



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 30, 2017 – 06:52 PM EDT

PDB ID : 3QYH
Title : Crystal Structure of Co-type Nitrile Hydratase beta-H71L from *Pseudomonas putida*.
Authors : Brodtkin, H.R.; Novak, W.R.P.; Ringe, D.; Petsko, G.A.
Deposited on : unknown
Resolution : 2.00 Å(reported)

This is a Full wwPDB X-ray Structure 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/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : **FAILED**
Mogul : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20030345
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20030345

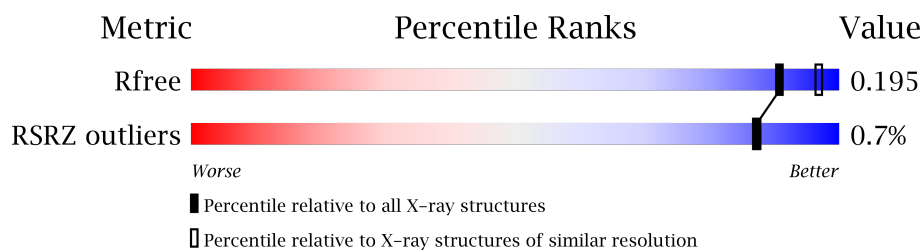
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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}	100719	6609 (2.00-2.00)
RSRZ outliers	101464	6696 (2.00-2.00)

MolProbity failed to run properly - the sequence quality summary graphics cannot be shown.

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 14390 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 Co-type Nitrile Hydratase alpha subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	201	Total	C	N	O	S	0	0	0
			1547	985	264	290	8			
1	C	201	Total	C	N	O	S	0	0	0
			1539	980	263	288	8			
1	E	200	Total	C	N	O	S	0	0	0
			1530	975	260	287	8			
1	G	200	Total	C	N	O	S	0	0	0
			1526	973	260	285	8			

- Molecule 2 is a protein called Co-type Nitrile Hydratase beta subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	219	Total	C	N	O	S	0	2	0
			1711	1084	304	319	4			
2	D	219	Total	C	N	O	S	0	3	0
			1725	1092	306	323	4			
2	F	219	Total	C	N	O	S	0	2	0
			1717	1087	305	321	4			
2	H	219	Total	C	N	O	S	0	2	0
			1709	1083	301	321	4			

- Molecule 3 is COBALT (III) ION (three-letter code: 3CO) (formula: Co).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	1	Total	Co	0	0
			1	1		
3	A	1	Total	Co	0	0
			1	1		
3	C	1	Total	Co	0	0
			1	1		
3	E	1	Total	Co	0	0
			1	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	181	Total 181	O 181	0	0
4	B	185	Total 185	O 185	0	0
4	C	150	Total 150	O 150	0	0
4	D	207	Total 207	O 207	0	0
4	E	151	Total 151	O 151	0	0
4	F	183	Total 183	O 183	0	0
4	G	160	Total 160	O 160	0	0
4	H	165	Total 165	O 165	0	0

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3 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	81.98Å 137.66Å 85.45Å 90.00° 92.45° 90.00°	Depositor
Resolution (Å)	45.40 – 2.00 45.40 – 2.00	Depositor EDS
% Data completeness (in resolution range)	98.2 (45.40-2.00) 98.2 (45.40-2.00)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.08 (at 2.00Å)	Xtriage
Refinement program	PHENIX (phenix.refine)	Depositor
R, R_{free}	0.168 , 0.202 0.160 , 0.195	Depositor DCC
R_{free} test set	6284 reflections (5.02%)	DCC
Wilson B-factor (Å ²)	21.0	Xtriage
Anisotropy	0.455	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 51.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.008 for l,k,-h 0.026 for h,-k,-l 0.076 for l,-k,h	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	14390	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.34% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

4 Model quality [i](#)

4.1 Standard geometry [i](#)

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4.2 Too-close contacts [i](#)

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4.3 Torsion angles [i](#)

4.3.1 Protein backbone [i](#)

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4.3.2 Protein sidechains [i](#)

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4.3.3 RNA [i](#)

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4.4 Non-standard residues in protein, DNA, RNA chains [i](#)

8 non-standard protein/DNA/RNA residues are 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	CSD	A	115	1,3	4,7,8	1.16	0	2,8,10	2.03	1 (50%)
1	CSD	A	117	1,3	4,7,8	0.93	0	2,8,10	1.88	1 (50%)
1	CSD	C	115	1,3	4,7,8	1.37	0	2,8,10	2.37	2 (100%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	CSD	C	117	1,3	4,7,8	0.94	0	2,8,10	2.09	1 (50%)
1	CSD	E	115	1,3	4,7,8	1.38	0	2,8,10	1.97	1 (50%)
1	CSD	E	117	1,3	4,7,8	1.05	0	2,8,10	1.24	0
1	CSD	G	115	1,3	4,7,8	1.02	0	2,8,10	2.25	1 (50%)
1	CSD	G	117	1,3	4,7,8	0.96	0	2,8,10	1.16	0

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	CSD	A	115	1,3	-	1/2/6/8	0/0/0/0
1	CSD	A	117	1,3	-	1/2/6/8	0/0/0/0
1	CSD	C	115	1,3	-	1/2/6/8	0/0/0/0
1	CSD	C	117	1,3	-	1/2/6/8	0/0/0/0
1	CSD	E	115	1,3	-	1/2/6/8	0/0/0/0
1	CSD	E	117	1,3	-	1/2/6/8	0/0/0/0
1	CSD	G	115	1,3	-	1/2/6/8	0/0/0/0
1	CSD	G	117	1,3	-	1/2/6/8	0/0/0/0

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	115	CSD	O-C-CA	-2.82	117.22	125.02
1	E	115	CSD	O-C-CA	-2.76	117.39	125.02
1	G	115	CSD	O-C-CA	-2.58	117.90	125.02
1	C	115	CSD	O-C-CA	-2.56	117.95	125.02
1	C	117	CSD	O-C-CA	-2.38	118.44	125.02
1	C	115	CSD	OD1-SG-CB	-2.16	101.55	105.61
1	A	117	CSD	O-C-CA	-2.14	119.10	125.02

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	C	117	CSD	CA-CB-SG-OD1
1	A	115	CSD	CA-CB-SG-OD1
1	C	115	CSD	CA-CB-SG-OD1

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Mol	Chain	Res	Type	Atoms
1	E	115	CSD	CA-CB-SG-OD1
1	E	117	CSD	CA-CB-SG-OD1
1	G	115	CSD	CA-CB-SG-OD1
1	G	117	CSD	CA-CB-SG-OD1
1	A	117	CSD	CA-CB-SG-OD1

There are no ring outliers.

No monomer is involved in short contacts.

4.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

4.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 4 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.

4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

5 Fit of model and data ⓘ

5.1 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	199/226 (88%)	-0.43	0 100 100	10, 18, 32, 43	0
1	C	199/226 (88%)	-0.43	2 (1%) 82 82	10, 19, 35, 51	0
1	E	198/226 (87%)	-0.57	1 (0%) 90 90	10, 19, 33, 51	1 (0%)
1	G	198/226 (87%)	-0.47	1 (0%) 90 90	10, 19, 37, 54	0
2	B	219/219 (100%)	-0.38	1 (0%) 90 90	10, 18, 39, 59	0
2	D	219/219 (100%)	-0.42	1 (0%) 90 90	11, 18, 34, 58	0
2	F	219/219 (100%)	-0.42	2 (0%) 84 83	11, 19, 35, 58	0
2	H	219/219 (100%)	-0.41	3 (1%) 75 75	13, 19, 45, 58	0
All	All	1670/1780 (93%)	-0.44	11 (0%) 87 87	10, 19, 36, 59	1 (0%)

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	F	203	PRO	3.1
2	H	203	PRO	2.7
2	H	201	SER	2.6
1	G	183	ALA	2.5
2	H	200	ALA	2.5
2	F	200	ALA	2.5
2	D	203	PRO	2.4
1	E	183	ALA	2.2
1	C	179	ALA	2.2
2	B	204	LYS	2.0
1	C	23	LEU	2.0

5.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
1	CSD	C	117	8/9	0.99	0.10	-	12,13,20,34	0
1	CSD	E	117	8/9	0.98	0.09	-	11,13,15,26	0
1	CSD	G	117	8/9	0.99	0.09	-	12,15,23,31	0
1	CSD	C	115	8/9	0.99	0.11	-	10,12,15,15	0
1	CSD	A	115	8/9	0.99	0.11	-	7,11,12,13	0
1	CSD	G	115	8/9	0.99	0.08	-	11,13,18,19	0
1	CSD	E	115	8/9	0.99	0.11	-	7,10,13,18	0
1	CSD	A	117	8/9	0.99	0.09	-	8,11,26,27	0

5.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.4 Ligands [i](#)

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
3	3CO	G	212	1/1	1.00	0.10	-	12,12,12,12	0
3	3CO	A	212	1/1	1.00	0.10	-	11,11,11,11	0
3	3CO	C	212	1/1	1.00	0.09	-	12,12,12,12	0
3	3CO	E	212	1/1	0.99	0.10	-	11,11,11,11	0

5.5 Other polymers [i](#)

There are no such residues in this entry.