



Full wwPDB NMR Structure Validation Report ⓘ

Feb 12, 2017 – 08:43 pm GMT

PDB ID : 1Y0J
Title : Zinc fingers as protein recognition motifs: structural basis for the GATA-1/Friend of GATA interaction
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Deposited on : 2004-11-15

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
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
ShiftChecker : trunk28760
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : recalc28949

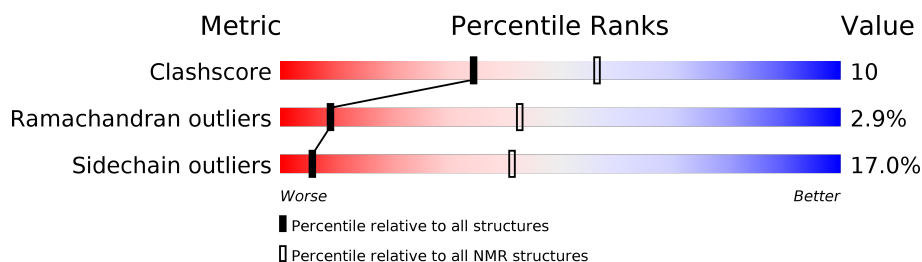
1 Overall quality at a glance

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	125131	11601
Ramachandran outliers	121729	10391
Sidechain outliers	121581	10367

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	46	 59% 26% 15%
2	B	36	 61% 33% 6%

2 Ensemble composition and analysis

This entry contains 20 models. Model 15 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:200-A:238, B:1-B:34 (73)	0.95	15

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 4 clusters and 3 single-model clusters were found.

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

3 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1139 atoms, of which 556 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Erythroid transcription factor.

Mol	Chain	Residues	Atoms						Trace
1	A	39	Total	C	H	N	O	S	0
			589	183	284	62	55	5	

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	198	GLY	-	EXPRESSION TAG	UNP P17679
A	199	SER	-	EXPRESSION TAG	UNP P17679

- Molecule 2 is a protein called Zinc-finger protein ush.

Mol	Chain	Residues	Atoms						Trace
2	B	36	Total	C	H	N	O	S	0
			548	176	272	48	48	4	

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1	GLY	-	EXPRESSION TAG	UNP Q9VPQ6
B	2	SER	-	EXPRESSION TAG	UNP Q9VPQ6

- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

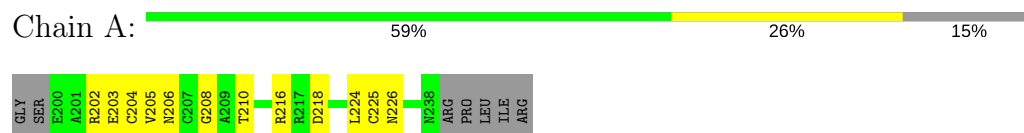
Mol	Chain	Residues	Atoms	
3	B	1	Total	Zn
			1	1
3	A	1	Total	Zn
			1	1

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: Erythroid transcription factor



- Molecule 2: Zinc-finger protein ush

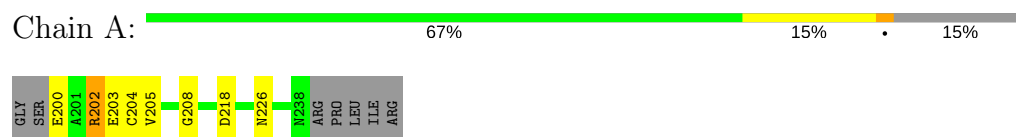


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

- Molecule 1: Erythroid transcription factor

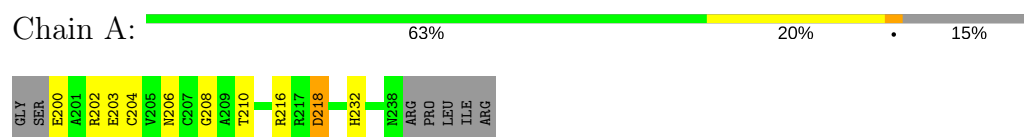


- Molecule 2: Zinc-finger protein ush

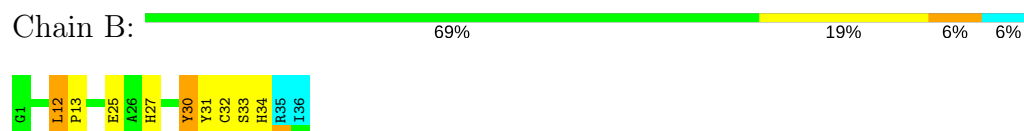


4.2.2 Score per residue for model 2

- Molecule 1: Erythroid transcription factor

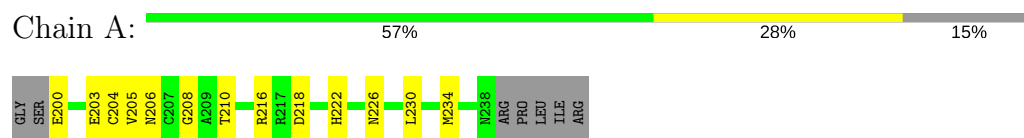


- Molecule 2: Zinc-finger protein ush

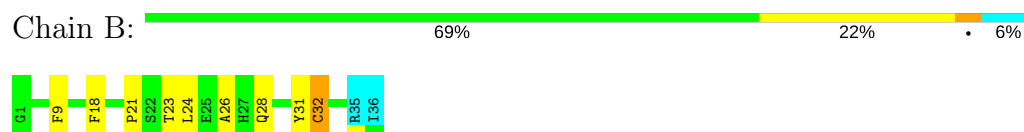


4.2.3 Score per residue for model 3

- Molecule 1: Erythroid transcription factor

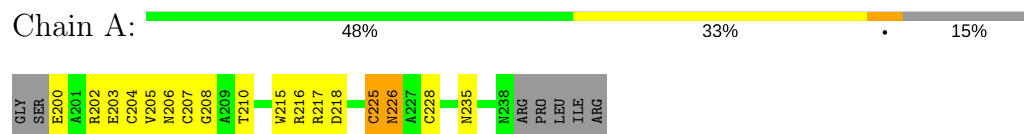


- Molecule 2: Zinc-finger protein ush

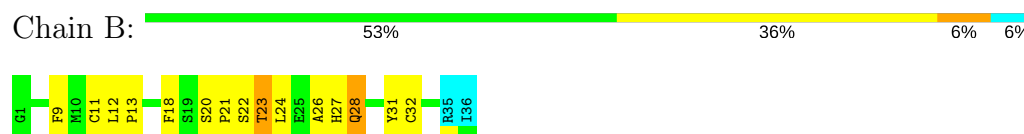


4.2.4 Score per residue for model 4

- Molecule 1: Erythroid transcription factor

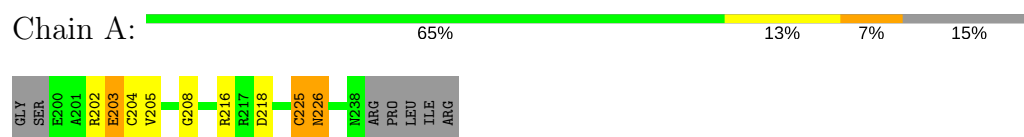


- Molecule 2: Zinc-finger protein ush

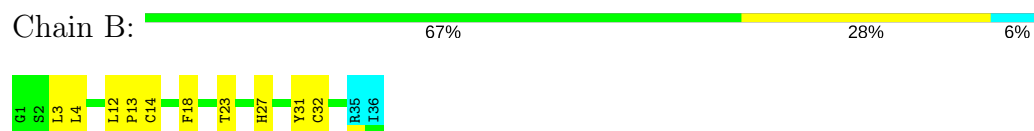


4.2.5 Score per residue for model 5

- Molecule 1: Erythroid transcription factor

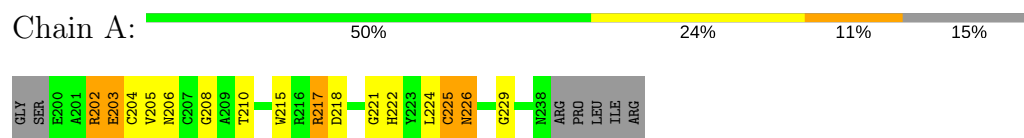


- Molecule 2: Zinc-finger protein ush



4.2.6 Score per residue for model 6

- Molecule 1: Erythroid transcription factor



- Molecule 2: Zinc-finger protein ush



4.2.7 Score per residue for model 7

- Molecule 1: Erythroid transcription factor

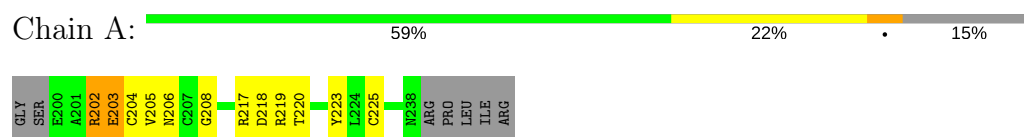


- Molecule 2: Zinc-finger protein ush

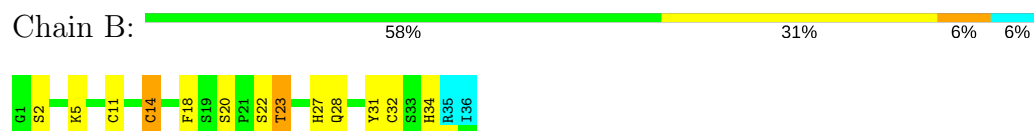


4.2.8 Score per residue for model 8

- Molecule 1: Erythroid transcription factor

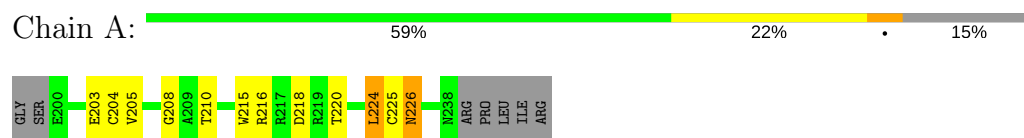


- Molecule 2: Zinc-finger protein ush

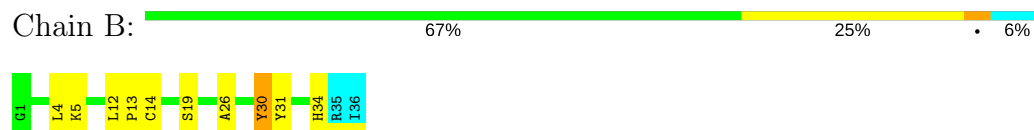


4.2.9 Score per residue for model 9

- Molecule 1: Erythroid transcription factor

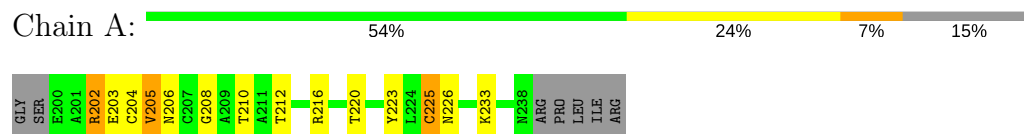


- Molecule 2: Zinc-finger protein ush

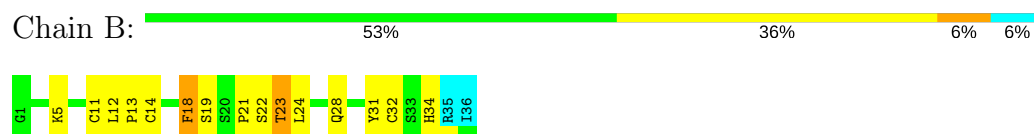


4.2.10 Score per residue for model 10

- Molecule 1: Erythroid transcription factor

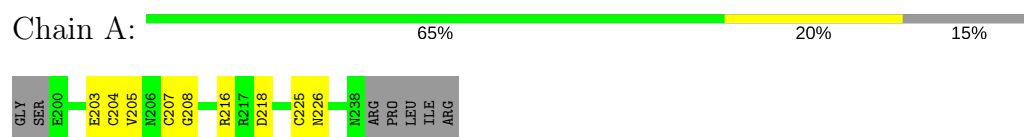


- Molecule 2: Zinc-finger protein ush



4.2.11 Score per residue for model 11

- Molecule 1: Erythroid transcription factor

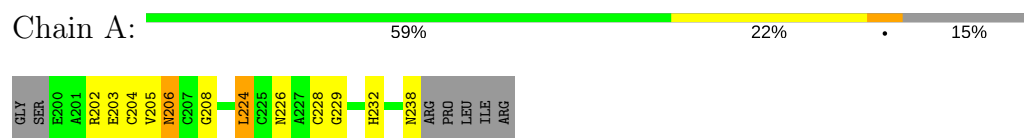


- Molecule 2: Zinc-finger protein ush

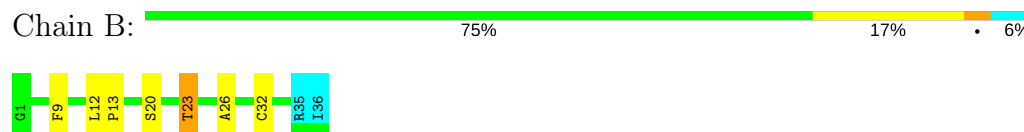


4.2.12 Score per residue for model 12

- Molecule 1: Erythroid transcription factor

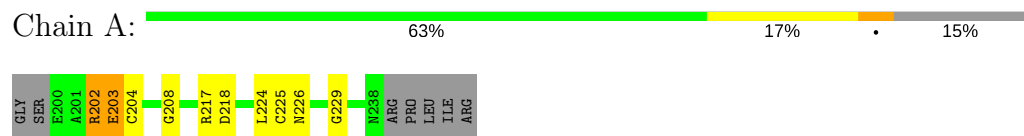


- Molecule 2: Zinc-finger protein ush

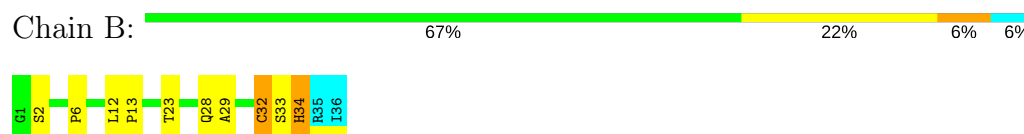


4.2.13 Score per residue for model 13

- Molecule 1: Erythroid transcription factor

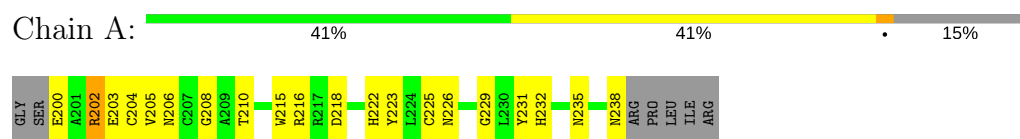


- Molecule 2: Zinc-finger protein ush

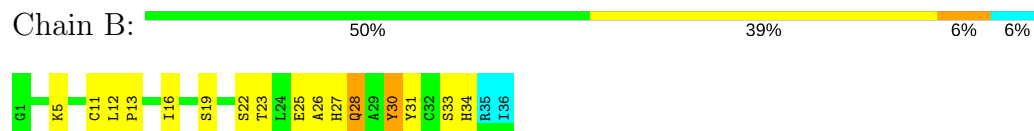


4.2.14 Score per residue for model 14

- Molecule 1: Erythroid transcription factor

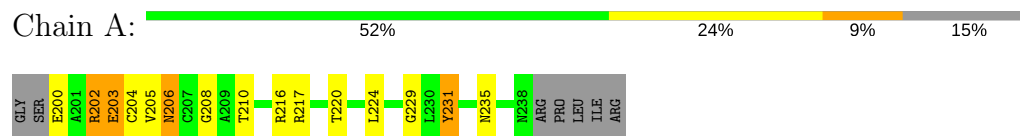


- Molecule 2: Zinc-finger protein ush



4.2.15 Score per residue for model 15 (medoid)

- Molecule 1: Erythroid transcription factor

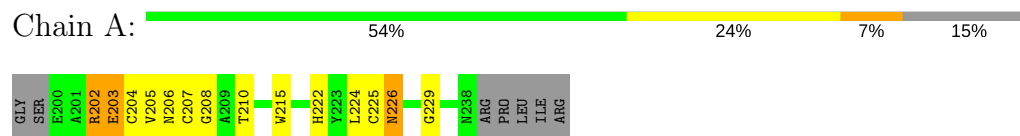


- Molecule 2: Zinc-finger protein ush

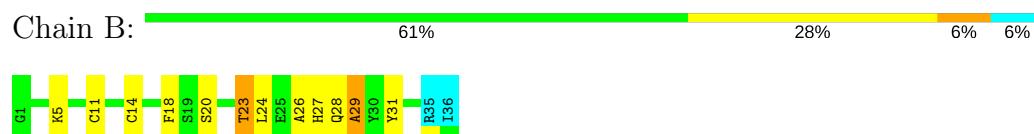


4.2.16 Score per residue for model 16

- Molecule 1: Erythroid transcription factor

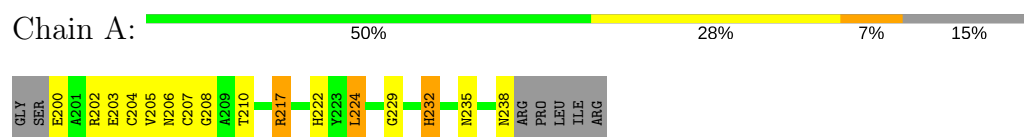


- Molecule 2: Zinc-finger protein ush



4.2.17 Score per residue for model 17

- Molecule 1: Erythroid transcription factor

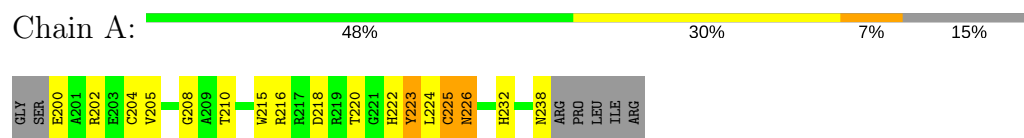


- Molecule 2: Zinc-finger protein ush



4.2.18 Score per residue for model 18

- Molecule 1: Erythroid transcription factor

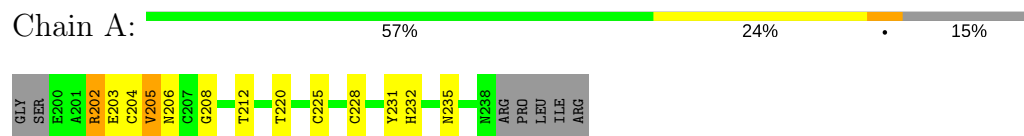


- Molecule 2: Zinc-finger protein ush

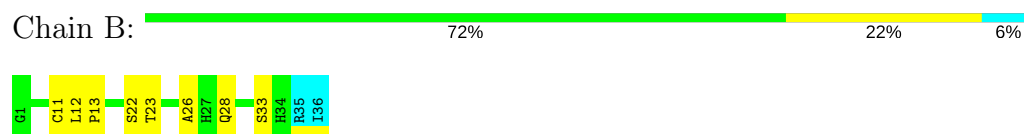


4.2.19 Score per residue for model 19

- Molecule 1: Erythroid transcription factor

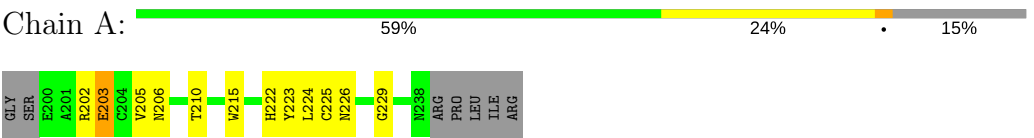


- Molecule 2: Zinc-finger protein ush



4.2.20 Score per residue for model 20

- Molecule 1: Erythroid transcription factor



- Molecule 2: Zinc-finger protein ush



5 Refinement protocol and experimental data overview ⓘ

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

Of the 100 calculated structures, 20 were deposited, based on the following criterion: *structures with the lowest energy*.

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

Software name	Classification	Version
ARIA	structure solution	1.2
Haddock	structure solution	1.0
Haddock	refinement	1.0

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](#)

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

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	305	284	281	7±2
2	B	256	248	247	5±2
All	All	11260	10640	10560	221

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 10.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:205:VAL:HG12	2:B:23:THR:HA	0.89	1.43	14	3
1:A:205:VAL:HB	2:B:26:ALA:HB3	0.85	1.47	14	7
1:A:204:CYS:HB3	1:A:208:GLY:H	0.83	1.30	5	14
2:B:11:CYS:HB2	2:B:14:CYS:SG	0.77	2.19	16	2
1:A:231:TYR:HA	1:A:235:ASN:HB2	0.76	1.58	19	1
1:A:204:CYS:H	1:A:208:GLY:HA2	0.68	1.49	9	3
2:B:28:GLN:HA	2:B:32:CYS:SG	0.66	2.30	1	3
2:B:28:GLN:HA	2:B:32:CYS:HB2	0.66	1.68	10	7
2:B:5:LYS:HA	2:B:5:LYS:HE2	0.64	1.70	9	2
2:B:12:LEU:HB2	2:B:13:PRO:HD3	0.63	1.69	11	15
1:A:206:ASN:HB2	1:A:228:CYS:HB3	0.62	1.72	12	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:11:CYS:HB3	2:B:14:CYS:SG	0.62	2.34	1	3
1:A:224:LEU:HD13	1:A:229:GLY:HA2	0.61	1.71	20	2
2:B:27:HIS:HD2	2:B:32:CYS:SG	0.58	2.19	18	4
1:A:205:VAL:HG11	2:B:26:ALA:HB3	0.58	1.75	4	4
2:B:14:CYS:SG	2:B:31:TYR:HB3	0.57	2.39	5	1
1:A:206:ASN:HB2	1:A:228:CYS:SG	0.57	2.40	4	1
1:A:200:GLU:N	1:A:210:THR:HG1	0.55	2.00	4	3
1:A:210:THR:HA	1:A:215:TRP:HZ2	0.55	1.62	7	2
2:B:5:LYS:HE2	2:B:5:LYS:HA	0.55	1.78	16	3
2:B:11:CYS:SG	2:B:13:PRO:HD2	0.55	2.42	14	4
2:B:2:SER:HB2	2:B:6:PRO:HA	0.55	1.78	13	1
1:A:212:THR:HB	1:A:225:CYS:HB2	0.54	1.79	19	1
2:B:18:PHE:CE2	2:B:23:THR:HB	0.54	2.37	4	2
2:B:21:PRO:HA	2:B:24:LEU:HD12	0.54	1.80	4	1
2:B:18:PHE:HE2	2:B:27:HIS:HB2	0.54	1.61	7	1
1:A:205:VAL:CB	2:B:26:ALA:HB3	0.53	2.28	14	3
1:A:202:ARG:HD3	1:A:203:GLU:OE2	0.53	2.04	5	1
2:B:16:ILE:HD12	2:B:27:HIS:HE1	0.53	1.64	17	1
1:A:200:GLU:HG3	1:A:210:THR:HG21	0.53	1.80	17	2
1:A:202:ARG:NE	1:A:202:ARG:HA	0.52	2.19	1	3
1:A:210:THR:HA	1:A:215:TRP:CZ2	0.52	2.39	7	4
1:A:205:VAL:HG21	2:B:26:ALA:HB1	0.51	1.82	18	2
1:A:204:CYS:HB3	1:A:208:GLY:N	0.51	2.20	15	11
1:A:232:HIS:CE1	1:A:238:ASN:HA	0.51	2.40	18	3
1:A:222:HIS:CD2	2:B:26:ALA:HB2	0.51	2.41	3	1
2:B:5:LYS:HE2	2:B:6:PRO:HD2	0.51	1.82	6	1
1:A:202:ARG:O	1:A:210:THR:HB	0.51	2.06	10	1
1:A:205:VAL:HG11	2:B:26:ALA:HB1	0.50	1.83	19	1
1:A:223:TYR:HB2	2:B:23:THR:HG23	0.50	1.82	20	1
2:B:29:ALA:O	2:B:34:HIS:HA	0.50	2.07	17	1
1:A:206:ASN:HD21	2:B:30:TYR:CB	0.50	2.20	2	1
1:A:200:GLU:HA	1:A:210:THR:HG21	0.50	1.83	2	1
1:A:219:ARG:HE	1:A:219:ARG:HA	0.50	1.66	7	1
1:A:203:GLU:HB2	2:B:23:THR:HG21	0.49	1.82	20	1
1:A:210:THR:HA	1:A:215:TRP:CH2	0.49	2.42	20	2
1:A:212:THR:OG1	1:A:226:ASN:HB2	0.49	2.07	10	1
1:A:205:VAL:HG23	1:A:206:ASN:HD22	0.49	1.67	3	5
1:A:230:LEU:O	1:A:234:MET:HG2	0.49	2.07	3	1
2:B:18:PHE:CE2	2:B:27:HIS:HB2	0.49	2.42	7	1
1:A:205:VAL:HG22	1:A:224:LEU:CD2	0.48	2.38	20	1
2:B:11:CYS:SG	2:B:14:CYS:HB2	0.48	2.48	7	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:30:TYR:N	2:B:30:TYR:CD1	0.48	2.81	14	3
1:A:202:ARG:HB3	1:A:215:TRP:CE2	0.48	2.44	7	1
1:A:207:CYS:SG	1:A:208:GLY:N	0.48	2.86	16	1
2:B:24:LEU:HA	2:B:27:HIS:HB3	0.48	1.83	16	1
1:A:218:ASP:HB3	1:A:222:HIS:HB2	0.48	1.86	18	1
1:A:205:VAL:HB	2:B:27:HIS:HA	0.48	1.85	5	2
1:A:222:HIS:ND1	2:B:26:ALA:HB2	0.48	2.24	17	1
1:A:205:VAL:HG13	2:B:18:PHE:CZ	0.48	2.43	10	1
2:B:21:PRO:HA	2:B:24:LEU:HG	0.48	1.86	10	2
2:B:20:SER:HB2	2:B:23:THR:OG1	0.48	2.09	16	3
1:A:203:GLU:HB2	2:B:18:PHE:CD1	0.47	2.44	5	1
1:A:204:CYS:HB3	1:A:208:GLY:CA	0.47	2.40	1	4
1:A:224:LEU:HD12	1:A:229:GLY:HA2	0.47	1.85	17	2
1:A:204:CYS:SG	1:A:205:VAL:N	0.47	2.88	12	6
1:A:225:CYS:SG	1:A:226:ASN:N	0.46	2.84	4	8
1:A:217:ARG:HG2	1:A:223:TYR:HD1	0.46	1.71	8	1
2:B:3:LEU:O	2:B:4:LEU:HB2	0.46	2.10	11	1
2:B:11:CYS:CB	2:B:14:CYS:SG	0.46	3.01	1	1
1:A:215:TRP:HB3	1:A:223:TYR:CE1	0.46	2.46	18	1
1:A:217:ARG:HD3	1:A:218:ASP:O	0.46	2.11	6	1
2:B:18:PHE:HE1	2:B:27:HIS:HD1	0.45	1.54	4	1
1:A:202:ARG:HG3	1:A:203:GLU:H	0.45	1.70	6	2
1:A:202:ARG:HG3	1:A:203:GLU:OE2	0.45	2.11	8	1
2:B:16:ILE:HB	2:B:27:HIS:HE1	0.45	1.72	14	1
1:A:219:ARG:NE	1:A:219:ARG:HA	0.45	2.27	7	1
1:A:205:VAL:CG2	1:A:224:LEU:HD23	0.45	2.42	9	1
1:A:205:VAL:HG22	1:A:224:LEU:HD21	0.44	1.89	18	1
1:A:200:GLU:HG2	1:A:210:THR:HG21	0.44	1.89	18	1
1:A:204:CYS:N	1:A:208:GLY:HA2	0.44	2.26	16	1
1:A:217:ARG:HA	1:A:222:HIS:O	0.44	2.13	17	1
1:A:216:ARG:HB3	1:A:229:GLY:HA3	0.43	1.90	15	2
1:A:232:HIS:NE2	1:A:238:ASN:HA	0.43	2.28	14	1
2:B:30:TYR:N	2:B:30:TYR:HD1	0.43	2.11	6	2
1:A:205:VAL:HG11	2:B:23:THR:O	0.43	2.13	10	1
1:A:216:ARG:CB	1:A:226:ASN:HA	0.43	2.43	18	1
1:A:205:VAL:HG21	1:A:224:LEU:HD23	0.43	1.89	9	1
1:A:222:HIS:CE1	2:B:26:ALA:HB2	0.43	2.48	6	1
1:A:204:CYS:HB3	1:A:208:GLY:HA2	0.42	1.91	4	1
1:A:218:ASP:HB2	1:A:232:HIS:CE1	0.42	2.50	2	1
2:B:30:TYR:HD1	2:B:30:TYR:N	0.42	2.12	9	1
1:A:224:LEU:HD13	1:A:229:GLY:HA3	0.42	1.90	12	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:231:TYR:O	1:A:235:ASN:HB2	0.42	2.15	15	1
1:A:202:ARG:HD3	1:A:203:GLU:OE1	0.41	2.15	15	1
1:A:202:ARG:HG3	1:A:203:GLU:OE1	0.41	2.16	16	1
1:A:224:LEU:CD1	1:A:229:GLY:HA2	0.41	2.46	6	1
2:B:27:HIS:C	2:B:27:HIS:CD2	0.41	2.94	14	1
1:A:205:VAL:HG21	1:A:224:LEU:HD22	0.41	1.93	17	1
2:B:19:SER:O	2:B:21:PRO:HD3	0.41	2.16	15	1
1:A:205:VAL:HB	2:B:26:ALA:CB	0.41	2.34	17	1
1:A:206:ASN:HD21	2:B:30:TYR:HB2	0.40	1.76	6	1
2:B:30:TYR:CD1	2:B:30:TYR:N	0.40	2.89	2	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	37/46 (80%)	32±2 (86±5%)	4±2 (11±5%)	1±1 (3±2%)	8	40
2	B	33/36 (92%)	26±2 (79±5%)	6±2 (18±5%)	1±1 (3±3%)	10	46
All	All	1400/1640 (85%)	1158 (83%)	201 (14%)	41 (3%)	9	43

All 10 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	226	ASN	11
1	A	225	CYS	11
2	B	33	SER	5
2	B	29	ALA	5
2	B	2	SER	2
2	B	12	LEU	2
2	B	34	HIS	2
1	A	235	ASN	1
1	A	221	GLY	1
2	B	28	GLN	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	31/37 (84%)	26±2 (84±5%)	5±2 (16±5%)	6	43
2	B	28/30 (93%)	23±1 (82±5%)	5±1 (18±5%)	5	39
All	All	1180/1340 (88%)	979 (83%)	201 (17%)	6	41

All 37 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	203	GLU	19
2	B	23	THR	16
1	A	202	ARG	16
2	B	31	TYR	15
2	B	22	SER	11
1	A	218	ASP	10
2	B	34	HIS	9
1	A	216	ARG	8
2	B	32	CYS	7
1	A	206	ASN	7
1	A	220	THR	6
2	B	28	GLN	6
2	B	18	PHE	6
1	A	217	ARG	5
2	B	19	SER	5
2	B	14	CYS	4
1	A	224	LEU	4
2	B	30	TYR	4
1	A	222	HIS	3
2	B	25	GLU	3
2	B	4	LEU	3
1	A	223	TYR	3
1	A	226	ASN	3
2	B	20	SER	3
2	B	9	PHE	3
1	A	232	HIS	3
1	A	207	CYS	3
1	A	235	ASN	2

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Mol	Chain	Res	Type	Models (Total)
1	A	205	VAL	2
1	A	219	ARG	2
1	A	231	TYR	2
2	B	3	LEU	2
1	A	200	GLU	2
2	B	24	LEU	1
2	B	11	CYS	1
2	B	5	LYS	1
1	A	233	LYS	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](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

6.7 Other polymers [i](#)

There are no such molecules in this entry.

6.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided