



# Full wwPDB NMR Structure Validation Report ⓘ

Apr 26, 2016 – 05:13 PM BST

PDB ID : 1SR2  
Title : Solution structure of the Escherichia coli YojN Histidine-Phosphotransferase (HPt) domain  
Authors : Rogov, V.V.; Bernhard, F.; Loehr, F.; Doetsch, V.  
Deposited on : 2004-03-22

This is a Full wwPDB NMR Structure Validation Report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/NMRValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

Cyrange : Kirchner and Güntert (2011)  
NmrClust : Kelley et al. (1996)  
MolProbity : 4.02b-467  
Mogul : unknown  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
RCI : v\_1n\_11\_5\_13\_A (Berjanski et al., 2005)  
PANAV : Wang et al. (2010)  
ShiftChecker : rb-20027457  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20027457

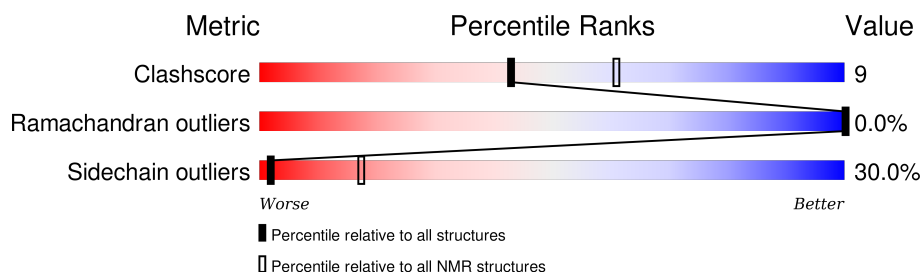
# 1 Overall quality at a glance

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	114402	11133
Ramachandran outliers	111179	9975
Sidechain outliers	111093	9958

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	116	

## 2 Ensemble composition and analysis

This entry contains 25 models. Model 9 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:802-A:890 (89)	0.36	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 6 clusters and 4 single-model clusters were found.

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

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

There is only 1 type of molecule in this entry. The entry contains 1806 atoms, of which 903 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Putative sensor-like histidine kinase yojN.

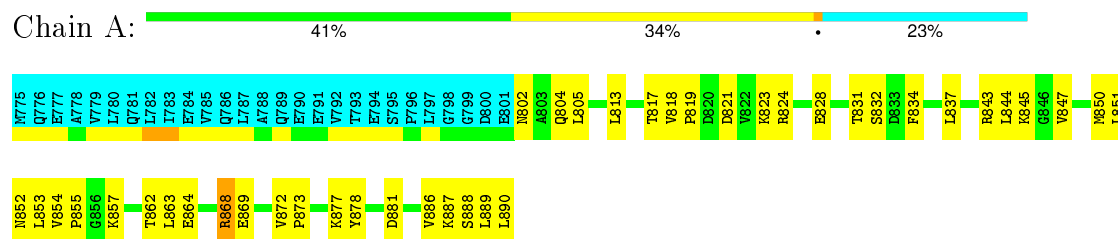
Mol	Chain	Residues	Atoms						Trace
1	A	116	Total	C	H	N	O	S	0
			1806	573	903	146	181	3	

## 4 Residue-property plots

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

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

- Molecule 1: Putative sensor-like histidine kinase yojN

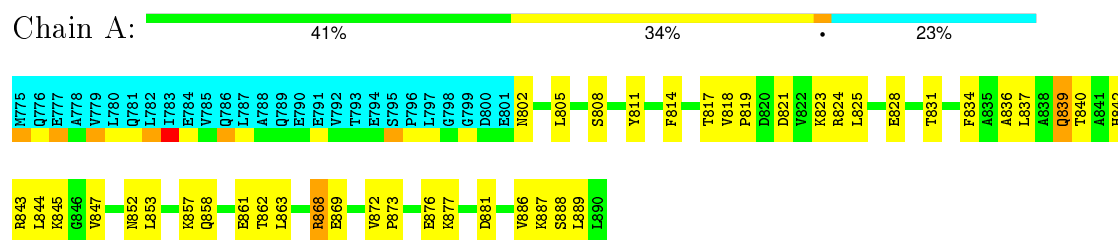


### 4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

#### 4.2.1 Score per residue for model 1

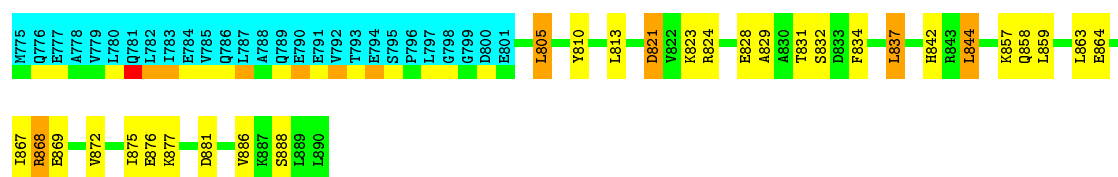
- Molecule 1: Putative sensor-like histidine kinase yojN



#### 4.2.2 Score per residue for model 2

- Molecule 1: Putative sensor-like histidine kinase yojN

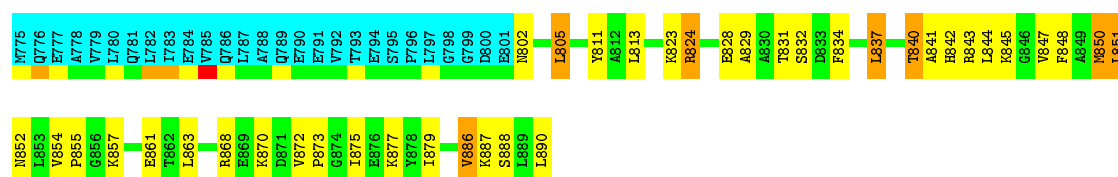




### 4.2.3 Score per residue for model 3

- Molecule 1: Putative sensor-like histidine kinase vojN

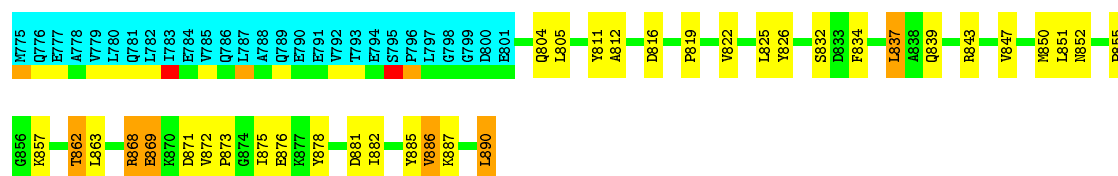
Chain A:



### 4.2.4 Score per residue for model 4

- Molecule 1: Putative sensor-like histidine kinase vojN

Chain A:



### 4.2.5 Score per residue for model 5

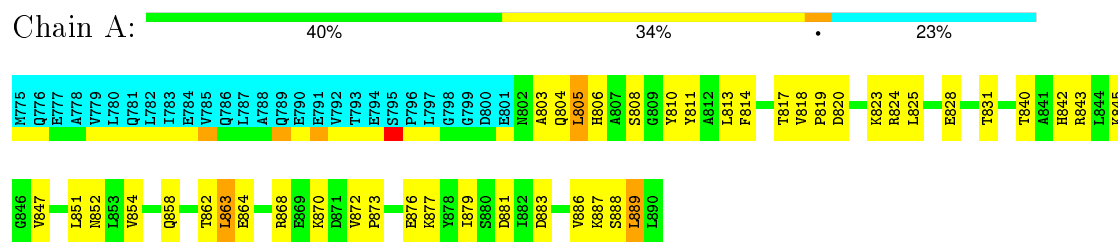
- Molecule 1: Putative sensor-like histidine kinase vojN

Chain A:



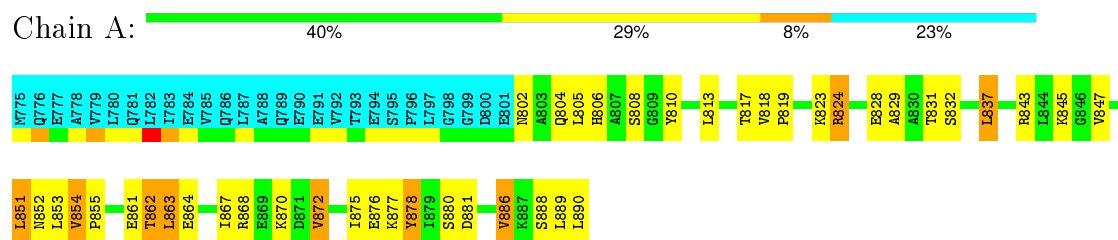
### 4.2.6 Score per residue for model 6

- Molecule 1: Putative sensor-like histidine kinase vojN



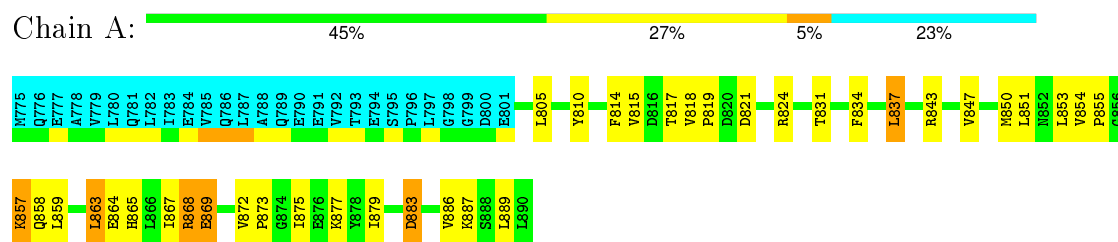
#### 4.2.7 Score per residue for model 7

- Molecule 1: Putative sensor-like histidine kinase yojN



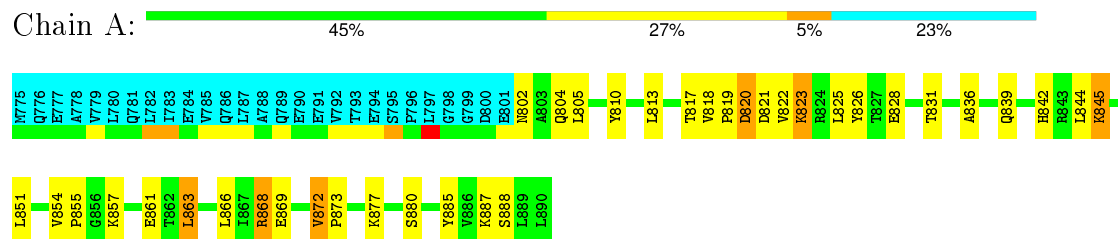
#### 4.2.8 Score per residue for model 8

- Molecule 1: Putative sensor-like histidine kinase yojN



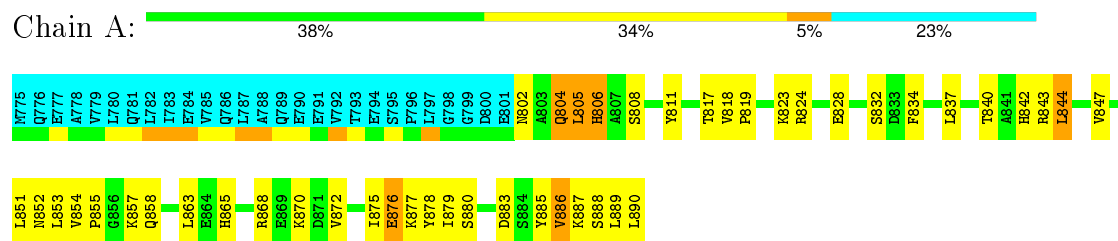
#### 4.2.9 Score per residue for model 9 (medoid)

- Molecule 1: Putative sensor-like histidine kinase yojN



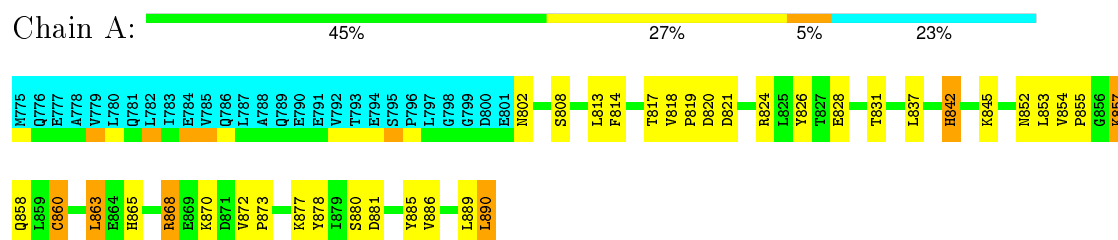
### 4.2.10 Score per residue for model 10

- Molecule 1: Putative sensor-like histidine kinase yojN



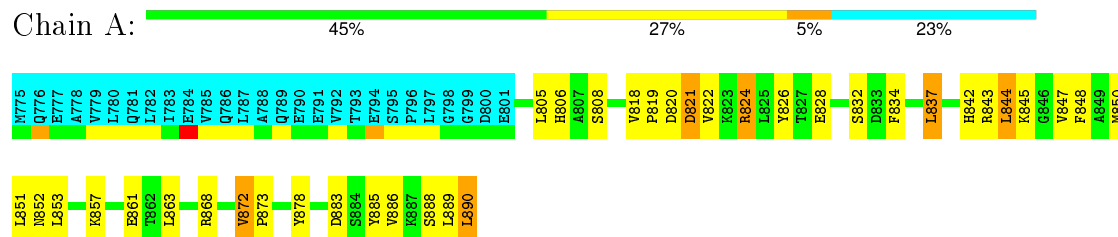
### 4.2.11 Score per residue for model 11

- Molecule 1: Putative sensor-like histidine kinase yojN



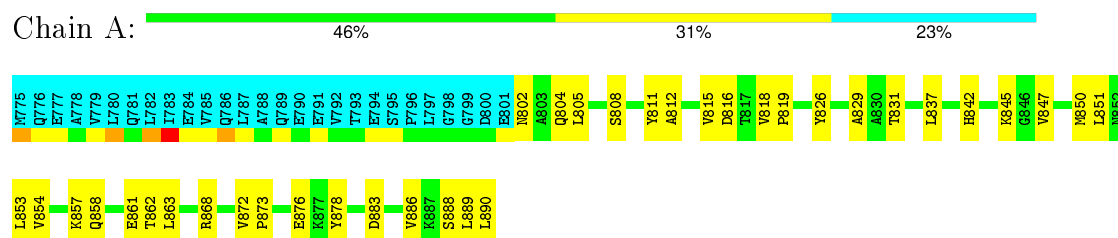
### 4.2.12 Score per residue for model 12

- Molecule 1: Putative sensor-like histidine kinase yojN



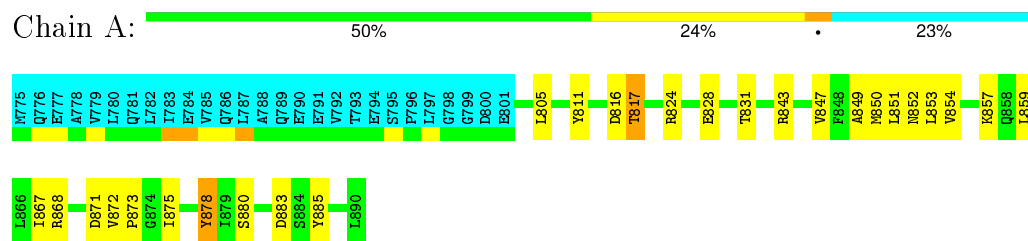
### 4.2.13 Score per residue for model 13

- Molecule 1: Putative sensor-like histidine kinase yojN



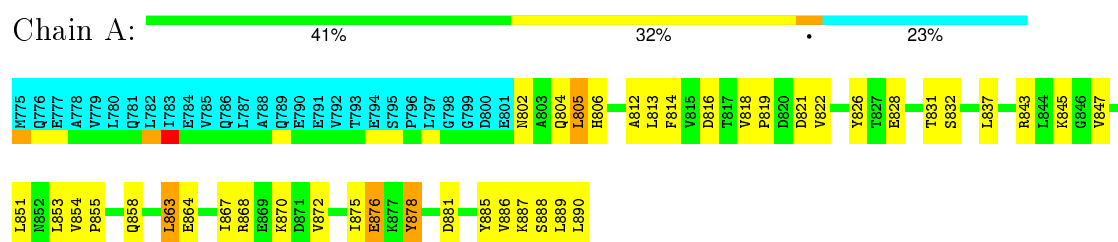
#### 4.2.14 Score per residue for model 14

- Molecule 1: Putative sensor-like histidine kinase yojN



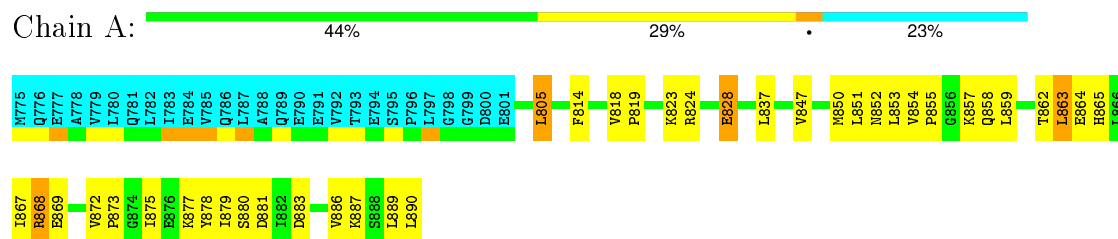
#### 4.2.15 Score per residue for model 15

- Molecule 1: Putative sensor-like histidine kinase yojN



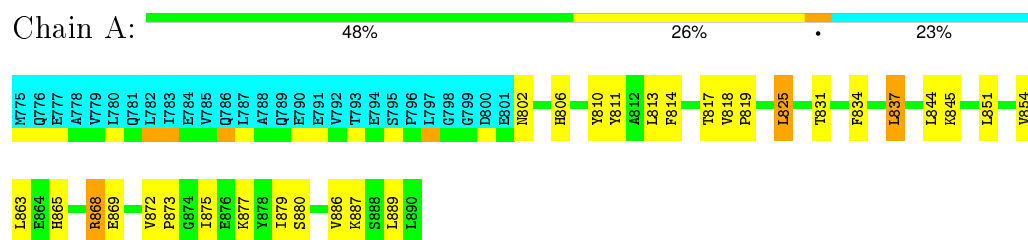
#### 4.2.16 Score per residue for model 16

- Molecule 1: Putative sensor-like histidine kinase yojN



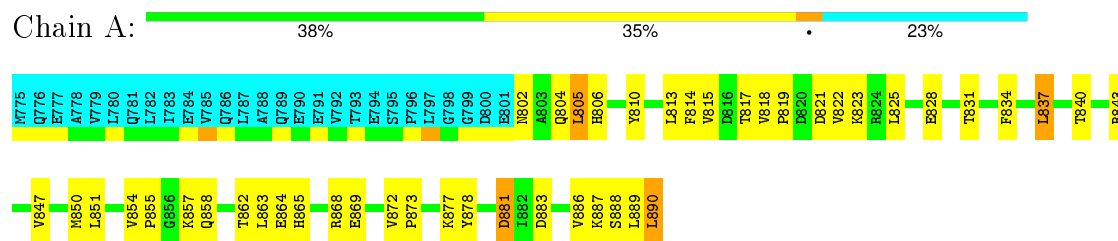
#### 4.2.17 Score per residue for model 17

- Molecule 1: Putative sensor-like histidine kinase yojN



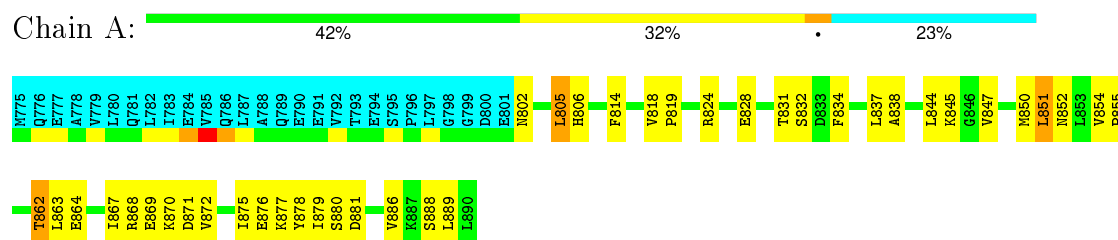
### 4.2.18 Score per residue for model 18

- Molecule 1: Putative sensor-like histidine kinase yojN



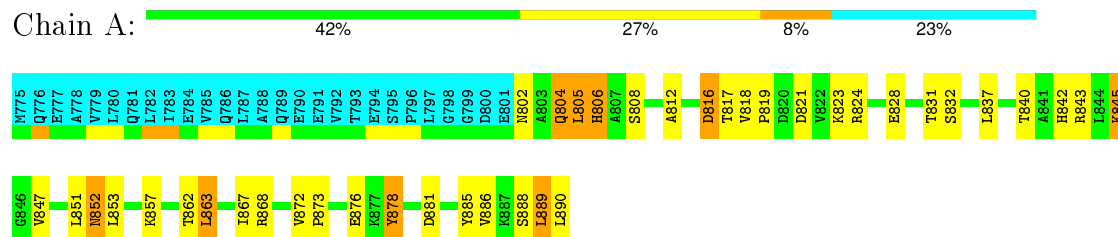
### 4.2.19 Score per residue for model 19

- Molecule 1: Putative sensor-like histidine kinase yojN



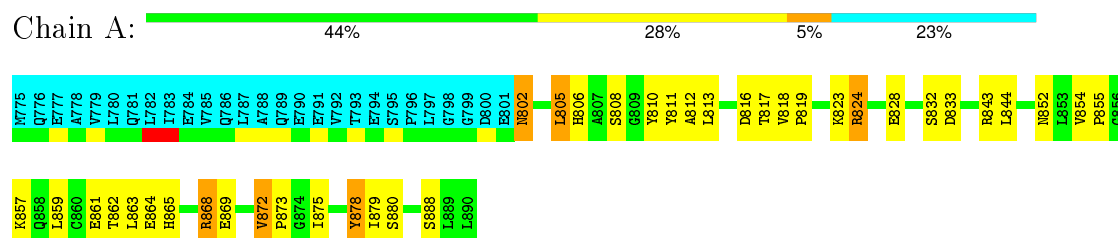
### 4.2.20 Score per residue for model 20

- Molecule 1: Putative sensor-like histidine kinase yojN



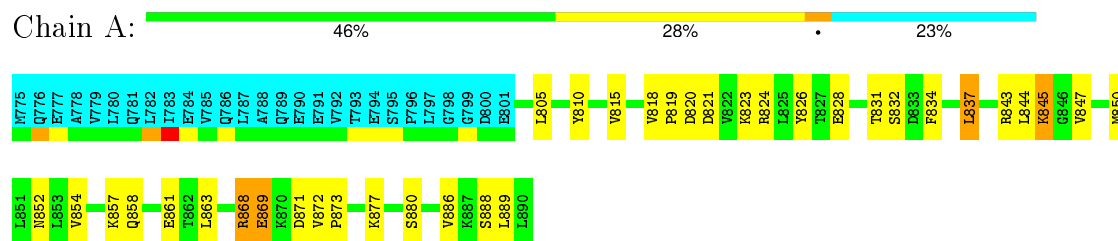
### 4.2.21 Score per residue for model 21

- Molecule 1: Putative sensor-like histidine kinase yojN



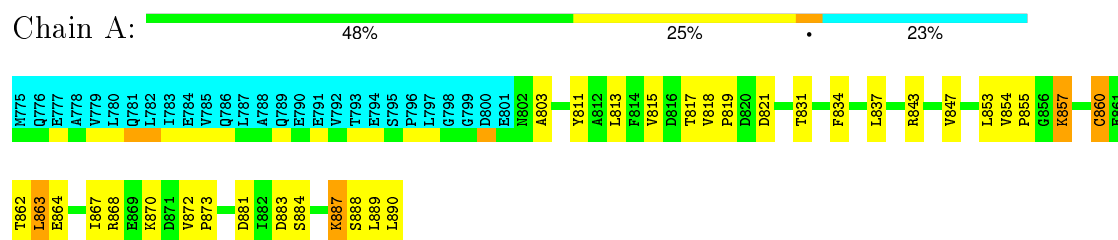
### 4.2.22 Score per residue for model 22

- Molecule 1: Putative sensor-like histidine kinase yojN



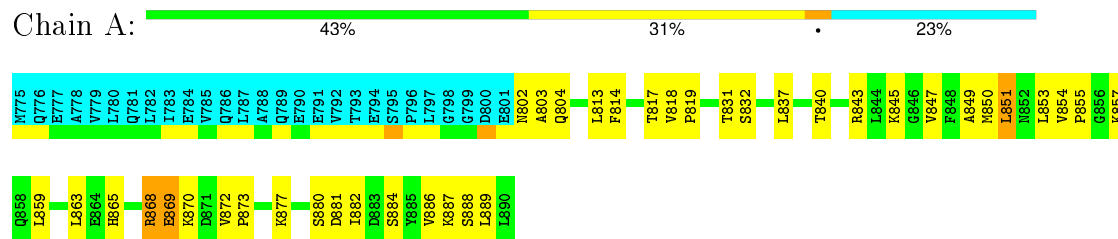
### 4.2.23 Score per residue for model 23

- Molecule 1: Putative sensor-like histidine kinase yojN



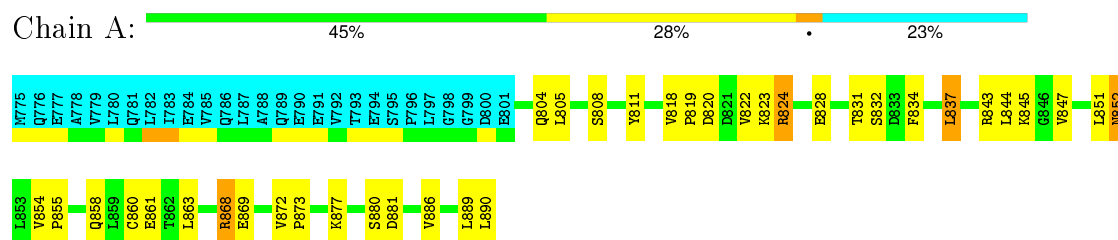
### 4.2.24 Score per residue for model 24

- Molecule 1: Putative sensor-like histidine kinase yojN



### 4.2.25 Score per residue for model 25

- Molecule 1: Putative sensor-like histidine kinase yojN



## 5 Refinement protocol and experimental data overview

The models were refined using the following method: *Energy minimization*.

Of the 50 calculated structures, 25 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
DYANA	structure solution	1.5
CNS	refinement	1.1

No chemical shift data was provided. No validations of the models with respect to experimental NMR restraints is performed at this time.

## 6 Model quality ⓘ

### 6.1 Standard geometry ⓘ

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

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 6.2 Too-close contacts ⓘ

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	698	703	700	12±3
All	All	17450	17575	17500	299

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 9.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:802:ASN:HA	1:A:805:LEU:HD23	0.83	1.47	20	5
1:A:854:VAL:HG13	1:A:855:PRO:HD3	0.79	1.55	7	1
1:A:820:ASP:HA	1:A:823:LYS:HD3	0.73	1.59	9	1
1:A:863:LEU:HG	1:A:878:TYR:CD2	0.66	2.26	16	1
1:A:854:VAL:HB	1:A:855:PRO:HD3	0.65	1.68	19	11
1:A:818:VAL:HG11	1:A:886:VAL:HG21	0.64	1.69	7	3
1:A:847:VAL:O	1:A:851:LEU:HG	0.64	1.92	5	17
1:A:840:THR:HA	1:A:843:ARG:HD3	0.63	1.69	20	1
1:A:865:HIS:HA	1:A:868:ARG:HG2	0.62	1.69	24	3
1:A:857:LYS:HA	1:A:860:CYS:SG	0.62	2.34	11	2
1:A:818:VAL:HB	1:A:819:PRO:HD3	0.62	1.71	16	19
1:A:829:ALA:HA	1:A:837:LEU:HD11	0.62	1.72	3	4
1:A:886:VAL:O	1:A:890:LEU:HG	0.61	1.95	7	13
1:A:824:ARG:O	1:A:828:GLU:HG2	0.61	1.94	1	14

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:863:LEU:HG	1:A:878:TYR:HB3	0.60	1.71	15	5
1:A:872:VAL:HB	1:A:873:PRO:HD3	0.59	1.74	16	11
1:A:859:LEU:HB3	1:A:878:TYR:HE1	0.59	1.57	16	1
1:A:825:LEU:HD23	1:A:837:LEU:HG	0.59	1.74	17	1
1:A:822:VAL:HG11	1:A:883:ASP:HB2	0.59	1.75	12	1
1:A:842:HIS:HA	1:A:845:LYS:HD2	0.58	1.73	9	2
1:A:823:LYS:HA	1:A:826:TYR:HD2	0.58	1.58	9	1
1:A:834:PHE:HA	1:A:837:LEU:HB2	0.58	1.75	17	11
1:A:814:PHE:HE1	1:A:886:VAL:HG22	0.58	1.59	15	1
1:A:865:HIS:O	1:A:869:GLU:HG2	0.57	1.99	18	1
1:A:841:ALA:O	1:A:845:LYS:HG3	0.57	1.98	3	1
1:A:819:PRO:HA	1:A:822:VAL:HG22	0.57	1.76	4	1
1:A:805:LEU:HD11	1:A:814:PHE:HB2	0.56	1.76	16	3
1:A:838:ALA:HA	1:A:867:ILE:HD13	0.56	1.78	19	1
1:A:805:LEU:HB3	1:A:811:TYR:HD1	0.55	1.60	3	1
1:A:816:ASP:O	1:A:817:THR:HB	0.54	2.02	14	1
1:A:810:TYR:HB3	1:A:851:LEU:HD22	0.54	1.79	6	2
1:A:845:LYS:HE2	1:A:861:GLU:HG2	0.53	1.78	25	4
1:A:851:LEU:O	1:A:852:ASN:HB2	0.53	2.03	4	4
1:A:862:THR:HB	1:A:878:TYR:CE2	0.53	2.39	21	7
1:A:868:ARG:HG3	1:A:869:GLU:N	0.52	2.19	4	10
1:A:811:TYR:OH	1:A:890:LEU:HA	0.52	2.04	25	1
1:A:814:PHE:CZ	1:A:886:VAL:HG23	0.51	2.40	16	3
1:A:821:ASP:HB3	1:A:844:LEU:HD21	0.51	1.81	2	1
1:A:872:VAL:HA	1:A:875:ILE:HD12	0.51	1.82	14	2
1:A:836:ALA:O	1:A:839:GLN:HG3	0.51	2.05	9	2
1:A:814:PHE:CE1	1:A:886:VAL:HG22	0.50	2.41	6	2
1:A:864:GLU:HA	1:A:867:ILE:HD12	0.50	1.84	15	1
1:A:803:ALA:HA	1:A:806:HIS:CD2	0.50	2.42	6	1
1:A:825:LEU:HG	1:A:840:THR:HG21	0.50	1.84	1	1
1:A:863:LEU:O	1:A:867:ILE:HG12	0.49	2.07	20	3
1:A:863:LEU:HA	1:A:866:LEU:HD12	0.49	1.84	9	1
1:A:865:HIS:O	1:A:868:ARG:HG3	0.49	2.07	11	4
1:A:812:ALA:O	1:A:816:ASP:HB2	0.49	2.08	4	5
1:A:842:HIS:O	1:A:845:LYS:HG2	0.49	2.07	11	2
1:A:840:THR:O	1:A:843:ARG:HG2	0.49	2.07	10	1
1:A:859:LEU:HB3	1:A:878:TYR:CE1	0.49	2.41	16	1
1:A:824:ARG:HB3	1:A:840:THR:HG21	0.49	1.84	3	1
1:A:875:ILE:O	1:A:879:ILE:HG13	0.49	2.08	16	6
1:A:865:HIS:O	1:A:869:GLU:HB2	0.48	2.09	8	1
1:A:819:PRO:O	1:A:822:VAL:HG22	0.48	2.08	25	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:815:VAL:HG12	1:A:890:LEU:HD22	0.48	1.85	23	3
1:A:845:LYS:HA	1:A:860:CYS:SG	0.48	2.49	11	1
1:A:883:ASP:O	1:A:887:LYS:HG2	0.48	2.09	18	4
1:A:872:VAL:N	1:A:873:PRO:HD2	0.48	2.24	14	9
1:A:828:GLU:HB2	1:A:837:LEU:HD12	0.48	1.84	22	1
1:A:851:LEU:HB2	1:A:853:LEU:HG	0.47	1.84	16	1
1:A:842:HIS:HA	1:A:845:LYS:HD3	0.47	1.85	3	1
1:A:814:PHE:CZ	1:A:886:VAL:HG22	0.47	2.44	11	2
1:A:837:LEU:HB3	1:A:867:ILE:HD12	0.47	1.86	8	1
1:A:820:ASP:O	1:A:823:LYS:HG2	0.47	2.10	9	1
1:A:872:VAL:O	1:A:876:GLU:HG2	0.47	2.10	10	3
1:A:883:ASP:O	1:A:886:VAL:HG12	0.47	2.10	18	1
1:A:805:LEU:HG	1:A:806:HIS:N	0.46	2.24	20	2
1:A:805:LEU:HA	1:A:810:TYR:CE1	0.46	2.46	2	1
1:A:886:VAL:HG13	1:A:890:LEU:HD21	0.46	1.86	25	1
1:A:871:ASP:O	1:A:875:ILE:HG12	0.46	2.10	4	1
1:A:854:VAL:HA	1:A:857:LYS:HD3	0.45	1.88	8	1
1:A:849:ALA:HB2	1:A:857:LYS:HD2	0.45	1.87	24	2
1:A:867:ILE:HA	1:A:875:ILE:HD11	0.45	1.87	2	3
1:A:864:GLU:HG3	1:A:865:HIS:N	0.45	2.26	14	1
1:A:875:ILE:O	1:A:879:ILE:HG12	0.45	2.11	21	1
1:A:863:LEU:HG	1:A:878:TYR:CE2	0.45	2.46	16	1
1:A:804:GLN:HG3	1:A:805:LEU:N	0.45	2.27	20	1
1:A:834:PHE:HA	1:A:837:LEU:HB3	0.45	1.88	19	1
1:A:806:HIS:HA	1:A:811:TYR:HB2	0.44	1.87	21	2
1:A:828:GLU:HB2	1:A:837:LEU:HD13	0.44	1.89	12	2
1:A:847:VAL:O	1:A:850:MET:HB3	0.44	2.12	3	1
1:A:884:SER:HA	1:A:887:LYS:HB2	0.44	1.88	23	1
1:A:862:THR:HB	1:A:878:TYR:HE2	0.44	1.71	13	1
1:A:818:VAL:O	1:A:822:VAL:HG22	0.44	2.13	15	1
1:A:872:VAL:O	1:A:876:GLU:HG3	0.44	2.13	15	1
1:A:814:PHE:O	1:A:819:PRO:HD3	0.44	2.13	8	2
1:A:857:LYS:O	1:A:861:GLU:HG2	0.44	2.12	9	2
1:A:834:PHE:HA	1:A:837:LEU:HD12	0.43	1.90	1	1
1:A:854:VAL:HB	1:A:855:PRO:CD	0.43	2.43	24	2
1:A:819:PRO:HA	1:A:822:VAL:CG2	0.43	2.43	4	2
1:A:855:PRO:HG2	1:A:885:TYR:OH	0.43	2.13	11	2
1:A:878:TYR:HA	1:A:881:ASP:HB2	0.43	1.90	18	1
1:A:854:VAL:N	1:A:855:PRO:HD2	0.43	2.29	10	2
1:A:868:ARG:HG3	1:A:869:GLU:HG2	0.42	1.90	16	2
1:A:844:LEU:HA	1:A:847:VAL:HG22	0.42	1.89	1	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:802:ASN:HB2	1:A:889:LEU:HD23	0.42	1.91	20	1
1:A:818:VAL:O	1:A:822:VAL:HG13	0.42	2.15	25	1
1:A:844:LEU:HB3	1:A:860:CYS:SG	0.42	2.55	25	1
1:A:886:VAL:HG22	1:A:890:LEU:HD21	0.42	1.91	18	1
1:A:842:HIS:HA	1:A:845:LYS:CD	0.42	2.43	6	1
1:A:802:ASN:HB3	1:A:889:LEU:HG	0.42	1.91	19	1
1:A:845:LYS:HE2	1:A:861:GLU:HA	0.42	1.90	7	1
1:A:837:LEU:HD21	1:A:875:ILE:HG21	0.42	1.91	19	1
1:A:863:LEU:HD13	1:A:867:ILE:HD11	0.41	1.92	16	1
1:A:887:LYS:HA	1:A:890:LEU:HD12	0.41	1.91	16	1
1:A:814:PHE:CZ	1:A:889:LEU:HB3	0.41	2.50	6	1
1:A:868:ARG:HD2	1:A:869:GLU:OE2	0.41	2.15	5	1
1:A:818:VAL:N	1:A:819:PRO:HD2	0.41	2.30	23	1
1:A:821:ASP:OD1	1:A:843:ARG:HD2	0.41	2.16	12	1
1:A:822:VAL:HA	1:A:825:LEU:HD12	0.41	1.93	9	1
1:A:845:LYS:HD2	1:A:861:GLU:HG2	0.41	1.92	22	1
1:A:883:ASP:O	1:A:887:LYS:HB2	0.41	2.16	8	1
1:A:845:LYS:HE3	1:A:861:GLU:HG2	0.41	1.91	3	1
1:A:863:LEU:HD11	1:A:879:ILE:HG12	0.40	1.92	6	1
1:A:821:ASP:HB3	1:A:844:LEU:HD11	0.40	1.92	12	1
1:A:857:LYS:HG2	1:A:858:GLN:N	0.40	2.31	8	1

## 6.3 Torsion angles ⓘ

### 6.3.1 Protein backbone ⓘ

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	88/116 (76%)	86±1 (98±1%)	2±1 (2±1%)	0±0 (0±0%)	100	100
All	All	2200/2900 (76%)	2156 (98%)	43 (2%)	1 (0%)	100	100

All 1 unique Ramachandran outliers are listed below.

Mol	Chain	Res	Type	Models (Total)
1	A	817	THR	1

### 6.3.2 Protein sidechains ⓘ

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	75/98 (77%)	53±4 (70±5%)	22±4 (30±5%)	2	17
All	All	1875/2450 (77%)	1313 (70%)	562 (30%)	2	17

All 64 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	863	LEU	25
1	A	868	ARG	25
1	A	805	LEU	20
1	A	831	THR	19
1	A	889	LEU	18
1	A	888	SER	17
1	A	857	LYS	16
1	A	877	LYS	16
1	A	837	LEU	15
1	A	843	ARG	15
1	A	881	ASP	15
1	A	832	SER	14
1	A	852	ASN	14
1	A	813	LEU	13
1	A	817	THR	13
1	A	853	LEU	13
1	A	823	LYS	13
1	A	880	SER	12
1	A	850	MET	12
1	A	821	ASP	12
1	A	858	GLN	11
1	A	808	SER	11
1	A	864	GLU	11
1	A	862	THR	10
1	A	804	GLN	10
1	A	802	ASN	10
1	A	844	LEU	9
1	A	886	VAL	9
1	A	870	LYS	9

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Mol	Chain	Res	Type	Models (Total)
1	A	876	GLU	8
1	A	811	TYR	8
1	A	824	ARG	8
1	A	887	LYS	8
1	A	878	TYR	7
1	A	845	LYS	7
1	A	806	HIS	7
1	A	810	TYR	7
1	A	826	TYR	6
1	A	885	TYR	6
1	A	842	HIS	6
1	A	851	LEU	6
1	A	820	ASP	6
1	A	883	ASP	5
1	A	840	THR	5
1	A	828	GLU	5
1	A	859	LEU	5
1	A	869	GLU	5
1	A	825	LEU	5
1	A	872	VAL	5
1	A	854	VAL	5
1	A	890	LEU	4
1	A	871	ASP	3
1	A	848	PHE	2
1	A	847	VAL	2
1	A	882	ILE	2
1	A	839	GLN	2
1	A	815	VAL	2
1	A	860	CYS	2
1	A	833	ASP	1
1	A	814	PHE	1
1	A	884	SER	1
1	A	822	VAL	1
1	A	865	HIS	1
1	A	816	ASP	1

### 6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 6.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.6 Ligand geometry [i](#)

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