Full wwPDB X-ray Structure Validation Report ⓘ

Nov 25, 2024 – 06:05 PM EST

PDB ID	:	3FS5
Title	:	Crystal structure of Saccharomyces cerevisiae Ygr203w, a homolog of single-domain rhodanese and Cdc25 phosphatase catalytic domain
Authors	:	Yeo, H.K.; Lee, J.Y.
Deposited on	:	2009-01-09
Resolution	:	1.90 Å(reported)

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

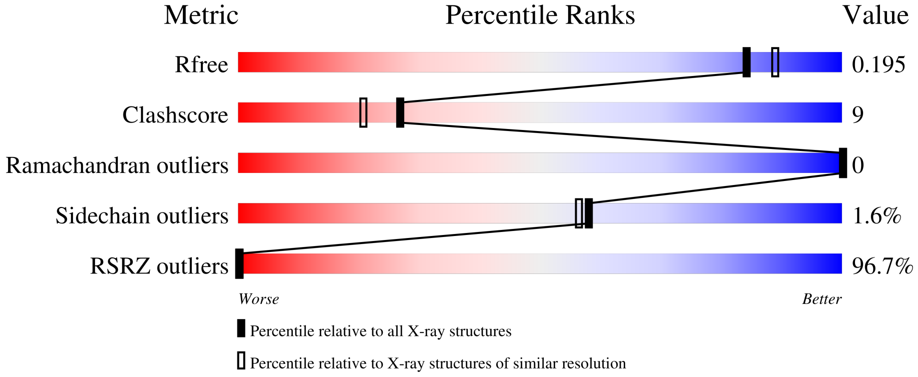
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

1 Overall quality at a glance ⓘ

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

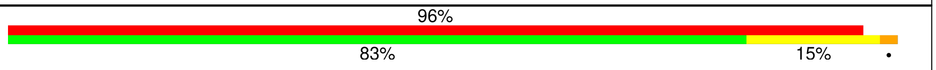
The reported resolution of this entry is 1.90 Å.

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}	164625	7293 (1.90-1.90)
Clashscore	180529	8090 (1.90-1.90)
Ramachandran outliers	177936	8022 (1.90-1.90)
Sidechain outliers	177891	8022 (1.90-1.90)
RSRZ outliers	164620	7292 (1.90-1.90)

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%

Mol	Chain	Length	Quality of chain
1	A	152	

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 1323 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 Uncharacterized protein YGR203W.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	152	1233	776	222	227	8	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	149	ALA	-	expression tag	UNP P42937
A	150	ALA	-	expression tag	UNP P42937
A	151	ALA	-	expression tag	UNP P42937
A	152	ALA	-	expression tag	UNP P42937

- Molecule 2 is water.

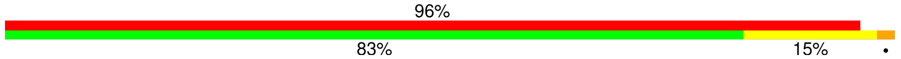
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	A	90	90	90	0	0

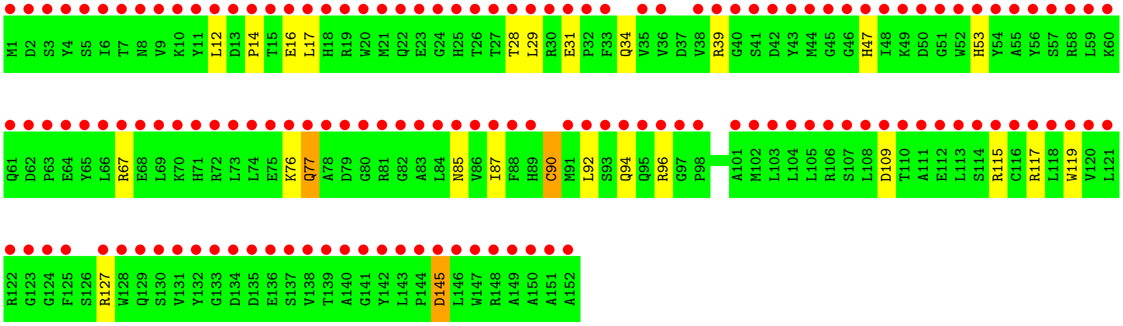
3 Residue-property plots ⓘ

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. 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.

- Molecule 1: Uncharacterized protein YGR203W

Chain A:





4 Data and refinement statistics ⓘ

Property	**Value**	**Source**
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	40.48Å 50.95Å 91.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.90 20.00 – 1.90	Depositor EDS
% Data completeness (in resolution range)	(Not available) (20.00-1.90) 97.6 (20.00-1.90)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.86 (at 1.93Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.182 , 0.205 0.195 , 0.195	Depositor DCC
R_{free} test set	721 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	25.5	Xtriage
Anisotropy	0.287	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 26.1	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	0.62	EDS
Total number of atoms	1323	wwPDB-VP
Average B, all atoms (Å^2)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.52% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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)

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

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	0.29	0/1253	0.54	0/1693

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	1233	0	1191	22	0
2	A	90	0	0	6	0
All	All	1323	0	1191	22	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 9.

All (22) 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:77:GLN:NE2	1:A:115:ARG:HD2	1.98	0.78
1:A:85:ASN:HD22	1:A:119:TRP:HE1	1.32	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:92:LEU:H	1:A:94:GLN:HE21	1.40	0.70
1:A:14:PRO:HG3	2:A:181:HOH:O	1.93	0.68
1:A:14:PRO:HG2	1:A:127:ARG:HD2	1.78	0.66
1:A:85:ASN:HD21	1:A:117:ARG:HD2	1.61	0.65
1:A:92:LEU:H	1:A:94:GLN:NE2	1.98	0.62
1:A:85:ASN:ND2	1:A:117:ARG:HD2	2.16	0.60
1:A:34:GLN:HE21	1:A:76:LYS:HE3	1.68	0.57
1:A:28:THR:HG22	1:A:29:LEU:HG	1.88	0.56
1:A:90:CME:HE3	1:A:96:ARG:HD2	1.87	0.56
1:A:39:ARG:O	1:A:53:HIS:HE1	1.91	0.53
1:A:145:ASP:HB2	2:A:193:HOH:O	2.10	0.50
1:A:109:ASP:HB3	2:A:212:HOH:O	2.12	0.48
1:A:47:HIS:HD2	2:A:155:HOH:O	1.97	0.47
1:A:77:GLN:NE2	1:A:115:ARG:HH21	2.13	0.46
1:A:34:GLN:NE2	1:A:76:LYS:HE3	2.31	0.45
1:A:67:ARG:HD3	2:A:215:HOH:O	2.17	0.43
1:A:29:LEU:HB2	1:A:31:GLU:HG3	2.01	0.43
1:A:12:LEU:HD11	1:A:16:GLU:HG2	2.01	0.42
1:A:17:LEU:HD13	1:A:87:ILE:HD13	2.00	0.42
1:A:53:HIS:HD2	2:A:186:HOH:O	2.02	0.42

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	149/152 (98%)	144 (97%)	5 (3%)	0	100 100

There are no Ramachandran outliers to report.

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	127/128 (99%)	125 (98%)	2 (2%)	58 56

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	77	GLN
1	A	145	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	34	GLN
1	A	47	HIS
1	A	53	HIS
1	A	71	HIS
1	A	77	GLN
1	A	85	ASN
1	A	94	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	CME	A	90	1	8,9,10	0.52	0	6,9,11	1.32	1 (16%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	CME	A	90	1	-	2/5/8/10	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	90	CME	CZ-CE-SD	-3.00	103.37	113.39

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	90	CME	CZ-CE-SD-SG
1	A	90	CME	SD-CE-CZ-OH

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	90	CME	1	0

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

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

6.1 Protein, DNA and RNA chains

Warning: The R factor obtained from EDS is 0.5098, which does not match the depositor's R factor of 0.182. Please interpret the results in this section carefully.

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	151/152 (99%)	4.43	146 (96%)	0	0	15, 25, 45, 84	0

All (146) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	150	ALA	12.1
1	A	78	ALA	10.0
1	A	82	GLY	10.0
1	A	151	ALA	9.8
1	A	149	ALA	9.3
1	A	80	GLY	9.0
1	A	12	LEU	9.0
1	A	62	ASP	7.7
1	A	5	SER	7.6
1	A	28	THR	7.6
1	A	27	THR	7.3
1	A	24	GLY	7.3
1	A	4	TYR	7.0
1	A	96	ARG	6.9
1	A	123	GLY	6.8
1	A	124	GLY	6.7
1	A	152	ALA	6.6
1	A	143	LEU	6.4
1	A	67	ARG	6.1
1	A	147	TRP	6.0
1	A	74	LEU	6.0
1	A	29	LEU	5.9
1	A	142	TYR	5.9
1	A	131	VAL	5.9

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Mol	Chain	Res	Type	RSRZ
1	A	138	VAL	5.8
1	A	111	ALA	5.7
1	A	148	ARG	5.7
1	A	10	LYS	5.6
1	A	95	GLN	5.5
1	A	40	GLY	5.4
1	A	88	PHE	5.4
1	A	121	LEU	5.4
1	A	127	ARG	5.4
1	A	9	VAL	5.4
1	A	17	LEU	5.2
1	A	105	LEU	5.2
1	A	49	LYS	5.2
1	A	25	HIS	5.2
1	A	79	ASP	5.2
1	A	92	LEU	5.2
1	A	137	SER	5.1
1	A	110	THR	5.1
1	A	115	ARG	5.1
1	A	59	LEU	5.1
1	A	132	TYR	5.0
1	A	33	PHE	5.0
1	A	128	TRP	5.0
1	A	57	SER	5.0
1	A	61	GLN	5.0
1	A	32	PRO	5.0
1	A	43	TYR	4.9
1	A	146	LEU	4.8
1	A	20	TRP	4.8
1	A	104	LEU	4.8
1	A	30	ARG	4.8
1	A	144	PRO	4.8
1	A	1	MET	4.8
1	A	55	ALA	4.6
1	A	65	TYR	4.6
1	A	87	ILE	4.6
1	A	19	ARG	4.5
1	A	52	TRP	4.5
1	A	83	ALA	4.4
1	A	64	GLU	4.4
1	A	18	HIS	4.4
1	A	135	ASP	4.3

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Mol	Chain	Res	Type	RSRZ
1	A	26	THR	4.3
1	A	15	THR	4.3
1	A	56	TYR	4.3
1	A	60	LYS	4.2
1	A	76	LYS	4.2
1	A	103	LEU	4.2
1	A	2	ASP	4.2
1	A	94	GLN	4.2
1	A	119	TRP	4.1
1	A	48	ILE	4.1
1	A	145	ASP	4.0
1	A	6	ILE	4.0
1	A	108	LEU	4.0
1	A	8	ASN	3.9
1	A	81	ARG	3.9
1	A	134	ASP	3.9
1	A	113	LEU	3.9
1	A	3	SER	3.9
1	A	11	TYR	3.9
1	A	73	LEU	3.9
1	A	36	VAL	3.8
1	A	122	ARG	3.8
1	A	53	HIS	3.8
1	A	102	MET	3.8
1	A	101	ALA	3.8
1	A	63	PRO	3.7
1	A	114	SER	3.7
1	A	35	VAL	3.7
1	A	120	VAL	3.7
1	A	42	ASP	3.6
1	A	72	ARG	3.6
1	A	136	GLU	3.6
1	A	130	SER	3.6
1	A	51	GLY	3.6
1	A	133	GLY	3.5
1	A	85	ASN	3.5
1	A	22	GLN	3.5
1	A	97	GLY	3.5
1	A	38	VAL	3.4
1	A	140	ALA	3.4
1	A	139	THR	3.3
1	A	47	HIS	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	116	CYS	3.3
1	A	13	ASP	3.2
1	A	7	THR	3.2
1	A	93	SER	3.2
1	A	68	GLU	3.2
1	A	107	SER	3.2
1	A	71	HIS	3.2
1	A	118	LEU	3.1
1	A	77	GLN	3.1
1	A	109	ASP	3.1
1	A	16	GLU	3.1
1	A	44	MET	3.0
1	A	70	LYS	3.0
1	A	23	GLU	3.0
1	A	31	GLU	3.0
1	A	54	TYR	3.0
1	A	84	LEU	3.0
1	A	75	GLU	2.9
1	A	89	HIS	2.9
1	A	117	ARG	2.9
1	A	86	VAL	2.8
1	A	129	GLN	2.8
1	A	46	GLY	2.7
1	A	69	LEU	2.7
1	A	91	MET	2.7
1	A	106	ARG	2.7
1	A	66	LEU	2.7
1	A	14	PRO	2.7
1	A	141	GLY	2.6
1	A	58	ARG	2.6
1	A	41	SER	2.6
1	A	125	PHE	2.5
1	A	39	ARG	2.4
1	A	112	GLU	2.4
1	A	50	ASP	2.3
1	A	98	PRO	2.2
1	A	45	GLY	2.2
1	A	21	MET	2.1

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

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**
1	CME	A	90	10/11	0.78	0.23	14,21,38,41	0

6.3 Carbohydrates ⓘ

There are no monosaccharides 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.