



Full wwPDB NMR Structure Validation Report ⓘ

Apr 26, 2016 – 02:39 PM BST

PDB ID : 1G7D
Title : NMR STRUCTURE OF ERP29 C-DOMAIN
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Deposited on : 2000-11-10

This is a Full wwPDB NMR 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/NMRValidationReportHelp>
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:

Cyrange : Kirchner and Güntert (2011)
NmrClust : Kelley et al. (1996)
MolProbity : 4.02b-467
Mogul : unknown
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
ShiftChecker : rb-20027457
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20027457

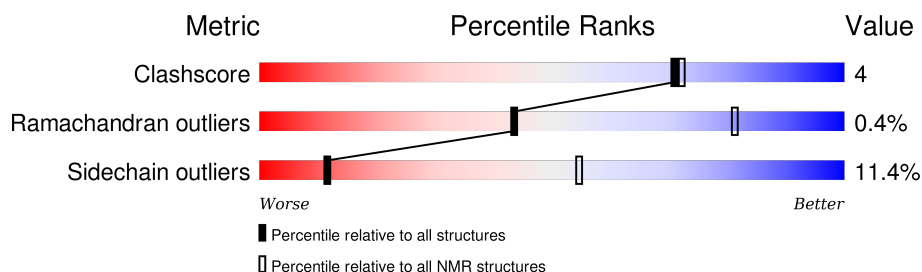
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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)	NMR archive (#Entries)
Clashscore	114402	11133
Ramachandran outliers	111179	9975
Sidechain outliers	111093	9958

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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	106	 75% 14% • 10%

2 Ensemble composition and analysis ⓘ

This entry contains 20 models. Model 6 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	Residue range (total)	Backbone RMSD (Å)	Medoid model
1	A:157-A:251 (95)	0.43	6

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

The models can be grouped into 2 clusters and 3 single-model clusters were found.

Cluster number	Models
1	1, 2, 3, 4, 5, 6, 7, 11, 13, 14, 15, 16, 17, 18, 19
2	8, 20
Single-model clusters	9; 10; 12

3 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 1673 atoms, of which 847 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called ENDOPLASMIC RETICULUM PROTEIN ERP29.

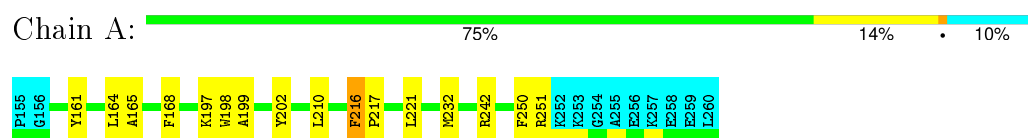
Mol	Chain	Residues	Atoms						Trace
1	A	106	Total	C	H	N	O	S	0
			1673	517	847	144	162	3	

4 Residue-property plots [i](#)

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA and DNA chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29

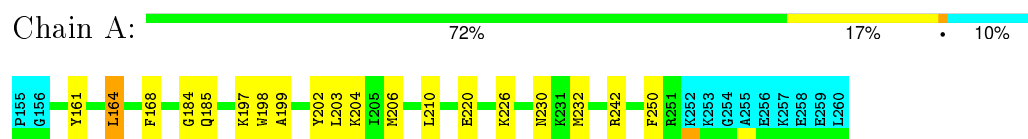


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

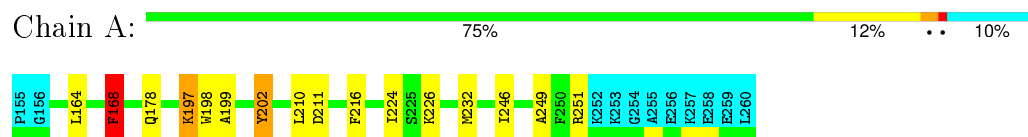
4.2.1 Score per residue for model 1

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



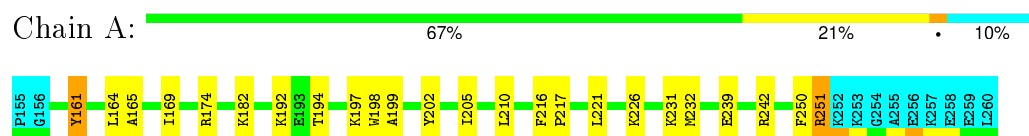
4.2.2 Score per residue for model 2

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



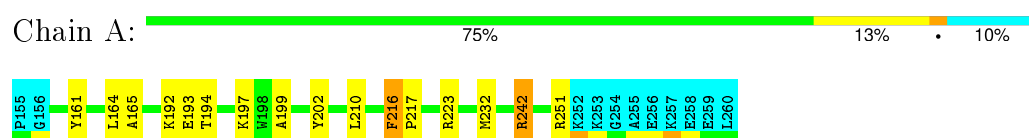
4.2.3 Score per residue for model 3

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



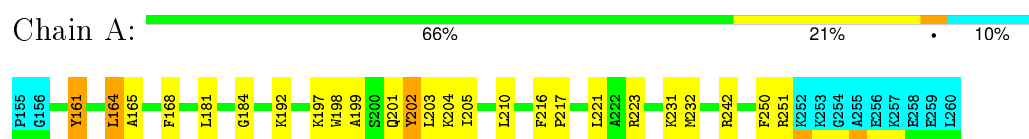
4.2.4 Score per residue for model 4

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



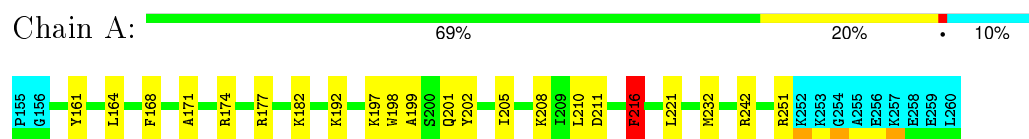
4.2.5 Score per residue for model 5

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



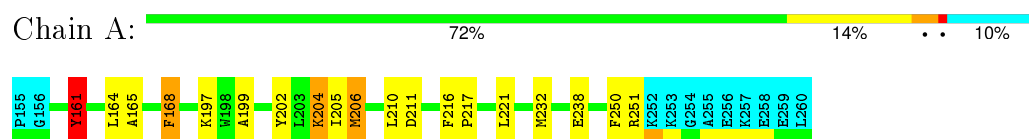
4.2.6 Score per residue for model 6 (medoid)

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



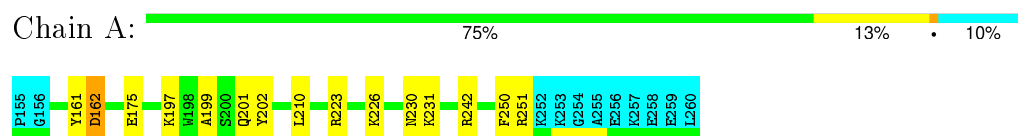
4.2.7 Score per residue for model 7

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



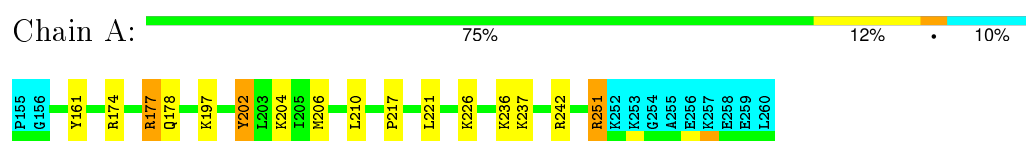
4.2.8 Score per residue for model 8

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



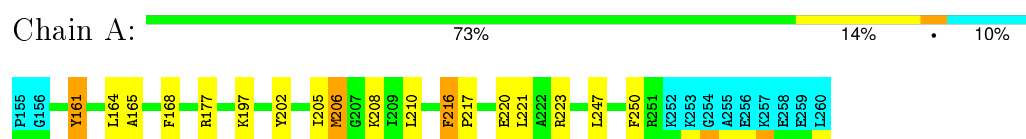
4.2.9 Score per residue for model 9

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



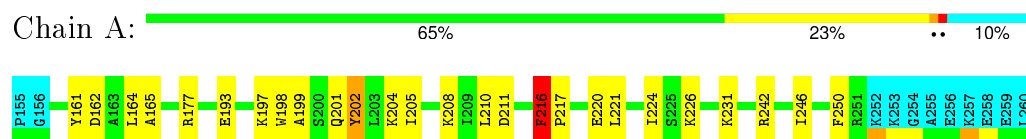
4.2.10 Score per residue for model 10

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



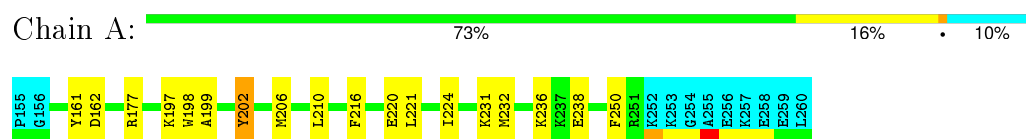
4.2.11 Score per residue for model 11

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



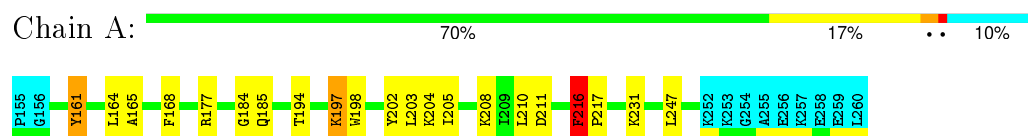
4.2.12 Score per residue for model 12

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



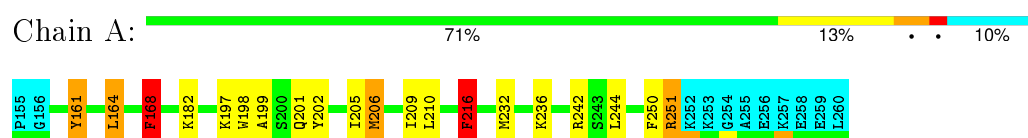
4.2.13 Score per residue for model 13

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



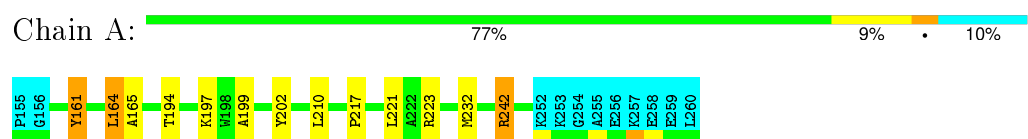
4.2.14 Score per residue for model 14

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



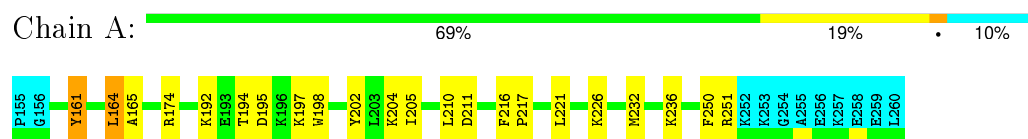
4.2.15 Score per residue for model 15

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



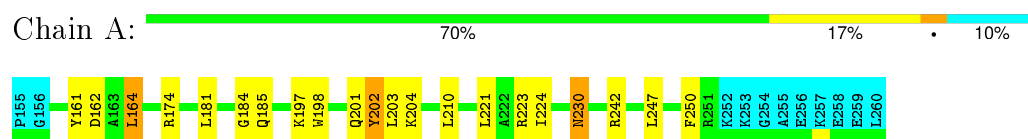
4.2.16 Score per residue for model 16

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



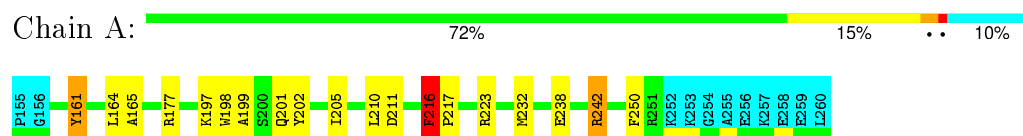
4.2.17 Score per residue for model 17

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



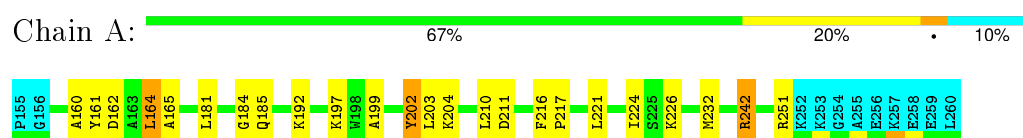
4.2.18 Score per residue for model 18

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



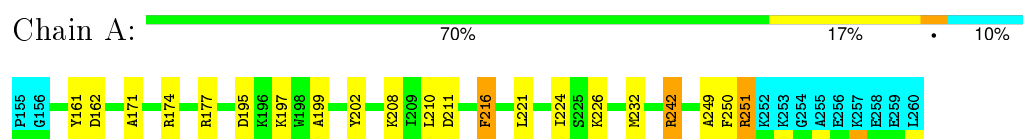
4.2.19 Score per residue for model 19

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



4.2.20 Score per residue for model 20

- Molecule 1: ENDOPLASMIC RETICULUM PROTEIN ERP29



5 Refinement protocol and experimental data overview ⓘ

The models were refined using the following method: *torsion angle dynamics, molecular dynamics*.

Of the 50 calculated structures, 20 were deposited, based on the following criterion: *structures with the lowest energy, target function*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
DYANA	structure solution	1.5
OPAL	refinement	2.6

No chemical shift data was provided. No validations of the models with respect to experimental NMR restraints is performed at this time.

6 Model quality i

6.1 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 (average) 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	0.62±0.01	0±0/752 (0.0±0.0%)	1.25±0.03	3±1/1005 (0.3±0.1%)
All	All	0.62	0/15040 (0.0%)	1.25	64/20100 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	Chirality	Planarity
1	A	0.0±0.0	2.0±1.3
All	All	0	41

There are no bond-length outliers.

All unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	168	PHE	CB-CG-CD2	-8.91	114.56	120.80	2	6
1	A	202	TYR	CA-CB-CG	8.25	129.07	113.40	9	6
1	A	161	TYR	CB-CG-CD2	-6.96	116.83	121.00	16	9
1	A	220	GLU	CB-CA-C	6.92	124.25	110.40	12	4
1	A	202	TYR	CB-CG-CD2	-6.48	117.11	121.00	2	1
1	A	251	ARG	NE-CZ-NH1	6.36	123.48	120.30	20	1
1	A	242	ARG	CD-NE-CZ	6.30	132.42	123.60	15	2
1	A	198	TRP	CB-CG-CD2	6.20	134.66	126.60	12	8
1	A	251	ARG	NE-CZ-NH2	-6.09	117.25	120.30	8	8
1	A	174	ARG	NE-CZ-NH2	-5.97	117.31	120.30	16	2
1	A	164	LEU	CB-CG-CD2	-5.92	100.93	111.00	11	1
1	A	242	ARG	NE-CZ-NH1	5.88	123.24	120.30	15	1
1	A	211	ASP	CB-CG-OD2	-5.66	113.20	118.30	6	2
1	A	242	ARG	NE-CZ-NH2	-5.57	117.52	120.30	4	1
1	A	216	PHE	CB-CG-CD2	-5.51	116.94	120.80	4	4

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	164	LEU	CB-CG-CD1	5.49	120.33	111.00	2	1
1	A	220	GLU	OE1-CD-OE2	-5.44	116.78	123.30	11	1
1	A	230	ASN	N-CA-CB	5.35	120.23	110.60	17	1
1	A	192	LYS	CB-CG-CD	5.26	125.29	111.60	5	1
1	A	162	ASP	N-CA-CB	-5.11	101.41	110.60	8	1
1	A	168	PHE	CB-CG-CD1	5.09	124.36	120.80	14	1
1	A	211	ASP	CB-CA-C	-5.03	100.35	110.40	16	1
1	A	198	TRP	CB-CG-CD1	-5.01	120.49	127.00	12	1

There are no chirality outliers.

All unique planar outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Group	Models (Total)
1	A	251	ARG	Sidechain	7
1	A	216	PHE	Sidechain	7
1	A	177	ARG	Sidechain	6
1	A	242	ARG	Sidechain	5
1	A	223	ARG	Sidechain	5
1	A	211	ASP	Sidechain	3
1	A	168	PHE	Sidechain	3
1	A	174	ARG	Sidechain	2
1	A	161	TYR	Sidechain	2
1	A	162	ASP	Sidechain	1

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	743	761	761	7±2
All	All	14860	15220	15220	131

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.

All unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:162:ASP:HA	1:A:221:LEU:HD21	0.66	1.67	19	5
1:A:184:GLY:HA3	1:A:203:LEU:HD21	0.60	1.74	19	5
1:A:224:ILE:HD11	1:A:249:ALA:HB2	0.58	1.76	2	2
1:A:165:ALA:HB1	1:A:217:PRO:HB2	0.56	1.76	19	11
1:A:161:TYR:CE1	1:A:202:TYR:CD2	0.55	2.95	4	17
1:A:199:ALA:HA	1:A:202:TYR:CD2	0.52	2.39	19	14
1:A:205:ILE:HD13	1:A:250:PHE:HB3	0.52	1.81	7	3
1:A:161:TYR:CE1	1:A:202:TYR:CE2	0.52	2.98	3	9
1:A:202:TYR:HB2	1:A:250:PHE:CE2	0.52	2.40	17	11
1:A:199:ALA:HA	1:A:202:TYR:CE2	0.51	2.41	19	11
1:A:195:ASP:HA	1:A:198:TRP:CD1	0.50	2.41	16	1
1:A:238:GLU:CD	1:A:238:GLU:H	0.49	2.11	18	2
1:A:221:LEU:HD23	1:A:224:ILE:HG13	0.48	1.86	17	5
1:A:164:LEU:HD13	1:A:202:TYR:CE1	0.48	2.43	19	5
1:A:205:ILE:N	1:A:205:ILE:HD12	0.47	2.24	6	3
1:A:197:LYS:HE3	1:A:198:TRP:CE2	0.45	2.46	2	2
1:A:205:ILE:CD1	1:A:250:PHE:HA	0.45	2.41	11	1
1:A:206:MET:SD	1:A:250:PHE:CE1	0.45	3.10	7	1
1:A:206:MET:SD	1:A:250:PHE:CZ	0.45	3.10	14	3
1:A:161:TYR:CD1	1:A:202:TYR:CD2	0.44	3.05	19	1
1:A:205:ILE:HG23	1:A:216:PHE:CD1	0.43	2.48	10	1
1:A:193:GLU:H	1:A:193:GLU:CD	0.42	2.16	11	1
1:A:164:LEU:HD13	1:A:202:TYR:CD1	0.42	2.49	15	2
1:A:198:TRP:HB3	1:A:246:ILE:HD11	0.42	1.92	2	2
1:A:205:ILE:HD12	1:A:205:ILE:N	0.42	2.29	14	3
1:A:204:LYS:HA	1:A:204:LYS:HE3	0.41	1.92	7	1
1:A:160:ALA:O	1:A:164:LEU:HD12	0.41	2.16	19	1
1:A:171:ALA:HB3	1:A:177:ARG:HG2	0.41	1.91	20	2
1:A:168:PHE:CE1	1:A:209:ILE:HG21	0.41	2.49	14	1
1:A:192:LYS:HD3	1:A:193:GLU:H	0.41	1.76	4	1
1:A:236:LYS:HA	1:A:236:LYS:CE	0.41	2.45	9	1
1:A:208:LYS:HE2	1:A:208:LYS:HA	0.41	1.93	10	1
1:A:175:GLU:N	1:A:175:GLU:CD	0.41	2.75	8	1
1:A:238:GLU:N	1:A:238:GLU:CD	0.40	2.74	7	1

6.3 Torsion angles ⓘ

6.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. 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	95/106 (90%)	86±2 (90±2%)	9±2 (10±2%)	0±0 (0±1%)	43	81
All	All	1900/2120 (90%)	1710 (90%)	183 (10%)	7 (0%)	43	81

All 3 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	194	THR	5
1	A	251	ARG	1
1	A	217	PRO	1

6.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. 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	78/86 (91%)	69±2 (89±2%)	9±2 (11±2%)	11	54
All	All	1560/1720 (91%)	1382 (89%)	178 (11%)	11	54

All 31 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	210	LEU	20
1	A	197	LYS	20
1	A	232	MET	14
1	A	164	LEU	14
1	A	216	PHE	11
1	A	242	ARG	11
1	A	204	LYS	9
1	A	226	LYS	9
1	A	221	LEU	8
1	A	201	GLN	7
1	A	206	MET	6
1	A	231	LYS	6
1	A	185	GLN	4
1	A	208	LYS	4

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Mol	Chain	Res	Type	Models (Total)
1	A	192	LYS	4
1	A	230	ASN	3
1	A	182	LYS	3
1	A	181	LEU	3
1	A	236	LYS	3
1	A	168	PHE	3
1	A	211	ASP	3
1	A	174	ARG	2
1	A	223	ARG	2
1	A	178	GLN	2
1	A	239	GLU	1
1	A	169	ILE	1
1	A	244	LEU	1
1	A	177	ARG	1
1	A	202	TYR	1
1	A	237	LYS	1
1	A	195	ASP	1

6.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.6 Ligand geometry [i](#)

There are no ligands in this entry.

6.7 Other polymers [i](#)

There are no such molecules in this entry.

6.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided