



Full wwPDB NMR Structure Validation Report ⓘ

Mar 7, 2026 – 03:19 AM UTC

PDB ID : 2K2Q / pdb_00002k2q
Title : complex structure of the external thioesterase of the Surfactin-synthetase with a carrier domain
Authors : Koglin, A.; Lohr, F.; Bernhard, F.; Rogov, V.V.; Frueh, D.P.; Strieter, E.R.; Mofid, M.R.; Guntert, P.; Wagner, G.; Walsh, C.T.; Marahiel, M.A.; Dotsch, V.
Deposited on : 2008-04-10

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 ⓘ 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

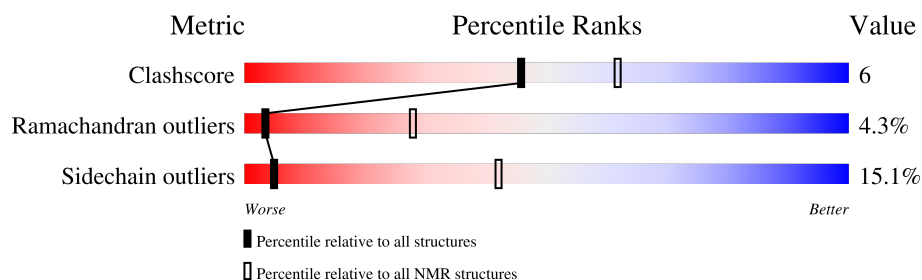
1 Overall quality at a glance

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	82	
2	B	242	

2 Ensemble composition and analysis

This entry contains 18 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 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:1-A:82, B:1-B:242 (324)	1.88	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 3 clusters. No single-model clusters were found.

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

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5125 atoms, of which 2548 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Tyrocidine synthetase 3 (Tyrocidine synthetase III).

Mol	Chain	Residues	Atoms						Trace
1	A	82	Total	C	H	N	O	S	0
			1272	407	644	105	114	2	

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	expression tag	UNP O30409
A	2	GLY	-	expression tag	UNP O30409

- Molecule 2 is a protein called Surfactin synthetase thioesterase subunit.

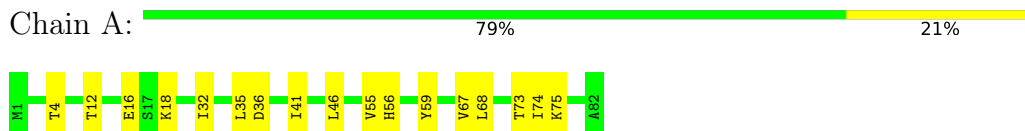
Mol	Chain	Residues	Atoms						Trace
2	B	242	Total	C	H	N	O	S	0
			3853	1253	1904	329	357	10	

4 Residue-property plots [i](#)

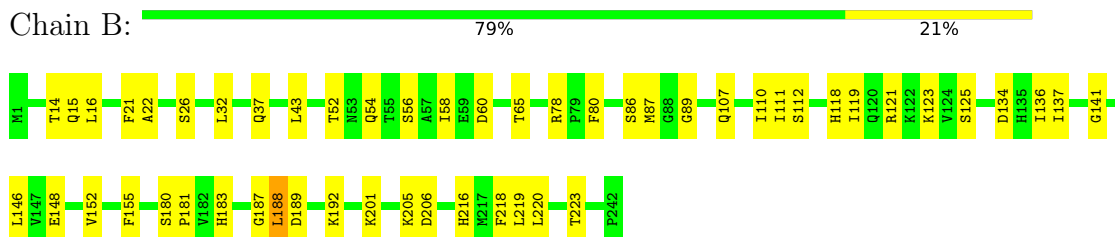
4.1 Average score per residue in the NMR ensemble

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: Tyrocidine synthetase 3 (Tyrocidine synthetase III)



- Molecule 2: Surfactin synthetase thioesterase subunit

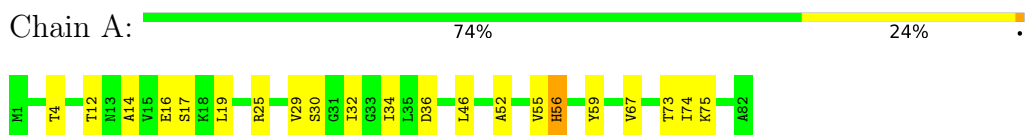


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

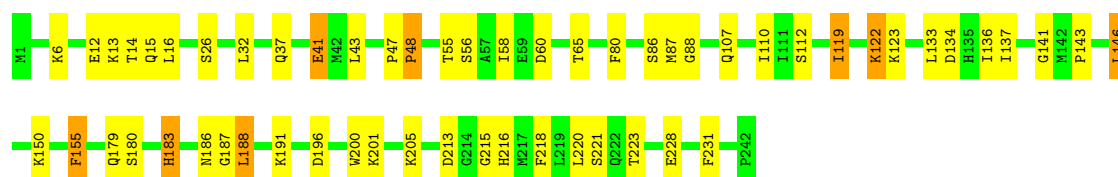
4.2.1 Score per residue for model 1

- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)



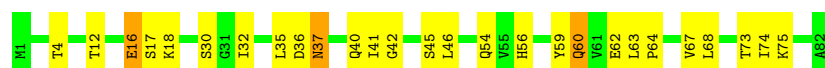
- Molecule 2: Surfactin synthetase thioesterase subunit



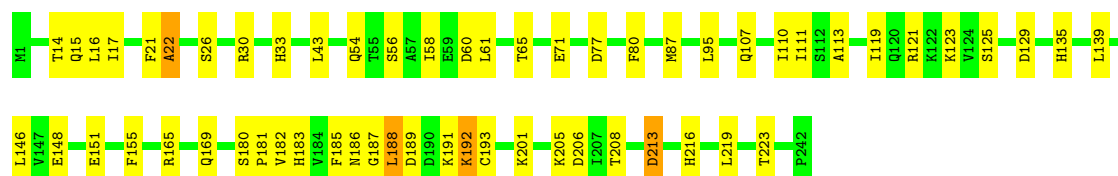


4.2.2 Score per residue for model 2

- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

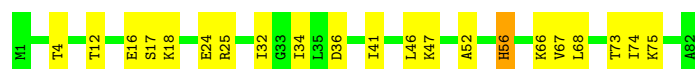


- Molecule 2: Surfactin synthetase thioesterase subunit

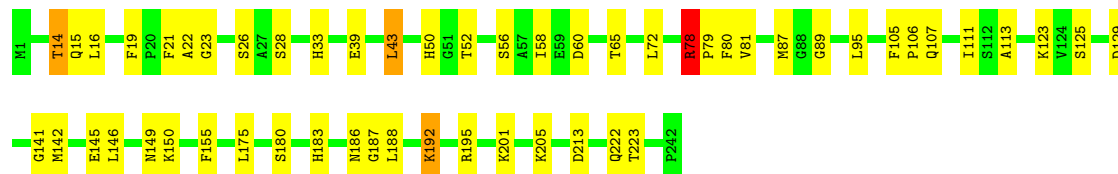
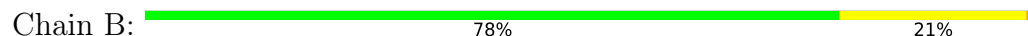


4.2.3 Score per residue for model 3

- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)



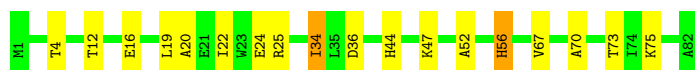
- Molecule 2: Surfactin synthetase thioesterase subunit



4.2.4 Score per residue for model 4

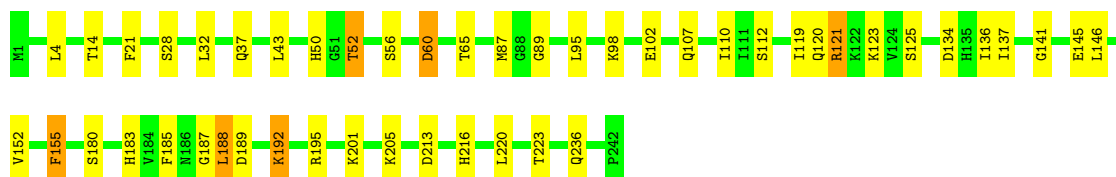
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  78% 20% .



- Molecule 2: Surfactin synthetase thioesterase subunit

Chain B:  80% 17% .



4.2.5 Score per residue for model 5

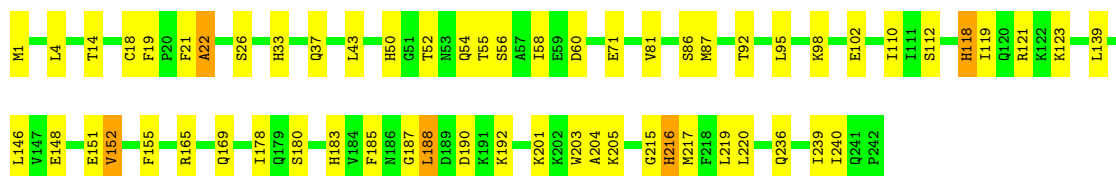
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  80% 16% .



- Molecule 2: Surfactin synthetase thioesterase subunit

Chain B:  75% 23% .



4.2.6 Score per residue for model 6

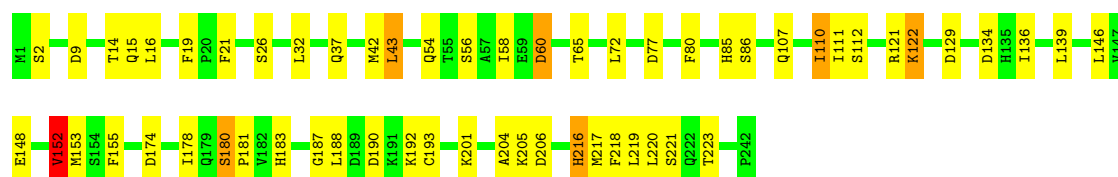
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  70% 29% .



- Molecule 2: Surfactin synthetase thioesterase subunit

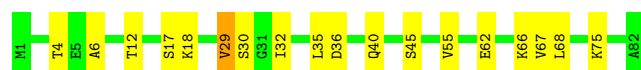
Chain B:  76% 21% .



4.2.7 Score per residue for model 7

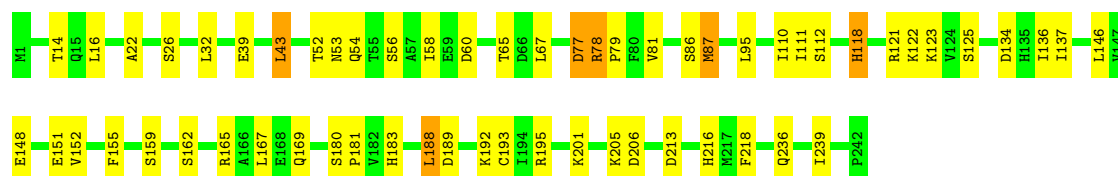
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A: 78% 21% .



- Molecule 2: Surfactin synthetase thioesterase subunit

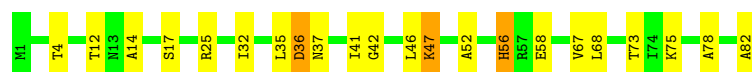
Chain B: 76% 22% .



4.2.8 Score per residue for model 8

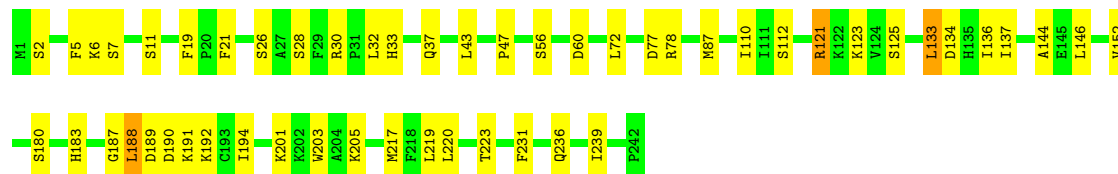
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A: 73% 23% .



- Molecule 2: Surfactin synthetase thioesterase subunit

Chain B: 79% 20% .



4.2.9 Score per residue for model 9 (medoid)

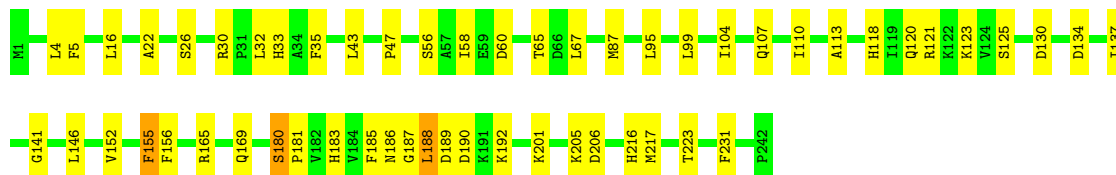
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  83% 15% .



- Molecule 2: Surfactin synthetase thioesterase subunit

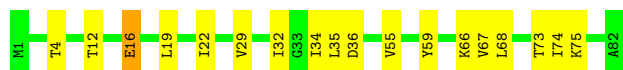
Chain B:  77% 21% .



4.2.10 Score per residue for model 10

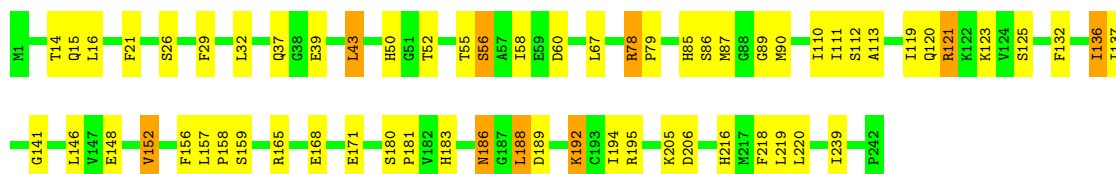
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  78% 21% .



- Molecule 2: Surfactin synthetase thioesterase subunit

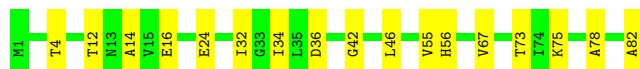
Chain B:  74% 22% .



4.2.11 Score per residue for model 11

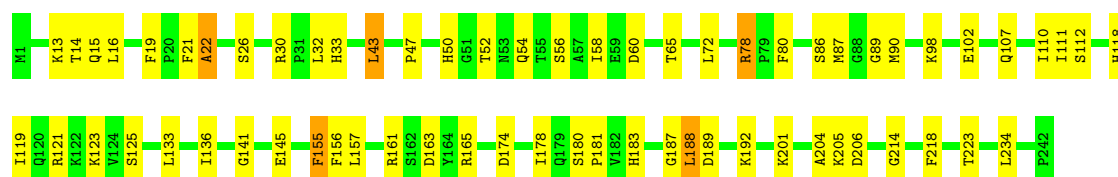
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  79% 21% .



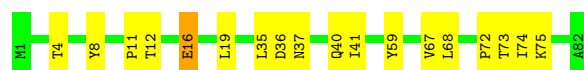
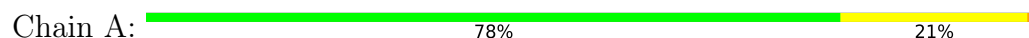
- Molecule 2: Surfactin synthetase thioesterase subunit

Chain B:  73% 25% .

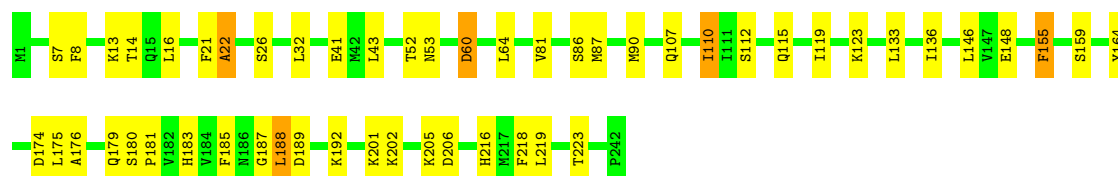
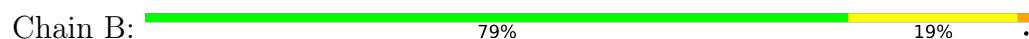


4.2.12 Score per residue for model 12

- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

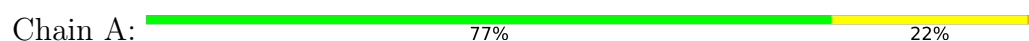


- Molecule 2: Surfactin synthetase thioesterase subunit

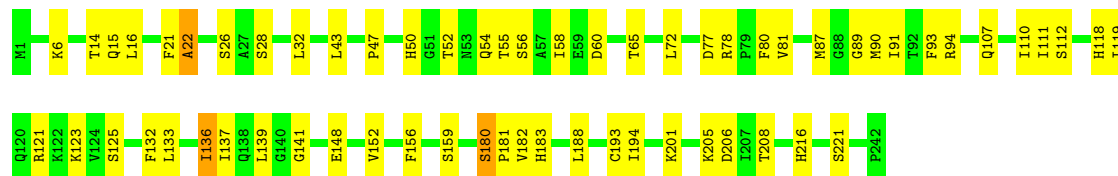


4.2.13 Score per residue for model 13

- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)



- Molecule 2: Surfactin synthetase thioesterase subunit



4.2.14 Score per residue for model 14

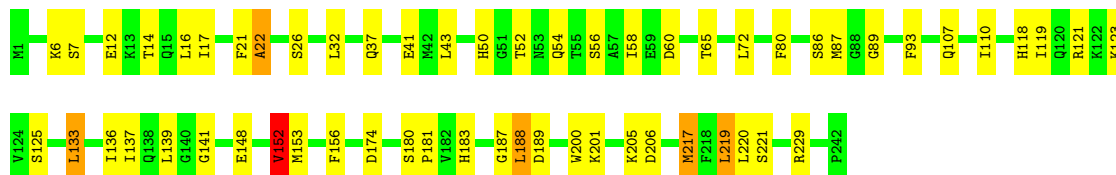
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  83% 17%



- Molecule 2: Surfactin synthetase thioesterase subunit

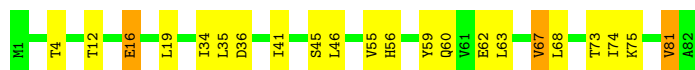
Chain B:  76% 21%



4.2.15 Score per residue for model 15

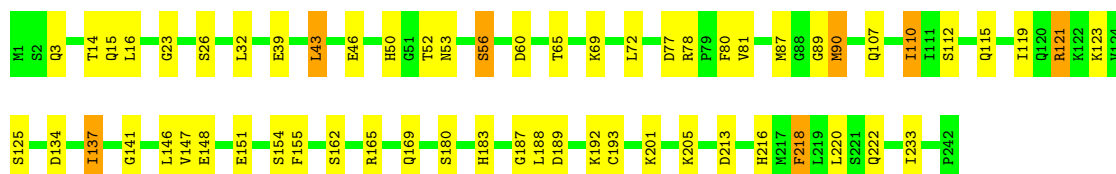
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  73% 23%



- Molecule 2: Surfactin synthetase thioesterase subunit

Chain B:  75% 22%



4.2.16 Score per residue for model 16

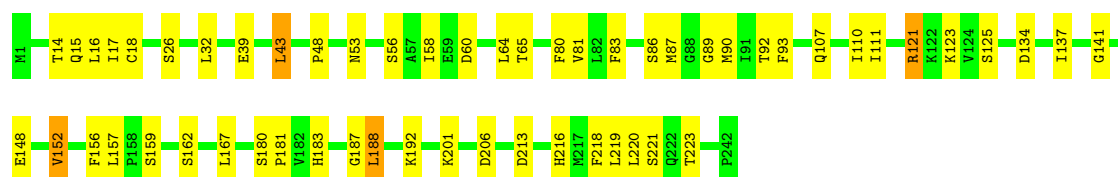
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A:  77% 22%



- Molecule 2: Surfactin synthetase thioesterase subunit

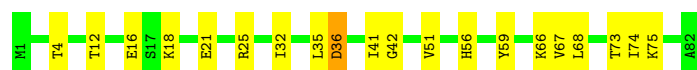
Chain B:  77% 21%



4.2.17 Score per residue for model 17

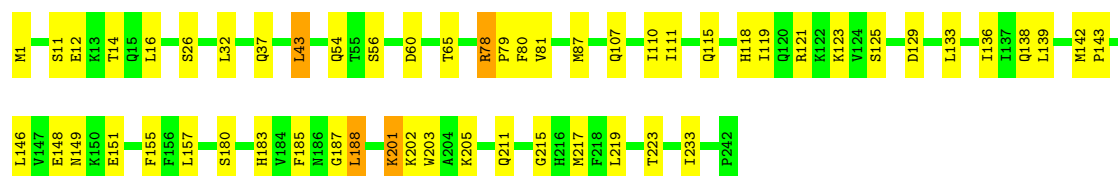
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A: 76% 23% .



- Molecule 2: Surfactin synthetase thioesterase subunit

Chain B: 77% 21% .



4.2.18 Score per residue for model 18

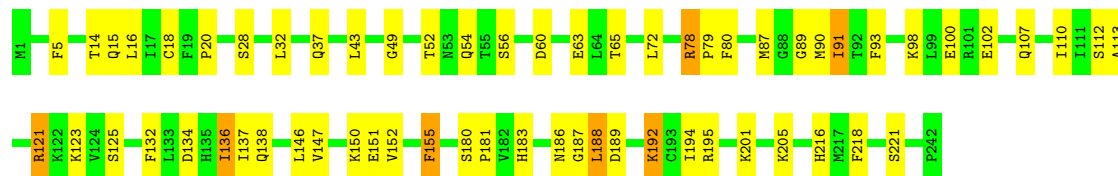
- Molecule 1: Tyrocidine synthetase 3 (Tyrocidine synthetase III)

Chain A: 71% 27% ..



- Molecule 2: Surfactin synthetase thioesterase subunit

Chain B: 74% 23% .



5 Refinement protocol and experimental data overview ⓘ

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

Of the 200 calculated structures, 18 were deposited, based on the following criterion: ?.

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

Software name	Classification	Version
CNS	structure solution	1.2
CNS	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	0.36±0.01	0±0/640 (0.0± 0.0%)	0.68±0.02	0±0/868 (0.0± 0.0%)
2	B	0.37±0.00	0±0/2001 (0.0± 0.0%)	0.66±0.01	0±1/2702 (0.0± 0.0%)
All	All	0.37	0/47538 (0.0%)	0.67	5/64260 (0.0%)

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	34	ILE	N-CA-C	5.21	111.78	106.21	3	1
2	B	115	GLN	CA-C-N	5.04	123.34	119.66	12	2
2	B	115	GLN	C-N-CA	5.04	123.34	119.66	12	2

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	628	644	644	10±7
2	B	1949	1904	1904	23±8
All	All	46386	45884	45864	574

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 6.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:16:GLU:CD	1:A:74:ILE:CD1	1.55	1.79	2	3
1:A:16:GLU:CD	1:A:74:ILE:HD12	1.44	0.98	2	4
1:A:45:SER:C	1:A:46:LEU:HD12	1.41	1.36	2	2
2:B:16:LEU:HD22	2:B:80:PHE:CZ	1.40	1.49	6	10
1:A:16:GLU:OE2	1:A:74:ILE:HB	1.35	1.17	17	1
1:A:16:GLU:OE1	1:A:74:ILE:CD1	1.32	1.77	2	4
1:A:45:SER:O	1:A:46:LEU:HD12	1.31	1.20	15	2
1:A:16:GLU:CD	1:A:74:ILE:HD13	1.31	1.49	16	4
2:B:21:PHE:CE2	2:B:85:HIS:CE1	1.27	2.22	6	1
1:A:16:GLU:OE2	1:A:74:ILE:HD12	1.26	1.12	18	2
1:A:16:GLU:OE2	1:A:74:ILE:CB	1.25	1.83	17	1
1:A:16:GLU:OE2	1:A:34:ILE:CD1	1.25	1.83	4	2
1:A:16:GLU:CD	1:A:74:ILE:HB	1.25	1.57	17	2
1:A:16:GLU:OE1	1:A:74:ILE:HD13	1.20	1.27	2	2
2:B:21:PHE:CE2	2:B:85:HIS:NE2	1.17	2.11	6	1
2:B:21:PHE:HE2	2:B:85:HIS:NE2	1.16	1.35	6	1
1:A:16:GLU:OE2	1:A:74:ILE:CD1	1.13	1.97	18	4
1:A:45:SER:O	1:A:46:LEU:CD1	1.12	1.97	2	2
1:A:16:GLU:CG	1:A:74:ILE:HB	1.08	1.77	2	3
2:B:16:LEU:CD2	2:B:80:PHE:HZ	1.08	1.61	13	4
1:A:16:GLU:OE2	1:A:74:ILE:HD13	1.07	1.47	17	2
2:B:14:THR:HG22	2:B:16:LEU:CD1	1.07	1.77	16	9
1:A:45:SER:C	1:A:46:LEU:CD1	1.07	2.26	2	2
1:A:16:GLU:CG	1:A:74:ILE:HD13	1.06	1.80	10	4
2:B:14:THR:HG22	2:B:16:LEU:HD11	1.06	1.23	16	10
2:B:14:THR:CG2	2:B:16:LEU:HD11	1.06	1.81	16	8
1:A:16:GLU:OE2	1:A:74:ILE:CG1	1.04	2.06	17	2
1:A:16:GLU:HG2	1:A:74:ILE:HB	1.03	1.27	16	6
1:A:16:GLU:HG2	1:A:74:ILE:CB	1.02	1.83	2	3
1:A:16:GLU:OE2	1:A:34:ILE:HD12	1.02	1.44	4	2
2:B:16:LEU:CD2	2:B:80:PHE:CZ	1.02	2.42	6	5
2:B:16:LEU:HD13	2:B:80:PHE:CE1	1.01	1.90	6	5
2:B:16:LEU:HD22	2:B:80:PHE:CE1	0.99	1.93	3	9
2:B:16:LEU:HG	2:B:43:LEU:HD21	0.98	1.31	3	8
1:A:16:GLU:OE2	1:A:34:ILE:HD11	0.98	1.58	4	4
2:B:21:PHE:CD2	2:B:22:ALA:N	0.94	2.35	13	7
1:A:16:GLU:OE1	1:A:74:ILE:HD11	0.94	1.63	6	1
2:B:16:LEU:CD1	2:B:80:PHE:CE1	0.93	2.51	6	4
2:B:16:LEU:HD22	2:B:80:PHE:HZ	0.92	1.24	11	7
2:B:16:LEU:CG	2:B:43:LEU:HD21	0.92	1.93	3	6
1:A:16:GLU:CG	1:A:74:ILE:HD12	0.90	1.97	2	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:16:LEU:HG	2:B:43:LEU:CD2	0.88	1.98	18	6
1:A:16:GLU:OE1	1:A:74:ILE:CG2	0.85	2.23	3	1
1:A:46:LEU:C	1:A:46:LEU:HD13	0.84	1.96	11	2
2:B:21:PHE:HE2	2:B:85:HIS:HE2	0.84	0.96	6	1
2:B:16:LEU:CD1	2:B:43:LEU:HD21	0.84	2.03	15	8
2:B:16:LEU:CD2	2:B:80:PHE:CE1	0.83	2.60	6	6
1:A:16:GLU:OE1	1:A:19:LEU:CB	0.83	2.27	15	3
1:A:16:GLU:CG	1:A:74:ILE:CD1	0.81	2.57	16	5
1:A:16:GLU:OE1	1:A:19:LEU:HD22	0.81	1.74	4	2
2:B:16:LEU:HG	2:B:43:LEU:HD23	0.81	1.53	13	4
2:B:16:LEU:CD1	2:B:43:LEU:HD23	0.78	2.08	14	4
2:B:16:LEU:CD1	2:B:80:PHE:HE1	0.78	1.87	6	2
2:B:21:PHE:CE2	2:B:85:HIS:HE1	0.77	1.90	6	1
1:A:16:GLU:OE1	1:A:19:LEU:HB3	0.76	1.79	15	2
1:A:16:GLU:OE1	1:A:74:ILE:HD12	0.76	1.79	1	2
2:B:21:PHE:CG	2:B:22:ALA:N	0.76	2.52	2	7
1:A:16:GLU:OE1	1:A:74:ILE:HG21	0.73	1.83	3	1
1:A:16:GLU:HG3	1:A:74:ILE:CD1	0.73	2.14	16	3
1:A:16:GLU:OE1	1:A:19:LEU:HD12	0.73	1.83	14	1
1:A:16:GLU:OE1	1:A:19:LEU:HB2	0.72	1.83	10	2
1:A:16:GLU:CD	1:A:74:ILE:CB	0.71	2.47	17	2
1:A:46:LEU:C	1:A:46:LEU:CD1	0.71	2.64	11	2
2:B:21:PHE:CD2	2:B:85:HIS:CE1	0.69	2.80	6	1
2:B:21:PHE:HE2	2:B:85:HIS:CE1	0.69	1.74	6	1
1:A:16:GLU:HG3	1:A:74:ILE:HD13	0.68	1.66	10	2
2:B:15:GLN:C	2:B:16:LEU:HD12	0.68	2.14	18	10
2:B:16:LEU:CG	2:B:43:LEU:HD23	0.68	2.18	14	4
2:B:16:LEU:N	2:B:16:LEU:HD12	0.67	2.05	6	12
1:A:63:LEU:HD12	1:A:63:LEU:N	0.67	2.05	15	2
2:B:16:LEU:HD12	2:B:16:LEU:N	0.67	2.05	18	1
2:B:16:LEU:HG	2:B:43:LEU:HD11	0.67	1.67	2	2
1:A:46:LEU:N	1:A:46:LEU:HD12	0.67	2.05	18	2
2:B:16:LEU:HD22	2:B:80:PHE:HE1	0.66	1.50	14	2
2:B:4:LEU:HD21	2:B:60:ASP:HB3	0.66	1.68	4	1
2:B:6:LYS:HB3	2:B:43:LEU:HD13	0.66	1.68	8	4
2:B:21:PHE:CD2	2:B:85:HIS:NE2	0.65	2.64	6	1
1:A:55:VAL:HG13	2:B:218:PHE:CD1	0.65	2.27	1	1
1:A:46:LEU:HD12	1:A:46:LEU:N	0.64	2.05	15	1
2:B:16:LEU:HD22	2:B:80:PHE:CE2	0.64	2.25	11	1
1:A:16:GLU:OE1	1:A:74:ILE:CG1	0.64	2.45	6	1
2:B:16:LEU:CD2	2:B:80:PHE:HE1	0.62	2.05	3	3

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:14:ALA:HB2	2:B:47:PRO:HB3	0.62	1.69	1	3
2:B:16:LEU:CD2	2:B:80:PHE:CE2	0.61	2.83	11	1
2:B:21:PHE:CD2	2:B:22:ALA:O	0.60	2.54	3	1
1:A:16:GLU:CG	1:A:74:ILE:CB	0.60	2.61	2	2
2:B:187:GLY:O	2:B:188:LEU:HG	0.60	1.97	11	6
1:A:16:GLU:O	1:A:16:GLU:OE1	0.60	2.20	13	2
2:B:14:THR:CG2	2:B:16:LEU:CD1	0.59	2.59	16	1
1:A:14:ALA:CB	2:B:47:PRO:HB3	0.59	2.27	1	1
2:B:21:PHE:CE2	2:B:22:ALA:HB3	0.59	2.33	5	5
1:A:78:ALA:HA	1:A:82:ALA:HB3	0.59	1.74	8	2
2:B:16:LEU:CD1	2:B:43:LEU:CD2	0.59	2.79	3	3
1:A:15:VAL:HG21	2:B:21:PHE:HZ	0.59	1.58	6	1
1:A:16:GLU:OE1	1:A:16:GLU:O	0.58	2.21	12	4
2:B:16:LEU:CD1	2:B:16:LEU:N	0.58	2.67	15	12
1:A:46:LEU:N	1:A:46:LEU:CD1	0.58	2.67	3	2
2:B:110:ILE:O	2:B:183:HIS:HA	0.57	1.98	15	17
1:A:63:LEU:N	1:A:63:LEU:CD1	0.57	2.67	15	2
2:B:16:LEU:CG	2:B:43:LEU:CD2	0.56	2.82	14	3
2:B:16:LEU:N	2:B:16:LEU:CD1	0.56	2.67	17	1
2:B:133:LEU:HA	2:B:136:ILE:HG22	0.56	1.76	8	4
1:A:55:VAL:HA	2:B:218:PHE:CE1	0.56	2.35	7	2
2:B:217:MET:SD	2:B:219:LEU:HB2	0.56	2.41	14	1
1:A:24:GLU:HA	1:A:24:GLU:OE1	0.56	2.01	3	1
1:A:46:LEU:CD1	1:A:46:LEU:O	0.55	2.54	11	1
2:B:17:ILE:HG22	2:B:83:PHE:HB2	0.55	1.79	16	1
2:B:16:LEU:HD12	2:B:43:LEU:HD21	0.55	1.78	2	2
1:A:24:GLU:OE1	1:A:32:ILE:HG12	0.55	2.02	11	2
2:B:16:LEU:HG	2:B:43:LEU:CD1	0.54	2.32	2	1
1:A:55:VAL:HA	2:B:218:PHE:CE2	0.54	2.38	10	1
1:A:40:GLN:NE2	1:A:72:PRO:HA	0.54	2.17	12	1
1:A:55:VAL:HG22	2:B:218:PHE:CZ	0.54	2.37	7	1
2:B:90:MET:HA	2:B:154:SER:O	0.54	2.03	15	1
2:B:187:GLY:C	2:B:188:LEU:HG	0.54	2.28	1	11
1:A:16:GLU:CD	1:A:16:GLU:O	0.54	2.51	10	3
1:A:16:GLU:OE1	1:A:74:ILE:HG13	0.53	2.03	6	1
2:B:132:PHE:O	2:B:136:ILE:HB	0.53	2.04	13	3
1:A:17:SER:O	1:A:21:GLU:HG2	0.53	2.02	6	1
2:B:16:LEU:HD11	2:B:43:LEU:HD23	0.53	1.80	14	1
2:B:3:GLN:HB2	2:B:46:GLU:HB2	0.53	1.81	15	1
2:B:217:MET:SD	2:B:219:LEU:HG	0.53	2.43	17	1
1:A:46:LEU:CD1	1:A:46:LEU:N	0.53	2.67	15	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:121:ARG:HA	2:B:134:ASP:OD2	0.53	2.03	8	5
2:B:137:ILE:HD11	2:B:144:ALA:HB3	0.53	1.80	8	1
2:B:60:ASP:O	2:B:64:LEU:HG	0.53	2.04	16	2
2:B:119:ILE:HD12	2:B:134:ASP:HA	0.52	1.81	4	1
1:A:16:GLU:HG2	1:A:74:ILE:HD13	0.52	1.77	10	1
2:B:5:PHE:O	2:B:43:LEU:HA	0.52	2.04	9	3
1:A:51:VAL:O	1:A:55:VAL:HG23	0.52	2.04	16	1
1:A:20:ALA:O	1:A:24:GLU:HB3	0.52	2.05	4	1
2:B:21:PHE:CE2	2:B:22:ALA:O	0.51	2.63	3	1
1:A:16:GLU:OE1	1:A:19:LEU:HD11	0.51	2.06	1	1
2:B:122:LYS:HG3	2:B:134:ASP:OD1	0.51	2.05	1	2
2:B:192:LYS:O	2:B:195:ARG:HG3	0.50	2.04	10	4
1:A:62:GLU:C	1:A:63:LEU:HD12	0.50	2.30	15	2
2:B:16:LEU:HD11	2:B:80:PHE:HE1	0.50	1.65	6	1
2:B:190:ASP:HA	2:B:216:HIS:CB	0.50	2.37	5	1
2:B:107:GLN:OE1	2:B:107:GLN:HA	0.50	2.07	11	1
2:B:165:ARG:O	2:B:169:GLN:HG2	0.50	2.07	7	5
1:A:17:SER:OG	2:B:48:PRO:HD2	0.49	2.07	1	1
2:B:176:ALA:HA	2:B:202:LYS:O	0.49	2.08	12	1
1:A:25:ARG:NH2	2:B:1:MET:SD	0.49	2.86	17	1
2:B:196:ASP:O	2:B:200:TRP:HB2	0.49	2.08	1	1
2:B:90:MET:O	2:B:94:ARG:HB2	0.49	2.07	13	1
2:B:178:ILE:O	2:B:204:ALA:HB1	0.49	2.08	5	3
2:B:98:LYS:O	2:B:102:GLU:HG2	0.49	2.08	4	4
1:A:16:GLU:O	1:A:16:GLU:CD	0.49	2.55	13	1
1:A:52:ALA:O	1:A:56:HIS:HB2	0.48	2.08	1	5
2:B:16:LEU:HD11	2:B:43:LEU:HD21	0.48	1.84	2	2
2:B:16:LEU:HD21	2:B:60:ASP:OD2	0.48	2.08	6	1
1:A:18:LYS:O	1:A:21:GLU:HG2	0.48	2.08	17	1
1:A:60:GLN:CD	1:A:64:PRO:HA	0.48	2.34	2	1
2:B:187:GLY:O	2:B:213:ASP:HA	0.48	2.08	3	3
2:B:147:VAL:O	2:B:151:GLU:HB2	0.48	2.09	18	1
2:B:181:PRO:HD2	2:B:206:ASP:OD1	0.48	2.09	10	6
2:B:85:HIS:HB3	2:B:87:MET:SD	0.48	2.49	10	1
1:A:55:VAL:HG11	2:B:216:HIS:O	0.47	2.10	9	1
1:A:18:LYS:HD2	2:B:18:CYS:SG	0.47	2.50	5	1
2:B:188:LEU:HD13	2:B:195:ARG:HG2	0.47	1.86	7	1
2:B:181:PRO:HD2	2:B:206:ASP:OD2	0.47	2.08	16	4
1:A:14:ALA:HA	2:B:47:PRO:HB3	0.47	1.86	11	2
1:A:32:ILE:HB	1:A:37:ASN:OD1	0.47	2.10	2	1
2:B:182:VAL:HG13	2:B:208:THR:HB	0.47	1.85	2	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:30:ARG:HA	2:B:33:HIS:CD2	0.46	2.46	2	4
2:B:18:CYS:SG	2:B:92:THR:HG21	0.46	2.50	16	1
1:A:22:ILE:HG23	2:B:91:ILE:HD13	0.46	1.86	18	1
1:A:55:VAL:HG11	2:B:218:PHE:HA	0.46	1.87	15	1
2:B:113:ALA:HA	2:B:186:ASN:O	0.46	2.09	3	5
2:B:146:LEU:O	2:B:150:LYS:HE2	0.46	2.11	1	1
1:A:60:GLN:OE1	1:A:67:VAL:HG11	0.46	2.10	9	3
2:B:16:LEU:CG	2:B:43:LEU:HD11	0.46	2.39	2	1
2:B:152:VAL:HG23	2:B:157:LEU:HD22	0.46	1.87	16	2
2:B:16:LEU:HD13	2:B:80:PHE:CZ	0.45	2.46	13	1
2:B:201:LYS:HG3	2:B:202:LYS:N	0.45	2.26	17	1
1:A:46:LEU:HD13	1:A:47:LYS:N	0.45	2.25	8	1
2:B:190:ASP:OD1	2:B:217:MET:HA	0.44	2.12	8	1
1:A:16:GLU:CD	1:A:19:LEU:HD12	0.44	2.37	1	1
2:B:118:HIS:CD2	2:B:151:GLU:HB3	0.44	2.48	7	1
1:A:34:ILE:HG23	1:A:40:GLN:HE22	0.44	1.72	6	1
2:B:122:LYS:HG2	2:B:134:ASP:OD1	0.44	2.12	7	1
1:A:16:GLU:OE1	1:A:19:LEU:CD1	0.44	2.65	1	1
2:B:152:VAL:HG13	2:B:153:MET:H	0.44	1.73	6	2
2:B:90:MET:HG2	2:B:91:ILE:HD12	0.44	1.89	13	1
2:B:13:LYS:O	2:B:41:GLU:HB3	0.44	2.12	12	2
2:B:161:ARG:O	2:B:165:ARG:HB2	0.44	2.13	11	1
1:A:16:GLU:CD	1:A:19:LEU:CD1	0.43	2.90	1	1
2:B:180:SER:HB2	2:B:181:PRO:HD3	0.43	1.90	9	3
2:B:21:PHE:CE2	2:B:22:ALA:CB	0.43	3.01	13	1
2:B:78:ARG:N	2:B:79:PRO:HD2	0.43	2.28	17	2
2:B:191:LYS:O	2:B:194:ILE:HG22	0.43	2.13	8	1
1:A:55:VAL:HG13	2:B:218:PHE:CZ	0.43	2.49	11	1
1:A:24:GLU:O	1:A:25:ARG:HD2	0.43	2.13	3	1
2:B:78:ARG:H	2:B:79:PRO:HD2	0.43	1.73	10	3
2:B:188:LEU:HD12	2:B:192:LYS:HA	0.43	1.88	2	1
2:B:179:GLN:CB	2:B:206:ASP:HA	0.43	2.43	12	1
2:B:165:ARG:HA	2:B:171:GLU:OE1	0.43	2.14	10	1
2:B:183:HIS:NE2	2:B:206:ASP:OD1	0.43	2.51	9	3
2:B:189:ASP:CG	2:B:216:HIS:HB2	0.43	2.39	12	2
1:A:35:LEU:O	1:A:36:ASP:HB3	0.42	2.14	18	3
2:B:8:PHE:HB3	2:B:41:GLU:CD	0.42	2.38	12	1
2:B:236:GLN:HA	2:B:239:ILE:O	0.42	2.14	7	3
2:B:158:PRO:HB3	2:B:188:LEU:CD2	0.42	2.44	10	1
1:A:16:GLU:HG2	1:A:74:ILE:HD12	0.42	1.91	13	1
2:B:65:THR:O	2:B:69:LYS:HB2	0.42	2.14	15	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:16:GLU:OE1	2:B:87:MET:HE1	0.42	2.15	17	1
2:B:147:VAL:O	2:B:151:GLU:HG3	0.42	2.15	15	1
2:B:157:LEU:H	2:B:157:LEU:HD23	0.42	1.73	11	2
1:A:55:VAL:CG1	2:B:216:HIS:O	0.42	2.68	1	1
1:A:55:VAL:O	2:B:221:SER:CB	0.42	2.68	1	1
1:A:6:ALA:HB1	1:A:35:LEU:HD12	0.42	1.91	7	1
2:B:120:GLN:O	2:B:121:ARG:C	0.42	2.63	10	1
2:B:183:HIS:NE2	2:B:206:ASP:OD2	0.41	2.53	2	4
1:A:46:LEU:C	2:B:143:PRO:HG2	0.41	2.40	1	1
2:B:148:GLU:HA	2:B:151:GLU:OE2	0.41	2.15	17	1
2:B:157:LEU:HD21	2:B:163:ASP:HB2	0.41	1.91	11	1
1:A:55:VAL:HG22	2:B:218:PHE:CE2	0.41	2.51	7	1
2:B:93:PHE:CE1	2:B:156:PHE:HB2	0.41	2.51	14	1
1:A:67:VAL:HG13	1:A:68:LEU:H	0.41	1.75	18	1
1:A:37:ASN:ND2	1:A:40:GLN:H	0.41	2.14	2	1
2:B:54:GLN:HA	2:B:54:GLN:OE1	0.41	2.15	18	1
2:B:100:GLU:HB3	2:B:107:GLN:NE2	0.41	2.31	18	1
1:A:51:VAL:HG22	2:B:143:PRO:HD2	0.41	1.92	17	1
2:B:118:HIS:NE2	2:B:151:GLU:HB3	0.41	2.31	5	1
2:B:138:GLN:O	2:B:139:LEU:HB2	0.41	2.16	17	1
2:B:1:MET:HG2	2:B:55:THR:OG1	0.41	2.16	5	1
2:B:95:LEU:O	2:B:99:LEU:HG	0.41	2.16	9	1
2:B:130:ASP:O	2:B:134:ASP:HB2	0.41	2.15	9	1
1:A:16:GLU:CG	1:A:74:ILE:CG1	0.40	3.00	2	1
2:B:78:ARG:CB	2:B:79:PRO:HD3	0.40	2.47	3	1
1:A:16:GLU:HG3	1:A:74:ILE:HD12	0.40	1.90	16	1
2:B:118:HIS:HE2	2:B:151:GLU:CD	0.40	2.23	17	1
2:B:148:GLU:HA	2:B:151:GLU:OE1	0.40	2.16	2	1
1:A:55:VAL:HG21	2:B:216:HIS:C	0.40	2.41	6	1
2:B:77:ASP:OD1	2:B:79:PRO:HD2	0.40	2.15	7	1
2:B:105:PHE:HB3	2:B:106:PRO:HD3	0.40	1.92	3	1
1:A:14:ALA:CA	2:B:47:PRO:HB3	0.40	2.47	1	1
1:A:16:GLU:OE1	1:A:19:LEU:CD2	0.40	2.59	4	1
2:B:136:ILE:O	2:B:138:GLN:HG2	0.40	2.17	18	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	80/82 (98%)	55±2 (69±3%)	19±3 (24±3%)	6±1 (7±2%)	2	16
2	B	240/242 (99%)	193±5 (81±2%)	39±5 (16±2%)	8±2 (3±1%)	5	35
All	All	5760/5832 (99%)	4471 (78%)	1044 (18%)	245 (4%)	3	28

All 48 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	36	ASP	18
1	A	67	VAL	18
2	B	180	SER	18
2	B	87	MET	15
2	B	121	ARG	15
2	B	58	ILE	12
1	A	68	LEU	12
1	A	41	ILE	11
2	B	141	GLY	10
1	A	59	TYR	9
2	B	137	ILE	9
2	B	89	GLY	9
2	B	155	PHE	8
2	B	22	ALA	8
1	A	66	LYS	7
1	A	42	GLY	6
1	A	29	VAL	5
2	B	19	PHE	5
2	B	53	ASN	4
2	B	12	GLU	3
2	B	215	GLY	3
2	B	78	ARG	3
2	B	152	VAL	3
2	B	56	SER	3
1	A	34	ILE	2
2	B	48	PRO	2
2	B	23	GLY	2
1	A	44	HIS	2
2	B	52	THR	2
1	A	61	VAL	2
2	B	11	SER	2
2	B	88	GLY	1

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Mol	Chain	Res	Type	Models (Total)
2	B	119	ILE	1
2	B	149	ASN	1
1	A	70	ALA	1
2	B	139	LEU	1
1	A	45	SER	1
1	A	32	ILE	1
1	A	47	LYS	1
2	B	214	GLY	1
1	A	11	PRO	1
1	A	28	GLY	1
1	A	81	VAL	1
1	A	65	LEU	1
1	A	5	GLU	1
2	B	20	PRO	1
2	B	49	GLY	1
2	B	181	PRO	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	64/64 (100%)	55±2 (86±3%)	9±2 (14±3%)	6	45
2	B	210/210 (100%)	177±3 (84±1%)	33±3 (16±1%)	4	41
All	All	4932/4932 (100%)	4186 (85%)	746 (15%)	5	42

All 140 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	12	THR	18
1	A	75	LYS	18
1	A	4	THR	17
2	B	60	ASP	17
2	B	123	LYS	17
2	B	188	LEU	17
2	B	201	LYS	17
2	B	205	LYS	17

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Mol	Chain	Res	Type	Models (Total)
2	B	26	SER	16
2	B	56	SER	16
1	A	73	THR	15
2	B	32	LEU	15
2	B	146	LEU	14
2	B	125	SER	14
2	B	192	LYS	14
2	B	65	THR	13
2	B	107	GLN	12
2	B	112	SER	12
1	A	56	HIS	11
2	B	155	PHE	11
2	B	223	THR	11
2	B	43	LEU	11
2	B	152	VAL	11
2	B	119	ILE	10
2	B	52	THR	10
2	B	37	GLN	9
2	B	86	SER	9
2	B	220	LEU	9
2	B	111	ILE	9
2	B	189	ASP	9
2	B	216	HIS	9
2	B	148	GLU	9
2	B	136	ILE	8
2	B	54	GLN	8
2	B	219	LEU	8
2	B	50	HIS	8
2	B	72	LEU	8
2	B	78	ARG	8
2	B	81	VAL	8
1	A	32	ILE	7
1	A	18	LYS	7
2	B	14	THR	7
1	A	25	ARG	6
1	A	16	GLU	6
1	A	17	SER	6
1	A	35	LEU	6
2	B	77	ASP	6
2	B	185	PHE	6
2	B	118	HIS	6
2	B	90	MET	6

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Mol	Chain	Res	Type	Models (Total)
1	A	30	SER	5
2	B	133	LEU	5
2	B	213	ASP	5
2	B	95	LEU	5
2	B	193	CYS	5
2	B	28	SER	5
2	B	39	GLU	5
1	A	46	LEU	5
2	B	221	SER	5
2	B	159	SER	5
2	B	156	PHE	5
2	B	129	ASP	4
2	B	139	LEU	4
2	B	217	MET	4
2	B	174	ASP	4
2	B	218	PHE	4
2	B	55	THR	3
2	B	231	PHE	3
1	A	37	ASN	3
1	A	54	GLN	3
1	A	47	LYS	3
2	B	145	GLU	3
2	B	21	PHE	3
2	B	203	TRP	3
2	B	110	ILE	3
1	A	40	GLN	3
2	B	67	LEU	3
2	B	162	SER	3
2	B	7	SER	3
2	B	194	ILE	3
1	A	81	VAL	3
2	B	93	PHE	3
2	B	41	GLU	2
2	B	122	LYS	2
2	B	183	HIS	2
2	B	186	ASN	2
2	B	191	LYS	2
2	B	17	ILE	2
2	B	71	GLU	2
2	B	33	HIS	2
2	B	142	MET	2
2	B	150	LYS	2

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Mol	Chain	Res	Type	Models (Total)
2	B	175	LEU	2
2	B	222	GLN	2
1	A	22	ILE	2
2	B	120	GLN	2
2	B	4	LEU	2
1	A	24	GLU	2
1	A	36	ASP	2
2	B	2	SER	2
2	B	190	ASP	2
1	A	29	VAL	2
2	B	167	LEU	2
2	B	137	ILE	2
2	B	233	ILE	2
2	B	179	GLN	1
2	B	228	GLU	1
1	A	60	GLN	1
2	B	61	LEU	1
2	B	135	HIS	1
2	B	236	GLN	1
2	B	92	THR	1
2	B	240	ILE	1
2	B	9	ASP	1
2	B	42	MET	1
1	A	62	GLU	1
2	B	87	MET	1
1	A	58	GLU	1
2	B	16	LEU	1
2	B	35	PHE	1
2	B	104	ILE	1
2	B	29	PHE	1
2	B	168	GLU	1
2	B	239	ILE	1
2	B	13	LYS	1
2	B	234	LEU	1
1	A	8	TYR	1
2	B	164	TYR	1
1	A	69	PHE	1
1	A	80	TYR	1
2	B	200	TRP	1
2	B	229	ARG	1
2	B	115	GLN	1
2	B	149	ASN	1

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Mol	Chain	Res	Type	Models (Total)
2	B	211	GLN	1
1	A	67	VAL	1
1	A	71	GLN	1
2	B	18	CYS	1
2	B	63	GLU	1
2	B	91	ILE	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