



# Full wwPDB NMR Structure Validation Report ⓘ

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PDB ID : 1RKL / pdb\_00001rkl  
Title : NMR structure of yeast oligosaccharyltransferase subunit Ost4p  
Authors : Zubkov, S.; Lennarz, W.J.; Mohanty, S.  
Deposited on : 2003-11-21

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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>.

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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

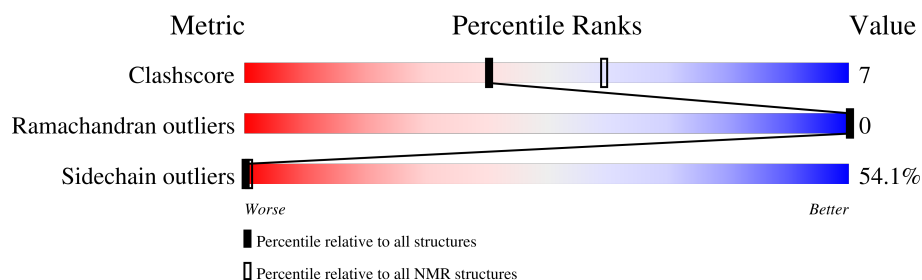
# 1 Overall quality at a glance

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  $\geq 3$ , 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	36	<div> <div></div> <div>11%</div> <div>22%</div> <div>19%</div> <div>47%</div> </div>

## 2 Ensemble composition and analysis

This entry contains 20 models. The atoms present in the NMR models are not consistent. Some calculations may have failed as a result. All residues are included in the validation scores. Model 9 is the overall representative, medoid model (most similar to other models). The authors have identified model 14 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:10-A:28 (19)	0.13	9

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

### 3 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 525 atoms, of which 249 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit.

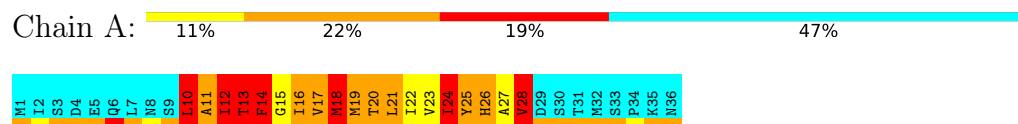
Mol	Chain	Residues	Atoms						Trace
1	A	36	Total	C	H	N	O	S	0
			525	176	249	42	54	4	

## 4 Residue-property plots [i](#)

### 4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit

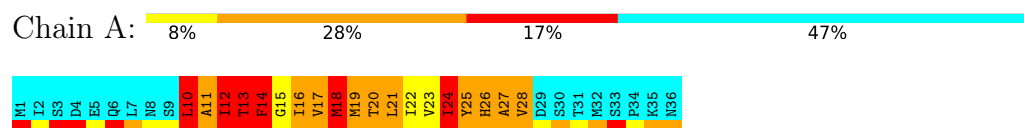


### 4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

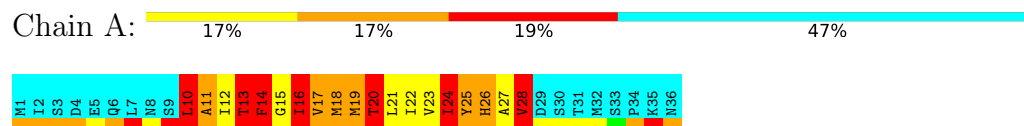
#### 4.2.1 Score per residue for model 1

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



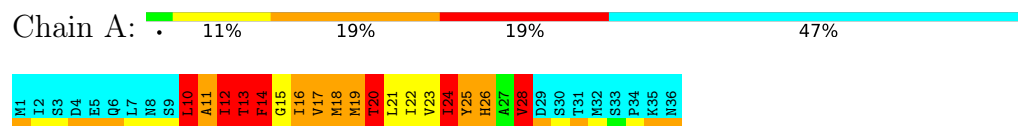
#### 4.2.2 Score per residue for model 2

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



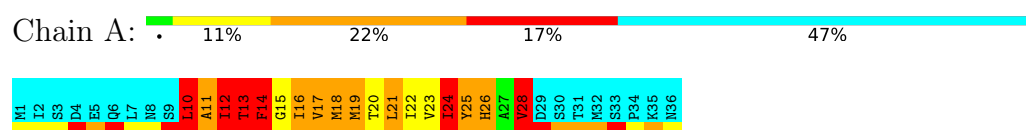
### 4.2.3 Score per residue for model 3

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



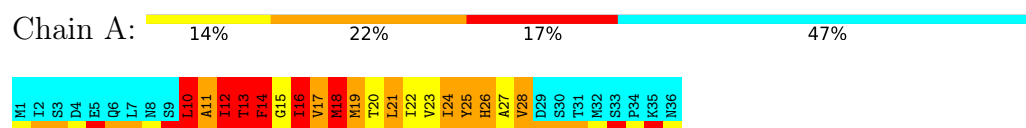
### 4.2.4 Score per residue for model 4

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



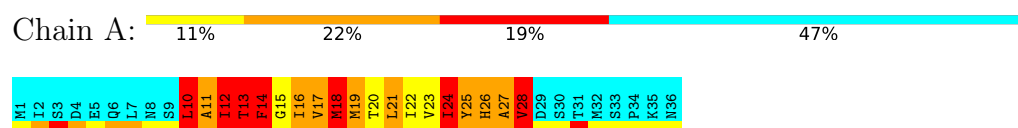
### 4.2.5 Score per residue for model 5

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



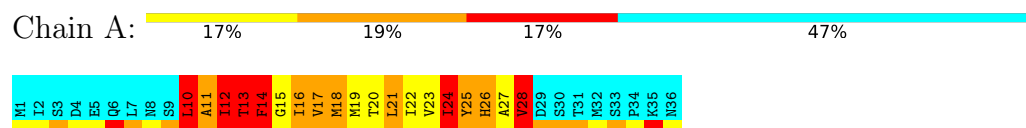
### 4.2.6 Score per residue for model 6

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



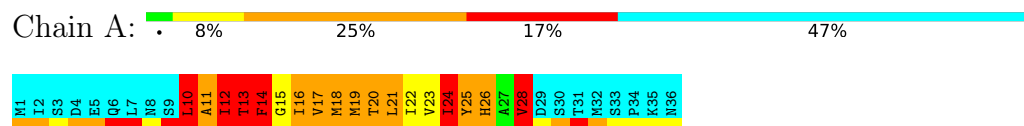
### 4.2.7 Score per residue for model 7

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



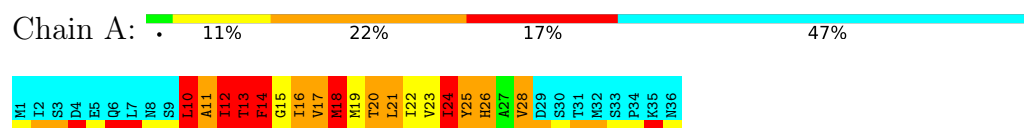
### 4.2.8 Score per residue for model 8

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



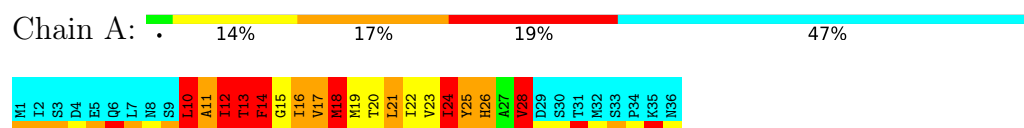
### 4.2.9 Score per residue for model 9 (medoid)

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



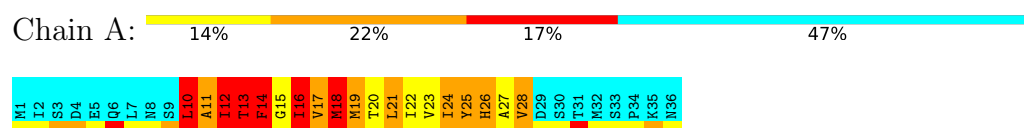
### 4.2.10 Score per residue for model 10

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



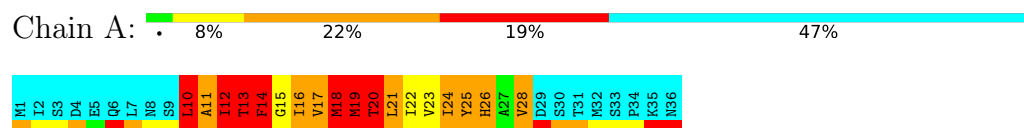
### 4.2.11 Score per residue for model 11

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



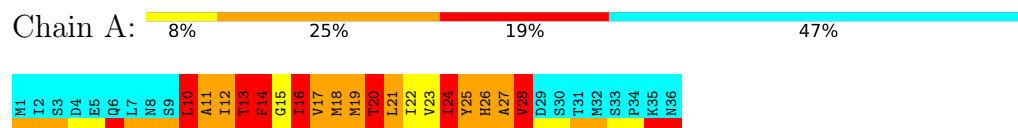
### 4.2.12 Score per residue for model 12

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



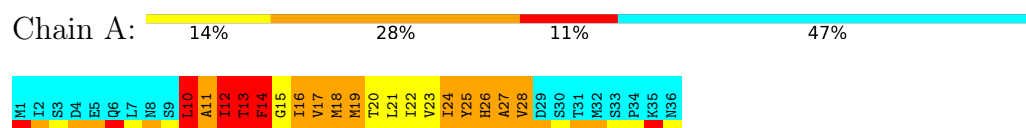
#### 4.2.13 Score per residue for model 13

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



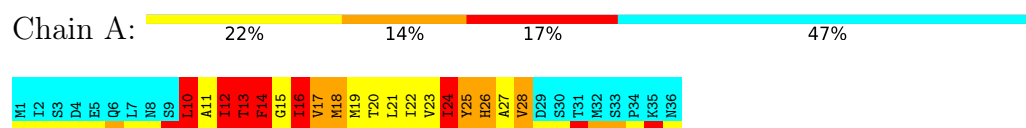
#### 4.2.14 Score per residue for model 14

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



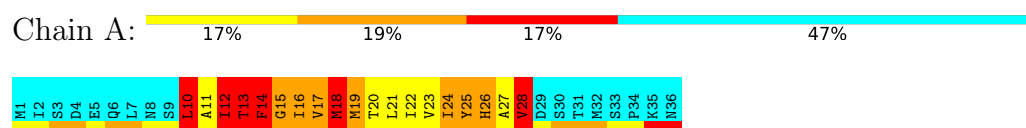
#### 4.2.15 Score per residue for model 15

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



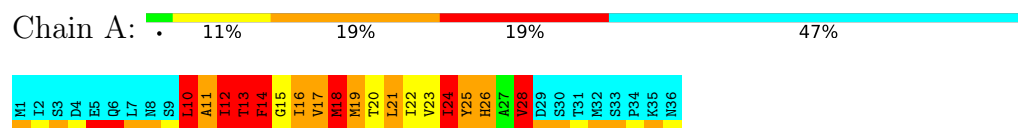
#### 4.2.16 Score per residue for model 16

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



#### 4.2.17 Score per residue for model 17

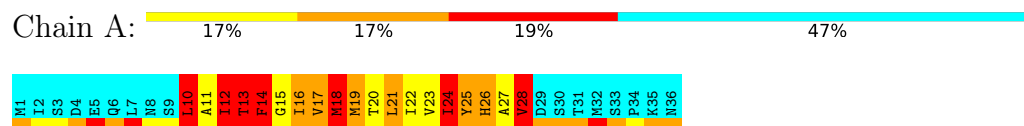
- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit





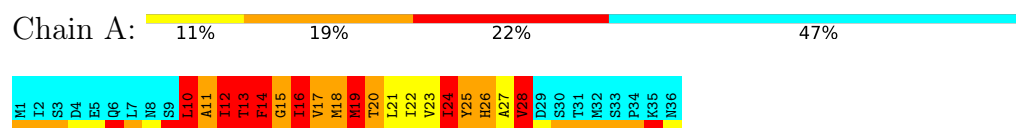
### 4.2.18 Score per residue for model 18

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



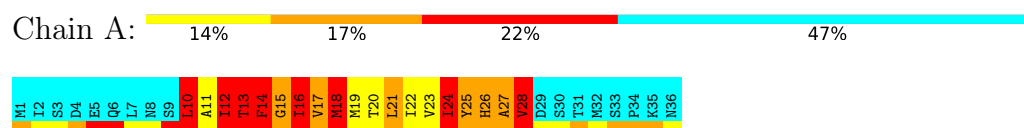
### 4.2.19 Score per residue for model 19

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



### 4.2.20 Score per residue for model 20

- Molecule 1: Dolichyl-diphosphooligosaccharide--protein glycosyltransferase 4 kDa subunit



## 5 Refinement protocol and experimental data overview

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

Of the 500 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
CYANA	structure solution	1.0.6
ARIA	refinement	1.2

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	0.76±0.01	0±0/149 ( 0.0± 0.0%)	4.89±0.08	59±5/204 ( 29.0± 2.4%)
All	All	0.76	0/2980 ( 0.0%)	4.89	1185/4080 ( 29.0%)

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	10.7±1.1
All	All	0	214

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(°)	Ideal(°)	Models	
								Worst	Total
1	A	26	HIS	CA-CB-CG	17.58	131.38	113.80	17	20
1	A	13	THR	CA-C-N	14.38	141.38	120.38	18	20
1	A	13	THR	C-N-CA	14.38	141.38	120.38	18	20
1	A	13	THR	CA-CB-CG2	14.07	134.43	110.50	2	20
1	A	14	PHE	CA-CB-CG	12.29	126.09	113.80	8	20
1	A	28	VAL	CA-CB-CG2	11.82	130.50	110.40	11	20
1	A	26	HIS	CA-C-O	-11.41	107.21	120.10	17	1
1	A	16	ILE	CA-CB-CG1	11.21	129.46	110.40	16	20
1	A	28	VAL	CA-C-N	10.87	134.57	120.44	6	20
1	A	28	VAL	C-N-CA	10.87	134.57	120.44	6	20
1	A	24	ILE	CA-C-N	10.65	134.97	120.38	17	20
1	A	24	ILE	C-N-CA	10.65	134.97	120.38	17	20
1	A	24	ILE	CB-CA-C	10.32	124.94	111.94	12	20
1	A	21	LEU	CA-C-O	-10.28	109.52	120.42	13	18
1	A	12	ILE	CA-C-O	-10.12	110.06	120.69	14	20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	11	ALA	CA-C-N	9.91	133.09	123.08	2	14
1	A	11	ALA	C-N-CA	9.91	133.09	123.08	2	14
1	A	21	LEU	CA-C-N	9.74	133.03	120.56	19	20
1	A	21	LEU	C-N-CA	9.74	133.03	120.56	19	20
1	A	24	ILE	N-CA-C	9.45	121.60	111.58	14	20
1	A	12	ILE	CA-CB-CG1	9.34	126.28	110.40	13	19
1	A	12	ILE	CB-CA-C	9.28	122.76	111.80	14	20
1	A	24	ILE	CA-CB-CG1	9.10	125.87	110.40	11	20
1	A	14	PHE	N-CA-C	9.03	122.09	111.71	6	20
1	A	12	ILE	CA-C-N	9.03	132.57	120.65	2	20
1	A	12	ILE	C-N-CA	9.03	132.57	120.65	2	20
1	A	27	ALA	CA-C-O	-8.81	109.25	120.00	14	3
1	A	22	ILE	N-CA-C	8.76	118.77	110.53	12	20
1	A	16	ILE	CB-CA-C	8.70	125.65	112.16	13	2
1	A	26	HIS	CB-CG-CD2	-8.69	119.91	131.20	9	20
1	A	22	ILE	CA-C-N	8.66	134.85	120.64	17	20
1	A	22	ILE	C-N-CA	8.66	134.85	120.64	17	20
1	A	10	LEU	CA-C-O	-8.34	112.11	120.70	7	20
1	A	25	TYR	CA-C-O	-8.29	110.73	120.10	12	16
1	A	18	MET	CA-C-O	-8.02	111.92	120.42	3	20
1	A	20	THR	CA-C-N	7.95	131.58	120.29	13	20
1	A	20	THR	C-N-CA	7.95	131.58	120.29	13	20
1	A	13	THR	N-CA-C	7.93	120.69	111.02	6	20
1	A	16	ILE	CA-C-N	7.75	131.43	120.42	18	20
1	A	16	ILE	C-N-CA	7.75	131.43	120.42	18	20
1	A	23	VAL	CG1-CB-CG2	-7.64	94.00	110.80	17	20
1	A	17	VAL	CG1-CB-CG2	-7.54	94.22	110.80	14	20
1	A	12	ILE	CA-CB-CG2	7.51	123.27	110.50	15	20
1	A	26	HIS	N-CA-C	7.43	121.93	113.01	3	19
1	A	25	TYR	CB-CA-C	7.33	122.95	110.79	3	20
1	A	11	ALA	N-CA-C	7.22	121.53	112.87	4	19
1	A	28	VAL	N-CA-C	7.21	118.16	111.45	14	1
1	A	19	MET	CG-SD-CE	7.21	116.76	100.90	19	3
1	A	16	ILE	CA-C-O	-7.20	112.86	120.57	13	18
1	A	13	THR	CB-CA-C	7.18	122.03	110.96	2	20
1	A	17	VAL	CA-C-N	7.13	129.84	120.28	5	17
1	A	17	VAL	C-N-CA	7.13	129.84	120.28	5	17
1	A	19	MET	CA-C-O	-7.08	111.83	119.97	3	12
1	A	27	ALA	CA-C-N	6.94	130.89	122.63	1	4
1	A	27	ALA	C-N-CA	6.94	130.89	122.63	1	4
1	A	22	ILE	CA-CB-CG2	6.85	122.15	110.50	11	20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	18	MET	CA-CB-CG	6.83	127.77	114.10	15	6
1	A	17	VAL	CA-C-O	-6.67	113.57	120.71	19	13
1	A	19	MET	CA-CB-CG	6.62	127.33	114.10	13	7
1	A	12	ILE	CB-CG1-CD1	6.54	127.54	113.80	13	5
1	A	21	LEU	N-CA-C	6.45	118.39	111.36	13	2
1	A	20	THR	CA-C-O	-6.37	112.27	119.79	13	14
1	A	25	TYR	CA-CB-CG	6.33	125.30	113.90	10	20
1	A	23	VAL	CA-CB-CG2	6.31	121.12	110.40	2	3
1	A	22	ILE	CA-CB-CG1	6.15	120.86	110.40	3	19
1	A	18	MET	CA-C-N	6.12	129.62	120.31	13	14
1	A	18	MET	C-N-CA	6.12	129.62	120.31	13	14
1	A	15	GLY	CA-C-O	-6.11	109.94	120.57	5	4
1	A	18	MET	N-CA-C	6.08	117.99	111.36	4	8
1	A	19	MET	N-CA-C	5.97	118.57	111.71	12	3
1	A	22	ILE	N-CA-CB	5.90	118.12	110.57	3	4
1	A	23	VAL	CA-C-N	5.86	129.93	120.55	8	9
1	A	23	VAL	C-N-CA	5.86	129.93	120.55	8	9
1	A	15	GLY	CA-C-N	5.72	129.50	120.47	2	2
1	A	15	GLY	C-N-CA	5.72	129.50	120.47	2	2
1	A	27	ALA	CB-CA-C	5.70	118.96	109.56	6	2
1	A	25	TYR	CA-C-N	5.63	130.13	120.72	2	5
1	A	25	TYR	C-N-CA	5.63	130.13	120.72	2	5
1	A	16	ILE	N-CA-C	5.62	118.07	111.05	14	18
1	A	28	VAL	CA-C-O	-5.62	113.76	120.78	19	6
1	A	18	MET	N-CA-CB	-5.61	101.58	110.28	15	1
1	A	20	THR	CA-CB-OG1	5.60	118.00	109.60	10	7
1	A	10	LEU	CB-CA-C	5.50	119.59	110.90	7	5
1	A	28	VAL	CA-CB-CG1	5.43	119.63	110.40	13	5
1	A	20	THR	N-CA-C	5.30	118.91	112.23	7	1
1	A	13	THR	CA-C-O	-5.25	115.30	121.07	1	2
1	A	25	TYR	N-CA-C	5.24	117.74	111.71	13	2
1	A	18	MET	CG-SD-CE	5.24	112.42	100.90	2	1
1	A	10	LEU	N-CA-C	5.23	116.79	111.14	5	2
1	A	28	VAL	CB-CA-C	5.09	119.64	111.29	4	2
1	A	14	PHE	CB-CA-C	5.09	120.33	110.46	7	1
1	A	14	PHE	O-C-N	5.02	127.92	122.20	18	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	14	PHE	Sidechain,Mainchain	20
1	A	18	MET	Mainchain	20
1	A	19	MET	Mainchain	20
1	A	25	TYR	Mainchain,Sidechain	20
1	A	26	HIS	Sidechain,Mainchain	20
1	A	12	ILE	Mainchain	18
1	A	15	GLY	Peptide	17
1	A	11	ALA	Peptide,Mainchain	16
1	A	13	THR	Mainchain	15
1	A	21	LEU	Mainchain	14
1	A	27	ALA	Mainchain	11
1	A	24	ILE	Mainchain	6
1	A	20	THR	Mainchain	4
1	A	16	ILE	Mainchain	2
1	A	28	VAL	Mainchain	2
1	A	10	LEU	Mainchain	1

## 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	146	151	163	2±1
All	All	2920	3020	3260	43

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 7.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:10:LEU:HA	1:A:13:THR:HG22	0.63	1.71	15	20
1:A:20:THR:O	1:A:24:ILE:HB	0.47	2.09	2	7
1:A:24:ILE:O	1:A:28:VAL:HG13	0.44	2.12	18	11
1:A:12:ILE:O	1:A:16:ILE:HD13	0.43	2.14	5	5

## 6.3 Torsion angles

### 6.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. The Analysed column shows the number of residues for which the backbone conformation was analysed and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	19/36 (53%)	18±1 (97±3%)	0±1 (3±3%)	0±0 (0±0%)	100	100
All	All	380/720 (53%)	370 (97%)	10 (3%)	0 (0%)	100	100

There are no Ramachandran outliers.

### 6.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. The Analysed column shows the number of residues for which the sidechain conformation was analysed and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	16/33 (48%)	7±1 (46±5%)	9±1 (54±5%)	0	1
All	All	320/660 (48%)	147 (46%)	173 (54%)	0	1

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	10	LEU	20
1	A	13	THR	20
1	A	14	PHE	20
1	A	16	ILE	20
1	A	17	VAL	20
1	A	24	ILE	20
1	A	28	VAL	20
1	A	12	ILE	19
1	A	18	MET	11
1	A	19	MET	2
1	A	20	THR	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