



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 03:57 AM UTC

PDB ID : 5D3O / pdb_00005d3o
Title : Crystal structure of full length human glutaminase C expressed in E.coli
Authors : Huang, Q.
Deposited on : 2015-08-06
Resolution : 2.79 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 Phenix2.0
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

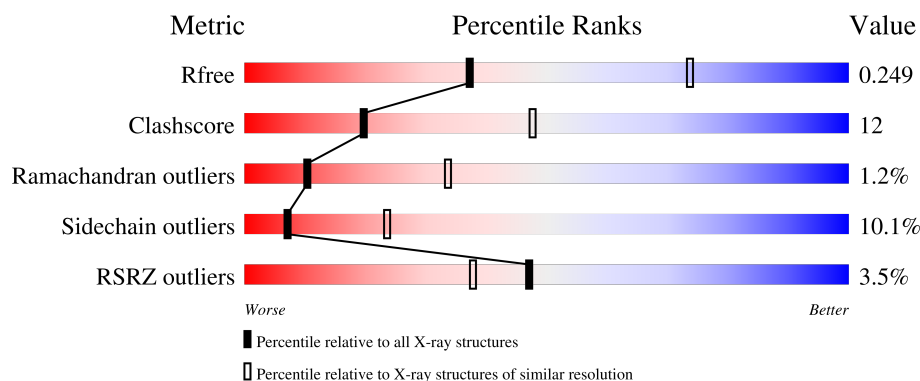
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.79 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}	180053	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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 $\leq 5\%$. 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	527	2% 52%18%•26%
1	B	527	3% 51%19%•26%

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 6082 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 Glutaminase kidney isoform, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	391	Total	C	N	O	S	2	0	0
			3052	1945	514	565	28			
1	B	389	Total	C	N	O	S	2	0	0
			3030	1933	510	559	28			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	273	ALA	VAL	conflict	UNP O94925
B	273	ALA	VAL	conflict	UNP O94925

I447	L453	S454	V458	M470	Y471	D472	L483	I493	V497	P498	N499	V500	M501	G502	M503	M504	G505	M506	S507	P508	P509	K512	M513	I520	H521	F522	D525	S528	L529	N534	Y535	L538	A542	K543	K544	L545	E550	G551	GLY	ASP	GLN	ARG	HIS	SER	PHE	
GLY	PRO	LEU	ASP	TYR	GLU	SER	LEU	ALA	LYS	GLU	THR	VAL	TRP	LYS	LYS	VAL	SER	PRO	GLU	SER	ASN	GLU	ASP	ILE	SER	THR	THR	VAL	VAL	TYR	ARG	MET	GLU	SER	LEU	GLY	GLU	LYS	SER							

4 Data and refinement statistics

Property	Value	Source
Space group	P 2 ₁ 2 ₁ 2 ₁	Depositor
Cell constants a, b, c, α , β , γ	51.61Å 139.37Å 179.79Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.77 – 2.79 37.77 – 2.79	Depositor EDS
% Data completeness (in resolution range)	87.7 (37.77-2.79) 85.6 (37.77-2.79)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.13 (at 2.81Å)	Xtriage
Refinement program	PHENIX 1.7_650	Depositor
R, R_{free}	0.214 , 0.266 0.202 , 0.249	Depositor DCC
R_{free} test set	1662 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	62.4	Xtriage
Anisotropy	0.640	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 51.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6082	wwPDB-VP
Average B, all atoms (Å ²)	86.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.02% 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.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.56	0/3117	0.88	4/4200 (0.1%)
1	B	0.56	0/3095	0.86	4/4171 (0.1%)
All	All	0.56	0/6212	0.87	8/8371 (0.1%)

There are no bond length outliers.

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	507	SER	CA-C-N	7.20	127.80	120.38
1	B	507	SER	C-N-CA	7.20	127.80	120.38
1	A	507	SER	CA-C-N	7.12	127.71	120.38
1	A	507	SER	C-N-CA	7.12	127.71	120.38
1	B	508	PRO	N-CA-C	6.06	118.09	110.70

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	3052	0	3013	70	0
1	B	3030	0	2993	70	0
All	All	6082	0	6006	139	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 12.

The worst 5 of 139 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:158:LYS:HB3	1:A:199:MET:HE3	1.43	1.00
1:A:461:THR:HG22	1:A:465:MET:HE2	1.49	0.93
1:B:145:GLU:HG3	1:B:206:LYS:HG3	1.54	0.89
1:A:228:ASP:OD2	1:A:231:SER:HB3	1.75	0.86
1:B:177:ASP:OD1	1:B:179:ARG:HD3	1.81	0.80

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	381/527 (72%)	353 (93%)	23 (6%)	5 (1%)	9	31
1	B	379/527 (72%)	343 (90%)	32 (8%)	4 (1%)	11	36
All	All	760/1054 (72%)	696 (92%)	55 (7%)	9 (1%)	10	34

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	389	SER
1	B	260	LYS
1	A	327	PHE
1	B	327	PHE
1	B	550	GLU

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	337/451 (75%)	302 (90%)	35 (10%)	7	22
1	B	334/451 (74%)	301 (90%)	33 (10%)	7	24
All	All	671/902 (74%)	603 (90%)	68 (10%)	7	23

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	364	MET
1	B	386	GLU
1	B	538	LEU
1	A	331	ASP
1	A	330	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	441	ASN
1	B	534	ASN
1	B	276	GLN
1	B	335	HIS
1	B	352	GLN

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 [i](#)

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	391/527 (74%)	0.39	12 (3%)	51	41	63, 81, 122, 142	2 (0%)
1	B	389/527 (73%)	0.39	15 (3%)	43	34	64, 81, 124, 160	2 (0%)
All	All	780/1054 (74%)	0.39	27 (3%)	47	38	63, 81, 124, 160	4 (0%)

The worst 5 of 27 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	262	SER	5.3
1	A	261	PHE	4.8
1	A	204	LEU	4.2
1	B	150	TYR	3.5
1	A	262	SER	3.5

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.