



Full wwPDB NMR Structure Validation Report ⓘ

Mar 8, 2026 – 10:11 AM UTC

PDB ID : 1ONB / pdb_00001onb
Title : Solution structure of an engineered arginine-rich subdomain 2 of the hepatitis C virus NS3 RNA helicase
Authors : Liu, D.; Wang, Y.S.; Gesell, J.J.; Wyss, D.F.
Deposited on : 2003-02-27

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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

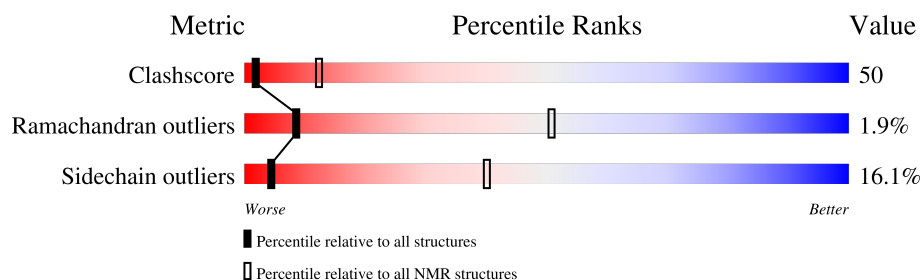
1 Overall quality at a glance

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	229148	14424
Ramachandran outliers	224038	12848
Sidechain outliers	223484	12823

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	142	25% 43% 8% • 20% •

2 Ensemble composition and analysis

This entry contains 25 models. Model 14 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:9-A:74, A:79-A:88, A:95-A:104, A:110-A:133 (110)	0.41	14

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. No single-model clusters were found.

Cluster number	Models
1	1, 2, 3, 5, 6, 9, 10, 14, 15, 16, 17, 18, 21, 23, 24, 25
2	4, 7, 11, 12
3	8, 13, 19
4	20, 22

3 Entry composition

There is only 1 type of molecule in this entry. The entry contains 2080 atoms, of which 1045 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called helicase NS3.

Mol	Chain	Residues	Atoms						Trace
1	A	138	Total	C	H	N	O	S	0
			2080	650	1045	185	196	4	

There are 31 discrepancies between the modelled and reference sequences:

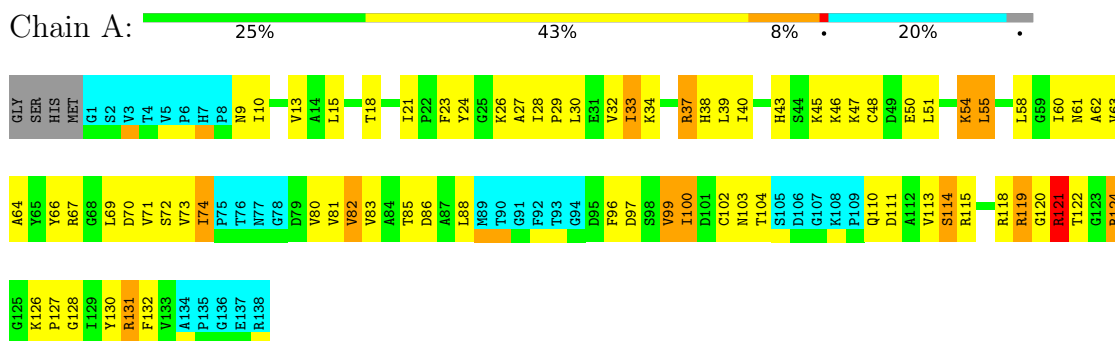
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	cloning artifact	UNP P27958
A	-2	SER	-	cloning artifact	UNP P27958
A	-1	HIS	-	cloning artifact	UNP P27958
A	0	MET	-	cloning artifact	UNP P27958
A	77	ASN	SER	conflict	UNP P27958
A	92	PHE	TYR	conflict	UNP P27958
A	105	SER	-	SEE REMARK 999	UNP P27958
A	106	ASP	-	SEE REMARK 999	UNP P27958
A	107	GLY	-	SEE REMARK 999	UNP P27958
A	108	LYS	-	SEE REMARK 999	UNP P27958
A	?	-	CYS	deletion	UNP P27958
A	?	-	VAL	deletion	UNP P27958
A	?	-	THR	deletion	UNP P27958
A	?	-	GLN	deletion	UNP P27958
A	?	-	THR	deletion	UNP P27958
A	?	-	VAL	deletion	UNP P27958
A	?	-	ASP	deletion	UNP P27958
A	?	-	PHE	deletion	UNP P27958
A	?	-	SER	deletion	UNP P27958
A	?	-	LEU	deletion	UNP P27958
A	?	-	ASP	deletion	UNP P27958
A	?	-	PRO	deletion	UNP P27958
A	?	-	THR	deletion	UNP P27958
A	?	-	PHE	deletion	UNP P27958
A	?	-	THR	deletion	UNP P27958
A	?	-	ILE	deletion	UNP P27958
A	?	-	GLU	deletion	UNP P27958
A	?	-	THR	deletion	UNP P27958
A	?	-	ILE	deletion	UNP P27958
A	?	-	THR	deletion	UNP P27958
A	?	-	LEU	deletion	UNP P27958

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: helicase NS3

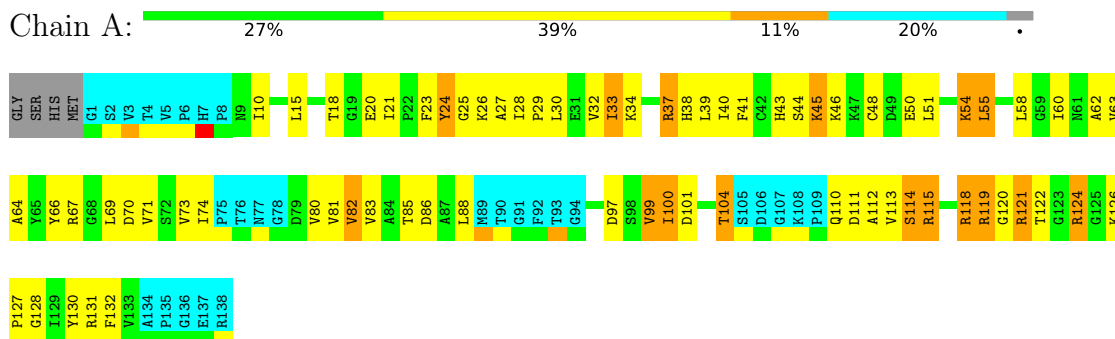


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

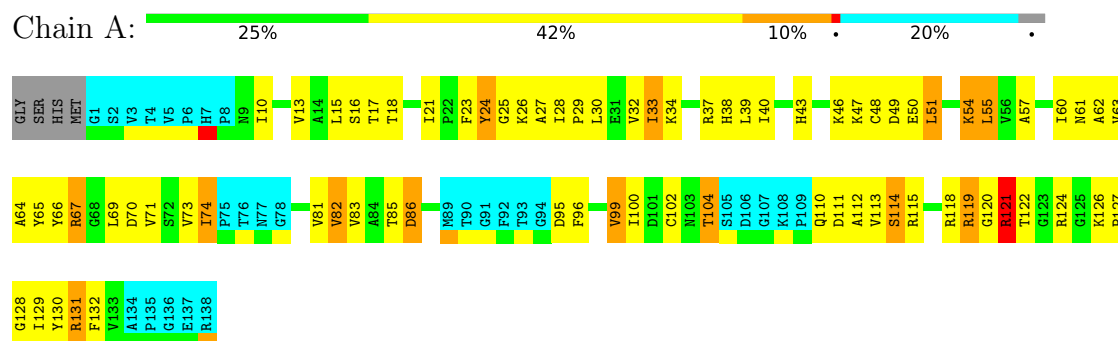
4.2.1 Score per residue for model 1

- Molecule 1: helicase NS3



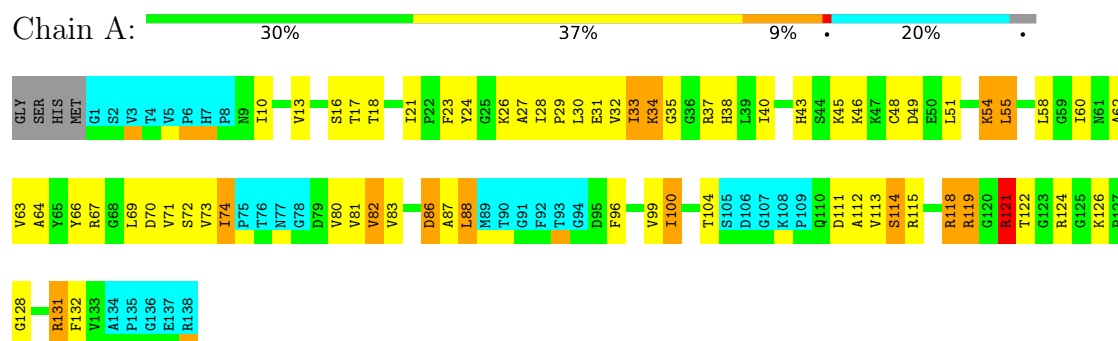
4.2.5 Score per residue for model 5

- Molecule 1: helicase NS3



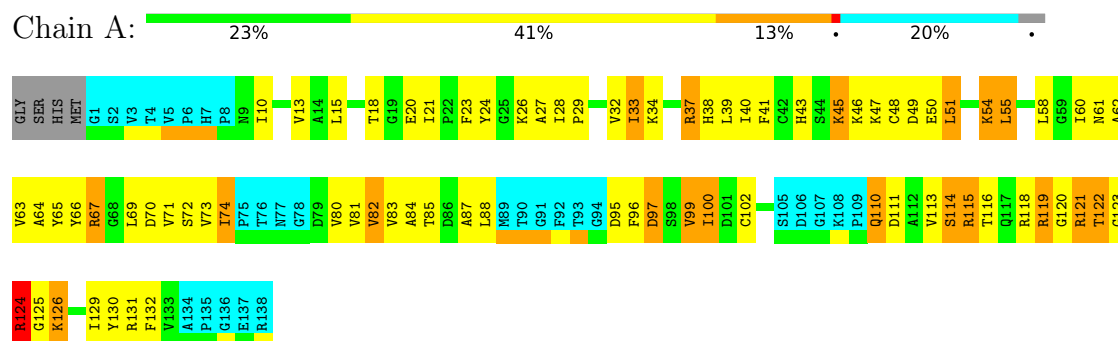
4.2.6 Score per residue for model 6

- Molecule 1: helicase NS3



4.2.11 Score per residue for model 11

- Molecule 1: helicase NS3



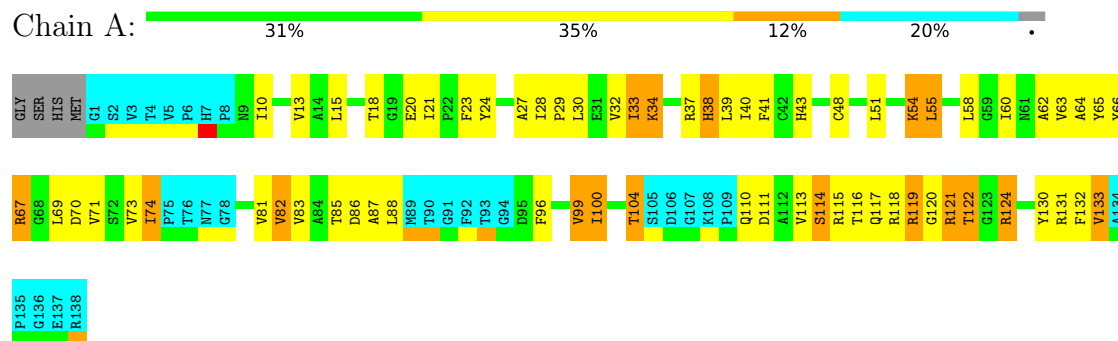
4.2.12 Score per residue for model 12

- Molecule 1: helicase NS3



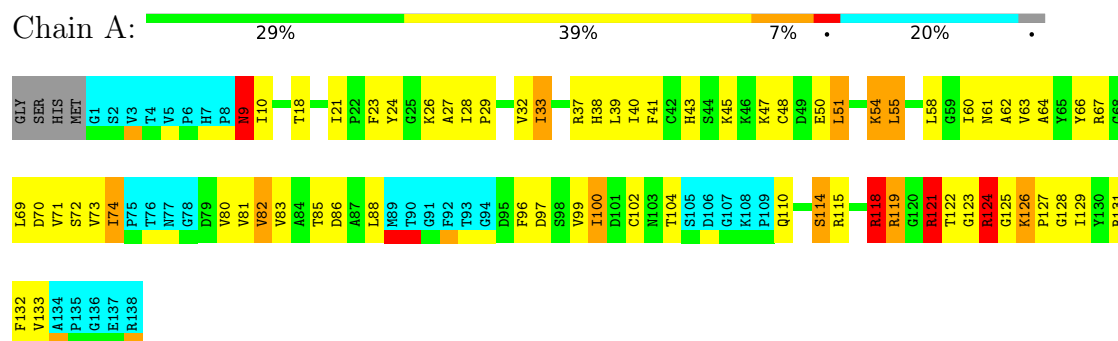
4.2.13 Score per residue for model 13

- Molecule 1: helicase NS3



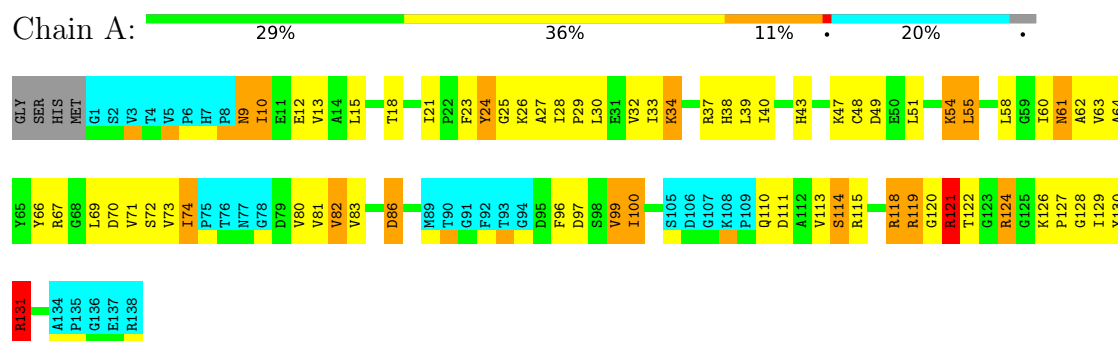
4.2.14 Score per residue for model 14 (medoid)

- Molecule 1: helicase NS3



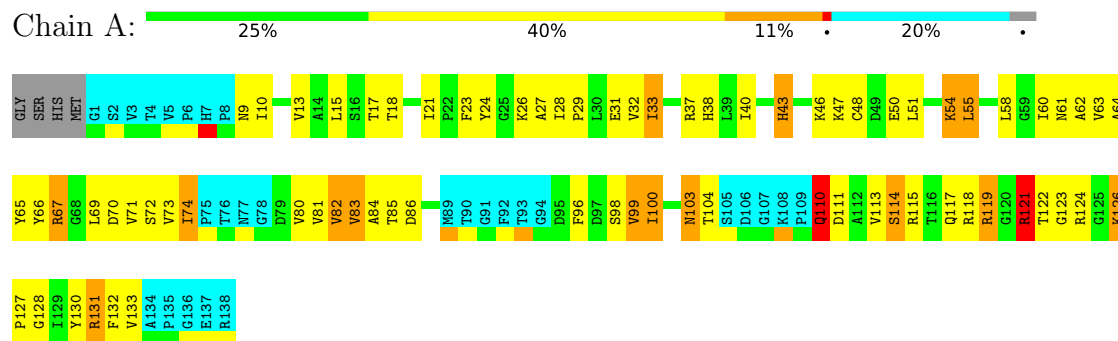
4.2.15 Score per residue for model 15

- Molecule 1: helicase NS3



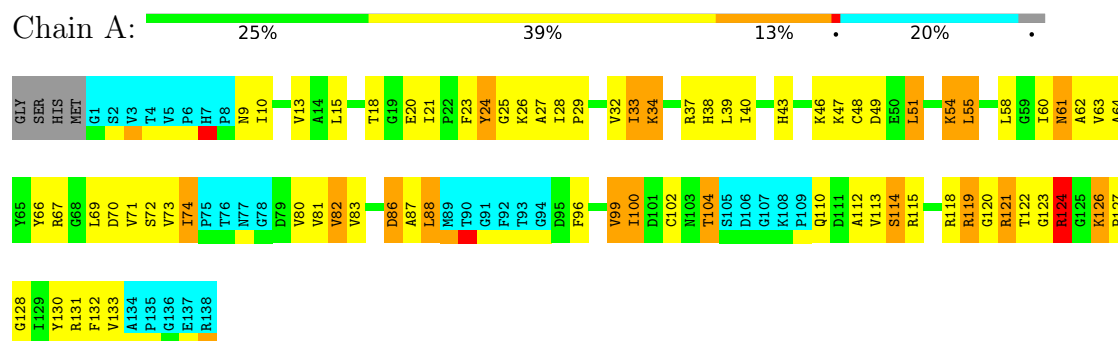
4.2.16 Score per residue for model 16

- Molecule 1: helicase NS3



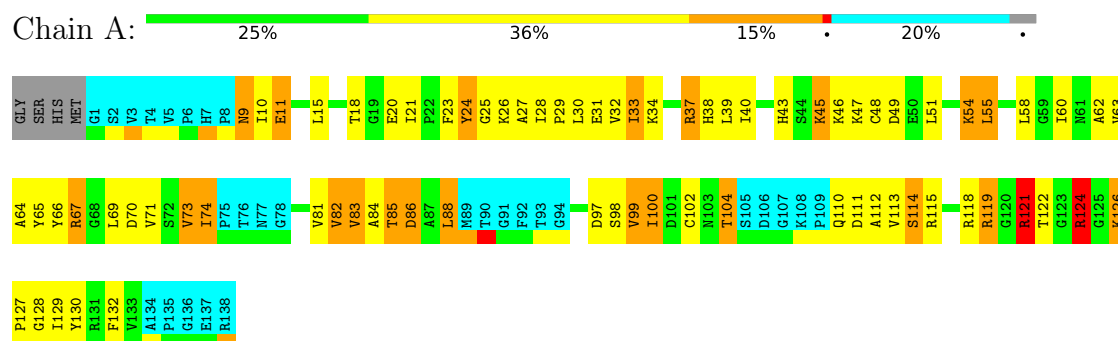
4.2.17 Score per residue for model 17

- Molecule 1: helicase NS3



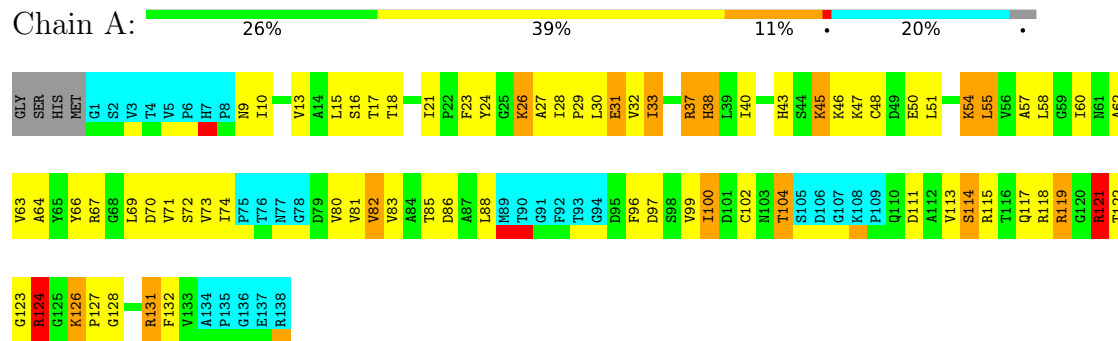
4.2.18 Score per residue for model 18

- Molecule 1: helicase NS3



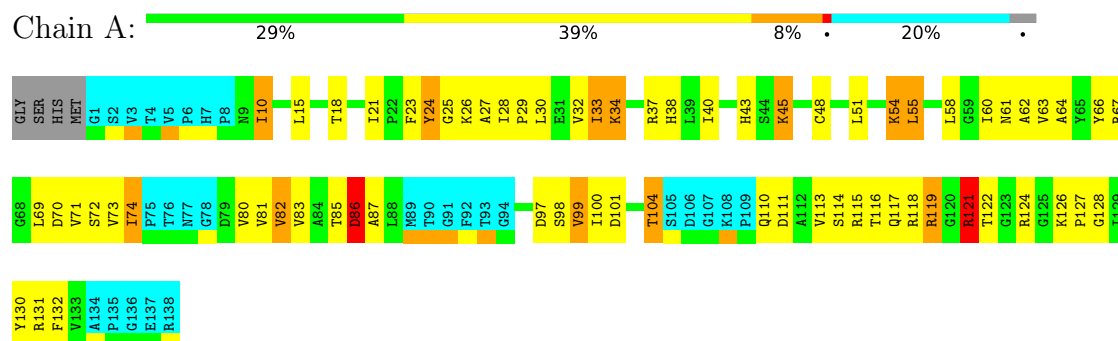
4.2.19 Score per residue for model 19

- Molecule 1: helicase NS3



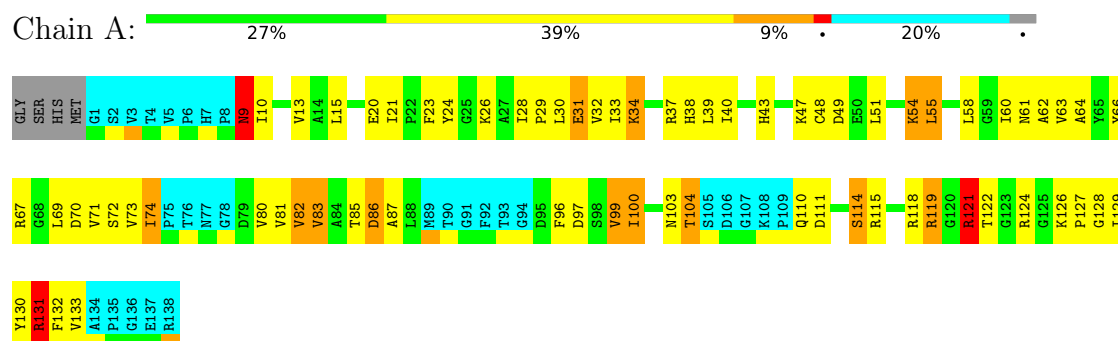
4.2.20 Score per residue for model 20

- Molecule 1: helicase NS3



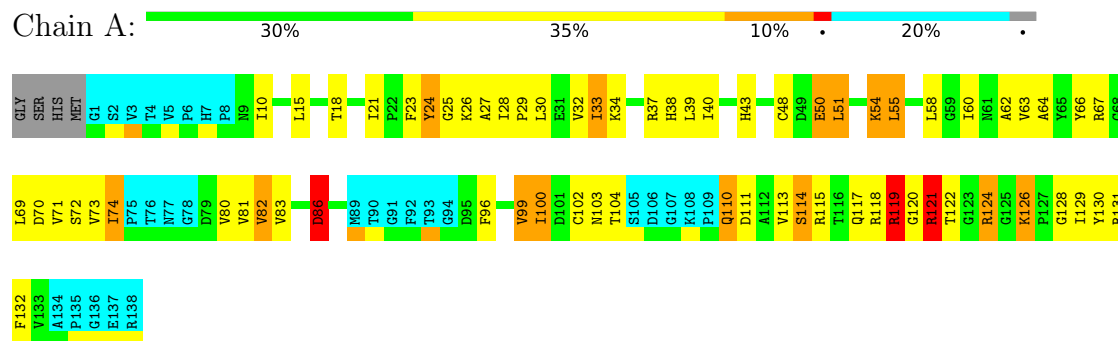
4.2.21 Score per residue for model 21

- Molecule 1: helicase NS3



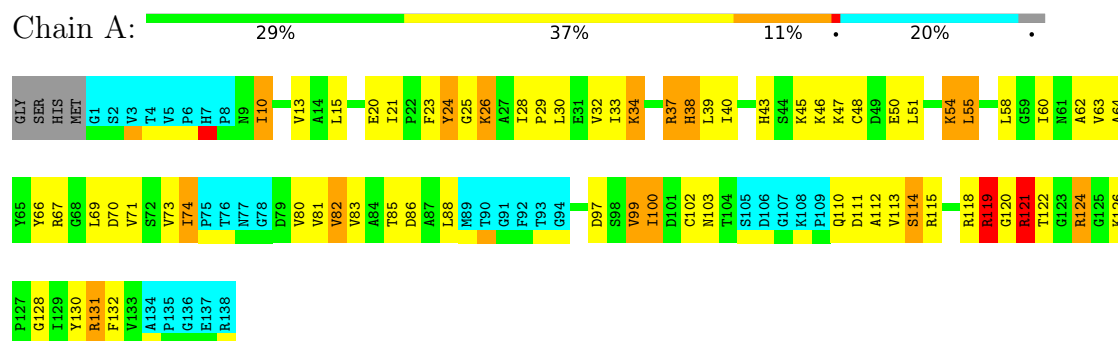
4.2.22 Score per residue for model 22

- Molecule 1: helicase NS3

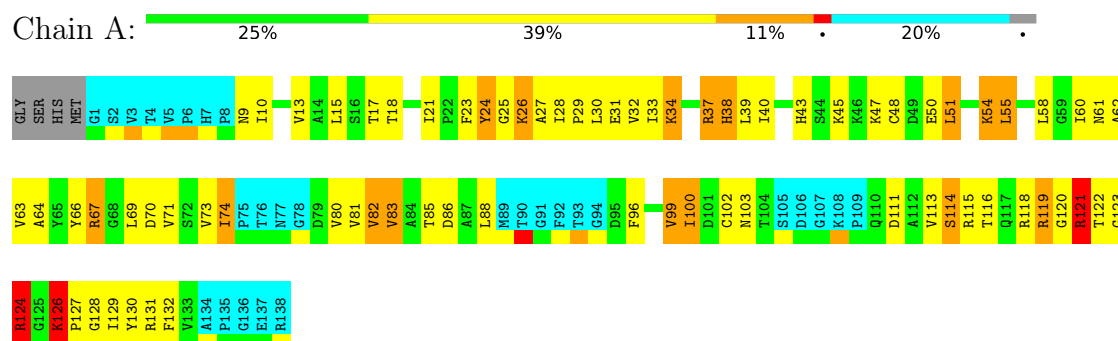


4.2.23 Score per residue for model 23

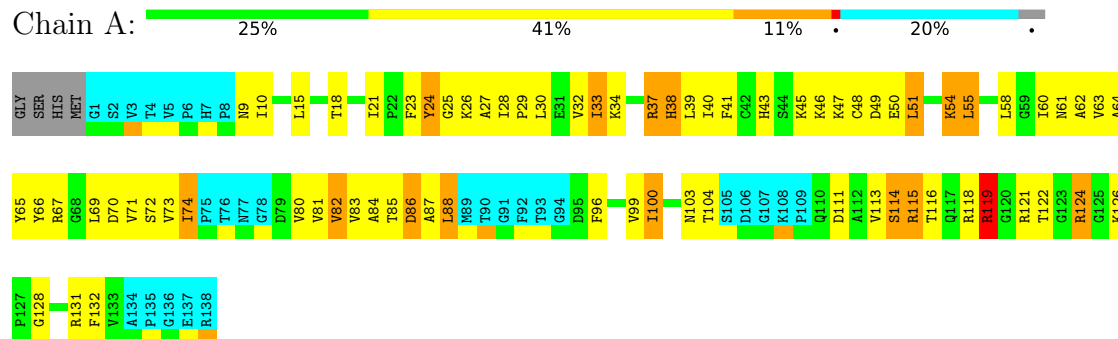
- Molecule 1: helicase NS3



- Molecule 1: helicase NS3



- Molecule 1: helicase NS3



5 Refinement protocol and experimental data overview

The models were refined using the following method: *simulated annealing*.

Of the 100 calculated structures, 25 were deposited, based on the following criterion: *structures with the least restraint violations*.

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

Software name	Classification	Version
X-PLOR	structure solution	98
X-PLOR	refinement	98

No chemical shift data was provided.

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	1.50±0.01	0±0/855 (0.0± 0.0%)	1.64±0.01	4±1/1158 (0.3± 0.1%)
All	All	1.50	1/21375 (0.0%)	1.64	98/28950 (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	7.9±0.3
All	All	0	197

All unique bond outliers are listed below.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)	Models	
								Worst	Total
1	A	126	LYS	N-CA	5.09	1.49	1.46	6	1

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	33	ILE	N-CA-CB	-6.42	104.69	112.33	18	19
1	A	82	VAL	N-CA-CB	-5.92	104.28	111.21	21	25
1	A	20	GLU	CA-C-N	-5.88	118.60	122.60	9	4
1	A	20	GLU	C-N-CA	-5.88	118.60	122.60	9	4
1	A	9	ASN	N-CA-CB	-5.70	107.67	114.17	18	1
1	A	100	ILE	N-CA-CB	-5.59	104.62	111.67	19	23
1	A	126	LYS	N-CA-CB	-5.45	104.43	111.35	22	1
1	A	38	HIS	CA-CB-CG	-5.29	108.51	113.80	19	6
1	A	10	ILE	N-CA-CB	-5.26	105.06	111.21	15	1
1	A	83	VAL	N-CA-CB	-5.23	105.83	112.15	16	5

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	133	VAL	N-CA-CB	-5.13	104.85	110.65	13	1
1	A	103	ASN	N-CA-CB	-5.12	104.94	112.78	16	4
1	A	72	SER	N-CA-CB	-5.06	104.30	110.98	14	2
1	A	21	ILE	N-CA-CB	-5.05	105.35	111.31	8	1
1	A	28	ILE	N-CA-CB	-5.03	104.17	111.21	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	37	ARG	Sidechain	25
1	A	67	ARG	Sidechain	25
1	A	115	ARG	Sidechain	25
1	A	118	ARG	Sidechain	25
1	A	119	ARG	Sidechain	25
1	A	124	ARG	Sidechain	25
1	A	121	ARG	Sidechain	24
1	A	131	ARG	Sidechain	23

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	842	864	864	86±8
All	All	21050	21600	21600	2151

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 50.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:28:ILE:HD11	1:A:100:ILE:HG21	0.99	1.30	8	25
1:A:32:VAL:HG23	1:A:33:ILE:HG23	0.97	1.33	13	25
1:A:51:LEU:HD12	1:A:83:VAL:HG11	0.91	1.41	25	17

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:66:TYR:CZ	1:A:69:LEU:HD23	0.88	2.03	17	25
1:A:40:ILE:HD12	1:A:83:VAL:HG12	0.85	1.46	24	19
1:A:73:VAL:CG1	1:A:82:VAL:HG22	0.85	2.00	18	12
1:A:28:ILE:CD1	1:A:100:ILE:HG21	0.85	2.01	8	25
1:A:69:LEU:HD13	1:A:70:ASP:N	0.85	1.85	24	25
1:A:40:ILE:HD12	1:A:83:VAL:CG1	0.84	2.01	24	19
1:A:82:VAL:HG11	1:A:88:LEU:HD13	0.84	1.47	25	3
1:A:40:ILE:CG1	1:A:83:VAL:HG12	0.83	2.02	25	23
1:A:21:ILE:HD12	1:A:55:LEU:HD13	0.83	1.49	18	24
1:A:72:SER:O	1:A:74:ILE:HG23	0.82	1.75	17	12
1:A:29:PRO:O	1:A:32:VAL:HG22	0.80	1.75	13	25
1:A:15:LEU:HD23	1:A:26:LYS:HB2	0.79	1.55	15	10
1:A:21:ILE:HG23	1:A:28:ILE:HB	0.77	1.55	9	25
1:A:21:ILE:HD11	1:A:51:LEU:HD21	0.77	1.55	3	15
1:A:63:VAL:HB	1:A:73:VAL:HG22	0.77	1.57	24	14
1:A:74:ILE:HD12	1:A:74:ILE:O	0.76	1.77	1	12
1:A:15:LEU:HD23	1:A:26:LYS:CB	0.76	2.10	15	12
1:A:63:VAL:HG21	1:A:73:VAL:HA	0.76	1.58	17	24
1:A:73:VAL:HG11	1:A:82:VAL:HG22	0.75	1.54	18	1
1:A:66:TYR:CE1	1:A:69:LEU:HD23	0.74	2.17	12	23
1:A:73:VAL:HG13	1:A:82:VAL:HG22	0.74	1.59	21	24
1:A:48:CYS:HB3	1:A:64:ALA:HB1	0.73	1.59	9	25
1:A:54:LYS:O	1:A:58:LEU:HD23	0.73	1.84	20	24
1:A:18:THR:N	1:A:27:ALA:HB3	0.71	2.00	25	20
1:A:40:ILE:HG13	1:A:83:VAL:HG12	0.71	1.62	20	6
1:A:13:VAL:HG11	1:A:131:ARG:NE	0.71	2.01	8	6
1:A:13:VAL:HG11	1:A:131:ARG:CZ	0.70	2.16	19	9
1:A:21:ILE:HD12	1:A:55:LEU:CD1	0.69	2.15	8	25
1:A:21:ILE:HD11	1:A:51:LEU:CD2	0.69	2.18	10	19
1:A:13:VAL:HG11	1:A:131:ARG:NH1	0.68	2.04	16	2
1:A:28:ILE:HD11	1:A:100:ILE:CG2	0.68	2.16	22	18
1:A:61:ASN:ND2	1:A:74:ILE:HD11	0.67	2.04	25	9
1:A:40:ILE:CD1	1:A:83:VAL:HG12	0.66	2.19	24	19
1:A:74:ILE:O	1:A:80:VAL:HG11	0.66	1.91	2	12
1:A:55:LEU:HD23	1:A:62:ALA:CB	0.65	2.21	2	24
1:A:21:ILE:HD12	1:A:54:LYS:HE2	0.65	1.68	3	1
1:A:30:LEU:HD11	1:A:58:LEU:HD12	0.65	1.67	21	13
1:A:10:ILE:HG12	1:A:122:THR:HG23	0.65	1.68	25	4
1:A:30:LEU:HD22	1:A:60:ILE:CD1	0.64	2.23	13	17
1:A:99:VAL:HG23	1:A:130:TYR:CD1	0.64	2.28	11	4
1:A:33:ILE:HB	1:A:81:VAL:HG11	0.64	1.68	20	11

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:10:ILE:HD13	1:A:122:THR:HG23	0.64	1.69	11	1
1:A:10:ILE:HD11	1:A:122:THR:O	0.63	1.93	22	15
1:A:73:VAL:HG13	1:A:82:VAL:CG2	0.63	2.23	3	10
1:A:83:VAL:O	1:A:83:VAL:HG23	0.63	1.93	22	25
1:A:99:VAL:HG22	1:A:122:THR:HG21	0.63	1.71	8	2
1:A:73:VAL:HG11	1:A:82:VAL:HG13	0.63	1.70	18	2
1:A:33:ILE:CD1	1:A:55:LEU:HD11	0.63	2.23	20	14
1:A:48:CYS:O	1:A:64:ALA:HB2	0.63	1.94	22	21
1:A:82:VAL:CG1	1:A:88:LEU:HD13	0.62	2.24	6	2
1:A:63:VAL:HG11	1:A:73:VAL:CG2	0.62	2.24	12	9
1:A:21:ILE:HG22	1:A:28:ILE:O	0.62	1.95	9	25
1:A:71:VAL:O	1:A:71:VAL:HG23	0.62	1.95	13	25
1:A:63:VAL:HG11	1:A:73:VAL:N	0.61	2.10	17	9
1:A:54:LYS:CE	1:A:58:LEU:HD21	0.61	2.26	8	1
1:A:51:LEU:O	1:A:51:LEU:HD13	0.61	1.96	2	16
1:A:55:LEU:HD23	1:A:62:ALA:HB2	0.61	1.73	9	24
1:A:63:VAL:HG11	1:A:73:VAL:HG23	0.60	1.72	6	7
1:A:51:LEU:C	1:A:51:LEU:HD13	0.59	2.22	23	7
1:A:73:VAL:HG21	1:A:82:VAL:HG13	0.59	1.72	18	1
1:A:63:VAL:CG1	1:A:73:VAL:HG22	0.59	2.28	14	5
1:A:23:PHE:CE1	1:A:24:TYR:CE2	0.59	2.91	11	5
1:A:100:ILE:N	1:A:100:ILE:HD12	0.59	2.12	11	11
1:A:24:TYR:CE1	1:A:43:HIS:CE1	0.58	2.92	13	4
1:A:33:ILE:HG22	1:A:100:ILE:HD13	0.58	1.75	24	11
1:A:74:ILE:O	1:A:74:ILE:HD12	0.58	1.98	21	3
1:A:24:TYR:CZ	1:A:43:HIS:CD2	0.58	2.92	6	10
1:A:99:VAL:CG2	1:A:122:THR:HG21	0.57	2.29	8	2
1:A:82:VAL:HG11	1:A:88:LEU:CD1	0.57	2.28	6	1
1:A:99:VAL:HG23	1:A:130:TYR:CD2	0.57	2.34	18	11
1:A:51:LEU:HD13	1:A:51:LEU:C	0.57	2.23	15	14
1:A:69:LEU:HD13	1:A:70:ASP:O	0.57	2.00	12	24
1:A:73:VAL:HG11	1:A:82:VAL:CG1	0.57	2.30	7	4
1:A:73:VAL:HG12	1:A:82:VAL:HG22	0.57	1.76	18	1
1:A:73:VAL:HG11	1:A:82:VAL:CG2	0.56	2.28	18	2
1:A:63:VAL:HB	1:A:73:VAL:HG13	0.56	1.77	18	1
1:A:66:TYR:HA	1:A:87:ALA:HB2	0.56	1.78	25	4
1:A:61:ASN:HD22	1:A:80:VAL:HG23	0.55	1.61	16	3
1:A:30:LEU:HD22	1:A:60:ILE:HD11	0.55	1.79	6	9
1:A:99:VAL:CG2	1:A:130:TYR:CD2	0.55	2.89	13	15
1:A:73:VAL:HG22	1:A:82:VAL:HG13	0.55	1.78	17	5
1:A:39:LEU:HD12	1:A:82:VAL:O	0.55	2.01	15	12

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:128:GLY:C	1:A:129:ILE:HD12	0.55	2.27	12	1
1:A:85:THR:HG23	1:A:86:ASP:N	0.54	2.18	16	15
1:A:15:LEU:HD23	1:A:133:VAL:HG22	0.54	1.78	13	6
1:A:65:TYR:CD1	1:A:69:LEU:HD12	0.54	2.38	18	4
1:A:21:ILE:HG23	1:A:28:ILE:CB	0.54	2.33	21	25
1:A:85:THR:HG23	1:A:87:ALA:H	0.53	1.63	13	3
1:A:23:PHE:CZ	1:A:24:TYR:CE2	0.53	2.96	6	3
1:A:24:TYR:CZ	1:A:43:HIS:CE1	0.53	2.96	13	2
1:A:24:TYR:CE1	1:A:43:HIS:NE2	0.53	2.77	18	17
1:A:18:THR:H	1:A:27:ALA:HB3	0.53	1.64	22	4
1:A:24:TYR:CZ	1:A:43:HIS:NE2	0.52	2.77	2	4
1:A:40:ILE:HB	1:A:83:VAL:HG12	0.52	1.81	21	18
1:A:111:ASP:OD2	1:A:113:VAL:HG22	0.51	2.04	18	3
1:A:83:VAL:O	1:A:83:VAL:CG2	0.51	2.58	13	25
1:A:40:ILE:HD12	1:A:83:VAL:HG11	0.51	1.82	19	7
1:A:39:LEU:CD2	1:A:41:PHE:CZ	0.51	2.93	8	4
1:A:45:LYS:CG	1:A:66:TYR:CG	0.51	2.94	1	2
1:A:55:LEU:CB	1:A:62:ALA:CB	0.51	2.89	23	25
1:A:33:ILE:HD11	1:A:55:LEU:HD11	0.51	1.81	11	9
1:A:51:LEU:HD13	1:A:51:LEU:O	0.51	2.05	12	5
1:A:85:THR:HG23	1:A:86:ASP:OD2	0.51	2.05	3	2
1:A:119:ARG:O	1:A:122:THR:HG23	0.51	2.05	11	1
1:A:39:LEU:HD21	1:A:41:PHE:CZ	0.51	2.41	25	2
1:A:21:ILE:CG2	1:A:28:ILE:O	0.50	2.59	3	25
1:A:60:ILE:HG22	1:A:81:VAL:HG22	0.50	1.84	1	25
1:A:23:PHE:CZ	1:A:24:TYR:CD2	0.50	3.00	11	5
1:A:111:ASP:OD1	1:A:113:VAL:HG22	0.50	2.07	2	19
1:A:124:ARG:N	1:A:124:ARG:CD	0.50	2.75	25	3
1:A:24:TYR:N	1:A:24:TYR:CD1	0.50	2.80	3	2
1:A:96:PHE:CD1	1:A:96:PHE:N	0.50	2.80	2	4
1:A:51:LEU:CD1	1:A:83:VAL:HG11	0.50	2.36	20	4
1:A:34:LYS:HB2	1:A:60:ILE:HD11	0.50	1.83	6	19
1:A:38:HIS:CE1	1:A:97:ASP:CB	0.49	2.95	2	6
1:A:126:LYS:CB	1:A:127:PRO:CD	0.49	2.90	24	13
1:A:99:VAL:HG21	1:A:130:TYR:CD2	0.49	2.42	8	2
1:A:15:LEU:HD11	1:A:28:ILE:HG12	0.49	1.83	18	2
1:A:99:VAL:HG22	1:A:122:THR:CG2	0.49	2.38	8	2
1:A:66:TYR:CZ	1:A:69:LEU:CD2	0.49	2.91	20	7
1:A:54:LYS:HD3	1:A:58:LEU:HD23	0.49	1.83	23	1
1:A:99:VAL:CG2	1:A:122:THR:CG2	0.49	2.91	8	2
1:A:33:ILE:HA	1:A:38:HIS:CG	0.49	2.42	19	24

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:132:PHE:C	1:A:132:PHE:CD1	0.49	2.91	17	11
1:A:55:LEU:CB	1:A:62:ALA:HB2	0.49	2.37	20	9
1:A:129:ILE:HG21	1:A:131:ARG:CZ	0.49	2.38	5	1
1:A:45:LYS:CG	1:A:66:TYR:CD1	0.49	2.96	6	2
1:A:43:HIS:CD2	1:A:43:HIS:C	0.48	2.90	8	9
1:A:39:LEU:HD23	1:A:121:ARG:HG2	0.48	1.83	22	1
1:A:32:VAL:O	1:A:38:HIS:CD2	0.48	2.67	3	2
1:A:63:VAL:CG1	1:A:73:VAL:CG2	0.48	2.91	14	7
1:A:122:THR:OG1	1:A:128:GLY:CA	0.48	2.62	23	22
1:A:21:ILE:CD1	1:A:51:LEU:HD21	0.48	2.38	4	3
1:A:24:TYR:OH	1:A:43:HIS:CD2	0.48	2.67	14	2
1:A:64:ALA:HA	1:A:83:VAL:O	0.48	2.09	20	20
1:A:13:VAL:O	1:A:132:PHE:CE2	0.48	2.67	11	10
1:A:24:TYR:OH	1:A:43:HIS:CE1	0.48	2.67	7	1
1:A:69:LEU:CD1	1:A:70:ASP:O	0.48	2.62	22	25
1:A:32:VAL:O	1:A:38:HIS:CE1	0.48	2.67	15	7
1:A:119:ARG:O	1:A:121:ARG:N	0.47	2.47	5	18
1:A:38:HIS:CE1	1:A:97:ASP:HB2	0.47	2.44	2	7
1:A:62:ALA:HA	1:A:81:VAL:O	0.47	2.09	3	13
1:A:13:VAL:O	1:A:132:PHE:CD2	0.47	2.67	10	3
1:A:55:LEU:HB3	1:A:62:ALA:CB	0.47	2.40	19	19
1:A:33:ILE:HA	1:A:38:HIS:CD2	0.47	2.45	20	7
1:A:39:LEU:HB3	1:A:99:VAL:HG12	0.47	1.86	18	2
1:A:45:LYS:HG3	1:A:66:TYR:CG	0.47	2.45	1	4
1:A:132:PHE:CD1	1:A:132:PHE:O	0.47	2.67	9	7
1:A:73:VAL:CG1	1:A:82:VAL:CG2	0.47	2.92	19	7
1:A:32:VAL:CG2	1:A:33:ILE:HG23	0.47	2.27	22	2
1:A:58:LEU:N	1:A:58:LEU:CD2	0.47	2.78	18	1
1:A:13:VAL:CG1	1:A:131:ARG:NE	0.47	2.77	8	1
1:A:132:PHE:CD1	1:A:132:PHE:C	0.47	2.93	6	10
1:A:23:PHE:CZ	1:A:102:CYS:SG	0.47	3.08	12	2
1:A:10:ILE:CD1	1:A:122:THR:O	0.47	2.62	22	7
1:A:24:TYR:CD2	1:A:102:CYS:HB3	0.47	2.44	23	4
1:A:10:ILE:CD1	1:A:119:ARG:O	0.47	2.63	21	19
1:A:33:ILE:O	1:A:81:VAL:CG1	0.47	2.63	24	25
1:A:73:VAL:CG2	1:A:82:VAL:HG13	0.47	2.40	3	8
1:A:15:LEU:CD2	1:A:26:LYS:CB	0.47	2.92	8	2
1:A:9:ASN:ND2	1:A:9:ASN:N	0.47	2.62	14	1
1:A:30:LEU:CD2	1:A:33:ILE:HD11	0.47	2.40	18	1
1:A:126:LYS:HB2	1:A:127:PRO:CD	0.46	2.41	2	15
1:A:111:ASP:O	1:A:114:SER:OG	0.46	2.34	18	3

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:69:LEU:HD13	1:A:70:ASP:H	0.46	1.68	10	4
1:A:54:LYS:HE3	1:A:58:LEU:HD21	0.46	1.86	8	1
1:A:33:ILE:CD1	1:A:60:ILE:CD1	0.46	2.92	16	3
1:A:45:LYS:HG2	1:A:66:TYR:CG	0.46	2.46	11	2
1:A:110:GLN:NE2	1:A:110:GLN:N	0.46	2.63	7	1
1:A:37:ARG:C	1:A:38:HIS:CD2	0.46	2.94	23	2
1:A:123:GLY:CA	1:A:126:LYS:O	0.46	2.64	11	3
1:A:48:CYS:CB	1:A:64:ALA:HB1	0.46	2.39	6	2
1:A:15:LEU:HD23	1:A:26:LYS:HB3	0.46	1.88	11	1
1:A:38:HIS:HB2	1:A:81:VAL:HG12	0.46	1.87	9	2
1:A:24:TYR:CE1	1:A:102:CYS:SG	0.46	3.09	3	1
1:A:120:GLY:O	1:A:124:ARG:NE	0.46	2.49	8	5
1:A:29:PRO:HG2	1:A:32:VAL:HG13	0.45	1.88	4	9
1:A:45:LYS:HD2	1:A:66:TYR:CD1	0.45	2.47	18	3
1:A:40:ILE:CB	1:A:83:VAL:HG12	0.45	2.40	22	5
1:A:10:ILE:HD13	1:A:122:THR:CG2	0.45	2.42	17	1
1:A:23:PHE:CE2	1:A:24:TYR:CE1	0.45	3.04	7	1
1:A:26:LYS:HG3	1:A:133:VAL:HG13	0.45	1.88	12	1
1:A:39:LEU:HD12	1:A:82:VAL:HB	0.45	1.87	14	3
1:A:74:ILE:O	1:A:74:ILE:CD1	0.45	2.63	23	7
1:A:24:TYR:CD2	1:A:102:CYS:CB	0.45	2.99	5	2
1:A:51:LEU:HD13	1:A:55:LEU:HD22	0.45	1.88	25	2
1:A:23:PHE:CE1	1:A:24:TYR:CD1	0.45	3.04	7	1
1:A:23:PHE:O	1:A:25:GLY:N	0.45	2.50	4	12
1:A:58:LEU:N	1:A:58:LEU:HD22	0.45	2.25	18	1
1:A:24:TYR:CE1	1:A:43:HIS:CD2	0.45	3.04	24	1
1:A:23:PHE:N	1:A:26:LYS:O	0.45	2.50	11	10
1:A:111:ASP:OD1	1:A:113:VAL:CG2	0.45	2.65	15	15
1:A:24:TYR:CD2	1:A:102:CYS:SG	0.45	3.10	19	6
1:A:33:ILE:CG2	1:A:100:ILE:HD13	0.45	2.42	10	1
1:A:55:LEU:HB3	1:A:62:ALA:HB2	0.45	1.89	1	5
1:A:28:ILE:HD13	1:A:100:ILE:HG21	0.45	1.89	5	1
1:A:21:ILE:HD11	1:A:51:LEU:HD22	0.45	1.87	10	1
1:A:73:VAL:CG1	1:A:82:VAL:HG13	0.44	2.42	7	1
1:A:65:TYR:O	1:A:84:ALA:HB1	0.44	2.11	9	3
1:A:100:ILE:N	1:A:100:ILE:CD1	0.44	2.81	11	1
1:A:33:ILE:O	1:A:38:HIS:CD2	0.44	2.70	23	1
1:A:111:ASP:OD1	1:A:114:SER:N	0.44	2.50	16	16
1:A:110:GLN:CG	1:A:114:SER:HB3	0.44	2.42	17	2
1:A:30:LEU:HD22	1:A:60:ILE:HD12	0.44	1.88	19	1
1:A:66:TYR:CA	1:A:87:ALA:HB2	0.44	2.42	21	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:39:LEU:HD23	1:A:41:PHE:CZ	0.44	2.47	8	1
1:A:71:VAL:O	1:A:71:VAL:CG2	0.44	2.66	18	21
1:A:23:PHE:CZ	1:A:24:TYR:CE1	0.44	3.05	7	1
1:A:21:ILE:HD11	1:A:51:LEU:CD1	0.44	2.43	9	1
1:A:51:LEU:CD1	1:A:55:LEU:HD22	0.44	2.43	25	2
1:A:50:GLU:O	1:A:54:LYS:CB	0.44	2.65	25	9
1:A:123:GLY:HA2	1:A:126:LYS:O	0.44	2.13	24	10
1:A:63:VAL:CB	1:A:73:VAL:HG22	0.44	2.41	7	2
1:A:31:GLU:OE1	1:A:32:VAL:HG12	0.44	2.13	19	2
1:A:85:THR:CG2	1:A:86:ASP:N	0.44	2.81	25	2
1:A:51:LEU:C	1:A:51:LEU:CD1	0.43	2.91	15	9
1:A:65:TYR:CB	1:A:84:ALA:HB2	0.43	2.43	25	1
1:A:115:ARG:O	1:A:119:ARG:CB	0.43	2.66	4	4
1:A:21:ILE:CG1	1:A:51:LEU:HD21	0.43	2.44	8	1
1:A:61:ASN:ND2	1:A:61:ASN:C	0.43	2.77	15	1
1:A:10:ILE:CG1	1:A:122:THR:O	0.43	2.66	1	5
1:A:111:ASP:OD2	1:A:113:VAL:CG2	0.43	2.66	13	3
1:A:24:TYR:CB	1:A:102:CYS:HG	0.43	2.26	18	1
1:A:103:ASN:ND2	1:A:110:GLN:NE2	0.43	2.67	23	1
1:A:9:ASN:O	1:A:127:PRO:HA	0.43	2.14	21	4
1:A:123:GLY:O	1:A:125:GLY:N	0.43	2.52	14	5
1:A:130:TYR:CD1	1:A:130:TYR:C	0.43	2.93	11	2
1:A:122:THR:HG23	1:A:128:GLY:HA3	0.43	1.90	18	4
1:A:15:LEU:O	1:A:26:LYS:CD	0.43	2.67	16	1
1:A:54:LYS:O	1:A:57:ALA:HB3	0.43	2.13	7	4
1:A:66:TYR:OH	1:A:69:LEU:HD23	0.43	2.12	13	3
1:A:103:ASN:O	1:A:110:GLN:NE2	0.43	2.52	16	1
1:A:86:ASP:OD1	1:A:87:ALA:N	0.43	2.52	21	1
1:A:38:HIS:ND1	1:A:98:SER:OG	0.43	2.52	7	5
1:A:24:TYR:CD1	1:A:102:CYS:SG	0.43	3.12	3	1
1:A:24:TYR:CE2	1:A:102:CYS:HB3	0.43	2.48	11	2
1:A:80:VAL:O	1:A:80:VAL:HG13	0.43	2.14	15	1
1:A:110:GLN:CD	1:A:110:GLN:N	0.43	2.77	16	1
1:A:31:GLU:OE2	1:A:32:VAL:CG1	0.43	2.67	4	1
1:A:40:ILE:N	1:A:82:VAL:O	0.43	2.50	5	4
1:A:65:TYR:CD2	1:A:88:LEU:CD1	0.43	3.02	3	1
1:A:62:ALA:CB	1:A:81:VAL:HG23	0.42	2.44	18	11
1:A:110:GLN:N	1:A:110:GLN:OE1	0.42	2.52	16	2
1:A:43:HIS:ND1	1:A:43:HIS:C	0.42	2.77	16	1
1:A:51:LEU:HD22	1:A:54:LYS:HG2	0.42	1.91	20	1
1:A:101:ASP:CB	1:A:130:TYR:OH	0.42	2.67	20	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:10:ILE:HA	1:A:128:GLY:O	0.42	2.14	18	2
1:A:21:ILE:HG23	1:A:21:ILE:O	0.42	2.14	14	5
1:A:130:TYR:C	1:A:130:TYR:CD1	0.42	2.98	21	3
1:A:31:GLU:OE2	1:A:32:VAL:HG12	0.42	2.15	4	1
1:A:100:ILE:HD13	1:A:131:ARG:HB2	0.42	1.90	5	1
1:A:103:ASN:CB	1:A:110:GLN:OE1	0.42	2.66	7	1
1:A:103:ASN:CA	1:A:110:GLN:OE1	0.42	2.67	7	1
1:A:45:LYS:HD2	1:A:66:TYR:CE1	0.42	2.50	18	1
1:A:114:SER:O	1:A:118:ARG:CD	0.42	2.67	1	1
1:A:24:TYR:CE1	1:A:47:LYS:HD3	0.42	2.49	4	1
1:A:23:PHE:O	1:A:26:LYS:HB2	0.42	2.15	7	1
1:A:16:SER:O	1:A:18:THR:N	0.42	2.53	10	4
1:A:110:GLN:NE2	1:A:111:ASP:O	0.42	2.52	11	2
1:A:120:GLY:O	1:A:121:ARG:NE	0.42	2.53	12	2
1:A:45:LYS:HE3	1:A:66:TYR:CE1	0.42	2.49	1	1
1:A:24:TYR:OH	1:A:43:HIS:ND1	0.42	2.51	3	2
1:A:122:THR:OG1	1:A:128:GLY:HA3	0.42	2.15	6	1
1:A:117:GLN:O	1:A:121:ARG:NH1	0.42	2.51	22	2
1:A:54:LYS:CD	1:A:54:LYS:C	0.42	2.92	13	2
1:A:110:GLN:O	1:A:110:GLN:NE2	0.42	2.52	15	1
1:A:33:ILE:O	1:A:81:VAL:HG11	0.42	2.15	17	1
1:A:31:GLU:OE1	1:A:32:VAL:CG1	0.42	2.68	21	1
1:A:74:ILE:O	1:A:74:ILE:CG1	0.42	2.67	16	2
1:A:99:VAL:HG11	1:A:121:ARG:CB	0.42	2.45	22	1
1:A:33:ILE:O	1:A:38:HIS:ND1	0.42	2.52	24	1
1:A:41:PHE:CB	1:A:101:ASP:OD2	0.42	2.68	1	1
1:A:24:TYR:CZ	1:A:102:CYS:SG	0.42	3.12	3	1
1:A:66:TYR:HA	1:A:87:ALA:CB	0.42	2.45	12	3
1:A:11:GLU:N	1:A:128:GLY:O	0.42	2.50	18	1
1:A:40:ILE:O	1:A:83:VAL:HA	0.42	2.15	6	5
1:A:32:VAL:O	1:A:38:HIS:ND1	0.42	2.53	21	7
1:A:33:ILE:HD11	1:A:60:ILE:HD12	0.42	1.91	2	1
1:A:10:ILE:HG12	1:A:122:THR:O	0.42	2.14	15	2
1:A:32:VAL:CG1	1:A:131:ARG:NE	0.41	2.82	2	1
1:A:21:ILE:CG1	1:A:51:LEU:CD2	0.41	2.98	8	1
1:A:48:CYS:O	1:A:64:ALA:CB	0.41	2.67	13	1
1:A:32:VAL:HG11	1:A:131:ARG:NE	0.41	2.30	2	1
1:A:129:ILE:HD12	1:A:129:ILE:N	0.41	2.31	18	2
1:A:33:ILE:HA	1:A:38:HIS:ND1	0.41	2.30	3	3
1:A:34:LYS:CE	1:A:35:GLY:N	0.41	2.83	6	1
1:A:30:LEU:O	1:A:34:LYS:N	0.41	2.48	9	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:41:PHE:CB	1:A:101:ASP:OD1	0.41	2.68	9	1
1:A:45:LYS:CD	1:A:66:TYR:CD1	0.41	3.03	18	1
1:A:49:ASP:OD1	1:A:66:TYR:CE2	0.41	2.74	18	1
1:A:15:LEU:O	1:A:26:LYS:NZ	0.41	2.53	7	1
1:A:69:LEU:HD13	1:A:69:LEU:C	0.41	2.41	11	1
1:A:66:TYR:CA	1:A:87:ALA:CB	0.41	2.98	6	2
1:A:45:LYS:HD3	1:A:66:TYR:CD1	0.41	2.50	11	2
1:A:65:TYR:HB3	1:A:84:ALA:CB	0.41	2.46	4	4
1:A:86:ASP:OD1	1:A:118:ARG:NH2	0.41	2.53	15	1
1:A:47:LYS:O	1:A:51:LEU:CB	0.41	2.69	3	1
1:A:39:LEU:HB2	1:A:96:PHE:CD2	0.41	2.51	5	2
1:A:70:ASP:N	1:A:70:ASP:OD1	0.41	2.53	15	1
1:A:10:ILE:HD13	1:A:122:THR:HG22	0.41	1.92	17	1
1:A:103:ASN:CG	1:A:110:GLN:NE2	0.41	2.79	2	1
1:A:100:ILE:HD12	1:A:100:ILE:N	0.41	2.31	3	2
1:A:114:SER:O	1:A:118:ARG:N	0.41	2.39	10	1
1:A:74:ILE:CG1	1:A:74:ILE:O	0.41	2.69	13	1
1:A:9:ASN:OD1	1:A:9:ASN:N	0.41	2.53	16	1
1:A:30:LEU:HD11	1:A:58:LEU:HB3	0.41	1.91	18	1
1:A:32:VAL:O	1:A:38:HIS:CG	0.41	2.73	20	1
1:A:24:TYR:CD2	1:A:102:CYS:HB2	0.41	2.50	22	1
1:A:23:PHE:CE2	1:A:24:TYR:CD2	0.41	3.09	23	1
1:A:10:ILE:HD13	1:A:119:ARG:O	0.41	2.16	4	1
1:A:24:TYR:CZ	1:A:47:LYS:HD2	0.41	2.51	25	1
1:A:113:VAL:O	1:A:114:SER:C	0.40	2.64	9	3
1:A:41:PHE:CE2	1:A:118:ARG:HG2	0.40	2.51	14	1
1:A:30:LEU:O	1:A:34:LYS:CB	0.40	2.69	10	1
1:A:21:ILE:CG2	1:A:28:ILE:HG22	0.40	2.46	13	1
1:A:111:ASP:OD2	1:A:114:SER:N	0.40	2.51	18	1
1:A:121:ARG:O	1:A:124:ARG:CD	0.40	2.69	18	1
1:A:86:ASP:N	1:A:86:ASP:OD1	0.40	2.53	19	1
1:A:86:ASP:O	1:A:87:ALA:C	0.40	2.64	21	1
1:A:63:VAL:CG1	1:A:72:SER:HB2	0.40	2.45	22	1
1:A:51:LEU:HD22	1:A:54:LYS:HE3	0.40	1.94	1	1
1:A:111:ASP:O	1:A:112:ALA:C	0.40	2.64	6	1
1:A:116:THR:O	1:A:119:ARG:NH2	0.40	2.53	7	1
1:A:55:LEU:HB2	1:A:62:ALA:CB	0.40	2.46	13	1
1:A:103:ASN:ND2	1:A:110:GLN:OE1	0.40	2.54	22	1
1:A:55:LEU:HD23	1:A:81:VAL:CG2	0.40	2.46	1	1
1:A:115:ARG:O	1:A:119:ARG:HB2	0.40	2.17	12	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	110/142 (77%)	98±2 (89±1%)	10±2 (9±1%)	2±1 (2±1%)	8	51
All	All	2750/3550 (77%)	2440 (89%)	258 (9%)	52 (2%)	8	51

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	24	TYR	12
1	A	110	GLN	7
1	A	120	GLY	7
1	A	86	ASP	7
1	A	9	ASN	6
1	A	124	ARG	5
1	A	85	THR	2
1	A	121	ARG	2
1	A	17	THR	2
1	A	126	LYS	2

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	90/114 (79%)	75±3 (84±3%)	15±3 (16±3%)	4	40
All	All	2250/2850 (79%)	1887 (84%)	363 (16%)	4	40

All 43 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	55	LEU	25
1	A	99	VAL	24
1	A	114	SER	24
1	A	54	LYS	22
1	A	74	ILE	21
1	A	121	ARG	19
1	A	104	THR	15
1	A	46	LYS	14
1	A	47	LYS	14
1	A	34	LYS	14
1	A	88	LEU	13
1	A	126	LYS	13
1	A	45	LYS	12
1	A	110	GLN	10
1	A	37	ARG	9
1	A	49	ASP	9
1	A	86	ASP	9
1	A	51	LEU	8
1	A	97	ASP	7
1	A	31	GLU	7
1	A	124	ARG	7
1	A	129	ILE	7
1	A	20	GLU	6
1	A	17	THR	6
1	A	67	ARG	6
1	A	50	GLU	5
1	A	26	LYS	5
1	A	117	GLN	4
1	A	95	ASP	3
1	A	118	ARG	3
1	A	122	THR	3
1	A	9	ASN	3
1	A	119	ARG	3
1	A	61	ASN	2
1	A	131	ARG	2
1	A	10	ILE	2
1	A	44	SER	1
1	A	28	ILE	1
1	A	115	ARG	1
1	A	12	GLU	1
1	A	43	HIS	1
1	A	11	GLU	1
1	A	73	VAL	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 oligosaccharides 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 [i](#)

There are no chain breaks in this entry.

7 Chemical shift validation

No chemical shift data were provided