Full wwPDB NMR Structure Validation Report

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PDB ID	:	2JZ4
BMRB ID	:	15607
Title	:	Putative 32 kDa myrosinase binding protein At3g16450.1 from Arabidopsis thaliana
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Deposited on	:	2007-12-28

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
https://www.wwpdb.org/validation/2017/NMRValidationReportHelp
with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

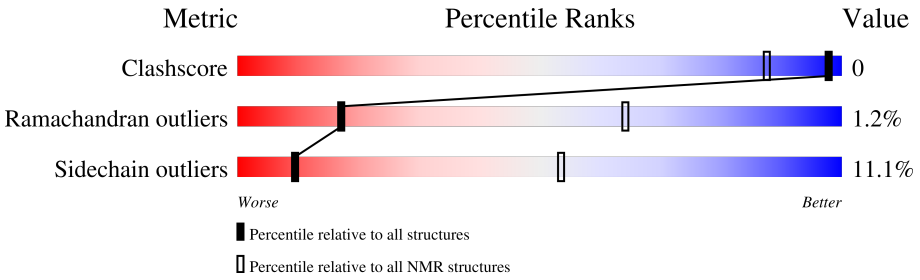
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
BMRB Restraints Analysis	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.33

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment is 67%.

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	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	299	94% · 5%

2 Ensemble composition and analysis

This entry contains 20 models. Model 1 is the overall representative, medoid model (most similar to other models).

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:2-A:18, A:22-A:144 (140)	1.70	3
2	A:153-A:297 (145)	1.30	1

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 6 clusters. No single-model clusters were found.

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

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 4427 atoms, of which 2171 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Jasmonate inducible protein isolog.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	299	4427	1433	2171	372	449	2	0

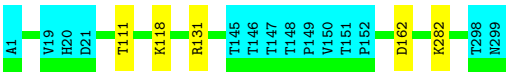
4 Residue-property plots (i)

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide 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: Jasmonate inducible protein isolog

Chain A:



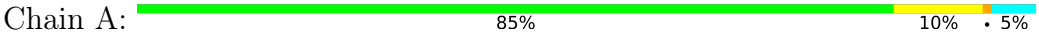
4.2 Scores per residue for each member of the ensemble

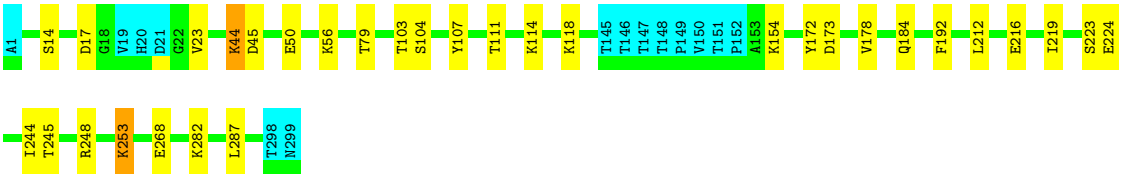
Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1 (medoid)

• Molecule 1: Jasmonate inducible protein isolog

Chain A:

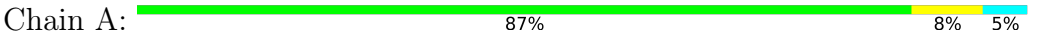




4.2.2 Score per residue for model 2

• Molecule 1: Jasmonate inducible protein isolog

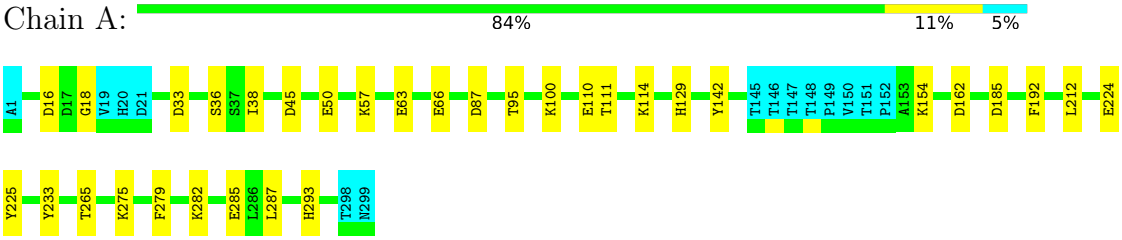
Chain A:



4.2.3 Score per residue for model 3

• Molecule 1: Jasmonate inducible protein isolog

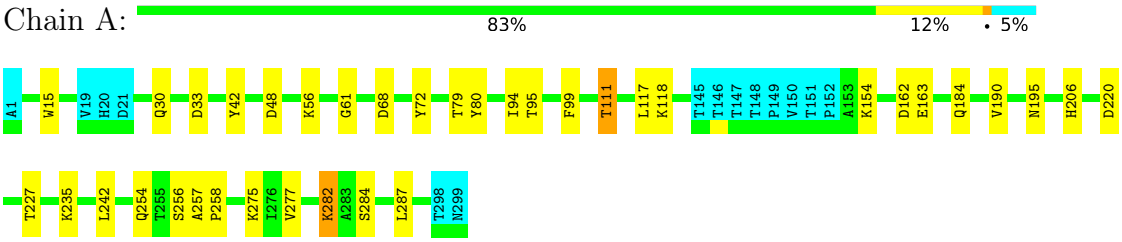
Chain A:



4.2.4 Score per residue for model 4

• Molecule 1: Jasmonate inducible protein isolog

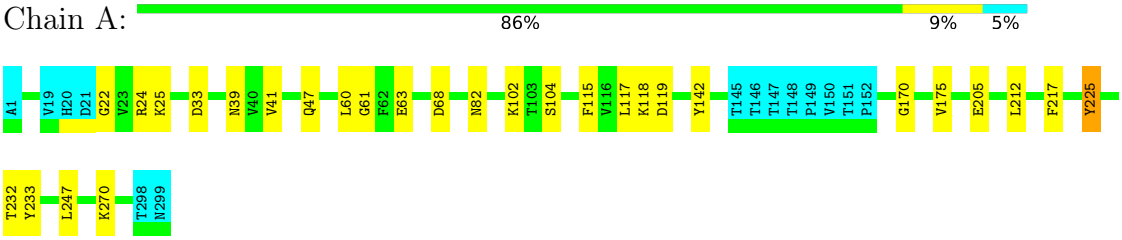
Chain A:



4.2.5 Score per residue for model 5

• Molecule 1: Jasmonate inducible protein isolog

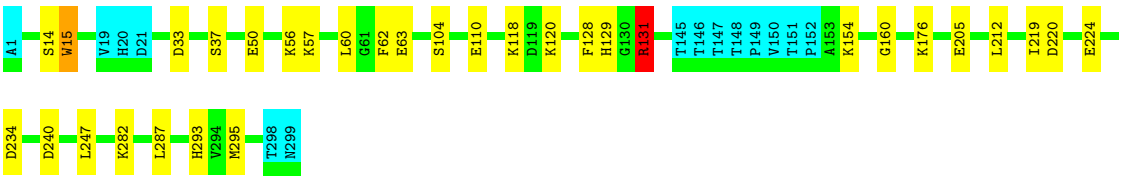
Chain A:



4.2.6 Score per residue for model 6

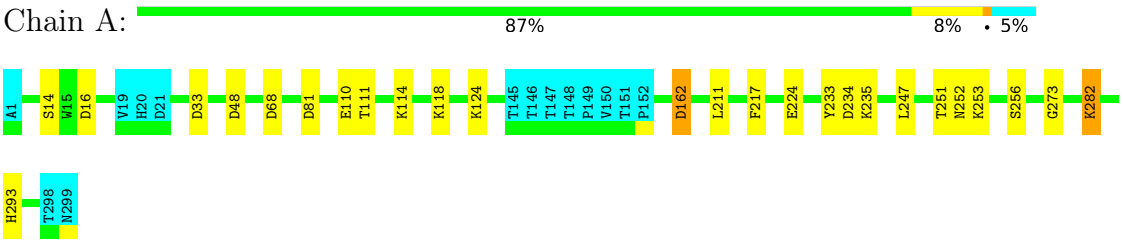
• Molecule 1: Jasmonate inducible protein isolog

Chain A:



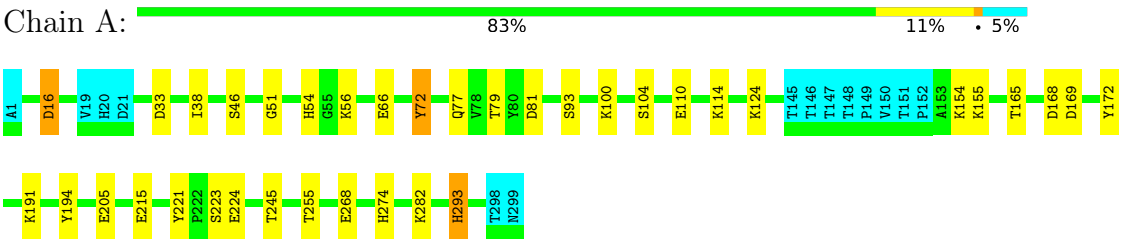
4.2.7 Score per residue for model 7

• Molecule 1: Jasmonate inducible protein isolog



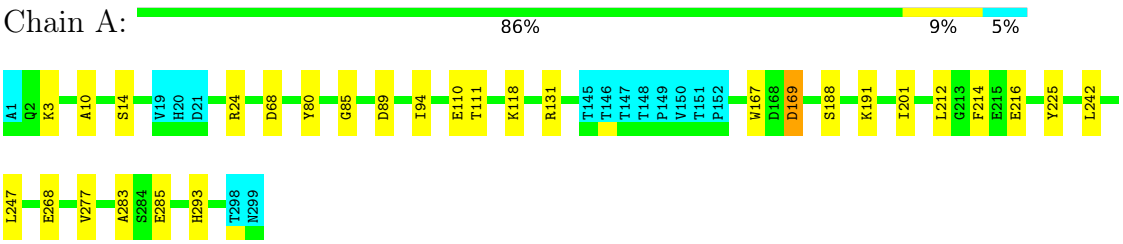
4.2.8 Score per residue for model 8

• Molecule 1: Jasmonate inducible protein isolog



4.2.9 Score per residue for model 9

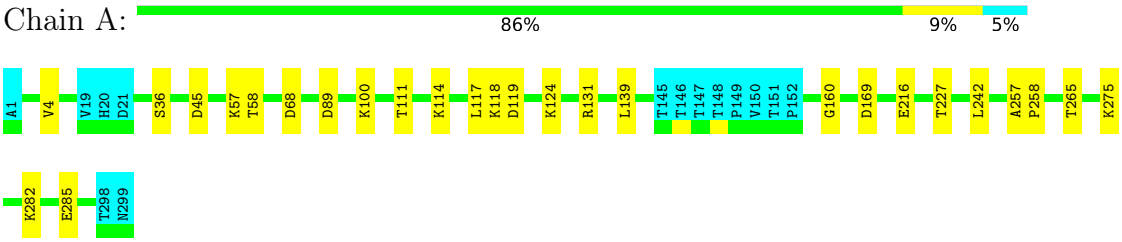
• Molecule 1: Jasmonate inducible protein isolog



4.2.10 Score per residue for model 10

• Molecule 1: Jasmonate inducible protein isolog

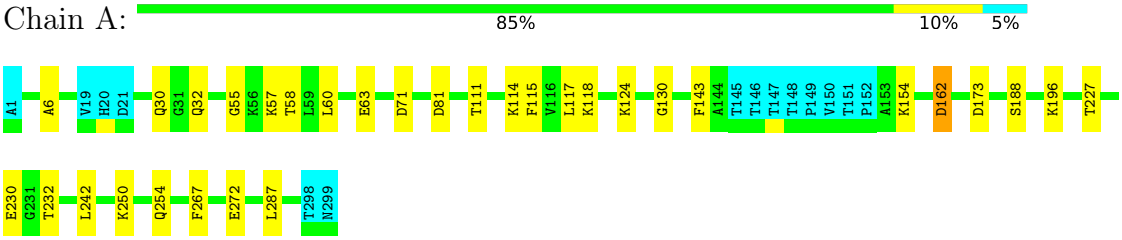
Chain A:



4.2.11 Score per residue for model 11

• Molecule 1: Jasmonate inducible protein isolog

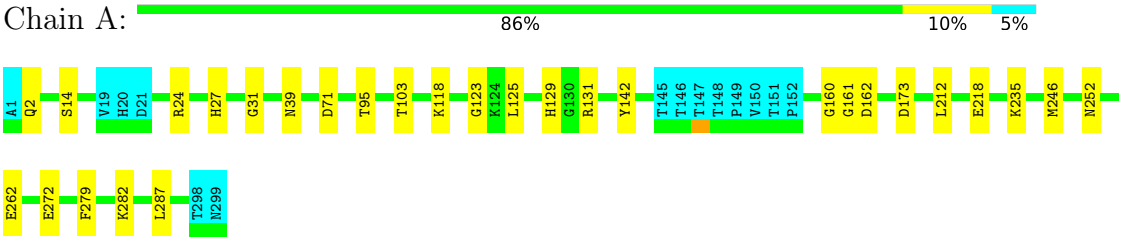
Chain A:



4.2.12 Score per residue for model 12

• Molecule 1: Jasmonate inducible protein isolog

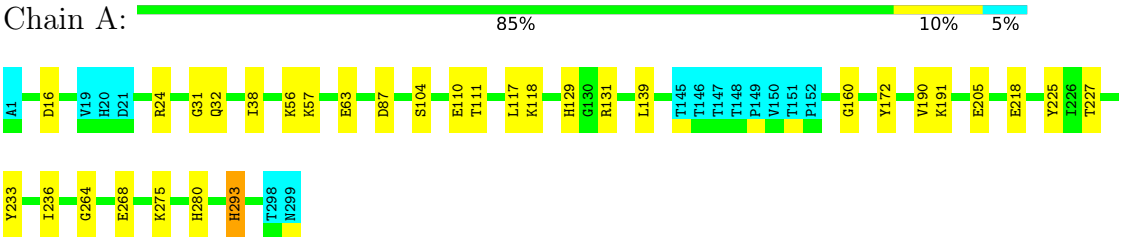
Chain A:



4.2.13 Score per residue for model 13

• Molecule 1: Jasmonate inducible protein isolog

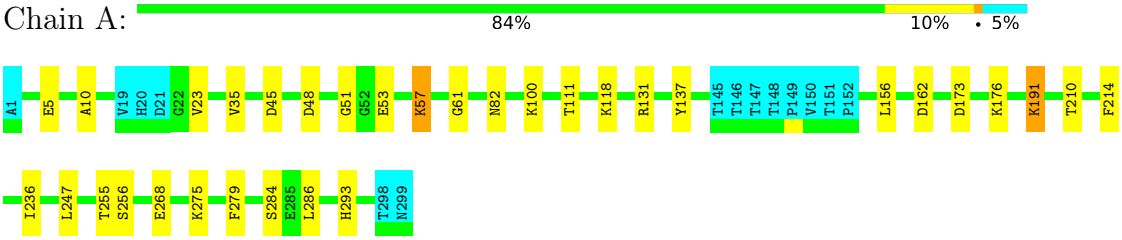
Chain A:



4.2.14 Score per residue for model 14

• Molecule 1: Jasmonate inducible protein isolog

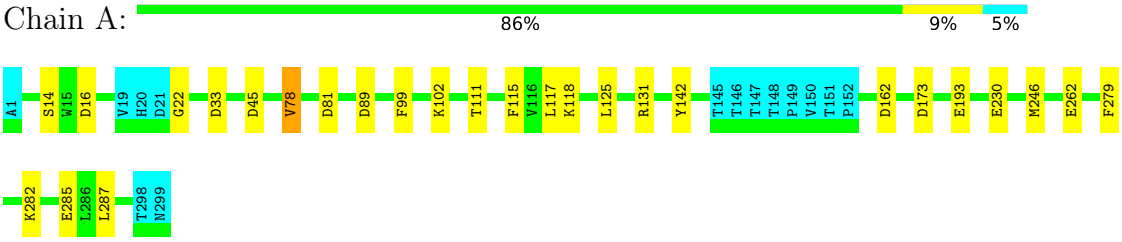
Chain A:



4.2.15 Score per residue for model 15

• Molecule 1: Jasmonate inducible protein isolog

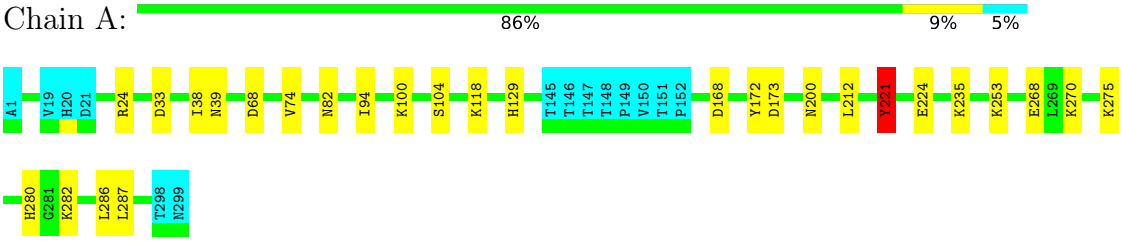
Chain A:



4.2.16 Score per residue for model 16

• Molecule 1: Jasmonate inducible protein isolog

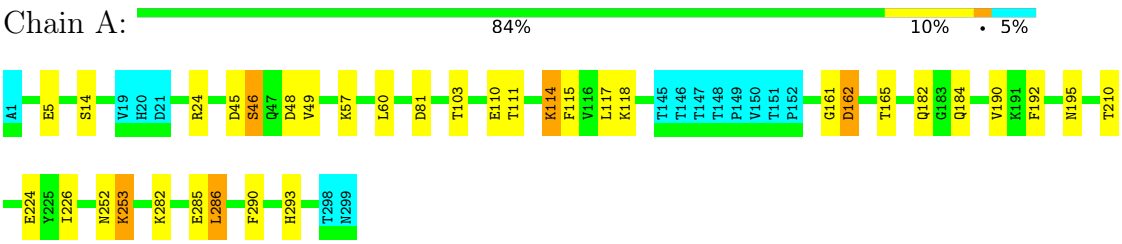
Chain A:



4.2.17 Score per residue for model 17

• Molecule 1: Jasmonate inducible protein isolog

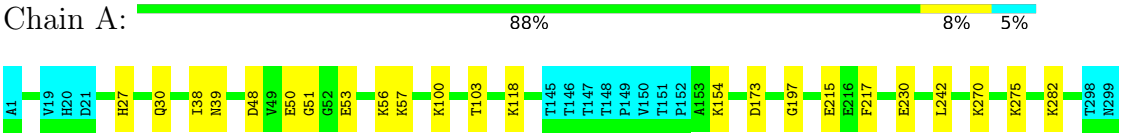
Chain A:



4.2.18 Score per residue for model 18

• Molecule 1: Jasmonate inducible protein isolog

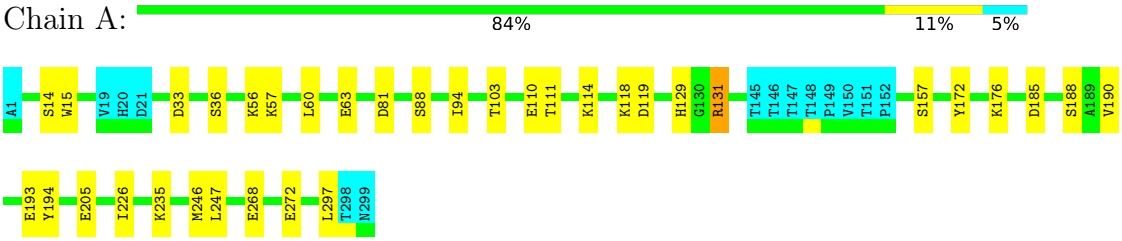
Chain A:



4.2.19 Score per residue for model 19

• Molecule 1: Jasmonate inducible protein isolog

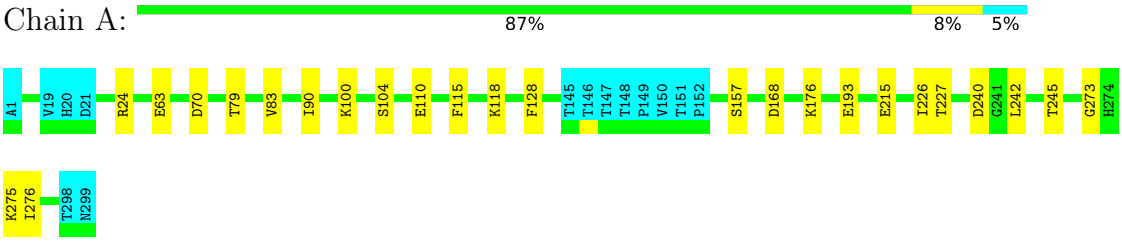
Chain A:



4.2.20 Score per residue for model 20

• Molecule 1: Jasmonate inducible protein isolog

Chain A:



5 Refinement protocol and experimental data overview

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

Of the 100 calculated structures, 20 were deposited, based on the following criterion: *target function*.

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

Software name	Classification	Version
CYANA	structure solution	2.2
OPALp	refinement	1.4

The following table shows chemical shift validation statistics as aggregates over all chemical shift files. Detailed validation can be found in section 7 of this report.

Chemical shift file(s)	working_cs.cif
Number of chemical shift lists	1
Total number of shifts	2538
Number of shifts mapped to atoms	2537
Number of unparsed shifts	0
Number of shifts with mapping errors	1
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	67%

6 Model quality

6.1 Standard geometry

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	0.64±0.01	0±0/2202 (0.0± 0.0%)	1.01±0.02	0±1/2968 (0.0± 0.0%)
All	All	0.64	0/44040 (0.0%)	1.01	7/59360 (0.0%)

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	0.9±1.0
All	All	0	19

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(^{o})	Ideal(^{o})	Models	
								Worst	Total
1	A	131	ARG	NE-CZ-NH2	-6.73	116.93	120.30	6	1
1	A	225	TYR	CB-CG-CD2	-5.68	117.59	121.00	5	1
1	A	44	LYS	C-N-CA	5.66	135.85	121.70	1	1
1	A	172	TYR	CB-CG-CD2	-5.66	117.61	121.00	1	1
1	A	24	ARG	NE-CZ-NH2	-5.13	117.74	120.30	20	1
1	A	131	ARG	CD-NE-CZ	5.11	130.75	123.60	6	1
1	A	32	GLN	C-N-CA	5.08	134.39	121.70	11	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	142	TYR	Sidechain	3

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Mol	Chain	Res	Type	Group	Models (Total)
1	A	72	TYR	Sidechain	2
1	A	80	TYR	Sidechain	2
1	A	172	TYR	Sidechain	2
1	A	221	TYR	Sidechain	2
1	A	131	ARG	Sidechain	2
1	A	107	TYR	Sidechain	1
1	A	248	ARG	Sidechain	1
1	A	179	TYR	Sidechain	1
1	A	233	TYR	Sidechain	1
1	A	42	TYR	Sidechain	1
1	A	225	TYR	Sidechain	1

6.2 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 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	2155	2076	2076	2±1
All	All	43100	41520	41520	34

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 0.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:167:TRP:HE1	1:A:283:ALA:HB2	0.61	1.55	9	1
1:A:162:ASP:C	1:A:282:LYS:HE3	0.55	2.22	4	1
1:A:191:LYS:HE2	1:A:214:PHE:CE2	0.54	2.37	14	1
1:A:79:THR:HG21	1:A:110:GLU:HA	0.53	1.80	20	1
1:A:191:LYS:HE2	1:A:214:PHE:CZ	0.50	2.41	14	1
1:A:162:ASP:HA	1:A:282:LYS:CE	0.49	2.38	7	1
1:A:79:THR:HG21	1:A:111:THR:H	0.49	1.66	1	2
1:A:178:VAL:HG13	1:A:192:PHE:CE2	0.48	2.44	1	1
1:A:257:ALA:HB1	1:A:258:PRO:HD2	0.48	1.86	10	2
1:A:191:LYS:HE3	1:A:214:PHE:CE2	0.47	2.45	9	1
1:A:115:PHE:CE2	1:A:117:LEU:HD22	0.46	2.45	5	2
1:A:191:LYS:CE	1:A:214:PHE:CZ	0.46	2.98	14	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:155:LYS:HE2	1:A:293:HIS:CE1	0.46	2.46	8	1
1:A:72:TYR:CG	1:A:124:LYS:HE3	0.45	2.47	8	1
1:A:78:VAL:HG13	1:A:115:PHE:CE1	0.45	2.47	15	1
1:A:110:GLU:OE1	1:A:114:LYS:NZ	0.43	2.51	19	1
1:A:226:ILE:HG22	1:A:276:ILE:HD12	0.43	1.91	20	1
1:A:57:LYS:HE3	1:A:62:PHE:CZ	0.43	2.49	6	1
1:A:15:TRP:CE3	1:A:129:HIS:CB	0.43	3.02	19	1
1:A:172:TYR:CD1	1:A:194:TYR:CE2	0.43	3.07	19	1
1:A:10:ALA:HB3	1:A:137:TYR:CG	0.42	2.49	14	1
1:A:117:LEU:HD23	1:A:117:LEU:N	0.42	2.30	11	1
1:A:191:LYS:HE3	1:A:214:PHE:CZ	0.41	2.50	9	1
1:A:162:ASP:HA	1:A:282:LYS:HE3	0.41	1.92	3	1
1:A:24:ARG:CG	1:A:43:ALA:HB2	0.41	2.46	2	1
1:A:25:LYS:HE3	1:A:41:VAL:HG21	0.41	1.92	5	1
1:A:15:TRP:CD1	1:A:131:ARG:HG3	0.41	2.51	6	1
1:A:280:HIS:CD2	1:A:293:HIS:HD1	0.41	2.34	13	1
1:A:53:GLU:OE2	1:A:57:LYS:HE2	0.41	2.16	14	1
1:A:27:HIS:CD2	1:A:39:ASN:HD22	0.40	2.35	18	1
1:A:25:LYS:HE3	1:A:41:VAL:CG2	0.40	2.47	5	1

6.3 Torsion angles (i)

6.3.1 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 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	285/299 (95%)	251±4 (88±1%)	30±3 (11±1%)	3±2 (1±1%)	17	64
All	All	5700/5980 (95%)	5023 (88%)	610 (11%)	67 (1%)	17	64

All 42 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	253	LYS	5
1	A	160	GLY	4
1	A	14	SER	3

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Mol	Chain	Res	Type	Models (Total)
1	A	273	GLY	3
1	A	61	GLY	3
1	A	162	ASP	3
1	A	51	GLY	3
1	A	264	GLY	2
1	A	285	GLU	2
1	A	284	SER	2
1	A	22	GLY	2
1	A	46	SER	2
1	A	114	LYS	2
1	A	31	GLY	2
1	A	161	GLY	2
1	A	45	ASP	1
1	A	204	GLY	1
1	A	277	VAL	1
1	A	18	GLY	1
1	A	87	ASP	1
1	A	170	GLY	1
1	A	16	ASP	1
1	A	10	ALA	1
1	A	85	GLY	1
1	A	169	ASP	1
1	A	227	THR	1
1	A	6	ALA	1
1	A	30	GLN	1
1	A	55	GLY	1
1	A	60	LEU	1
1	A	130	GLY	1
1	A	232	THR	1
1	A	123	GLY	1
1	A	35	VAL	1
1	A	156	LEU	1
1	A	221	TYR	1
1	A	287	LEU	1
1	A	182	GLN	1
1	A	286	LEU	1
1	A	197	GLY	1
1	A	131	ARG	1
1	A	226	ILE	1

6.3.2 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 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	218/231 (94%)	194±4 (89±2%)	24±4 (11±2%)	9 53
All	All	4360/4620 (94%)	3878 (89%)	482 (11%)	9 53

All 149 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	118	LYS	18
1	A	282	LYS	11
1	A	111	THR	11
1	A	33	ASP	10
1	A	56	LYS	8
1	A	224	GLU	8
1	A	268	GLU	8
1	A	100	LYS	8
1	A	57	LYS	8
1	A	275	LYS	8
1	A	293	HIS	8
1	A	104	SER	7
1	A	154	LYS	7
1	A	173	ASP	7
1	A	212	LEU	7
1	A	287	LEU	7
1	A	68	ASP	7
1	A	247	LEU	7
1	A	63	GLU	7
1	A	110	GLU	7
1	A	114	LYS	6
1	A	38	ILE	6
1	A	117	LEU	6
1	A	162	ASP	6
1	A	242	LEU	6
1	A	24	ARG	6
1	A	131	ARG	6
1	A	81	ASP	6
1	A	103	THR	5

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Mol	Chain	Res	Type	Models (Total)
1	A	279	PHE	5
1	A	16	ASP	5
1	A	45	ASP	5
1	A	129	HIS	5
1	A	48	ASP	5
1	A	235	LYS	5
1	A	205	GLU	5
1	A	14	SER	5
1	A	50	GLU	4
1	A	215	GLU	4
1	A	94	ILE	4
1	A	190	VAL	4
1	A	227	THR	4
1	A	60	LEU	4
1	A	176	LYS	4
1	A	184	GLN	3
1	A	216	GLU	3
1	A	245	THR	3
1	A	218	GLU	3
1	A	254	GLN	3
1	A	36	SER	3
1	A	95	THR	3
1	A	225	TYR	3
1	A	256	SER	3
1	A	39	ASN	3
1	A	82	ASN	3
1	A	119	ASP	3
1	A	217	PHE	3
1	A	233	TYR	3
1	A	270	LYS	3
1	A	124	LYS	3
1	A	252	ASN	3
1	A	168	ASP	3
1	A	169	ASP	3
1	A	191	LYS	3
1	A	89	ASP	3
1	A	188	SER	3
1	A	285	GLU	3
1	A	230	GLU	3
1	A	272	GLU	3
1	A	246	MET	3
1	A	286	LEU	3

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Mol	Chain	Res	Type	Models (Total)
1	A	193	GLU	3
1	A	23	VAL	2
1	A	219	ILE	2
1	A	223	SER	2
1	A	253	LYS	2
1	A	32	GLN	2
1	A	66	GLU	2
1	A	185	ASP	2
1	A	192	PHE	2
1	A	265	THR	2
1	A	15	TRP	2
1	A	30	GLN	2
1	A	99	PHE	2
1	A	195	ASN	2
1	A	220	ASP	2
1	A	277	VAL	2
1	A	102	LYS	2
1	A	128	PHE	2
1	A	234	ASP	2
1	A	240	ASP	2
1	A	165	THR	2
1	A	255	THR	2
1	A	58	THR	2
1	A	139	LEU	2
1	A	71	ASP	2
1	A	125	LEU	2
1	A	262	GLU	2
1	A	236	ILE	2
1	A	5	GLU	2
1	A	210	THR	2
1	A	115	PHE	2
1	A	157	SER	2
1	A	17	ASP	1
1	A	44	LYS	1
1	A	244	ILE	1
1	A	163	GLU	1
1	A	206	HIS	1
1	A	47	GLN	1
1	A	175	VAL	1
1	A	232	THR	1
1	A	37	SER	1
1	A	120	LYS	1

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Mol	Chain	Res	Type	Models (Total)
1	A	295	MET	1
1	A	211	LEU	1
1	A	251	THR	1
1	A	54	HIS	1
1	A	77	GLN	1
1	A	79	THR	1
1	A	93	SER	1
1	A	194	TYR	1
1	A	274	HIS	1
1	A	3	LYS	1
1	A	201	ILE	1
1	A	4	VAL	1
1	A	143	PHE	1
1	A	196	LYS	1
1	A	250	LYS	1
1	A	267	PHE	1
1	A	2	GLN	1
1	A	27	HIS	1
1	A	87	ASP	1
1	A	78	VAL	1
1	A	142	TYR	1
1	A	74	VAL	1
1	A	172	TYR	1
1	A	200	ASN	1
1	A	221	TYR	1
1	A	280	HIS	1
1	A	46	SER	1
1	A	49	VAL	1
1	A	226	ILE	1
1	A	290	PHE	1
1	A	53	GLU	1
1	A	88	SER	1
1	A	297	LEU	1
1	A	70	ASP	1
1	A	83	VAL	1
1	A	90	ILE	1

6.3.3 RNA

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates

There are no monosaccharides in this entry.

6.6 Ligand geometry

There are no ligands in this entry.

6.7 Other polymers

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

The completeness of assignment taking into account all chemical shift lists is 67% for the well-defined parts and 67% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chem_shift_list_1*

7.1.1 Bookkeeping

The following table shows the results of parsing the chemical shift list and reports the number of nuclei with statistically unusual chemical shifts.

Total number of shifts	2538
Number of shifts mapped to atoms	2537
Number of unparsed shifts	0
Number of shifts with mapping errors	1
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	11

The following assigned chemical shifts were not mapped to the molecules present in the coordinate file.

- No matching atom found in the structure. All 1 occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	1	ALA	H	8.114	0.02	1

7.1.2 Chemical shift referencing

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction ± precision, *ppm*	Suggested action
$^{13}C_{\alpha}$	261	0.01 ± 0.12	None needed (< 0.5 ppm)
$^{13}C_{\beta}$	240	-0.09 ± 0.11	None needed (< 0.5 ppm)
$^{13}C'$	0	—	None (insufficient data)
^{15}N	285	0.13 ± 0.28	None needed (< 0.5 ppm)

7.1.3 Completeness of resonance assignments (i)

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 67%, i.e. 2435 atoms were assigned a chemical shift out of a possible 3638. 0 out of 41 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	1085/1458 (74%)	557/609 (91%)	253/570 (44%)	275/279 (99%)
Sidechain	1249/1822 (69%)	786/1182 (66%)	449/588 (76%)	14/52 (27%)
Aromatic	101/358 (28%)	65/177 (37%)	35/171 (20%)	1/10 (10%)
Overall	2435/3638 (67%)	1408/1968 (72%)	737/1329 (55%)	290/341 (85%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 67%, i.e. 2538 atoms were assigned a chemical shift out of a possible 3803. 0 out of 43 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	1125/1524 (74%)	579/635 (91%)	261/598 (44%)	285/291 (98%)
Sidechain	1312/1914 (69%)	828/1243 (67%)	470/618 (76%)	14/53 (26%)
Aromatic	101/365 (28%)	65/181 (36%)	35/173 (20%)	1/11 (9%)
Overall	2538/3803 (67%)	1472/2059 (71%)	766/1389 (55%)	300/355 (85%)

7.1.4 Statistically unusual chemical shifts (i)

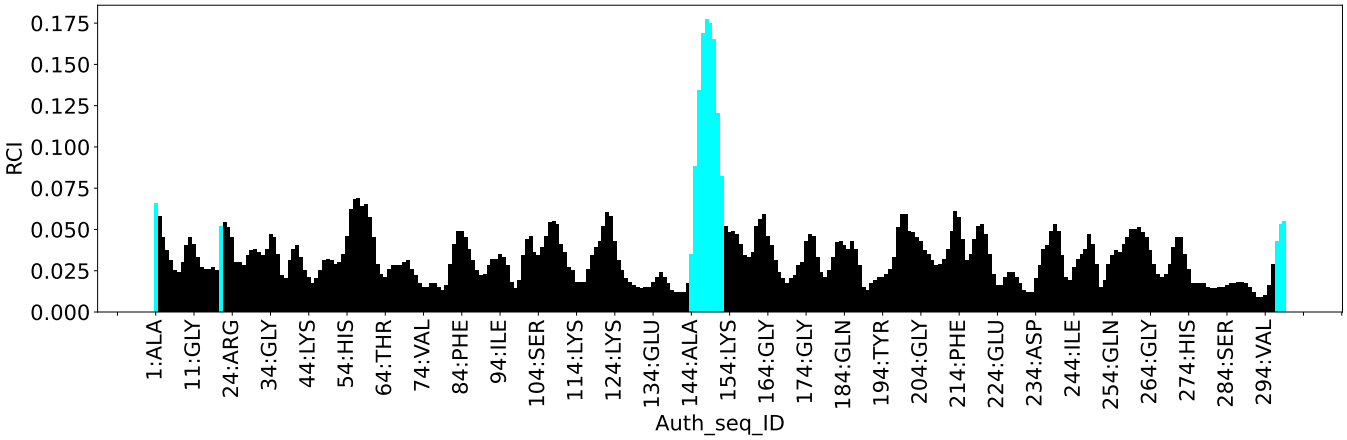
The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

List Id	Chain	Res	Type	Atom	Shift, *ppm*	Expected range, *ppm*	Z-score
1	A	191	LYS	HE2	0.89	1.95 – 3.88	-10.5
1	A	7	GLY	HA3	1.33	2.08 – 5.71	-7.1
1	A	3	LYS	HE2	1.71	1.95 – 3.88	-6.2
1	A	254	GLN	HE22	9.57	4.88 – 9.19	5.9
1	A	3	LYS	HG3	-0.19	0.04 – 2.67	-5.9
1	A	155	LYS	HG3	-0.15	0.04 – 2.67	-5.7
1	A	78	VAL	HB	0.21	0.43 – 3.54	-5.7
1	A	195	ASN	HB2	1.06	1.27 – 4.34	-5.7
1	A	191	LYS	HD3	0.43	0.54 – 2.65	-5.5
1	A	155	LYS	HE2	1.87	1.95 – 3.88	-5.4
1	A	163	GLU	HB2	0.93	1.00 – 3.05	-5.3

7.1.5 Random Coil Index (RCI) plots

The image below reports *random coil index* values for the protein chains in the structure. The height of each bar gives a probability of a given residue to be disordered, as predicted from the available chemical shifts and the amino acid sequence. A value above 0.2 is an indication of significant predicted disorder. The colour of the bar shows whether the residue is in the well-defined core (black) or in the ill-defined residue ranges (cyan), as described in section 2 on ensemble composition.If well-defined core and ill-defined regions are not identified then it is shown as gray bars.

Random coil index (RCI) for chain A:



8 NMR restraints analysis

8.1 Conformationally restricting restraints

The following table provides the summary of experimentally observed NMR restraints in different categories. Restraints are classified into different categories based on the sequence separation of the atoms involved.

Description	Value
Total distance restraints	1980
Intra-residue (|i-j|=0)	524
Sequential (|i-j|=1)	666
Medium range (|i-j|>1 and |i-j|<5)	111
Long range (|i-j|≥5)	679
Inter-chain	0
Hydrogen bond restraints	0
Disulfide bond restraints	0
Total dihedral-angle restraints	0
Number of unmapped restraints	1
Number of restraints per residue	6.6
Number of long range restraints per residue[1]	2.3

[1]Long range hydrogen bonds and disulfide bonds are counted as long range restraints while calculating the number of long range restraints per residue

8.2 Residual restraint violations

This section provides the overview of the restraint violations analysis. The violations are binned as small, medium and large violations based on its absolute value. Average number of violations per model is calculated by dividing the total number of violations in each bin by the size of the ensemble.

8.2.1 Average number of distance violations per model

Distance violations less than 0.1 Å are not included in the calculation.

Bins (Å)	Average number of violations per model	Max (Å)
0.1-0.2 (Small)	0.7	0.19
0.2-0.5 (Medium)	0.7	0.45
>0.5 (Large)	1.6	1.83

8.2.2 Average number of dihedral-angle violations per model (i)

Dihedral-angle violations less than 1° are not included in the calculation.There are no dihedral-angle violations

9 Distance violation analysis (i)

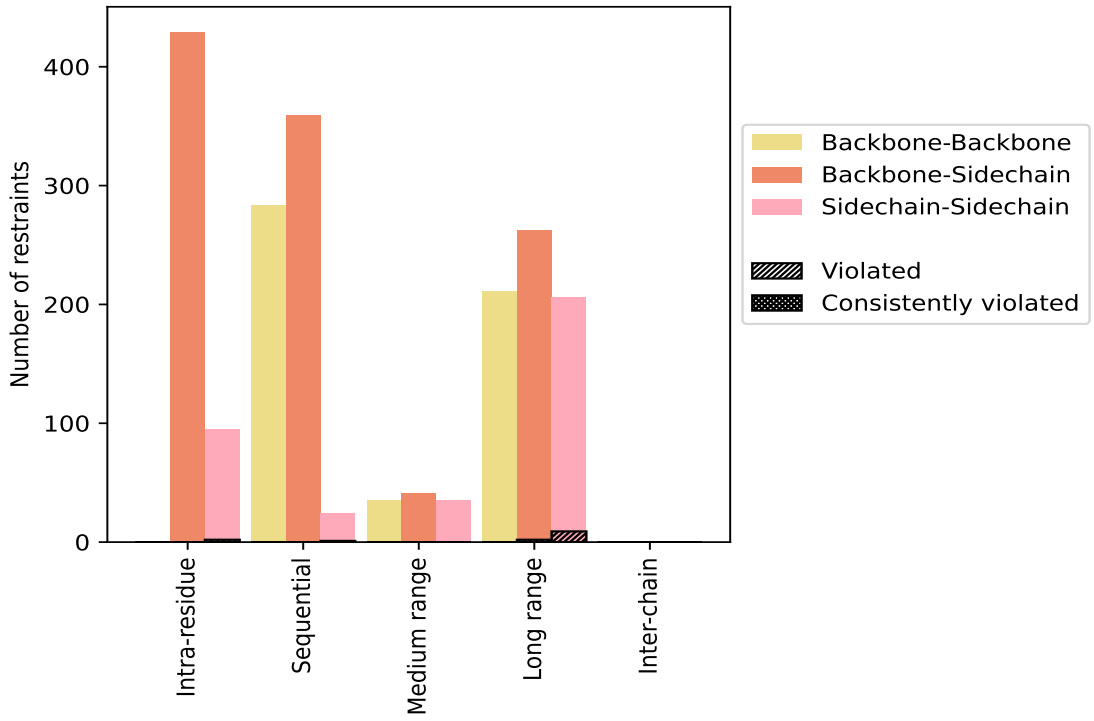
9.1 Summary of distance violations (i)

The following table shows the summary of distance violations in different restraint categories based on the sequence separation of the atoms involved. Each category is further sub-divided into three sub-categories based on the atoms involved. Violations less than 0.1 Å are not included in the statistics.

Restraints type	Count	%[1]	Violated[3]			Consistently Violated[4]		
			Count	%[2]	%[1]	Count	%[2]	%[1]
Intra-residue (|i-j|=0)	524	26.5	2	0.4	0.1	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	429	21.7	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	95	4.8	2	2.1	0.1	0	0.0	0.0
Sequential (|i-j|=1)	666	33.6	1	0.2	0.1	0	0.0	0.0
Backbone-Backbone	283	14.3	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	359	18.1	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	24	1.2	1	4.2	0.1	0	0.0	0.0
Medium range (|i-j|>1 & |i-j|<5)	111	5.6	0	0.0	0.0	0	0.0	0.0
Backbone-Backbone	35	1.8	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	41	2.1	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	35	1.8	0	0.0	0.0	0	0.0	0.0
Long range (|i-j|≥5)	679	34.3	11	1.6	0.6	0	0.0	0.0
Backbone-Backbone	211	10.7	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	262	13.2	2	0.8	0.1	0	0.0	0.0
Sidechain-Sidechain	206	10.4	9	4.4	0.5	0	0.0	0.0
Inter-chain	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Hydrogen bond	0	0.0	0	0.0	0.0	0	0.0	0.0
Disulfide bond	0	0.0	0	0.0	0.0	0	0.0	0.0
Total	1980	100.0	14	0.7	0.7	0	0.0	0.0
Backbone-Backbone	529	26.7	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	1091	55.1	2	0.2	0.1	0	0.0	0.0
Sidechain-Sidechain	360	18.2	12	3.3	0.6	0	0.0	0.0

[1] percentage calculated with respect to the total number of distance restraints, [2] percentage calculated with respect to the number of restraints in a particular restraint category, [3] violated in at least one model, [4] violated in all the models

9.1.1 Bar chart : Distribution of distance restraints and violations



Violated and consistently violated restraints are shown using different hatch patterns in their respective categories. The hydrogen bonds and disulfied bonds are counted in their appropriate category on the x-axis

9.2 Distance violation statistics for each model

The following table provides the distance violation statistics for each model in the ensemble. Violations less than 0.1 Å are not included in the statistics.

Model ID	Number of violations						Mean (Å)	Max (Å)	SD[6] (Å)	Median (Å)
	IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total				
1	0	0	0	4	0	4	0.82	1.7	0.62	0.74
2	1	0	0	2	0	3	1.01	1.43	0.44	1.19
3	0	0	0	3	0	3	1.02	1.79	0.61	0.98
4	0	0	0	2	0	2	0.22	0.3	0.08	0.22
5	0	0	0	2	0	2	0.44	0.78	0.34	0.44
6	0	0	0	3	0	3	0.62	1.43	0.58	0.32
7	0	0	0	2	0	2	1.38	1.83	0.45	1.38
8	0	0	0	1	0	1	1.18	1.18	0.0	1.18
9	0	0	0	5	0	5	0.83	1.83	0.64	0.8
10	1	0	0	1	0	2	0.65	0.99	0.34	0.65
11	1	0	0	5	0	6	0.83	1.72	0.62	0.75

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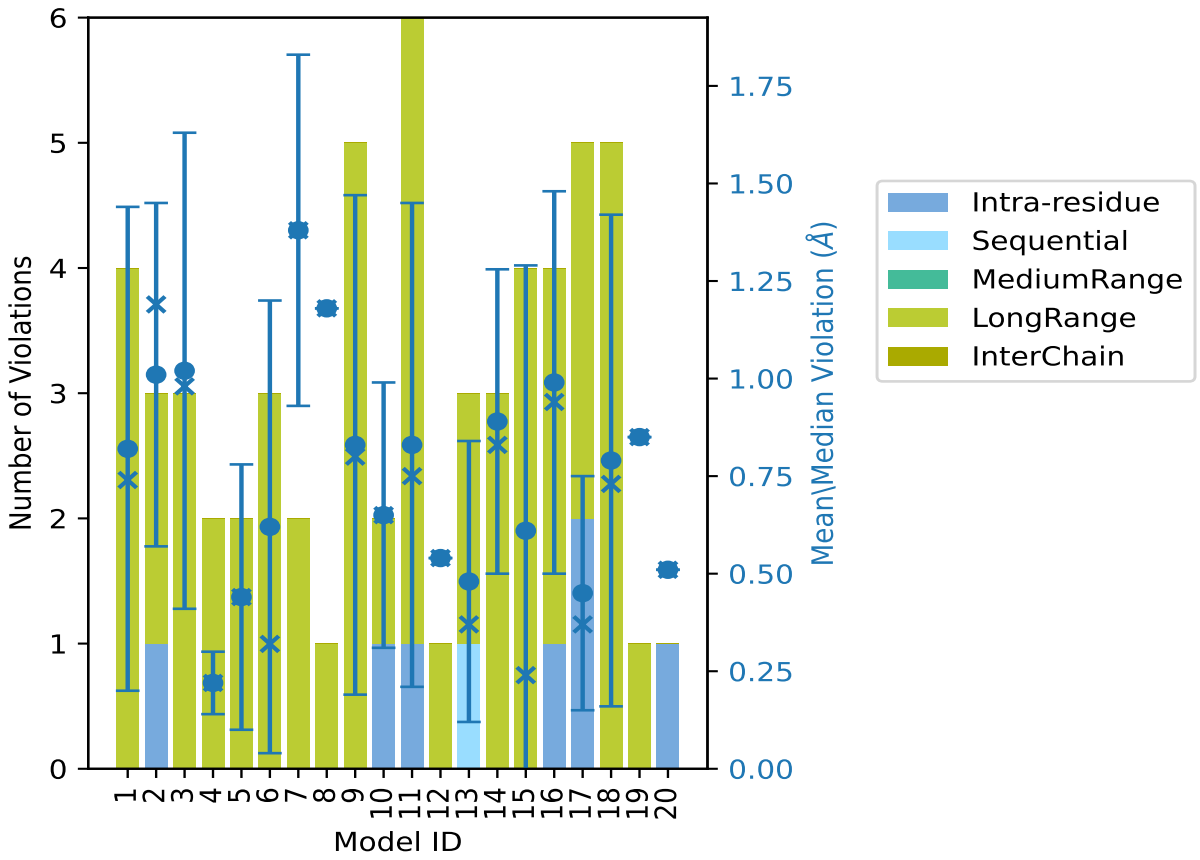
Model ID	Number of violations						Mean (Å)	Max (Å)	SD[6] (Å)	Median (Å)
	IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total				
12	0	0	0	1	0	1	0.54	0.54	0.0	0.54
13	0	1	0	2	0	3	0.48	0.96	0.36	0.37
14	0	0	0	3	0	3	0.89	1.4	0.39	0.83
15	0	0	0	4	0	4	0.61	1.79	0.68	0.24
16	1	0	0	3	0	4	0.99	1.68	0.49	0.94
17	2	0	0	3	0	5	0.45	0.98	0.3	0.37
18	0	0	0	5	0	5	0.79	1.75	0.63	0.73
19	0	0	0	1	0	1	0.85	0.85	0.0	0.85
20	1	0	0	0	0	1	0.51	0.51	0.0	0.51

[1]Intra-residue restraints, [2]Sequential restraints, [3]Medium range restraints, [4]Long range restraints, [5]Inter-chain restraints, [6]Standard deviation

9.2.1 Bar graph : Distance Violation statistics for each model



The mean(dot),median(x) and the standard deviation are shown in blue with respect to the y axis on the right

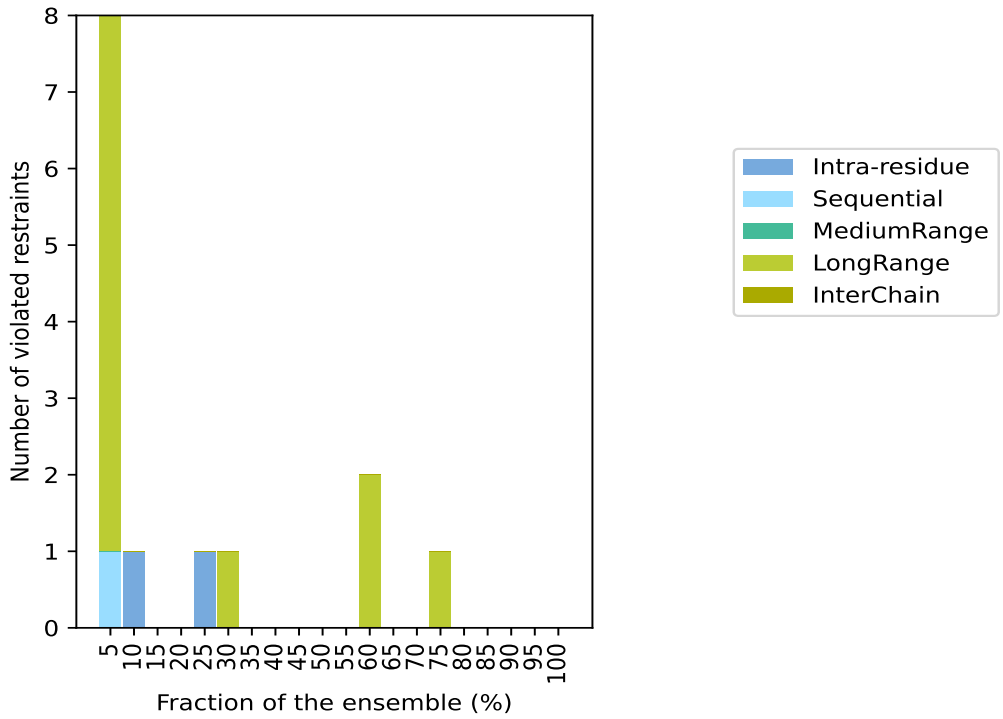
9.3 Distance violation statistics for the ensemble (i)

Violation analysis may find that some restraints are violated in few models and some are violated in most of models. The following table provides this information as number of violated restraints for a given fraction of the ensemble. In total, 1966(IR:522, SQ:665, MR:111, LR:668, IC:0) restraints are not violated in the ensemble.

Number of violated restraints						Fraction of the ensemble	
IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total	Count[6]	%
0	1	0	7	0	8	1	5.0
1	0	0	0	0	1	2	10.0
0	0	0	0	0	0	3	15.0
0	0	0	0	0	0	4	20.0
1	0	0	0	0	1	5	25.0
0	0	0	1	0	1	6	30.0
0	0	0	0	0	0	7	35.0
0	0	0	0	0	0	8	40.0
0	0	0	0	0	0	9	45.0
0	0	0	0	0	0	10	50.0
0	0	0	0	0	0	11	55.0
0	0	0	2	0	2	12	60.0
0	0	0	0	0	0	13	65.0
0	0	0	0	0	0	14	70.0
0	0	0	1	0	1	15	75.0
0	0	0	0	0	0	16	80.0
0	0	0	0	0	0	17	85.0
0	0	0	0	0	0	18	90.0
0	0	0	0	0	0	19	95.0
0	0	0	0	0	0	20	100.0

[1]Intra-residue restraints, [2]Sequential restraints, [3]Medium range restraints, [4]Long range restraints, [5]Inter-chain restraints, [6] Number of models with violations

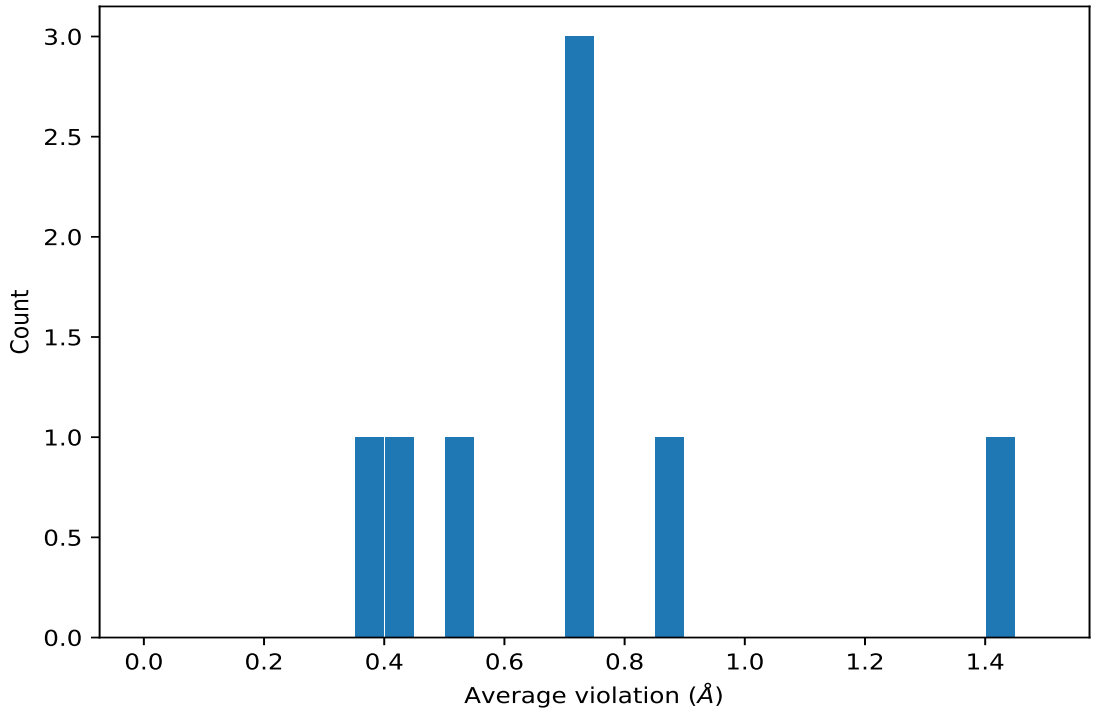
9.3.1 Bar graph : Distance violation statistics for the ensemble



9.4 Most violated distance restraints in the ensemble

9.4.1 Histogram : Distribution of mean distance violations

The following histogram shows the distribution of the average value of the violation. The average is calculated for each restraint that is violated in more than one model over all the violated models in the ensemble



9.4.2 Table: Most violated distance restraints (i)

The following table provides the mean and the standard deviation of the violation for each restraint sorted by number of violated models and the mean value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.

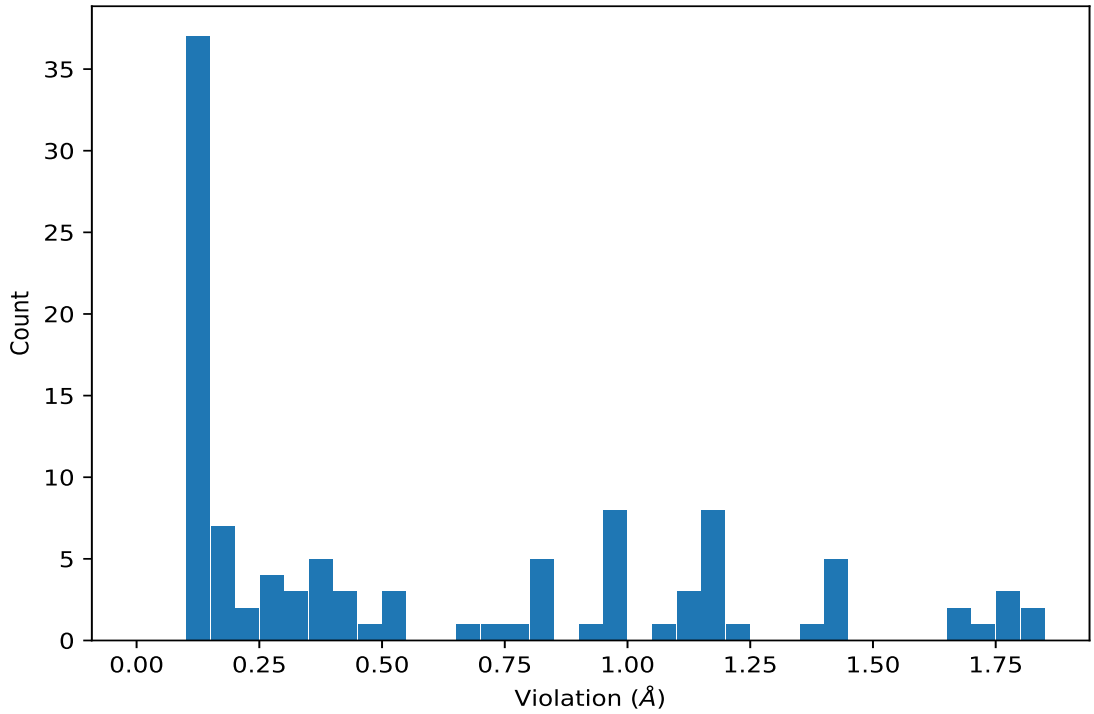
Key	Atom-1	Atom-2	Models[1]	Mean (Å)	SD[1] (Å)	Median (Å)
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	15	0.89	0.42	0.94
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	12	1.41	0.54	1.69
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	12	0.74	0.45	0.9
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	12	0.74	0.45	0.9
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	12	0.74	0.45	0.9
(1,1461)	1:A:246:MET:HE1	1:A:262:GLU:HA	6	0.44	0.24	0.34
(1,1778)	1:A:295:MET:HG2	1:A:295:MET:HE1	5	0.38	0.03	0.4
(1,1255)	1:A:94:ILE:HG21	1:A:94:ILE:HD11	2	0.52	0.02	0.52

[1]Number of violated models, [2]Standard deviation

9.5 All violated distance restraints (i)

9.5.1 Histogram : Distribution of distance violations (i)

The following histogram shows the distribution of the absolute value of the violation for all violated restraints in the ensemble.



9.5.2 Table : All distance violations (i)

The following table lists the absolute value of the violation for each restraint in the ensemble sorted by its value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.

Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	7	1.83
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	9	1.83
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	15	1.79
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	3	1.79
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	18	1.75
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	11	1.72
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	1	1.7
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	16	1.68
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	11	1.43
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	2	1.43

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	6	1.43
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	6	1.43
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	6	1.43
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	14	1.4
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	9	1.21
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	18	1.19
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	2	1.19
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	2	1.19
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	2	1.19
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	16	1.19
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	16	1.19
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	16	1.19
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	8	1.18
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	11	1.1
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	11	1.1
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	11	1.1
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	1	1.08
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	10	0.99
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	10	0.99
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	10	0.99
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	3	0.98
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	17	0.98
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	17	0.98
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	17	0.98
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	13	0.96
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	7	0.94
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	19	0.85
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	14	0.83
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	14	0.83
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	14	0.83
(1,1461)	1:A:246:MET:HE1	1:A:262:GLU:HA	9	0.8
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	5	0.78
(1,1461)	1:A:246:MET:HE1	1:A:262:GLU:HA	18	0.73
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	16	0.69
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	12	0.54
(1,1255)	1:A:94:ILE:HG21	1:A:94:ILE:HD11	17	0.54
(1,1255)	1:A:94:ILE:HG21	1:A:94:ILE:HD11	20	0.51
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	14	0.45
(1,1778)	1:A:295:MET:HG2	1:A:295:MET:HE1	2	0.4
(1,1778)	1:A:295:MET:HG2	1:A:295:MET:HE1	11	0.4
(1,1778)	1:A:295:MET:HG2	1:A:295:MET:HE1	16	0.4
(1,1461)	1:A:246:MET:HE1	1:A:262:GLU:HA	1	0.39

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1778)	1:A:295:MET:HG2	1:A:295:MET:HE1	17	0.37
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	13	0.37
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	13	0.37
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	13	0.37
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	15	0.33
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	6	0.32
(1,1778)	1:A:295:MET:HG2	1:A:295:MET:HE1	10	0.31
(1,1461)	1:A:246:MET:HE1	1:A:262:GLU:HA	3	0.3
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	4	0.3
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	4	0.3
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	4	0.3
(1,1461)	1:A:246:MET:HE1	1:A:262:GLU:HA	11	0.23
(1,1300)	1:A:246:MET:HE1	1:A:262:GLU:H	17	0.23
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	9	0.19
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	9	0.19
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	9	0.19
(1,1461)	1:A:246:MET:HE1	1:A:262:GLU:HA	15	0.16
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	15	0.16
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	15	0.16
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	15	0.16
(1,1462)	1:A:246:MET:HE1	1:A:262:GLU:HG2	4	0.15
(1,1238)	1:A:277:VAL:HG21	1:A:295:MET:HE1	18	0.14
(1,1238)	1:A:277:VAL:HG22	1:A:295:MET:HE1	18	0.14
(1,1238)	1:A:277:VAL:HG23	1:A:295:MET:HE1	18	0.14
(1,1922)	1:A:159:ILE:HG21	1:A:233:TYR:HE1	18	0.12
(1,1922)	1:A:159:ILE:HG21	1:A:233:TYR:HE2	18	0.12
(1,1922)	1:A:159:ILE:HG22	1:A:233:TYR:HE1	18	0.12
(1,1922)	1:A:159:ILE:HG22	1:A:233:TYR:HE2	18	0.12
(1,1922)	1:A:159:ILE:HG23	1:A:233:TYR:HE1	18	0.12
(1,1922)	1:A:159:ILE:HG23	1:A:233:TYR:HE2	18	0.12
(1,867)	1:A:76:VAL:HG21	1:A:96:PHE:HE1	11	0.11
(1,867)	1:A:76:VAL:HG21	1:A:96:PHE:HE2	11	0.11
(1,867)	1:A:76:VAL:HG22	1:A:96:PHE:HE1	11	0.11
(1,867)	1:A:76:VAL:HG22	1:A:96:PHE:HE2	11	0.11
(1,867)	1:A:76:VAL:HG23	1:A:96:PHE:HE1	11	0.11
(1,867)	1:A:76:VAL:HG23	1:A:96:PHE:HE2	11	0.11
(1,856)	1:A:24:ARG:HD2	1:A:43:ALA:HB1	17	0.11
(1,856)	1:A:24:ARG:HD2	1:A:43:ALA:HB2	17	0.11
(1,856)	1:A:24:ARG:HD2	1:A:43:ALA:HB3	17	0.11
(1,1793)	1:A:33:ASP:HB2	1:A:90:ILE:HD11	5	0.11
(1,1793)	1:A:33:ASP:HB2	1:A:90:ILE:HD12	5	0.11
(1,1793)	1:A:33:ASP:HB2	1:A:90:ILE:HD13	5	0.11

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1360)	1:A:229:VAL:HG21	1:A:267:PHE:HE1	9	0.11
(1,1360)	1:A:229:VAL:HG21	1:A:267:PHE:HE2	9	0.11
(1,1360)	1:A:229:VAL:HG22	1:A:267:PHE:HE1	9	0.11
(1,1360)	1:A:229:VAL:HG22	1:A:267:PHE:HE2	9	0.11
(1,1360)	1:A:229:VAL:HG23	1:A:267:PHE:HE1	9	0.11
(1,1360)	1:A:229:VAL:HG23	1:A:267:PHE:HE2	9	0.11
(1,1280)	1:A:224:GLU:HG2	1:A:251:THR:HG21	6	0.11
(1,1280)	1:A:224:GLU:HG2	1:A:251:THR:HG22	6	0.11
(1,1280)	1:A:224:GLU:HG2	1:A:251:THR:HG23	6	0.11
(1,1275)	1:A:15:TRP:HD1	1:A:132:ALA:HB1	1	0.11
(1,1275)	1:A:15:TRP:HD1	1:A:132:ALA:HB2	1	0.11
(1,1275)	1:A:15:TRP:HD1	1:A:132:ALA:HB3	1	0.11
(1,1166)	1:A:1:ALA:HB1	1:A:2:GLN:HB2	13	0.11
(1,1166)	1:A:1:ALA:HB2	1:A:2:GLN:HB2	13	0.11
(1,1166)	1:A:1:ALA:HB3	1:A:2:GLN:HB2	13	0.11

10 Dihedral-angle violation analysis (i)

Dihedral angle analysis failed due to data error in the dihedral angle restraints, possibly missing target value