



Full wwPDB X-ray Structure Validation Report

Feb 26, 2014 – 09:12 PM GMT

PDB ID : 3FC7
Title : The crystal structure of a domain of HTR-like protein from *Haloarcula marismortui* ATCC 43049
Authors : Tan, K.; Hatzos, C.; Freeman, L.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2008-11-21
Resolution : 2.65 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

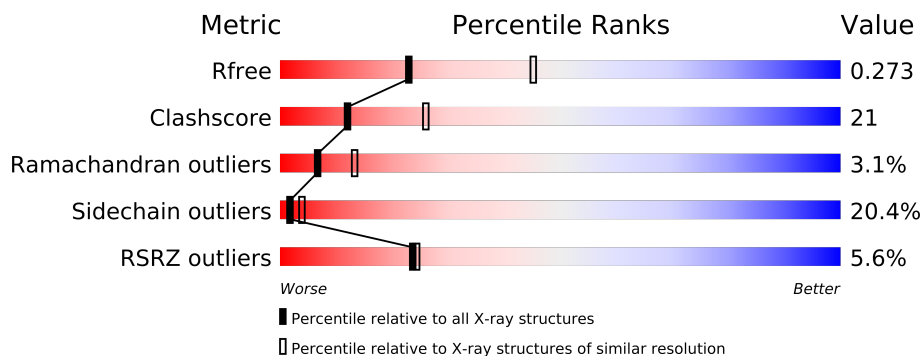
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.65 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}	66092	2232 (2.70-2.62)
Clashscore	79885	2700 (2.70-2.62)
Ramachandran outliers	78287	2657 (2.70-2.62)
Sidechain outliers	78261	2657 (2.70-2.62)
RSRZ outliers	66119	2234 (2.70-2.62)

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 ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	125	
1	B	125	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1481 atoms, of which 0 are hydrogen and 0 are deuterium.

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 HTR-like protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	100	Total	C	N	O	Se	0	0	0
			744	446	138	158	2			
1	B	98	Total	C	N	O	Se	0	0	0
			730	439	136	153	2			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	117	SER	-	expression tag	UNP Q5V4P0
A	118	ASN	-	expression tag	UNP Q5V4P0
A	119	ALA	-	expression tag	UNP Q5V4P0
B	117	SER	-	expression tag	UNP Q5V4P0
B	118	ASN	-	expression tag	UNP Q5V4P0
B	119	ALA	-	expression tag	UNP Q5V4P0

- Molecule 2 is water.

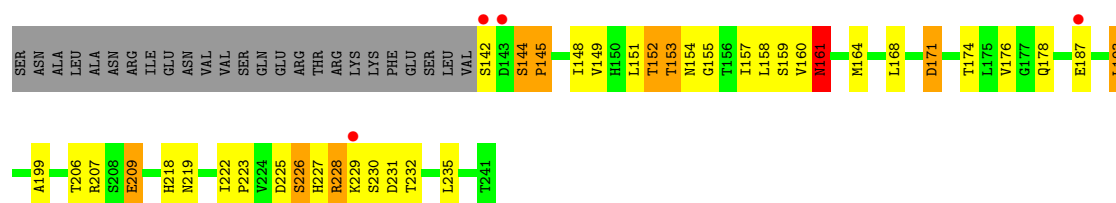
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	O	0	0
			2	2		
2	B	5	Total	O	0	0
			5	5		

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

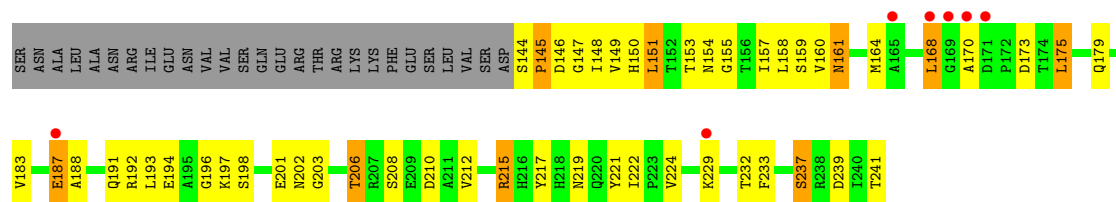
- Molecule 1: HTR-like protein

Chain A: 



- Molecule 1: HTR-like protein

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	55.18Å 55.18Å 249.92Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	34.54 – 2.65 31.40 – 2.65	Depositor EDS
% Data completeness (in resolution range)	99.6 (34.54-2.65) 99.6 (31.40-2.65)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.97 (at 2.64Å)	Xtriage
Refinement program	REFMAC 5.5.0054	Depositor
R, R_{free}	0.202 , 0.274 0.210 , 0.273	Depositor DCC
R_{free} test set	340 reflections (4.95%)	DCC
Wilson B-factor (Å ²)	67.5	Xtriage
Anisotropy	0.021	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 66.3	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 7208 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	1481	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.44% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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	0.84	0/752	0.95	1/1016 (0.1%)
1	B	0.78	0/738	0.93	3/997 (0.3%)
All	All	0.81	0/1490	0.94	4/2013 (0.2%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	192	ARG	NE-CZ-NH2	6.47	123.53	120.30
1	B	161	ASN	N-CA-CB	-5.71	100.31	110.60
1	A	161	ASN	N-CA-CB	-5.33	101.00	110.60
1	B	192	ARG	NE-CZ-NH1	-5.22	117.69	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	744	0	710	30	0
1	B	730	0	701	35	0
2	A	2	0	0	0	0
2	B	5	0	0	0	0
All	All	1481	0	1411	62	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 21.

All (62) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:225:ASP:HB2	1:A:229:LYS:HB3	1.33	1.05
1:A:225:ASP:HB2	1:A:229:LYS:CB	2.03	0.89
1:B:170:ALA:HB3	1:B:175:LEU:HD13	1.55	0.87
1:B:197:LYS:O	1:B:201:GLU:HG2	1.82	0.78
1:A:152:THR:HG22	1:A:154:ASN:H	1.53	0.73
1:B:153:THR:HB	1:B:197:LYS:HG2	1.71	0.72
1:A:152:THR:CG2	1:A:154:ASN:H	2.05	0.70
1:B:160:VAL:HG23	1:B:164:MSE:HB3	1.74	0.69
1:B:170:ALA:HB3	1:B:175:LEU:CD1	2.23	0.68
1:A:152:THR:HG22	1:A:154:ASN:N	2.09	0.67
1:B:160:VAL:CG2	1:B:164:MSE:HB3	2.25	0.67
1:A:222:ILE:HD13	1:B:222:ILE:HD13	1.79	0.65
1:B:215:ARG:NH2	1:B:241:THR:HB	2.11	0.65
1:A:161:ASN:HB3	1:A:164:MSE:H	1.60	0.65
1:B:150:HIS:NE2	1:B:232:THR:OG1	2.29	0.64
1:B:144:SER:HB3	1:B:145:PRO:HD2	1.80	0.63
1:B:219:ASN:ND2	1:B:237:SER:OG	2.32	0.62
1:B:148:ILE:H	1:B:161:ASN:HD22	1.49	0.61
1:A:155:GLY:HA2	1:A:193:LEU:HD11	1.84	0.59
1:A:148:ILE:O	1:A:161:ASN:HB2	2.08	0.54
1:B:194:GLU:OE1	1:B:194:GLU:HA	2.07	0.54
1:A:157:ILE:O	1:A:176:VAL:O	2.25	0.53
1:B:144:SER:HB3	1:B:145:PRO:CD	2.38	0.53
1:A:225:ASP:HB3	1:A:228:ARG:HD2	1.91	0.52
1:B:193:LEU:HG	1:B:197:LYS:HE2	1.90	0.52
1:B:148:ILE:N	1:B:161:ASN:HD22	2.06	0.52
1:B:147:GLY:HA2	1:B:161:ASN:HD22	1.73	0.52
1:A:219:ASN:HB3	1:A:235:LEU:CD1	2.42	0.50
1:A:222:ILE:HD13	1:B:222:ILE:CD1	2.41	0.50
1:A:207:ARG:HA	1:A:219:ASN:O	2.12	0.50
1:B:215:ARG:HH22	1:B:241:THR:HB	1.77	0.50
1:A:160:VAL:CG2	1:A:164:MSE:HB3	2.42	0.49
1:B:196:GLY:HA3	1:B:233:PHE:CZ	2.48	0.49
1:A:209:GLU:OE2	1:A:218:HIS:ND1	2.46	0.48
1:B:146:ASP:O	1:B:161:ASN:ND2	2.46	0.48
1:B:154:ASN:O	1:B:179:GLN:NE2	2.47	0.48
1:A:227:HIS:H	1:A:227:HIS:CD2	2.29	0.48
1:B:224:VAL:HB	1:B:232:THR:HG23	1.97	0.47
1:B:210:ASP:OD2	1:B:217:TYR:HB2	2.14	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:153:THR:HG22	1:A:231:ASP:O	2.14	0.47
1:B:206:THR:HG22	1:B:221:TYR:HD2	1.80	0.47
1:B:157:ILE:HD11	1:B:183:VAL:HG11	1.97	0.46
1:A:207:ARG:NH1	1:A:218:HIS:NE2	2.62	0.46
1:A:222:ILE:HA	1:A:223:PRO:HD2	1.76	0.46
1:B:144:SER:C	1:B:146:ASP:H	2.20	0.46
1:A:144:SER:C	1:A:145:PRO:O	2.55	0.45
1:A:149:VAL:HG22	1:A:151:LEU:HG	1.99	0.45
1:A:229:LYS:O	1:A:231:ASP:N	2.51	0.44
1:B:187:GLU:HG3	1:B:188:ALA:H	1.82	0.43
1:A:199:ALA:HB1	1:A:223:PRO:HD3	2.01	0.43
1:B:160:VAL:HG23	1:B:164:MSE:CB	2.44	0.42
1:A:225:ASP:HA	1:B:159:SER:OG	2.20	0.42
1:A:160:VAL:HG22	1:A:164:MSE:HB3	2.01	0.42
1:B:164:MSE:HE3	1:B:168:LEU:HD21	2.01	0.42
1:B:151:LEU:HD13	1:B:155:GLY:HA2	2.01	0.42
1:A:229:LYS:HG2	1:A:232:THR:OG1	2.20	0.41
1:B:215:ARG:HD3	1:B:239:ASP:OD2	2.21	0.41
1:B:148:ILE:HB	1:B:161:ASN:HB2	2.02	0.41
1:B:147:GLY:HA2	1:B:161:ASN:ND2	2.35	0.40
1:A:209:GLU:CD	1:A:218:HIS:HD1	2.24	0.40
1:A:225:ASP:HB2	1:A:229:LYS:HB2	1.99	0.40
1:A:171:ASP:C	1:A:171:ASP:OD1	2.59	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution. The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	98/125 (78%)	91 (93%)	3 (3%)	4 (4%)	4	8
1	B	96/125 (77%)	88 (92%)	6 (6%)	2 (2%)	11	24
All	All	194/250 (78%)	179 (92%)	9 (5%)	6 (3%)	7	13

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	226	SER
1	B	203	GLY
1	A	230	SER
1	A	161	ASN
1	A	145	PRO
1	B	145	PRO

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution. The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	82/103 (80%)	65 (79%)	17 (21%)	2	4
1	B	80/103 (78%)	64 (80%)	16 (20%)	2	4
All	All	162/206 (79%)	129 (80%)	33 (20%)	2	4

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	142	SER
1	A	144	SER
1	A	152	THR
1	A	153	THR
1	A	158	LEU
1	A	159	SER
1	A	161	ASN
1	A	168	LEU
1	A	171	ASP
1	A	174	THR
1	A	178	GLN
1	A	187	GLU
1	A	193	LEU
1	A	206	THR
1	A	209	GLU
1	A	226	SER
1	A	228	ARG
1	B	149	VAL
1	B	151	LEU
1	B	158	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	168	LEU
1	B	173	ASP
1	B	175	LEU
1	B	187	GLU
1	B	191	GLN
1	B	198	SER
1	B	202	ASN
1	B	206	THR
1	B	208	SER
1	B	212	VAL
1	B	215	ARG
1	B	229	LYS
1	B	237	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	219	ASN
1	B	161	ASN
1	B	219	ASN
1	B	220	GLN

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	100/125 (80%)	0.17	4 (4%) 36 39	30, 39, 58, 77	0
1	B	98/125 (78%)	0.28	7 (7%) 16 16	29, 40, 50, 55	0
All	All	198/250 (79%)	0.22	11 (5%) 24 24	29, 39, 52, 77	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	170	ALA	3.9
1	B	169	GLY	3.7
1	B	168	LEU	3.6
1	B	171	ASP	3.4
1	B	187	GLU	2.9
1	A	142	SER	2.9
1	A	187	GLU	2.9
1	B	229	LYS	2.7
1	B	165	ALA	2.7
1	A	143	ASP	2.4
1	A	229	LYS	2.4

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.