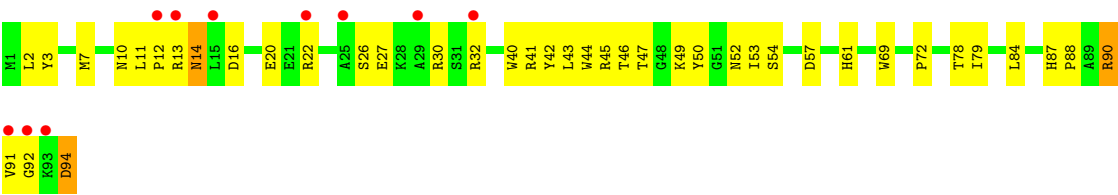
- Molecule 1: 5-chloromuconolactone dehalogenase



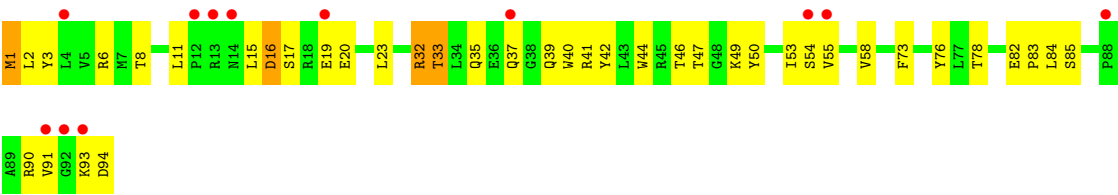
- Molecule 1: 5-chloromuconolactone dehalogenase



- Molecule 1: 5-chloromuconolactone dehalogenase



● Molecule 1: 5-chloromuconolactone dehalogenase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	122.19Å 79.66Å 125.91Å 90.00° 105.54° 90.00°	Depositor
Resolution (Å)	30.00 – 2.20 29.81 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.0 (30.00-2.20) 98.4 (29.81-2.10)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	0.09	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.15 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, $R_{free}$	0.228 , 0.301 0.228 , 0.296	Depositor DCC
$R_{free}$ test set	5905 reflections (5.30%)	DCC
Wilson B-factor (Å <sup>2</sup> )	33.5	Xtriage
Anisotropy	0.322	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 46.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.44$ , $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	0.037 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	15940	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.74% 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 ⓘ

### 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	0.76	0/804	0.84	1/1089 (0.1%)
1	B	0.67	0/785	0.82	2/1067 (0.2%)
1	C	0.71	0/792	0.82	1/1076 (0.1%)
1	D	0.70	0/801	0.80	0/1087
1	E	0.63	0/748	0.78	1/1018 (0.1%)
1	F	0.70	0/782	0.85	1/1065 (0.1%)
1	G	0.67	0/779	0.79	0/1060
1	H	0.76	0/792	0.81	1/1076 (0.1%)
1	I	0.73	0/790	0.84	0/1075
1	J	0.76	0/781	0.84	0/1063
1	K	0.64	0/796	0.78	0/1082
1	L	0.67	0/771	0.75	0/1050
1	M	0.60	0/792	0.77	0/1076
1	N	0.61	0/793	0.79	0/1078
1	O	0.66	0/791	0.78	0/1076
1	P	0.70	0/792	0.81	0/1076
1	R	0.69	0/819	0.73	0/1109
1	S	0.67	0/780	0.86	2/1062 (0.2%)
1	T	0.61	0/779	0.78	0/1061
1	U	0.61	0/790	0.78	0/1074
All	All	0.68	0/15757	0.80	9/21420 (0.0%)

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	90	ARG	NE-CZ-NH2	-5.74	117.43	120.30
1	B	90	ARG	NE-CZ-NH1	5.45	123.02	120.30
1	S	57	ASP	CB-CG-OD1	5.43	123.19	118.30
1	H	84	LEU	CA-CB-CG	5.30	127.48	115.30
1	E	15	LEU	CA-CB-CG	5.29	127.46	115.30

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	783	0	766	14	0
1	B	764	0	741	17	0
1	C	771	0	747	34	0
1	D	780	0	762	14	0
1	E	728	0	700	30	0
1	F	761	0	720	35	0
1	G	758	0	721	24	0
1	H	771	0	742	19	0
1	I	769	0	737	23	0
1	J	760	0	724	17	0
1	K	772	0	740	49	0
1	L	750	0	709	23	0
1	M	771	0	742	31	0
1	N	769	0	740	36	0
1	O	767	0	729	19	0
1	P	771	0	742	18	0
1	R	798	0	780	18	0
1	S	759	0	718	21	0
1	T	755	0	712	28	0
1	U	769	0	735	36	0
2	A	52	0	0	3	0
2	B	28	0	0	1	0
2	C	25	0	0	8	0
2	D	38	0	0	3	0
2	E	25	0	0	3	0
2	F	20	0	0	3	0
2	G	29	0	0	2	0
2	H	41	0	0	2	0
2	I	26	0	0	6	0
2	J	34	0	0	2	0
2	K	18	0	0	3	0
2	L	23	0	0	4	0
2	M	18	0	0	3	0
2	N	31	0	0	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	O	40	0	0	3	0
2	P	33	0	0	4	0
2	R	39	0	0	4	0
2	S	40	0	0	3	0
2	T	33	0	0	4	0
2	U	21	0	0	2	0
All	All	15940	0	14707	437	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 15.

The worst 5 of 437 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:C:1:MET:CE	1:F:1:MET:HE1	1.61	1.30
1:C:1:MET:HE3	1:F:1:MET:CE	1.66	1.24
1:R:18:ARG:HA	2:R:131:HOH:O	1.45	1.16
1:U:32:ARG:HD2	2:U:110:HOH:O	1.50	1.11
1:P:59:ASN:HB2	2:P:104:HOH:O	1.52	1.08

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	92/94 (98%)	87 (95%)	4 (4%)	1 (1%)	17 13
1	B	92/94 (98%)	84 (91%)	5 (5%)	3 (3%)	4 2
1	C	92/94 (98%)	89 (97%)	0	3 (3%)	4 2
1	D	92/94 (98%)	88 (96%)	4 (4%)	0	100 100
1	E	86/94 (92%)	83 (96%)	2 (2%)	1 (1%)	15 12

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	F	92/94 (98%)	80 (87%)	9 (10%)	3 (3%)	4	2
1	G	92/94 (98%)	86 (94%)	5 (5%)	1 (1%)	17	13
1	H	92/94 (98%)	87 (95%)	5 (5%)	0	100	100
1	I	92/94 (98%)	85 (92%)	5 (5%)	2 (2%)	8	4
1	J	92/94 (98%)	87 (95%)	5 (5%)	0	100	100
1	K	93/94 (99%)	86 (92%)	6 (6%)	1 (1%)	17	13
1	L	92/94 (98%)	81 (88%)	10 (11%)	1 (1%)	17	13
1	M	92/94 (98%)	82 (89%)	8 (9%)	2 (2%)	8	4
1	N	93/94 (99%)	87 (94%)	6 (6%)	0	100	100
1	O	93/94 (99%)	89 (96%)	1 (1%)	3 (3%)	5	2
1	P	92/94 (98%)	89 (97%)	3 (3%)	0	100	100
1	R	93/94 (99%)	87 (94%)	5 (5%)	1 (1%)	17	13
1	S	92/94 (98%)	84 (91%)	7 (8%)	1 (1%)	17	13
1	T	93/94 (99%)	86 (92%)	6 (6%)	1 (1%)	17	13
1	U	92/94 (98%)	82 (89%)	6 (6%)	4 (4%)	3	1
All	All	1839/1880 (98%)	1709 (93%)	102 (6%)	28 (2%)	12	9

5 of 28 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	13	ARG
1	C	16	ASP
1	F	15	LEU
1	G	17	SER
1	I	13	ARG

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	85/87 (98%)	78 (92%)	7 (8%)	13	13

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	81/87 (93%)	69 (85%)	12 (15%)	3	2
1	C	83/87 (95%)	77 (93%)	6 (7%)	17	18
1	D	85/87 (98%)	76 (89%)	9 (11%)	8	7
1	E	76/87 (87%)	66 (87%)	10 (13%)	5	4
1	F	81/87 (93%)	73 (90%)	8 (10%)	9	8
1	G	79/87 (91%)	72 (91%)	7 (9%)	11	11
1	H	83/87 (95%)	72 (87%)	11 (13%)	4	3
1	I	82/87 (94%)	77 (94%)	5 (6%)	22	25
1	J	80/87 (92%)	69 (86%)	11 (14%)	4	3
1	K	82/87 (94%)	68 (83%)	14 (17%)	2	2
1	L	76/87 (87%)	63 (83%)	13 (17%)	2	2
1	M	83/87 (95%)	73 (88%)	10 (12%)	6	5
1	N	80/87 (92%)	64 (80%)	16 (20%)	1	1
1	O	80/87 (92%)	71 (89%)	9 (11%)	7	6
1	P	83/87 (95%)	70 (84%)	13 (16%)	3	2
1	R	87/87 (100%)	80 (92%)	7 (8%)	14	14
1	S	80/87 (92%)	71 (89%)	9 (11%)	7	6
1	T	78/87 (90%)	69 (88%)	9 (12%)	6	6
1	U	81/87 (93%)	73 (90%)	8 (10%)	9	8
All	All	1625/1740 (93%)	1431 (88%)	194 (12%)	6	5

5 of 194 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	11	LEU
1	L	53	ILE
1	T	30	ARG
1	K	31	SER
1	K	90[A]	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 37 such sidechains are listed below:

Mol	Chain	Res	Type
1	J	61	HIS

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Mol	Chain	Res	Type
1	M	14	ASN
1	U	37	GLN
1	K	37	GLN
1	K	61	HIS

### 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 carbohydrates 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, 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	94/94 (100%)	-0.21	0	100	100	29, 38, 53, 61	0
1	B	94/94 (100%)	0.10	3 (3%)	48	46	30, 42, 75, 81	0
1	C	94/94 (100%)	0.02	2 (2%)	64	61	31, 43, 82, 84	0
1	D	94/94 (100%)	-0.09	1 (1%)	80	79	29, 40, 67, 70	0
1	E	90/94 (95%)	0.51	8 (8%)	10	9	39, 55, 73, 82	0
1	F	94/94 (100%)	0.38	3 (3%)	48	46	36, 48, 79, 84	0
1	G	94/94 (100%)	0.08	4 (4%)	36	34	31, 44, 71, 75	0
1	H	94/94 (100%)	-0.03	3 (3%)	48	46	31, 39, 73, 78	0
1	I	94/94 (100%)	0.27	5 (5%)	27	26	31, 43, 81, 84	0
1	J	94/94 (100%)	0.07	5 (5%)	27	26	29, 39, 72, 76	0
1	K	94/94 (100%)	0.39	4 (4%)	36	34	37, 55, 77, 80	0
1	L	94/94 (100%)	0.48	3 (3%)	48	46	43, 55, 80, 84	0
1	M	94/94 (100%)	0.18	7 (7%)	15	14	39, 53, 72, 80	0
1	N	94/94 (100%)	0.44	9 (9%)	9	7	43, 54, 78, 82	0
1	O	94/94 (100%)	-0.17	2 (2%)	64	61	32, 42, 69, 72	0
1	P	94/94 (100%)	0.36	8 (8%)	11	10	33, 48, 75, 80	0
1	R	94/94 (100%)	0.16	6 (6%)	20	19	31, 44, 69, 75	0
1	S	94/94 (100%)	-0.09	3 (3%)	48	46	30, 41, 71, 75	0
1	T	94/94 (100%)	0.71	10 (10%)	7	6	44, 56, 83, 84	0
1	U	94/94 (100%)	0.70	12 (12%)	4	4	42, 56, 77, 81	0
All	All	1876/1880 (99%)	0.21	98 (5%)	28	27	29, 48, 76, 84	0

The worst 5 of 98 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	15	LEU	7.5
1	T	92	GLY	6.3
1	R	15	LEU	5.8
1	T	15	LEU	5.8
1	J	15	LEU	5.7

## 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 carbohydrates 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.