



Full wwPDB NMR Structure Validation Report ⓘ

Mar 7, 2022 – 03:51 AM EST

PDB ID : 4ZNF
Title : HIGH-RESOLUTION THREE-DIMENSIONAL STRUCTURE OF A SINGLE ZINC FINGER FROM A HUMAN ENHANCER BINDING PROTEIN IN SOLUTION
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Deposited on : 1990-07-09

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 ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) 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)
RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
ShiftChecker : 2.27
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.27

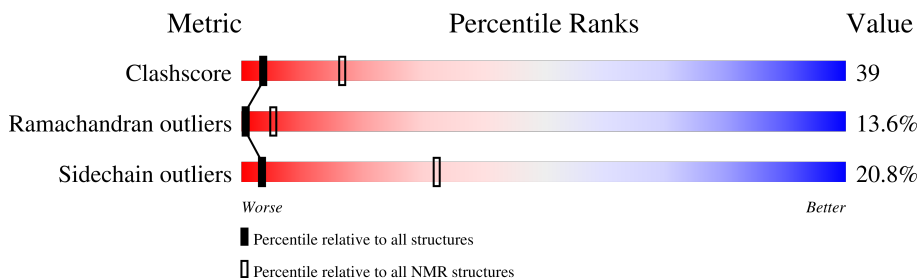
1 Overall quality at a glance

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	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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	30	

2 Ensemble composition and analysis i

This entry contains 41 models. Model 11 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:3-A:27 (25)	0.17	11

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 9 clusters and 7 single-model clusters were found.

Cluster number	Models
1	1, 3, 8, 10, 11, 19, 29, 31, 32
2	2, 6, 7, 17, 28, 41
3	13, 24, 25, 26, 39
4	20, 21, 30
5	18, 33, 37
6	4, 40
7	22, 27
8	16, 38
9	15, 36
Single-model clusters	5; 9; 12; 14; 23; 34; 35

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 502 atoms, of which 252 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called ZINC FINGER.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	30	501	157	252	48	41	3	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	6	SER	THR	conflict	UNP P15822

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

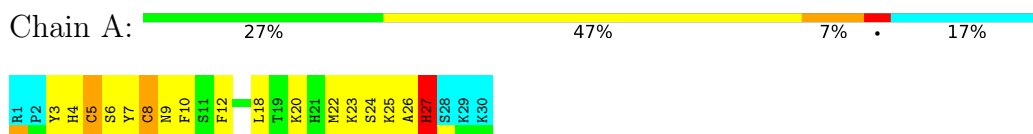
Mol	Chain	Residues	Atoms	
			Total	Zn
2	A	1	1	1

4 Residue-property plots

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: ZINC FINGER

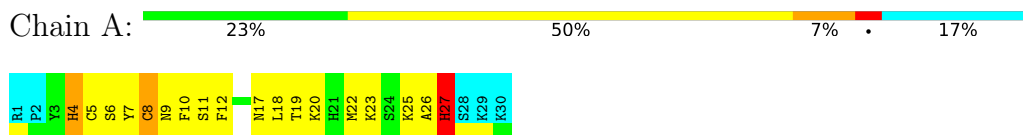


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

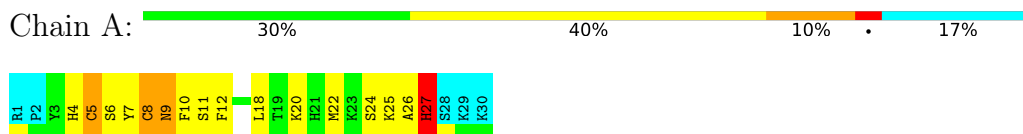
4.2.1 Score per residue for model 1

- Molecule 1: ZINC FINGER



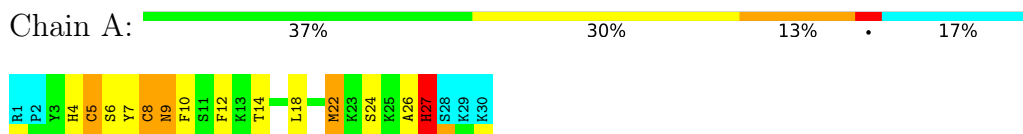
4.2.2 Score per residue for model 2

- Molecule 1: ZINC FINGER



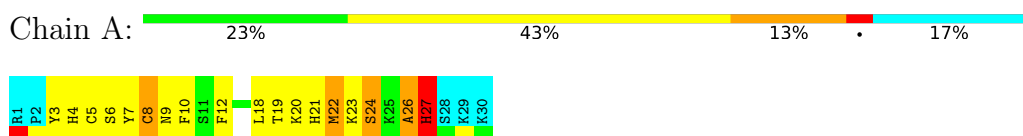
4.2.3 Score per residue for model 3

- Molecule 1: ZINC FINGER



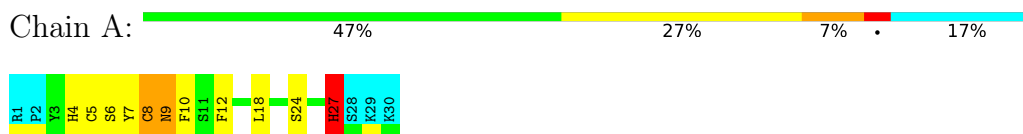
4.2.4 Score per residue for model 4

- Molecule 1: ZINC FINGER



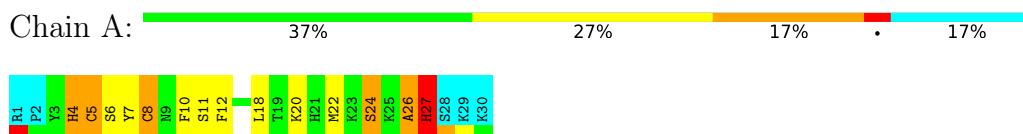
4.2.5 Score per residue for model 5

- Molecule 1: ZINC FINGER



4.2.6 Score per residue for model 6

- Molecule 1: ZINC FINGER



4.2.7 Score per residue for model 7

- Molecule 1: ZINC FINGER



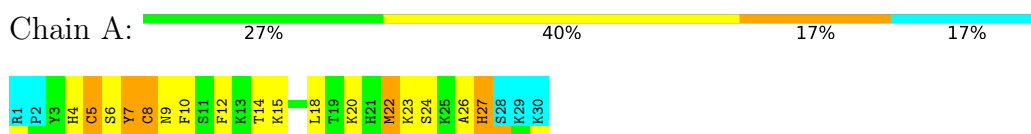
4.2.8 Score per residue for model 8

- Molecule 1: ZINC FINGER



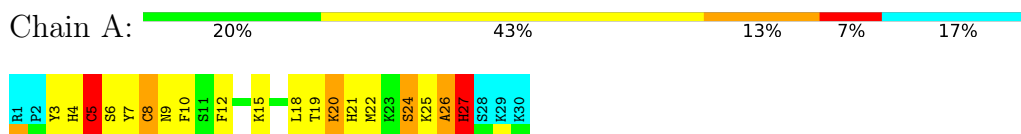
4.2.9 Score per residue for model 9

- Molecule 1: ZINC FINGER



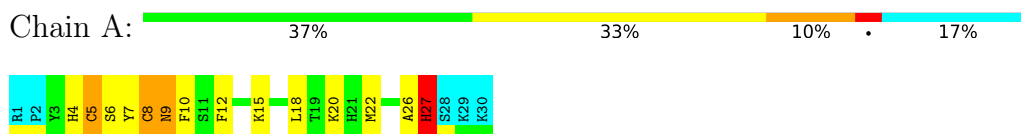
4.2.10 Score per residue for model 10

- Molecule 1: ZINC FINGER



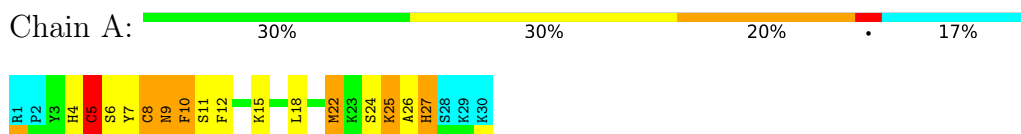
4.2.11 Score per residue for model 11 (medoid)

- Molecule 1: ZINC FINGER



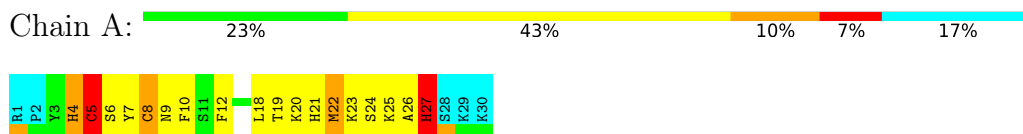
4.2.12 Score per residue for model 12

- Molecule 1: ZINC FINGER



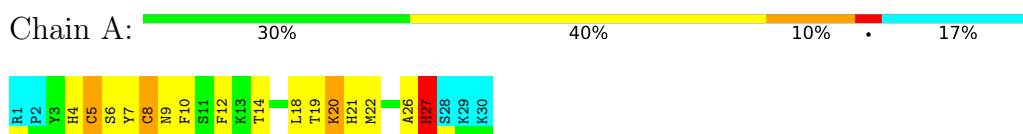
4.2.13 Score per residue for model 13

- Molecule 1: ZINC FINGER



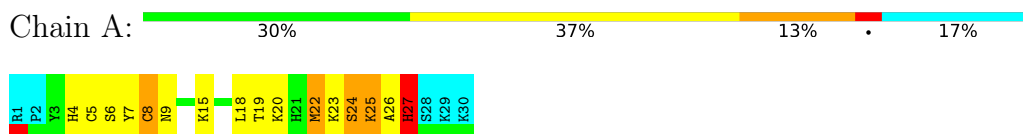
4.2.14 Score per residue for model 14

- Molecule 1: ZINC FINGER



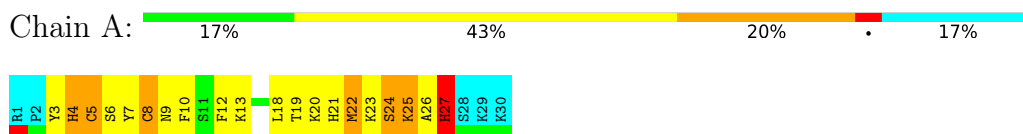
4.2.15 Score per residue for model 15

- Molecule 1: ZINC FINGER



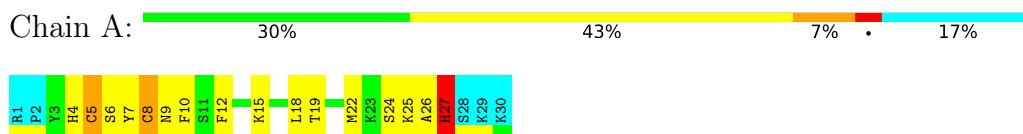
4.2.16 Score per residue for model 16

- Molecule 1: ZINC FINGER



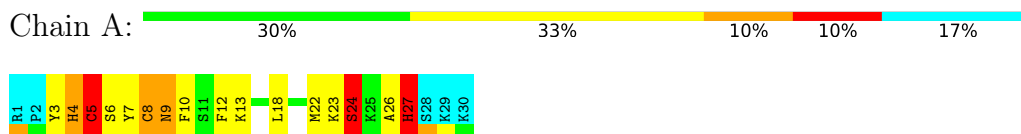
4.2.17 Score per residue for model 17

- Molecule 1: ZINC FINGER



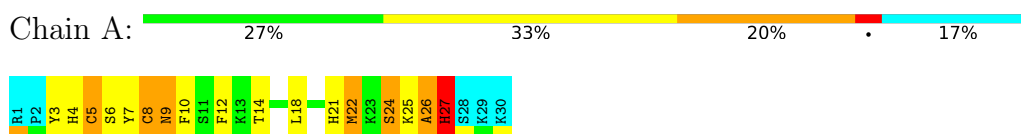
4.2.18 Score per residue for model 18

- Molecule 1: ZINC FINGER



4.2.19 Score per residue for model 19

- Molecule 1: ZINC FINGER



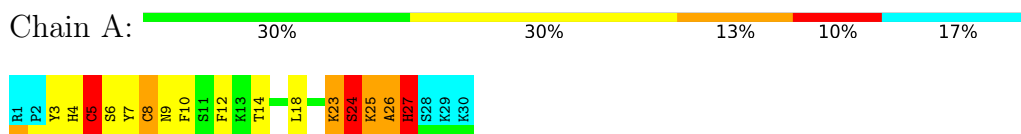
4.2.20 Score per residue for model 20

- Molecule 1: ZINC FINGER



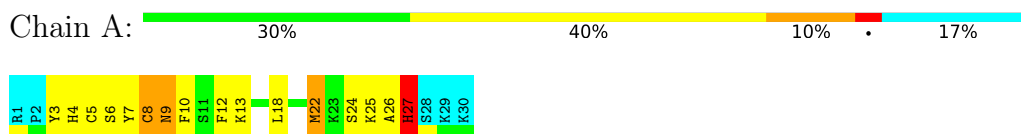
4.2.21 Score per residue for model 21

- Molecule 1: ZINC FINGER



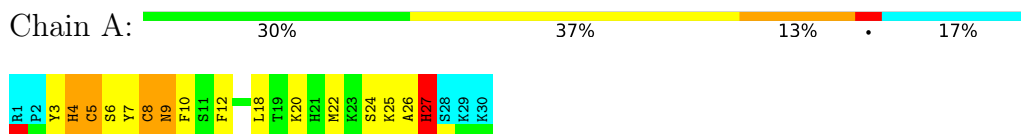
4.2.22 Score per residue for model 22

- Molecule 1: ZINC FINGER



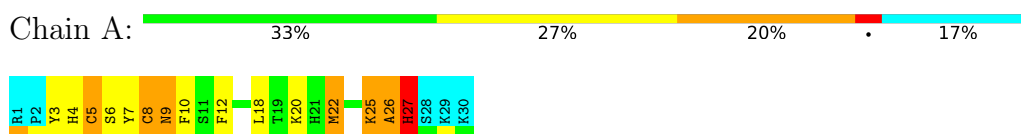
4.2.23 Score per residue for model 23

- Molecule 1: ZINC FINGER



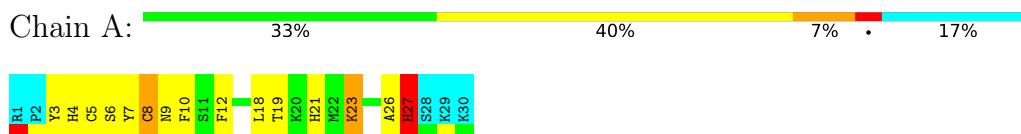
4.2.24 Score per residue for model 24

- Molecule 1: ZINC FINGER



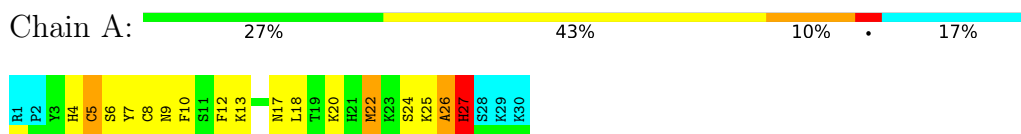
4.2.25 Score per residue for model 25

- Molecule 1: ZINC FINGER



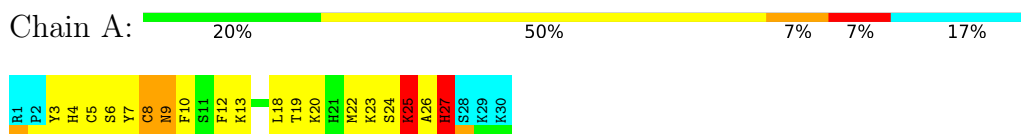
4.2.26 Score per residue for model 26

- Molecule 1: ZINC FINGER



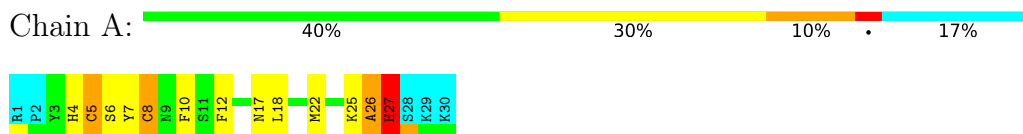
4.2.27 Score per residue for model 27

- Molecule 1: ZINC FINGER



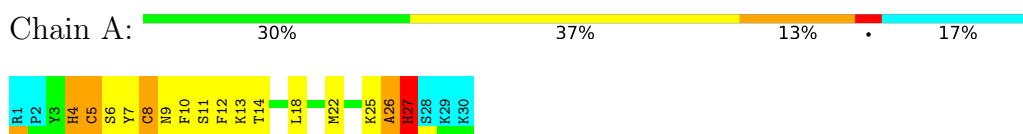
4.2.28 Score per residue for model 28

- Molecule 1: ZINC FINGER



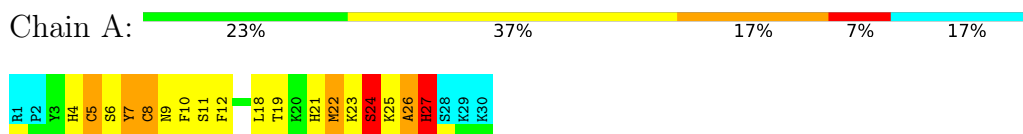
4.2.29 Score per residue for model 29

- Molecule 1: ZINC FINGER



4.2.30 Score per residue for model 30

- Molecule 1: ZINC FINGER



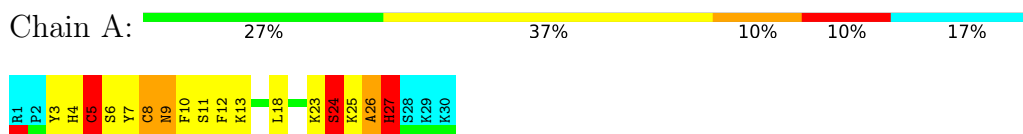
4.2.31 Score per residue for model 31

- Molecule 1: ZINC FINGER



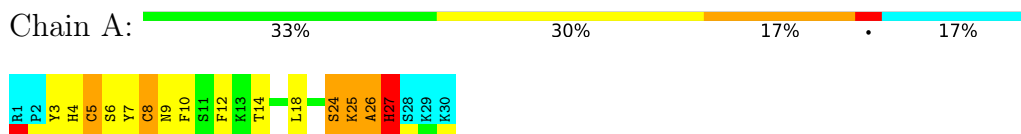
4.2.32 Score per residue for model 32

- Molecule 1: ZINC FINGER



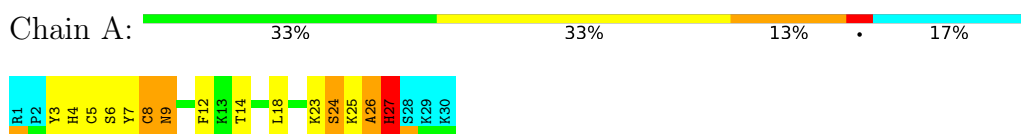
4.2.33 Score per residue for model 33

- Molecule 1: ZINC FINGER



4.2.34 Score per residue for model 34

- Molecule 1: ZINC FINGER



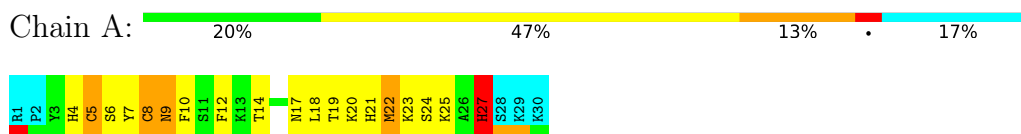
4.2.35 Score per residue for model 35

- Molecule 1: ZINC FINGER



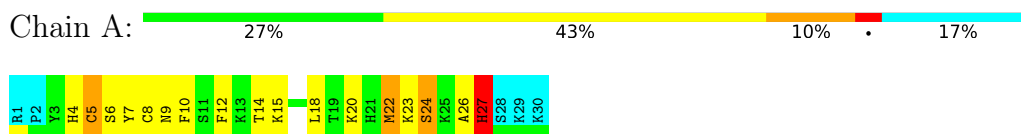
4.2.36 Score per residue for model 36

- Molecule 1: ZINC FINGER



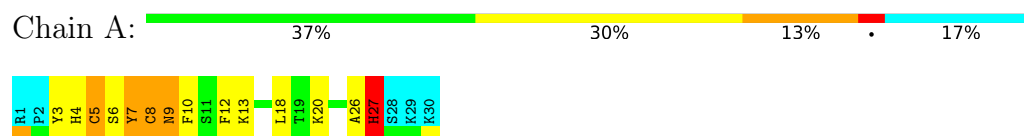
4.2.37 Score per residue for model 37

- Molecule 1: ZINC FINGER



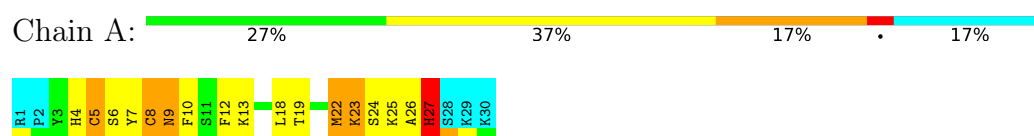
4.2.38 Score per residue for model 38

- Molecule 1: ZINC FINGER



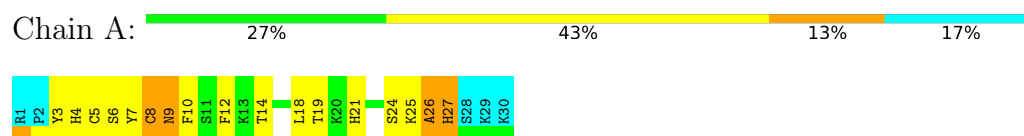
4.2.39 Score per residue for model 39

- Molecule 1: ZINC FINGER



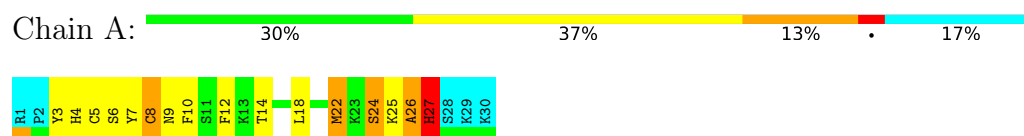
4.2.40 Score per residue for model 40

- Molecule 1: ZINC FINGER



4.2.41 Score per residue for model 41

- Molecule 1: ZINC FINGER



5 Refinement protocol and experimental data overview

The models were refined using the following method: ?.

Of the ? calculated structures, 41 were deposited, based on the following criterion: ?.

The authors did not provide any information on software used for structure solution, optimization or refinement.

No chemical shift data was provided.

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

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	1.21±0.01	2±0/213 (0.9± 0.1%)	0.93±0.01	0±0/283 (0.0± 0.0%)
All	All	1.21	79/8733 (0.9%)	0.93	0/11603 (0.0%)

All unique bond 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(Å)	Ideal(Å)	Models	
								Worst	Total
1	A	4	HIS	CG-ND1	-6.04	1.25	1.38	5	41
1	A	27	HIS	CG-ND1	-5.26	1.27	1.38	23	38

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	206	199	199	16±2
All	All	8487	8159	8159	654

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 39.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:18:LEU:C	1:A:18:LEU:HD13	0.68	2.09	21	39
1:A:5:CYS:SG	1:A:7:TYR:N	0.66	2.68	33	41
1:A:22:MET:N	1:A:22:MET:SD	0.65	2.69	12	14
1:A:10:PHE:O	1:A:12:PHE:CE1	0.65	2.50	12	33
1:A:10:PHE:O	1:A:12:PHE:CE2	0.63	2.52	21	6
1:A:22:MET:SD	1:A:22:MET:N	0.61	2.73	16	4
1:A:5:CYS:SG	1:A:6:SER:N	0.61	2.73	9	41
1:A:5:CYS:SG	1:A:8:CYS:N	0.60	2.75	16	41
1:A:24:SER:O	1:A:26:ALA:N	0.60	2.35	22	4
1:A:27:HIS:N	1:A:27:HIS:CD2	0.59	2.70	34	23
1:A:21:HIS:CD2	1:A:22:MET:SD	0.59	2.96	16	4
1:A:18:LEU:O	1:A:18:LEU:HD13	0.59	1.98	15	2
1:A:10:PHE:CD1	1:A:12:PHE:CE2	0.59	2.91	4	7
1:A:19:THR:O	1:A:23:LYS:N	0.58	2.36	35	9
1:A:10:PHE:O	1:A:12:PHE:CD1	0.58	2.57	2	10
1:A:10:PHE:CD1	1:A:12:PHE:CZ	0.57	2.93	8	11
1:A:6:SER:O	1:A:7:TYR:CG	0.57	2.58	41	32
1:A:7:TYR:CE2	1:A:27:HIS:O	0.56	2.58	24	11
1:A:6:SER:O	1:A:7:TYR:CD1	0.56	2.58	40	16
1:A:6:SER:O	1:A:7:TYR:CD2	0.56	2.58	30	24
1:A:27:HIS:CD2	1:A:27:HIS:N	0.55	2.73	16	11
1:A:6:SER:C	1:A:7:TYR:CD1	0.55	2.79	25	16
1:A:24:SER:OG	1:A:25:LYS:N	0.54	2.41	33	5
1:A:4:HIS:CD2	1:A:11:SER:HG	0.54	2.20	29	3
1:A:17:ASN:HD22	1:A:17:ASN:H	0.53	1.47	36	2
1:A:7:TYR:CE1	1:A:27:HIS:O	0.53	2.62	18	7
1:A:9:ASN:ND2	1:A:9:ASN:O	0.53	2.41	38	17
1:A:18:LEU:HD13	1:A:18:LEU:C	0.53	2.24	15	2
1:A:6:SER:C	1:A:7:TYR:CD2	0.52	2.83	31	25
1:A:3:TYR:CD2	1:A:13:LYS:O	0.52	2.62	18	2
1:A:18:LEU:HD13	1:A:18:LEU:O	0.51	2.04	25	37
1:A:4:HIS:CD2	1:A:11:SER:OG	0.51	2.64	1	3
1:A:12:PHE:N	1:A:12:PHE:CD1	0.51	2.77	41	9
1:A:19:THR:O	1:A:21:HIS:N	0.50	2.44	10	6
1:A:12:PHE:CD1	1:A:12:PHE:N	0.50	2.79	24	10
1:A:27:HIS:CG	1:A:27:HIS:O	0.49	2.66	35	2
1:A:11:SER:OG	1:A:12:PHE:N	0.48	2.47	30	1
1:A:18:LEU:C	1:A:18:LEU:CD1	0.47	2.83	9	39
1:A:19:THR:C	1:A:21:HIS:N	0.47	2.66	10	7
1:A:24:SER:C	1:A:26:ALA:H	0.47	2.13	40	9
1:A:6:SER:C	1:A:7:TYR:CG	0.46	2.88	34	3
1:A:4:HIS:NE2	1:A:11:SER:OG	0.46	2.48	7	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:4:HIS:CE1	1:A:9:ASN:HD21	0.46	2.29	18	1
1:A:9:ASN:O	1:A:11:SER:N	0.46	2.49	12	3
1:A:25:LYS:O	1:A:26:ALA:O	0.46	2.34	32	11
1:A:9:ASN:O	1:A:9:ASN:ND2	0.46	2.49	24	1
1:A:17:ASN:O	1:A:20:LYS:N	0.45	2.48	26	2
1:A:7:TYR:O	1:A:8:CYS:O	0.45	2.35	9	22
1:A:23:LYS:O	1:A:24:SER:O	0.44	2.35	34	5
1:A:22:MET:O	1:A:24:SER:O	0.44	2.35	17	5
1:A:4:HIS:O	1:A:5:CYS:O	0.43	2.36	18	1
1:A:24:SER:O	1:A:25:LYS:C	0.43	2.56	12	2
1:A:20:LYS:O	1:A:24:SER:OG	0.42	2.36	2	1
1:A:17:ASN:HD22	1:A:17:ASN:N	0.42	2.13	28	1
1:A:15:LYS:O	1:A:19:THR:OG1	0.42	2.36	15	2
1:A:26:ALA:C	1:A:27:HIS:CG	0.42	2.92	34	1
1:A:17:ASN:N	1:A:17:ASN:ND2	0.41	2.68	28	1
1:A:7:TYR:CD1	1:A:27:HIS:O	0.41	2.73	4	1
1:A:22:MET:C	1:A:24:SER:N	0.41	2.73	19	1
1:A:7:TYR:CD2	1:A:27:HIS:O	0.41	2.73	30	1
1:A:13:LYS:O	1:A:13:LYS:CG	0.41	2.69	39	1
1:A:17:ASN:ND2	1:A:17:ASN:N	0.41	2.69	36	1
1:A:19:THR:O	1:A:20:LYS:C	0.40	2.60	14	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	25/30 (83%)	16±1 (64±5%)	6±2 (23±6%)	3±1 (14±4%)	1 5
All	All	1025/1230 (83%)	654 (64%)	232 (23%)	139 (14%)	1 5

All 9 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	8	CYS	39

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Mol	Chain	Res	Type	Models (Total)
1	A	26	ALA	35
1	A	27	HIS	32
1	A	5	CYS	13
1	A	24	SER	10
1	A	25	LYS	5
1	A	7	TYR	3
1	A	20	LYS	1
1	A	10	PHE	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	23/28 (82%)	18±2 (79±7%)	5±2 (21±7%)	3 32
All	All	943/1148 (82%)	747 (79%)	196 (21%)	3 32

All 11 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	27	HIS	41
1	A	9	ASN	39
1	A	5	CYS	20
1	A	22	MET	17
1	A	20	LYS	16
1	A	24	SER	16
1	A	25	LYS	14
1	A	14	THR	14
1	A	23	LYS	7
1	A	13	LYS	7
1	A	15	LYS	5

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 monosaccharides in this entry.

6.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is 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