Full wwPDB NMR Structure Validation Report (i)

Nov 27, 2023 – 12:36 pm GMT

PDB ID	:	8BA1
BMRB ID	:	51624
Title	:	CTD12-CTD12 heterodimer from CPSF73 and CPSF100
Authors	:	Thore, S.; Mackereth, C.
Deposited on	:	2022-10-10

This is a Full wwPDB NMR Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
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 (i)) were used in the production of this report:

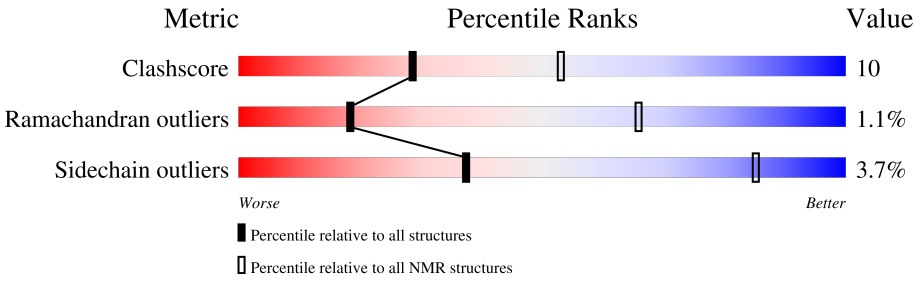
Cyrange	:	Kirchner and Güntert (2011)
NmrClust	:	Kelley et al. (1996)
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 is 45%.

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	119	71% 21% • 6%
2	B	116	76% 16% • 8%

2 Ensemble composition and analysis

This entry contains 20 models. Model 3 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *closest to the average*.

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:455-A:566, B:530-B:620, B:624-B:639 (219)	0.96	3

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

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

The models can be grouped into 2 clusters. No single-model clusters were found.

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

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 3664 atoms, of which 1824 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Cleavage and polyadenylation specificity factor subunit 3.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	119	1895	603	947	150	190	5	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	449	GLY	-	expression tag	UNP Q8SUE4
A	450	HIS	-	expression tag	UNP Q8SUE4
A	451	MET	-	expression tag	UNP Q8SUE4

- Molecule 2 is a protein called Cleavage and polyadenylation specificity factor subunit 2.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
2	B	116	1769	548	877	161	173	10	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	524	MET	-	initiating methionine	UNP M1JIZ1

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: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:

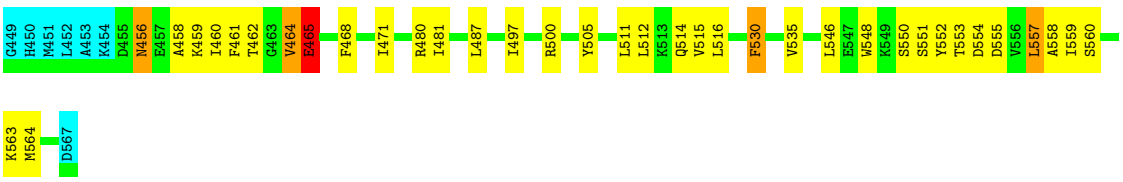
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:

4.2.2 Score per residue for model 2

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:

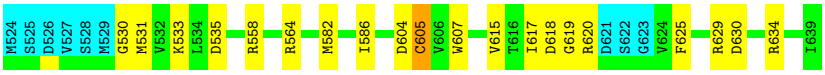
4.2.3 Score per residue for model 3 (medoid)

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:



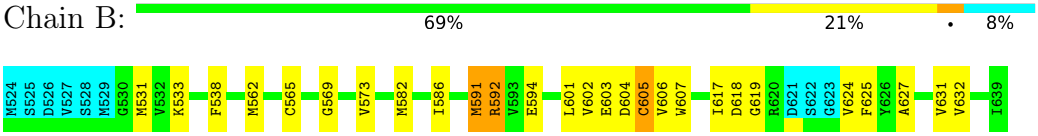
4.2.4 Score per residue for model 4

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

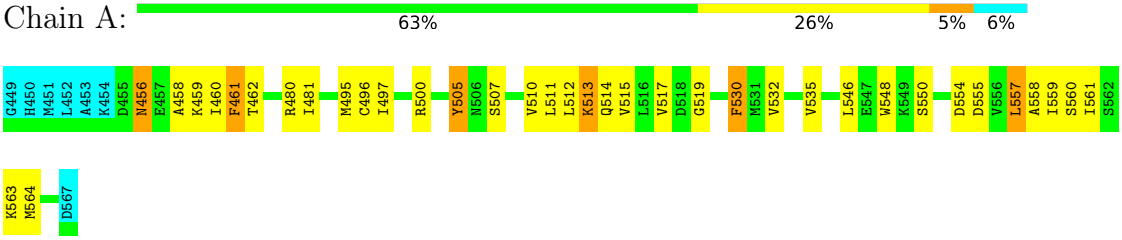
Chain B:



4.2.5 Score per residue for model 5

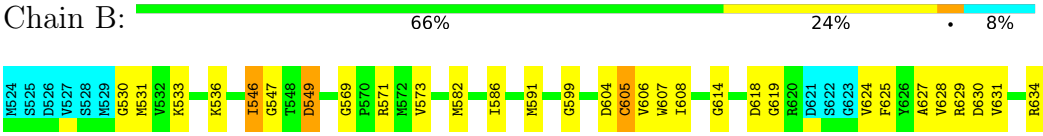
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

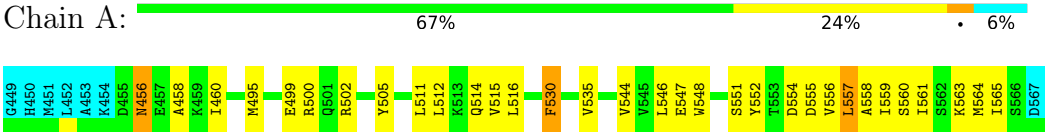
Chain B:



4.2.6 Score per residue for model 6

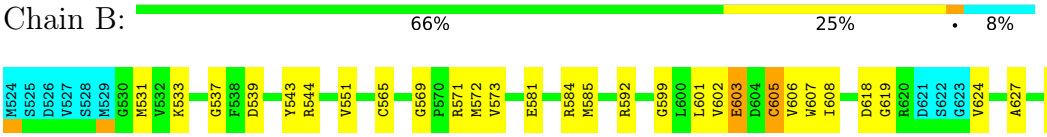
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

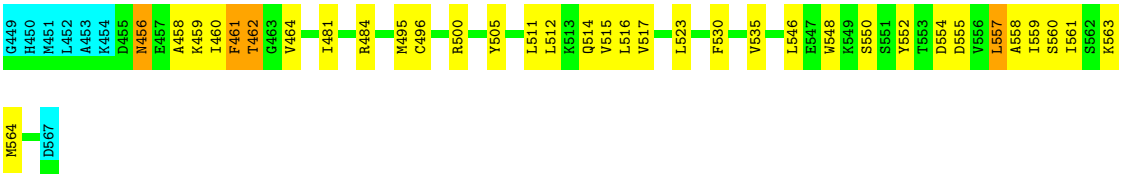
Chain B:



4.2.7 Score per residue for model 7

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:

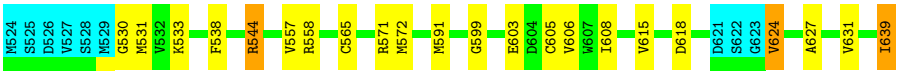
4.2.8 Score per residue for model 8

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:



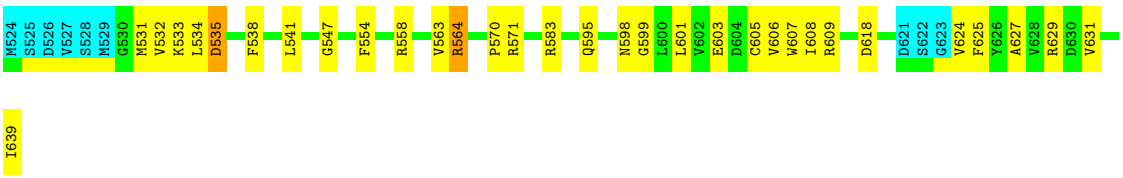
4.2.9 Score per residue for model 9

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

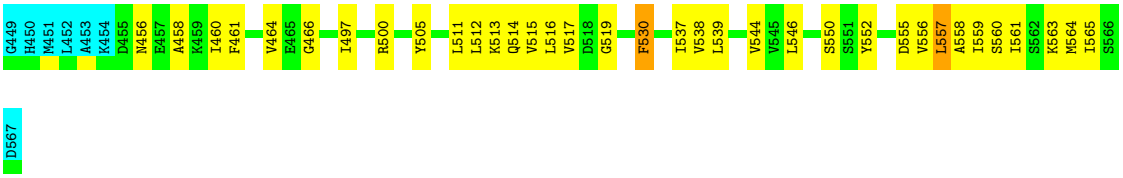
• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:



4.2.10 Score per residue for model 10

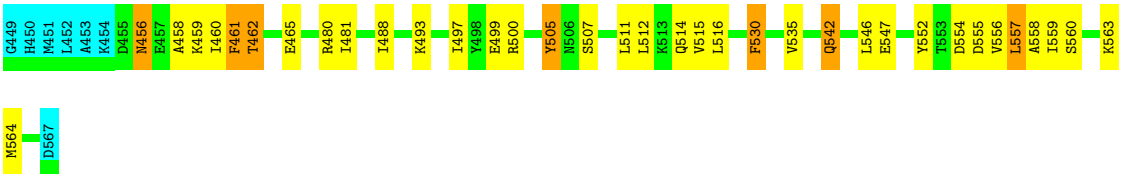
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

4.2.11 Score per residue for model 11

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

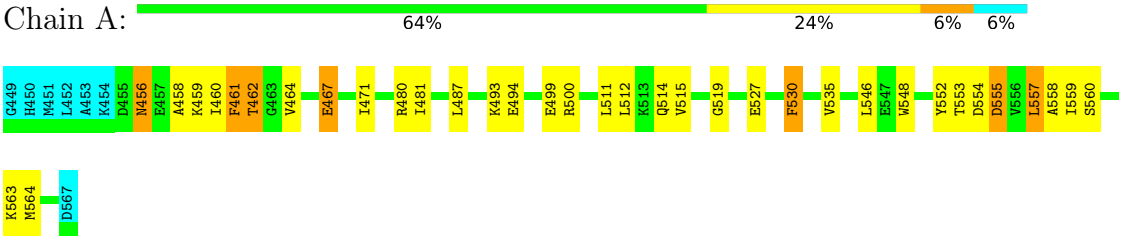


• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

4.2.12 Score per residue for model 12

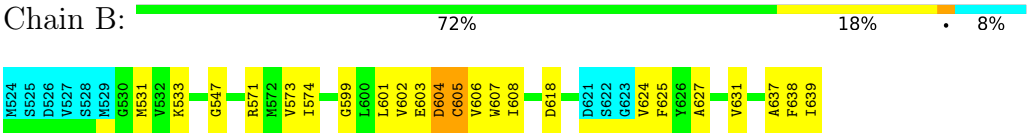
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

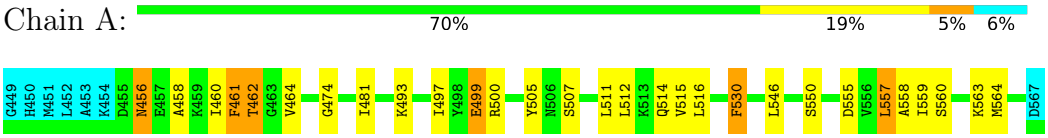
Chain B:



4.2.13 Score per residue for model 13

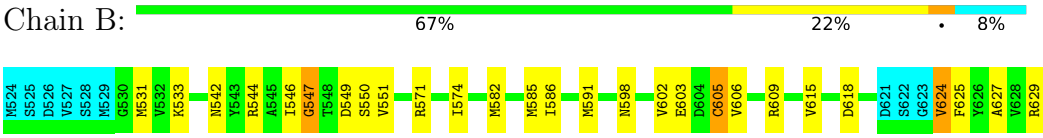
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

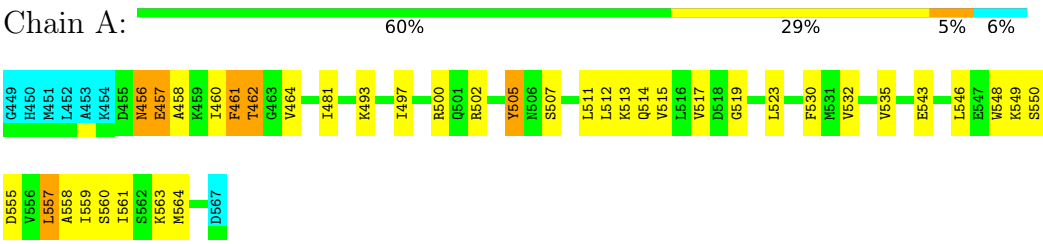
Chain B:



4.2.14 Score per residue for model 14

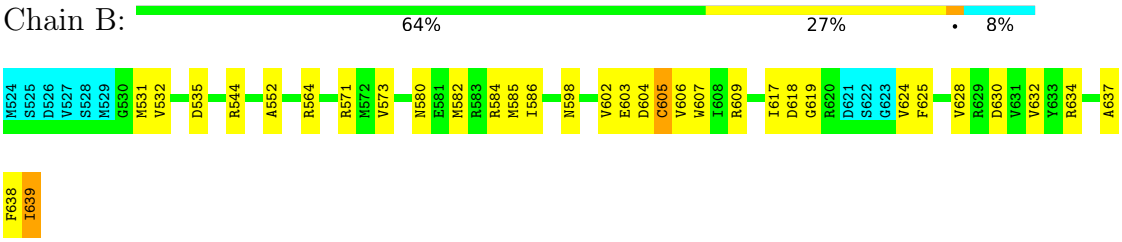
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:



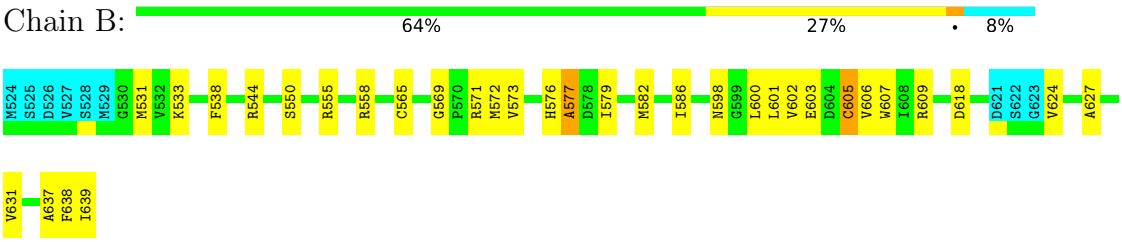
4.2.15 Score per residue for model 15

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

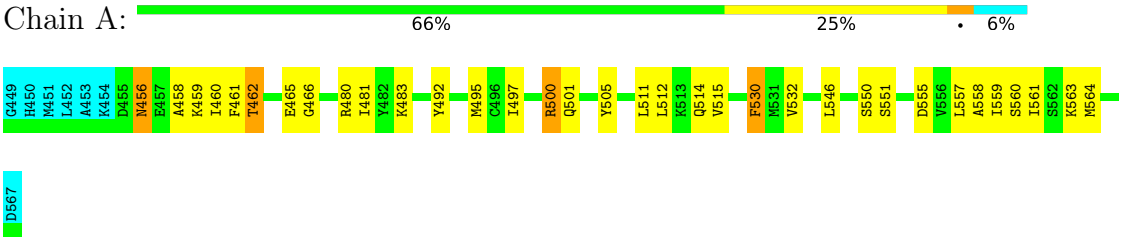
Chain B:



4.2.16 Score per residue for model 16

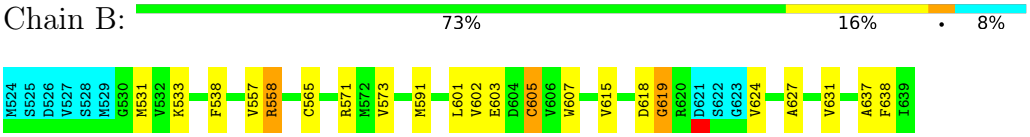
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

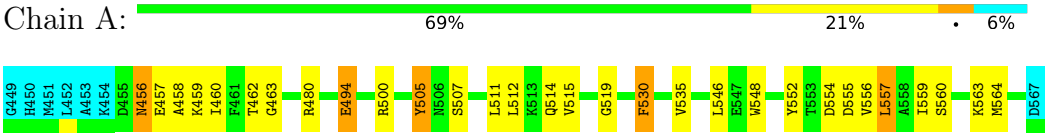
Chain B:



4.2.17 Score per residue for model 17

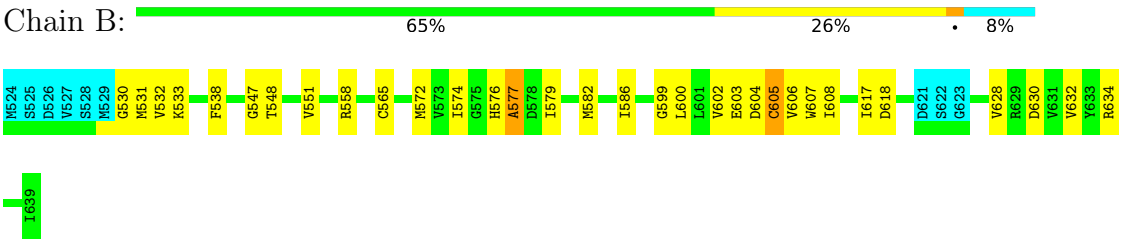
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

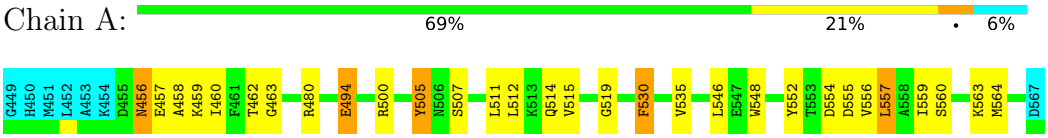
Chain B:



4.2.18 Score per residue for model 18

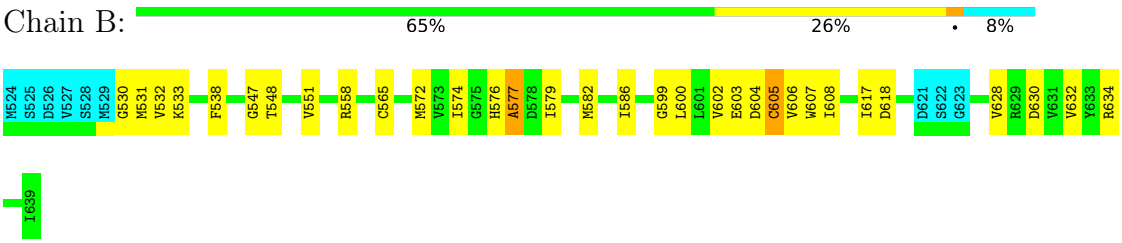
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

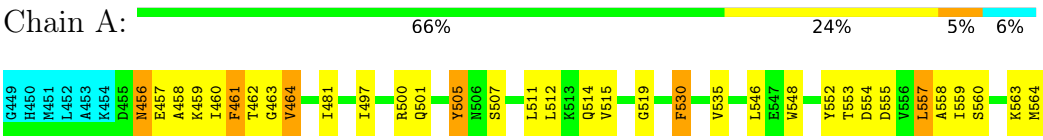
Chain B:



4.2.19 Score per residue for model 19

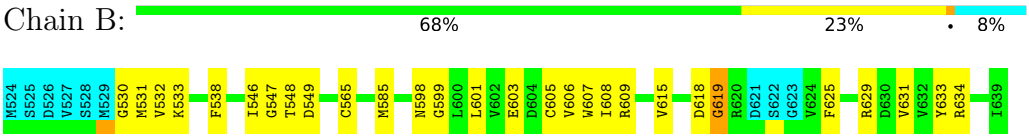
• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:



• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:



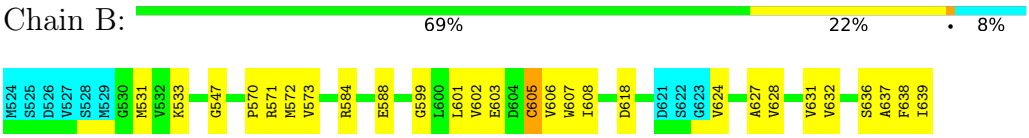
4.2.20 Score per residue for model 20

• Molecule 1: Cleavage and polyadenylation specificity factor subunit 3

Chain A:

• Molecule 2: Cleavage and polyadenylation specificity factor subunit 2

Chain B:



5 Refinement protocol and experimental data overview

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

Of the 250 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
CNS	refinement	1.2
ARIA	structure calculation	2.3

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	1407
Number of shifts mapped to atoms	1407
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	45%

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	0.37±0.02	0±0/908 (0.0± 0.0%)	0.54±0.05	0±0/1225 (0.0± 0.0%)
2	B	0.35±0.03	0±0/841 (0.0± 0.0%)	0.53±0.04	0±0/1127 (0.0± 0.0%)
All	All	0.36	0/34980 (0.0%)	0.54	2/47040 (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	1.6±1.1
2	B	0.0±0.0	1.2±0.4
All	All	0	56

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	543	GLU	CA-C-N	5.72	129.78	117.20	20	1
1	A	541	GLY	N-CA-C	-5.08	100.41	113.10	20	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)
2	B	605	CYS	Peptide	20
1	A	461	PHE	Peptide	10
1	A	462	THR	Peptide	9
1	A	463	GLY	Peptide	3

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Mol	Chain	Res	Type	Group	Models (Total)
1	A	464	VAL	Peptide	2
1	A	465	GLU	Peptide	2
1	A	547	GLU	Peptide	2
1	A	550	SER	Peptide	2
2	B	591	MET	Peptide	1
2	B	546	ILE	Peptide	1
2	B	604	ASP	Peptide	1
1	A	457	GLU	Peptide	1
2	B	619	GLY	Peptide	1
1	A	540	SER	Peptide	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	895	892	891	23±4
2	B	831	822	821	18±3
All	All	34520	34280	34240	717

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:540:SER:HB2	1:A:544:VAL:N	0.86	1.85	20	1
1:A:505:TYR:CE2	1:A:544:VAL:HB	0.81	2.09	10	1
1:A:535:VAL:HG21	1:A:558:ALA:HB2	0.76	1.57	6	4
1:A:499:GLU:O	1:A:548:TRP:HB2	0.76	1.79	2	1
2:B:606:VAL:HG21	2:B:625:PHE:HA	0.74	1.59	12	1
1:A:500:ARG:HA	1:A:546:LEU:O	0.73	1.84	16	20
2:B:586:ILE:O	2:B:591:MET:HB2	0.72	1.85	4	1
1:A:462:THR:O	1:A:464:VAL:HG23	0.71	1.85	13	5
1:A:461:PHE:O	1:A:462:THR:HG23	0.70	1.87	3	12
1:A:557:LEU:HD22	1:A:558:ALA:N	0.69	2.03	11	12
2:B:535:ASP:OD2	2:B:564:ARG:HA	0.69	1.87	9	5
1:A:460:ILE:O	2:B:530:GLY:HA2	0.69	1.88	17	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:546:ILE:HB	2:B:549:ASP:CB	0.68	2.18	13	1
2:B:576:HIS:CG	2:B:577:ALA:H	0.67	2.07	15	4
1:A:538:VAL:O	1:A:544:VAL:HA	0.67	1.90	20	1
1:A:460:ILE:HG12	1:A:461:PHE:N	0.67	2.05	9	1
1:A:458:ALA:O	2:B:531:MET:HA	0.66	1.90	17	20
1:A:557:LEU:HD12	1:A:558:ALA:N	0.66	2.04	16	1
1:A:516:LEU:HD23	1:A:564:MET:SD	0.65	2.32	2	11
1:A:560:SER:O	1:A:563:LYS:HG2	0.65	1.91	20	20
1:A:516:LEU:HA	1:A:564:MET:SD	0.65	2.32	11	5
1:A:512:LEU:HD23	1:A:530:PHE:CE2	0.64	2.27	20	20
1:A:460:ILE:HG13	1:A:481:ILE:O	0.63	1.93	9	1
2:B:591:MET:SD	2:B:624:VAL:HG23	0.63	2.34	16	2
1:A:505:TYR:OH	1:A:565:ILE:HD13	0.63	1.93	10	1
1:A:456:ASN:O	2:B:533:LYS:HA	0.63	1.94	2	18
1:A:465:GLU:CG	2:B:558:ARG:HG3	0.62	2.24	1	1
1:A:505:TYR:CZ	1:A:565:ILE:HD13	0.62	2.29	10	1
2:B:585:MET:SD	2:B:634:ARG:HD2	0.62	2.34	7	3
2:B:605:CYS:O	2:B:606:VAL:HG23	0.62	1.94	12	1
1:A:464:VAL:HG12	1:A:465:GLU:H	0.62	1.55	1	1
1:A:560:SER:O	1:A:564:MET:HG2	0.62	1.94	15	9
2:B:606:VAL:HG13	2:B:618:ASP:O	0.62	1.93	8	7
2:B:571:ARG:HA	2:B:639:ILE:O	0.62	1.95	8	9
1:A:457:GLU:HA	2:B:532:VAL:O	0.61	1.95	19	3
1:A:473:ILE:HA	2:B:550:SER:O	0.61	1.96	15	1
2:B:606:VAL:HA	2:B:618:ASP:O	0.61	1.96	12	1
1:A:548:TRP:CE3	1:A:558:ALA:HB1	0.60	2.32	1	5
2:B:546:ILE:HB	2:B:549:ASP:HB2	0.60	1.72	13	2
2:B:601:LEU:HD13	2:B:607:TRP:CE2	0.60	2.31	20	7
2:B:592:ARG:HD3	2:B:602:VAL:HG13	0.59	1.73	4	1
1:A:505:TYR:CE1	1:A:544:VAL:HG21	0.59	2.32	10	1
2:B:619:GLY:HA2	2:B:625:PHE:CD1	0.58	2.33	5	5
2:B:602:VAL:HB	2:B:606:VAL:HB	0.58	1.75	4	1
1:A:540:SER:CB	1:A:544:VAL:HG23	0.57	2.28	20	1
1:A:457:GLU:HB2	2:B:532:VAL:O	0.57	1.99	14	1
1:A:495:MET:O	2:B:573:VAL:HB	0.57	1.99	16	7
1:A:497:ILE:HA	2:B:615:VAL:O	0.57	2.00	11	6
2:B:592:ARG:H	2:B:592:ARG:CD	0.57	2.13	4	1
2:B:585:MET:HB3	2:B:631:VAL:HG13	0.57	1.77	13	1
1:A:505:TYR:CZ	1:A:544:VAL:HB	0.56	2.35	10	1
2:B:584:ARG:O	2:B:588:GLU:HG2	0.56	2.01	20	2
2:B:592:ARG:H	2:B:592:ARG:HD2	0.56	1.59	4	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:599:GLY:HA3	2:B:608:ILE:O	0.56	1.99	5	11
1:A:535:VAL:HG13	1:A:548:TRP:HB3	0.56	1.78	7	8
1:A:511:LEU:O	1:A:514:GLN:HG3	0.56	2.01	2	1
2:B:579:ILE:HA	2:B:582:MET:SD	0.56	2.40	2	1
1:A:540:SER:HB3	1:A:544:VAL:HG23	0.56	1.78	20	1
2:B:533:LYS:HD3	2:B:562:MET:SD	0.55	2.42	4	1
1:A:552:TYR:O	1:A:556:VAL:HG23	0.55	2.01	11	7
2:B:617:ILE:HD11	2:B:632:VAL:HG21	0.55	1.79	10	6
1:A:456:ASN:HD22	1:A:456:ASN:N	0.55	2.00	16	5
1:A:505:TYR:CE2	1:A:565:ILE:HG21	0.55	2.36	10	1
1:A:505:TYR:CZ	1:A:507:SER:HB2	0.55	2.37	13	9
1:A:474:GLY:H	2:B:550:SER:HB2	0.55	1.62	13	1
1:A:466:GLY:O	2:B:557:VAL:HA	0.54	2.02	8	3
2:B:607:TRP:HB2	2:B:618:ASP:O	0.54	2.01	19	1
1:A:459:LYS:O	1:A:480:ARG:HA	0.54	2.02	15	10
1:A:555:ASP:O	1:A:559:ILE:HG13	0.54	2.02	10	20
2:B:572:MET:O	2:B:639:ILE:HG13	0.54	2.01	8	1
1:A:460:ILE:HB	1:A:481:ILE:HB	0.53	1.80	5	12
1:A:474:GLY:N	2:B:550:SER:HB2	0.53	2.18	13	1
2:B:594:GLU:HB2	2:B:601:LEU:O	0.53	2.03	4	1
1:A:494:GLU:HG2	2:B:572:MET:SD	0.53	2.43	17	2
1:A:460:ILE:HA	1:A:481:ILE:O	0.53	2.03	19	2
2:B:571:ARG:HA	2:B:639:ILE:OXT	0.53	2.03	11	1
1:A:459:LYS:HA	2:B:530:GLY:O	0.53	2.03	1	6
1:A:497:ILE:H	1:A:550:SER:HB3	0.53	1.64	14	6
2:B:630:ASP:O	2:B:634:ARG:HG3	0.53	2.04	3	7
1:A:511:LEU:O	1:A:515:VAL:HG23	0.53	2.03	2	20
2:B:627:ALA:O	2:B:631:VAL:HG23	0.53	2.04	9	13
2:B:539:ASP:HA	2:B:543:TYR:OH	0.53	2.04	6	1
2:B:573:VAL:HG22	2:B:638:PHE:CD1	0.53	2.39	6	8
1:A:466:GLY:HA2	2:B:558:ARG:O	0.53	2.03	16	2
2:B:538:PHE:O	2:B:541:LEU:HG	0.53	2.03	9	1
2:B:582:MET:O	2:B:586:ILE:HG13	0.53	2.04	2	12
1:A:554:ASP:HA	1:A:557:LEU:CD1	0.53	2.34	11	14
2:B:601:LEU:HD13	2:B:607:TRP:NE1	0.52	2.19	19	1
1:A:519:GLY:HA3	1:A:564:MET:CE	0.52	2.34	10	7
2:B:585:MET:SD	2:B:631:VAL:HA	0.52	2.45	19	2
2:B:546:ILE:CB	2:B:549:ASP:HB2	0.52	2.34	13	1
2:B:546:ILE:HB	2:B:549:ASP:OD2	0.52	2.05	19	1
2:B:606:VAL:HG11	2:B:628:VAL:HG21	0.52	1.81	2	7
1:A:519:GLY:HA3	1:A:564:MET:HE3	0.51	1.82	10	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:505:TYR:CE1	1:A:544:VAL:CG2	0.51	2.93	10	1
2:B:573:VAL:HA	2:B:637:ALA:O	0.51	2.06	15	5
1:A:535:VAL:HG11	1:A:561:ILE:HD12	0.51	1.82	7	2
1:A:465:GLU:HG2	2:B:558:ARG:HG3	0.51	1.82	1	1
1:A:539:LEU:HD13	1:A:544:VAL:HG23	0.51	1.82	10	1
2:B:602:VAL:O	2:B:604:ASP:N	0.51	2.38	12	1
2:B:571:ARG:HG3	2:B:639:ILE:OXT	0.51	2.06	15	1
1:A:540:SER:HA	1:A:543:GLU:N	0.51	2.21	20	1
2:B:602:VAL:HB	2:B:624:VAL:N	0.51	2.20	12	1
2:B:576:HIS:CG	2:B:577:ALA:N	0.50	2.78	15	4
2:B:604:ASP:O	2:B:605:CYS:SG	0.50	2.69	10	11
1:A:500:ARG:O	2:B:619:GLY:HA3	0.50	2.06	4	5
1:A:552:TYR:HA	1:A:555:ASP:OD2	0.50	2.07	4	1
2:B:538:PHE:CE2	2:B:565:CYS:HB2	0.50	2.41	17	7
1:A:501:GLN:HA	2:B:619:GLY:HA2	0.50	1.84	16	1
2:B:607:TRP:HB2	2:B:618:ASP:HB2	0.49	1.84	17	4
2:B:592:ARG:CG	2:B:602:VAL:HG13	0.49	2.38	4	1
2:B:544:ARG:NH1	2:B:639:ILE:HG23	0.49	2.22	8	1
1:A:499:GLU:HG2	2:B:629:ARG:CZ	0.49	2.38	13	2
1:A:460:ILE:CG1	1:A:461:PHE:N	0.49	2.76	9	1
1:A:461:PHE:CE2	2:B:530:GLY:HA2	0.49	2.43	8	1
1:A:505:TYR:CB	1:A:540:SER:HB3	0.48	2.38	20	1
1:A:468:PHE:CE1	2:B:558:ARG:HB2	0.48	2.43	1	1
1:A:532:VAL:HB	1:A:561:ILE:HD11	0.48	1.84	5	5
2:B:598:ASN:O	2:B:609:ARG:HA	0.48	2.07	13	6
2:B:592:ARG:CD	2:B:602:VAL:HG13	0.48	2.39	4	1
2:B:624:VAL:HB	2:B:627:ALA:HB3	0.48	1.86	6	1
1:A:493:LYS:HG2	1:A:494:GLU:N	0.48	2.24	12	1
1:A:557:LEU:C	1:A:557:LEU:HD22	0.48	2.28	1	6
2:B:607:TRP:HB2	2:B:618:ASP:HB3	0.48	1.85	16	5
1:A:552:TYR:O	1:A:555:ASP:HB2	0.48	2.09	6	5
2:B:592:ARG:HB3	2:B:603:GLU:HG2	0.48	1.86	4	1
2:B:591:MET:SD	2:B:624:VAL:HG13	0.48	2.48	13	4
1:A:505:TYR:CE2	1:A:507:SER:HB2	0.48	2.43	8	1
2:B:602:VAL:C	2:B:605:CYS:HB2	0.48	2.29	6	6
1:A:471:ILE:HG12	1:A:487:LEU:HD22	0.48	1.84	12	5
2:B:579:ILE:O	2:B:600:LEU:HD11	0.48	2.07	15	1
1:A:505:TYR:HB3	1:A:540:SER:HB3	0.48	1.85	20	1
1:A:505:TYR:CZ	1:A:565:ILE:HG21	0.47	2.43	10	1
1:A:465:GLU:OE1	1:A:483:LYS:HE3	0.47	2.08	16	1
2:B:607:TRP:HB2	2:B:618:ASP:CB	0.47	2.39	16	5

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:544:ARG:HB2	2:B:551:VAL:HG23	0.47	1.84	6	1
1:A:469:GLU:OE1	1:A:484:ARG:HD3	0.47	2.08	8	1
2:B:542:ASN:HB2	2:B:544:ARG:NH1	0.47	2.24	13	1
1:A:496:CYS:O	2:B:614:GLY:HA3	0.47	2.10	5	1
2:B:579:ILE:HG12	2:B:600:LEU:CD1	0.47	2.39	10	4
2:B:582:MET:SD	2:B:632:VAL:HG22	0.47	2.49	10	3
1:A:488:ILE:O	1:A:493:LYS:HE2	0.47	2.10	11	1
1:A:474:GLY:CA	2:B:550:SER:HB2	0.47	2.39	13	1
2:B:580:ASN:O	2:B:584:ARG:HG3	0.47	2.09	14	1
1:A:505:TYR:CG	1:A:565:ILE:HG23	0.47	2.45	15	2
2:B:581:GLU:OE2	2:B:584:ARG:HD3	0.47	2.09	6	1
1:A:499:GLU:OE2	2:B:617:ILE:HB	0.46	2.10	3	1
2:B:546:ILE:CG2	2:B:549:ASP:HB2	0.46	2.40	13	1
1:A:462:THR:O	1:A:464:VAL:N	0.46	2.48	19	1
1:A:499:GLU:HB2	1:A:548:TRP:NE1	0.46	2.25	20	1
2:B:625:PHE:O	2:B:629:ARG:HG3	0.46	2.09	5	2
1:A:465:GLU:O	2:B:558:ARG:HB3	0.46	2.09	8	2
1:A:460:ILE:HG22	2:B:530:GLY:O	0.46	2.10	2	1
2:B:546:ILE:HG22	2:B:547:GLY:H	0.46	1.70	5	1
1:A:469:GLU:HG3	2:B:555:ARG:HE	0.46	1.71	15	1
1:A:553:THR:O	1:A:557:LEU:HD13	0.46	2.11	15	4
2:B:571:ARG:HG2	2:B:639:ILE:OXT	0.46	2.10	12	1
1:A:554:ASP:O	1:A:557:LEU:HD13	0.46	2.11	17	2
2:B:576:HIS:CD2	2:B:577:ALA:H	0.46	2.28	17	4
1:A:557:LEU:HD13	1:A:558:ALA:N	0.46	2.26	14	1
1:A:496:CYS:HA	1:A:550:SER:HB3	0.46	1.87	7	1
1:A:557:LEU:HD13	1:A:558:ALA:H	0.46	1.71	14	1
2:B:625:PHE:CE2	2:B:629:ARG:HD2	0.45	2.46	9	2
1:A:459:LYS:O	1:A:480:ARG:HG3	0.45	2.11	12	1
1:A:500:ARG:HD2	2:B:618:ASP:OD1	0.45	2.12	16	2
1:A:557:LEU:H	1:A:557:LEU:HD13	0.45	1.72	4	4
1:A:484:ARG:NH1	2:B:570:PRO:HG3	0.45	2.27	20	2
1:A:464:VAL:O	2:B:558:ARG:HD3	0.45	2.10	10	1
1:A:502:ARG:HD3	1:A:543:GLU:OE2	0.45	2.11	14	1
1:A:540:SER:HB2	1:A:543:GLU:C	0.45	2.32	20	1
1:A:468:PHE:CD1	2:B:558:ARG:HB2	0.45	2.46	1	1
1:A:539:LEU:HA	1:A:544:VAL:HG22	0.45	1.87	10	1
2:B:633:TYR:HA	2:B:636:SER:OG	0.45	2.12	1	1
2:B:592:ARG:CB	2:B:603:GLU:HG2	0.45	2.41	4	1
1:A:510:VAL:O	1:A:513:LYS:HG3	0.44	2.11	5	1
2:B:538:PHE:CE2	2:B:565:CYS:HB3	0.44	2.48	7	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:538:PHE:CZ	2:B:554:PHE:CD1	0.44	3.06	9	1
2:B:558:ARG:C	2:B:558:ARG:HD2	0.44	2.33	9	1
2:B:547:GLY:C	2:B:549:ASP:H	0.44	2.16	13	1
2:B:537:GLY:HA3	2:B:565:CYS:SG	0.44	2.52	7	2
2:B:602:VAL:O	2:B:605:CYS:HB2	0.44	2.13	16	2
2:B:606:VAL:HG21	2:B:625:PHE:CA	0.44	2.39	12	1
2:B:552:ALA:HA	2:B:639:ILE:HG21	0.44	1.89	14	1
1:A:558:ALA:O	1:A:561:ILE:HB	0.43	2.13	10	2
1:A:540:SER:HB2	1:A:544:VAL:H	0.43	1.70	20	1
2:B:602:VAL:HG12	2:B:603:GLU:HG2	0.43	1.89	17	3
1:A:505:TYR:CZ	1:A:544:VAL:CB	0.43	3.01	10	1
2:B:544:ARG:HD2	2:B:638:PHE:O	0.43	2.12	15	3
1:A:513:LYS:O	1:A:517:VAL:HG23	0.43	2.14	15	6
2:B:533:LYS:HB2	2:B:533:LYS:NZ	0.43	2.29	3	1
1:A:505:TYR:OH	1:A:565:ILE:CD1	0.43	2.66	10	1
1:A:464:VAL:HG12	1:A:465:GLU:N	0.42	2.25	1	1
1:A:551:SER:HB3	1:A:554:ASP:OD1	0.42	2.13	1	1
1:A:554:ASP:HA	1:A:557:LEU:HD11	0.42	1.90	3	5
2:B:618:ASP:OD2	2:B:620:ARG:HG2	0.42	2.14	3	1
1:A:548:TRP:HE1	1:A:555:ASP:CG	0.42	2.18	6	1
2:B:607:TRP:O	2:B:617:ILE:HA	0.42	2.14	7	1
1:A:542:GLN:HE21	1:A:542:GLN:HA	0.42	1.74	11	1
1:A:549:LYS:HB2	1:A:554:ASP:OD2	0.42	2.14	14	1
1:A:553:THR:O	1:A:557:LEU:HD12	0.42	2.15	14	2
2:B:629:ARG:HB3	2:B:633:TYR:CE2	0.42	2.49	19	1
2:B:628:VAL:O	2:B:632:VAL:HG23	0.42	2.14	20	1
2:B:551:VAL:CG1	2:B:574:ILE:HD11	0.42	2.45	13	1
1:A:512:LEU:O	1:A:516:LEU:HG	0.42	2.15	10	1
1:A:513:LYS:HB3	1:A:530:PHE:CD1	0.42	2.50	10	1
1:A:494:GLU:HA	2:B:574:ILE:HA	0.42	1.92	12	1
2:B:532:VAL:HG11	2:B:558:ARG:NH1	0.42	2.29	1	1
1:A:512:LEU:HD21	1:A:537:ILE:CG2	0.42	2.45	10	1
1:A:538:VAL:O	1:A:544:VAL:HG13	0.41	2.14	10	1
2:B:538:PHE:CE1	2:B:565:CYS:HB2	0.41	2.50	11	1
1:A:513:LYS:HG3	1:A:523:LEU:HD21	0.41	1.91	14	1
1:A:467:GLU:H	1:A:467:GLU:CD	0.41	2.19	12	1
2:B:586:ILE:CG2	2:B:592:ARG:HD2	0.41	2.44	4	1
1:A:499:GLU:O	1:A:548:TRP:HB3	0.41	2.16	6	1
1:A:544:VAL:HG21	1:A:565:ILE:HD13	0.41	1.93	6	1
2:B:583:ARG:HD2	2:B:595:GLN:HG3	0.41	1.92	9	1
1:A:505:TYR:CE1	1:A:512:LEU:HD13	0.41	2.51	10	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:571:ARG:N	2:B:571:ARG:HD2	0.41	2.31	7	1
1:A:461:PHE:O	1:A:462:THR:CG2	0.41	2.69	11	2
1:A:475:THR:HG22	2:B:549:ASP:OD2	0.41	2.16	2	1
2:B:551:VAL:HB	2:B:574:ILE:HD11	0.41	1.93	17	2
2:B:606:VAL:HA	2:B:619:GLY:HA3	0.41	1.92	19	1
1:A:472:ILE:HG13	1:A:481:ILE:HG12	0.41	1.93	9	1
1:A:460:ILE:HG12	1:A:461:PHE:O	0.40	2.16	10	1
1:A:505:TYR:CZ	1:A:544:VAL:CG2	0.40	3.04	10	1
2:B:626:TYR:O	2:B:629:ARG:HG2	0.40	2.16	10	1
1:A:548:TRP:CZ3	1:A:558:ALA:HB1	0.40	2.51	1	1
1:A:464:VAL:O	2:B:558:ARG:HD2	0.40	2.16	15	1
2:B:573:VAL:CG1	2:B:636:SER:HB2	0.40	2.46	20	1
2:B:592:ARG:HB2	2:B:603:GLU:CD	0.40	2.36	6	1
1:A:499:GLU:O	1:A:548:TRP:CB	0.40	2.69	12	1
1:A:492:TYR:N	1:A:492:TYR:CD2	0.40	2.88	15	1
1:A:517:VAL:HG23	1:A:523:LEU:HD23	0.40	1.93	7	1
2:B:544:ARG:NH2	2:B:639:ILE:HG12	0.40	2.32	8	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	112/119 (94%)	109±1 (98±1%)	2±1 (2±1%)	1±1 (0±1%)	32	76
2	B	106/116 (91%)	100±2 (95±2%)	4±1 (4±1%)	2±1 (2±1%)	12	54
All	All	4360/4700 (93%)	4191 (96%)	120 (3%)	49 (1%)	18	66

All 12 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
2	B	603	GLU	10
1	A	551	SER	7
2	B	624	VAL	7
2	B	547	GLY	7

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Mol	Chain	Res	Type	Models (Total)
2	B	569	GLY	6
2	B	577	ALA	4
2	B	548	THR	3
1	A	465	GLU	1
1	A	466	GLY	1
2	B	619	GLY	1
1	A	463	GLY	1
1	A	566	SER	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	101/106 (95%)	95±1 (94±1%)	6±1 (6±1%)	23 72
2	B	88/96 (92%)	87±1 (99±1%)	1±1 (1±1%)	74 96
All	All	3780/4040 (94%)	3640 (96%)	140 (4%)	37 85

All 34 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	514	GLN	19
1	A	557	LEU	19
1	A	456	ASN	17
1	A	530	PHE	17
1	A	505	TYR	16
1	A	552	TYR	8
1	A	493	LYS	4
2	B	572	MET	4
2	B	571	ARG	3
1	A	492	TYR	3
1	A	499	GLU	3
1	A	553	THR	2
2	B	558	ARG	2
2	B	639	ILE	2
1	A	494	GLU	2
1	A	548	TRP	1

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Mol	Chain	Res	Type	Models (Total)
1	A	457	GLU	1
2	B	592	ARG	1
1	A	513	LYS	1
2	B	536	LYS	1
2	B	549	ASP	1
1	A	502	ARG	1
1	A	484	ARG	1
2	B	544	ARG	1
2	B	535	ASP	1
2	B	564	ARG	1
1	A	542	GLN	1
2	B	542	ASN	1
2	B	568	GLU	1
1	A	467	GLU	1
1	A	527	GLU	1
1	A	555	ASP	1
1	A	500	ARG	1
1	A	554	ASP	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 45% for the well-defined parts and 44% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chemical_shifts_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	1407
Number of shifts mapped to atoms	1407
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	2

7.1.2 Chemical shift referencing

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction ± precision, *ppm*	Suggested action
$^{13}C_{\alpha}$	116	-0.09 ± 0.16	None needed (< 0.5 ppm)
$^{13}C_{\beta}$	105	0.07 ± 0.14	None needed (< 0.5 ppm)
$^{13}C'$	113	0.18 ± 0.09	None needed (< 0.5 ppm)
^{15}N	111	-0.42 ± 0.21	None needed (< 0.5 ppm)

7.1.3 Completeness of resonance assignments

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 45%, i.e. 1364 atoms were assigned a chemical shift out of a possible 3006. 0 out of 39 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	558/1112 (50%)	229/457 (50%)	221/438 (50%)	108/217 (50%)
Sidechain	746/1702 (44%)	524/1106 (47%)	216/529 (41%)	6/67 (9%)

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	Total	^{1}H	^{13}C	^{15}N
Aromatic	60/192 (31%)	46/92 (50%)	13/94 (14%)	1/6 (17%)
Overall	1364/3006 (45%)	799/1655 (48%)	450/1061 (42%)	115/290 (40%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 44%, i.e. 1407 atoms were assigned a chemical shift out of a possible 3190. 0 out of 41 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	576/1194 (48%)	236/491 (48%)	229/470 (49%)	111/233 (48%)
Sidechain	771/1796 (43%)	539/1168 (46%)	226/560 (40%)	6/68 (9%)
Aromatic	60/200 (30%)	46/96 (48%)	13/96 (14%)	1/8 (12%)
Overall	1407/3190 (44%)	821/1755 (47%)	468/1126 (42%)	118/309 (38%)

7.1.4 Statistically unusual chemical shifts (i)

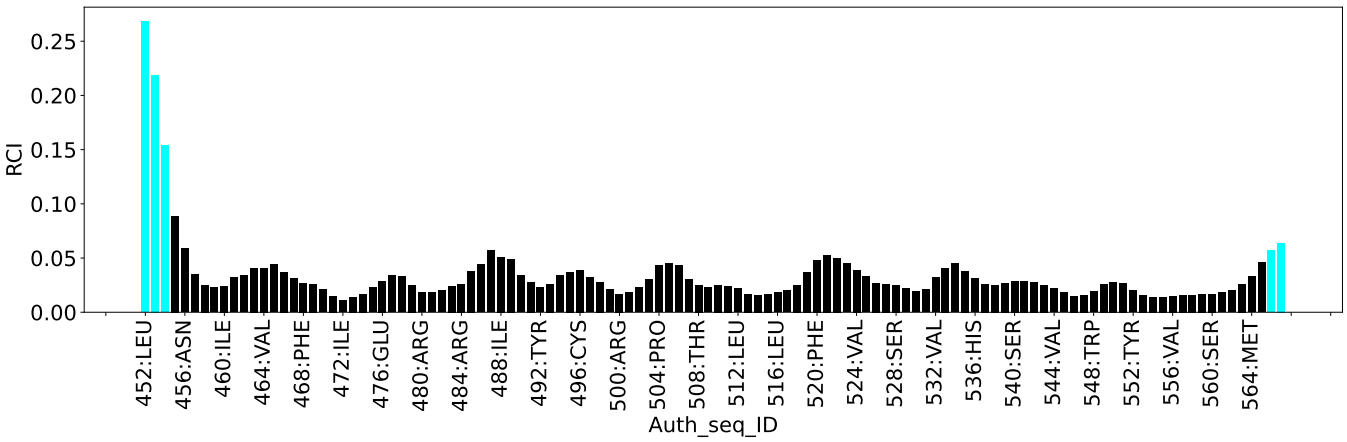
The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

List Id	Chain	Res	Type	Atom	Shift, *ppm*	Expected range, *ppm*	Z-score
1	A	499	GLU	HB2	-0.10	1.00 – 3.05	-10.4
1	A	499	GLU	HB3	0.84	0.95 – 3.05	-5.5

7.1.5 Random Coil Index (RCI) plots (i)

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:


RCI
0.25
0.20
0.15
0.10
0.05
0.00
452:LEU
456:ASN
460:ILE
464:VAL
468:PHE
472:ILE
476:GLU
480:ARG
484:ARG
488:ILE
492:TYR
496:CYS
500:ARG
504:PRO
508:THR
512:LEU
516:LEU
520:PHE
524:VAL
528:SER
532:VAL
536:HIS
540:SER
544:VAL
548:TRP
552:TYR
556:VAL
560:SER
564:MET
Auth_seq_ID