Full wwPDB X-ray Structure Validation Report ⓘ

Jun 24, 2025 – 03:26 pm BST

PDB ID	:	6H5C / pdb_00006h5c
Title	:	Crystal structure of DHQ1 from Salmonella typhi covalently modified by ligand 1
Authors	:	Sanz-Gaitero, M.; Maneiro, M.; Lence, E.; Otero, J.M.; Thompson, P.; Hawkins, A.R.; Gonzalez-Bello, C.; van Raaij, M.J.
Deposited on	:	2018-07-24
Resolution	:	1.14 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
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

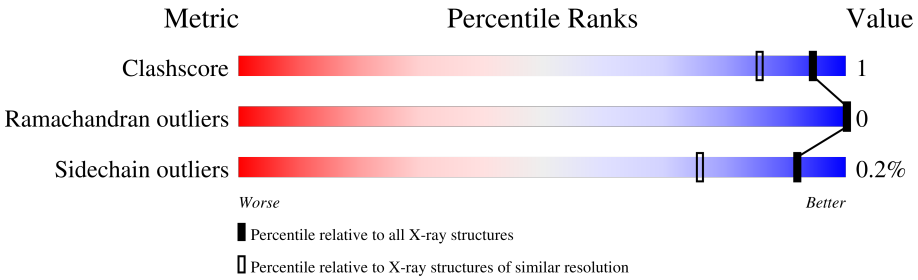
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	FAILED
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

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 1.14 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	180529	1248 (1.16-1.12)
Ramachandran outliers	177936	1224 (1.16-1.12)
Sidechain outliers	177891	1224 (1.16-1.12)

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%

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	252	97%
1	B	252	98%

2 Entry composition

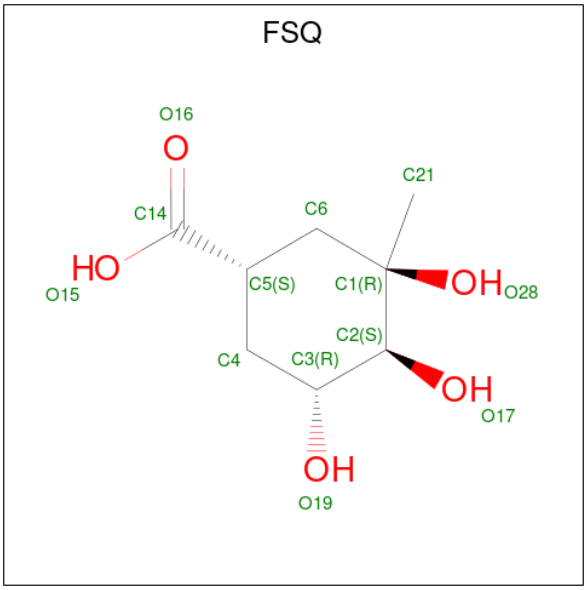
There are 3 unique types of molecules in this entry. The entry contains 4696 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 3-dehydroquinate dehydratase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	252	Total	C	N	O	S	0	11	0
			1992	1269	341	366	16			
1	B	252	Total	C	N	O	S	0	8	0
			1975	1254	337	367	17			

- Molecule 2 is (1 {S},3 {R},4 {S},5 {R})-3-methyl-3,4,5-tris(hydroxyl)cyclohexane-1-carboxylic Acid (CCD ID: FSQ) (formula: $C_8H_{14}O_5$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O		0	0
			13	8	5			
2	B	1	Total	C	O		0	0
			13	8	5			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	358	Total O 358 358	0	0
3	B	345	Total O 345 345	0	0

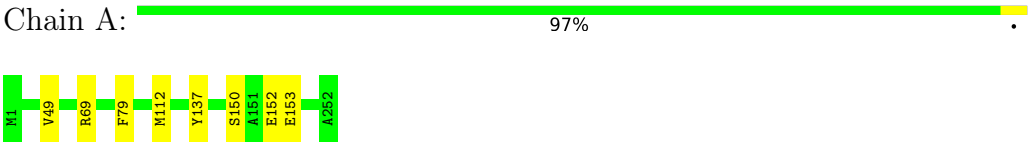
3 Residue-property plots (i)

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.

Note EDS failed to run properly.

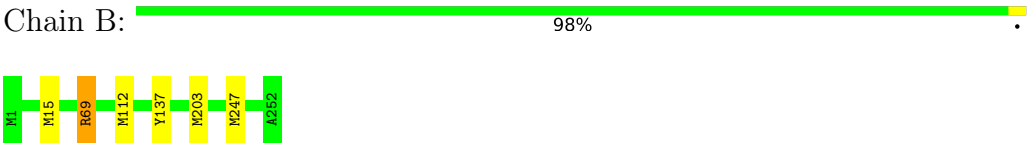
- Molecule 1: 3-dehydroquinate dehydratase

Chain A:



- Molecule 1: 3-dehydroquinate dehydratase

Chain B:



4 Data and refinement statistics (i)

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	42.88Å 43.84Å 73.26Å 92.26° 93.05° 119.25°	Depositor
Resolution (Å)	38.14 – 1.14	Depositor
% Data completeness (in resolution range)	88.6 (38.14-1.14)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.34 (at 1.14Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.151 , 0.182	Depositor
Wilson B-factor (Å^2)	13.5	Xtriage
Anisotropy	0.314	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	0.023 for -k,-h,-l	Xtriage
Total number of atoms	4696	wwPDB-VP
Average B, all atoms (Å^2)	15.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.25% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: FSQ

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	0.66	0/2058	0.80	0/2784
1	B	0.66	0/2031	0.78	0/2746
All	All	0.66	0/4089	0.79	0/5530

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

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	1992	0	2073	6	0
1	B	1975	0	2041	4	0
2	A	13	0	0	0	0
2	B	13	0	0	1	0
3	A	358	0	0	0	0
3	B	345	0	0	0	0
All	All	4696	0	4114	10	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 1.

All (10) 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:B:15:MET:HE1	1:B:247[A]:MET:HE2	1.70	0.72
1:A:150:SER:OG	1:A:152:GLU:HG2	1.98	0.64
1:B:112[B]:MET:HG2	1:B:137:TYR:HB2	1.91	0.53
1:A:112[B]:MET:HG2	1:A:137:TYR:HB2	1.95	0.48
1:B:69:ARG:HD3	1:B:69:ARG:HA	1.73	0.45
1:A:152:GLU:HG2	1:A:153:GLU:N	2.34	0.43
1:A:49[B]:VAL:HG21	1:A:79:PHE:CE2	2.54	0.43
1:A:152:GLU:CG	1:A:153:GLU:N	2.82	0.42
1:B:203[A]:MET:SD	2:B:301:FSQ:O16	2.79	0.41
1:A:69:ARG:HD3	1:A:69:ARG:HA	1.92	0.40

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	
1	A	261/252 (104%)	255 (98%)	6 (2%)	0	100	100
1	B	258/252 (102%)	252 (98%)	6 (2%)	0	100	100
All	All	519/504 (103%)	507 (98%)	12 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	
1	A	220/209 (105%)	220 (100%)	0	100	100
1	B	217/209 (104%)	216 (100%)	1 (0%)	86	67
All	All	437/418 (104%)	436 (100%)	1 (0%)	92	76

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	69	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	146	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

2 ligands 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	$\#\|Z\|>2$
2	FSQ	A	301	1	13,13,13	0.68	0	17,20,20	1.79	4 (23%)
2	FSQ	B	301	1	13,13,13	0.84	0	17,20,20	1.76	5 (29%)

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
2	FSQ	A	301	1	-	0/4/23/23	0/1/1/1
2	FSQ	B	301	1	-	0/4/23/23	0/1/1/1

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	301	FSQ	C21-C1-C6	-4.14	102.77	110.78
2	B	301	FSQ	C21-C1-C6	-3.31	104.38	110.78
2	B	301	FSQ	O15-C14-C5	3.04	122.16	114.21
2	A	301	FSQ	C5-C4-C3	-2.70	108.14	112.50
2	A	301	FSQ	O28-C1-C6	2.44	113.44	107.96
2	B	301	FSQ	O28-C1-C21	2.18	112.90	108.13
2	B	301	FSQ	C21-C1-C2	-2.10	106.74	111.30
2	A	301	FSQ	O15-C14-C5	2.05	119.58	114.21
2	B	301	FSQ	O15-C14-O16	-2.04	119.45	124.09

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	FSQ	1	0

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

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

6.4 Ligands

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers

EDS failed to run properly - this section is therefore empty.