Full wwPDB X-ray Structure Validation Report (i)

Feb 24, 2026 – 12:42 AM EST

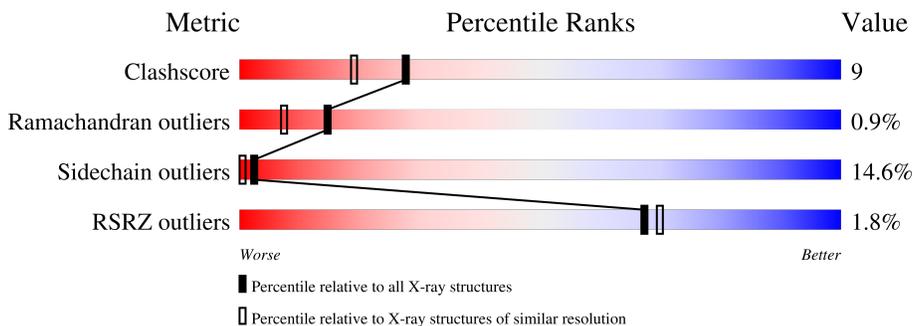|		
PDB ID	:	1BQ5 / pdb_00001bq5
Title	:	NITRITE REDUCTASE FROM ALCALIGENES XYLOSOXIDANS GIFU 1051
Authors	:	Inoue, T.; Gotowda, M.; Deligeer; Suzuki, S.; Kataoka, K.; Yamaguchi, K.; Watanabe, H.; Goho, M.; Yasushi, K.A.I.
Deposited on	:	1998-08-21
Resolution	:	2.05 Å(reported)

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 2.05 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	Percentile Ranks	Value
Clashscore		9
Ramachandran outliers		0.9%
Sidechain outliers		14.6%
RSRZ outliers		1.8%

Worse ... *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	180529	2229 (2.04-2.04)
Ramachandran outliers	177936	2217 (2.04-2.04)
Sidechain outliers	177891	2217 (2.04-2.04)
RSRZ outliers	164620	2096 (2.04-2.04)

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% 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	342	2% 66% 26% · · ·

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 2657 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 NITRITE REDUCTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	333	Total 2544	C 1620	N 439	O 474	S 11	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	231	ASP	ASN	conflict	UNP O68601

- Molecule 2 is COPPER (II) ION (CCD ID: CU) (formula: Cu).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total 2	Cu 2	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	111	Total 111	O 111	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 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: NITRITE REDUCTASE
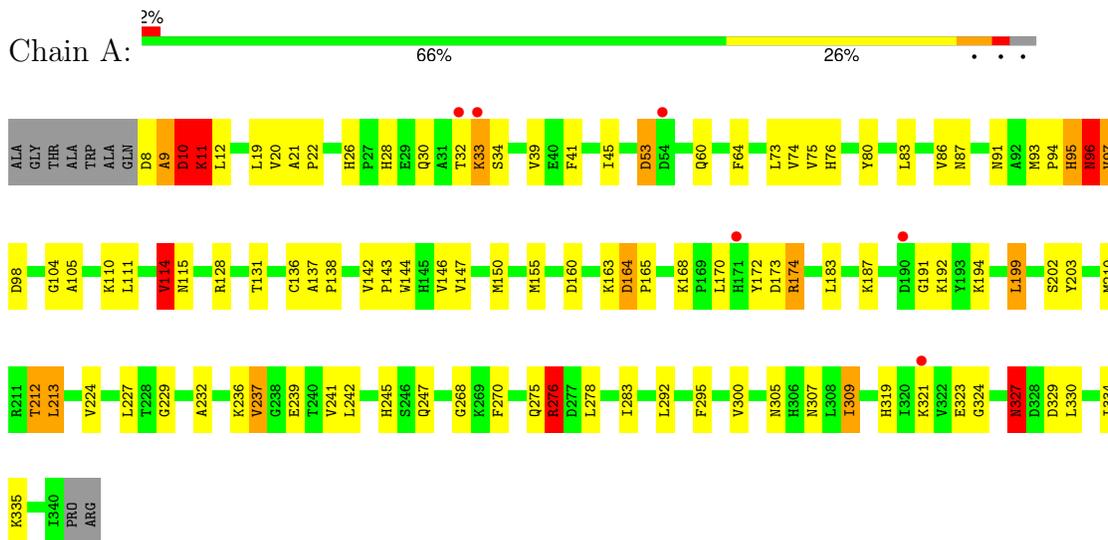
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, α, β, γ	106.56Å 106.56Å 63.58Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	10.00 – 2.05 10.00 – 2.06	Depositor EDS
% Data completeness (in resolution range)	77.1 (10.00-2.05) 83.4 (10.00-2.06)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.35 (at 2.07Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.180 , 0.226 0.170 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	25.9	Xtriage
Anisotropy	0.009	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 64.1	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.047 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	2657	wwPDB-VP
Average B, all atoms (Å^2)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.53% 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 ⓘ

5.1 Standard geometry ⓘ

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

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	0.63	0/2614	1.58	39/3561 (1.1%)

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
1	A	0	1

There are no bond length outliers.

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	276	ARG	CD-NE-CZ	12.24	141.54	124.40
1	A	41	PHE	CA-CB-CG	8.87	122.67	113.80
1	A	164	ASP	CA-CB-CG	8.70	121.30	112.60
1	A	114	VAL	N-CA-CB	-8.41	101.31	111.90
1	A	104	GLY	CA-C-N	8.01	136.84	121.54
1	A	104	GLY	C-N-CA	8.01	136.84	121.54
1	A	76	HIS	CA-CB-CG	-7.37	106.43	113.80
1	A	305	ASN	CA-CB-CG	6.79	119.39	112.60
1	A	114	VAL	CB-CA-C	6.78	119.81	110.99
1	A	10	ASP	CA-CB-CG	6.69	119.29	112.60
1	A	173	ASP	CA-CB-CG	-6.42	106.17	112.60
1	A	146	VAL	CA-C-O	6.40	128.16	121.05
1	A	236	LYS	CA-C-O	-6.38	113.65	121.11
1	A	191	GLY	N-CA-C	-6.25	105.75	116.01
1	A	309	ILE	CA-CB-CG2	6.21	121.05	110.50
1	A	95	HIS	CA-CB-CG	6.10	119.90	113.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	327	ASN	CA-CB-CG	5.98	118.58	112.60
1	A	128	ARG	CA-C-N	5.91	129.26	120.87
1	A	128	ARG	C-N-CA	5.91	129.26	120.87
1	A	307	ASN	N-CA-C	-5.90	99.53	108.67
1	A	203	TYR	N-CA-C	5.79	118.08	111.02
1	A	275	GLN	CA-C-O	-5.65	114.61	121.28
1	A	9	ALA	CA-C-N	5.54	132.13	121.54
1	A	9	ALA	C-N-CA	5.54	132.13	121.54
1	A	53	ASP	CA-CB-CG	5.50	118.10	112.60
1	A	150	MET	N-CA-C	5.35	117.83	108.52
1	A	295	PHE	CA-CB-CG	-5.30	108.50	113.80
1	A	97	VAL	CB-CA-C	-5.29	101.24	110.71
1	A	98	ASP	CA-CB-CG	5.29	117.89	112.60
1	A	96	ASN	CA-CB-CG	5.25	117.84	112.60
1	A	10	ASP	N-CA-C	-5.24	99.64	110.80
1	A	104	GLY	O-C-N	-5.21	116.59	122.64
1	A	64	PHE	CA-CB-CG	5.21	119.01	113.80
1	A	73	LEU	CA-C-N	-5.09	116.48	123.14
1	A	73	LEU	C-N-CA	-5.09	116.48	123.14
1	A	275	GLN	OE1-CD-NE2	-5.08	117.52	122.60
1	A	202	SER	CA-C-N	5.06	127.82	120.79
1	A	202	SER	C-N-CA	5.06	127.82	120.79
1	A	268	GLY	N-CA-C	5.03	122.30	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	212	THR	Mainchain

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	A	2544	0	2495	45	0
2	A	2	0	0	0	0
3	A	111	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	2657	0	2495	45	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 (45) 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:155:MET:HE1	1:A:242:LEU:HD21	1.44	1.00
1:A:53:ASP:HA	1:A:224:VAL:HG22	1.61	0.81
1:A:96:ASN:HD21	1:A:137:ALA:H	1.27	0.80
1:A:96:ASN:ND2	1:A:137:ALA:H	1.83	0.75
1:A:93:MET:HE2	1:A:144:TRP:HZ3	1.52	0.74
1:A:237:VAL:HG13	1:A:324:GLY:HA3	1.72	0.70
1:A:87:ASN:ND2	1:A:91:ASN:HD22	1.90	0.69
1:A:8:ASP:HB3	1:A:10:ASP:O	1.93	0.68
1:A:33:LYS:H	1:A:33:LYS:HE2	1.58	0.68
1:A:155:MET:HE2	1:A:270:PHE:CZ	2.29	0.68
1:A:10:ASP:O	1:A:11:LYS:HB2	1.94	0.67
1:A:155:MET:HE2	1:A:270:PHE:HZ	1.63	0.62
1:A:93:MET:HE2	1:A:144:TRP:CZ3	2.36	0.59
1:A:87:ASN:HD22	1:A:91:ASN:HD22	1.50	0.58
1:A:143:PRO:HB2	1:A:210:MET:HE1	1.86	0.57
1:A:96:ASN:HD21	1:A:137:ALA:N	2.01	0.56
1:A:131:THR:CG2	1:A:155:MET:HE3	2.37	0.55
1:A:96:ASN:C	1:A:96:ASN:HD22	2.15	0.55
1:A:105:ALA:HB1	1:A:110:LYS:HB2	1.90	0.54
1:A:60:GLN:HB3	1:A:199:LEU:HD23	1.90	0.52
1:A:229:GLY:H	1:A:319:HIS:HD2	1.57	0.52
1:A:39:VAL:HG21	1:A:75:VAL:HG12	1.92	0.51
1:A:10:ASP:O	1:A:11:LYS:CB	2.59	0.51
1:A:45:ILE:HG21	1:A:95:HIS:CD2	2.46	0.50
1:A:245:HIS:HB3	1:A:283:ILE:CD1	2.42	0.50
1:A:327:ASN:HD21	1:A:329:ASP:HB3	1.77	0.50
1:A:245:HIS:HB3	1:A:283:ILE:HD13	1.95	0.49
1:A:327:ASN:HD22	1:A:327:ASN:C	2.20	0.49
1:A:174:ARG:NE	1:A:239:GLU:OE2	2.45	0.49
1:A:45:ILE:HD13	1:A:95:HIS:HB2	1.96	0.48
1:A:327:ASN:HD22	1:A:329:ASP:H	1.60	0.47
1:A:9:ALA:HB1	1:A:80:TYR:CE2	2.50	0.47
1:A:28:HIS:HE1	1:A:172:TYR:OH	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:232:ALA:CB	1:A:321:LYS:HD3	2.45	0.46
1:A:276:ARG:HH11	1:A:276:ARG:HG2	1.82	0.45
1:A:87:ASN:HB2	1:A:114:VAL:HG13	1.97	0.45
1:A:136:CYS:SG	1:A:138:PRO:HD3	2.57	0.45
1:A:300:VAL:HG13	1:A:321:LYS:HD2	2.00	0.44
1:A:26:HIS:O	1:A:28:HIS:HD2	2.00	0.44
1:A:94:PRO:HB3	1:A:115:ASN:HD22	1.86	0.41
1:A:9:ALA:HB1	1:A:80:TYR:CZ	2.55	0.41
1:A:174:ARG:HG3	1:A:241:VAL:HG22	2.01	0.41
1:A:21:ALA:HA	1:A:22:PRO:HD3	1.96	0.41
1:A:164:ASP:HB2	1:A:165:PRO:CD	2.51	0.40
1:A:212:THR:O	1:A:213:LEU:HB2	2.22	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	331/342 (97%)	315 (95%)	13 (4%)	3 (1%)	14	7

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	11	LYS
1	A	10	ASP
1	A	30	GLN

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	267/273 (98%)	228 (85%)	39 (15%)	2	0

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	11	LYS
1	A	12	LEU
1	A	19	LEU
1	A	20	VAL
1	A	32	THR
1	A	33	LYS
1	A	34	SER
1	A	74	VAL
1	A	83	LEU
1	A	86	VAL
1	A	96	ASN
1	A	97	VAL
1	A	111	LEU
1	A	114	VAL
1	A	142	VAL
1	A	147	VAL
1	A	160	ASP
1	A	163	LYS
1	A	168	LYS
1	A	170	LEU
1	A	174	ARG
1	A	183	LEU
1	A	187	LYS
1	A	192	LYS
1	A	194	LYS
1	A	199	LEU
1	A	213	LEU
1	A	227	LEU
1	A	237	VAL
1	A	247	GLN
1	A	276	ARG
1	A	278	LEU
1	A	292	LEU
1	A	309	ILE

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Mol	Chain	Res	Type
1	A	323	GLU
1	A	327	ASN
1	A	330	LEU
1	A	334	ILE
1	A	335	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	24	GLN
1	A	28	HIS
1	A	60	GLN
1	A	87	ASN
1	A	96	ASN
1	A	113	ASN
1	A	115	ASN
1	A	255	HIS
1	A	260	HIS
1	A	319	HIS
1	A	327	ASN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	333/342 (97%)	-0.57	6 (1%)	67	70	15, 29, 49, 84	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	54	ASP	2.5
1	A	190	ASP	2.4
1	A	171	HIS	2.3
1	A	32	THR	2.2
1	A	33	LYS	2.2
1	A	321	LYS	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 oligosaccharides in this entry.

6.4　Ligands ⓘ

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
2	CU	A	344	1/1	0.99	0.02	26,26,26,26	0
2	CU	A	343	1/1	1.00	0.02	27,27,27,27	0

6.5 Other polymers ⓘ

There are no such residues in this entry.