



Full wwPDB EM Validation Report ⓘ

Jul 9, 2025 – 12:51 PM JST

PDB ID : 8JOU / pdb_00008jou
EMDB ID : EMD-36462
Title : Fiber I and fiber-tail-adaptor of phage GP4
Authors : Liu, H.; Chen, W.
Deposited on : 2023-06-08
Resolution : 4.10 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

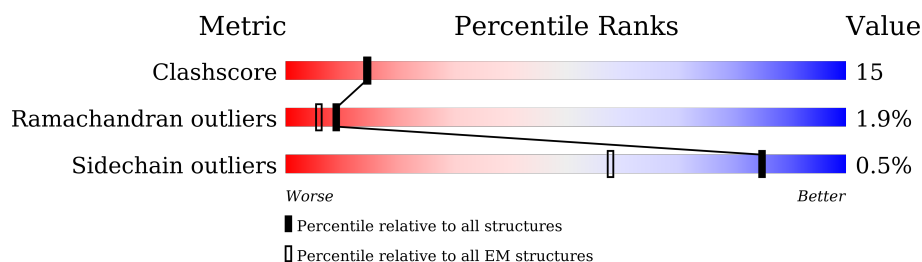
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.10 Å.

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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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	140	60% 36% ..
1	b	140	64% 31% ..
1	c	140	73% 22% ..
1	d	140	61% 34% ..
1	e	140	74% 22% ..
1	f	140	71% 26% ..
1	g	140	67% 28% ..
1	h	140	62% 34% ..
1	i	140	71% 26% ..

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	j	140	77%19%
2	A	120	88%10%
3	B	93	57%38%
3	C	93	70%26%
3	D	93	60%33%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 12485 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Virion-associated phage protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
1	a	136	Total	C	N	O	0	0
			990	626	171	193		
1	b	136	Total	C	N	O	0	0
			990	626	171	193		
1	c	136	Total	C	N	O	0	0
			990	626	171	193		
1	d	136	Total	C	N	O	0	0
			990	626	171	193		
1	e	136	Total	C	N	O	0	0
			990	626	171	193		
1	f	136	Total	C	N	O	0	0
			990	626	171	193		
1	g	136	Total	C	N	O	0	0
			990	626	171	193		
1	h	136	Total	C	N	O	0	0
			990	626	171	193		
1	i	136	Total	C	N	O	0	0
			990	626	171	193		
1	j	136	Total	C	N	O	0	0
			990	626	171	193		

- Molecule 2 is a protein called rope protein of phage GP4.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	A	118	Total	C	N	O	0	0
			590	354	118	118		

- Molecule 3 is a protein called Virion-associated phage protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	89	Total	C	N	O	S	0	0
			665	418	111	134	2		
3	B	89	Total	C	N	O	S	0	0
			665	418	111	134	2		

Continued on next page...

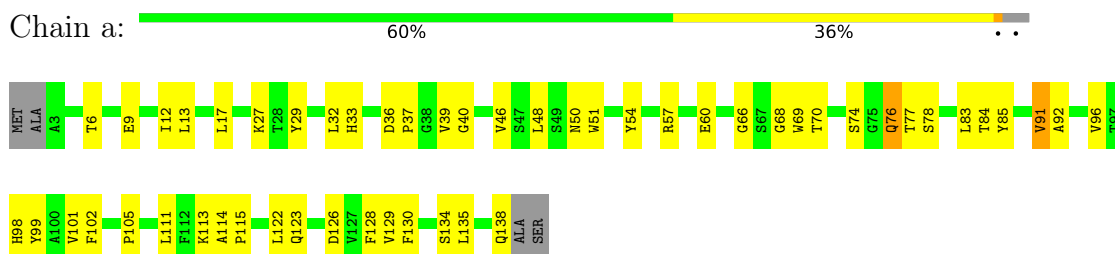
Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	89	Total	C	N	O	S	0	0
			665	418	111	134	2		

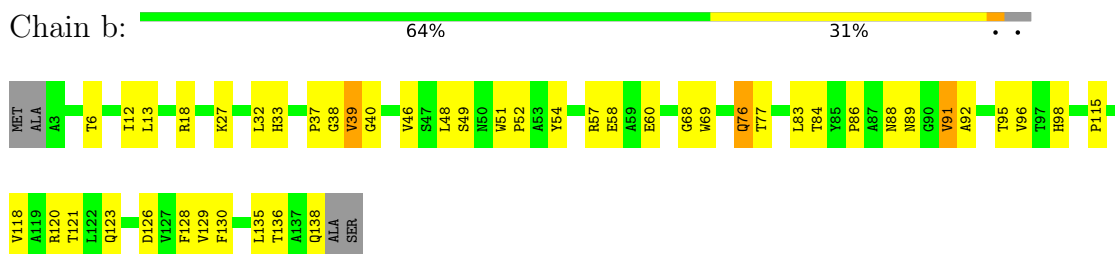
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-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 outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

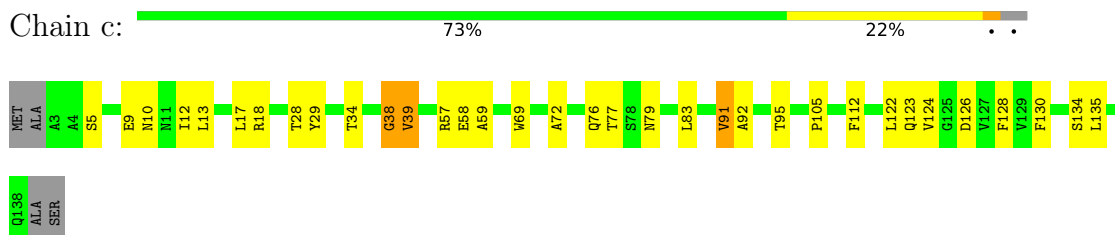
- Molecule 1: Virion-associated phage protein



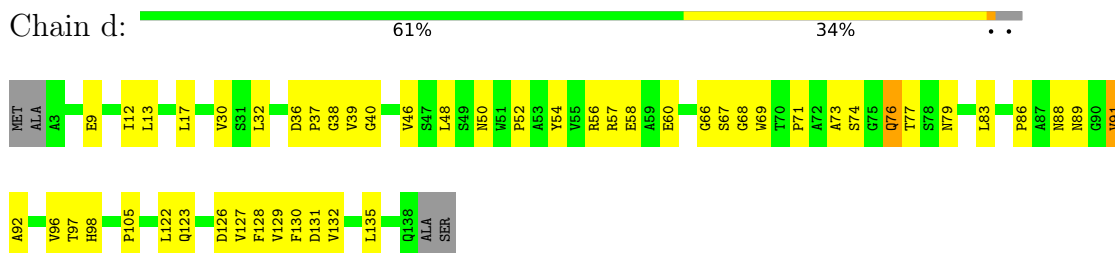
- Molecule 1: Virion-associated phage protein



- Molecule 1: Virion-associated phage protein



- Molecule 1: Virion-associated phage protein



- Molecule 1: Virion-associated phage protein

Chain e:  74% 22% ..



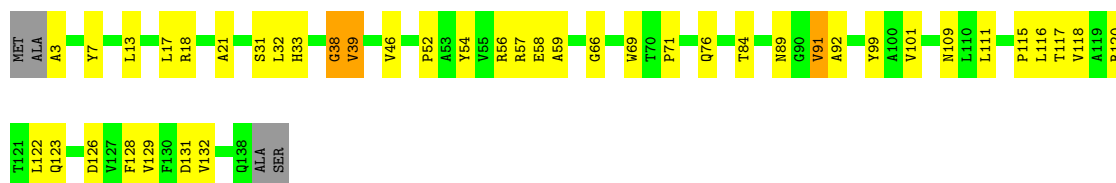
- Molecule 1: Virion-associated phage protein

Chain f:  71% 26% ..



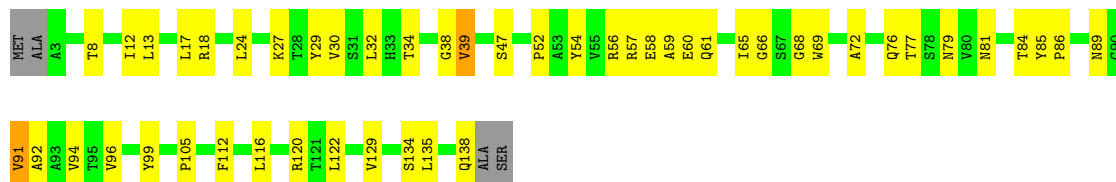
- Molecule 1: Virion-associated phage protein

Chain g:  67% 28% ..



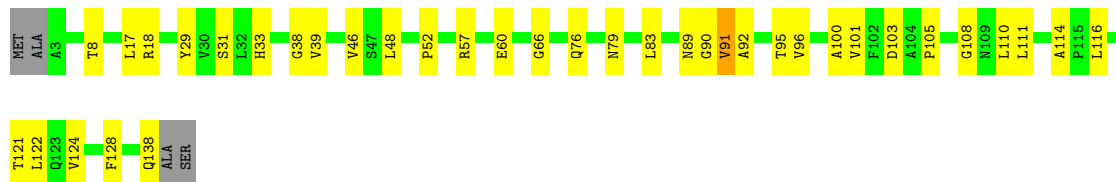
- Molecule 1: Virion-associated phage protein

Chain h:  62% 34% ..



- Molecule 1: Virion-associated phage protein

Chain i:  71% 26% ..



- Molecule 1: Virion-associated phage protein

Chain j:  77% 19% ..



- Molecule 2: rope protein of phage GP4

Chain A:  88% 10% .



- Molecule 3: Virion-associated phage protein

Chain D:  60% 33% ..



- Molecule 3: Virion-associated phage protein

Chain B:  57% 38% ..



- Molecule 3: Virion-associated phage protein

Chain C:  70% 26% .



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	39883	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	35	Depositor
Minimum defocus (nm)	100	Depositor
Maximum defocus (nm)	3800	Depositor
Magnification	Not provided	
Image detector	FEI FALCON II (4k x 4k)	Depositor

5 Model quality [i](#)

5.1 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 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	0.21	0/1013	0.49	0/1392
1	b	0.19	0/1013	0.49	0/1392
1	c	0.19	0/1013	0.51	2/1392 (0.1%)
1	d	0.22	0/1013	0.49	0/1392
1	e	0.18	0/1013	0.46	2/1392 (0.1%)
1	f	0.18	0/1013	0.46	0/1392
1	g	0.17	0/1013	0.48	2/1392 (0.1%)
1	h	0.18	0/1013	0.48	0/1392
1	i	0.14	0/1013	0.40	2/1392 (0.1%)
1	j	0.14	0/1013	0.40	0/1392
3	B	0.28	0/676	0.76	2/923 (0.2%)
3	C	0.27	0/676	0.69	4/923 (0.4%)
3	D	0.28	0/676	0.64	3/923 (0.3%)
All	All	0.20	0/12158	0.51	17/16689 (0.1%)

There are no bond length outliers.

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	39	ASP	N-CA-C	11.77	125.38	111.02
3	B	64	ALA	N-CA-C	8.97	121.05	111.28
3	C	41	GLY	N-CA-C	-8.29	104.14	114.92
3	D	39	ASP	N-CA-C	-6.87	103.81	111.71
1	c	38	GLY	CA-C-N	5.75	132.32	121.97
1	c	38	GLY	C-N-CA	5.75	132.32	121.97
3	C	37	THR	CA-C-N	-5.61	113.33	120.23
3	C	37	THR	C-N-CA	-5.61	113.33	120.23
1	g	38	GLY	CA-C-N	5.34	131.58	121.97
1	g	38	GLY	C-N-CA	5.34	131.58	121.97
3	D	37	THR	CA-C-N	-5.33	113.44	120.96
3	D	37	THR	C-N-CA	-5.33	113.44	120.96
3	C	39	ASP	N-CA-C	-5.14	106.85	113.02
1	e	38	GLY	CA-C-N	5.14	131.22	121.97

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	e	38	GLY	C-N-CA	5.14	131.22	121.97
1	i	38	GLY	CA-C-N	5.07	131.10	121.97
1	i	38	GLY	C-N-CA	5.07	131.10	121.97

There are no chirality outliers.

There are no planarity outliers.

5.2 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 the 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 within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	a	990	0	962	42	0
1	b	990	0	962	35	0
1	c	990	0	962	36	0
1	d	990	0	962	40	0
1	e	990	0	962	28	0
1	f	990	0	962	38	0
1	g	990	0	962	40	0
1	h	990	0	962	49	0
1	i	990	0	962	26	0
1	j	990	0	962	18	0
2	A	590	0	153	28	0
3	B	665	0	654	27	0
3	C	665	0	654	15	0
3	D	665	0	654	22	0
All	All	12485	0	11735	366	0

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 15.

All (366) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:h:134:SER:HB3	2:A:82:UNK:CB	1.57	1.32
1:h:135:LEU:H	2:A:82:UNK:CB	1.61	1.13
1:g:3:ALA:CB	2:A:89:UNK:CB	2.33	1.06

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:f:138:GLN:H	2:A:66:UNK:CB	1.70	1.04
1:h:134:SER:CB	2:A:82:UNK:CB	2.38	1.01
1:g:3:ALA:HB1	2:A:89:UNK:CB	1.95	0.94
1:h:135:LEU:N	2:A:82:UNK:CB	2.38	0.87
1:h:52:PRO:HB2	1:h:89:ASN:HD22	1.41	0.85
1:g:3:ALA:HB3	2:A:89:UNK:CB	2.07	0.83
1:a:12:ILE:HD12	1:b:12:ILE:HG12	1.61	0.82
1:a:122:LEU:HD11	1:a:128:PHE:HB2	1.62	0.81
1:f:138:GLN:N	2:A:66:UNK:CB	2.43	0.80
1:c:91:VAL:HG12	1:c:92:ALA:H	1.49	0.77
1:f:128:PHE:H	2:A:58:UNK:CB	1.99	0.76
1:a:98:HIS:HD2	1:a:115:PRO:HA	1.51	0.75
1:f:8:THR:HG21	1:f:111:LEU:HA	1.67	0.75
1:b:83:LEU:HB2	1:b:130:PHE:HB2	1.71	0.73
1:e:18:ARG:NH2	1:f:66:GLY:O	2.21	0.72
1:a:37:PRO:HB2	1:a:113:LYS:HG3	1.72	0.70
1:h:134:SER:CA	2:A:82:UNK:CB	2.70	0.69
1:f:138:GLN:HG2	2:A:66:UNK:CB	2.21	0.69
1:c:18:ARG:HD2	1:d:71:PRO:HA	1.74	0.69
1:i:100:ALA:HB1	1:i:110:LEU:HD11	1.74	0.68
1:g:99:TYR:HE1	2:A:91:UNK:CB	2.07	0.67
1:a:74:SER:O	1:a:76:GLN:NE2	2.28	0.66
1:d:91:VAL:HG12	1:d:92:ALA:H	1.60	0.66
1:b:129:VAL:HG11	3:B:30:GLN:HE21	1.61	0.66
1:a:91:VAL:HG12	1:a:92:ALA:H	1.61	0.65
1:h:38:GLY:O	1:h:39:VAL:HG22	1.96	0.65
3:B:13:LEU:HB2	3:B:15:TYR:CE2	2.31	0.65
1:a:123:GLN:N	1:a:126:ASP:OD1	2.30	0.65
1:c:72:ALA:HB2	1:d:13:LEU:HD22	1.78	0.65
1:f:122:LEU:HD21	1:f:128:PHE:HB2	1.79	0.65
1:g:69:TRP:CD1	1:h:17:LEU:HB3	2.32	0.65
1:h:61:GLN:H	1:h:81:ASN:HD22	1.43	0.65
1:a:66:GLY:O	1:b:18:ARG:NH2	2.30	0.64
3:B:36:ILE:HD12	3:B:43:LEU:HD22	1.80	0.64
1:g:84:THR:HG23	1:g:129:VAL:HG12	1.80	0.64
1:i:31:SER:HG	1:i:33:HIS:HE2	1.43	0.64
3:B:22:TRP:HH2	3:B:80:ARG:HB2	1.63	0.64
1:a:98:HIS:CD2	1:a:115:PRO:HA	2.34	0.63
3:B:6:GLN:HB3	3:B:88:THR:HA	1.81	0.63
1:b:120:ARG:HE	1:b:128:PHE:HD1	1.47	0.63
1:i:8:THR:HG21	1:i:111:LEU:HA	1.80	0.63

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:f:4:ALA:HB2	2:A:67:UNK:CB	2.30	0.62
1:i:66:GLY:O	1:j:18:ARG:NH2	2.33	0.62
3:C:8:THR:O	3:C:91:ARG:N	2.24	0.62
1:i:46:VAL:HG23	1:i:48:LEU:HD22	1.82	0.61
1:d:30:VAL:HG11	1:d:83:LEU:HD13	1.81	0.61
1:d:60:GLU:OE1	1:d:67:SER:N	2.32	0.61
1:g:18:ARG:NH2	1:h:66:GLY:O	2.33	0.61
1:h:60:GLU:OE1	1:h:68:GLY:N	2.30	0.61
1:c:91:VAL:HG12	1:c:92:ALA:N	2.16	0.61
1:a:17:LEU:HD12	1:b:69:TRP:CE2	2.36	0.60
1:c:79:ASN:HB3	1:c:135:LEU:HD23	1.83	0.60
3:C:34:VAL:HG11	3:C:57:VAL:HG21	1.83	0.60
1:b:48:LEU:HD12	1:b:49:SER:H	1.66	0.60
1:h:56:ARG:NH1	1:h:105:PRO:O	2.33	0.60
1:b:76:GLN:H	1:b:138:GLN:HA	1.67	0.60
1:j:77:THR:OG1	1:j:137:ALA:N	2.33	0.59
1:a:69:TRP:HB3	1:a:77:THR:HB	1.84	0.59
3:D:6:GLN:HB3	3:D:15:TYR:CZ	2.37	0.59
3:C:62:GLY:HA3	3:C:68:TYR:HE2	1.66	0.59
1:j:58:GLU:O	1:j:61:GLN:NE2	2.36	0.59
1:j:122:LEU:HD21	1:j:128:PHE:HB2	1.85	0.59
1:h:116:LEU:HD11	2:A:81:UNK:CB	2.33	0.59
3:B:14:ASP:OD1	3:B:15:TYR:N	2.33	0.59
1:f:138:GLN:CB	2:A:66:UNK:CB	2.81	0.59
1:b:33:HIS:ND1	1:b:37:PRO:HG3	2.17	0.58
1:c:77:THR:HG22	1:d:13:LEU:HD21	1.85	0.58
1:a:83:LEU:HB2	1:a:130:PHE:HB2	1.84	0.58
1:g:13:LEU:HD22	1:h:72:ALA:HB2	1.85	0.58
1:c:10:ASN:HD21	1:d:74:SER:H	1.52	0.58
1:b:38:GLY:O	1:b:39:VAL:HG12	2.04	0.58
1:b:27:LYS:NZ	1:b:58:GLU:OE2	2.21	0.58
1:g:71:PRO:HA	1:h:18:ARG:HD2	1.85	0.58
1:a:32:LEU:HG	1:a:85:TYR:HE2	1.69	0.57
1:b:51:TRP:HE1	1:b:88:ASN:HA	1.69	0.57
1:d:97:THR:HG23	1:d:98:HIS:CD2	2.39	0.57
1:g:17:LEU:HD23	1:h:69:TRP:CD2	2.40	0.57
1:f:79:ASN:HD22	1:f:135:LEU:HD13	1.70	0.57
1:d:46:VAL:HG21	1:d:56:ARG:HH21	1.70	0.57
1:j:60:GLU:HG3	1:j:67:SER:HB2	1.85	0.57
1:d:79:ASN:HD22	1:d:135:LEU:HD13	1.70	0.56
1:i:31:SER:OG	1:i:33:HIS:NE2	2.37	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:h:129:VAL:O	2:A:80:UNK:CB	2.53	0.56
1:d:91:VAL:HG12	1:d:92:ALA:N	2.20	0.56
1:h:61:GLN:H	1:h:81:ASN:ND2	2.04	0.56
3:C:27:ASP:OD2	3:C:80:ARG:NH1	2.38	0.56
3:D:43:LEU:HD21	3:D:59:LEU:HD11	1.86	0.56
1:e:88:ASN:ND2	1:e:123:GLN:O	2.34	0.56
1:g:91:VAL:HG12	1:g:92:ALA:N	2.22	0.55
1:j:61:GLN:OE1	1:j:81:ASN:ND2	2.40	0.55
3:D:11:GLU:OE1	3:D:11:GLU:N	2.40	0.55
1:c:83:LEU:HB2	1:c:130:PHE:HB2	1.87	0.55
3:D:50:ILE:HG22	3:D:55:VAL:HG22	1.88	0.55
1:b:51:TRP:CD1	1:b:88:ASN:HD22	2.24	0.54
3:D:13:LEU:HD23	3:D:15:TYR:CZ	2.42	0.54
3:C:6:GLN:HB2	3:C:88:THR:HG22	1.89	0.54
1:a:9:GLU:HA	1:a:12:ILE:HG22	1.90	0.54
3:D:19:PHE:CE2	3:D:74:VAL:HG21	2.42	0.54
1:c:122:LEU:HD21	1:c:128:PHE:HD1	1.73	0.54
1:d:52:PRO:HB2	1:d:89:ASN:HD22	1.73	0.54
1:h:79:ASN:ND2	1:h:135:LEU:HD13	2.23	0.54
1:g:117:THR:HG23	2:A:92:UNK:HA	1.90	0.54
1:e:91:VAL:HG12	1:e:92:ALA:N	2.23	0.54
3:D:36:ILE:HG21	3:D:43:LEU:HD23	1.89	0.54
1:e:79:ASN:HD22	1:e:135:LEU:HD12	1.73	0.53
1:h:91:VAL:HG12	1:h:92:ALA:N	2.23	0.53
1:g:31:SER:OG	1:g:56:ARG:HD3	2.08	0.53
1:g:115:PRO:O	2:A:91:UNK:CB	2.56	0.53
1:j:56:ARG:NH1	1:j:105:PRO:O	2.41	0.53
1:b:91:VAL:HG12	1:b:92:ALA:N	2.24	0.53
1:c:9:GLU:HA	1:c:12:ILE:HG12	1.90	0.53
1:h:30:VAL:O	1:h:85:TYR:OH	2.26	0.53
1:a:91:VAL:HG12	1:a:92:ALA:N	2.24	0.53
1:g:101:VAL:HB	1:g:111:LEU:HB2	1.91	0.53
1:i:91:VAL:HG12	1:i:92:ALA:N	2.24	0.53
1:f:61:GLN:H	1:f:81:ASN:HD22	1.55	0.53
1:e:100:ALA:HB1	1:e:110:LEU:HD11	1.91	0.52
1:h:27:LYS:HE2	1:h:29:TYR:CE1	2.44	0.52
1:h:32:LEU:HD23	1:h:99:TYR:HB3	1.91	0.52
1:f:91:VAL:HG12	1:f:92:ALA:N	2.24	0.52
1:i:79:ASN:HD21	1:i:83:LEU:HD13	1.75	0.52
1:e:9:GLU:HA	1:e:12:ILE:HG12	1.91	0.52
1:g:91:VAL:HG12	1:g:92:ALA:H	1.75	0.52

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:11:GLU:HB2	3:C:81:ILE:O	2.10	0.52
1:a:74:SER:HA	1:b:6:THR:HG23	1.90	0.52
1:d:32:LEU:HD22	1:d:96:VAL:HG11	1.91	0.52
1:a:84:THR:HA	1:a:129:VAL:HG12	1.92	0.51
1:c:5:SER:HA	1:c:39:VAL:HG22	1.93	0.51
1:c:123:GLN:N	1:c:126:ASP:OD1	2.43	0.51
1:e:123:GLN:OE1	1:h:120:ARG:NH2	2.44	0.51
3:C:67:SER:HB2	3:C:87:LYS:HE2	1.93	0.51
1:i:114:ALA:HB2	2:A:111:UNK:CB	2.41	0.51
1:a:60:GLU:HB3	1:a:68:GLY:HA2	1.93	0.51
3:D:36:ILE:HD11	3:D:45:SER:HB3	1.93	0.51
1:j:91:VAL:HG12	1:j:92:ALA:N	2.26	0.51
3:C:50:ILE:O	3:C:50:ILE:HG13	2.11	0.51
1:g:17:LEU:HD22	1:h:77:THR:HG21	1.93	0.51
3:B:36:ILE:HG23	3:B:39:ASP:HA	1.93	0.51
1:e:51:TRP:NE1	1:e:88:ASN:HA	2.26	0.51
1:e:51:TRP:HE1	1:e:88:ASN:HA	1.76	0.50
1:a:29:TYR:O	1:a:102:PHE:N	2.32	0.50
1:i:91:VAL:HG12	1:i:92:ALA:H	1.75	0.50
1:h:18:ARG:HH11	1:h:18:ARG:HB3	1.75	0.50
1:e:91:VAL:HG12	1:e:92:ALA:H	1.77	0.50
1:f:138:GLN:CG	2:A:66:UNK:CB	2.89	0.50
1:j:76:GLN:OE1	1:j:138:GLN:NE2	2.36	0.50
1:h:60:GLU:HB3	1:h:68:GLY:N	2.27	0.50
1:g:52:PRO:HD2	1:g:89:ASN:HB2	1.93	0.50
1:i:18:ARG:NH2	1:j:69:TRP:O	2.40	0.50
1:i:29:TYR:CE1	1:i:105:PRO:HD3	2.47	0.50
3:D:6:GLN:HB2	3:D:88:THR:HG22	1.93	0.49
3:C:43:LEU:HB2	3:C:68:TYR:CD2	2.47	0.49
1:h:32:LEU:HD12	1:h:85:TYR:CE1	2.47	0.49
1:g:122:LEU:HD21	1:g:128:PHE:HB2	1.94	0.49
1:i:76:GLN:OE1	1:i:138:GLN:NE2	2.41	0.49
1:a:29:TYR:HE2	1:a:105:PRO:HD3	1.77	0.49
1:c:18:ARG:NH2	1:d:66:GLY:O	2.45	0.49
1:e:126:ASP:OD1	1:e:127:VAL:N	2.45	0.49
1:b:91:VAL:HG12	1:b:92:ALA:H	1.76	0.49
1:h:32:LEU:O	1:h:54:TYR:OH	2.23	0.49
3:B:52:GLY:O	3:B:53:THR:OG1	2.26	0.49
1:c:38:GLY:O	1:c:39:VAL:HG12	2.12	0.48
1:d:36:ASP:HA	1:d:98:HIS:ND1	2.28	0.48
1:h:84:THR:HG22	1:h:129:VAL:HG23	1.95	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:24:PRO:HD2	3:B:27:ASP:OD2	2.13	0.48
1:a:17:LEU:HD12	1:b:69:TRP:CD2	2.48	0.48
1:b:95:THR:HA	1:b:121:THR:HA	1.96	0.48
1:d:60:GLU:HB3	1:d:68:GLY:N	2.29	0.48
1:g:32:LEU:N	1:g:54:TYR:OH	2.32	0.48
1:h:138:GLN:HB3	2:A:85:UNK:HA	1.96	0.48
1:f:138:GLN:HB2	2:A:66:UNK:CB	2.43	0.48
1:e:52:PRO:HG2	1:e:89:ASN:HB2	1.95	0.47
1:f:8:THR:O	1:f:12:ILE:HG12	2.13	0.47
1:f:84:THR:HG22	1:f:129:VAL:HG23	1.96	0.47
1:c:124:VAL:HG21	1:f:82:GLN:NE2	2.29	0.47
3:C:38:PRO:HG2	3:C:68:TYR:CG	2.49	0.47
1:a:36:ASP:HA	1:a:98:HIS:ND1	2.29	0.47
1:h:18:ARG:HB3	1:h:18:ARG:NH1	2.29	0.47
1:e:12:ILE:HB	1:f:12:ILE:HD12	1.95	0.47
1:h:94:VAL:O	1:h:122:LEU:HB2	2.14	0.47
3:C:19:PHE:HE1	3:C:74:VAL:HG21	1.76	0.47
1:c:69:TRP:CD1	1:c:77:THR:HB	2.49	0.47
1:i:101:VAL:HG12	1:i:111:LEU:HD12	1.95	0.47
1:a:51:TRP:CZ2	1:a:122:LEU:HD12	2.49	0.47
1:a:70:THR:HG22	1:a:78:SER:H	1.78	0.47
3:B:11:GLU:OE1	3:B:11:GLU:N	2.48	0.47
1:g:52:PRO:HB2	1:g:89:ASN:HD22	1.80	0.47
1:b:57:ARG:HD3	1:b:86:PRO:HD3	1.97	0.47
1:a:99:TYR:CE2	1:a:135:LEU:HD23	2.50	0.46
1:d:9:GLU:O	1:d:12:ILE:HG22	2.15	0.46
1:d:58:GLU:N	1:d:58:GLU:OE1	2.48	0.46
1:f:61:GLN:H	1:f:81:ASN:ND2	2.12	0.46
1:d:57:ARG:HE	1:d:86:PRO:HD3	1.80	0.46
1:g:21:ALA:HA	1:h:24:LEU:HD11	1.98	0.46
3:B:32:ALA:O	3:B:48:TYR:OH	2.29	0.46
1:c:28:THR:HG21	1:c:69:TRP:HZ3	1.81	0.46
1:d:123:GLN:N	1:d:126:ASP:OD2	2.44	0.46
1:c:124:VAL:HG21	1:f:82:GLN:HE22	1.80	0.46
3:B:24:PRO:HG2	3:B:80:ARG:HH12	1.80	0.46
1:e:33:HIS:CE1	1:e:46:VAL:HG22	2.51	0.46
1:i:122:LEU:HD21	1:i:128:PHE:CD1	2.51	0.46
3:C:43:LEU:HB2	3:C:68:TYR:HD2	1.81	0.46
1:a:12:ILE:HG23	1:a:13:LEU:HD22	1.97	0.46
1:d:69:TRP:HZ2	1:d:135:LEU:HD23	1.80	0.46
3:D:11:GLU:HB3	3:B:83:GLU:OE1	2.15	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:52:GLY:O	3:D:53:THR:OG1	2.30	0.46
1:a:101:VAL:HG12	1:a:111:LEU:HD12	1.98	0.46
1:b:52:PRO:HB2	1:b:89:ASN:OD1	2.15	0.46
1:g:118:VAL:HG23	1:g:120:ARG:HD3	1.98	0.46
1:j:32:LEU:HD21	1:j:130:PHE:HE2	1.81	0.46
1:g:17:LEU:HD11	1:h:112:PHE:HE2	1.80	0.46
1:i:33:HIS:CE1	1:i:46:VAL:HG12	2.51	0.46
1:e:33:HIS:HE2	1:e:100:ALA:HB3	1.81	0.46
1:g:38:GLY:O	1:g:39:VAL:HG12	2.15	0.46
1:g:58:GLU:HG2	1:g:59:ALA:O	2.16	0.46
1:h:57:ARG:HH11	1:h:86:PRO:HD3	1.80	0.46
1:b:98:HIS:NE2	1:b:115:PRO:HB3	2.31	0.45
1:g:33:HIS:CE1	1:g:46:VAL:HG22	2.51	0.45
1:i:96:VAL:HG12	1:i:116:LEU:HD11	1.98	0.45
3:B:14:ASP:HA	3:B:58:TRP:CD1	2.52	0.45
1:a:48:LEU:C	1:a:50:ASN:H	2.24	0.45
1:h:91:VAL:HG12	1:h:92:ALA:H	1.81	0.45
1:c:69:TRP:HZ2	1:c:135:LEU:HD21	1.81	0.45
1:b:33:HIS:HD2	1:b:46:VAL:HA	1.82	0.45
1:f:79:ASN:HD21	1:f:134:SER:HB3	1.81	0.45
1:h:58:GLU:HG2	1:h:59:ALA:O	2.17	0.45
1:h:134:SER:HA	2:A:82:UNK:CB	2.45	0.45
1:a:32:LEU:HD13	1:a:96:VAL:HG11	1.99	0.45
1:a:130:PHE:CE2	1:a:135:LEU:HD21	2.52	0.45
1:c:13:LEU:HD21	1:d:77:THR:CG2	2.47	0.45
1:b:32:LEU:HD22	1:b:96:VAL:HG11	1.99	0.45
1:d:38:GLY:C	1:d:40:GLY:H	2.25	0.45
1:h:27:LYS:HB2	1:h:58:GLU:OE1	2.16	0.45
1:b:54:TYR:CG	1:b:54:TYR:O	2.70	0.45
1:d:48:LEU:C	1:d:50:ASN:H	2.25	0.45
1:e:17:LEU:HD23	1:f:69:TRP:CE3	2.52	0.44
1:e:37:PRO:HD2	1:e:113:LYS:HG3	2.00	0.44
1:g:101:VAL:HG12	1:g:111:LEU:HD12	1.99	0.44
1:j:70:THR:HG22	1:j:78:SER:N	2.31	0.44
3:D:49:GLU:O	3:D:56:LYS:N	2.40	0.44
1:c:29:TYR:HE2	1:c:58:GLU:HB2	1.82	0.44
1:c:112:PHE:CZ	1:d:17:LEU:HD21	2.53	0.44
1:g:13:LEU:HD21	1:h:77:THR:HG22	1.98	0.44
3:B:19:PHE:HB3	3:B:23:MET:HE2	1.99	0.44
1:c:18:ARG:HB3	1:c:18:ARG:NH1	2.33	0.44
1:e:79:ASN:OD1	1:e:79:ASN:N	2.51	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:f:95:THR:HA	1:f:121:THR:HA	1.98	0.44
1:a:134:SER:HB2	1:a:135:LEU:HD12	2.00	0.44
1:g:99:TYR:CE1	2:A:91:UNK:CB	2.95	0.44
1:a:138:GLN:C	1:b:13:LEU:HD21	2.43	0.44
1:f:138:GLN:CA	2:A:66:UNK:CB	2.96	0.44
1:d:122:LEU:HD11	1:d:128:PHE:CD2	2.53	0.44
1:f:32:LEU:HD21	1:f:128:PHE:CE1	2.52	0.44
3:D:37:THR:OG1	3:D:38:PRO:HD3	2.17	0.44
3:C:6:GLN:C	3:C:7:LYS:HD3	2.43	0.44
3:B:43:LEU:HD21	3:B:59:LEU:HD22	1.99	0.43
1:a:99:TYR:CE1	1:a:114:ALA:HB3	2.53	0.43
1:b:123:GLN:HB2	1:b:126:ASP:OD2	2.19	0.43
1:g:84:THR:HB	1:j:84:THR:HG21	1.99	0.43
3:B:41:GLY:O	3:B:43:LEU:N	2.52	0.43
1:a:6:THR:HG22	1:a:40:GLY:HA2	2.01	0.43
1:a:51:TRP:HZ2	1:a:122:LEU:HD12	1.83	0.43
1:e:112:PHE:HE1	1:f:17:LEU:HD11	1.83	0.43
1:e:17:LEU:HD23	1:f:69:TRP:CD2	2.53	0.43
1:f:83:LEU:HB2	1:f:130:PHE:HB2	2.00	0.43
1:d:79:ASN:ND2	1:d:135:LEU:HD13	2.33	0.43
3:C:38:PRO:HG2	3:C:68:TYR:CD1	2.54	0.43
1:b:120:ARG:HH22	3:B:50:ILE:CD1	2.31	0.43
1:c:77:THR:HG23	1:d:13:LEU:HD11	2.01	0.43
1:c:134:SER:OG	1:c:135:LEU:N	2.50	0.43
1:d:127:VAL:HG23	1:d:129:VAL:HG13	2.01	0.43
1:h:12:ILE:HG13	1:h:13:LEU:N	2.33	0.43
1:i:17:LEU:HB3	1:j:69:TRP:CE3	2.54	0.43
1:i:57:ARG:HA	1:i:57:ARG:HD3	1.74	0.43
3:B:87:LYS:HZ1	3:B:89:ARG:HB2	1.83	0.43
1:b:118:VAL:HG11	3:B:33:GLY:HA2	2.01	0.43
1:c:69:TRP:CZ2	1:c:135:LEU:HD21	2.53	0.43
1:b:51:TRP:NE1	1:b:88:ASN:HA	2.32	0.43
1:g:123:GLN:N	1:g:126:ASP:OD2	2.37	0.42
1:d:73:ALA:O	1:d:76:GLN:NE2	2.52	0.42
1:e:79:ASN:ND2	1:e:135:LEU:HD12	2.33	0.42
1:a:122:LEU:HD23	1:a:122:LEU:HA	1.83	0.42
1:c:58:GLU:HG2	1:c:59:ALA:O	2.18	0.42
1:f:87:ALA:HA	1:f:126:ASP:O	2.19	0.42
1:g:128:PHE:O	1:g:128:PHE:CD2	2.71	0.42
3:D:22:TRP:NE1	3:D:82:LYS:HD3	2.34	0.42
1:a:57:ARG:HB3	1:a:85:TYR:CE1	2.53	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:e:48:LEU:C	1:e:50:ASN:H	2.27	0.42
1:g:131:ASP:OD1	1:g:132:VAL:N	2.53	0.42
1:i:52:PRO:HD2	1:i:89:ASN:HB2	2.01	0.42
3:B:49:GLU:OE1	3:B:49:GLU:N	2.52	0.42
1:a:54:TYR:O	1:a:54:TYR:CG	2.72	0.42
1:g:32:LEU:H	1:g:54:TYR:HH	1.62	0.42
1:i:95:THR:HA	1:i:121:THR:HA	2.01	0.42
1:h:32:LEU:HD22	1:h:96:VAL:HG11	2.00	0.42
3:B:80:ARG:H	3:B:80:ARG:HG2	1.66	0.42
1:c:12:ILE:HD12	1:d:12:ILE:HD11	2.02	0.42
3:D:36:ILE:HG22	3:D:38:PRO:HD2	2.01	0.42
1:b:84:THR:HG22	1:b:129:VAL:HG23	2.01	0.42
1:e:12:ILE:HG13	1:e:13:LEU:N	2.35	0.42
3:D:49:GLU:CD	3:D:58:TRP:HE1	2.28	0.42
1:e:13:LEU:HD21	1:f:77:THR:CG2	2.50	0.42
1:c:57:ARG:HD3	1:c:57:ARG:HA	1.71	0.41
1:f:102:PHE:HE1	1:f:110:LEU:HD12	1.85	0.41
1:g:66:GLY:O	1:h:18:ARG:NH2	2.53	0.41
1:h:34:THR:OG1	1:h:47:SER:OG	2.32	0.41
1:j:57:ARG:HA	1:j:57:ARG:HD3	1.72	0.41
3:D:51:ASP:N	3:D:51:ASP:OD1	2.53	0.41
1:c:124:VAL:HG22	1:f:84:THR:HG21	2.01	0.41
1:d:57:ARG:HA	1:d:57:ARG:HD3	1.79	0.41
1:a:122:LEU:HD11	1:a:128:PHE:CB	2.42	0.41
1:j:9:GLU:HA	1:j:12:ILE:HG12	2.02	0.41
1:d:131:ASP:OD1	1:d:132:VAL:N	2.53	0.41
1:g:13:LEU:HD11	1:h:77:THR:HG23	2.01	0.41
1:h:8:THR:O	1:h:12:ILE:HG12	2.20	0.41
3:D:46:PRO:HG2	3:D:58:TRP:HB2	2.02	0.41
1:b:60:GLU:HB3	1:b:68:GLY:CA	2.51	0.41
1:c:17:LEU:HD12	1:d:77:THR:HG21	2.02	0.41
1:f:32:LEU:HD23	1:f:96:VAL:HG21	2.03	0.41
1:g:57:ARG:HA	1:g:57:ARG:HD3	1.85	0.41
1:j:101:VAL:C	1:j:102:PHE:HD2	2.28	0.41
3:D:43:LEU:HB2	3:D:68:TYR:CD1	2.56	0.41
1:a:27:LYS:HA	1:a:27:LYS:HD3	1.92	0.41
1:b:38:GLY:C	1:b:40:GLY:H	2.29	0.41
1:e:60:GLU:HB3	1:e:68:GLY:CA	2.51	0.41
1:g:116:LEU:HD22	2:A:93:UNK:CB	2.50	0.41
1:i:52:PRO:HB2	1:i:89:ASN:OD1	2.21	0.41
1:i:90:GLY:HA2	1:i:124:VAL:HG13	2.02	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:c:135:LEU:O	1:c:135:LEU:HG	2.21	0.41
1:d:130:PHE:CD2	1:d:135:LEU:HD11	2.56	0.41
1:e:95:THR:HA	1:e:121:THR:HA	2.02	0.41
1:f:31:SER:HA	1:f:56:ARG:NH2	2.35	0.41
1:a:33:HIS:CE1	1:a:46:VAL:HG12	2.55	0.41
1:a:51:TRP:HB3	1:a:54:TYR:HB2	2.02	0.41
1:b:130:PHE:CD2	1:b:135:LEU:HD11	2.56	0.41
1:j:70:THR:HG22	1:j:78:SER:H	1.86	0.41
3:D:8:THR:O	3:D:91:ARG:N	2.38	0.41
3:C:11:GLU:CD	3:C:11:GLU:H	2.29	0.41
1:e:69:TRP:CE3	1:f:17:LEU:HB3	2.56	0.41
1:i:60:GLU:OE2	1:i:66:GLY:N	2.53	0.41
1:i:114:ALA:CB	2:A:111:UNK:CB	2.99	0.41
3:D:5:VAL:HA	3:D:87:LYS:O	2.21	0.41
3:B:37:THR:HB	3:B:38:PRO:HD3	2.03	0.41
1:b:120:ARG:HD2	3:B:48:TYR:OH	2.21	0.40
1:c:12:ILE:HB	1:d:12:ILE:HD11	2.02	0.40
1:c:34:THR:HG22	1:c:95:THR:O	2.21	0.40
1:d:37:PRO:HD3	1:d:98:HIS:ND1	2.36	0.40
1:d:88:ASN:ND2	1:d:123:GLN:O	2.37	0.40
3:B:6:GLN:O	3:B:89:ARG:N	2.47	0.40
1:c:12:ILE:HG13	1:c:13:LEU:N	2.36	0.40
1:e:13:LEU:HD21	1:f:77:THR:HG23	2.03	0.40
1:h:60:GLU:OE2	1:h:65:ILE:HA	2.21	0.40
1:i:103:ASP:HB3	1:i:108:GLY:O	2.22	0.40
3:D:66:ALA:O	3:D:90:VAL:HG22	2.21	0.40
1:b:77:THR:O	1:b:136:THR:HA	2.22	0.40
1:c:29:TYR:HE1	1:c:105:PRO:HD3	1.87	0.40
1:d:32:LEU:HB2	1:d:54:TYR:OH	2.21	0.40
1:d:56:ARG:NH1	1:d:105:PRO:O	2.54	0.40
1:h:34:THR:HG1	1:h:47:SER:HG	1.55	0.40
1:g:7:TYR:CD2	1:g:109:ASN:HB3	2.57	0.40
1:f:12:ILE:HD13	1:f:22:PHE:CE1	2.55	0.40
1:f:57:ARG:HA	1:f:57:ARG:HD3	1.71	0.40
3:B:19:PHE:CD2	3:B:82:LYS:HD3	2.57	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 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 EM 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	134/140 (96%)	122 (91%)	9 (7%)	3 (2%)	5	32
1	b	134/140 (96%)	123 (92%)	8 (6%)	3 (2%)	5	32
1	c	134/140 (96%)	124 (92%)	7 (5%)	3 (2%)	5	32
1	d	134/140 (96%)	124 (92%)	7 (5%)	3 (2%)	5	32
1	e	134/140 (96%)	121 (90%)	11 (8%)	2 (2%)	8	40
1	f	134/140 (96%)	122 (91%)	9 (7%)	3 (2%)	5	32
1	g	134/140 (96%)	120 (90%)	11 (8%)	3 (2%)	5	32
1	h	134/140 (96%)	121 (90%)	10 (8%)	3 (2%)	5	32
1	i	134/140 (96%)	119 (89%)	13 (10%)	2 (2%)	8	40
1	j	134/140 (96%)	123 (92%)	8 (6%)	3 (2%)	5	32
3	B	87/93 (94%)	76 (87%)	9 (10%)	2 (2%)	5	31
3	C	87/93 (94%)	77 (88%)	10 (12%)	0	100	100
3	D	87/93 (94%)	76 (87%)	11 (13%)	0	100	100
All	All	1601/1679 (95%)	1448 (90%)	123 (8%)	30 (2%)	9	35

All (30) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	a	39	VAL
1	b	39	VAL
1	c	39	VAL
1	d	39	VAL
1	d	76	GLN
1	e	39	VAL
1	f	39	VAL
1	g	39	VAL
1	h	39	VAL
1	i	39	VAL

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	j	39	VAL
3	B	42	THR
1	c	91	VAL
1	d	91	VAL
1	g	91	VAL
1	h	91	VAL
1	a	91	VAL
1	b	76	GLN
1	b	91	VAL
1	e	91	VAL
1	f	91	VAL
1	g	76	GLN
1	h	76	GLN
1	i	91	VAL
1	j	91	VAL
1	c	76	GLN
1	a	76	GLN
1	f	76	GLN
1	j	76	GLN
3	B	65	GLY

5.3.2 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 EM 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	101/103 (98%)	101 (100%)	0	100	100
1	b	101/103 (98%)	101 (100%)	0	100	100
1	c	101/103 (98%)	101 (100%)	0	100	100
1	d	101/103 (98%)	101 (100%)	0	100	100
1	e	101/103 (98%)	101 (100%)	0	100	100
1	f	101/103 (98%)	101 (100%)	0	100	100
1	g	101/103 (98%)	101 (100%)	0	100	100
1	h	101/103 (98%)	101 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	i	101/103 (98%)	101 (100%)	0	100	100
1	j	101/103 (98%)	101 (100%)	0	100	100
3	B	70/74 (95%)	68 (97%)	2 (3%)	37	58
3	C	70/74 (95%)	69 (99%)	1 (1%)	62	76
3	D	70/74 (95%)	67 (96%)	3 (4%)	25	48
All	All	1220/1252 (97%)	1214 (100%)	6 (0%)	85	90

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	D	37	THR
3	D	42	THR
3	D	43	LEU
3	B	39	ASP
3	B	40	ASP
3	C	40	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	a	14	ASN
1	a	98	HIS
1	b	50	ASN
1	b	88	ASN
1	b	109	ASN
1	c	44	ASN
1	d	81	ASN
1	d	89	ASN
1	d	109	ASN
1	f	81	ASN
1	f	138	GLN
1	g	44	ASN
1	g	89	ASN
1	g	98	HIS
1	g	109	ASN
1	h	89	ASN
1	j	14	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.