



Full wwPDB NMR Structure Validation Report ⓘ

Mar 24, 2026 – 09:37 PM UTC

PDB ID : 2HYM / pdb_00002hym
Title : NMR based Docking Model of the Complex between the Human Type I Interferon Receptor and Human Interferon alpha-2
Authors : Quadt-Akabayov, S.R.; Chill, J.H.; Levy, R.; Kessler, N.; Anglister, J.
Deposited on : 2006-08-07

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/NMRValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

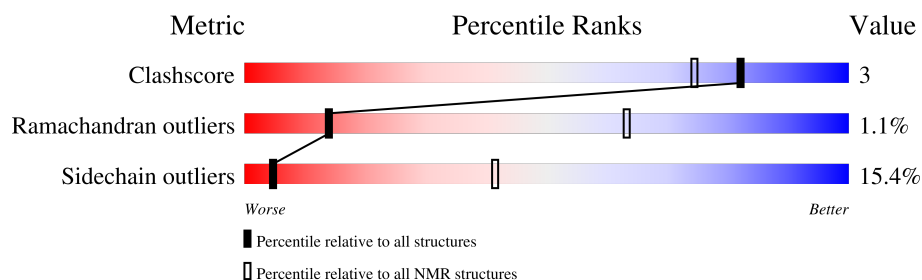
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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



Metric	Whole archive (#Entries)	NMR archive (#Entries)
Clashscore	229148	14424
Ramachandran outliers	224038	12848
Sidechain outliers	223484	12823

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

Mol	Chain	Length	Quality of chain
1	A	212	
2	B	165	

2 Ensemble composition and analysis

This entry contains 10 models. Model 6 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:1-A:212, B:1-B:165 (377)	0.71	6

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 and 1 single-model cluster was found.

Cluster number	Models
1	1, 2, 3, 5, 6, 8, 10
2	7, 9
Single-model clusters	4

3 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 6063 atoms, of which 3002 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Soluble IFN alpha/beta receptor.

Mol	Chain	Residues	Atoms						Trace
1	A	212	Total	C	H	N	O	S	0
			3363	1094	1653	270	336	10	

- Molecule 2 is a protein called Interferon alpha-2.

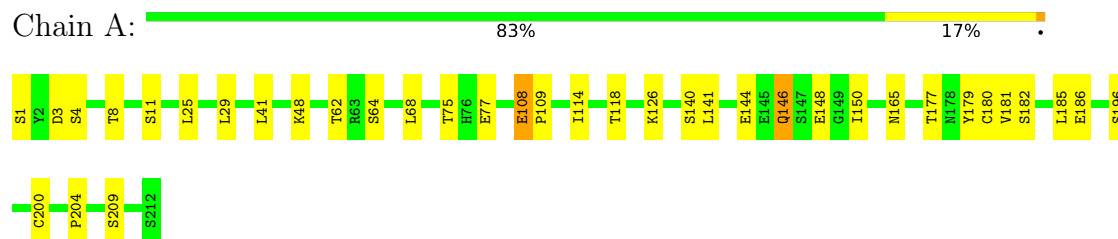
Mol	Chain	Residues	Atoms						Trace
2	B	165	Total	C	H	N	O	S	0
			2700	860	1349	227	255	9	

4 Residue-property plots

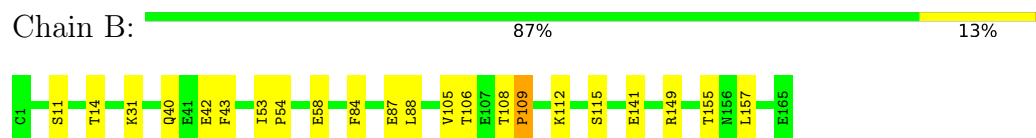
4.1 Average score per residue in the NMR ensemble

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: Soluble IFN alpha/beta receptor



- Molecule 2: Interferon alpha-2

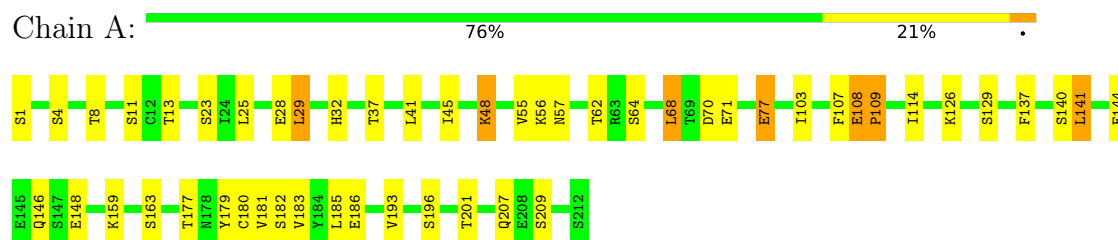


4.2 Scores per residue for each member of the ensemble

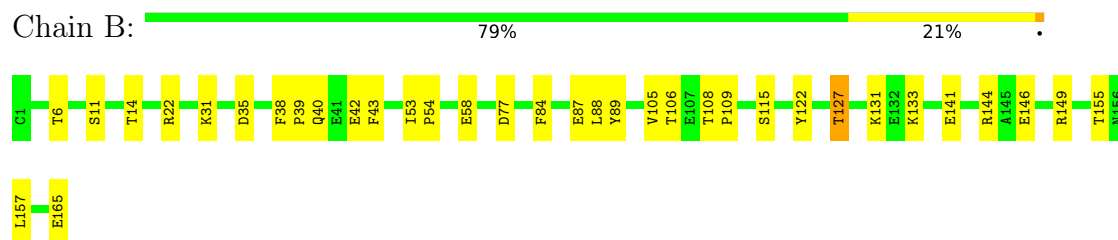
Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

- Molecule 1: Soluble IFN alpha/beta receptor

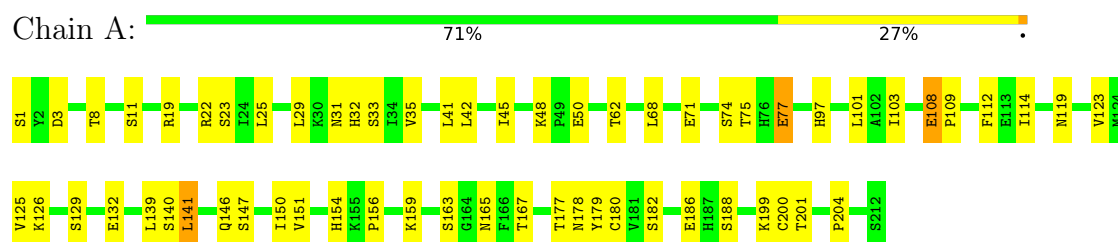


- Molecule 2: Interferon alpha-2

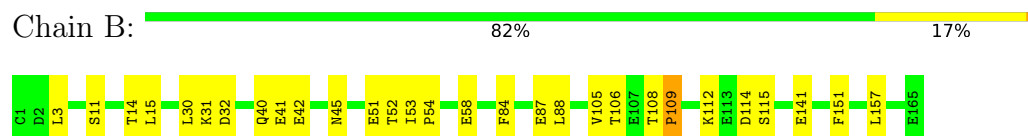


4.2.2 Score per residue for model 2

- Molecule 1: Soluble IFN alpha/beta receptor

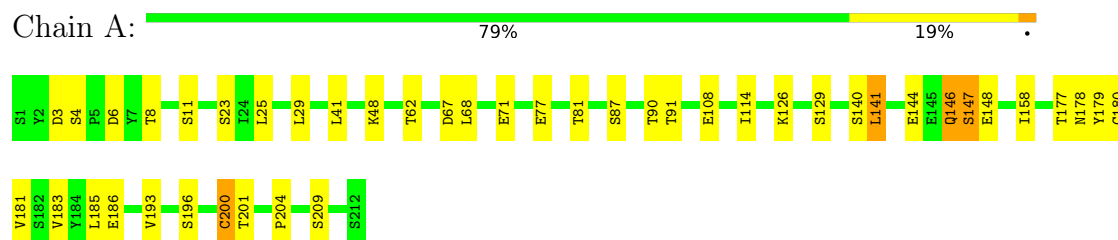


- Molecule 2: Interferon alpha-2

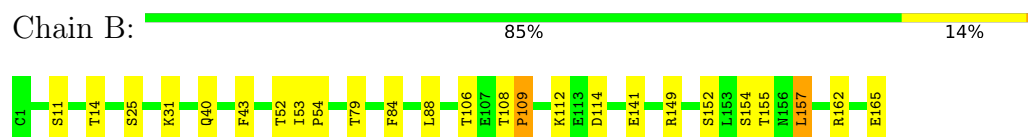


4.2.3 Score per residue for model 3

- Molecule 1: Soluble IFN alpha/beta receptor

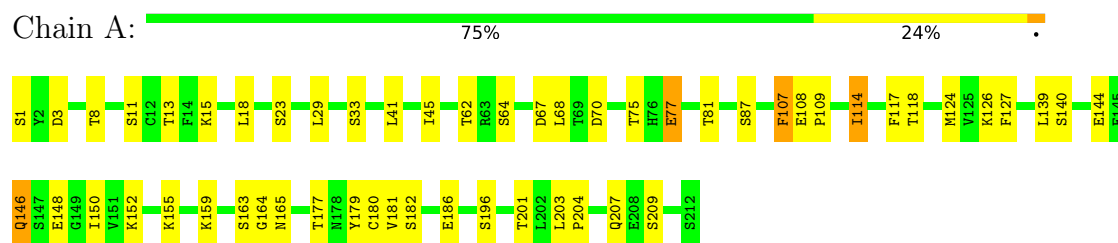


- Molecule 2: Interferon alpha-2

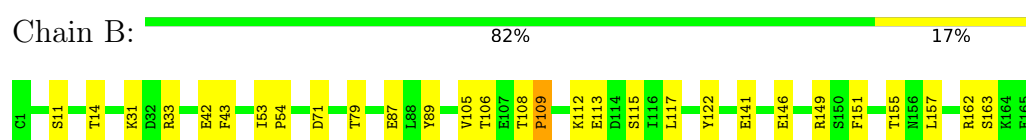


4.2.4 Score per residue for model 4

- Molecule 1: Soluble IFN alpha/beta receptor

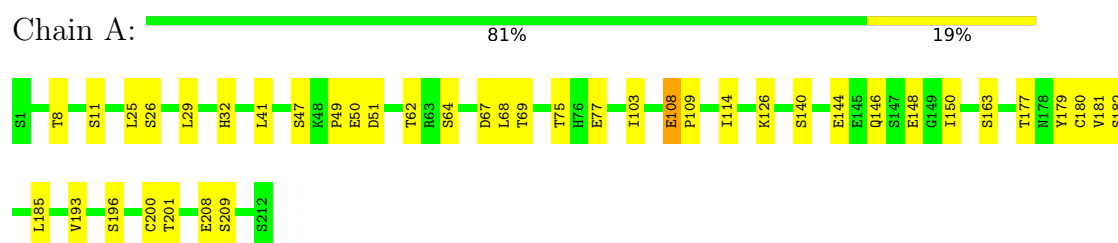


- Molecule 2: Interferon alpha-2

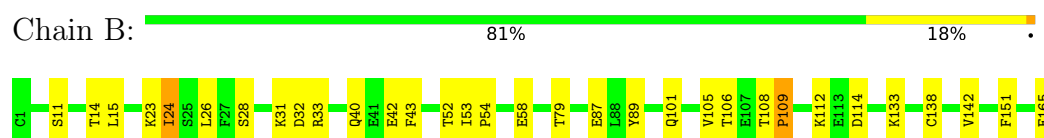


4.2.5 Score per residue for model 5

- Molecule 1: Soluble IFN alpha/beta receptor

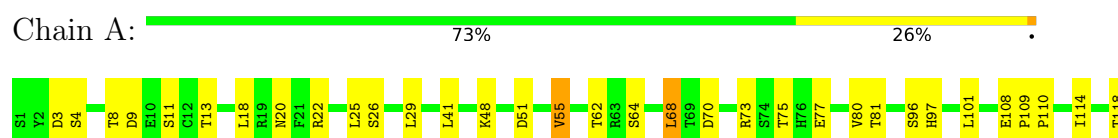


- Molecule 2: Interferon alpha-2



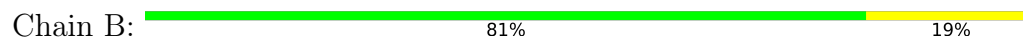
4.2.6 Score per residue for model 6 (medoid)

- Molecule 1: Soluble IFN alpha/beta receptor



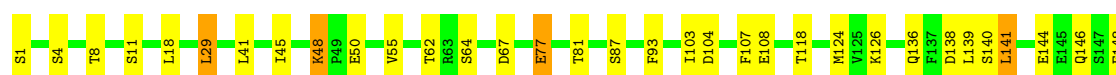
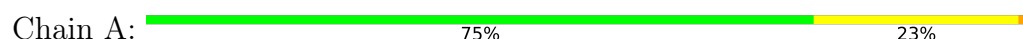


• Molecule 2: Interferon alpha-2

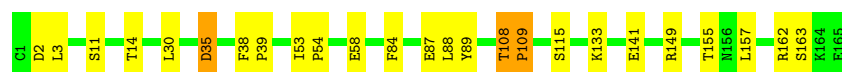


4.2.7 Score per residue for model 7

• Molecule 1: Soluble IFN alpha/beta receptor

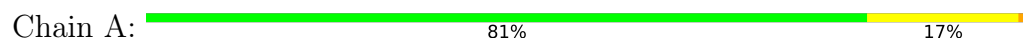


• Molecule 2: Interferon alpha-2

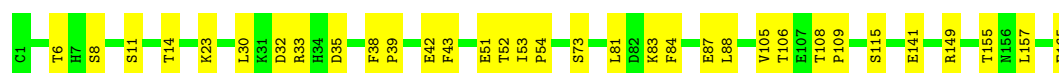


4.2.8 Score per residue for model 8

• Molecule 1: Soluble IFN alpha/beta receptor

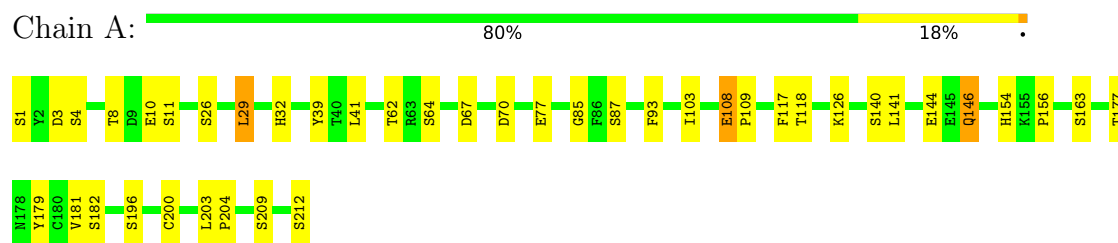


• Molecule 2: Interferon alpha-2

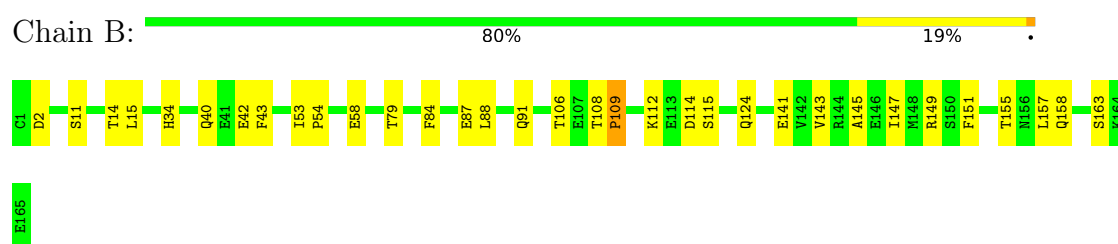


4.2.9 Score per residue for model 9

- Molecule 1: Soluble IFN alpha/beta receptor

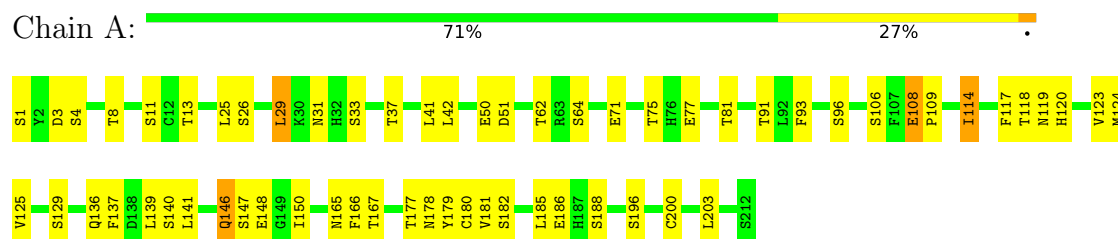


- Molecule 2: Interferon alpha-2

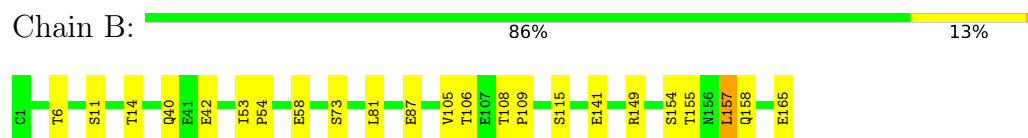


4.2.10 Score per residue for model 10

- Molecule 1: Soluble IFN alpha/beta receptor



- Molecule 2: Interferon alpha-2



5 Refinement protocol and experimental data overview

The models were refined using the following method: *Rigid body docking, semi-flexible simulated annealing, refinement using explicit water.*

Of the 200 calculated structures, 10 were deposited, based on the following criterion: *LOWEST ENERGY STRUCTURES OF LOWEST ENERGY CLUSTER.*

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

Software name	Classification	Version
HADDOCK	refinement	1.3

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	0.39±0.01	0±0/1754 (0.0± 0.0%)	0.69±0.01	0±0/2382 (0.0± 0.0%)
2	B	0.34±0.00	0±0/1377 (0.0± 0.0%)	0.69±0.01	0±0/1853 (0.0± 0.0%)
All	All	0.37	0/31310 (0.0%)	0.69	1/42350 (0.0%)

There are no bond-length outliers.

All unique angle outliers are listed below.

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
1	A	109	PRO	N-CA-C	5.03	116.84	110.70	1	1

There are no chirality outliers.

There are no planarity outliers.

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	1710	1653	1649	10±3
2	B	1351	1349	1347	6±1
All	All	30610	30020	29960	152

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 3.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:141:LEU:HD11	1:A:183:VAL:HG13	0.63	1.70	7	4
1:A:146:GLN:O	1:A:179:TYR:HA	0.62	1.94	9	10
1:A:108:GLU:N	1:A:109:PRO:HD2	0.59	2.12	4	1
2:B:54:PRO:HD3	2:B:105:VAL:HG13	0.55	1.78	10	3
1:A:50:GLU:HB3	2:B:33:ARG:CZ	0.53	2.32	5	2
1:A:29:LEU:HG	1:A:93:PHE:CZ	0.53	2.39	7	3
1:A:108:GLU:H	1:A:109:PRO:CD	0.51	2.19	5	6
1:A:109:PRO:N	1:A:110:PRO:HD2	0.51	2.20	6	1
1:A:144:GLU:O	1:A:181:VAL:HA	0.51	2.06	7	7
1:A:154:HIS:O	1:A:156:PRO:HD3	0.50	2.06	7	3
2:B:109:PRO:O	2:B:112:LYS:HG2	0.50	2.07	9	6
1:A:124:MET:SD	1:A:165:ASN:HB2	0.50	2.47	4	3
1:A:108:GLU:H	1:A:109:PRO:HD2	0.49	1.67	5	4
2:B:108:THR:HG22	2:B:109:PRO:HD2	0.49	1.83	7	1
2:B:84:PHE:O	2:B:88:LEU:HG	0.49	2.08	6	7
1:A:49:PRO:HG3	2:B:26:LEU:O	0.49	2.07	5	1
1:A:184:TYR:CE1	1:A:193:VAL:HG12	0.49	2.43	6	2
1:A:18:LEU:HD23	1:A:107:PHE:CE2	0.48	2.43	4	2
1:A:45:ILE:HB	1:A:77:GLU:OE2	0.48	2.09	7	4
2:B:53:ILE:N	2:B:54:PRO:HD2	0.48	2.24	1	9
1:A:146:GLN:HA	1:A:150:ILE:O	0.47	2.09	5	6
2:B:154:SER:O	2:B:157:LEU:HB2	0.47	2.10	10	2
2:B:30:LEU:O	2:B:33:ARG:HD3	0.47	2.08	8	1
2:B:54:PRO:HD3	2:B:105:VAL:CG1	0.47	2.40	8	4
1:A:112:PHE:O	1:A:199:LYS:HE3	0.47	2.10	2	1
1:A:20:ASN:O	1:A:22:ARG:HG3	0.47	2.09	6	2
2:B:38:PHE:CD1	2:B:39:PRO:HD2	0.46	2.45	8	3
2:B:113:GLU:O	2:B:117:LEU:HG	0.46	2.09	4	1
1:A:147:SER:HA	1:A:178:ASN:O	0.46	2.11	2	2
1:A:179:TYR:CE1	1:A:201:THR:HB	0.46	2.45	2	1
1:A:123:VAL:O	1:A:167:THR:HA	0.45	2.11	2	2
2:B:22:ARG:HD3	2:B:24:ILE:O	0.45	2.10	6	1
2:B:73:SER:HA	2:B:81:LEU:CD1	0.45	2.42	6	2
1:A:56:LYS:O	1:A:57:ASN:HB3	0.45	2.11	1	1
2:B:99:VAL:HG22	2:B:105:VAL:HG11	0.45	1.89	6	1
1:A:31:ASN:OD1	1:A:35:VAL:HG13	0.45	2.12	2	1
1:A:138:ASP:OD1	2:B:162:ARG:HD3	0.45	2.11	7	1
1:A:179:TYR:O	1:A:200:CYS:HA	0.44	2.13	3	3
1:A:55:VAL:HG11	1:A:68:LEU:HD23	0.44	1.89	6	1
1:A:161:ASN:HB3	1:A:166:PHE:CE2	0.43	2.48	8	1
1:A:161:ASN:HB3	1:A:166:PHE:CD1	0.43	2.47	7	1
1:A:127:PHE:HB2	1:A:164:GLY:O	0.43	2.14	4	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:68:LEU:CB	1:A:71:GLU:HB2	0.43	2.44	1	1
2:B:127:THR:O	2:B:131:LYS:HG3	0.43	2.14	1	1
2:B:22:ARG:HD3	2:B:144:ARG:CZ	0.43	2.44	1	1
1:A:112:PHE:HB3	1:A:125:VAL:HG13	0.43	1.91	2	1
1:A:48:LYS:HE3	2:B:35:ASP:OD1	0.43	2.13	1	1
1:A:50:GLU:HB2	2:B:30:LEU:O	0.42	2.14	7	2
1:A:179:TYR:CZ	1:A:201:THR:HB	0.42	2.49	5	3
2:B:122:TYR:OH	2:B:146:GLU:HB3	0.42	2.14	4	2
1:A:114:ILE:HD13	1:A:181:VAL:HB	0.42	1.92	10	2
2:B:41:GLU:O	2:B:45:ASN:HB2	0.42	2.15	2	1
1:A:55:VAL:HG11	1:A:66:CYS:SG	0.42	2.54	8	1
2:B:73:SER:HA	2:B:81:LEU:HD13	0.42	1.91	8	2
2:B:145:ALA:O	2:B:149:ARG:HB2	0.42	2.15	9	1
1:A:117:PHE:O	1:A:203:LEU:HB2	0.42	2.15	9	2
1:A:70:ASP:OD1	1:A:73:ARG:HD3	0.42	2.15	6	1
1:A:85:GLY:HA3	1:A:93:PHE:CZ	0.41	2.49	9	1
1:A:141:LEU:O	1:A:156:PRO:HD2	0.41	2.14	2	1
1:A:8:THR:O	1:A:32:HIS:HB2	0.41	2.14	5	1
1:A:48:LYS:HE2	2:B:35:ASP:OD1	0.41	2.16	7	1
1:A:28:GLU:C	1:A:29:LEU:HD13	0.41	2.40	1	1
1:A:19:ARG:O	1:A:22:ARG:HB2	0.41	2.15	2	1
2:B:143:VAL:O	2:B:147:ILE:HG12	0.41	2.16	9	1
1:A:125:VAL:HB	1:A:166:PHE:HB3	0.41	1.91	10	1
1:A:117:PHE:HB2	1:A:120:HIS:O	0.41	2.16	10	1
1:A:108:GLU:N	1:A:109:PRO:CD	0.40	2.84	1	1
2:B:138:CYS:O	2:B:142:VAL:HG23	0.40	2.17	5	1
1:A:179:TYR:CE2	1:A:201:THR:HB	0.40	2.51	4	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	210/212 (99%)	180±3 (85±1%)	28±3 (13±1%)	3±1 (1±1%)	12	60
2	B	163/165 (99%)	145±2 (89±1%)	16±2 (10±1%)	1±1 (1±0%)	16	66

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	3730/3770 (99%)	3248 (87%)	441 (12%)	41 (1%)	14 63

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)
1	A	108	GLU	9
2	B	109	PRO	9
1	A	3	ASP	7
1	A	204	PRO	6
2	B	31	LYS	3
1	A	159	LYS	1
1	A	158	ILE	1
2	B	162	ARG	1
2	B	24	ILE	1
1	A	104	ASP	1
1	A	103	ILE	1
1	A	106	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	201/201 (100%)	166±6 (83±3%)	35±6 (17±3%)	4 37
2	B	152/152 (100%)	133±2 (87±2%)	19±2 (13±2%)	6 47
All	All	3530/3530 (100%)	2986 (85%)	544 (15%)	5 41

All 141 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	11	SER	10
1	A	29	LEU	10
1	A	41	LEU	10
1	A	62	THR	10
1	A	177	THR	10

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Mol	Chain	Res	Type	Models (Total)
2	B	11	SER	10
2	B	14	THR	10
2	B	108	THR	10
1	A	8	THR	9
1	A	77	GLU	9
1	A	126	LYS	9
1	A	140	SER	9
1	A	180	CYS	9
2	B	87	GLU	9
2	B	106	THR	9
2	B	141	GLU	9
1	A	64	SER	8
1	A	114	ILE	8
1	A	148	GLU	8
1	A	196	SER	8
2	B	42	GLU	8
2	B	115	SER	8
2	B	155	THR	8
2	B	157	LEU	8
1	A	141	LEU	7
1	A	182	SER	7
1	A	186	GLU	7
1	A	209	SER	7
2	B	58	GLU	7
2	B	149	ARG	7
1	A	200	CYS	7
1	A	1	SER	6
1	A	4	SER	6
1	A	25	LEU	6
1	A	48	LYS	6
1	A	68	LEU	6
1	A	185	LEU	6
2	B	40	GLN	6
2	B	43	PHE	6
1	A	75	THR	6
1	A	118	THR	6
1	A	13	THR	5
1	A	129	SER	5
1	A	163	SER	5
2	B	165	GLU	5
1	A	139	LEU	5
2	B	114	ASP	5

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Mol	Chain	Res	Type	Models (Total)
2	B	151	PHE	5
1	A	67	ASP	5
1	A	81	THR	5
1	A	87	SER	5
1	A	146	GLN	5
1	A	23	SER	4
1	A	103	ILE	4
2	B	6	THR	4
2	B	89	TYR	4
1	A	71	GLU	4
2	B	52	THR	4
2	B	79	THR	4
1	A	26	SER	4
1	A	51	ASP	4
1	A	32	HIS	3
1	A	55	VAL	3
1	A	70	ASP	3
1	A	193	VAL	3
2	B	133	LYS	3
1	A	33	SER	3
1	A	165	ASN	3
2	B	15	LEU	3
2	B	31	LYS	3
2	B	32	ASP	3
1	A	91	THR	3
2	B	163	SER	3
1	A	212	SER	3
1	A	37	THR	2
1	A	107	PHE	2
1	A	137	PHE	2
1	A	159	LYS	2
1	A	207	GLN	2
2	B	127	THR	2
1	A	42	LEU	2
1	A	97	HIS	2
1	A	101	LEU	2
1	A	119	ASN	2
1	A	188	SER	2
2	B	3	LEU	2
2	B	51	GLU	2
1	A	147	SER	2
1	A	155	LYS	2

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Mol	Chain	Res	Type	Models (Total)
2	B	23	LYS	2
1	A	96	SER	2
2	B	91	GLN	2
1	A	136	GLN	2
2	B	2	ASP	2
2	B	35	ASP	2
2	B	158	GLN	2
2	B	77	ASP	1
1	A	74	SER	1
1	A	132	GLU	1
1	A	151	VAL	1
1	A	6	ASP	1
1	A	90	THR	1
2	B	25	SER	1
2	B	152	SER	1
2	B	162	ARG	1
1	A	15	LYS	1
1	A	144	GLU	1
1	A	152	LYS	1
2	B	33	ARG	1
2	B	71	ASP	1
1	A	47	SER	1
1	A	69	THR	1
1	A	208	GLU	1
2	B	24	ILE	1
2	B	28	SER	1
2	B	101	GLN	1
1	A	9	ASP	1
1	A	18	LEU	1
1	A	80	VAL	1
1	A	143	ILE	1
1	A	145	GLU	1
2	B	69	THR	1
2	B	72	SER	1
2	B	94	ASP	1
1	A	173	LEU	1
1	A	3	ASP	1
1	A	53	LYS	1
1	A	98	ASN	1
1	A	99	PHE	1
1	A	161	ASN	1
1	A	210	GLU	1

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Mol	Chain	Res	Type	Models (Total)
2	B	8	SER	1
2	B	83	LYS	1
1	A	10	GLU	1
1	A	39	TYR	1
2	B	34	HIS	1
2	B	124	GLN	1
1	A	31	ASN	1
1	A	50	GLU	1
1	A	178	ASN	1
1	A	203	LEU	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