



# Full wwPDB NMR Structure Validation Report ⓘ

Apr 21, 2024 – 04:05 PM EDT

PDB ID : 2RQU  
Title : Solution structure of the complex between the DDEF1 SH3 domain and the APC SAMP1 motif  
Authors : Kaieda, S.; Matsui, C.; Mimori-Kiyosue, Y.; Ikegami, T.  
Deposited on : 2009-12-14

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<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>.

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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

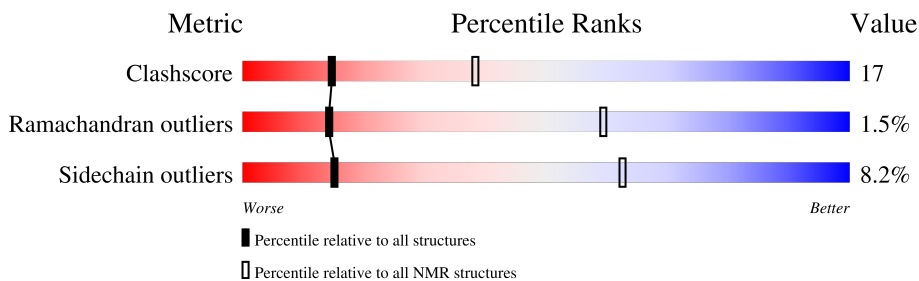
# 1 Overall quality at a glance

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and a grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	61	
2	B	19	

## 2 Ensemble composition and analysis i

This entry contains 20 models. Model 19 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:1070-A:1129, B:1578- B:1591 (74)	0.62	19

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 4 clusters and 1 single-model cluster was found.

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

### 3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1275 atoms, of which 635 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called DDEF1\_SH3.

Mol	Chain	Residues	Atoms					Trace	
			Total	C	H	N	O		S
1	A	61	972	316	473	82	100	1	0

- Molecule 2 is a protein called 19-mer from Adenomatous polyposis coli protein.

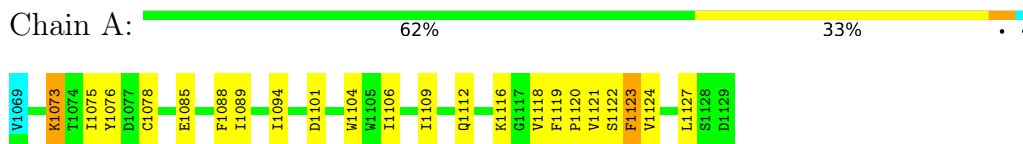
Mol	Chain	Residues	Atoms					Trace	
			Total	C	H	N	O		S
2	B	19	303	87	162	27	25	2	0

## 4 Residue-property plots [i](#)

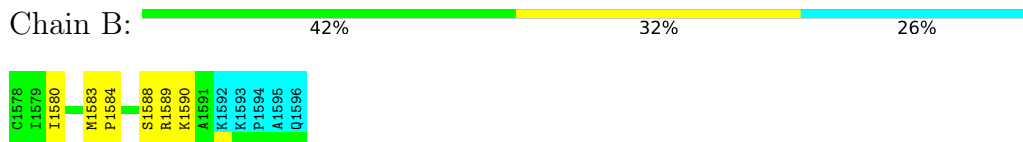
### 4.1 Average score per residue in the NMR ensemble

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: DDEF1\_SH3



- Molecule 2: 19-mer from Adenomatous polyposis coli protein

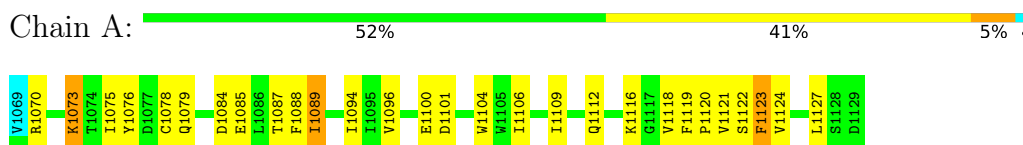


### 4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

#### 4.2.1 Score per residue for model 1

- Molecule 1: DDEF1\_SH3

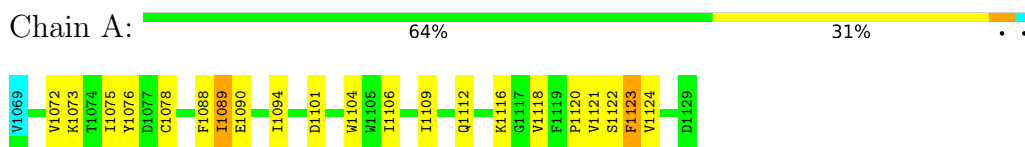


- Molecule 2: 19-mer from Adenomatous polyposis coli protein

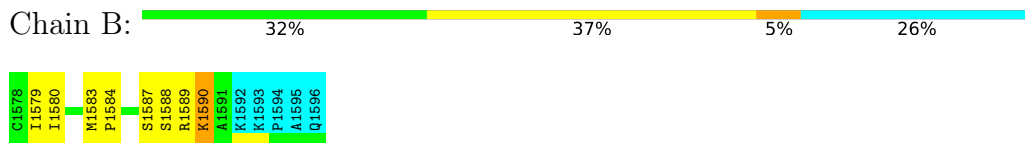


### 4.2.2 Score per residue for model 2

- Molecule 1: DDEF1\_SH3

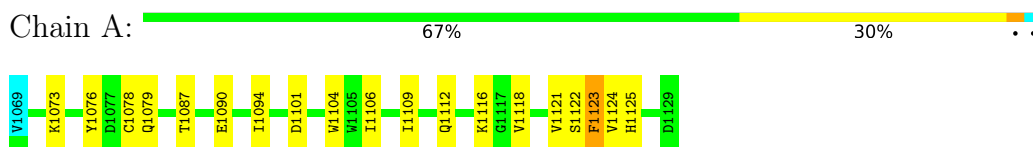


- Molecule 2: 19-mer from Adenomatous polyposis coli protein

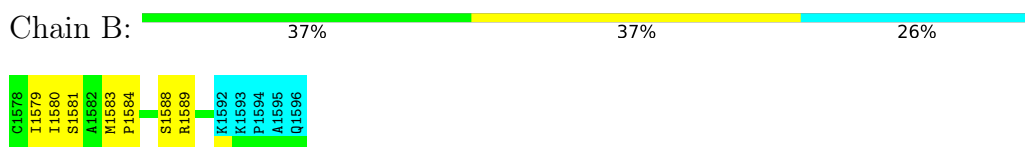


### 4.2.3 Score per residue for model 3

- Molecule 1: DDEF1\_SH3

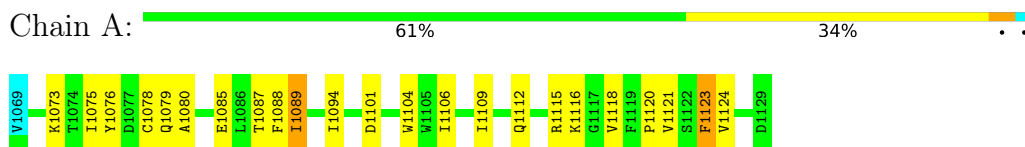


- Molecule 2: 19-mer from Adenomatous polyposis coli protein



### 4.2.4 Score per residue for model 4

- Molecule 1: DDEF1\_SH3



- Molecule 2: 19-mer from Adenomatous polyposis coli protein





#### 4.2.5 Score per residue for model 5

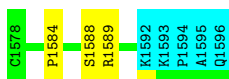
- Molecule 1: DDEF1\_SH3

Chain A: 44% 48% 7%



- Molecule 2: 19-mer from Adenomatous polyposis coli protein

Chain B: 58% 16% 26%



#### 4.2.6 Score per residue for model 6

- Molecule 1: DDEF1\_SH3

Chain A: 66% 26% 7%



- Molecule 2: 19-mer from Adenomatous polyposis coli protein

Chain B: 53% 21% 26%



#### 4.2.7 Score per residue for model 7

- Molecule 1: DDEF1\_SH3

Chain A: 56% 39%

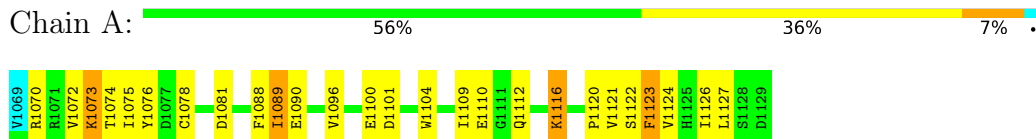


- Molecule 2: 19-mer from Adenomatous polyposis coli protein



#### 4.2.8 Score per residue for model 8

- Molecule 1: DDEF1\_SH3

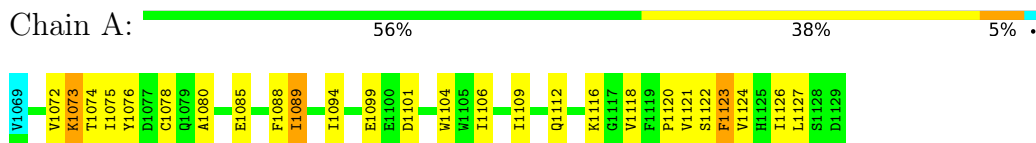


- Molecule 2: 19-mer from Adenomatous polyposis coli protein

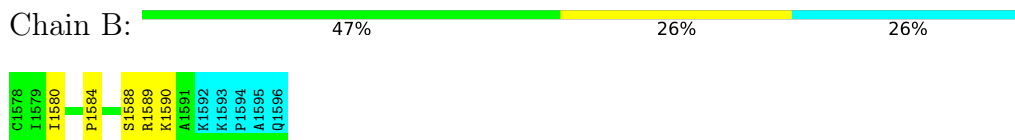


#### 4.2.9 Score per residue for model 9

- Molecule 1: DDEF1\_SH3

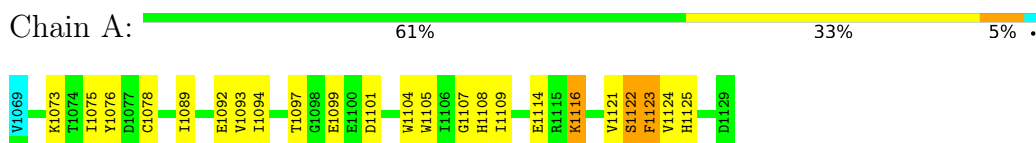


- Molecule 2: 19-mer from Adenomatous polyposis coli protein



#### 4.2.10 Score per residue for model 10

- Molecule 1: DDEF1\_SH3



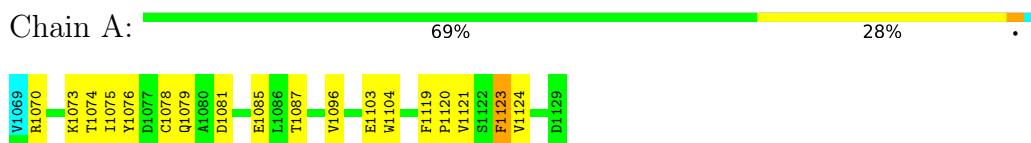


- Molecule 2: 19-mer from Adenomatous polyposis coli protein

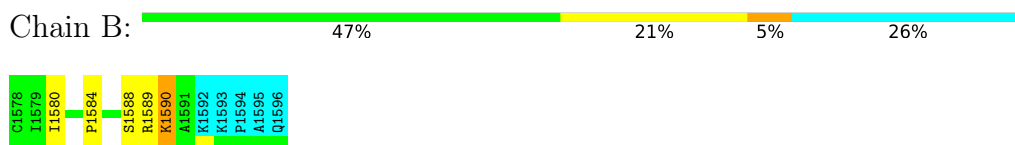


#### 4.2.11 Score per residue for model 11

- Molecule 1: DDEF1\_SH3

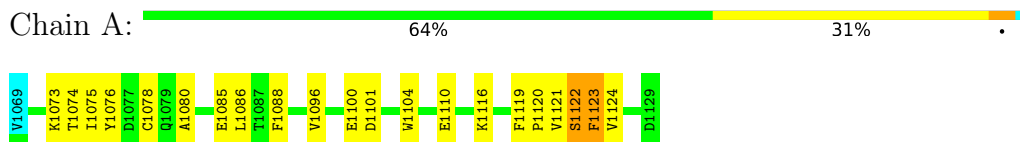


- Molecule 2: 19-mer from Adenomatous polyposis coli protein



#### 4.2.12 Score per residue for model 12

- Molecule 1: DDEF1\_SH3



- Molecule 2: 19-mer from Adenomatous polyposis coli protein



#### 4.2.13 Score per residue for model 13

- Molecule 1: DDEF1\_SH3





- Molecule 2: 19-mer from Adenomatous polyposis coli protein

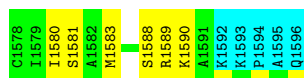


#### 4.2.14 Score per residue for model 14

- Molecule 1: DDEF1\_SH3



- Molecule 2: 19-mer from Adenomatous polyposis coli protein

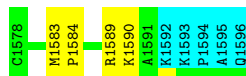


#### 4.2.15 Score per residue for model 15

- Molecule 1: DDEF1\_SH3



- Molecule 2: 19-mer from Adenomatous polyposis coli protein



#### 4.2.16 Score per residue for model 16

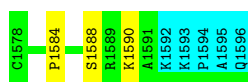
- Molecule 1: DDEF1\_SH3

Chain A:  51% 39% 8%




- Molecule 2: 19-mer from Adenomatous polyposis coli protein

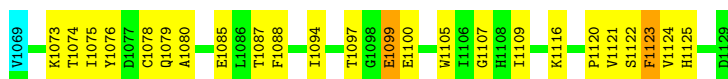
Chain B:  58% 16% 26%



#### 4.2.17 Score per residue for model 17

- Molecule 1: DDEF1\_SH3

Chain A:  59% 36%



- Molecule 2: 19-mer from Adenomatous polyposis coli protein

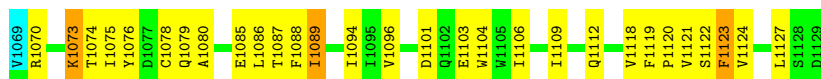
Chain B:  53% 21% 26%



#### 4.2.18 Score per residue for model 18

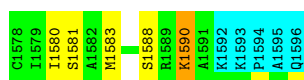
- Molecule 1: DDEF1\_SH3

Chain A:  51% 43% 5%



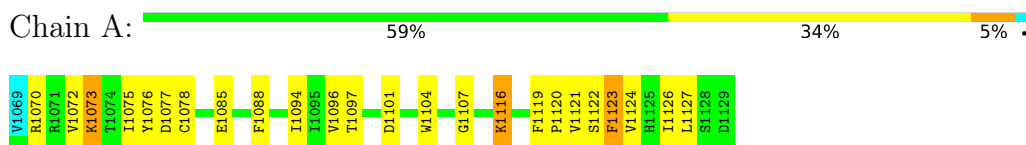
- Molecule 2: 19-mer from Adenomatous polyposis coli protein

Chain B:  47% 21% 5% 26%



#### 4.2.19 Score per residue for model 19 (medoid)

- Molecule 1: DDEF1\_SH3

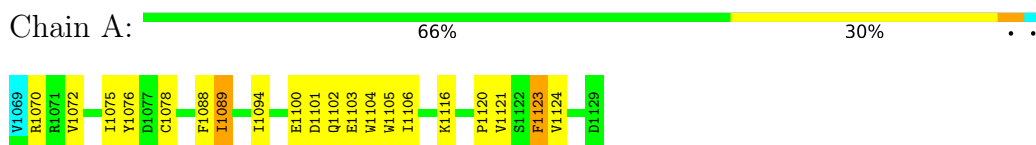


- Molecule 2: 19-mer from Adenomatous polyposis coli protein



#### 4.2.20 Score per residue for model 20

- Molecule 1: DDEF1\_SH3



- Molecule 2: 19-mer from Adenomatous polyposis coli protein



## 5 Refinement protocol and experimental data overview

The models were refined using the following method: *torsion angle dynamics, 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	structure solution	2.1
ARIA	refinement	2.2

No chemical shift data was provided.

## 6 Model quality i

### 6.1 Standard geometry i

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 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	492	462	460	18±3
2	B	101	116	113	5±1
All	All	11860	11560	11460	396

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 17.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:1073:LYS:HB2	1:A:1127:LEU:HD11	0.77	1.56	15	11
1:A:1109:ILE:HB	1:A:1112:GLN:HB2	0.75	1.59	4	6
1:A:1076:TYR:CE1	2:B:1584:PRO:HD3	0.74	2.17	2	16
1:A:1078:CYS:HB2	1:A:1123:PHE:CD2	0.70	2.22	5	20
2:B:1590:LYS:H	2:B:1590:LYS:HD2	0.68	1.49	1	3
1:A:1076:TYR:CD1	2:B:1584:PRO:HD3	0.67	2.24	4	11
1:A:1076:TYR:CE1	2:B:1583:MET:HA	0.66	2.25	3	6
1:A:1101:ASP:HB3	1:A:1104:TRP:HB2	0.65	1.69	12	16
1:A:1081:ASP:HB2	2:B:1586:LYS:HE3	0.64	1.68	8	1
1:A:1106:ILE:HG12	1:A:1118:VAL:HG22	0.63	1.69	15	10
1:A:1094:ILE:HG12	1:A:1109:ILE:HG12	0.60	1.72	10	3
1:A:1100:GLU:HG2	2:B:1589:ARG:HE	0.60	1.57	17	3
1:A:1086:LEU:HD23	1:A:1119:PHE:HB3	0.59	1.74	18	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:1080:ALA:HB1	1:A:1085:GLU:HB2	0.59	1.73	4	6
1:A:1101:ASP:OD2	2:B:1590:LYS:HG2	0.59	1.97	16	2
1:A:1075:ILE:HG13	1:A:1076:TYR:CD2	0.57	2.34	15	15
1:A:1076:TYR:HB2	1:A:1123:PHE:HB3	0.57	1.76	13	6
1:A:1094:ILE:HG12	1:A:1109:ILE:HD13	0.57	1.77	1	7
1:A:1101:ASP:CB	1:A:1104:TRP:HB2	0.56	2.31	16	5
1:A:1088:PHE:HE2	1:A:1120:PRO:HD2	0.56	1.60	9	6
1:A:1085:GLU:HG2	2:B:1589:ARG:HH11	0.56	1.58	9	2
1:A:1103:GLU:O	1:A:1120:PRO:HA	0.56	2.01	18	3
1:A:1089:ILE:HD13	1:A:1089:ILE:H	0.55	1.62	20	5
1:A:1076:TYR:CZ	2:B:1584:PRO:HD3	0.55	2.37	3	6
1:A:1089:ILE:H	1:A:1089:ILE:HD13	0.54	1.62	8	5
1:A:1088:PHE:CE1	1:A:1120:PRO:HD2	0.54	2.38	20	6
2:B:1588:SER:O	2:B:1590:LYS:HD3	0.54	2.02	18	1
1:A:1104:TRP:CD1	2:B:1589:ARG:HA	0.54	2.37	11	3
1:A:1072:VAL:HG12	1:A:1126:ILE:HA	0.54	1.77	9	5
1:A:1088:PHE:HZ	1:A:1123:PHE:HB2	0.54	1.62	15	1
1:A:1070:ARG:HB3	1:A:1096:VAL:HB	0.53	1.81	18	7
1:A:1075:ILE:HA	1:A:1090:GLU:OE1	0.53	2.04	16	1
1:A:1085:GLU:HG2	2:B:1589:ARG:NH1	0.53	2.19	9	1
2:B:1590:LYS:HD2	2:B:1590:LYS:N	0.53	2.19	2	5
1:A:1075:ILE:HD12	2:B:1580:ILE:HB	0.52	1.81	12	2
1:A:1122:SER:HB2	1:A:1123:PHE:CD1	0.51	2.40	12	7
2:B:1583:MET:HG3	2:B:1584:PRO:HD2	0.51	1.81	7	7
1:A:1096:VAL:HG22	1:A:1119:PHE:HZ	0.51	1.64	12	3
1:A:1102:GLN:HG2	1:A:1103:GLU:N	0.51	2.21	7	1
2:B:1590:LYS:HD2	2:B:1590:LYS:H	0.51	1.64	2	1
1:A:1074:THR:HA	1:A:1124:VAL:HG12	0.51	1.83	5	8
1:A:1088:PHE:CE2	1:A:1120:PRO:HD2	0.51	2.41	18	5
1:A:1097:THR:OG1	1:A:1107:GLY:HA2	0.50	2.06	10	7
1:A:1118:VAL:HG21	2:B:1589:ARG:NH1	0.50	2.21	14	1
1:A:1121:VAL:HA	1:A:1124:VAL:CG2	0.50	2.37	17	20
1:A:1088:PHE:HE1	1:A:1120:PRO:HD2	0.50	1.67	8	2
1:A:1123:PHE:N	1:A:1123:PHE:CD1	0.50	2.80	13	11
1:A:1105:TRP:CH2	1:A:1126:ILE:HD13	0.49	2.42	16	1
1:A:1086:LEU:HB3	1:A:1119:PHE:HB3	0.49	1.85	13	3
1:A:1089:ILE:HD12	1:A:1092:GLU:HG2	0.49	1.84	14	2
1:A:1100:GLU:HB2	1:A:1106:ILE:HD11	0.49	1.84	20	1
1:A:1090:GLU:HG3	2:B:1579:ILE:HG12	0.49	1.85	3	3
1:A:1099:GLU:HB2	1:A:1105:TRP:CD1	0.49	2.43	17	1
1:A:1109:ILE:HG22	1:A:1111:GLY:H	0.48	1.68	14	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:1103:GLU:OE1	2:B:1587:SER:HB2	0.48	2.09	6	1
1:A:1122:SER:OG	2:B:1587:SER:HB2	0.48	2.09	2	1
1:A:1100:GLU:HG2	2:B:1589:ARG:NE	0.48	2.24	13	1
1:A:1094:ILE:HA	1:A:1109:ILE:HA	0.47	1.86	10	1
1:A:1123:PHE:CD1	1:A:1123:PHE:N	0.47	2.83	14	4
1:A:1116:LYS:HD3	1:A:1116:LYS:H	0.47	1.68	6	3
2:B:1580:ILE:O	2:B:1580:ILE:HG22	0.47	2.10	13	5
1:A:1096:VAL:HG22	1:A:1119:PHE:CZ	0.47	2.45	18	2
1:A:1099:GLU:HG3	1:A:1105:TRP:CD1	0.47	2.45	10	1
1:A:1079:GLN:HA	1:A:1087:THR:HG23	0.46	1.87	1	10
1:A:1076:TYR:CD2	1:A:1123:PHE:HA	0.46	2.46	11	2
1:A:1100:GLU:OE1	2:B:1589:ARG:HD2	0.46	2.10	8	2
1:A:1104:TRP:CE2	2:B:1589:ARG:HG2	0.46	2.46	19	1
1:A:1088:PHE:HE2	1:A:1119:PHE:HB2	0.46	1.71	13	5
1:A:1080:ALA:CB	1:A:1085:GLU:HG2	0.45	2.41	14	2
2:B:1590:LYS:N	2:B:1590:LYS:HD2	0.45	2.26	14	2
1:A:1078:CYS:SG	1:A:1120:PRO:HG3	0.45	2.52	5	2
1:A:1085:GLU:HG2	2:B:1589:ARG:HH21	0.45	1.71	19	1
1:A:1088:PHE:CZ	1:A:1120:PRO:HD2	0.45	2.46	19	1
1:A:1082:ASN:HB3	2:B:1589:ARG:HH21	0.45	1.70	14	1
1:A:1103:GLU:HA	1:A:1121:VAL:HB	0.45	1.88	15	2
1:A:1112:GLN:OE1	1:A:1115:ARG:HD2	0.45	2.12	4	1
1:A:1088:PHE:CE2	1:A:1119:PHE:HB2	0.45	2.47	1	3
2:B:1590:LYS:HE3	2:B:1590:LYS:H	0.45	1.72	13	1
2:B:1590:LYS:H	2:B:1590:LYS:CD	0.45	2.24	1	1
1:A:1104:TRP:NE1	2:B:1589:ARG:HA	0.44	2.27	11	1
1:A:1109:ILE:HB	1:A:1112:GLN:HB3	0.44	1.90	8	1
1:A:1089:ILE:HD12	1:A:1092:GLU:HB2	0.44	1.89	10	1
1:A:1123:PHE:N	1:A:1123:PHE:HD1	0.44	2.11	13	2
1:A:1104:TRP:CD2	2:B:1589:ARG:HG2	0.44	2.48	19	2
1:A:1076:TYR:CE1	2:B:1580:ILE:O	0.43	2.71	19	8
1:A:1116:LYS:HD3	1:A:1116:LYS:N	0.43	2.28	6	1
1:A:1072:VAL:CG2	1:A:1094:ILE:HB	0.43	2.43	13	5
1:A:1108:HIS:HB3	1:A:1116:LYS:HB3	0.43	1.90	10	2
1:A:1100:GLU:HG2	1:A:1106:ILE:HD11	0.43	1.90	1	1
1:A:1086:LEU:HD12	1:A:1116:LYS:CA	0.42	2.44	15	1
1:A:1080:ALA:CB	1:A:1085:GLU:HB2	0.42	2.44	18	1
1:A:1102:GLN:HG3	1:A:1103:GLU:HG3	0.42	1.91	20	1
1:A:1071:ARG:HG2	1:A:1095:ILE:HD13	0.42	1.91	5	1
2:B:1583:MET:HG3	2:B:1584:PRO:CD	0.42	2.44	7	1
1:A:1122:SER:HB2	1:A:1123:PHE:HD1	0.42	1.74	10	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:1070:ARG:HD3	1:A:1105:TRP:CZ3	0.42	2.50	20	1
1:A:1099:GLU:HA	1:A:1105:TRP:HA	0.41	1.92	17	1
1:A:1084:ASP:HB2	1:A:1085:GLU:OE2	0.41	2.16	1	1
1:A:1086:LEU:HD12	1:A:1116:LYS:C	0.41	2.35	15	1
1:A:1088:PHE:CZ	1:A:1123:PHE:HB2	0.41	2.47	15	1
1:A:1074:THR:HG22	1:A:1124:VAL:HG12	0.41	1.93	12	1
1:A:1085:GLU:O	1:A:1117:GLY:HA3	0.41	2.16	14	1
1:A:1080:ALA:HA	1:A:1085:GLU:HG2	0.40	1.93	5	1
1:A:1109:ILE:HG21	1:A:1112:GLN:NE2	0.40	2.32	7	1
1:A:1093:VAL:O	1:A:1109:ILE:HG23	0.40	2.16	10	1
1:A:1094:ILE:HG12	1:A:1109:ILE:CD1	0.40	2.46	3	1
1:A:1121:VAL:HA	1:A:1124:VAL:HG22	0.40	1.92	3	2
1:A:1094:ILE:HG21	1:A:1119:PHE:CE1	0.40	2.51	19	1
1:A:1118:VAL:HG21	2:B:1589:ARG:NH2	0.40	2.32	4	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	59/61 (97%)	57±1 (97±2%)	2±1 (3±2%)	0±0 (0±0%)	54	85
2	B	13/19 (68%)	9±1 (67±7%)	3±1 (25±8%)	1±1 (8±4%)	2	15
All	All	1440/1600 (90%)	1321 (92%)	98 (7%)	21 (1%)	14	59

All 3 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	1588	SER	15
2	B	1581	SER	5
1	A	1080	ALA	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	54/55 (98%)	49±1 (91±2%)	5±1 (9±2%)	13	59
2	B	12/16 (75%)	12±1 (96±5%)	0±1 (4±5%)	33	82
All	All	1320/1420 (93%)	1212 (92%)	108 (8%)	15	62

All 17 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	1123	PHE	20
1	A	1073	LYS	19
1	A	1116	LYS	16
1	A	1122	SER	11
1	A	1089	ILE	10
2	B	1590	LYS	9
1	A	1112	GLN	4
1	A	1125	HIS	3
1	A	1085	GLU	3
1	A	1110	GLU	3
1	A	1099	GLU	2
1	A	1114	GLU	2
1	A	1077	ASP	2
2	B	1583	MET	1
1	A	1081	ASP	1
1	A	1102	GLN	1
1	A	1090	GLU	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