



Full wwPDB NMR Structure Validation Report ⓘ

Jun 12, 2024 – 12:26 PM EDT

PDB ID : 2KT5
Title : RRM domain of mRNA export adaptor REF2-I bound to HSV-1 ICP27 peptide
Authors : Tunnicliffe, N.B.; Golovanov, A.P.; Wilson, S.A.; Hautbergue, G.M.
Deposited on : 2010-01-18

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	:	4.02b-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)	:	2.36.2

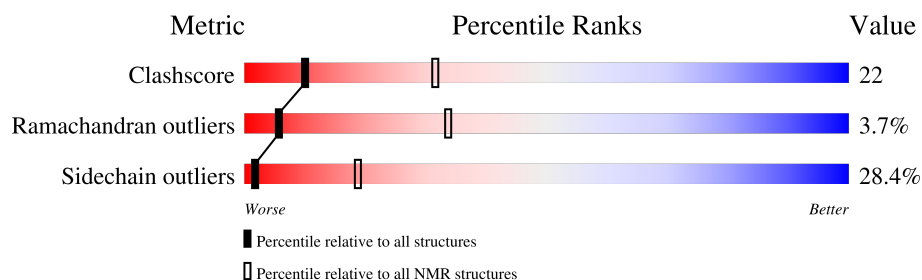
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and a grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	124	
2	B	40	

2 Ensemble composition and analysis

This entry contains 20 models. Model 12 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

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:73-A:152, B:105-B:110 (86)	0.28	12

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 3 clusters and 4 single-model clusters were found.

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

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2464 atoms, of which 1213 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called RNA and export factor-binding protein 2.

Mol	Chain	Residues	Atoms						Trace
1	A	124	Total	C	H	N	O	S	0
			1855	587	903	174	185	6	

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	40	MET	-	expression tag	UNP Q9JJW6
A	41	ALA	-	expression tag	UNP Q9JJW6
A	42	SER	-	expression tag	UNP Q9JJW6
A	43	MET	-	expression tag	UNP Q9JJW6
A	44	THR	-	expression tag	UNP Q9JJW6
A	45	GLY	-	expression tag	UNP Q9JJW6
A	46	GLY	-	expression tag	UNP Q9JJW6
A	47	GLN	-	expression tag	UNP Q9JJW6
A	48	GLN	-	expression tag	UNP Q9JJW6
A	49	MET	-	expression tag	UNP Q9JJW6
A	50	GLY	-	expression tag	UNP Q9JJW6
A	51	ARG	-	expression tag	UNP Q9JJW6
A	52	ASP	-	expression tag	UNP Q9JJW6
A	156	LEU	-	expression tag	UNP Q9JJW6
A	157	GLU	-	expression tag	UNP Q9JJW6
A	158	HIS	-	expression tag	UNP Q9JJW6
A	159	HIS	-	expression tag	UNP Q9JJW6
A	160	HIS	-	expression tag	UNP Q9JJW6
A	161	HIS	-	expression tag	UNP Q9JJW6
A	162	HIS	-	expression tag	UNP Q9JJW6
A	163	HIS	-	expression tag	UNP Q9JJW6

- Molecule 2 is a protein called ICP27.

Mol	Chain	Residues	Atoms						Trace
2	B	40	Total	C	H	N	O	S	0
			609	184	310	65	49	1	

There are 4 discrepancies between the modelled and reference sequences:

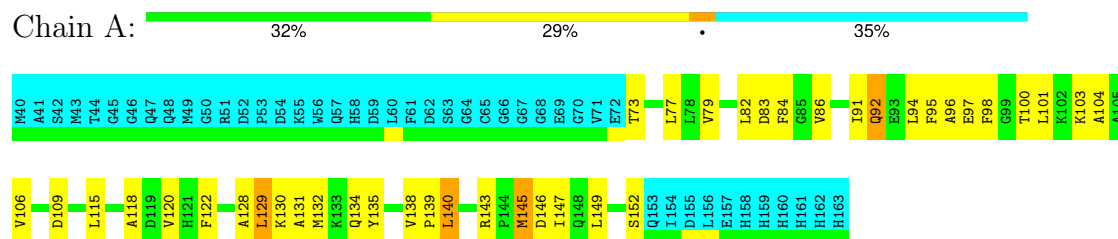
Chain	Residue	Modelled	Actual	Comment	Reference
B	99	GLY	-	expression tag	UNP Q9J0X9
B	100	PRO	-	expression tag	UNP Q9J0X9
B	101	LEU	-	expression tag	UNP Q9J0X9
B	102	GLY	-	expression tag	UNP Q9J0X9

4 Residue-property plots [i](#)

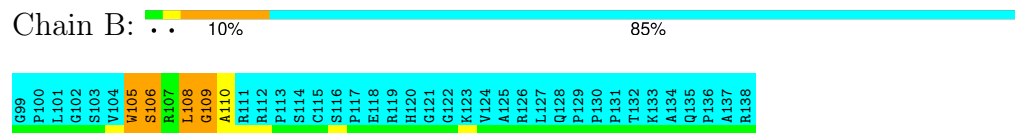
4.1 Average score per residue in the NMR ensemble

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: RNA and export factor-binding protein 2



- Molecule 2: ICP27

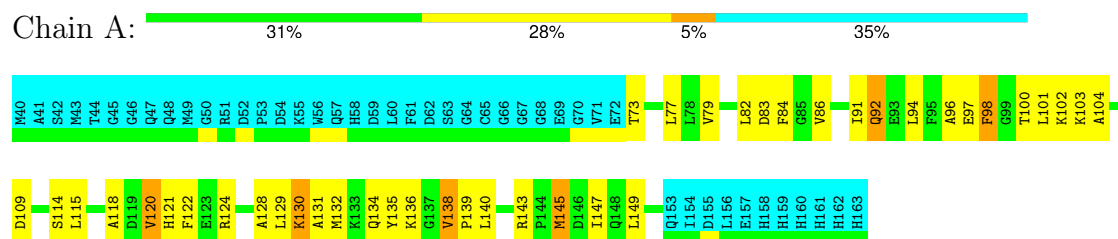


4.2 Scores per residue for each member of the ensemble

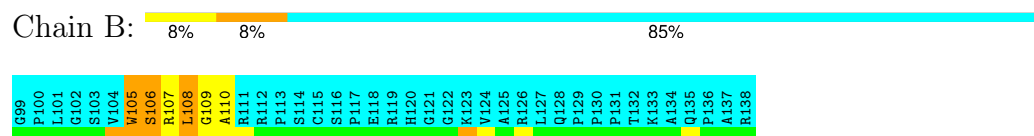
Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

- Molecule 1: RNA and export factor-binding protein 2

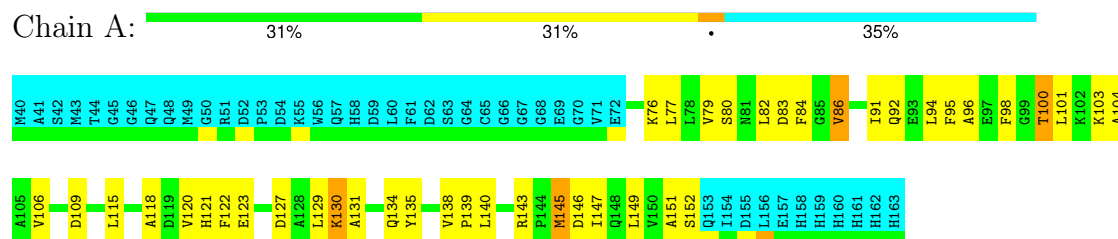


- Molecule 2: ICP27

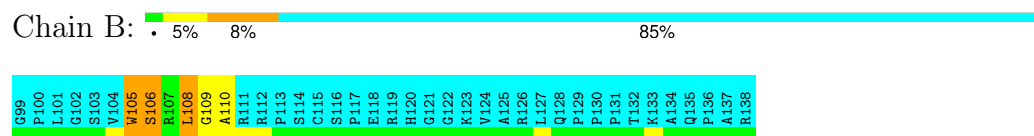


4.2.2 Score per residue for model 2

- Molecule 1: RNA and export factor-binding protein 2

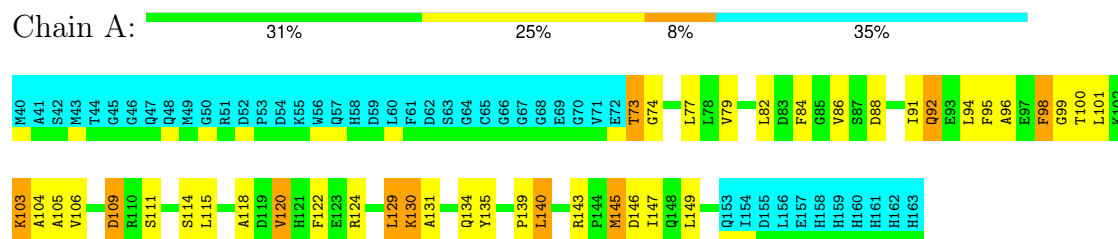


- Molecule 2: ICP27

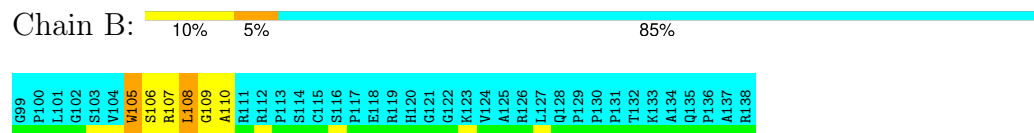


4.2.3 Score per residue for model 3

- Molecule 1: RNA and export factor-binding protein 2

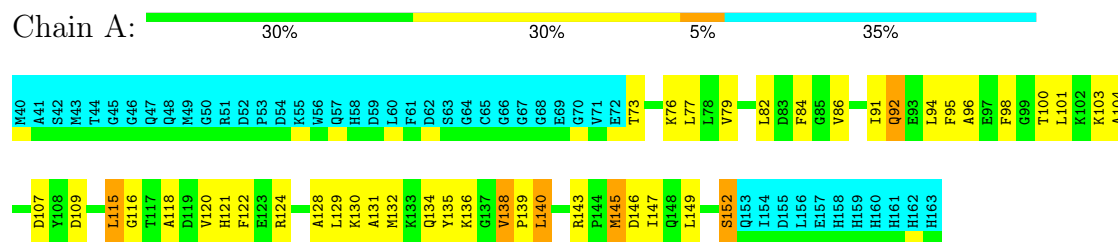


- Molecule 2: ICP27

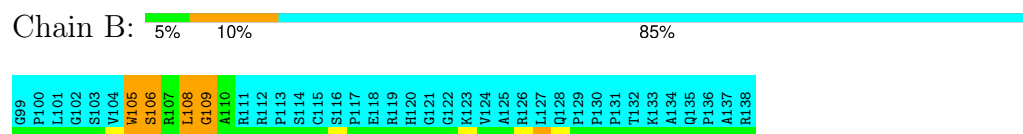


4.2.4 Score per residue for model 4

- Molecule 1: RNA and export factor-binding protein 2

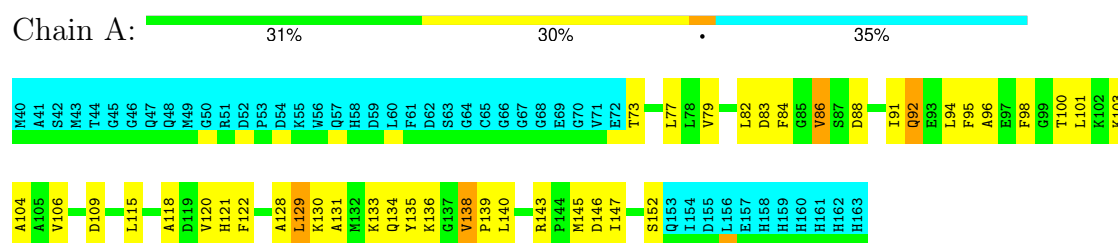


- Molecule 2: ICP27

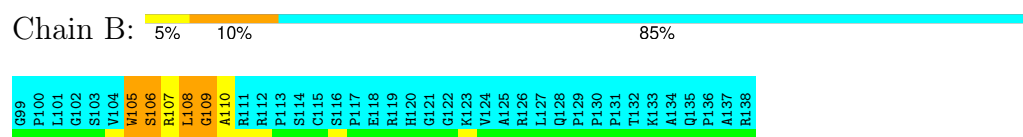


4.2.5 Score per residue for model 5

- Molecule 1: RNA and export factor-binding protein 2

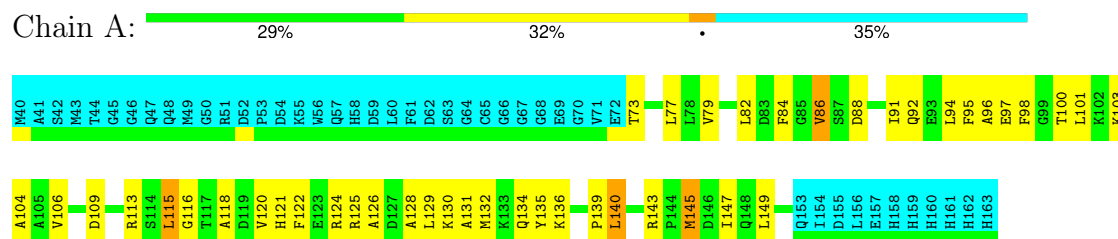


- Molecule 2: ICP27



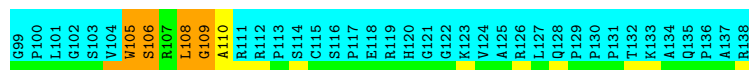
4.2.6 Score per residue for model 6

- Molecule 1: RNA and export factor-binding protein 2




- Molecule 2: ICP27

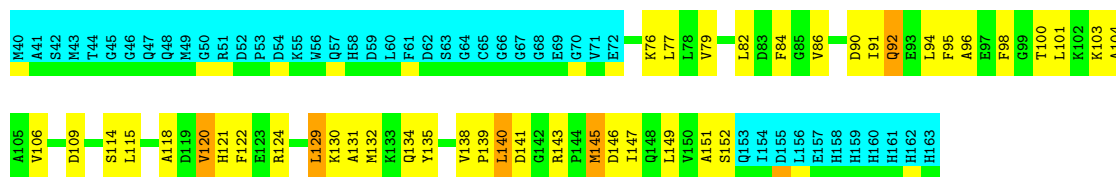
Chain B:  10% 85%



4.2.7 Score per residue for model 7

- Molecule 1: RNA and export factor-binding protein 2

Chain A:  30% 31% 35%



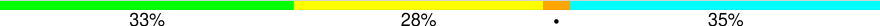
- Molecule 2: ICP27

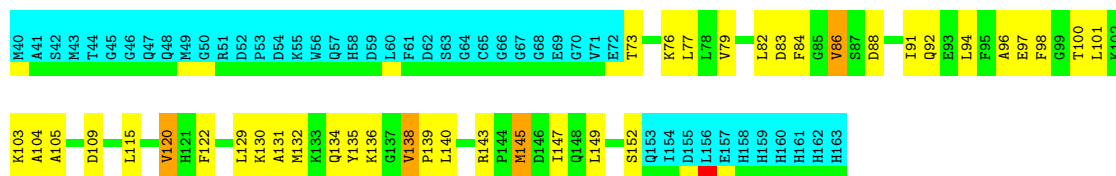
Chain B:  5% 8% 85%



4.2.8 Score per residue for model 8

- Molecule 1: RNA and export factor-binding protein 2

Chain A:  33% 28% 35%



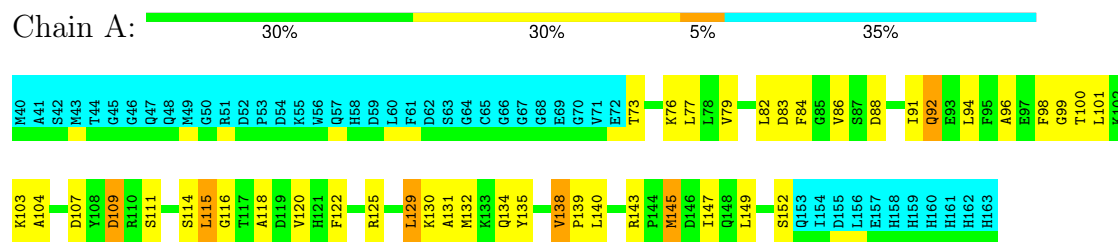
- Molecule 2: ICP27

Chain B:  5% 8% 85%

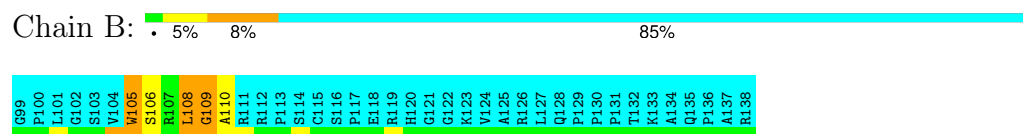


4.2.9 Score per residue for model 9

- Molecule 1: RNA and export factor-binding protein 2

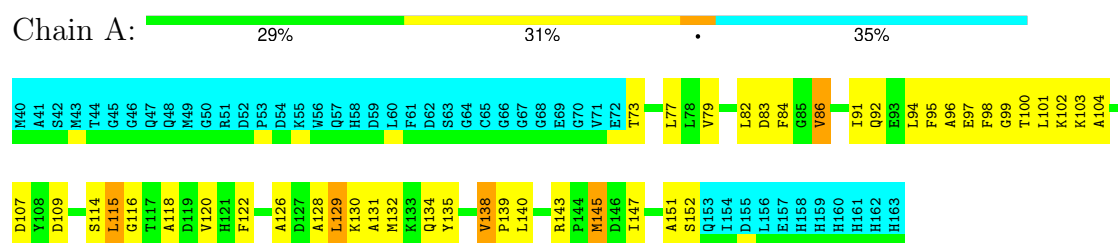


- Molecule 2: ICP27

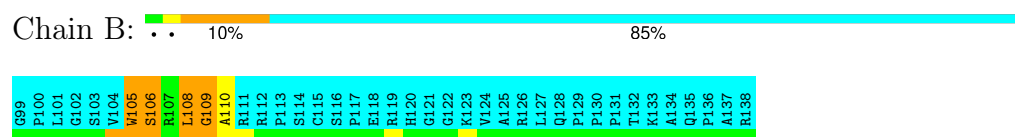


4.2.10 Score per residue for model 10

- Molecule 1: RNA and export factor-binding protein 2

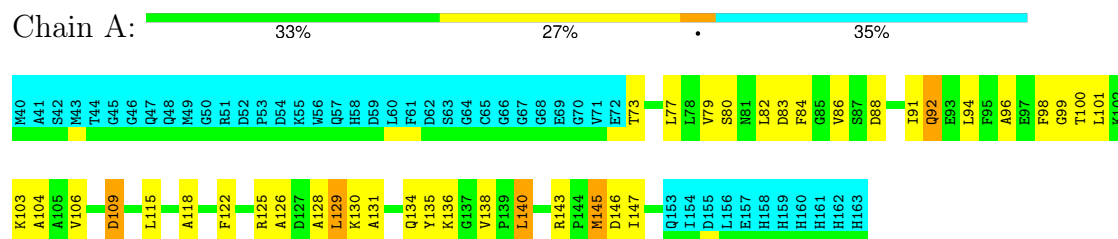


- Molecule 2: ICP27



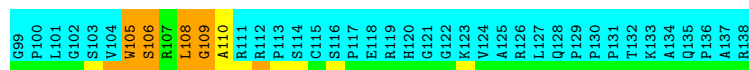
4.2.11 Score per residue for model 11

- Molecule 1: RNA and export factor-binding protein 2



- Molecule 2: ICP27

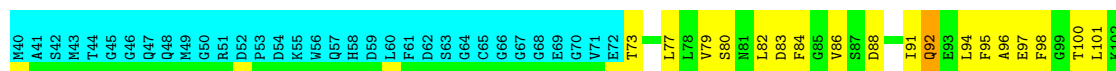
Chain B:  10% 85%



4.2.12 Score per residue for model 12 (medoid)

- Molecule 1: RNA and export factor-binding protein 2

Chain A:  33% 27% 35%




- Molecule 2: ICP27

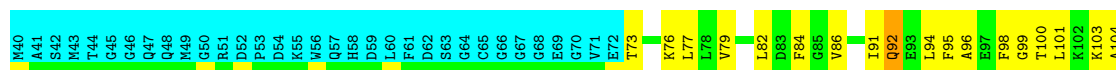
Chain B:  10% 85%



4.2.13 Score per residue for model 13

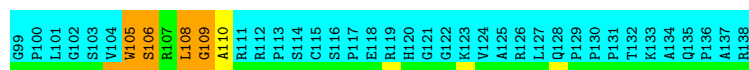
- Molecule 1: RNA and export factor-binding protein 2

Chain A:  29% 31% 35%



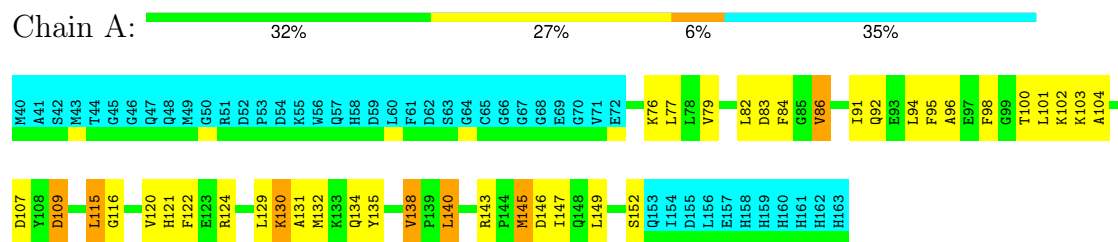
- Molecule 2: ICP27

Chain B:  10% 85%

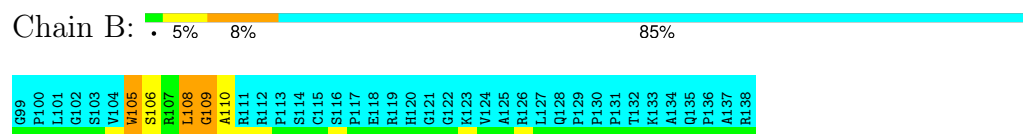


4.2.14 Score per residue for model 14

- Molecule 1: RNA and export factor-binding protein 2

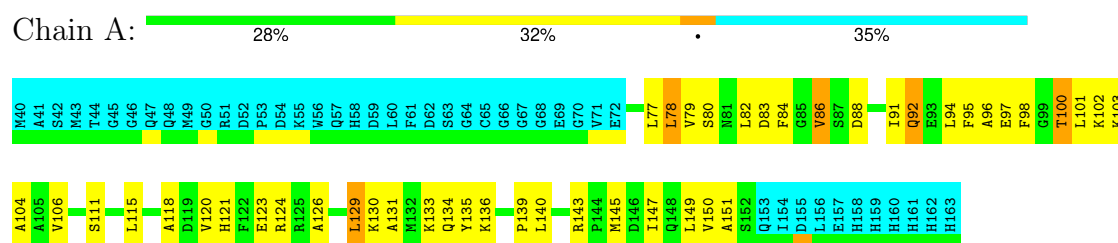


- Molecule 2: ICP27

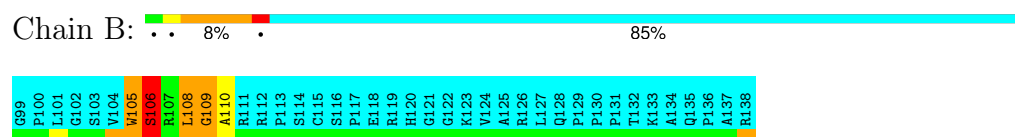


4.2.15 Score per residue for model 15

- Molecule 1: RNA and export factor-binding protein 2

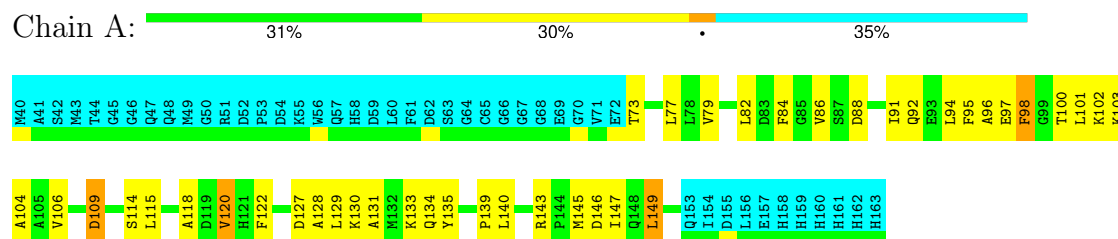


- Molecule 2: ICP27



4.2.16 Score per residue for model 16

- Molecule 1: RNA and export factor-binding protein 2



- Molecule 2: ICP27

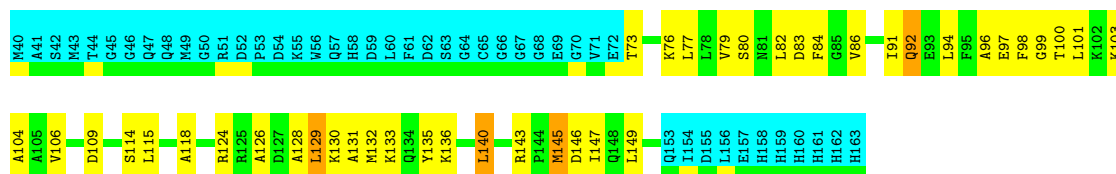
Chain B: 5% 8% 85%



4.2.17 Score per residue for model 17

- Molecule 1: RNA and export factor-binding protein 2

Chain A: 31% 30% 35%



- Molecule 2: ICP27

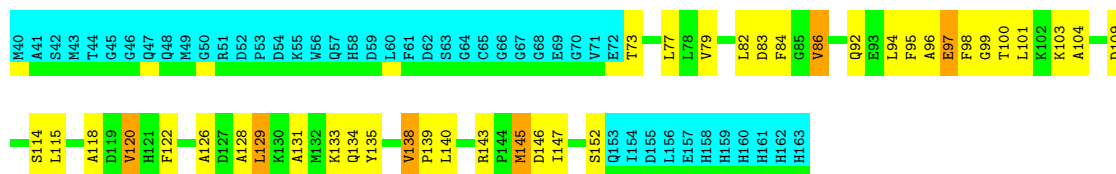
Chain B: 10% 85%



4.2.18 Score per residue for model 18

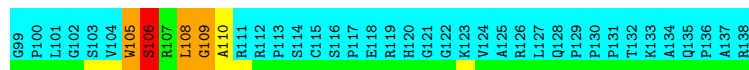
- Molecule 1: RNA and export factor-binding protein 2

Chain A: 33% 27% 5% 35%



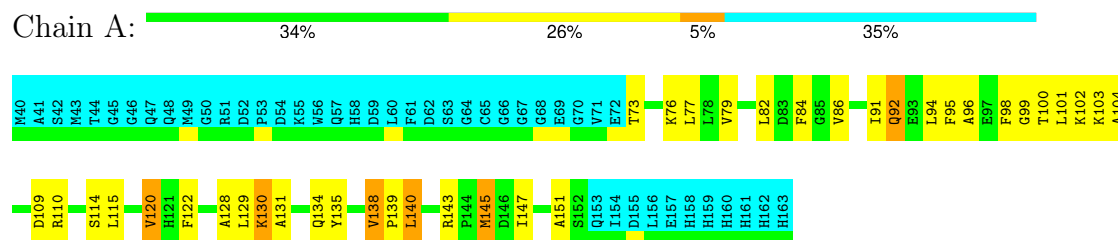
- Molecule 2: ICP27

Chain B: 8% 85%

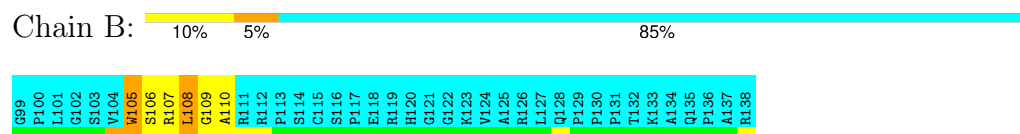


4.2.19 Score per residue for model 19

- Molecule 1: RNA and export factor-binding protein 2

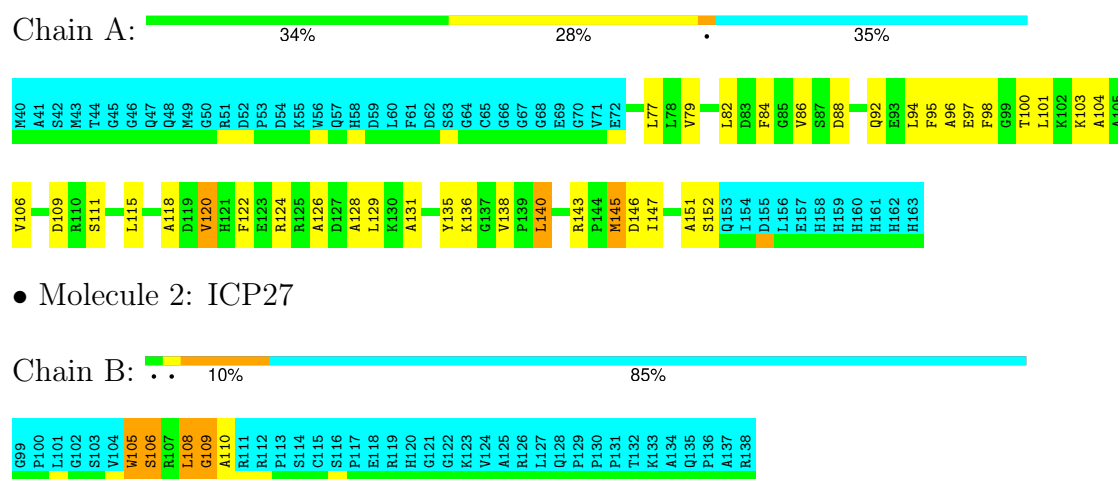


- Molecule 2: ICP27

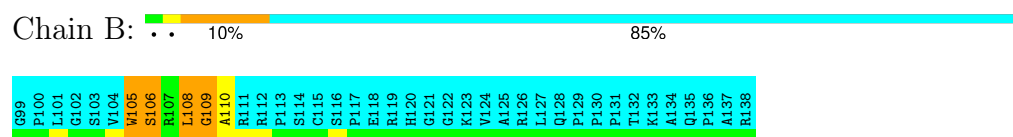


4.2.20 Score per residue for model 20

- Molecule 1: RNA and export factor-binding protein 2



- Molecule 2: ICP27



5 Refinement protocol and experimental data overview

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

Of the 100 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	2.1
CYANA	refinement	2.1

No chemical shift data was provided.

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	610	612	612	25±3
2	B	48	47	47	6±1
All	All	13160	13180	13180	571

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 22.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:94:LEU:HD13	1:A:140:LEU:HD21	0.96	1.38	10	20
1:A:77:LEU:HD13	1:A:128:ALA:HB1	0.86	1.45	6	12
1:A:82:LEU:HD12	1:A:86:VAL:HG21	0.76	1.56	1	14
1:A:101:LEU:HD11	1:A:120:VAL:CG2	0.72	2.15	19	8
1:A:140:LEU:HD22	2:B:108:LEU:HD13	0.68	1.65	15	8
1:A:79:VAL:HG12	1:A:82:LEU:HD21	0.68	1.66	17	20
1:A:94:LEU:CD1	1:A:140:LEU:HD21	0.66	2.19	18	20
2:B:105:TRP:O	2:B:106:SER:C	0.65	2.35	16	20
1:A:101:LEU:HD11	1:A:120:VAL:HG23	0.64	1.70	7	8
1:A:78:LEU:HD23	1:A:150:VAL:CG2	0.64	2.23	15	1
1:A:101:LEU:HD11	1:A:120:VAL:CG1	0.62	2.24	6	7
1:A:132:MET:HE3	1:A:149:LEU:HD12	0.62	1.71	8	2
1:A:140:LEU:HD22	2:B:108:LEU:HD22	0.60	1.72	4	7

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:95:PHE:C	1:A:101:LEU:HD22	0.60	2.16	18	15
1:A:86:VAL:HB	1:A:91:ILE:HD11	0.60	1.72	17	15
1:A:132:MET:CE	1:A:149:LEU:HD13	0.59	2.28	9	6
1:A:101:LEU:HD11	1:A:104:ALA:HB2	0.59	1.75	11	3
1:A:79:VAL:CG1	1:A:82:LEU:HD21	0.59	2.28	8	20
1:A:101:LEU:HD12	1:A:121:HIS:O	0.58	1.98	14	9
1:A:140:LEU:HD23	1:A:145:MET:CE	0.58	2.27	4	11
1:A:92:GLN:HG2	1:A:104:ALA:HB3	0.58	1.73	20	8
1:A:115:LEU:HD12	1:A:116:GLY:N	0.58	2.13	14	6
1:A:140:LEU:CD2	2:B:108:LEU:HD22	0.58	2.29	14	14
2:B:108:LEU:O	2:B:109:GLY:C	0.58	2.43	17	14
1:A:101:LEU:HD21	1:A:104:ALA:HB2	0.57	1.76	14	13
1:A:98:PHE:CE2	1:A:131:ALA:HB2	0.57	2.34	6	18
1:A:126:ALA:HA	1:A:129:LEU:HD23	0.57	1.76	10	4
1:A:92:GLN:HA	1:A:104:ALA:HB3	0.57	1.75	18	17
1:A:98:PHE:CE1	1:A:131:ALA:HB2	0.57	2.34	17	2
1:A:77:LEU:CD1	1:A:149:LEU:HD12	0.55	2.31	2	5
1:A:77:LEU:HD12	1:A:149:LEU:HA	0.55	1.78	16	2
1:A:106:VAL:HG23	1:A:118:ALA:HB2	0.54	1.79	7	12
2:B:108:LEU:HD11	2:B:110:ALA:O	0.54	2.03	7	19
1:A:94:LEU:CD1	1:A:140:LEU:HD11	0.53	2.33	12	4
1:A:86:VAL:HG13	1:A:140:LEU:HD12	0.53	1.81	15	1
1:A:132:MET:HE1	1:A:149:LEU:HD13	0.53	1.80	17	2
1:A:79:VAL:HB	1:A:118:ALA:HB3	0.53	1.80	10	5
1:A:107:ASP:HB3	1:A:115:LEU:HD11	0.52	1.82	4	4
1:A:79:VAL:HG22	1:A:147:ILE:HG13	0.51	1.81	17	5
1:A:98:PHE:CD2	1:A:131:ALA:HB2	0.51	2.40	2	15
1:A:139:PRO:HG2	2:B:110:ALA:HB1	0.51	1.82	3	9
1:A:140:LEU:HD23	1:A:145:MET:HE2	0.51	1.82	14	6
1:A:77:LEU:CD1	1:A:128:ALA:HB1	0.50	2.28	6	3
1:A:77:LEU:HD22	1:A:122:PHE:CE1	0.50	2.41	6	18
1:A:138:VAL:HG22	1:A:139:PRO:HD2	0.50	1.83	19	8
1:A:92:GLN:O	1:A:96:ALA:CB	0.50	2.59	19	17
1:A:86:VAL:CG1	1:A:91:ILE:HD11	0.50	2.36	15	3
1:A:107:ASP:HB2	1:A:115:LEU:HD11	0.49	1.84	9	1
1:A:103:LYS:NZ	1:A:105:ALA:HB3	0.49	2.22	8	2
1:A:101:LEU:HD11	1:A:120:VAL:HG12	0.48	1.85	6	4
1:A:135:TYR:CB	1:A:147:ILE:HD13	0.48	2.39	2	17
1:A:92:GLN:O	1:A:96:ALA:N	0.47	2.47	8	9
1:A:132:MET:CE	1:A:149:LEU:HD12	0.47	2.40	13	1
1:A:100:THR:HG22	1:A:123:GLU:HG3	0.47	1.86	15	2

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:115:LEU:HD12	1:A:116:GLY:H	0.46	1.70	14	6
1:A:139:PRO:CG	2:B:110:ALA:HB1	0.46	2.41	1	8
2:B:105:TRP:CD2	2:B:105:TRP:C	0.45	2.89	20	16
1:A:86:VAL:HG11	1:A:91:ILE:HD11	0.45	1.89	15	2
1:A:132:MET:HE2	1:A:149:LEU:HD13	0.45	1.88	6	1
1:A:129:LEU:HG	1:A:130:LYS:N	0.44	2.28	11	9
1:A:97:GLU:HB2	2:B:105:TRP:CZ2	0.44	2.48	18	8
1:A:135:TYR:HB3	1:A:145:MET:HE3	0.44	1.90	6	6
1:A:101:LEU:HD13	1:A:122:PHE:CZ	0.42	2.49	16	1
1:A:86:VAL:HG12	1:A:140:LEU:HD12	0.42	1.92	8	1
1:A:101:LEU:HD11	1:A:120:VAL:HG13	0.42	1.92	2	1
1:A:135:TYR:HB2	1:A:147:ILE:HD13	0.42	1.91	20	3
1:A:92:GLN:O	1:A:96:ALA:HB2	0.42	2.14	16	1
1:A:98:PHE:CZ	1:A:131:ALA:HB2	0.42	2.50	17	1
1:A:124:ARG:HE	1:A:126:ALA:HB3	0.41	1.74	15	1
1:A:124:ARG:HG3	1:A:126:ALA:HB3	0.41	1.91	6	3
1:A:77:LEU:HG	1:A:147:ILE:HG23	0.41	1.93	17	1
1:A:128:ALA:O	1:A:132:MET:CB	0.41	2.68	10	2
1:A:96:ALA:HA	1:A:101:LEU:HB2	0.41	1.92	19	1
1:A:97:GLU:HB3	2:B:105:TRP:CE2	0.40	2.51	20	2
2:B:105:TRP:CE3	2:B:106:SER:N	0.40	2.90	16	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	80/124 (65%)	69±2 (86±2%)	9±2 (12±2%)	1±1 (2±1%)	12	54
2	B	6/40 (15%)	3±1 (52±9%)	1±1 (19±10%)	2±0 (29±7%)	0	1
All	All	1720/3280 (52%)	1446 (84%)	211 (12%)	63 (4%)	6	34

All 6 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	109	GLY	20
1	A	109	ASP	16
2	B	106	SER	15
1	A	99	GLY	8
1	A	130	LYS	2
1	A	152	SER	2

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	63/98 (64%)	46±2 (73±2%)	17±2 (27±2%)	2	22
2	B	4/31 (13%)	2±0 (42±11%)	2±0 (57±11%)	0	0
All	All	1340/2580 (52%)	959 (72%)	381 (28%)	2	19

All 41 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	84	PHE	20
1	A	100	THR	20
1	A	115	LEU	20
1	A	129	LEU	20
1	A	143	ARG	20
1	A	145	MET	20
2	B	105	TRP	20
2	B	108	LEU	20
1	A	103	LYS	19
1	A	73	THR	14
1	A	138	VAL	14
1	A	146	ASP	13
1	A	83	ASP	12
1	A	92	GLN	12
1	A	140	LEU	11
1	A	114	SER	10
1	A	120	VAL	10
1	A	88	ASP	10
1	A	136	LYS	9

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Models (Total)
1	A	76	LYS	9
1	A	86	VAL	9
1	A	152	SER	9
1	A	109	ASP	8
1	A	102	LYS	6
1	A	130	LYS	5
1	A	80	SER	5
1	A	124	ARG	5
1	A	133	LYS	5
2	B	107	ARG	4
1	A	111	SER	4
1	A	98	PHE	3
1	A	125	ARG	3
1	A	127	ASP	2
1	A	113	ARG	2
2	B	106	SER	2
1	A	90	ASP	1
1	A	141	ASP	1
1	A	78	LEU	1
1	A	149	LEU	1
1	A	97	GLU	1
1	A	110	ARG	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 monosaccharides 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