



# wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 28, 2024 – 05:33 pm BST

PDB ID : 2XQ8  
Title : Pentameric ligand gated ion channel GLIC in complex with zinc ion (Zn<sup>2+</sup>)  
Authors : Hilf, R.J.C.; Bertozzi, C.; Zimmermann, I.; Reiter, A.; Trauner, D.; Dutzler, R.  
Deposited on : 2010-09-01  
Resolution : 3.60 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](mailto: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>.

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

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.36.2  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

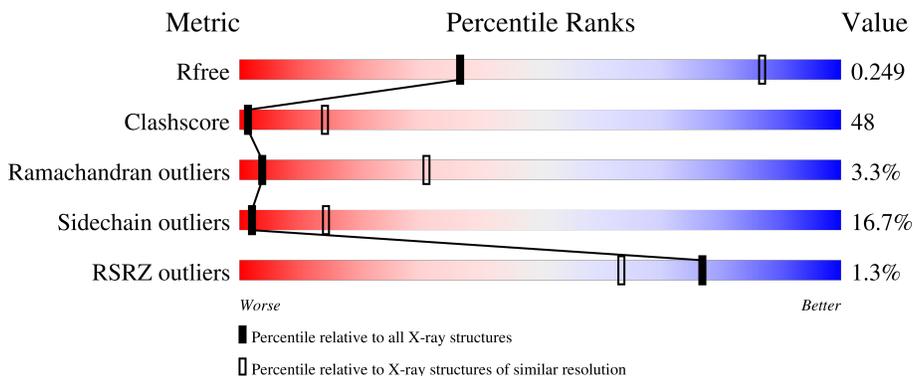
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.60 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))
$R_{free}$	130704	1257 (3.70-3.50)
Clashscore	141614	1353 (3.70-3.50)
Ramachandran outliers	138981	1307 (3.70-3.50)
Sidechain outliers	138945	1307 (3.70-3.50)
RSRZ outliers	127900	1161 (3.70-3.50)

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  $\geq 3$ , 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	317	 2% 32% 52% 13% ..
1	B	317	 2% 31% 54% 12% ..
1	C	317	 0% 33% 52% 12% ..
1	D	317	 0% 32% 52% 13% ..
1	E	317	 2% 33% 51% 13% ..

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 12653 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 GLR4197 PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	310	2530	1667	404	455	4	0	1	0
1	B	310	2530	1667	404	455	4	0	1	0
1	C	310	2530	1667	404	455	4	0	1	0
1	D	310	2530	1667	404	455	4	0	1	0
1	E	310	2530	1667	404	455	4	0	1	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	C	2	Total	Zn	0	0
			2	2		
2	D	1	Total	Zn	0	0
			1	1		

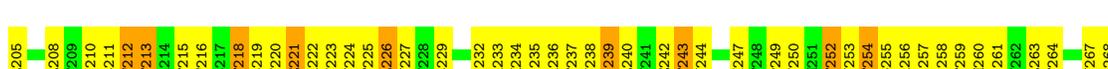




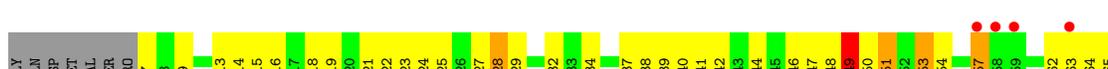
• Molecule 1: GLR4197 PROTEIN



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• Molecule 1: GLR4197 PROTEIN



V269	I270	E271	V274	Q275	H276	Y277	L278	K279	V280	Q283	P284	A285	R286	A287	A288	S289	I290	I291	R292	R295	I296	A297	F298	P299	V300	V301	F302	L303	L304	A305	I308	L309	F313	F314	G315	F316																			
M204	L205	L208	F209	I210	S211	W212	T213	F215	W216	S217	T218	S219	Y220	E221	A222	N223	V224	T225	L226	V227	V228	I232	A233	H234	I235	A236	F237	N238	I239	L240	T243	N244	K247	T248	P249	Y250	M251	T252	Y253	T254	G255	A256	I257	F258	M260	I261	Y262	L263	F264	Y265	F266	V267	A268		
R132	S133	V134	D135	T136	R137	W138	I139	V140	L141	A142	V143	K147	V148	G149	N82	A83	K150	R84	D85	A86	D87	V88	F155	L156	T157	L161	E162	S163	F164	T165	P170	A171	N172	L175	E176	D177	L178	L179	E180	L183	L187	R188	I189	S190	Y193	F194	S195	Y196	I197	P198	N199	I200	L201	L202	P203
E66	P67	E68	A69	I70	W71	I72	P73	R76	F77	V78	W79	V80	E81	N82	A83	R84	D85	A86	D87	V88	F89	V89	S92	V93	S94	P95	D96	G97	T98	V99	Q100	Y101	L102	E103	R104	F105	R108	V109	L110	S111	P112	F115	R116	R117	Y118	P119	S122	Q123	T124	L125	Y128	L129	I130	V131	

## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	183.31Å 128.31Å 164.37Å 90.00° 104.04° 90.00°	Depositor
Resolution (Å)	40.20 – 3.60 40.20 – 3.60	Depositor EDS
% Data completeness (in resolution range)	99.6 (40.20-3.60) 99.7 (40.20-3.60)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.48 (at 3.57Å)	Xtrriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, $R_{free}$	0.238 , 0.248 0.238 , 0.249	Depositor DCC
$R_{free}$ test set	2172 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	94.3	Xtrriage
Anisotropy	0.318	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 86.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.45$ , $\langle L^2 \rangle = 0.28$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.88	EDS
Total number of atoms	12653	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	108.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.86% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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](#)

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

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	0.53	0/2598	0.73	3/3547 (0.1%)
1	B	0.53	0/2598	0.75	3/3547 (0.1%)
1	C	0.54	0/2598	0.74	3/3547 (0.1%)
1	D	0.55	0/2598	0.75	3/3547 (0.1%)
1	E	0.55	0/2598	0.74	3/3547 (0.1%)
All	All	0.54	0/12990	0.74	15/17735 (0.1%)

There are no bond length outliers.

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	179	LEU	CA-CB-CG	5.96	129.01	115.30
1	D	179	LEU	CA-CB-CG	5.96	129.01	115.30
1	E	179	LEU	CA-CB-CG	5.95	128.99	115.30
1	A	179	LEU	CA-CB-CG	5.95	128.99	115.30
1	C	179	LEU	CA-CB-CG	5.95	128.98	115.30

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	2530	0	2542	281	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	2530	0	2542	278	0
1	C	2530	0	2542	256	0
1	D	2530	0	2542	283	0
1	E	2530	0	2542	255	0
2	C	2	0	0	0	0
2	D	1	0	0	0	0
All	All	12653	0	12710	1219	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 48.

The worst 5 of 1219 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:76:ARG:NH2	1:B:130:ILE:HD12	1.66	1.09
1:D:76:ARG:NH2	1:D:130:ILE:HD12	1.68	1.09
1:D:210:ILE:HG23	1:E:269:VAL:HG11	1.31	1.06
1:E:76:ARG:NH2	1:E:130:ILE:HD12	1.70	1.06
1:A:76:ARG:NH2	1:A:130:ILE:HD12	1.71	1.05

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	309/317 (98%)	250 (81%)	49 (16%)	10 (3%)	4	31
1	B	309/317 (98%)	245 (79%)	54 (18%)	10 (3%)	4	31
1	C	309/317 (98%)	250 (81%)	50 (16%)	9 (3%)	4	33
1	D	309/317 (98%)	248 (80%)	50 (16%)	11 (4%)	3	29
1	E	309/317 (98%)	248 (80%)	50 (16%)	11 (4%)	3	29

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	1545/1585 (98%)	1241 (80%)	253 (16%)	51 (3%)	4	31

5 of 51 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	150	LYS
1	A	194	PHE
1	A	275	GLN
1	B	148	VAL
1	B	150	LYS

### 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	279/284 (98%)	230 (82%)	49 (18%)	2	12
1	B	279/284 (98%)	232 (83%)	47 (17%)	2	14
1	C	279/284 (98%)	233 (84%)	46 (16%)	2	15
1	D	279/284 (98%)	232 (83%)	47 (17%)	2	14
1	E	279/284 (98%)	231 (83%)	48 (17%)	2	13
All	All	1395/1420 (98%)	1158 (83%)	237 (17%)	2	14

5 of 237 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	130	ILE
1	E	212	TRP
1	D	28	SER
1	E	190	SER
1	E	314	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 30 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	151	ASN
1	E	244	ASN
1	C	283	GLN
1	E	283	GLN
1	E	39	ASN

### 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 monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 3 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 [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	310/317 (97%)	-0.26	4 (1%) 77 63	63, 102, 160, 213	0
1	B	310/317 (97%)	-0.26	5 (1%) 72 57	66, 102, 160, 212	0
1	C	310/317 (97%)	-0.33	3 (0%) 82 70	66, 102, 160, 213	0
1	D	310/317 (97%)	-0.23	3 (0%) 82 70	64, 102, 160, 213	0
1	E	310/317 (97%)	-0.23	5 (1%) 72 57	65, 102, 160, 213	0
All	All	1550/1585 (97%)	-0.26	20 (1%) 77 63	63, 102, 161, 213	0

The worst 5 of 20 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	316	PHE	4.5
1	E	316	PHE	4.3
1	E	63	LYS	3.3
1	E	59	GLY	3.2
1	A	59	GLY	2.8

### 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 monosaccharides in this entry.

### 6.4 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. The B-factors column lists the minimum,

median, 95<sup>th</sup> 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( $\text{\AA}^2$ )	Q<0.9
2	ZN	D	1317	1/1	0.74	0.23	176,176,176,176	0
2	ZN	C	1318	1/1	0.82	0.22	186,186,186,186	0
2	ZN	C	1317	1/1	0.90	0.28	130,130,130,130	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.