wwPDB X-ray Structure Validation Summary Report (i)

Aug 29, 2023 – 01:47 AM EDT

PDB ID	:	3MQT
Title	:	Crystal structure of a mandelate racemase/muconate lactonizing enzyme from Shewanella pealeana
Authors	:	Agarwal, R.; Burley, S.K.; Swaminathan, S.; New York SGX Research Center for Structural Genomics (NYSGXRC)
Deposited on	:	2010-04-28
Resolution	:	2.10 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

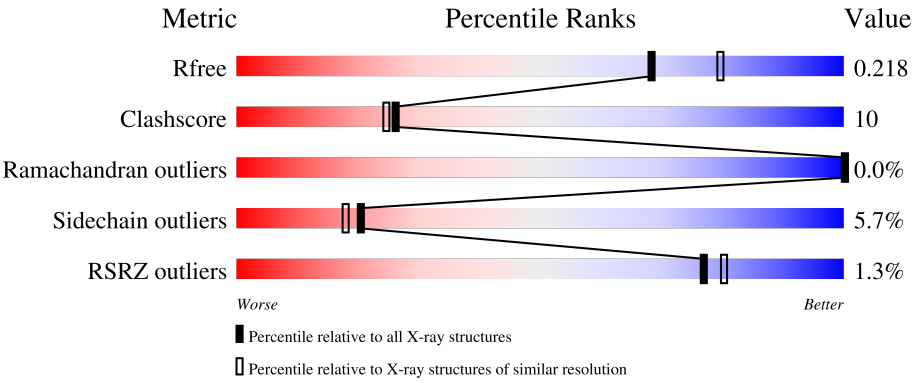
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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 <=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	394	78% 15%
1	B	394	76% 18%
1	C	394	78% 16%
1	D	394	74% 19%
1	E	394	80% 14%

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Mol	Chain	Length	Quality of chain
1	F	394	2% 76% 17%
1	G	394	2% 79% 15%
1	H	394	% 78% 16%
1	I	394	2% 80% 14%
1	J	394	2% 80% 13%
1	K	394	2% 77% 18%
1	L	394	% 80% 14%
1	M	394	79% 15%
1	N	394	% 80% 14%
1	O	394	% 76% 18%
1	P	394	2% 79% 15%
1	Q	394	2% 75% 18%
1	R	394	% 80% 14%
1	S	394	2% 78% 15%
1	T	394	% 76% 18%
1	U	394	% 77% 16%
1	V	394	% 79% 14%
1	W	394	3% 79% 15%
1	X	394	2% 78% 15%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 72942 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 Mandelate racemase/muconate lactonizing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	B	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	C	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	D	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	E	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	F	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	G	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	H	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	I	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	J	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	K	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	L	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	M	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	N	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	O	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	P	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	Q	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	R	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	S	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			
1	T	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	U	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	V	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	W	378	Total	C	N	O	S	0	0	0
			2983	1905	502	557	19			
1	X	377	Total	C	N	O	S	0	0	0
			2978	1902	501	556	19			

There are 264 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP A8H7M5
A	2	SER	-	expression tag	UNP A8H7M5
A	3	LEU	-	expression tag	UNP A8H7M5
A	387	GLU	-	expression tag	UNP A8H7M5
A	388	GLY	-	expression tag	UNP A8H7M5
A	389	HIS	-	expression tag	UNP A8H7M5
A	390	HIS	-	expression tag	UNP A8H7M5
A	391	HIS	-	expression tag	UNP A8H7M5
A	392	HIS	-	expression tag	UNP A8H7M5
A	393	HIS	-	expression tag	UNP A8H7M5
A	394	HIS	-	expression tag	UNP A8H7M5
B	1	MET	-	expression tag	UNP A8H7M5
B	2	SER	-	expression tag	UNP A8H7M5
B	3	LEU	-	expression tag	UNP A8H7M5
B	387	GLU	-	expression tag	UNP A8H7M5
B	388	GLY	-	expression tag	UNP A8H7M5
B	389	HIS	-	expression tag	UNP A8H7M5
B	390	HIS	-	expression tag	UNP A8H7M5
B	391	HIS	-	expression tag	UNP A8H7M5
B	392	HIS	-	expression tag	UNP A8H7M5
B	393	HIS	-	expression tag	UNP A8H7M5
B	394	HIS	-	expression tag	UNP A8H7M5
C	1	MET	-	expression tag	UNP A8H7M5

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Chain	Residue	Modelled	Actual	Comment	Reference
C	2	SER	-	expression tag	UNP A8H7M5
C	3	LEU	-	expression tag	UNP A8H7M5
C	387	GLU	-	expression tag	UNP A8H7M5
C	388	GLY	-	expression tag	UNP A8H7M5
C	389	HIS	-	expression tag	UNP A8H7M5
C	390	HIS	-	expression tag	UNP A8H7M5
C	391	HIS	-	expression tag	UNP A8H7M5
C	392	HIS	-	expression tag	UNP A8H7M5
C	393	HIS	-	expression tag	UNP A8H7M5
C	394	HIS	-	expression tag	UNP A8H7M5
D	1	MET	-	expression tag	UNP A8H7M5
D	2	SER	-	expression tag	UNP A8H7M5
D	3	LEU	-	expression tag	UNP A8H7M5
D	387	GLU	-	expression tag	UNP A8H7M5
D	388	GLY	-	expression tag	UNP A8H7M5
D	389	HIS	-	expression tag	UNP A8H7M5
D	390	HIS	-	expression tag	UNP A8H7M5
D	391	HIS	-	expression tag	UNP A8H7M5
D	392	HIS	-	expression tag	UNP A8H7M5
D	393	HIS	-	expression tag	UNP A8H7M5
D	394	HIS	-	expression tag	UNP A8H7M5
E	1	MET	-	expression tag	UNP A8H7M5
E	2	SER	-	expression tag	UNP A8H7M5
E	3	LEU	-	expression tag	UNP A8H7M5
E	387	GLU	-	expression tag	UNP A8H7M5
E	388	GLY	-	expression tag	UNP A8H7M5
E	389	HIS	-	expression tag	UNP A8H7M5
E	390	HIS	-	expression tag	UNP A8H7M5
E	391	HIS	-	expression tag	UNP A8H7M5
E	392	HIS	-	expression tag	UNP A8H7M5
E	393	HIS	-	expression tag	UNP A8H7M5
E	394	HIS	-	expression tag	UNP A8H7M5
F	1	MET	-	expression tag	UNP A8H7M5
F	2	SER	-	expression tag	UNP A8H7M5
F	3	LEU	-	expression tag	UNP A8H7M5
F	387	GLU	-	expression tag	UNP A8H7M5
F	388	GLY	-	expression tag	UNP A8H7M5
F	389	HIS	-	expression tag	UNP A8H7M5
F	390	HIS	-	expression tag	UNP A8H7M5
F	391	HIS	-	expression tag	UNP A8H7M5
F	392	HIS	-	expression tag	UNP A8H7M5
F	393	HIS	-	expression tag	UNP A8H7M5

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Chain	Residue	Modelled	Actual	Comment	Reference
F	394	HIS	-	expression tag	UNP A8H7M5
G	1	MET	-	expression tag	UNP A8H7M5
G	2	SER	-	expression tag	UNP A8H7M5
G	3	LEU	-	expression tag	UNP A8H7M5
G	387	GLU	-	expression tag	UNP A8H7M5
G	388	GLY	-	expression tag	UNP A8H7M5
G	389	HIS	-	expression tag	UNP A8H7M5
G	390	HIS	-	expression tag	UNP A8H7M5
G	391	HIS	-	expression tag	UNP A8H7M5
G	392	HIS	-	expression tag	UNP A8H7M5
G	393	HIS	-	expression tag	UNP A8H7M5
G	394	HIS	-	expression tag	UNP A8H7M5
H	1	MET	-	expression tag	UNP A8H7M5
H	2	SER	-	expression tag	UNP A8H7M5
H	3	LEU	-	expression tag	UNP A8H7M5
H	387	GLU	-	expression tag	UNP A8H7M5
H	388	GLY	-	expression tag	UNP A8H7M5
H	389	HIS	-	expression tag	UNP A8H7M5
H	390	HIS	-	expression tag	UNP A8H7M5
H	391	HIS	-	expression tag	UNP A8H7M5
H	392	HIS	-	expression tag	UNP A8H7M5
H	393	HIS	-	expression tag	UNP A8H7M5
H	394	HIS	-	expression tag	UNP A8H7M5
I	1	MET	-	expression tag	UNP A8H7M5
I	2	SER	-	expression tag	UNP A8H7M5
I	3	LEU	-	expression tag	UNP A8H7M5
I	387	GLU	-	expression tag	UNP A8H7M5
I	388	GLY	-	expression tag	UNP A8H7M5
I	389	HIS	-	expression tag	UNP A8H7M5
I	390	HIS	-	expression tag	UNP A8H7M5
I	391	HIS	-	expression tag	UNP A8H7M5
I	392	HIS	-	expression tag	UNP A8H7M5
I	393	HIS	-	expression tag	UNP A8H7M5
I	394	HIS	-	expression tag	UNP A8H7M5
J	1	MET	-	expression tag	UNP A8H7M5
J	2	SER	-	expression tag	UNP A8H7M5
J	3	LEU	-	expression tag	UNP A8H7M5
J	387	GLU	-	expression tag	UNP A8H7M5
J	388	GLY	-	expression tag	UNP A8H7M5
J	389	HIS	-	expression tag	UNP A8H7M5
J	390	HIS	-	expression tag	UNP A8H7M5
J	391	HIS	-	expression tag	UNP A8H7M5

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Chain	Residue	Modelled	Actual	Comment	Reference
J	392	HIS	-	expression tag	UNP A8H7M5
J	393	HIS	-	expression tag	UNP A8H7M5
J	394	HIS	-	expression tag	UNP A8H7M5
K	1	MET	-	expression tag	UNP A8H7M5
K	2	SER	-	expression tag	UNP A8H7M5
K	3	LEU	-	expression tag	UNP A8H7M5
K	387	GLU	-	expression tag	UNP A8H7M5
K	388	GLY	-	expression tag	UNP A8H7M5
K	389	HIS	-	expression tag	UNP A8H7M5
K	390	HIS	-	expression tag	UNP A8H7M5
K	391	HIS	-	expression tag	UNP A8H7M5
K	392	HIS	-	expression tag	UNP A8H7M5
K	393	HIS	-	expression tag	UNP A8H7M5
K	394	HIS	-	expression tag	UNP A8H7M5
L	1	MET	-	expression tag	UNP A8H7M5
L	2	SER	-	expression tag	UNP A8H7M5
L	3	LEU	-	expression tag	UNP A8H7M5
L	387	GLU	-	expression tag	UNP A8H7M5
L	388	GLY	-	expression tag	UNP A8H7M5
L	389	HIS	-	expression tag	UNP A8H7M5
L	390	HIS	-	expression tag	UNP A8H7M5
L	391	HIS	-	expression tag	UNP A8H7M5
L	392	HIS	-	expression tag	UNP A8H7M5
L	393	HIS	-	expression tag	UNP A8H7M5
L	394	HIS	-	expression tag	UNP A8H7M5
M	1	MET	-	expression tag	UNP A8H7M5
M	2	SER	-	expression tag	UNP A8H7M5
M	3	LEU	-	expression tag	UNP A8H7M5
M	387	GLU	-	expression tag	UNP A8H7M5
M	388	GLY	-	expression tag	UNP A8H7M5
M	389	HIS	-	expression tag	UNP A8H7M5
M	390	HIS	-	expression tag	UNP A8H7M5
M	391	HIS	-	expression tag	UNP A8H7M5
M	392	HIS	-	expression tag	UNP A8H7M5
M	393	HIS	-	expression tag	UNP A8H7M5
M	394	HIS	-	expression tag	UNP A8H7M5
N	1	MET	-	expression tag	UNP A8H7M5
N	2	SER	-	expression tag	UNP A8H7M5
N	3	LEU	-	expression tag	UNP A8H7M5
N	387	GLU	-	expression tag	UNP A8H7M5
N	388	GLY	-	expression tag	UNP A8H7M5
N	389	HIS	-	expression tag	UNP A8H7M5

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Chain	Residue	Modelled	Actual	Comment	Reference
N	390	HIS	-	expression tag	UNP A8H7M5
N	391	HIS	-	expression tag	UNP A8H7M5
N	392	HIS	-	expression tag	UNP A8H7M5
N	393	HIS	-	expression tag	UNP A8H7M5
N	394	HIS	-	expression tag	UNP A8H7M5
O	1	MET	-	expression tag	UNP A8H7M5
O	2	SER	-	expression tag	UNP A8H7M5
O	3	LEU	-	expression tag	UNP A8H7M5
O	387	GLU	-	expression tag	UNP A8H7M5
O	388	GLY	-	expression tag	UNP A8H7M5
O	389	HIS	-	expression tag	UNP A8H7M5
O	390	HIS	-	expression tag	UNP A8H7M5
O	391	HIS	-	expression tag	UNP A8H7M5
O	392	HIS	-	expression tag	UNP A8H7M5
O	393	HIS	-	expression tag	UNP A8H7M5
O	394	HIS	-	expression tag	UNP A8H7M5
P	1	MET	-	expression tag	UNP A8H7M5
P	2	SER	-	expression tag	UNP A8H7M5
P	3	LEU	-	expression tag	UNP A8H7M5
P	387	GLU	-	expression tag	UNP A8H7M5
P	388	GLY	-	expression tag	UNP A8H7M5
P	389	HIS	-	expression tag	UNP A8H7M5
P	390	HIS	-	expression tag	UNP A8H7M5
P	391	HIS	-	expression tag	UNP A8H7M5
P	392	HIS	-	expression tag	UNP A8H7M5
P	393	HIS	-	expression tag	UNP A8H7M5
P	394	HIS	-	expression tag	UNP A8H7M5
Q	1	MET	-	expression tag	UNP A8H7M5
Q	2	SER	-	expression tag	UNP A8H7M5
Q	3	LEU	-	expression tag	UNP A8H7M5
Q	387	GLU	-	expression tag	UNP A8H7M5
Q	388	GLY	-	expression tag	UNP A8H7M5
Q	389	HIS	-	expression tag	UNP A8H7M5
Q	390	HIS	-	expression tag	UNP A8H7M5
Q	391	HIS	-	expression tag	UNP A8H7M5
Q	392	HIS	-	expression tag	UNP A8H7M5
Q	393	HIS	-	expression tag	UNP A8H7M5
Q	394	HIS	-	expression tag	UNP A8H7M5
R	1	MET	-	expression tag	UNP A8H7M5
R	2	SER	-	expression tag	UNP A8H7M5
R	3	LEU	-	expression tag	UNP A8H7M5
R	387	GLU	-	expression tag	UNP A8H7M5

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Chain	Residue	Modelled	Actual	Comment	Reference
R	388	GLY	-	expression tag	UNP A8H7M5
R	389	HIS	-	expression tag	UNP A8H7M5
R	390	HIS	-	expression tag	UNP A8H7M5
R	391	HIS	-	expression tag	UNP A8H7M5
R	392	HIS	-	expression tag	UNP A8H7M5
R	393	HIS	-	expression tag	UNP A8H7M5
R	394	HIS	-	expression tag	UNP A8H7M5
S	1	MET	-	expression tag	UNP A8H7M5
S	2	SER	-	expression tag	UNP A8H7M5
S	3	LEU	-	expression tag	UNP A8H7M5
S	387	GLU	-	expression tag	UNP A8H7M5
S	388	GLY	-	expression tag	UNP A8H7M5
S	389	HIS	-	expression tag	UNP A8H7M5
S	390	HIS	-	expression tag	UNP A8H7M5
S	391	HIS	-	expression tag	UNP A8H7M5
S	392	HIS	-	expression tag	UNP A8H7M5
S	393	HIS	-	expression tag	UNP A8H7M5
S	394	HIS	-	expression tag	UNP A8H7M5
T	1	MET	-	expression tag	UNP A8H7M5
T	2	SER	-	expression tag	UNP A8H7M5
T	3	LEU	-	expression tag	UNP A8H7M5
T	387	GLU	-	expression tag	UNP A8H7M5
T	388	GLY	-	expression tag	UNP A8H7M5
T	389	HIS	-	expression tag	UNP A8H7M5
T	390	HIS	-	expression tag	UNP A8H7M5
T	391	HIS	-	expression tag	UNP A8H7M5
T	392	HIS	-	expression tag	UNP A8H7M5
T	393	HIS	-	expression tag	UNP A8H7M5
T	394	HIS	-	expression tag	UNP A8H7M5
U	1	MET	-	expression tag	UNP A8H7M5
U	2	SER	-	expression tag	UNP A8H7M5
U	3	LEU	-	expression tag	UNP A8H7M5
U	387	GLU	-	expression tag	UNP A8H7M5
U	388	GLY	-	expression tag	UNP A8H7M5
U	389	HIS	-	expression tag	UNP A8H7M5
U	390	HIS	-	expression tag	UNP A8H7M5
U	391	HIS	-	expression tag	UNP A8H7M5
U	392	HIS	-	expression tag	UNP A8H7M5
U	393	HIS	-	expression tag	UNP A8H7M5
U	394	HIS	-	expression tag	UNP A8H7M5
V	1	MET	-	expression tag	UNP A8H7M5
V	2	SER	-	expression tag	UNP A8H7M5

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Chain	Residue	Modelled	Actual	Comment	Reference
V	3	LEU	-	expression tag	UNP A8H7M5
V	387	GLU	-	expression tag	UNP A8H7M5
V	388	GLY	-	expression tag	UNP A8H7M5
V	389	HIS	-	expression tag	UNP A8H7M5
V	390	HIS	-	expression tag	UNP A8H7M5
V	391	HIS	-	expression tag	UNP A8H7M5
V	392	HIS	-	expression tag	UNP A8H7M5
V	393	HIS	-	expression tag	UNP A8H7M5
V	394	HIS	-	expression tag	UNP A8H7M5
W	1	MET	-	expression tag	UNP A8H7M5
W	2	SER	-	expression tag	UNP A8H7M5
W	3	LEU	-	expression tag	UNP A8H7M5
W	387	GLU	-	expression tag	UNP A8H7M5
W	388	GLY	-	expression tag	UNP A8H7M5
W	389	HIS	-	expression tag	UNP A8H7M5
W	390	HIS	-	expression tag	UNP A8H7M5
W	391	HIS	-	expression tag	UNP A8H7M5
W	392	HIS	-	expression tag	UNP A8H7M5
W	393	HIS	-	expression tag	UNP A8H7M5
W	394	HIS	-	expression tag	UNP A8H7M5
X	1	MET	-	expression tag	UNP A8H7M5
X	2	SER	-	expression tag	UNP A8H7M5
X	3	LEU	-	expression tag	UNP A8H7M5
X	387	GLU	-	expression tag	UNP A8H7M5
X	388	GLY	-	expression tag	UNP A8H7M5
X	389	HIS	-	expression tag	UNP A8H7M5
X	390	HIS	-	expression tag	UNP A8H7M5
X	391	HIS	-	expression tag	UNP A8H7M5
X	392	HIS	-	expression tag	UNP A8H7M5
X	393	HIS	-	expression tag	UNP A8H7M5
X	394	HIS	-	expression tag	UNP A8H7M5

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Mg 1 1	0	0
2	D	1	Total Mg 1 1	0	0
2	E	1	Total Mg 1 1	0	0
2	F	1	Total Mg 1 1	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	G	1	Total Mg 1 1	0	0
2	H	1	Total Mg 1 1	0	0
2	K	1	Total Mg 1 1	0	0
2	L	1	Total Mg 1 1	0	0
2	U	1	Total Mg 1 1	0	0
2	V	1	Total Mg 1 1	0	0
2	W	1	Total Mg 1 1	0	0
2	X	1	Total Mg 1 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	64	Total O 64 64	0	0
3	B	58	Total O 58 58	0	0
3	C	73	Total O 73 73	0	0
3	D	67	Total O 67 67	0	0
3	E	62	Total O 62 62	0	0
3	F	59	Total O 59 59	0	0
3	G	58	Total O 58 58	0	0
3	H	70	Total O 70 70	0	0
3	I	54	Total O 54 54	0	0
3	J	52	Total O 52 52	0	0
3	K	53	Total O 53 53	0	0

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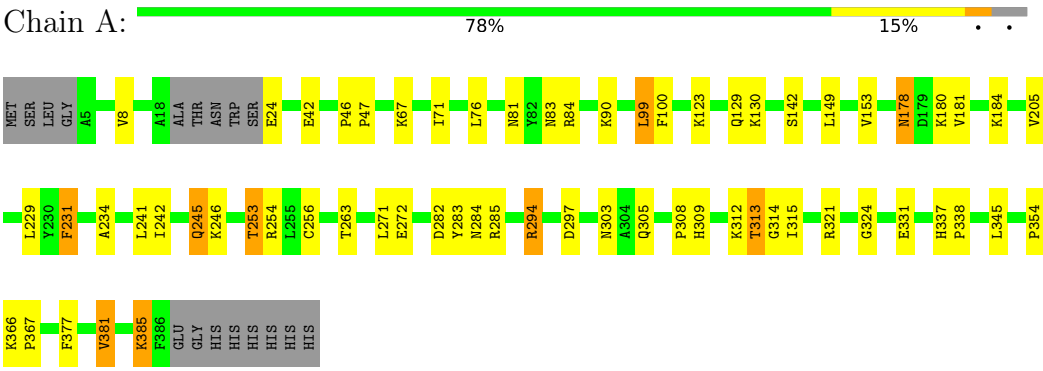
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	L	58	Total O 58 58	0	0
3	M	55	Total O 55 55	0	0
3	N	51	Total O 51 51	0	0
3	O	52	Total O 52 52	0	0
3	P	53	Total O 53 53	0	0
3	Q	55	Total O 55 55	0	0
3	R	56	Total O 56 56	0	0
3	S	54	Total O 54 54	0	0
3	T	58	Total O 58 58	0	0
3	U	54	Total O 54 54	0	0
3	V	59	Total O 59 59	0	0
3	W	55	Total O 55 55	0	0
3	X	53	Total O 53 53	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.

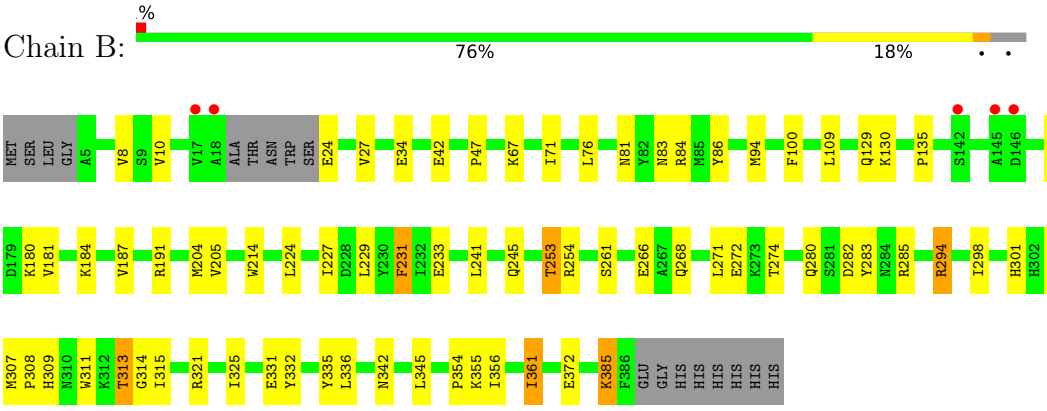
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain A:



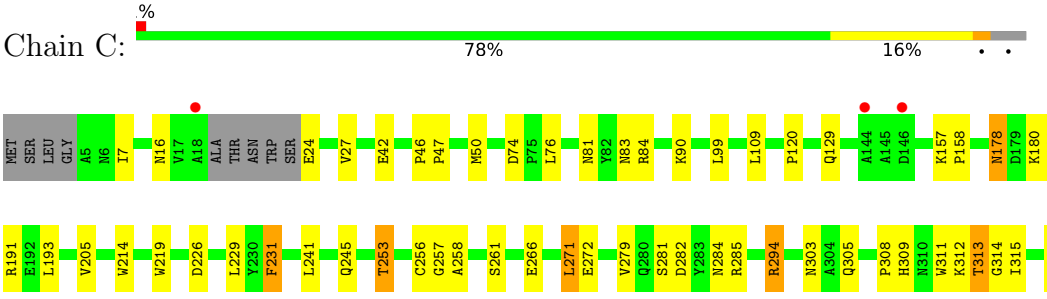
• Molecule 1: Mandelate racemase/muconate lactonizing protein

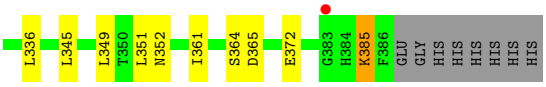
Chain B:



• Molecule 1: Mandelate racemase/muconate lactonizing protein

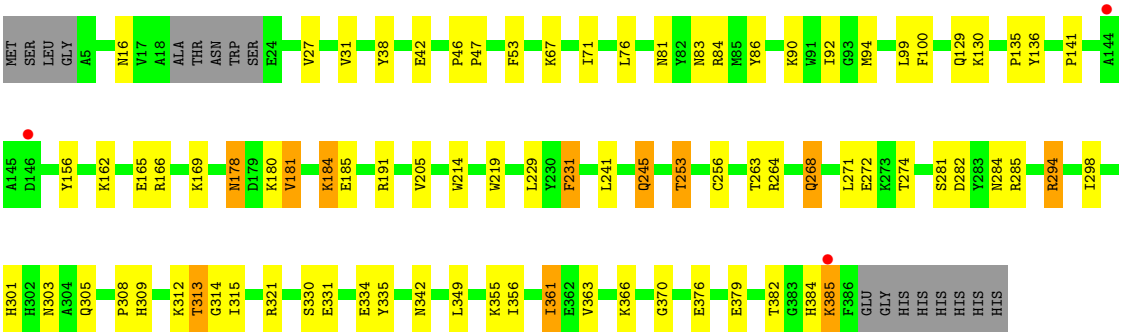
Chain C:





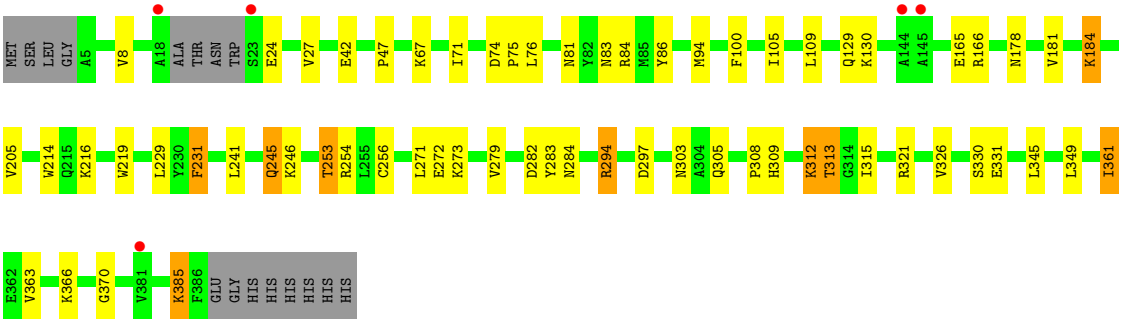
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain D:



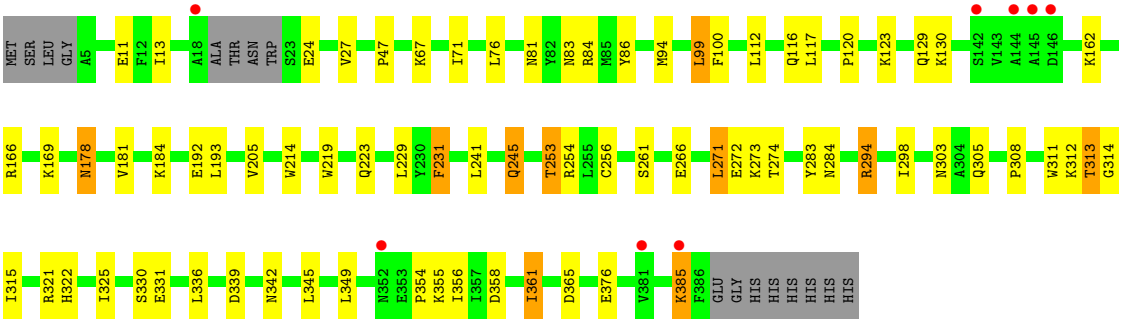
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain E:



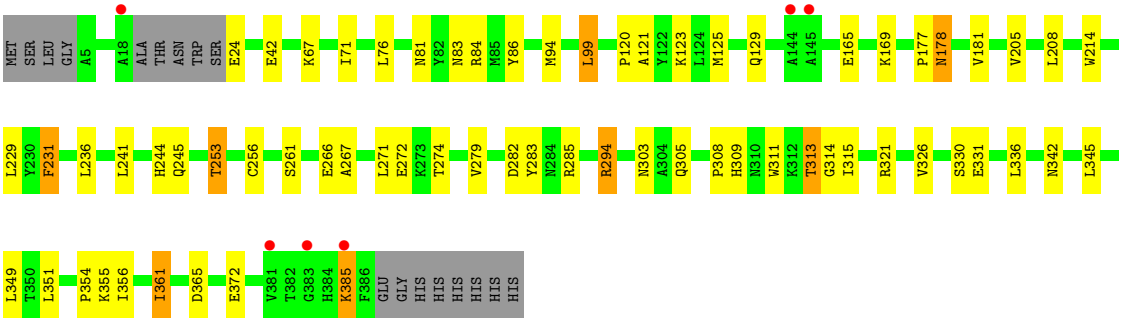
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain F:



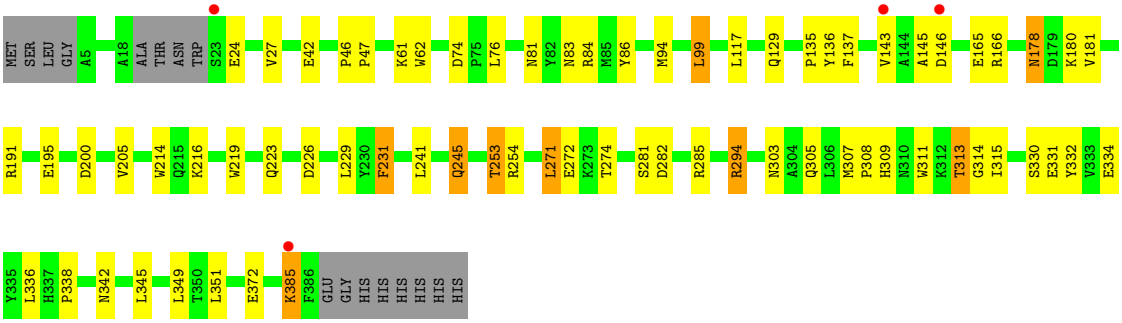
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain G:



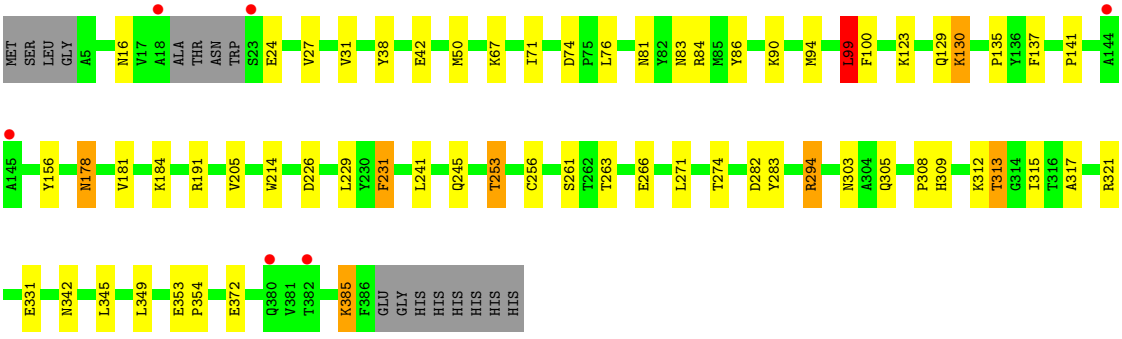
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain H:



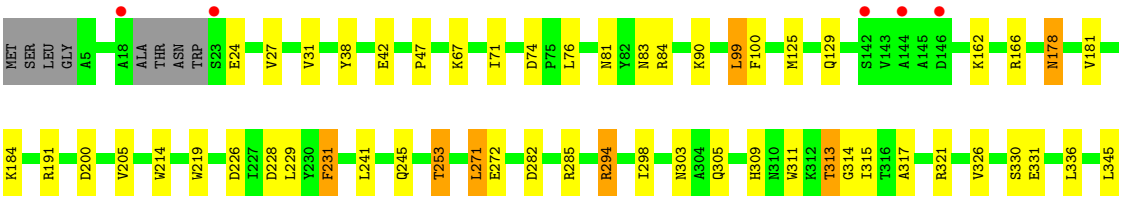
• Molecule 1: Mandelate racemase/muconate lactonizing protein

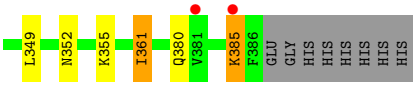
Chain I:



• Molecule 1: Mandelate racemase/muconate lactonizing protein

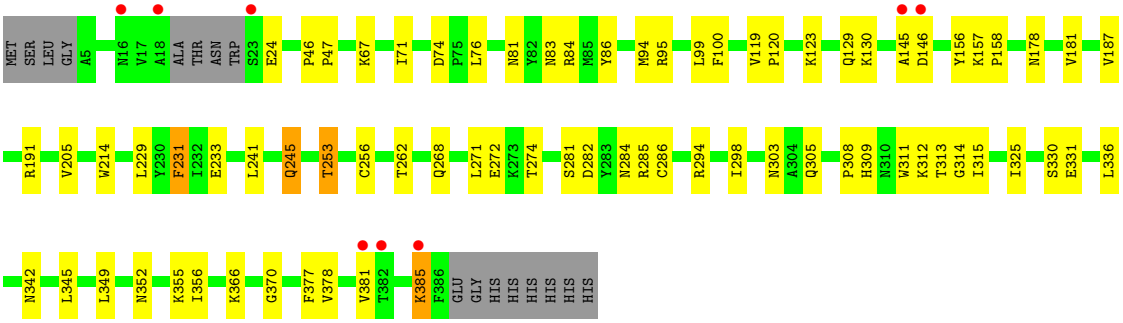
Chain J:





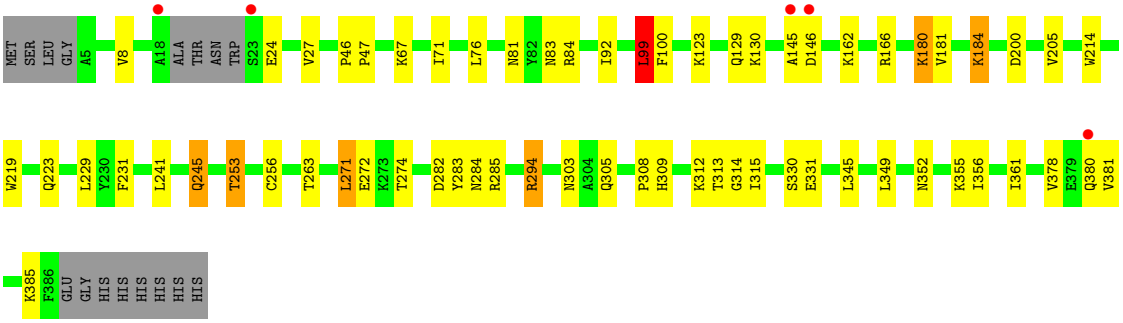
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain K:



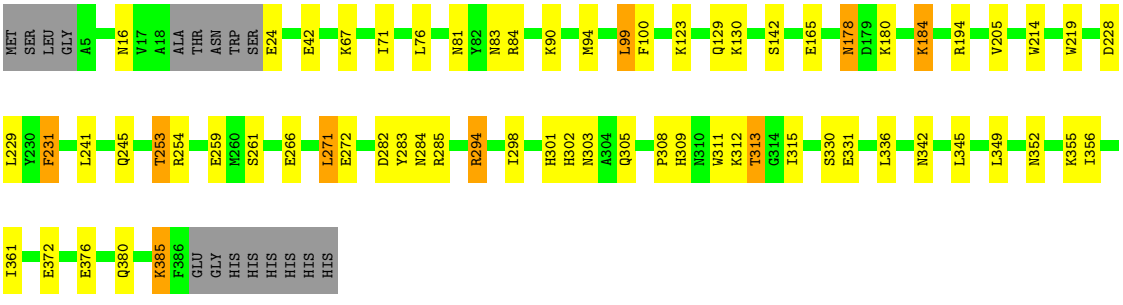
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain L:



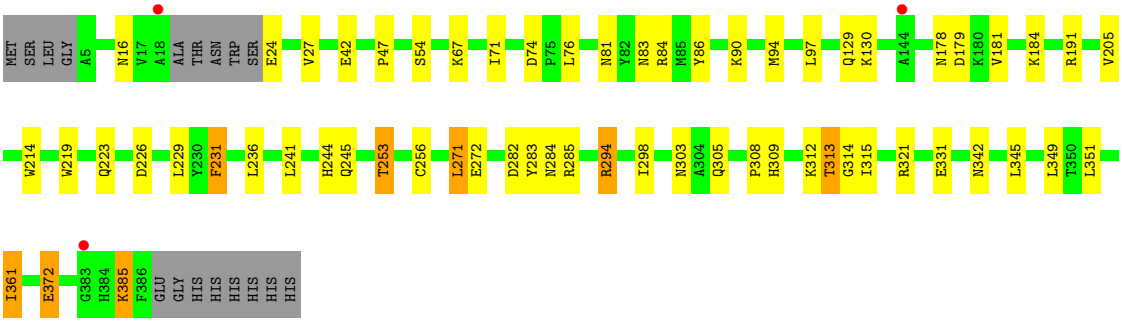
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain M:



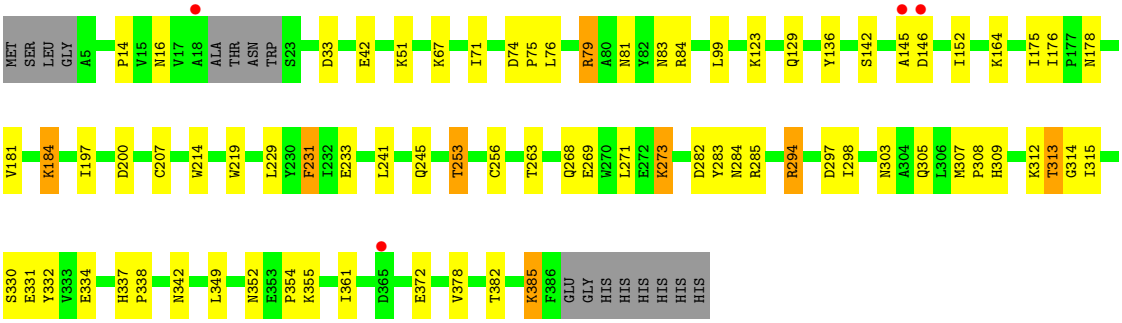
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain N:



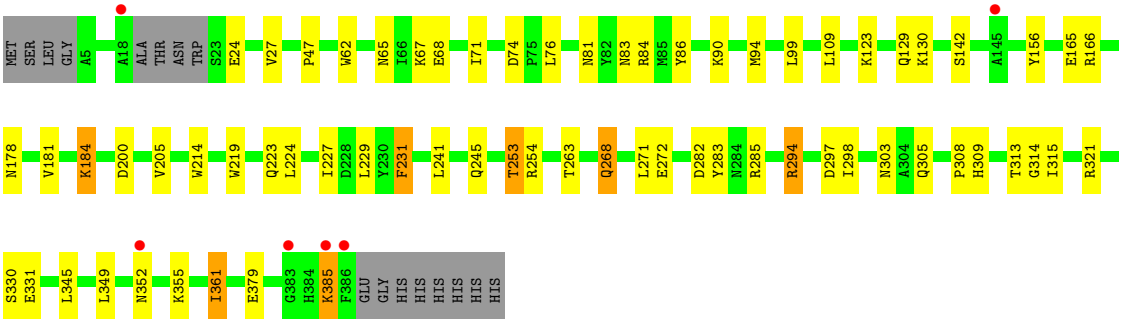
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain O:



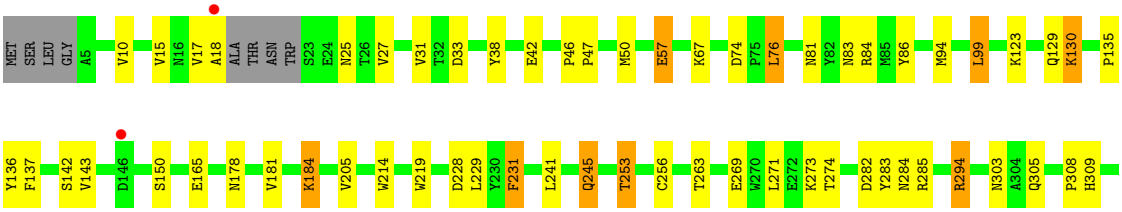
• Molecule 1: Mandelate racemase/muconate lactonizing protein

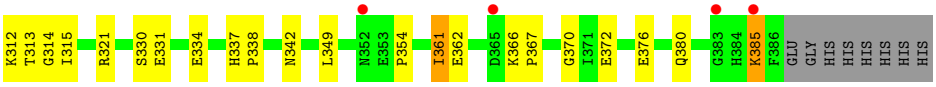
Chain P:



• Molecule 1: Mandelate racemase/muconate lactonizing protein

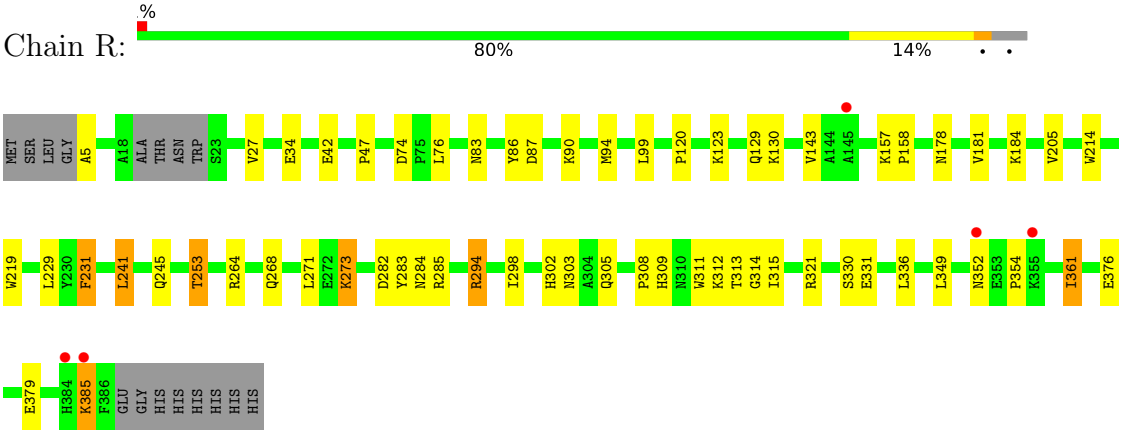
Chain Q:





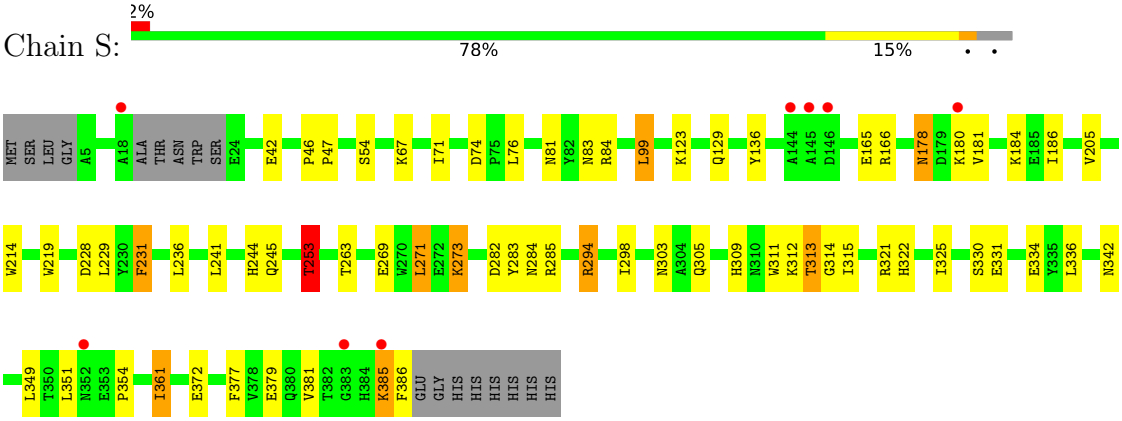
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain R:



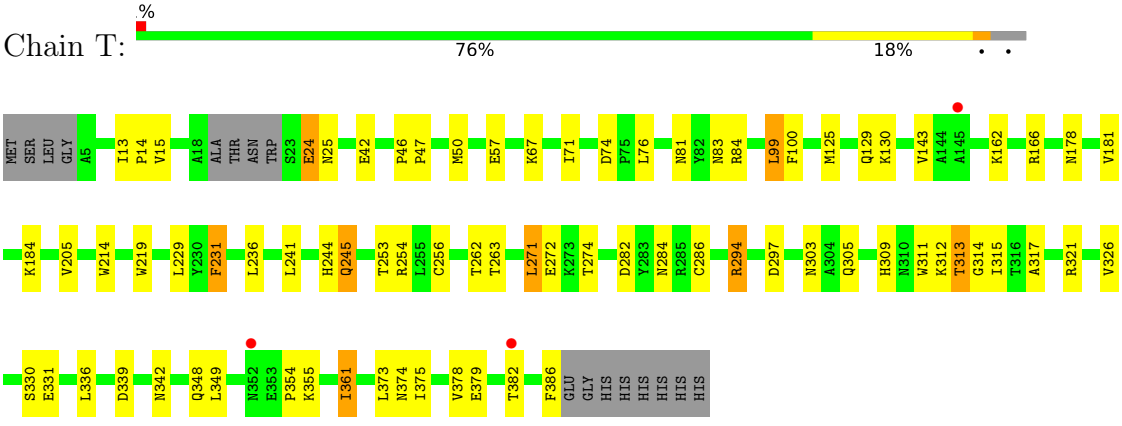
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain S:



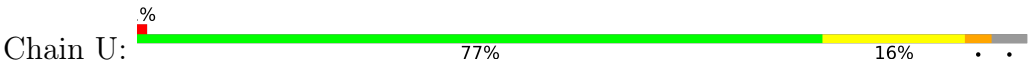
• Molecule 1: Mandelate racemase/muconate lactonizing protein

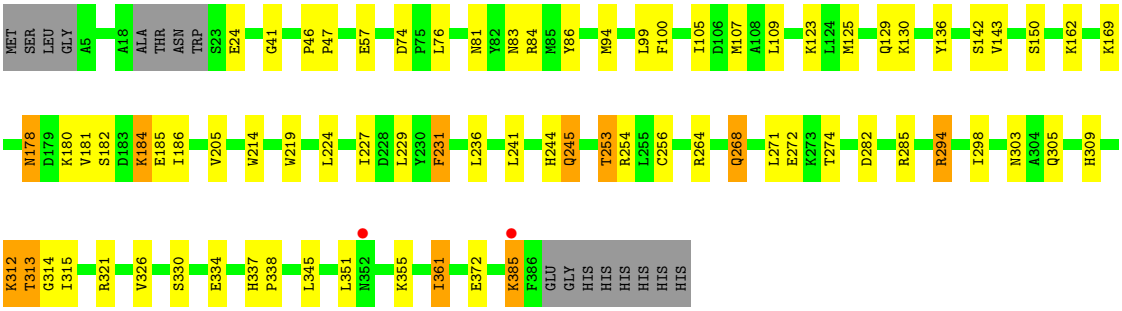
Chain T:



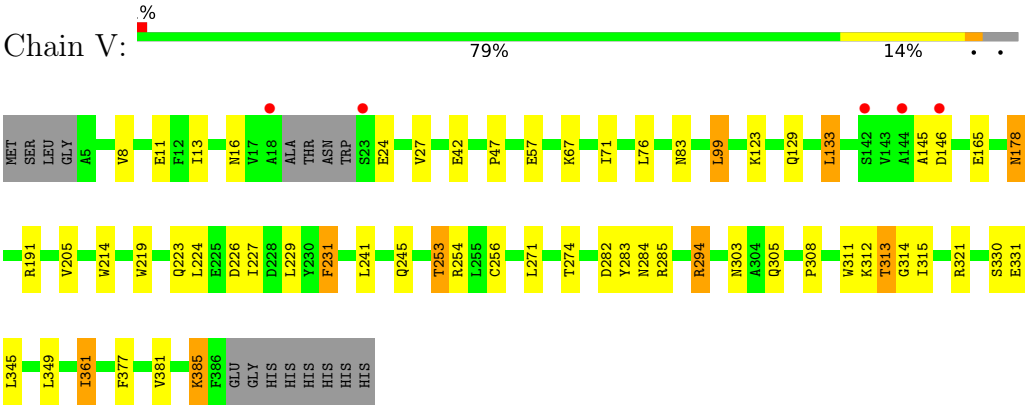
• Molecule 1: Mandelate racemase/muconate lactonizing protein

Chain U:

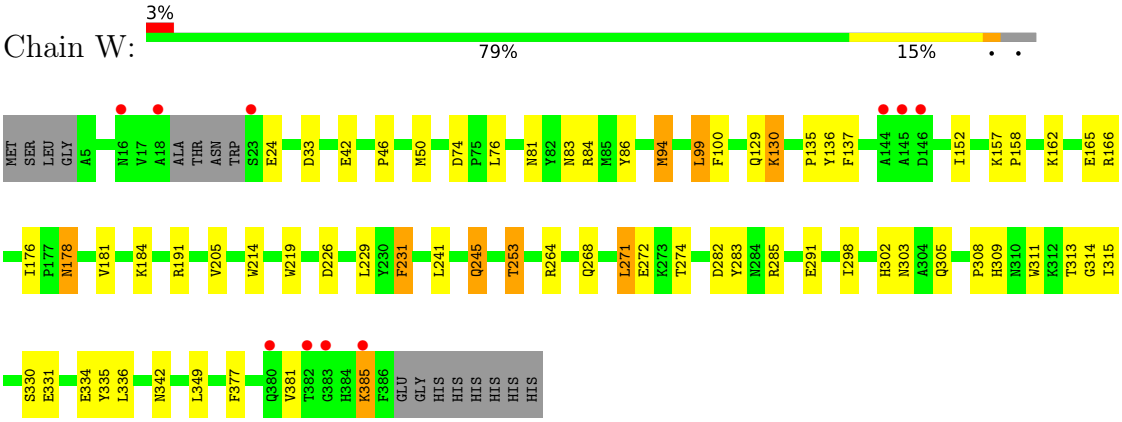




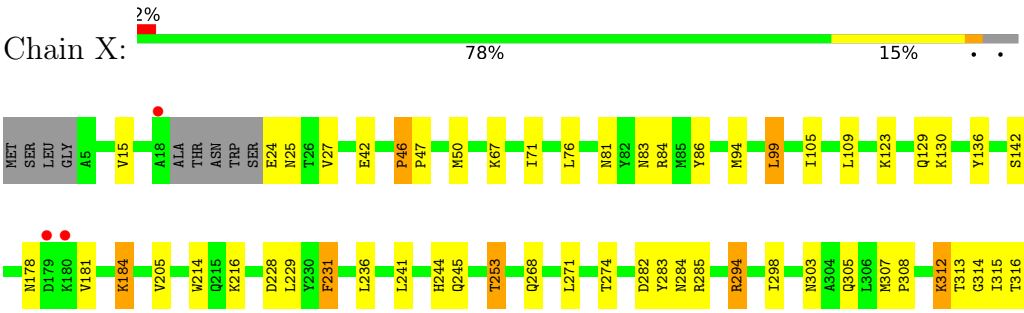
• Molecule 1: Mandelate racemase/muconate lactonizing protein

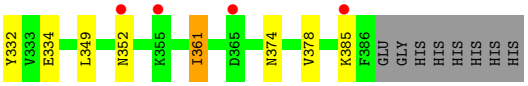


• Molecule 1: Mandelate racemase/muconate lactonizing protein



• Molecule 1: Mandelate racemase/muconate lactonizing protein




Y332
V333
E334
L349
N352
K355
I361
D365
N374
V378
K385
F386
GLU
GLY
HIS
HIS
HIS
HIS
HIS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	111.16Å 146.14Å 158.71Å 98.47° 96.80° 105.04°	Depositor
Resolution (Å)	49.33 – 2.10 49.32 – 2.10	Depositor EDS
% Data completeness (in resolution range)	100.0 (49.33-2.10) 88.4 (49.32-2.10)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.04 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.185 , 0.213 0.189 , 0.218	Depositor DCC
R_{free} test set	4843 reflections (1.00%)	wwPDB-VP
Wilson B-factor (Å^2)	18.6	Xtriage
Anisotropy	0.159	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 38.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	72942	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.45% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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

Bond lengths and bond angles in the following residue types are not validated in this section: MG

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	0.49	0/3042	0.59	0/4125
1	B	0.49	0/3042	0.61	0/4125
1	C	0.50	0/3042	0.60	0/4125
1	D	0.50	0/3042	0.60	0/4125
1	E	0.50	0/3047	0.58	0/4132
1	F	0.49	0/3047	0.59	1/4132 (0.0%)
1	G	0.49	0/3042	0.60	1/4125 (0.0%)
1	H	0.50	0/3047	0.60	2/4132 (0.0%)
1	I	0.47	0/3047	0.59	1/4132 (0.0%)
1	J	0.48	0/3047	0.59	1/4132 (0.0%)
1	K	0.48	0/3047	0.59	0/4132
1	L	0.51	0/3047	0.61	2/4132 (0.0%)
1	M	0.47	0/3042	0.58	1/4125 (0.0%)
1	N	0.48	0/3042	0.58	0/4125
1	O	0.47	0/3047	0.59	0/4132
1	P	0.48	0/3047	0.58	0/4132
1	Q	0.48	0/3047	0.59	1/4132 (0.0%)
1	R	0.48	0/3047	0.58	0/4132
1	S	0.47	0/3042	0.58	2/4125 (0.0%)
1	T	0.49	0/3047	0.61	2/4132 (0.0%)
1	U	0.48	0/3047	0.59	1/4132 (0.0%)
1	V	0.49	0/3047	0.58	1/4132 (0.0%)
1	W	0.47	0/3047	0.59	1/4132 (0.0%)
1	X	0.48	0/3042	0.59	1/4125 (0.0%)
All	All	0.49	0/73083	0.59	18/99105 (0.0%)

There are no bond length outliers.

The worst 5 of 18 bond angle outliers are listed below:

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	T	99	LEU	CA-CB-CG	-7.26	98.61	115.30
1	M	99	LEU	CA-CB-CG	-6.36	100.67	115.30
1	U	99	LEU	CA-CB-CG	-6.36	100.67	115.30
1	S	99	LEU	CA-CB-CG	-6.25	100.92	115.30
1	I	99	LEU	CA-CB-CG	-6.13	101.20	115.30

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	2978	0	2938	65	0
1	B	2978	0	2938	65	0
1	C	2978	0	2938	74	0
1	D	2978	0	2938	78	0
1	E	2983	0	2940	71	0
1	F	2983	0	2940	76	0
1	G	2978	0	2938	68	0
1	H	2983	0	2940	70	0
1	I	2983	0	2940	60	0
1	J	2983	0	2940	70	0
1	K	2983	0	2940	67	0
1	L	2983	0	2940	66	0
1	M	2978	0	2938	66	0
1	N	2978	0	2938	65	0
1	O	2983	0	2940	73	0
1	P	2983	0	2940	64	0
1	Q	2983	0	2940	85	0
1	R	2983	0	2940	62	0
1	S	2978	0	2938	67	0
1	T	2983	0	2940	82	0
1	U	2983	0	2940	67	0
1	V	2983	0	2940	59	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	W	2983	0	2940	56	0
1	X	2978	0	2938	66	0
2	A	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
2	U	1	0	0	0	0
2	V	1	0	0	0	0
2	W	1	0	0	0	0
2	X	1	0	0	0	0
3	A	64	0	0	1	0
3	B	58	0	0	1	0
3	C	73	0	0	1	0
3	D	67	0	0	2	0
3	E	62	0	0	2	0
3	F	59	0	0	1	0
3	G	58	0	0	2	0
3	H	70	0	0	1	0
3	I	54	0	0	4	0
3	J	52	0	0	3	0
3	K	53	0	0	1	0
3	L	58	0	0	5	0
3	M	55	0	0	4	0
3	N	51	0	0	0	0
3	O	52	0	0	1	0
3	P	53	0	0	1	0
3	Q	55	0	0	1	0
3	R	56	0	0	0	0
3	S	54	0	0	0	0
3	T	58	0	0	1	0
3	U	54	0	0	2	0
3	V	59	0	0	6	0
3	W	55	0	0	3	0
3	X	53	0	0	1	0
All	All	72942	0	70542	1476	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 10.

The worst 5 of 1476 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:294:ARG:HH11	1:A:294:ARG:HG2	1.03	1.19
1:A:321:ARG:HD3	1:A:361:ILE:HD11	1.21	1.16
1:S:313:THR:HG22	1:S:315:ILE:H	1.08	1.15
1:C:313:THR:HG22	1:C:315:ILE:H	1.13	1.14
1:J:321:ARG:CD	1:J:361:ILE:HD11	1.76	1.14

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	373/394 (95%)	362 (97%)	11 (3%)	0	100	100
1	B	373/394 (95%)	363 (97%)	10 (3%)	0	100	100
1	C	373/394 (95%)	360 (96%)	13 (4%)	0	100	100
1	D	373/394 (95%)	358 (96%)	15 (4%)	0	100	100
1	E	374/394 (95%)	363 (97%)	11 (3%)	0	100	100
1	F	374/394 (95%)	362 (97%)	12 (3%)	0	100	100
1	G	373/394 (95%)	362 (97%)	11 (3%)	0	100	100
1	H	374/394 (95%)	358 (96%)	16 (4%)	0	100	100
1	I	374/394 (95%)	360 (96%)	14 (4%)	0	100	100
1	J	374/394 (95%)	364 (97%)	10 (3%)	0	100	100
1	K	374/394 (95%)	364 (97%)	10 (3%)	0	100	100
1	L	374/394 (95%)	364 (97%)	10 (3%)	0	100	100
1	M	373/394 (95%)	360 (96%)	12 (3%)	1 (0%)	41	41
1	N	373/394 (95%)	361 (97%)	12 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	O	374/394 (95%)	360 (96%)	14 (4%)	0	100	100
1	P	374/394 (95%)	361 (96%)	13 (4%)	0	100	100
1	Q	374/394 (95%)	358 (96%)	16 (4%)	0	100	100
1	R	374/394 (95%)	361 (96%)	13 (4%)	0	100	100
1	S	373/394 (95%)	360 (96%)	13 (4%)	0	100	100
1	T	374/394 (95%)	361 (96%)	13 (4%)	0	100	100
1	U	374/394 (95%)	359 (96%)	15 (4%)	0	100	100
1	V	374/394 (95%)	361 (96%)	13 (4%)	0	100	100
1	W	374/394 (95%)	358 (96%)	16 (4%)	0	100	100
1	X	373/394 (95%)	360 (96%)	13 (4%)	0	100	100
All	All	8967/9456 (95%)	8660 (97%)	306 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	M	94	MET

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	314/330 (95%)	295 (94%)	19 (6%)	18	16
1	B	314/330 (95%)	299 (95%)	15 (5%)	25	24
1	C	314/330 (95%)	297 (95%)	17 (5%)	22	20
1	D	314/330 (95%)	294 (94%)	20 (6%)	17	14
1	E	314/330 (95%)	297 (95%)	17 (5%)	22	20
1	F	314/330 (95%)	294 (94%)	20 (6%)	17	14
1	G	314/330 (95%)	300 (96%)	14 (4%)	27	27
1	H	314/330 (95%)	296 (94%)	18 (6%)	20	18

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	I	314/330 (95%)	298 (95%)	16 (5%)	24	22
1	J	314/330 (95%)	297 (95%)	17 (5%)	22	20
1	K	314/330 (95%)	299 (95%)	15 (5%)	25	24
1	L	314/330 (95%)	297 (95%)	17 (5%)	22	20
1	M	314/330 (95%)	292 (93%)	22 (7%)	15	12
1	N	314/330 (95%)	296 (94%)	18 (6%)	20	18
1	O	314/330 (95%)	294 (94%)	20 (6%)	17	14
1	P	314/330 (95%)	296 (94%)	18 (6%)	20	18
1	Q	314/330 (95%)	292 (93%)	22 (7%)	15	12
1	R	314/330 (95%)	297 (95%)	17 (5%)	22	20
1	S	314/330 (95%)	298 (95%)	16 (5%)	24	22
1	T	314/330 (95%)	296 (94%)	18 (6%)	20	18
1	U	314/330 (95%)	293 (93%)	21 (7%)	16	13
1	V	314/330 (95%)	296 (94%)	18 (6%)	20	18
1	W	314/330 (95%)	299 (95%)	15 (5%)	25	24
1	X	314/330 (95%)	294 (94%)	20 (6%)	17	14
All	All	7536/7920 (95%)	7106 (94%)	430 (6%)	20	18

5 of 430 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	N	179	ASP
1	Q	142	SER
1	W	130	LYS
1	N	272	GLU
1	O	313	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 217 such sidechains are listed below:

Mol	Chain	Res	Type
1	M	352	ASN
1	Q	6	ASN
1	W	132	GLN
1	N	132	GLN
1	O	268	GLN

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

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 12 ligands modelled in this entry, 12 are monoatomic - leaving 0 for Mogul analysis.

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.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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^{th} 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	377/394 (95%)	-0.46	0 100 100	8, 16, 33, 51	0
1	B	377/394 (95%)	-0.35	5 (1%) 77 80	8, 15, 32, 47	0
1	C	377/394 (95%)	-0.30	4 (1%) 80 84	7, 15, 32, 49	0
1	D	377/394 (95%)	-0.33	3 (0%) 86 88	7, 16, 33, 55	0
1	E	378/394 (95%)	-0.43	5 (1%) 77 80	7, 15, 32, 46	0
1	F	378/394 (95%)	-0.29	8 (2%) 63 68	6, 16, 34, 51	0
1	G	377/394 (95%)	-0.34	6 (1%) 72 75	8, 16, 34, 49	0
1	H	378/394 (95%)	-0.39	4 (1%) 80 84	7, 15, 33, 57	0
1	I	378/394 (95%)	-0.38	6 (1%) 72 75	7, 17, 34, 49	0
1	J	378/394 (95%)	-0.25	7 (1%) 66 71	9, 17, 38, 59	0
1	K	378/394 (95%)	-0.28	8 (2%) 63 68	8, 18, 37, 58	0
1	L	378/394 (95%)	-0.38	5 (1%) 77 80	9, 16, 32, 51	0
1	M	377/394 (95%)	-0.36	0 100 100	9, 17, 33, 48	0
1	N	377/394 (95%)	-0.29	3 (0%) 86 88	9, 18, 38, 57	0
1	O	378/394 (95%)	-0.30	4 (1%) 80 84	9, 18, 37, 51	0
1	P	378/394 (95%)	-0.31	6 (1%) 72 75	7, 18, 41, 62	0
1	Q	378/394 (95%)	-0.25	6 (1%) 72 75	10, 18, 38, 60	0
1	R	378/394 (95%)	-0.38	5 (1%) 77 80	8, 17, 35, 60	0
1	S	377/394 (95%)	-0.25	8 (2%) 63 68	11, 19, 39, 64	0
1	T	378/394 (95%)	-0.36	3 (0%) 86 88	7, 16, 36, 52	0
1	U	378/394 (95%)	-0.35	2 (0%) 91 92	8, 18, 37, 60	0
1	V	378/394 (95%)	-0.29	5 (1%) 77 80	9, 18, 37, 54	0
1	W	378/394 (95%)	-0.29	10 (2%) 56 61	9, 18, 36, 56	0
1	X	377/394 (95%)	-0.26	9 (2%) 59 64	8, 17, 35, 62	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2		OWAB(Å^2)	Q<0.9
All	All	9063/9456 (95%)	-0.33	122 (1%)	77 80	6, 17, 36, 64	0

The worst 5 of 122 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	Q	18	ALA	6.0
1	W	23	SER	5.6
1	K	18	ALA	5.2
1	S	18	ALA	4.9
1	G	18	ALA	4.8

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, 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
2	MG	X	1479	1/1	0.70	0.32	17,17,17,17	1
2	MG	W	395	1/1	0.78	0.06	38,38,38,38	0
2	MG	V	395	1/1	0.78	0.10	30,30,30,30	0
2	MG	U	974	1/1	0.80	0.17	4,4,4,4	1
2	MG	E	395	1/1	0.85	0.17	28,28,28,28	0
2	MG	F	1460	1/1	0.85	0.18	8,8,8,8	1
2	MG	K	683	1/1	0.89	0.18	3,3,3,3	1
2	MG	L	395	1/1	0.89	0.11	26,26,26,26	0
2	MG	G	395	1/1	0.92	0.28	10,10,10,10	1
2	MG	A	1243	1/1	0.97	0.04	29,29,29,29	0
2	MG	H	626	1/1	0.98	0.04	22,22,22,22	0
2	MG	D	395	1/1	0.99	0.05	24,24,24,24	0

6.5 Other polymers (i)

There are no such residues in this entry.