wwPDB X-ray Structure Validation Summary Report (i)

May 23, 2020 – 07:14 am BST

PDB ID	:	3VPR
Title	:	Crystal Structure of a TetR Family Transcriptional Regulator PfmR from Thermus thermophilus HB8
Authors	:	Agari, Y.; Sakamoto, K.; Kuramitsu, S.; Shinkai, A.
Deposited on	:	2012-03-12
Resolution	:	2.27 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 following versions of software and data (see references (1)) were used in the production of this report:

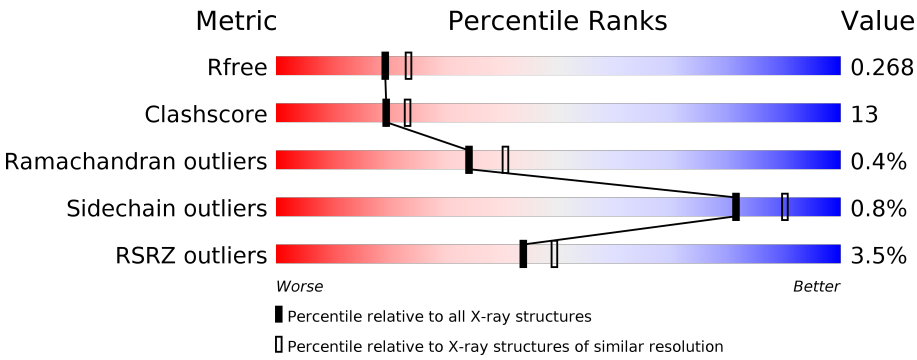
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.27 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	6980 (2.30-2.26)
Clashscore	141614	7711 (2.30-2.26)
Ramachandran outliers	138981	7597 (2.30-2.26)
Sidechain outliers	138945	7598 (2.30-2.26)
RSRZ outliers	127900	6849 (2.30-2.26)

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 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	190	4% 70% 28% ••
1	B	190	2% 79% 19% •
1	C	190	2% 69% 27% •
1	D	190	5% 68% 28% • •

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 6130 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 Transcriptional regulator, TetR family.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	Se			
1	A	189	1517	963	275	274	5	12	0	0
1	B	187	1503	954	273	271	5	8	0	0
1	C	182	1468	935	265	263	5	12	0	0
1	D	185	1492	949	271	267	5	29	0	0

- Molecule 2 is water.

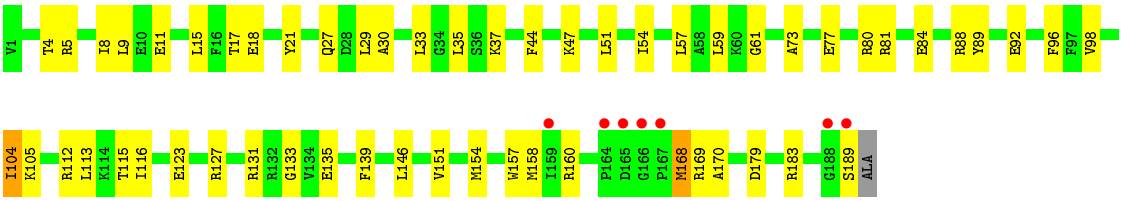
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	44	44	44	0	0
2	B	37	37	37	0	0
2	C	33	33	33	0	0
2	D	36	36	36	0	0

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.

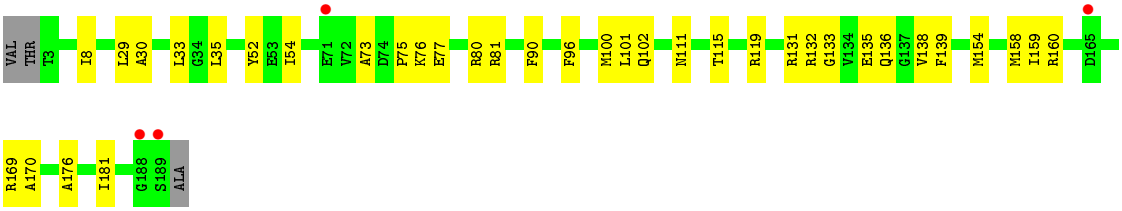
- Molecule 1: Transcriptional regulator, TetR family

Chain A:



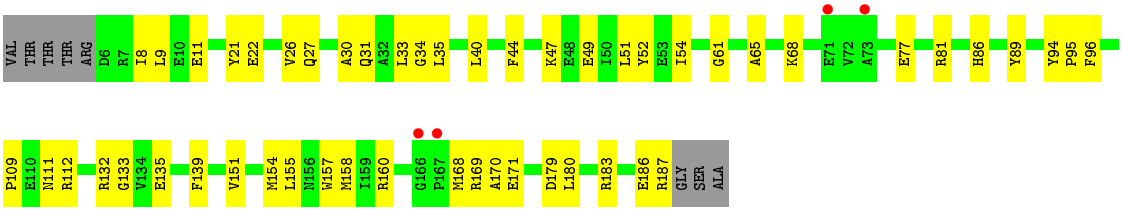
- Molecule 1: Transcriptional regulator, TetR family

Chain B:



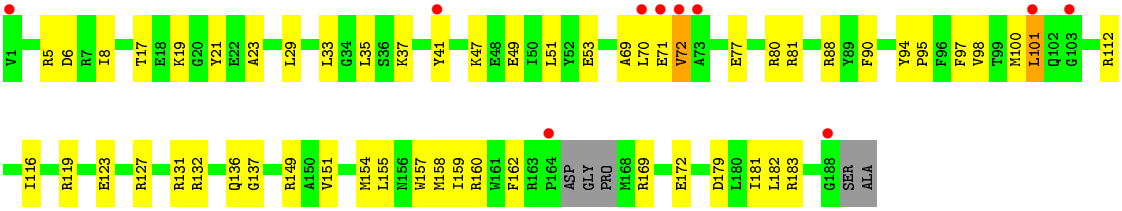
- Molecule 1: Transcriptional regulator, TetR family

Chain C:



- Molecule 1: Transcriptional regulator, TetR family

Chain D:


V1
R5
D6
R7
I8
T17
E18
K19
G20
Y21
E22
A23
L29
L33
G34
L35
S36
K37
Y41
K47
E48
E49
I50
L51
Y52
E53
A69
L70
E71
V72
A73
E77
R80
R81
R88
Y89
F90
Y94
P95
F96
F97
V98
T99
M100
L101
Q102
G103
R112
I116
R119
E123
R127
R131
R132
Q136
G137
R149
A150
V151
M154
L155
N156
W157
M158
I159
R160
W161
F162
R163
P164
ASP
GLY
PRO
M168
R169
E172
D179
L180
I181
L182
R183
G188
SER
ALA

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	49.68Å 57.58Å 133.45Å 90.00° 94.01° 90.00°	Depositor
Resolution (Å)	28.81 – 2.27 28.81 – 2.27	Depositor EDS
% Data completeness (in resolution range)	99.7 (28.81-2.27) 99.8 (28.81-2.27)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.96 (at 2.26Å)	Xtriage
Refinement program	CNS 1.3	Depositor
R, R_{free}	0.212 , 0.269 0.212 , 0.268	Depositor DCC
R_{free} test set	3475 reflections (9.93%)	wwPDB-VP
Wilson B-factor (Å^2)	41.9	Xtriage
Anisotropy	0.243	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 61.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6130	wwPDB-VP
Average B, all atoms (Å^2)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 26.34 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.6834e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[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 (i)

5.1 Standard geometry (i)

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	0.37	0/1539	0.55	0/2063
1	B	0.40	0/1525	0.58	0/2043
1	C	0.38	0/1490	0.58	0/1996
1	D	0.35	0/1513	0.55	0/2027
All	All	0.37	0/6067	0.57	0/8129

There are no bond length outliers.

There are no bond angle outliers.

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	1517	0	1539	46	0
1	B	1503	0	1520	36	0
1	C	1468	0	1485	44	0
1	D	1492	0	1519	39	0
2	A	44	0	0	3	0
2	B	37	0	0	1	0
2	C	33	0	0	4	0
2	D	36	0	0	1	0
All	All	6130	0	6063	152	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 13.

The worst 5 of 152 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:151:VAL:HA	1:A:154:MSE:HE3	1.46	0.97
1:B:100:MSE:HE3	1:B:119:ARG:HH21	1.33	0.94
1:A:160:ARG:HH22	1:B:101:LEU:HD21	1.34	0.92
1:D:151:VAL:HA	1:D:154:MSE:HE2	1.64	0.78
1:A:160:ARG:NH2	1:B:160:ARG:HH22	1.85	0.75

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	187/190 (98%)	181 (97%)	5 (3%)	1 (0%)	29	34
1	B	185/190 (97%)	179 (97%)	6 (3%)	0	100	100
1	C	180/190 (95%)	178 (99%)	2 (1%)	0	100	100
1	D	181/190 (95%)	173 (96%)	6 (3%)	2 (1%)	14	14
All	All	733/760 (96%)	711 (97%)	19 (3%)	3 (0%)	34	40

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	70	LEU
1	D	72	VAL
1	A	104	ILE

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	154/149 (103%)	152 (99%)	2 (1%)	69	80
1	B	152/149 (102%)	152 (100%)	0	100	100
1	C	148/149 (99%)	148 (100%)	0	100	100
1	D	151/149 (101%)	148 (98%)	3 (2%)	55	70
All	All	605/596 (102%)	600 (99%)	5 (1%)	81	90

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	168	MSE
1	A	189	SER
1	D	6	ASP
1	D	88	ARG
1	D	101	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	27	GLN
1	C	136	GLN

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 (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	184/190 (96%)	0.14	7 (3%)	40	45	29, 44, 70, 106	2 (1%)
1	B	182/190 (95%)	0.08	4 (2%)	62	68	25, 41, 65, 87	2 (1%)
1	C	177/190 (93%)	-0.02	4 (2%)	60	66	26, 44, 66, 83	2 (1%)
1	D	180/190 (94%)	0.28	10 (5%)	24	29	29, 49, 75, 96	5 (2%)
All	All	723/760 (95%)	0.12	25 (3%)	44	49	25, 44, 71, 106	11 (1%)

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	188	GLY	7.4
1	B	189	SER	5.5
1	A	189	SER	5.3
1	A	166	GLY	5.2
1	D	1	VAL	5.0

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.