wwPDB X-ray Structure Validation Summary Report (i)

May 22, 2020 – 07:42 pm BST

PDB ID	:	1MNM
Title	:	YEAST MATALPHA2/MCM1/DNA TERNARY TRANSCRIPTION COMPLEX CRYSTAL STRUCTURE
Authors	:	Tan, S.; Richmond, T.J.
Deposited on	:	1997-11-03
Resolution	:	2.25 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:

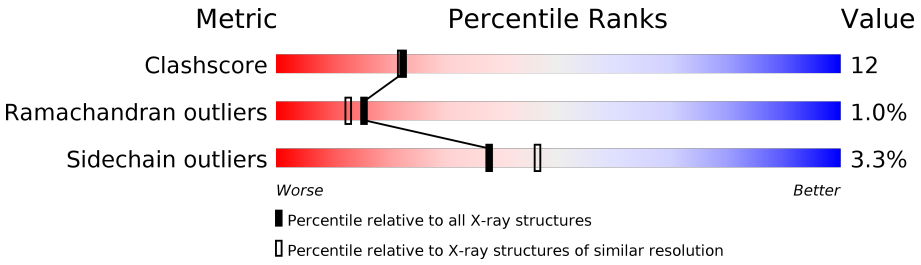
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.25 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))
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)

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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	E	26	38% 62%
2	F	26	50% 46% •
3	A	100	67% 17% • 15%
3	B	100	62% 17% •• 19%
4	C	87	64% 24% 11%
4	D	87	74% 15% 11%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 3657 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 DNA chain called DNA (STE6 OPERATOR DNA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	E	26	Total	C	N	O	P	0	0	0
			533	256	101	151	25			

- Molecule 2 is a DNA chain called DNA (STE6 OPERATOR DNA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	F	26	Total	C	N	O	P	0	0	0
			527	255	90	157	25			

- Molecule 3 is a protein called PROTEIN (MCM1 TRANSCRIPTIONAL REGULATOR).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	A	85	Total	C	N	O	S	0	0	0
			681	434	122	123	2			
3	B	81	Total	C	N	O	S	0	0	0
			623	402	109	110	2			

- Molecule 4 is a protein called PROTEIN (MAT ALPHA-2 TRANSCRIPTIONAL REPRESSOR).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	C	77	Total	C	N	O	S	0	0	0
			609	381	112	114	2			
4	D	77	Total	C	N	O	S	0	0	0
			631	396	119	114	2			

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	E	6	Total	O	0	0
			6	6		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	F	16	Total O 16 16	0	0
5	A	10	Total O 10 10	0	0
5	B	11	Total O 11 11	0	0
5	C	2	Total O 2 2	0	0
5	D	8	Total O 8 8	0	0

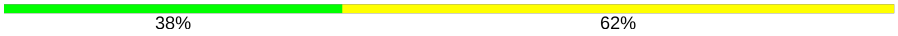
3 Residue-property plots (i)

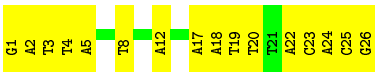
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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. 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.

Note EDS was not executed.

- Molecule 1: DNA (STE6 OPERATOR DNA)

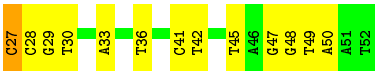
Chain E:





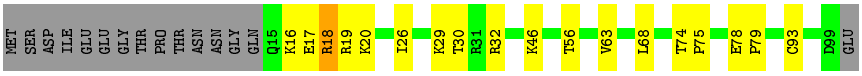
- Molecule 2: DNA (STE6 OPERATOR DNA)

Chain F:



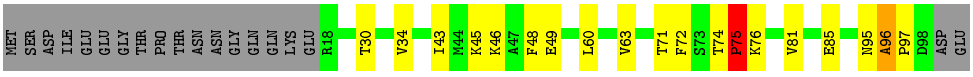
- Molecule 3: PROTEIN (MCM1 TRANSCRIPTIONAL REGULATOR)

Chain A:



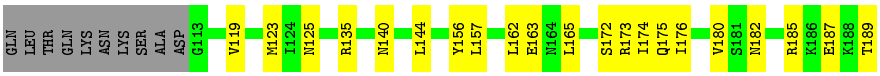
- Molecule 3: PROTEIN (MCM1 TRANSCRIPTIONAL REGULATOR)

Chain B:



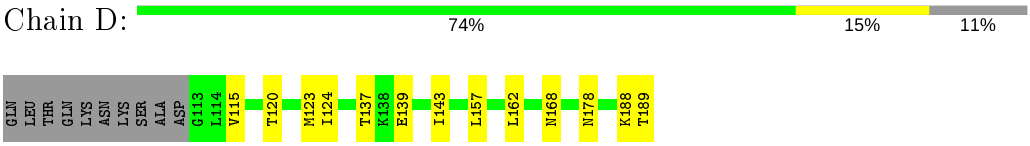
- Molecule 4: PROTEIN (MAT ALPHA-2 TRANSCRIPTIONAL REPRESSOR)

Chain C:



- Molecule 4: PROTEIN (MAT ALPHA-2 TRANSCRIPTIONAL REPRESSOR)

Chain D:


74%
15%
11%
GLN
LEU
THR
GLN
LYS
ASN
LYS
SER
ALA
ASP
G113
I114
V115
T120
M123
I124
T137
K138
E139
I143
L157
L162
N168
N178
K188
T189

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	70.62Å 72.55Å 150.70Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	25.00 – 2.25	Depositor
% Data completeness (in resolution range)	98.3 (25.00-2.25)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.843	Depositor
R, R_{free}	0.240 , 0.285	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3657	wwPDB-VP
Average B, all atoms (Å^2)	52.0	wwPDB-VP

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	E	0.40	0/599	0.75	0/923
2	F	0.38	0/589	0.75	0/907
3	A	0.41	0/691	0.60	0/929
3	B	0.38	0/633	0.61	0/856
4	C	0.36	0/620	0.59	0/841
4	D	0.37	0/642	0.55	0/864
All	All	0.38	0/3774	0.65	0/5320

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	F	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	F	27	DC	Sidechain
2	F	47	DG	Sidechain

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	E	533	0	295	22	0
2	F	527	0	298	16	0
3	A	681	0	708	11	0
3	B	623	0	638	14	0
4	C	609	0	574	17	0
4	D	631	0	629	6	0
5	A	10	0	0	0	0
5	B	11	0	0	0	0
5	C	2	0	0	0	0
5	D	8	0	0	0	0
5	E	6	0	0	0	0
5	F	16	0	0	0	0
All	All	3657	0	3142	77	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 12.

The worst 5 of 77 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)
2:F:27:DC:H2"	2:F:28:DC:H5'	1.34	1.10
1:E:2:DA:H2"	1:E:3:DT:H5'	1.41	1.02
1:E:2:DA:H2"	1:E:3:DT:C5'	2.01	0.91
3:B:96:ALA:HB1	3:B:97:PRO:HD2	1.55	0.88
2:F:27:DC:H2"	2:F:28:DC:C5'	2.07	0.83

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
3	A	83/100 (83%)	79 (95%)	3 (4%)	1 (1%)	13 9

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
3	B	79/100 (79%)	74 (94%)	3 (4%)	2 (2%)	5 3
4	C	75/87 (86%)	70 (93%)	5 (7%)	0	100 100
4	D	75/87 (86%)	75 (100%)	0	0	100 100
All	All	312/374 (83%)	298 (96%)	11 (4%)	3 (1%)	15 13

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	A	16	LYS
3	B	96	ALA
3	B	75	PRO

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
3	A	76/91 (84%)	74 (97%)	2 (3%)	46 55
3	B	67/91 (74%)	65 (97%)	2 (3%)	41 50
4	C	64/82 (78%)	61 (95%)	3 (5%)	26 29
4	D	69/82 (84%)	67 (97%)	2 (3%)	42 51
All	All	276/346 (80%)	267 (97%)	9 (3%)	38 46

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	C	123	MET
4	D	124	ILE
4	C	163	GLU
3	B	75	PRO
4	C	157	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
4	C	140	ASN
4	C	151	ASN
4	C	178	ASN
4	C	125	ASN
4	C	175	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 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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.