



wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 12, 2023 – 08:50 PM EDT

PDB ID : 4NPQ
Title : The resting-state conformation of the GLIC ligand-gated ion channel
Authors : Sauguet, L.; Shahsavari, A.; Poitevin, F.; Huon, C.; Menny, A.; Nemezc, A.;
Haouz, A.; Changeux, J.P.; Corringer, P.J.; Delarue, M.
Deposited on : 2013-11-22
Resolution : 4.35 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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.35.1
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) : 2.35.1

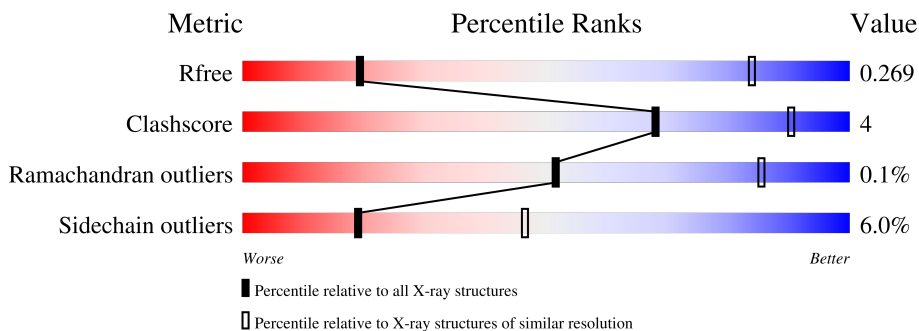
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.35 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	1018 (4.84-3.80)
Clashscore	141614	1081 (4.84-3.80)
Ramachandran outliers	138981	1033 (4.84-3.80)
Sidechain outliers	138945	1016 (4.84-3.80)

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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	318	85% 12% ..
1	B	318	84% 14% ..
1	C	318	84% 13% ..
1	D	318	83% 14% .
1	E	318	84% 13% ..
1	F	318	85% 12% ..
1	G	318	84% 13% ..

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Mol	Chain	Length	Quality of chain
1	H	318	 87% 10% .
1	I	318	 86% 10% .
1	J	318	 86% 11% ..
1	K	318	 84% 12% ..
1	L	318	 82% 13% 5%
1	M	318	 85% 12% .
1	N	318	 84% 13% ..
1	O	318	 82% 14% ..
1	P	318	 87% 10% .
1	Q	318	 83% 14% ..
1	R	318	 84% 13% .
1	S	318	 86% 10% .
1	T	318	 89% 9% .

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 45859 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 Proton-gated ion channel.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	311	Total 2322	C 1533	N 355	O 430	S 4	0	0	0
1	B	311	Total 2334	C 1540	N 361	O 429	S 4	0	0	0
1	C	311	Total 2341	C 1551	N 359	O 427	S 4	0	0	0
1	D	311	Total 2330	C 1543	N 353	O 431	S 3	0	0	0
1	E	311	Total 2355	C 1559	N 359	O 433	S 4	0	0	0
1	F	311	Total 2334	C 1546	N 361	O 423	S 4	0	0	0
1	G	311	Total 2325	C 1538	N 361	O 422	S 4	0	0	0
1	H	309	Total 2199	C 1440	N 350	O 406	S 3	0	0	0
1	I	307	Total 2145	C 1408	N 344	O 389	S 4	0	0	0
1	J	311	Total 2257	C 1485	N 362	O 407	S 3	0	0	0
1	K	309	Total 2312	C 1530	N 360	O 418	S 4	0	0	0
1	L	302	Total 2274	C 1505	N 344	O 421	S 4	0	0	0
1	M	308	Total 2271	C 1501	N 353	O 413	S 4	0	0	0
1	N	311	Total 2359	C 1564	N 364	O 427	S 4	0	0	0
1	O	311	Total 2366	C 1565	N 362	O 435	S 4	0	0	0
1	P	311	Total 2280	C 1499	N 357	O 420	S 4	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	Q	311	Total	C	N	O	S	0	0	0
			2345	1555	357	429	4			
1	R	311	Total	C	N	O	S	0	0	0
			2293	1511	362	417	3			
1	S	309	Total	C	N	O	S	0	0	0
			2268	1497	359	408	4			
1	T	311	Total	C	N	O	S	0	0	0
			2149	1410	352	384	3			

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	ALA	-	expression tag	UNP Q7NDN8
A	318	GLY	-	expression tag	UNP Q7NDN8
B	1	ALA	-	expression tag	UNP Q7NDN8
B	318	GLY	-	expression tag	UNP Q7NDN8
C	1	ALA	-	expression tag	UNP Q7NDN8
C	318	GLY	-	expression tag	UNP Q7NDN8
D	1	ALA	-	expression tag	UNP Q7NDN8
D	318	GLY	-	expression tag	UNP Q7NDN8
E	1	ALA	-	expression tag	UNP Q7NDN8
E	318	GLY	-	expression tag	UNP Q7NDN8
F	1	ALA	-	expression tag	UNP Q7NDN8
F	318	GLY	-	expression tag	UNP Q7NDN8
G	1	ALA	-	expression tag	UNP Q7NDN8
G	318	GLY	-	expression tag	UNP Q7NDN8
H	1	ALA	-	expression tag	UNP Q7NDN8
H	318	GLY	-	expression tag	UNP Q7NDN8
I	1	ALA	-	expression tag	UNP Q7NDN8
I	318	GLY	-	expression tag	UNP Q7NDN8
J	1	ALA	-	expression tag	UNP Q7NDN8
J	318	GLY	-	expression tag	UNP Q7NDN8
K	1	ALA	-	expression tag	UNP Q7NDN8
K	318	GLY	-	expression tag	UNP Q7NDN8
L	1	ALA	-	expression tag	UNP Q7NDN8
L	318	GLY	-	expression tag	UNP Q7NDN8
M	1	ALA	-	expression tag	UNP Q7NDN8
M	318	GLY	-	expression tag	UNP Q7NDN8
N	1	ALA	-	expression tag	UNP Q7NDN8
N	318	GLY	-	expression tag	UNP Q7NDN8
O	1	ALA	-	expression tag	UNP Q7NDN8
O	318	GLY	-	expression tag	UNP Q7NDN8
P	1	ALA	-	expression tag	UNP Q7NDN8

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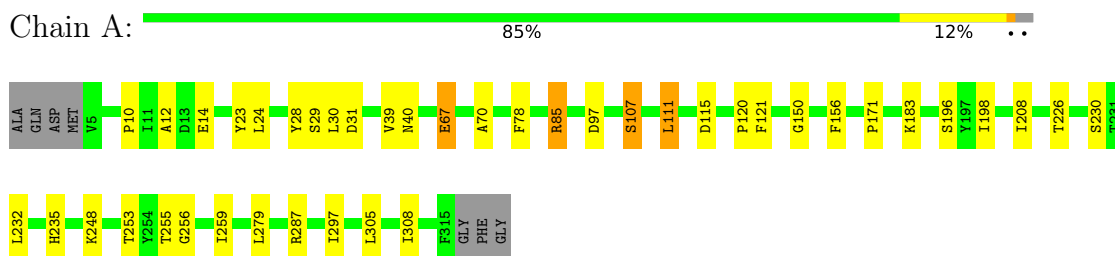
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Chain	Residue	Modelled	Actual	Comment	Reference
P	318	GLY	-	expression tag	UNP Q7NDN8
Q	1	ALA	-	expression tag	UNP Q7NDN8
Q	318	GLY	-	expression tag	UNP Q7NDN8
R	1	ALA	-	expression tag	UNP Q7NDN8
R	318	GLY	-	expression tag	UNP Q7NDN8
S	1	ALA	-	expression tag	UNP Q7NDN8
S	318	GLY	-	expression tag	UNP Q7NDN8
T	1	ALA	-	expression tag	UNP Q7NDN8
T	318	GLY	-	expression tag	UNP Q7NDN8

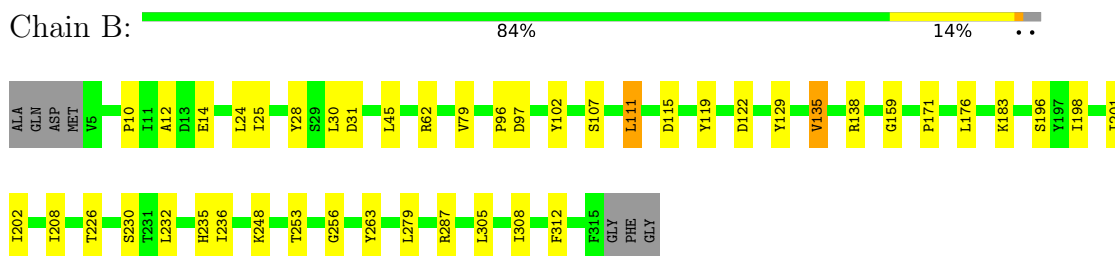
3 Residue-property plots [i](#)

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.

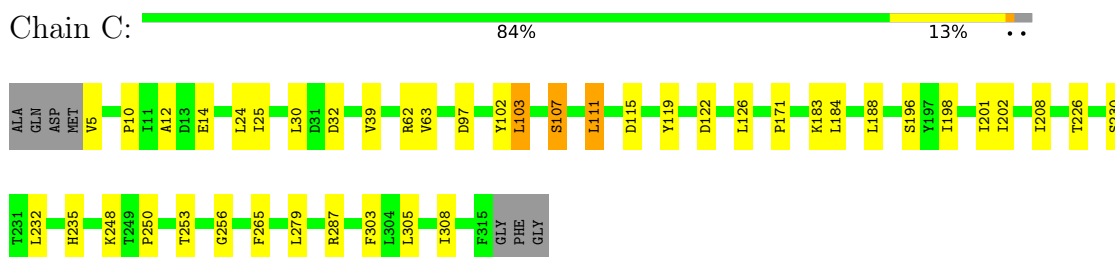
- Molecule 1: Proton-gated ion channel



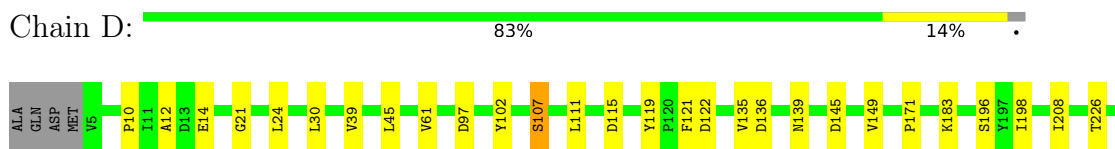
- Molecule 1: Proton-gated ion channel



- Molecule 1: Proton-gated ion channel



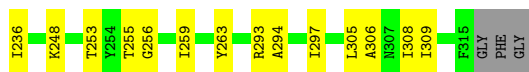
- Molecule 1: Proton-gated ion channel





- Molecule 1: Proton-gated ion channel

Chain E: 84% 13% ..



- Molecule 1: Proton-gated ion channel

Chain F: 85% 12% ..



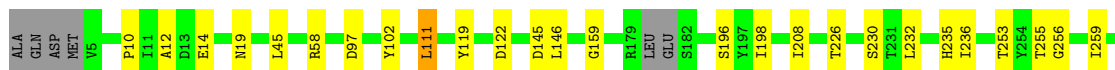
- Molecule 1: Proton-gated ion channel

Chain G: 84% 13% ..



- Molecule 1: Proton-gated ion channel

Chain H: 87% 10% .



- Molecule 1: Proton-gated ion channel

Chain I: 86% 10% .





- Molecule 1: Proton-gated ion channel

Chain J: 86% 11% ..



- Molecule 1: Proton-gated ion channel

Chain K: 84% 12% ..



- Molecule 1: Proton-gated ion channel

Chain L: 82% 13% 5%



- Molecule 1: Proton-gated ion channel

Chain M: 85% 12%



- Molecule 1: Proton-gated ion channel

Chain N: 84% 13% ..





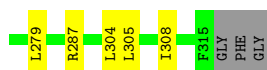
- Molecule 1: Proton-gated ion channel

Chain O: 82% 14% ..



- Molecule 1: Proton-gated ion channel

Chain P: 87% 10% .



- Molecule 1: Proton-gated ion channel

Chain Q: 83% 14% ..



- Molecule 1: Proton-gated ion channel

Chain R: 84% 13% .



- Molecule 1: Proton-gated ion channel

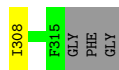
Chain S: 86% 10% .





- Molecule 1: Proton-gated ion channel

Chain T: 89% 9%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	131.53Å 384.10Å 148.44Å 90.00° 98.47° 90.00°	Depositor
Resolution (Å)	20.00 – 4.35 20.00 – 4.35	Depositor EDS
% Data completeness (in resolution range)	99.7 (20.00-4.35) 99.7 (20.00-4.35)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.54 (at 4.36Å)	Xtrriage
Refinement program	BUSTER 2.11.4	Depositor
R, R_{free}	0.240 , 0.244 0.265 , 0.269	Depositor DCC
R_{free} test set	4703 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	218.1	Xtrriage
Anisotropy	0.177	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.22 , 160.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.36$, $\langle L^2 \rangle = 0.20$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	45859	wwPDB-VP
Average B, all atoms (Å ²)	239.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% 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	0.38	0/2385	0.62	0/3291
1	B	0.40	0/2398	0.63	0/3306
1	C	0.40	0/2406	0.63	0/3317
1	D	0.38	0/2394	0.62	1/3306 (0.0%)
1	E	0.37	0/2419	0.62	0/3335
1	F	0.39	0/2399	0.62	1/3304 (0.0%)
1	G	0.41	0/2389	0.65	0/3293
1	H	0.38	0/2255	0.61	0/3115
1	I	0.38	0/2201	0.62	0/3043
1	J	0.39	0/2318	0.61	0/3197
1	K	0.38	0/2375	0.61	0/3273
1	L	0.36	0/2337	0.59	0/3226
1	M	0.37	0/2333	0.59	0/3221
1	N	0.38	0/2425	0.63	0/3342
1	O	0.37	0/2432	0.62	0/3354
1	P	0.38	0/2342	0.63	0/3234
1	Q	0.39	0/2411	0.63	1/3326 (0.0%)
1	R	0.36	0/2355	0.61	0/3250
1	S	0.37	0/2330	0.59	0/3214
1	T	0.37	0/2206	0.60	0/3050
All	All	0.38	0/47110	0.62	3/64997 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	Q	159	GLY	N-CA-C	-5.49	99.39	113.10
1	F	195	PHE	CA-CB-CG	5.27	126.54	113.90
1	D	121	PHE	N-CA-C	-5.19	96.98	111.00

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	2322	0	2154	21	0
1	B	2334	0	2173	23	0
1	C	2341	0	2196	20	0
1	D	2330	0	2181	21	0
1	E	2355	0	2213	18	0
1	F	2334	0	2181	22	0
1	G	2325	0	2175	16	0
1	H	2199	0	1930	18	0
1	I	2145	0	1855	15	0
1	J	2257	0	2033	20	0
1	K	2312	0	2156	17	0
1	L	2274	0	2128	21	0
1	M	2271	0	2086	15	0
1	N	2359	0	2238	19	0
1	O	2366	0	2233	29	0
1	P	2280	0	2054	15	0
1	Q	2345	0	2193	26	0
1	R	2293	0	2109	25	0
1	S	2268	0	2072	15	0
1	T	2149	0	1832	13	0
All	All	45859	0	42192	336	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 4.

The worst 5 of 336 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:L:12:ALA:HB2	1:R:141:VAL:HG11	1.24	1.13
1:H:19:ASN:HB3	1:H:145:ASP:OD1	1.55	1.06
1:L:12:ALA:HB2	1:R:141:VAL:CG1	1.98	0.94
1:Q:10:PRO:HB2	1:Q:12:ALA:O	1.73	0.89
1:L:12:ALA:CB	1:R:141:VAL:HG11	2.03	0.88

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	309/318 (97%)	293 (95%)	15 (5%)	1 (0%)	41	76
1	B	309/318 (97%)	290 (94%)	18 (6%)	1 (0%)	41	76
1	C	309/318 (97%)	291 (94%)	18 (6%)	0	100	100
1	D	309/318 (97%)	296 (96%)	13 (4%)	0	100	100
1	E	307/318 (96%)	290 (94%)	16 (5%)	1 (0%)	41	76
1	F	309/318 (97%)	290 (94%)	19 (6%)	0	100	100
1	G	309/318 (97%)	293 (95%)	15 (5%)	1 (0%)	41	76
1	H	305/318 (96%)	287 (94%)	18 (6%)	0	100	100
1	I	303/318 (95%)	287 (95%)	16 (5%)	0	100	100
1	J	309/318 (97%)	293 (95%)	16 (5%)	0	100	100
1	K	305/318 (96%)	289 (95%)	16 (5%)	0	100	100
1	L	298/318 (94%)	283 (95%)	15 (5%)	0	100	100
1	M	304/318 (96%)	286 (94%)	18 (6%)	0	100	100
1	N	309/318 (97%)	291 (94%)	17 (6%)	1 (0%)	41	76
1	O	309/318 (97%)	291 (94%)	18 (6%)	0	100	100
1	P	309/318 (97%)	294 (95%)	15 (5%)	0	100	100
1	Q	309/318 (97%)	290 (94%)	18 (6%)	1 (0%)	41	76
1	R	309/318 (97%)	290 (94%)	19 (6%)	0	100	100
1	S	305/318 (96%)	290 (95%)	15 (5%)	0	100	100
1	T	309/318 (97%)	295 (96%)	14 (4%)	0	100	100
All	All	6144/6360 (97%)	5809 (94%)	329 (5%)	6 (0%)	51	85

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	N	6	SER

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Mol	Chain	Res	Type
1	E	122	ASP
1	G	177	GLU
1	Q	166	THR
1	A	29	SER

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	230/284 (81%)	215 (94%)	15 (6%)	17	44
1	B	232/284 (82%)	220 (95%)	12 (5%)	23	50
1	C	233/284 (82%)	217 (93%)	16 (7%)	15	42
1	D	235/284 (83%)	221 (94%)	14 (6%)	19	46
1	E	239/284 (84%)	223 (93%)	16 (7%)	16	43
1	F	229/284 (81%)	216 (94%)	13 (6%)	20	48
1	G	229/284 (81%)	210 (92%)	19 (8%)	11	36
1	H	194/284 (68%)	186 (96%)	8 (4%)	30	56
1	I	181/284 (64%)	172 (95%)	9 (5%)	24	51
1	J	205/284 (72%)	193 (94%)	12 (6%)	19	47
1	K	226/284 (80%)	209 (92%)	17 (8%)	13	40
1	L	231/284 (81%)	218 (94%)	13 (6%)	21	48
1	M	217/284 (76%)	202 (93%)	15 (7%)	15	42
1	N	239/284 (84%)	222 (93%)	17 (7%)	14	41
1	O	242/284 (85%)	230 (95%)	12 (5%)	24	51
1	P	214/284 (75%)	203 (95%)	11 (5%)	24	50
1	Q	234/284 (82%)	218 (93%)	16 (7%)	16	43
1	R	219/284 (77%)	204 (93%)	15 (7%)	16	43
1	S	214/284 (75%)	203 (95%)	11 (5%)	24	50
1	T	173/284 (61%)	167 (96%)	6 (4%)	36	60

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	4416/5680 (78%)	4149 (94%)	267 (6%)	19 46

5 of 267 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	Q	248	LYS
1	R	86	ASP
1	S	308	ILE
1	G	115	ASP
1	G	97	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	K	83	ASN
1	N	83	ASN
1	T	235	HIS
1	P	235	HIS
1	E	139	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](#)

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

6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.