



Full wwPDB NMR Structure Validation Report ⓘ

Apr 27, 2016 – 12:42 AM BST

PDB ID : 2L8T
Title : Staphylococcus aureus pathogenicity island 1 protein gp6, an internal scaffold
in size determination
Authors : Dearborn, A.D.; Spilman, M.S.; Damle, P.K.; Chang, J.R.; Monroe, E.B.;
Saad, J.S.; Christie, G.E.; Dokland, T.
Deposited on : 2011-01-24

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
<http://wwpdb.org/validation/2016/NMRValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

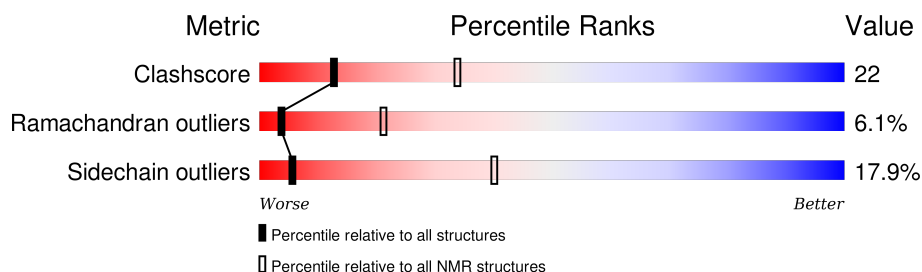
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment is 38%.

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 ≥ 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	71	<div> <div>23%</div> <div>24%</div> <div>54%</div> </div>
1	B	71	<div> <div>27%</div> <div>17%</div> <div>56%</div> </div>

2 Ensemble composition and analysis ⓘ

This entry contains 20 models. Model 16 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:7-A:39, B:179-B:209 (64)	0.26	16

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 1 clusters. No single-model clusters were found.

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

3 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 2286 atoms, of which 1146 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Transposon Tn557 toxic shock syndrome toxin-1.

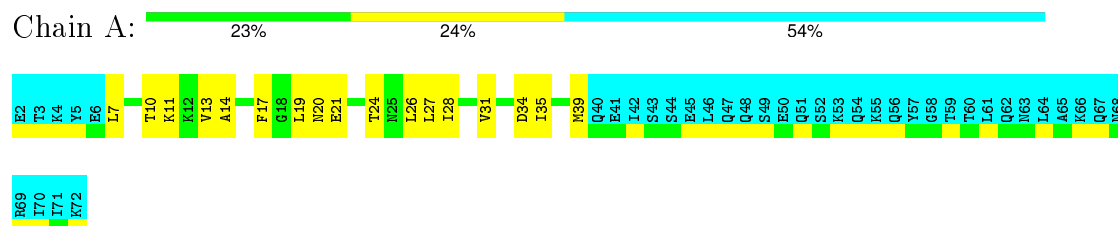
Mol	Chain	Residues	Atoms						Trace
1	A	71	Total	C	H	N	O	S	0
			1143	349	573	100	120	1	
1	B	71	Total	C	H	N	O	S	0
			1143	349	573	100	120	1	

4 Residue-property plots

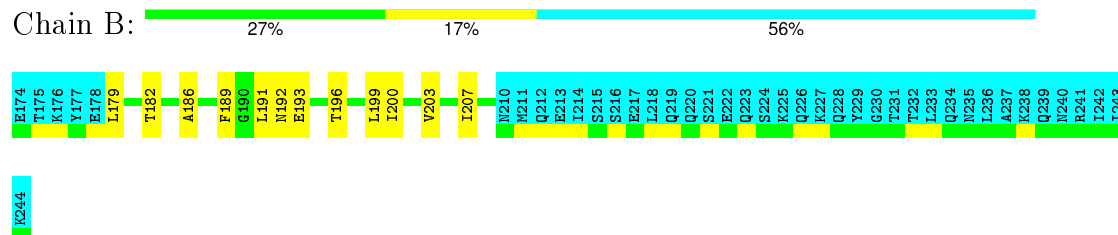
4.1 Average score per residue in the NMR ensemble

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: Transposon Tn557 toxic shock syndrome toxin-1



- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

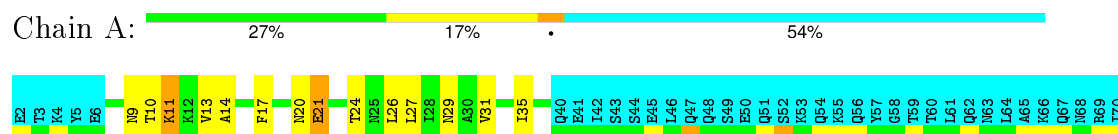


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



I71
K72

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain B: 24% 20% 56%

E174 T175 K176 Y177 E178 L179 N180 N181 K183 K184 V185 A186 L191 N192 E193 T196 L199 I200 V203 I207 N210 M211 Q212 E213 I214 S215 E217 L218 Q219 Q220 S221 E222 Q223 S224 K225 Q226 K227 Q228 Y229 G230 G232 T231 T232 L233 Q234 N235 L236 A237 K238 Q239 N240 R241 I242

I243
K244

4.2.2 Score per residue for model 2

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A: 27% 15% 54%

E2 T3 K4 Y5 E6 L7 T10 A14 L19 N20 E21 E22 D23 T24 N25 L26 L27 I28 V31 D34 I35 Q40 E41 I42 E43 S44 E45 L46 Q47 Q48 S49 E50 Q51 S52 K53 Q54 K55 Q56 E57 E58 T59 T60 L61 D62 N63 L64 A65 K66 E67 N68 E69 I70 I71 K72

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain B: 25% 17% 56%

E174 T175 K176 Y177 E178 L179 T182 A186 F189 G190 L191 D195 T196 N197 L198 L199 I200 V203 I207 K208 N209 N210 M211 Q212 E213 I214 S215 E217 L218 Q219 Q220 S221 E222 Q223 S224 K225 Q226 K227 Q228 Y229 G230 T231 T232 L233 Q234 N235 L236 A237 K238 Q239 N240 R241 I242

I243
K244

4.2.3 Score per residue for model 3

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A: 30% 15% 54%

E2 T3 K4 Y5 E6 L7 N8 N9 T10 V13 F17 N20 E21 L26 L27 V31 I35 N38 K39 Q40 E41 I42 E43 S44 E45 L46 Q47 Q48 S49 E50 Q51 S52 K53 Q54 K55 Q56 E57 E58 T59 T60 L61 D62 N63 L64 A65 K66 E67 N68 E69 I70 I71 K72

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain B: 27% 15% 56%

E174 T175 K176 Y177 E178 T182 A186 F189 G190 L191 N192 E193 L199 I200 N201 A202 V203 D204 L205 D206 I207 N210 M211 Q212 E213 I214 S215 E217 L218 Q219 Q220 S221 E222 Q223 S224 K225 Q226 K227 Q228 Y229 G230 T231 T232 L233 Q234 N235 L236 A237 K238 Q239 N240 R241 I242 I243

K244

4.2.4 Score per residue for model 4

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A: 

E2 T3 K4 Y5 E6 L7 T10 F17 G18 L19 N20 E21 L26 L27 I28 V31 D32 L33 D34 I35 K39 Q40 E41 I42 S43 S44 S45 L46 Q47 Q48 S49 E50 Q51 S52 K53 Q54 Q55 Q56 Y57 G58 T59 T60 Q61 Q62 N63 L64 A65 K66 Q67 N68 N69 I70 I71 K72


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain B: 

E174 T175 K176 Y177 E178 T182 K183 F189 G190 L191 N192 E193 E194 I200 N201 A202 V203 I207 N210 Q212 E213 I214 S215 S216 E217 L218 Q219 Q220 S221 E222 Q223 S224 K225 Q226 K227 Q228 Y229 Q230 T231 T232 L233 Q234 L235 L236 A237 Q238 Q239 N240 I241 I242 I243 K244

4.2.5 Score per residue for model 5

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A: 

E2 T3 K4 Y5 E6 L7 N8 N9 K11 A14 F17 G18 L19 N20 E21 T24 N25 L26 L27 I28 V31 D32 L33 D34 I35 Q40 E41 I42 S43 S44 S45 L46 Q47 Q48 S49 E50 Q51 S52 K53 Q54 Q55 Q56 Y57 G58 T59 T60 Q61 Q62 N63 L64 A65 K66 Q67 N68

R69 I70 I71 K72

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain B: 

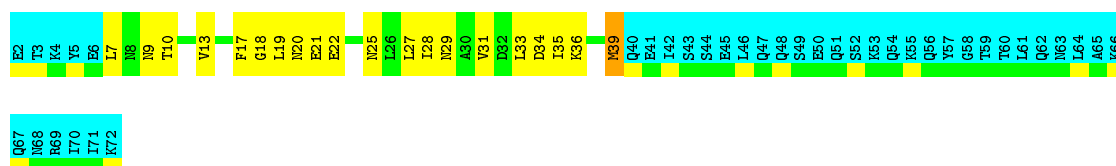
E174 T175 K176 Y177 E178 L179 N180 N181 T182 A186 F189 G190 L191 N192 E193 T196 L199 I200 V203 D204 L205 D206 I207 N210 Q212 E213 I214 S215 S216 E217 L218 Q219 Q220 S221 E222 Q223 S224 K225 Q226 K227 Q228 Y229 Q230 T231 T232 L233 Q234 L235 L236 A237 Q238 Q239 N240

R241 I242 I243 K244

4.2.6 Score per residue for model 6

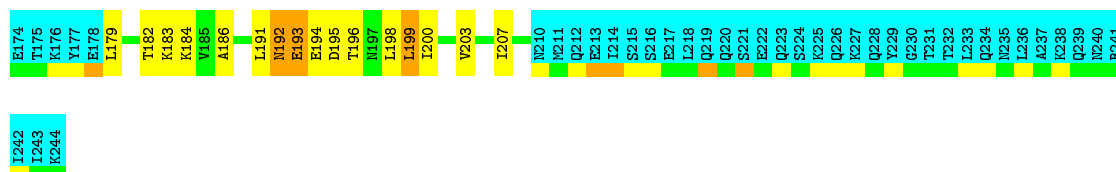
- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A: 



- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

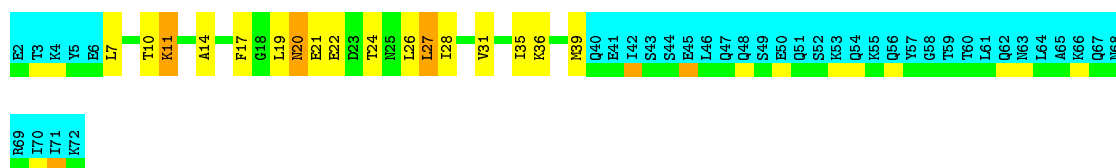
Chain B: 21% 18% 56%



4.2.7 Score per residue for model 7

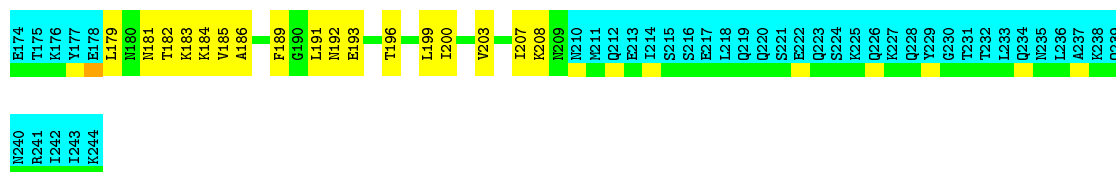
- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A: 23% 20% 54%



- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

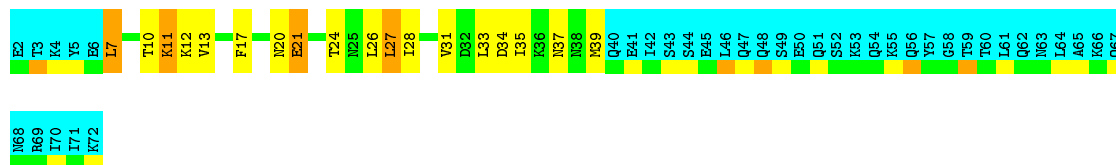
Chain B: 20% 24% 56%



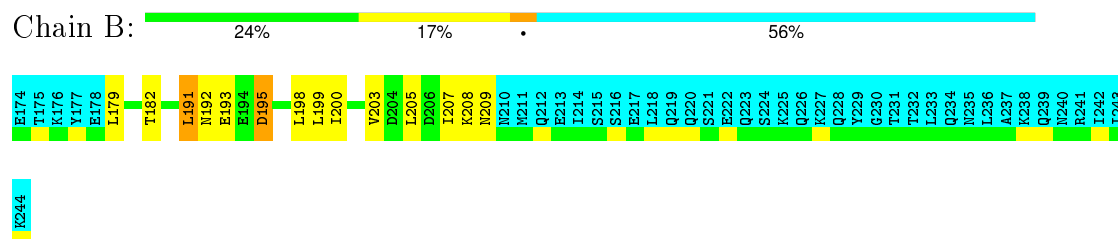
4.2.8 Score per residue for model 8

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A: 21% 20% 6% 54%

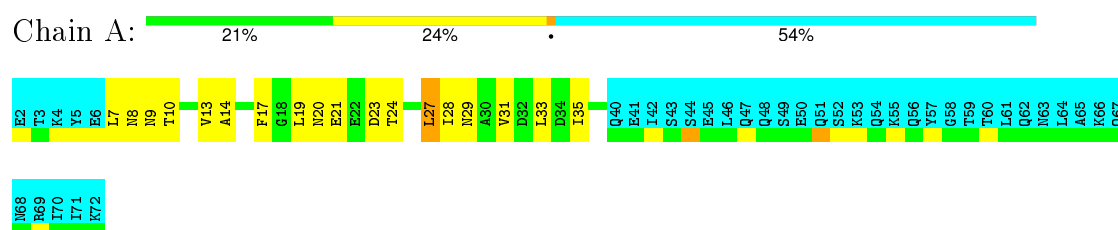


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

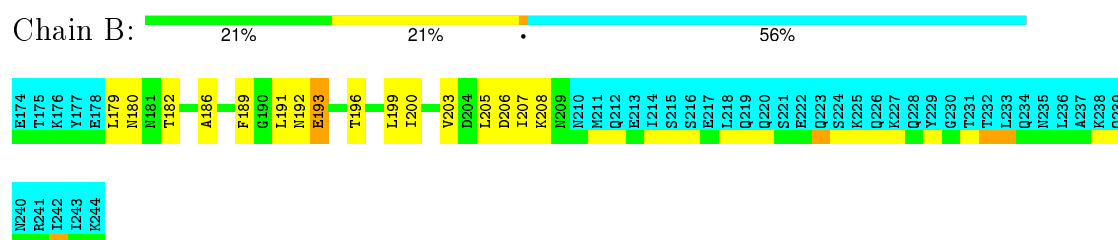


4.2.9 Score per residue for model 9

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

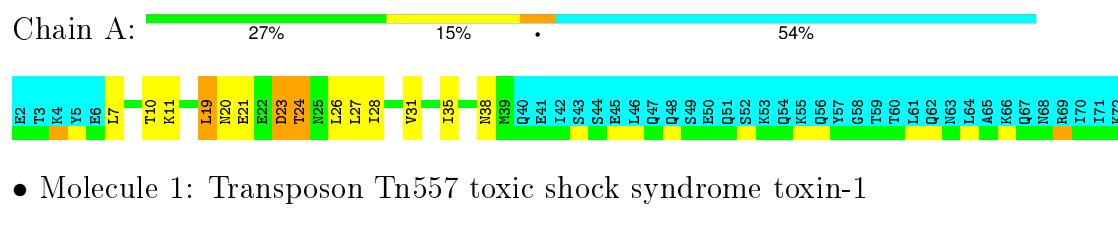


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

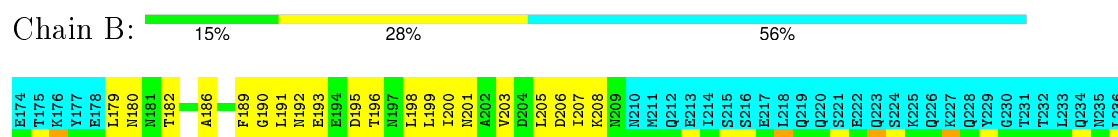


4.2.10 Score per residue for model 10

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



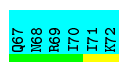
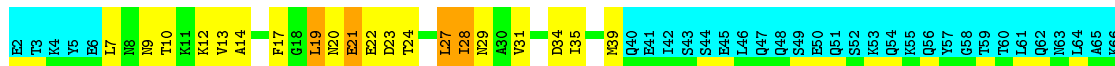
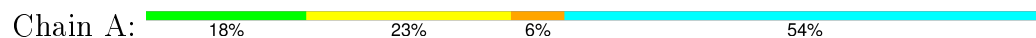
- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



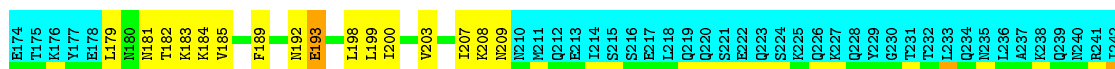


4.2.11 Score per residue for model 11

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

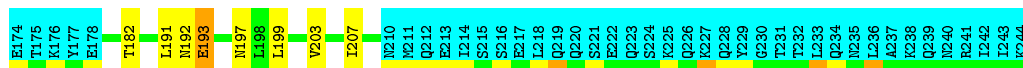


4.2.12 Score per residue for model 12

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

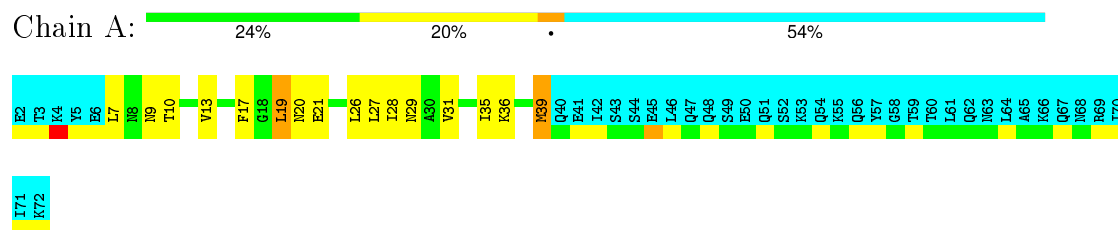


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

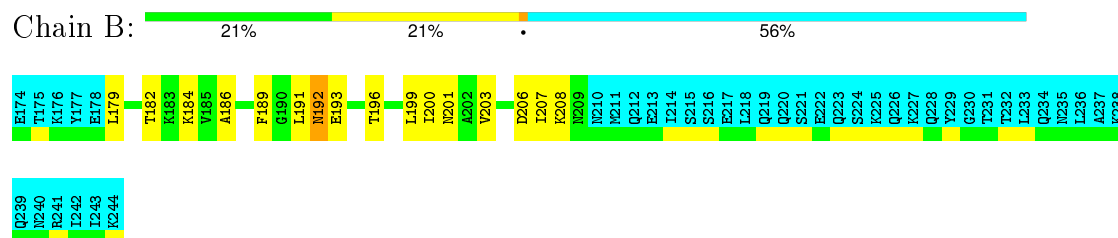


4.2.13 Score per residue for model 13

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

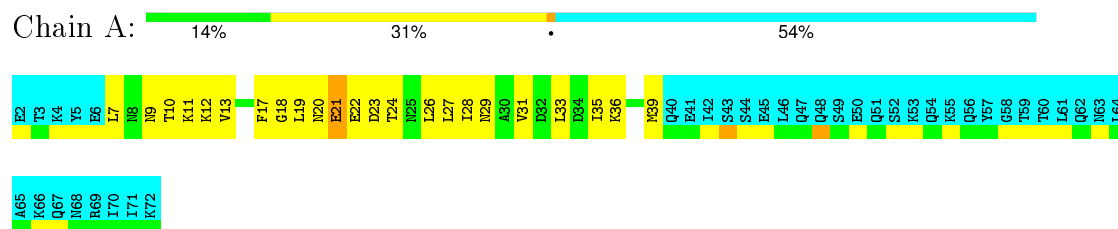


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

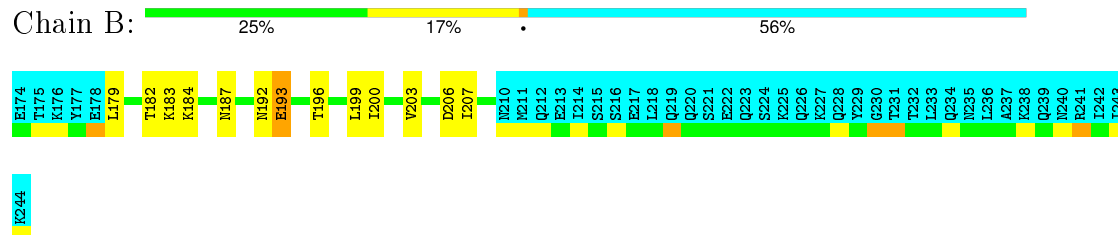


4.2.14 Score per residue for model 14

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

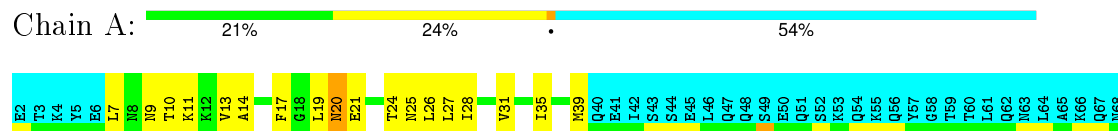


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



4.2.15 Score per residue for model 15

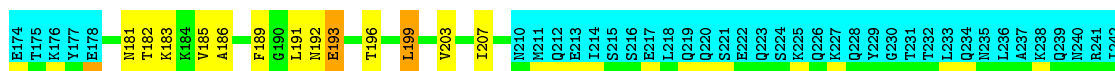
- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1





- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

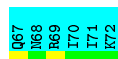
Chain B:



4.2.16 Score per residue for model 16 (medoid)

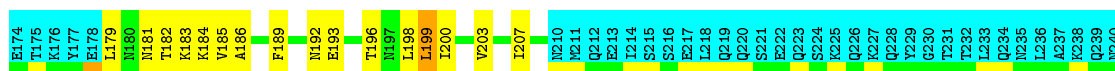
- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A:



- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

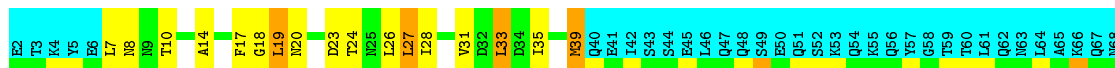
Chain B:



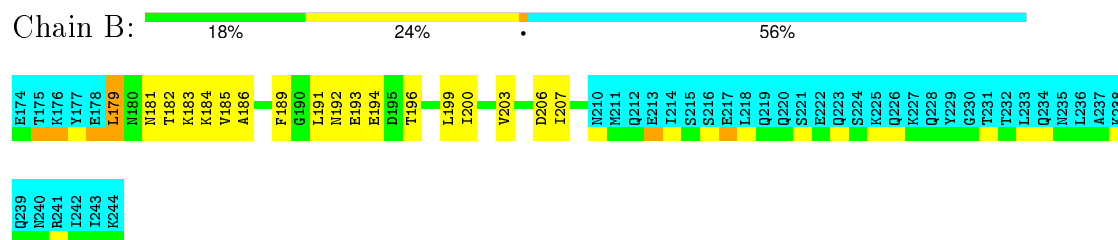
4.2.17 Score per residue for model 17

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

Chain A:

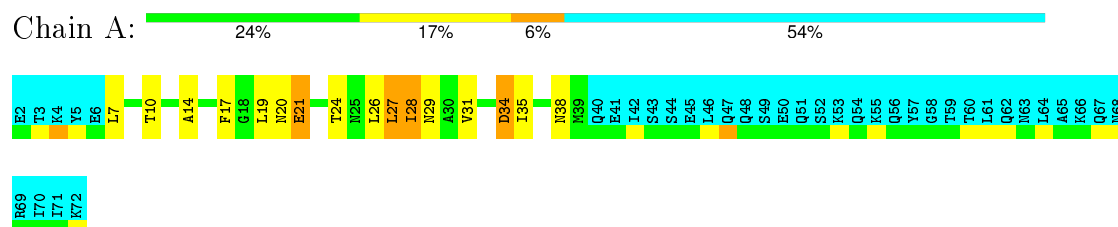


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

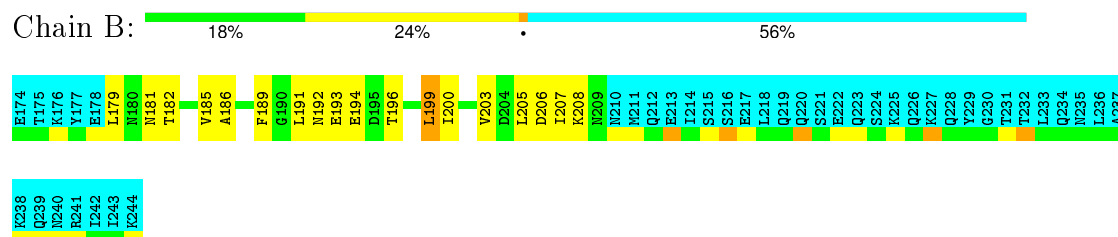


4.2.18 Score per residue for model 18

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

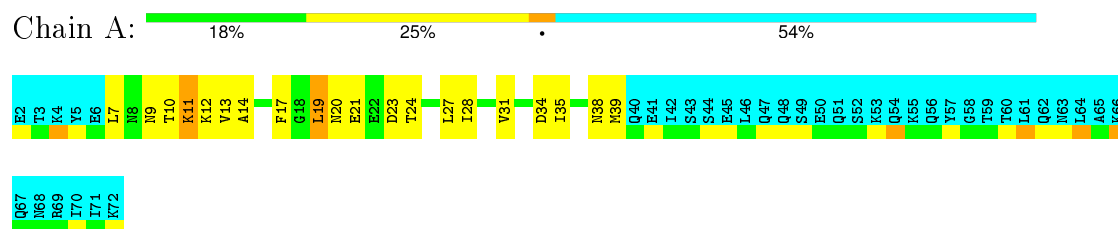


- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1

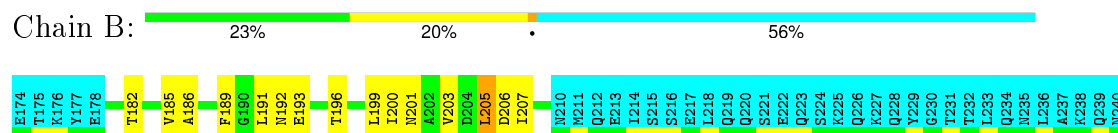


4.2.19 Score per residue for model 19

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



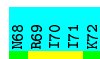
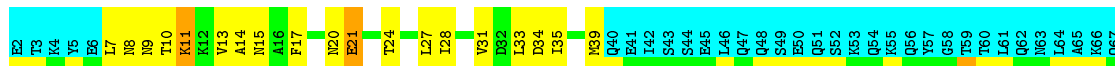
- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



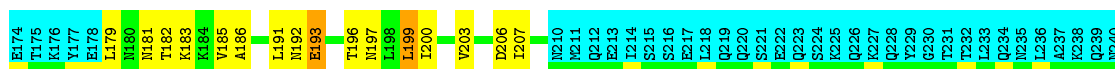


4.2.20 Score per residue for model 20

- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



- Molecule 1: Transposon Tn557 toxic shock syndrome toxin-1



5 Refinement protocol and experimental data overview

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

Of the 50 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	refinement	
CYANA	structure solution	
TALOS	geometry optimization	

The following table shows chemical shift validation statistics as aggregates over all chemical shift files. Detailed validation can be found in section 7 of this report.

Chemical shift file(s)	2l8t_cs.str
Number of chemical shift lists	1
Total number of shifts	636
Number of shifts mapped to atoms	636
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	38%

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	255	256	256	17±3
1	B	239	241	241	16±3
All	All	9880	9940	9940	433

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:35:ILE:HD13	1:B:207:ILE:HD13	1.02	1.29	10	13
1:A:35:ILE:HD13	1:B:207:ILE:HD12	0.93	1.39	9	3
1:A:14:ALA:HB3	1:A:24:THR:HG23	0.92	1.40	7	12
1:B:186:ALA:HB3	1:B:196:THR:HG23	0.91	1.41	2	14
1:A:7:LEU:HD12	1:A:28:ILE:HG23	0.88	1.44	8	2
1:A:35:ILE:HD12	1:B:207:ILE:HD13	0.87	1.44	5	3
1:A:31:VAL:HG22	1:B:182:THR:HG23	0.78	1.56	12	16
1:A:35:ILE:HD12	1:B:207:ILE:HD12	0.77	1.56	4	2
1:A:10:THR:HG23	1:B:203:VAL:HG22	0.75	1.58	14	15
1:A:31:VAL:HG11	1:B:203:VAL:HG11	0.74	1.57	20	5
1:A:27:LEU:HD21	1:B:199:LEU:HD21	0.69	1.64	20	2
1:A:7:LEU:HD13	1:A:28:ILE:HG23	0.69	1.64	17	11
1:B:203:VAL:O	1:B:207:ILE:HD12	0.67	1.90	18	15

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:31:VAL:HG22	1:B:182:THR:CG2	0.67	2.20	6	18
1:A:7:LEU:HD13	1:A:28:ILE:HD12	0.66	1.68	11	2
1:A:10:THR:CG2	1:B:203:VAL:HG22	0.66	2.21	16	18
1:A:31:VAL:O	1:A:35:ILE:HD12	0.64	1.92	13	16
1:A:9:ASN:O	1:A:13:VAL:HG23	0.64	1.93	6	10
1:A:7:LEU:HD13	1:A:28:ILE:CD1	0.64	2.23	18	3
1:B:186:ALA:CB	1:B:196:THR:HG23	0.63	2.23	15	5
1:B:181:ASN:O	1:B:185:VAL:HG23	0.63	1.93	18	7
1:A:10:THR:HG21	1:B:203:VAL:HG22	0.62	1.72	19	9
1:A:13:VAL:HG12	1:B:199:LEU:HD12	0.62	1.69	16	3
1:B:179:LEU:HD13	1:B:200:ILE:HG23	0.61	1.72	5	8
1:A:31:VAL:HG22	1:B:182:THR:HG21	0.61	1.72	5	6
1:A:18:GLY:O	1:A:19:LEU:HD22	0.60	1.96	14	1
1:A:31:VAL:HG11	1:B:203:VAL:CG1	0.60	2.27	4	2
1:A:35:ILE:HD13	1:B:207:ILE:CD1	0.60	2.22	7	9
1:A:35:ILE:HD12	1:B:207:ILE:CD1	0.60	2.27	20	2
1:A:14:ALA:CB	1:A:24:THR:HG23	0.59	2.24	7	5
1:A:19:LEU:HD22	1:A:23:ASP:CB	0.59	2.27	11	5
1:B:203:VAL:HG12	1:B:207:ILE:CD1	0.58	2.28	20	2
1:B:179:LEU:HD13	1:B:200:ILE:CG2	0.58	2.28	1	4
1:A:27:LEU:HD12	1:B:185:VAL:HG12	0.58	1.73	11	3
1:A:35:ILE:CD1	1:B:207:ILE:HD12	0.58	2.27	4	2
1:A:7:LEU:HB3	1:A:28:ILE:HD11	0.58	1.75	20	1
1:A:14:ALA:HB2	1:A:27:LEU:HD22	0.58	1.75	16	2
1:A:27:LEU:HD21	1:B:199:LEU:CD2	0.58	2.29	20	1
1:B:203:VAL:HG12	1:B:207:ILE:HD11	0.58	1.73	20	1
1:B:205:LEU:O	1:B:205:LEU:HD13	0.57	1.99	9	1
1:A:17:PHE:CD1	1:B:191:LEU:HD21	0.57	2.34	7	7
1:A:35:ILE:HG21	1:B:207:ILE:HG21	0.57	1.76	8	6
1:A:19:LEU:HD21	1:B:189:PHE:CD1	0.57	2.34	15	4
1:A:27:LEU:O	1:A:31:VAL:HG23	0.56	2.00	6	9
1:A:7:LEU:HD12	1:A:28:ILE:CG2	0.56	2.25	8	3
1:B:191:LEU:HD22	1:B:195:ASP:CB	0.56	2.30	8	1
1:A:35:ILE:CD1	1:B:207:ILE:HD13	0.56	2.28	18	3
1:A:31:VAL:CB	1:B:182:THR:HG21	0.56	2.31	20	2
1:A:31:VAL:HG12	1:A:35:ILE:CD1	0.55	2.32	17	2
1:A:17:PHE:CE1	1:B:191:LEU:HD21	0.55	2.37	8	2
1:B:179:LEU:HD12	1:B:200:ILE:CG2	0.55	2.32	14	6
1:A:31:VAL:CG1	1:B:203:VAL:HG11	0.55	2.32	3	4
1:B:191:LEU:HD22	1:B:195:ASP:OD1	0.54	2.03	2	1
1:B:186:ALA:HB3	1:B:196:THR:CG2	0.54	2.27	2	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:7:LEU:HD23	1:B:206:ASP:HB3	0.54	1.79	9	2
1:A:27:LEU:HD13	1:B:189:PHE:CE2	0.54	2.38	11	3
1:A:7:LEU:HD13	1:A:28:ILE:CG2	0.54	2.33	7	6
1:B:205:LEU:HD13	1:B:205:LEU:O	0.54	2.03	19	1
1:A:11:LYS:O	1:A:24:THR:HG21	0.53	2.03	20	4
1:A:17:PHE:CE1	1:B:191:LEU:HD11	0.53	2.38	13	5
1:B:183:LYS:HA	1:B:200:ILE:HD11	0.53	1.79	6	1
1:A:33:LEU:O	1:A:33:LEU:HD13	0.53	2.04	17	1
1:A:34:ASP:CB	1:B:179:LEU:HD23	0.52	2.34	18	2
1:A:13:VAL:HG12	1:B:199:LEU:HD13	0.52	1.79	8	1
1:A:7:LEU:HD21	1:B:207:ILE:HG13	0.52	1.82	9	2
1:A:18:GLY:C	1:A:19:LEU:HD22	0.52	2.24	6	2
1:A:35:ILE:CG2	1:B:207:ILE:HG21	0.52	2.35	8	5
1:A:19:LEU:HD11	1:B:189:PHE:CE1	0.52	2.40	2	9
1:B:199:LEU:O	1:B:203:VAL:HG23	0.51	2.06	19	15
1:A:11:LYS:HG3	1:A:24:THR:HG22	0.50	1.82	12	2
1:A:7:LEU:HD22	1:B:203:VAL:HG23	0.50	1.84	12	1
1:A:19:LEU:HD22	1:A:23:ASP:CG	0.49	2.27	17	2
1:A:19:LEU:HD22	1:A:23:ASP:HB3	0.49	1.83	19	2
1:A:10:THR:HG21	1:B:203:VAL:CB	0.49	2.37	4	1
1:A:31:VAL:HB	1:B:182:THR:HG21	0.48	1.86	20	1
1:A:17:PHE:CD1	1:B:191:LEU:HD11	0.48	2.43	4	2
1:A:17:PHE:CE2	1:B:199:LEU:HD13	0.48	2.44	16	5
1:A:27:LEU:HD13	1:B:189:PHE:CZ	0.48	2.43	18	1
1:B:179:LEU:HD12	1:B:200:ILE:HG23	0.48	1.86	14	1
1:A:7:LEU:HD23	1:B:206:ASP:CB	0.48	2.39	9	1
1:A:27:LEU:HD11	1:B:199:LEU:HD21	0.48	1.85	7	1
1:B:191:LEU:HD22	1:B:195:ASP:CG	0.48	2.29	6	3
1:A:7:LEU:CD1	1:A:28:ILE:HG23	0.47	2.37	4	1
1:A:35:ILE:HG21	1:B:207:ILE:CG2	0.47	2.39	10	7
1:A:27:LEU:HD21	1:B:199:LEU:HD11	0.47	1.86	5	1
1:B:191:LEU:HD13	1:B:195:ASP:OD2	0.47	2.10	2	1
1:A:19:LEU:HD21	1:B:189:PHE:CE1	0.46	2.45	16	3
1:A:13:VAL:CG1	1:B:199:LEU:HD12	0.46	2.40	14	2
1:B:187:ASN:HB2	1:B:196:THR:HG21	0.46	1.88	14	1
1:A:19:LEU:HD11	1:B:189:PHE:CZ	0.45	2.46	16	1
1:B:183:LYS:O	1:B:196:THR:HG21	0.44	2.12	1	1
1:B:191:LEU:HD22	1:B:195:ASP:HB3	0.44	1.89	8	1
1:A:11:LYS:HA	1:A:28:ILE:HD11	0.44	1.88	16	1
1:A:14:ALA:HB2	1:A:27:LEU:HD23	0.44	1.89	5	1
1:A:11:LYS:HG2	1:A:24:THR:HG21	0.43	1.90	8	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:34:ASP:HB3	1:B:179:LEU:HD22	0.43	1.88	8	1
1:A:13:VAL:HG12	1:B:199:LEU:CD2	0.43	2.44	6	1
1:A:19:LEU:HD11	1:B:189:PHE:CD1	0.42	2.50	17	1
1:A:17:PHE:CZ	1:B:191:LEU:HD11	0.42	2.49	17	1
1:A:17:PHE:CZ	1:B:199:LEU:HD13	0.42	2.49	11	1
1:A:33:LEU:HD13	1:A:33:LEU:C	0.42	2.35	4	1
1:A:14:ALA:HB3	1:A:24:THR:CG2	0.42	2.34	19	1
1:A:27:LEU:HD11	1:B:186:ALA:HB2	0.41	1.92	3	1
1:A:34:ASP:HB2	1:B:179:LEU:HD23	0.41	1.91	18	1
1:A:14:ALA:HB2	1:B:199:LEU:HD11	0.41	1.91	12	1
1:A:7:LEU:HD22	1:A:10:THR:CB	0.41	2.46	6	1
1:B:205:LEU:HD13	1:B:205:LEU:C	0.41	2.36	9	1
1:B:179:LEU:HD22	1:B:182:THR:HG21	0.41	1.93	6	1
1:A:35:ILE:CG1	1:B:179:LEU:HD21	0.41	2.46	20	1
1:A:29:ASN:O	1:A:33:LEU:HD23	0.41	2.16	14	1
1:A:27:LEU:HD23	1:A:28:ILE:N	0.40	2.31	16	1
1:A:7:LEU:HD13	1:B:203:VAL:CG2	0.40	2.45	4	1
1:A:34:ASP:HB3	1:B:179:LEU:HD23	0.40	1.92	2	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	33/71 (46%)	29±1 (87±2%)	2±1 (7±2%)	2±0 (6±1%)	4	22
1	B	31/71 (44%)	27±1 (86±2%)	2±0 (7±1%)	2±0 (6±1%)	3	20
All	All	1280/2840 (45%)	1109 (87%)	93 (7%)	78 (6%)	4	21

All 7 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	21	GLU	19
1	A	20	ASN	19
1	B	192	ASN	18

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Mol	Chain	Res	Type	Models (Total)
1	B	193	GLU	18
1	B	191	LEU	2
1	B	190	GLY	1
1	A	18	GLY	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	29/65 (45%)	23±2 (81±6%)	6±2 (19±6%)	5	37
1	B	27/65 (42%)	23±2 (84±6%)	4±2 (16±6%)	6	43
All	All	1120/2600 (43%)	919 (82%)	201 (18%)	5	40

All 40 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	27	LEU	13
1	A	26	LEU	12
1	B	193	GLU	11
1	A	39	MET	9
1	B	184	LYS	8
1	A	21	GLU	8
1	B	183	LYS	8
1	B	208	LYS	8
1	B	199	LEU	7
1	A	29	ASN	7
1	A	11	LYS	7
1	B	206	ASP	6
1	A	19	LEU	6
1	A	34	ASP	6
1	B	205	LEU	6
1	A	12	LYS	5
1	A	38	ASN	5
1	A	22	GLU	5
1	B	198	LEU	5
1	A	33	LEU	5

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Mol	Chain	Res	Type	Models (Total)
1	B	201	ASN	5
1	B	180	ASN	4
1	A	8	ASN	4
1	B	194	GLU	4
1	B	191	LEU	4
1	B	192	ASN	4
1	A	36	LYS	3
1	A	20	ASN	3
1	A	25	ASN	3
1	A	37	ASN	3
1	B	197	ASN	3
1	A	15	ASN	2
1	B	209	ASN	2
1	A	23	ASP	2
1	B	195	ASP	2
1	A	28	ILE	2
1	B	200	ILE	1
1	A	7	LEU	1
1	B	179	LEU	1
1	A	24	THR	1

6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

6.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.6 Ligand geometry ⓘ

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 [i](#)

The completeness of assignment taking into account all chemical shift lists is 38% for the well-defined parts and 33% for the entire structure.

7.1 Chemical shift list 1

File name: 2l8t_cs.str

Chemical shift list name: *sapi1-his6-gp6-shiftsSTAR3.str*

7.1.1 Bookkeeping [i](#)

The following table shows the results of parsing the chemical shift list and reports the number of nuclei with statistically unusual chemical shifts.

Total number of shifts	636
Number of shifts mapped to atoms	636
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	3

7.1.2 Chemical shift referencing [i](#)

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction \pm precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	68	1.84 ± 0.62	Should be applied
$^{13}\text{C}_\beta$	66	2.84 ± 0.15	Should be applied
$^{13}\text{C}'$	0	—	—
^{15}N	66	-0.57 ± 0.30	None needed (imprecise)

7.1.3 Completeness of resonance assignments [i](#)

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 38%, i.e. 292 atoms were assigned a chemical shift out of a possible 765. 6 out of 14 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	129/320 (40%)	64/128 (50%)	33/128 (26%)	32/64 (50%)
Sidechain	154/427 (36%)	83/241 (34%)	67/165 (41%)	4/21 (19%)

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	Total	¹ H	¹³ C	¹⁵ N
Aromatic	9/18 (50%)	5/10 (50%)	4/8 (50%)	0/0 (—%)
Overall	292/765 (38%)	152/379 (40%)	104/301 (35%)	36/85 (42%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 33%, i.e. 590 atoms were assigned a chemical shift out of a possible 1798. 7 out of 20 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	¹ H	¹³ C	¹⁵ N
Backbone	262/710 (37%)	128/284 (45%)	68/284 (24%)	66/142 (46%)
Sidechain	311/1038 (30%)	176/602 (29%)	131/378 (35%)	4/58 (7%)
Aromatic	17/50 (34%)	9/26 (35%)	8/24 (33%)	0/0 (—%)
Overall	590/1798 (33%)	313/912 (34%)	207/686 (30%)	70/200 (35%)

7.1.4 Statistically unusual chemical shifts ⓘ

The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

Mol	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
1	A	32	ASP	CG	24.04	188.49 – 169.99	-83.9
1	A	4	LYS	CD	21.75	34.86 – 23.06	-6.1
1	A	46	LEU	CD2	15.16	32.60 – 15.60	-5.3

7.1.5 Random Coil Index (RCI) plots ⓘ

The image below reports *random coil index* values for the protein chains in the structure. The height of each bar gives a probability of a given residue to be disordered, as predicted from the available chemical shifts and the amino acid sequence. A value above 0.2 is an indication of significant predicted disorder. The colour of the bar shows whether the residue is in the well-defined core (black) or in the ill-defined residue ranges (cyan), as described in section 2 on ensemble composition.

Random coil index (RCI) for chain A:

