



Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 03:17 PM GMT

PDB ID : 3VYC
Title : Crystal structure of unliganded *Saccharomyces cerevisiae* CRM1 (Xpo1p)
Authors : Saito, N.; Matsuura, Y.
Deposited on : 2012-09-22
Resolution : 2.10 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>

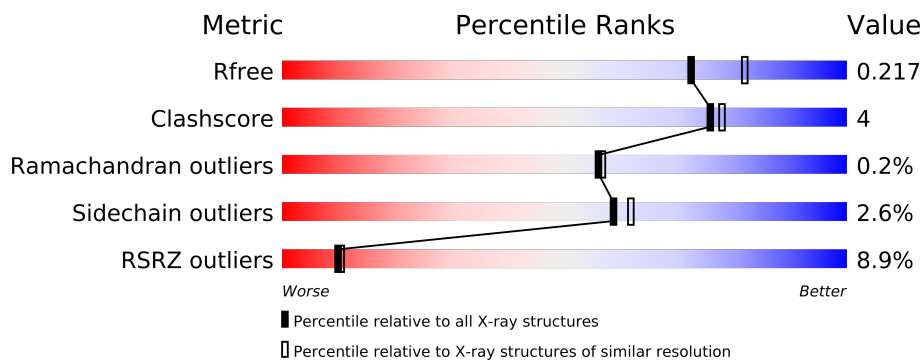
The following versions of software and data (see [references](#)) were used in the production of this report:

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 2.10 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}	66092	3012 (2.10-2.10)
Clashscore	79885	3649 (2.10-2.10)
Ramachandran outliers	78287	3610 (2.10-2.10)
Sidechain outliers	78261	3611 (2.10-2.10)
RSRZ outliers	66119	3013 (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 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	1033	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 8180 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 Exportin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	974	Total	C	N	O	S	0	0	0
			7802	5013	1289	1461	39			

There are 51 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	VAL	DELETION	UNP P30822
A	?	-	GLN	DELETION	UNP P30822
A	?	-	ARG	DELETION	UNP P30822
A	?	-	LEU	DELETION	UNP P30822
A	?	-	PRO	DELETION	UNP P30822
A	?	-	ALA	DELETION	UNP P30822
A	?	-	THR	DELETION	UNP P30822
A	?	-	GLU	DELETION	UNP P30822
A	?	-	MET	DELETION	UNP P30822
A	?	-	SER	DELETION	UNP P30822
A	?	-	PRO	DELETION	UNP P30822
A	?	-	LEU	DELETION	UNP P30822
A	?	-	ILE	DELETION	UNP P30822
A	?	-	GLN	DELETION	UNP P30822
A	?	-	LEU	DELETION	UNP P30822
A	?	-	SER	DELETION	UNP P30822
A	?	-	VAL	DELETION	UNP P30822
A	?	-	GLY	DELETION	UNP P30822
A	?	-	SER	DELETION	UNP P30822
A	?	-	GLN	DELETION	UNP P30822
A	?	-	ALA	DELETION	UNP P30822
A	?	-	ILE	DELETION	UNP P30822
A	?	-	SER	DELETION	UNP P30822
A	?	-	THR	DELETION	UNP P30822
A	?	-	GLY	DELETION	UNP P30822
A	?	-	SER	DELETION	UNP P30822
A	?	-	GLY	DELETION	UNP P30822

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Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	ALA	DELETION	UNP P30822
A	?	-	LEU	DELETION	UNP P30822
A	?	-	ASN	DELETION	UNP P30822
A	?	-	PRO	DELETION	UNP P30822
A	?	-	GLU	DELETION	UNP P30822
A	?	-	TYR	DELETION	UNP P30822
A	?	-	MET	DELETION	UNP P30822
A	?	-	LYS	DELETION	UNP P30822
A	?	-	ARG	DELETION	UNP P30822
A	?	-	PHE	DELETION	UNP P30822
A	?	-	ILE	DELETION	UNP P30822
A	?	-	SER	DELETION	UNP P30822
A	?	-	VAL	DELETION	UNP P30822
A	?	-	PRO	DELETION	UNP P30822
A	?	-	LEU	DELETION	UNP P30822
A	?	-	TYR	DELETION	UNP P30822
A	?	-	GLN	DELETION	UNP P30822
A	?	-	GLU	DELETION	UNP P30822
A	?	-	ALA	DELETION	UNP P30822
A	?	-	GLU	DELETION	UNP P30822
A	?	-	VAL	DELETION	UNP P30822
A	?	-	PRO	DELETION	UNP P30822
A	?	-	GLN	DELETION	UNP P30822
A	?	-	GLY	DELETION	UNP P30822

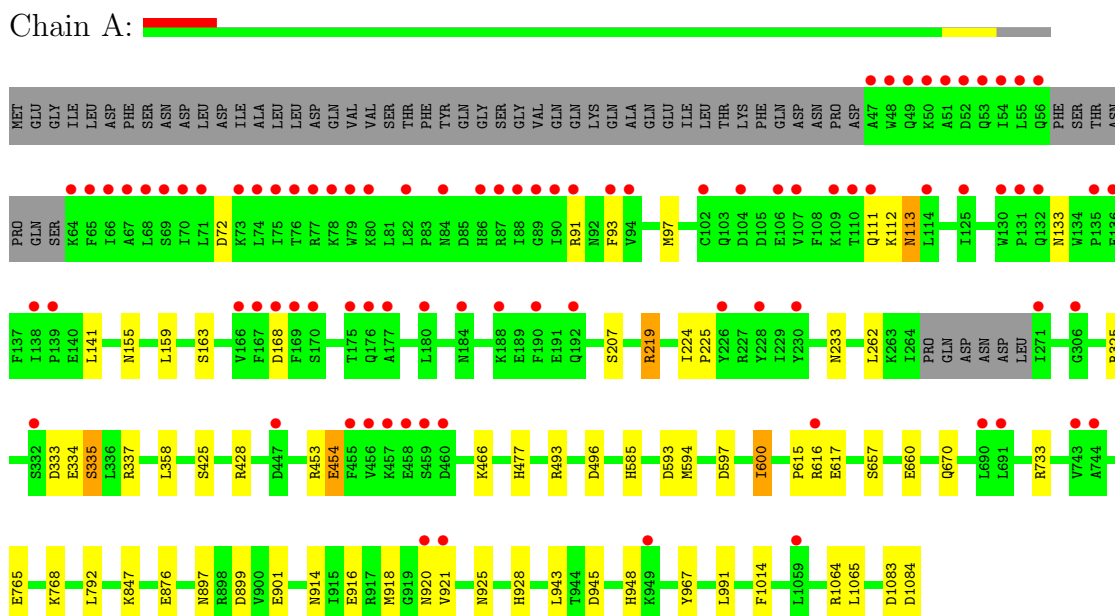
- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	378	Total O 378 378	0	0

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: Exportin-1



4 Data and refinement statistics

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	116.78Å 116.78Å 118.98Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.67 – 2.10 41.67 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.5 (41.67-2.10) 99.6 (41.67-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.20 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.187 , 0.217 0.187 , 0.217	Depositor DCC
R_{free} test set	4716 reflections (5.34%)	DCC
Wilson B-factor (Å ²)	39.2	Xtriage
Anisotropy	0.301	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 47.9	EDS
Estimated twinning fraction	0.015 for -h,-l,-k 0.007 for -h,l,k 0.007 for l,-k,h 0.013 for -l,-k,-h 0.033 for h,-k,-l	Xtriage
L-test for twinning	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 93065 reflections	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8180	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.54% 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	0.77	1/7945 (0.0%)	0.86	11/10763 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	733	ARG	CZ-NH2	5.60	1.40	1.33

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	493	ARG	NE-CZ-NH2	-21.12	109.74	120.30
1	A	493	ARG	NE-CZ-NH1	14.15	127.38	120.30
1	A	594	MET	CG-SD-CE	-7.14	88.77	100.20
1	A	943	LEU	CB-CG-CD2	-6.33	100.25	111.00
1	A	493	ARG	CG-CD-NE	-6.01	99.17	111.80
1	A	493	ARG	CD-NE-CZ	5.66	131.53	123.60
1	A	943	LEU	CA-CB-CG	5.65	128.31	115.30
1	A	428	ARG	CG-CD-NE	-5.53	100.19	111.80
1	A	792	LEU	CB-CG-CD2	-5.43	101.77	111.00
1	A	496	ASP	CB-CG-OD1	5.43	123.18	118.30
1	A	496	ASP	CB-CG-OD2	-5.27	113.56	118.30

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	7802	0	0	30	0
2	A	378	0	0	9	1
All	All	8180	0	0	30	1

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 4.

All (30) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:219:ARG:CG	1:A:219:ARG:NH1	2.51	0.74
1:A:262:LEU:O	1:A:325:ARG:NH2	2.21	0.74
1:A:897:ASN:ND2	1:A:899:ASP:OD1	2.21	0.73
1:A:901:GLU:OE2	1:A:948:HIS:NE2	2.27	0.67
1:A:585:HIS:NE2	2:A:1397:HOH:O	2.29	0.66
1:A:945:ASP:O	2:A:1475:HOH:O	2.14	0.64
1:A:1083:ASP:CA	1:A:1084:ASP:CB	2.76	0.64
1:A:921:VAL:O	1:A:925:ASN:ND2	2.33	0.62
1:A:453:ARG:NH2	1:A:593:ASP:OD2	2.34	0.60
1:A:847:LYS:CE	2:A:1310:HOH:O	2.52	0.57
1:A:768:LYS:CE	2:A:1358:HOH:O	2.53	0.56
1:A:168:ASP:CB	1:A:219:ARG:NH1	2.70	0.55
1:A:615:PRO:O	1:A:616:ARG:CB	2.55	0.53
1:A:928:HIS:CE1	2:A:1264:HOH:O	2.64	0.50
1:A:477:HIS:CD2	2:A:1426:HOH:O	2.66	0.49
1:A:597:ASP:O	1:A:600:ILE:CG2	2.60	0.49
1:A:899:ASP:C	2:A:1147:HOH:O	2.52	0.49
1:A:466:LYS:CE	2:A:1291:HOH:O	2.62	0.48
1:A:657:SER:OG	1:A:660:GLU:OE1	2.33	0.47
1:A:916:GLU:CG	2:A:1177:HOH:O	2.65	0.44
1:A:155:ASN:O	1:A:159:LEU:CD2	2.67	0.43
1:A:163:SER:OG	1:A:219:ARG:CG	2.67	0.43
1:A:453:ARG:O	1:A:454:GLU:C	2.57	0.42
1:A:111:GLN:O	1:A:113:ASN:N	2.51	0.42
1:A:899:ASP:OD1	1:A:899:ASP:N	2.52	0.42
1:A:224:ILE:O	1:A:225:PRO:C	2.56	0.42
1:A:765:GLU:OE2	1:A:768:LYS:NZ	2.53	0.41
1:A:91:ARG:NH1	1:A:133:ASN:O	2.54	0.41
1:A:333:ASP:OD1	1:A:335:SER:CB	2.69	0.41
1:A:967:TYR:CE2	1:A:991:LEU:CD2	3.05	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:A:1163:HOH:O	2:A:1424:HOH:O[3_555]	2.17	0.03

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	968/1033 (94%)	929 (96%)	37 (4%)	2 (0%)	56 57

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	112	LYS
1	A	334	GLU

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	870/943 (92%)	847 (97%)	23 (3%)	59 62

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	72	ASP
1	A	93	PHE
1	A	97	MET
1	A	113	ASN
1	A	141	LEU

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Mol	Chain	Res	Type
1	A	207	SER
1	A	219	ARG
1	A	233	ASN
1	A	335	SER
1	A	337	ARG
1	A	358	LEU
1	A	425	SER
1	A	454	GLU
1	A	600	ILE
1	A	617	GLU
1	A	670	GLN
1	A	876	GLU
1	A	914	ASN
1	A	918	MET
1	A	920	ASN
1	A	1014	PHE
1	A	1064	ARG
1	A	1065	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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	974/1033 (94%)	0.49	87 (8%)	10 10	24, 54, 125, 166	0

All (87) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	456	VAL	9.3
1	A	68	LEU	9.2
1	A	48	TRP	8.4
1	A	90	ILE	8.3
1	A	75	ILE	8.0
1	A	50	LYS	7.7
1	A	51	ALA	7.6
1	A	70	ILE	7.5
1	A	71	LEU	6.4
1	A	74	LEU	6.1
1	A	66	ILE	5.9
1	A	54	ILE	5.5
1	A	271	ILE	5.1
1	A	114	LEU	5.1
1	A	65	PHE	5.1
1	A	457	LYS	5.0
1	A	79	TRP	4.9
1	A	77	ARG	4.9
1	A	53	GLN	4.8
1	A	455	PHE	4.6
1	A	78	LYS	4.6
1	A	175	THR	4.6
1	A	49	GLN	4.1
1	A	55	LEU	4.1
1	A	67	ALA	4.1
1	A	80	LYS	4.1
1	A	88	ILE	4.0

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Mol	Chain	Res	Type	RSRZ
1	A	102	CYS	3.9
1	A	94	VAL	3.8
1	A	76	THR	3.7
1	A	111	GLN	3.5
1	A	73	LYS	3.4
1	A	86	HIS	3.4
1	A	184	ASN	3.3
1	A	226	TYR	3.3
1	A	136	GLU	3.3
1	A	135	PRO	3.2
1	A	177	ALA	3.2
1	A	228	TYR	3.2
1	A	82	LEU	3.1
1	A	87	ARG	3.1
1	A	690	LEU	3.1
1	A	168	ASP	3.1
1	A	47	ALA	3.1
1	A	691	LEU	3.0
1	A	64	LYS	3.0
1	A	170	SER	3.0
1	A	93	PHE	2.9
1	A	167	PHE	2.8
1	A	69	SER	2.8
1	A	230	TYR	2.7
1	A	131	PRO	2.6
1	A	188	LYS	2.6
1	A	125	ILE	2.5
1	A	458	GLU	2.5
1	A	920	ASN	2.5
1	A	166	VAL	2.5
1	A	190	PHE	2.4
1	A	332	SER	2.4
1	A	56	GLN	2.4
1	A	132	GLN	2.3
1	A	52	ASP	2.3
1	A	949	LYS	2.3
1	A	109	LYS	2.3
1	A	110	THR	2.3
1	A	84	ASN	2.2
1	A	89	GLY	2.2
1	A	169	PHE	2.2
1	A	306	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	104	ASP	2.2
1	A	106	GLU	2.2
1	A	1059	LEU	2.2
1	A	616	ARG	2.2
1	A	447	ASP	2.2
1	A	743	VAL	2.2
1	A	459	SER	2.2
1	A	176	GLN	2.1
1	A	744	ALA	2.1
1	A	921	VAL	2.1
1	A	180	LEU	2.1
1	A	139	PRO	2.1
1	A	91	ARG	2.1
1	A	192	GLN	2.1
1	A	107	VAL	2.0
1	A	460	ASP	2.0
1	A	138	ILE	2.0
1	A	130	TRP	2.0

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.