



## Full wwPDB EM Validation Report ⓘ

Nov 5, 2024 – 10:35 AM JST

PDB ID : 8W9Y  
EMDB ID : EMD-37385  
Title : The cryo-EM structure of human sphingomyelin synthase-related protein  
Authors : Hu, K.; Zhang, Q.; Chen, Y.; Yao, D.; Zhou, L.; Cao, Y.  
Deposited on : 2023-09-06  
Resolution : 3.50 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](mailto: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 : 4.02b-467  
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) : 2.39

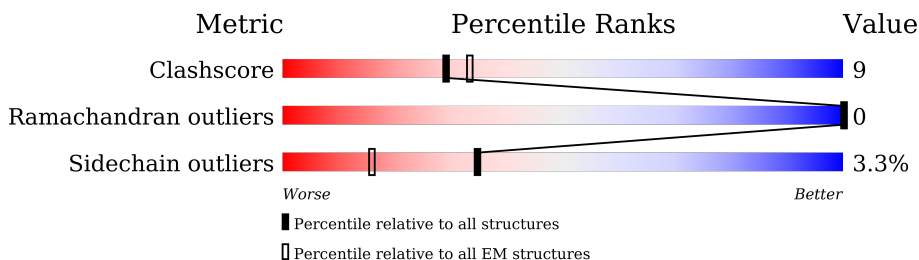
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.50 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  $\geq 3$ , 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	264	85% 14% .
1	B	264	85% 14% .
1	C	264	76% 23%
1	D	264	70% 28% .
1	E	264	69% 30% .
1	F	264	72% 26% .

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 13152 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.

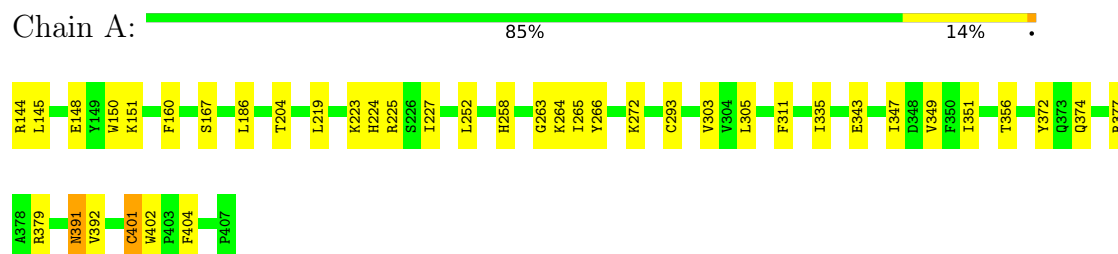
- Molecule 1 is a protein called Sphingomyelin synthase-related protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	264	Total	C	N	O	S	0	0
			2192	1465	354	354	19		
1	B	264	Total	C	N	O	S	0	0
			2192	1465	354	354	19		
1	C	264	Total	C	N	O	S	0	0
			2192	1465	354	354	19		
1	D	264	Total	C	N	O	S	0	0
			2192	1465	354	354	19		
1	E	264	Total	C	N	O	S	0	0
			2192	1465	354	354	19		
1	F	264	Total	C	N	O	S	0	0
			2192	1465	354	354	19		

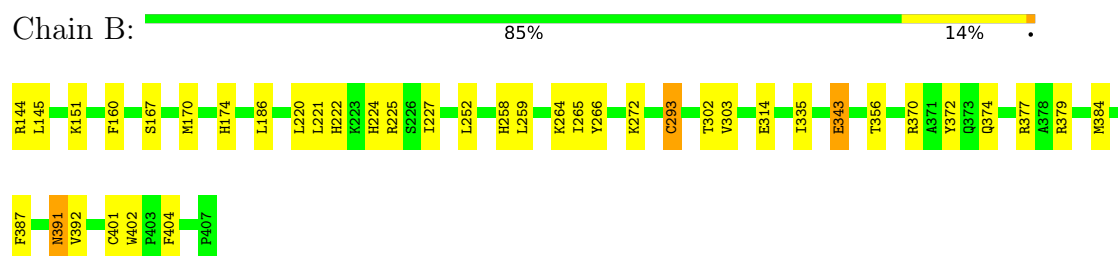
### 3 Residue-property plots

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.

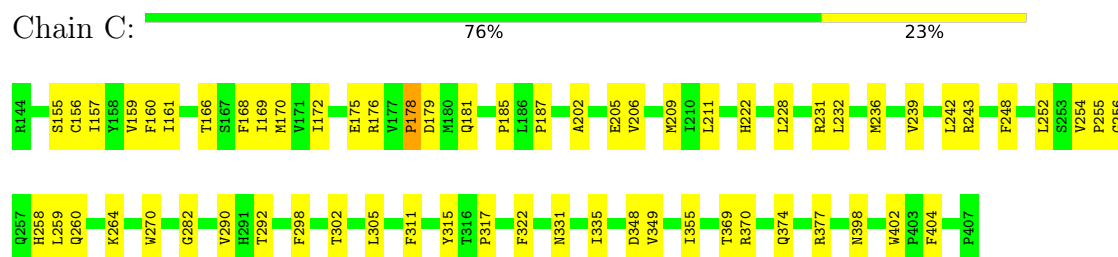
- Molecule 1: Spingomyelin synthase-related protein 1



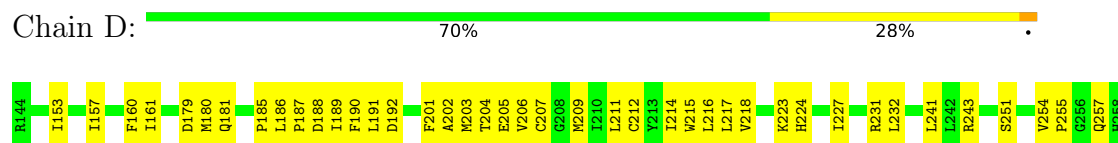
- Molecule 1: Spingomyelin synthase-related protein 1

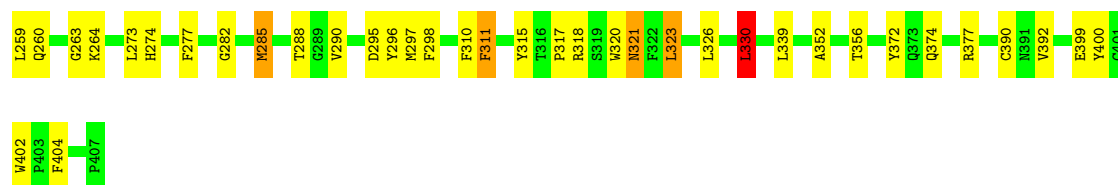


- Molecule 1: Spingomyelin synthase-related protein 1



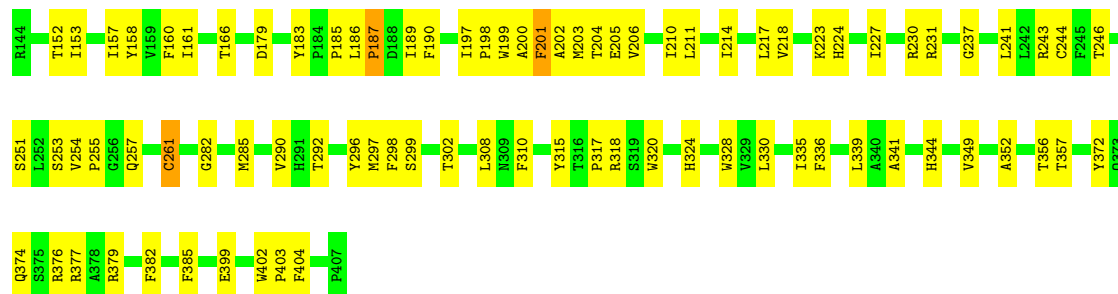
- Molecule 1: Spingomyelin synthase-related protein 1





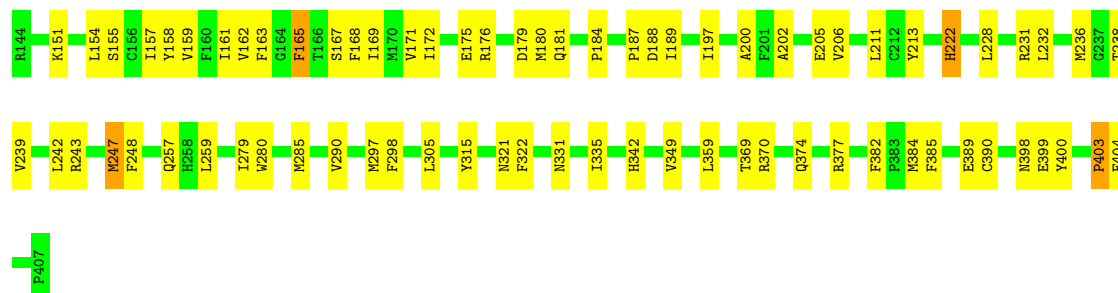
- Molecule 1: Spingomyelin synthase-related protein 1

Chain E: 69% 30% .



- Molecule 1: Spingomyelin synthase-related protein 1

Chain F: 72% 26% .



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	352573	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2600	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

## 5 Model quality

### 5.1 Standard geometry

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	0.27	0/2272	0.49	0/3098
1	B	0.27	0/2272	0.49	0/3098
1	C	0.30	0/2272	0.58	3/3098 (0.1%)
1	D	0.26	0/2272	0.53	1/3098 (0.0%)
1	E	0.28	0/2272	0.56	3/3098 (0.1%)
1	F	0.27	0/2272	0.55	2/3098 (0.1%)
All	All	0.28	0/13632	0.54	9/18588 (0.0%)

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	185	PRO	CA-N-CD	-8.19	100.03	111.50
1	C	178	PRO	CA-N-CD	-7.77	100.62	111.50
1	F	403	PRO	CA-N-CD	-7.50	100.99	111.50
1	D	330	LEU	CA-CB-CG	7.01	131.43	115.30
1	E	198	PRO	CA-N-CD	-6.99	101.71	111.50
1	E	185	PRO	CA-N-CD	-6.06	103.01	111.50
1	E	187	PRO	CA-N-CD	-5.68	103.55	111.50
1	F	180	MET	CA-CB-CG	5.36	122.41	113.30
1	C	255	PRO	CB-CA-C	-5.01	99.48	112.00

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 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	2192	0	2166	28	0
1	B	2192	0	2166	25	0
1	C	2192	0	2166	37	0
1	D	2192	0	2166	56	0
1	E	2192	0	2166	56	0
1	F	2192	0	2166	44	0
All	All	13152	0	12996	238	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 9.

All (238) 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:A:264:LYS:HG3	1:A:265:ILE:N	1.89	0.86
1:C:172:ILE:O	1:C:176:ARG:NH1	2.10	0.84
1:C:178:PRO:HD2	1:C:179:ASP:H	1.43	0.83
1:A:264:LYS:HG3	1:A:265:ILE:H	1.40	0.82
1:D:185:PRO:HA	1:D:255:PRO:HG2	1.63	0.80
1:E:205:GLU:HG2	1:E:285:MET:HG3	1.64	0.80
1:D:188:ASP:HB3	1:D:191:LEU:HB2	1.63	0.79
1:E:200:ALA:HB3	1:E:341:ALA:HB2	1.68	0.75
1:E:317:PRO:HD2	1:E:320:TRP:HE1	1.51	0.73
1:C:282:GLY:HA3	1:C:290:VAL:HG21	1.71	0.72
1:F:222:HIS:HD2	1:F:228:LEU:HD11	1.55	0.71
1:C:317:PRO:HA	1:C:398:ASN:HD21	1.55	0.70
1:C:178:PRO:HD2	1:C:179:ASP:N	2.08	0.68
1:D:326:LEU:O	1:D:330:LEU:HD12	1.94	0.68
1:A:379:ARG:HH22	1:C:322:PHE:HB2	1.57	0.67
1:C:202:ALA:O	1:C:206:VAL:HG23	1.95	0.66
1:E:211:LEU:HD22	1:E:308:LEU:HB3	1.76	0.66
1:D:399:GLU:OE2	1:D:399:GLU:N	2.19	0.65
1:A:263:GLY:O	1:A:264:LYS:HG2	1.96	0.65
1:F:202:ALA:O	1:F:206:VAL:HG23	1.97	0.65
1:F:159:VAL:HG22	1:F:163:PHE:HE1	1.61	0.65
1:C:242:LEU:HD13	1:C:355:ILE:HD11	1.79	0.64
1:D:282:GLY:HA3	1:D:290:VAL:HG21	1.78	0.64
1:F:403:PRO:HD2	1:F:404:PHE:H	1.61	0.64
1:F:151:LYS:NZ	1:F:390:CYS:SG	2.71	0.63
1:C:175:GLU:OE2	1:C:175:GLU:N	2.30	0.63
1:E:201:PHE:O	1:E:204:THR:OG1	2.17	0.62
1:F:232:LEU:O	1:F:236:MET:HG2	1.99	0.62

*Continued on next page...*



*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:210:ILE:O	1:E:214:ILE:HG13	2.00	0.61
1:B:151:LYS:NZ	1:B:391:ASN:OD1	2.29	0.60
1:E:153:ILE:O	1:E:157:ILE:HG23	2.01	0.60
1:C:205:GLU:OE2	1:C:205:GLU:N	2.25	0.60
1:D:374:GLN:OE1	1:D:377:ARG:NH2	2.36	0.59
1:C:168:PHE:O	1:C:172:ILE:HG12	2.01	0.59
1:B:174:HIS:NE2	1:B:293:CYS:SG	2.71	0.59
1:F:382:PHE:HB2	1:F:385:PHE:HB2	1.85	0.58
1:F:335:ILE:HG23	1:F:349:VAL:HG11	1.86	0.58
1:F:231:ARG:NH1	1:F:315:TYR:OH	2.33	0.57
1:D:153:ILE:O	1:D:157:ILE:HG23	2.03	0.57
1:D:190:PHE:HB3	1:D:339:LEU:HD21	1.85	0.57
1:A:151:LYS:NZ	1:A:391:ASN:OD1	2.36	0.57
1:A:258:HIS:NE2	1:A:343:GLU:OE2	2.35	0.57
1:D:224:HIS:HB3	1:D:227:ILE:HD13	1.86	0.57
1:F:168:PHE:O	1:F:172:ILE:HG23	2.04	0.57
1:D:211:LEU:HA	1:D:214:ILE:HD12	1.86	0.56
1:E:190:PHE:HB3	1:E:339:LEU:HD21	1.87	0.56
1:A:264:LYS:CG	1:A:265:ILE:N	2.59	0.56
1:C:176:ARG:HG2	1:C:176:ARG:HH11	1.70	0.56
1:F:403:PRO:HD2	1:F:404:PHE:N	2.19	0.56
1:F:243:ARG:O	1:F:247:MET:HG2	2.04	0.56
1:A:372:TYR:OH	1:A:392:VAL:O	2.22	0.56
1:E:352:ALA:O	1:E:356:THR:HG23	2.05	0.56
1:B:402:TRP:NE1	1:B:404:PHE:HB2	2.21	0.56
1:D:295:ASP:OD1	1:D:296:TYR:N	2.39	0.55
1:C:232:LEU:O	1:C:236:MET:HG2	2.05	0.55
1:F:205:GLU:OE1	1:F:205:GLU:N	2.30	0.55
1:C:231:ARG:NH1	1:C:315:TYR:OH	2.36	0.55
1:E:190:PHE:HD2	1:E:339:LEU:HD11	1.72	0.55
1:E:179:ASP:OD1	1:E:179:ASP:N	2.40	0.55
1:D:352:ALA:O	1:D:356:THR:HG22	2.06	0.55
1:C:236:MET:HA	1:C:239:VAL:HG22	1.87	0.55
1:D:254:VAL:HG22	1:D:257:GLN:OE1	2.07	0.55
1:C:335:ILE:HG23	1:C:349:VAL:HG11	1.89	0.54
1:E:157:ILE:O	1:E:161:ILE:HG12	2.07	0.54
1:E:372:TYR:HB3	1:E:385:PHE:HE2	1.72	0.54
1:D:179:ASP:OD1	1:D:179:ASP:N	2.40	0.54
1:E:282:GLY:HA3	1:E:290:VAL:HG21	1.88	0.54
1:F:169:ILE:HA	1:F:172:ILE:HG12	1.88	0.54
1:C:156:CYS:O	1:C:160:PHE:HD1	1.90	0.54

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:223:LYS:HG3	1:D:399:GLU:HG2	1.90	0.54
1:E:214:ILE:O	1:E:218:VAL:HG23	2.08	0.54
1:D:181:GLN:NE2	1:D:257:GLN:O	2.41	0.53
1:E:224:HIS:HB3	1:E:227:ILE:HD13	1.89	0.53
1:B:379:ARG:HH22	1:F:322:PHE:HB2	1.72	0.53
1:E:261:CYS:HB3	1:E:292:THR:HG22	1.91	0.53
1:E:302:THR:HG21	1:E:349:VAL:HG23	1.90	0.53
1:F:175:GLU:HB3	1:F:176:ARG:HH21	1.73	0.53
1:F:211:LEU:HD12	1:F:305:LEU:HD23	1.90	0.53
1:D:224:HIS:NE2	1:D:399:GLU:OE1	2.42	0.53
1:F:158:TYR:O	1:F:162:VAL:HG23	2.09	0.53
1:A:252:LEU:HD13	1:B:186:LEU:HD21	1.91	0.53
1:E:183:TYR:HE2	1:F:184:PRO:HD2	1.73	0.53
1:E:186:LEU:HG	1:E:187:PRO:HD3	1.91	0.53
1:E:382:PHE:HB3	1:E:385:PHE:HB2	1.92	0.52
1:E:257:GLN:H	1:E:257:GLN:CD	2.12	0.52
1:A:186:LEU:HD21	1:B:252:LEU:HD13	1.92	0.52
1:E:158:TYR:HE1	1:E:237:GLY:HA3	1.75	0.52
1:C:374:GLN:OE1	1:C:377:ARG:NH2	2.43	0.52
1:F:159:VAL:O	1:F:163:PHE:HD1	1.92	0.52
1:F:239:VAL:O	1:F:243:ARG:HG3	2.09	0.52
1:D:260:GLN:OE1	1:D:260:GLN:N	2.33	0.52
1:F:222:HIS:CD2	1:F:228:LEU:HD11	2.41	0.52
1:B:264:LYS:HG3	1:B:265:ILE:N	2.25	0.52
1:D:190:PHE:HD2	1:D:339:LEU:HD11	1.75	0.52
1:D:214:ILE:O	1:D:218:VAL:HG23	2.10	0.51
1:E:166:THR:OG1	1:E:244:CYS:SG	2.58	0.51
1:D:201:PHE:O	1:D:204:THR:OG1	2.26	0.51
1:D:202:ALA:O	1:D:206:VAL:HG13	2.11	0.51
1:E:231:ARG:NH1	1:E:315:TYR:OH	2.41	0.51
1:F:389:GLU:O	1:F:389:GLU:HG2	2.11	0.51
1:D:209:MET:SD	1:D:209:MET:N	2.84	0.51
1:A:264:LYS:CG	1:A:265:ILE:H	2.05	0.51
1:E:211:LEU:HD12	1:E:330:LEU:HD11	1.93	0.50
1:E:189:ILE:HG23	1:E:190:PHE:CD1	2.46	0.50
1:F:236:MET:HA	1:F:239:VAL:HG22	1.93	0.50
1:A:374:GLN:OE1	1:A:377:ARG:NH2	2.44	0.50
1:A:303:VAL:HA	1:A:356:THR:HG21	1.93	0.50
1:B:384:MET:HG2	1:B:384:MET:O	2.11	0.50
1:B:379:ARG:HG3	1:B:379:ARG:O	2.12	0.50
1:D:189:ILE:HG13	1:D:190:PHE:HD1	1.76	0.49

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:401:CYS:SG	1:A:402:TRP:N	2.84	0.49
1:C:166:THR:O	1:C:170:MET:HG3	2.12	0.49
1:E:246:THR:HG22	1:E:297:MET:HE1	1.93	0.49
1:F:257:GLN:HE21	1:F:342:HIS:HB3	1.76	0.49
1:B:303:VAL:HA	1:B:356:THR:HG21	1.94	0.49
1:C:211:LEU:HD12	1:C:305:LEU:HD23	1.94	0.49
1:C:181:GLN:OE1	1:C:259:LEU:HA	2.12	0.49
1:F:374:GLN:OE1	1:F:377:ARG:NH2	2.46	0.49
1:B:224:HIS:HB3	1:B:227:ILE:HD13	1.95	0.48
1:F:197:ILE:HD11	1:F:200:ALA:HB2	1.96	0.48
1:A:223:LYS:HD3	1:A:401:CYS:HB3	1.95	0.48
1:D:320:TRP:HE3	1:D:323:LEU:HD11	1.78	0.48
1:B:144:ARG:HG2	1:B:145:LEU:H	1.79	0.48
1:B:372:TYR:OH	1:B:392:VAL:O	2.22	0.48
1:E:197:ILE:HG23	1:E:199:TRP:CE3	2.49	0.48
1:F:398:ASN:N	1:F:398:ASN:OD1	2.47	0.47
1:C:175:GLU:HB2	1:C:176:ARG:NH2	2.29	0.47
1:B:302:THR:HG23	1:B:335:ILE:HG12	1.95	0.47
1:D:206:VAL:HA	1:D:209:MET:HG2	1.96	0.47
1:C:258:HIS:HB3	1:C:292:THR:O	2.14	0.47
1:C:369:THR:O	1:C:370:ARG:HG2	2.15	0.47
1:D:231:ARG:NH1	1:D:315:TYR:OH	2.40	0.47
1:E:297:MET:SD	1:E:298:PHE:HB2	2.54	0.47
1:D:297:MET:HG3	1:D:298:PHE:N	2.30	0.47
1:B:220:LEU:HG	1:B:221:LEU:HD23	1.96	0.47
1:F:238:THR:O	1:F:242:LEU:HG	2.15	0.46
1:F:369:THR:O	1:F:370:ARG:HG2	2.15	0.46
1:E:183:TYR:CE2	1:F:184:PRO:HD2	2.50	0.46
1:A:263:GLY:C	1:A:264:LYS:HG2	2.36	0.46
1:A:379:ARG:O	1:A:379:ARG:HG3	2.16	0.46
1:B:258:HIS:NE2	1:B:343:GLU:OE2	2.37	0.46
1:B:370:ARG:HG3	1:B:372:TYR:CZ	2.51	0.46
1:D:402:TRP:HE1	1:D:404:PHE:HB2	1.81	0.46
1:E:376:ARG:HE	1:E:379:ARG:NH2	2.14	0.46
1:B:374:GLN:OE1	1:B:377:ARG:NH2	2.49	0.46
1:E:241:LEU:HD23	1:E:241:LEU:HA	1.85	0.45
1:D:157:ILE:O	1:D:161:ILE:HG22	2.16	0.45
1:D:203:MET:HE1	1:D:207:CYS:HB2	1.97	0.45
1:E:297:MET:SD	1:E:298:PHE:N	2.90	0.45
1:A:335:ILE:HG23	1:A:349:VAL:HG11	1.99	0.45
1:E:310:PHE:HE2	1:E:357:THR:HG23	1.81	0.45

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:181:GLN:HG3	1:D:259:LEU:HA	1.98	0.45
1:F:279:ILE:HA	1:F:290:VAL:HG11	1.99	0.45
1:C:256:GLY:HA2	1:C:259:LEU:HD21	1.99	0.45
1:E:299:SER:HB3	1:E:344:HIS:CD2	2.52	0.45
1:F:159:VAL:HG22	1:F:163:PHE:CE1	2.46	0.45
1:A:144:ARG:HG2	1:A:145:LEU:H	1.82	0.44
1:D:263:GLY:O	1:D:264:LYS:HG2	2.17	0.44
1:F:188:ASP:OD1	1:F:189:ILE:N	2.44	0.44
1:F:179:ASP:O	1:F:181:GLN:HG3	2.16	0.44
1:B:264:LYS:HE3	1:B:266:TYR:CD2	2.52	0.44
1:D:179:ASP:O	1:D:180:MET:HG3	2.17	0.44
1:C:187:PRO:HG2	1:D:251:SER:HB2	1.99	0.44
1:D:288:THR:O	1:D:288:THR:OG1	2.32	0.44
1:A:266:TYR:O	1:A:272:LYS:NZ	2.35	0.44
1:B:264:LYS:HG3	1:B:265:ILE:H	1.83	0.44
1:D:317:PRO:HD3	1:D:400:TYR:OH	2.18	0.44
1:D:259:LEU:HD23	1:D:259:LEU:O	2.18	0.44
1:E:223:LYS:HG3	1:E:399:GLU:HG2	2.00	0.44
1:E:253:SER:HB2	1:E:296:TYR:CD1	2.53	0.44
1:D:232:LEU:HD13	1:D:311:PHE:HD2	1.82	0.43
1:E:251:SER:HB2	1:F:187:PRO:HG2	2.00	0.43
1:E:254:VAL:HG12	1:E:257:GLN:HE22	1.83	0.43
1:C:317:PRO:CA	1:C:398:ASN:HD21	2.28	0.43
1:D:215:TRP:HD1	1:D:216:LEU:HD22	1.83	0.43
1:D:321:ASN:OD1	1:D:321:ASN:N	2.52	0.43
1:E:399:GLU:OE2	1:E:399:GLU:N	2.27	0.43
1:E:374:GLN:OE1	1:E:377:ARG:NH2	2.51	0.43
1:C:169:ILE:HD11	1:C:248:PHE:HB2	2.00	0.43
1:C:243:ARG:HG3	1:C:298:PHE:HB3	2.00	0.43
1:A:402:TRP:NE1	1:A:404:PHE:HB2	2.34	0.43
1:D:274:HIS:HA	1:D:277:PHE:HD1	1.82	0.43
1:A:263:GLY:O	1:A:264:LYS:CG	2.64	0.43
1:D:186:LEU:HG	1:D:187:PRO:HD2	2.00	0.43
1:E:197:ILE:HG22	1:E:200:ALA:H	1.84	0.42
1:E:308:LEU:HD23	1:E:308:LEU:HA	1.82	0.42
1:E:335:ILE:HG13	1:E:336:PHE:N	2.34	0.42
1:C:398:ASN:OD1	1:C:398:ASN:O	2.38	0.42
1:D:273:LEU:O	1:D:277:PHE:CD1	2.72	0.42
1:D:205:GLU:OE2	1:D:285:MET:HA	2.18	0.42
1:E:324:HIS:O	1:E:328:TRP:HD1	2.03	0.42
1:F:161:ILE:O	1:F:165:PHE:HD1	2.03	0.42

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:215:TRP:CD1	1:D:216:LEU:HD22	2.54	0.42
1:F:285:MET:SD	1:F:285:MET:N	2.93	0.42
1:A:264:LYS:HG3	1:A:265:ILE:HG23	2.02	0.42
1:C:181:GLN:HE22	1:C:264:LYS:NZ	2.16	0.42
1:E:152:THR:HG22	1:E:230:ARG:HB2	2.01	0.42
1:E:217:LEU:HD23	1:E:217:LEU:HA	1.85	0.42
1:E:158:TYR:CE1	1:E:237:GLY:HA3	2.53	0.42
1:C:155:SER:O	1:C:159:VAL:HG12	2.20	0.42
1:D:257:GLN:N	1:D:257:GLN:CD	2.73	0.42
1:E:376:ARG:HA	1:E:379:ARG:HH22	1.84	0.42
1:D:323:LEU:H	1:D:323:LEU:HD12	1.84	0.41
1:E:190:PHE:CD1	1:E:190:PHE:N	2.88	0.41
1:A:347:ILE:O	1:A:351:ILE:HG23	2.21	0.41
1:D:203:MET:O	1:D:206:VAL:HG22	2.21	0.41
1:F:161:ILE:HG23	1:F:165:PHE:CE1	2.55	0.41
1:F:167:SER:O	1:F:171:VAL:HG23	2.20	0.41
1:F:181:GLN:OE1	1:F:259:LEU:HA	2.20	0.41
1:A:219:LEU:HD23	1:A:225:ARG:HB2	2.02	0.41
1:B:151:LYS:HE2	1:B:387:PHE:CE1	2.56	0.41
1:D:243:ARG:NE	1:D:298:PHE:O	2.54	0.41
1:E:202:ALA:O	1:E:206:VAL:HG23	2.21	0.41
1:B:222:HIS:O	1:B:225:ARG:NH2	2.54	0.41
1:D:217:LEU:HD23	1:D:217:LEU:HA	1.85	0.41
1:D:372:TYR:OH	1:D:392:VAL:O	2.36	0.41
1:C:205:GLU:O	1:C:209:MET:HG3	2.21	0.41
1:C:222:HIS:ND1	1:C:228:LEU:HD11	2.36	0.41
1:C:157:ILE:O	1:C:161:ILE:HG12	2.20	0.41
1:D:232:LEU:HD13	1:D:311:PHE:CD2	2.55	0.41
1:D:181:GLN:HB3	1:D:259:LEU:HG	2.01	0.41
1:F:321:ASN:OD1	1:F:321:ASN:N	2.53	0.41
1:A:148:GLU:HG3	1:A:150:TRP:CD1	2.56	0.41
1:B:259:LEU:HD23	1:B:259:LEU:H	1.86	0.41
1:B:314:GLU:OE2	1:B:314:GLU:HA	2.21	0.41
1:D:241:LEU:HD23	1:D:241:LEU:HA	1.88	0.41
1:D:212:CYS:O	1:D:216:LEU:HD23	2.21	0.40
1:F:155:SER:O	1:F:159:VAL:HG12	2.21	0.40
1:A:204:THR:HG23	1:A:305:LEU:HD11	2.03	0.40
1:C:302:THR:HG23	1:C:335:ILE:HD11	2.03	0.40
1:E:203:MET:HA	1:E:206:VAL:HB	2.03	0.40
1:A:224:HIS:HB3	1:A:227:ILE:HD13	2.03	0.40
1:C:402:TRP:HD1	1:C:404:PHE:H	1.69	0.40

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:402:TRP:CE3	1:E:403:PRO:HD2	2.57	0.40
1:F:154:LEU:HA	1:F:157:ILE:HG22	2.03	0.40
1:E:402:TRP:CZ2	1:E:404:PHE:HB2	2.56	0.40
1:B:266:TYR:O	1:B:272:LYS:NZ	2.52	0.40
1:E:183:TYR:O	1:E:255:PRO:HB2	2.21	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 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 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	262/264 (99%)	232 (88%)	30 (12%)	0	100	100
1	B	262/264 (99%)	229 (87%)	33 (13%)	0	100	100
1	C	262/264 (99%)	237 (90%)	25 (10%)	0	100	100
1	D	262/264 (99%)	237 (90%)	25 (10%)	0	100	100
1	E	262/264 (99%)	234 (89%)	28 (11%)	0	100	100
1	F	262/264 (99%)	235 (90%)	27 (10%)	0	100	100
All	All	1572/1584 (99%)	1404 (89%)	168 (11%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 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 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	241/241 (100%)	235 (98%)	6 (2%)	42	67
1	B	241/241 (100%)	234 (97%)	7 (3%)	37	64
1	C	241/241 (100%)	234 (97%)	7 (3%)	37	64
1	D	241/241 (100%)	231 (96%)	10 (4%)	26	55
1	E	241/241 (100%)	236 (98%)	5 (2%)	48	71
1	F	241/241 (100%)	228 (95%)	13 (5%)	18	46
All	All	1446/1446 (100%)	1398 (97%)	48 (3%)	35	61

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	160	PHE
1	A	167	SER
1	A	293	CYS
1	A	311	PHE
1	A	391	ASN
1	A	401	CYS
1	B	160	PHE
1	B	167	SER
1	B	170	MET
1	B	293	CYS
1	B	343	GLU
1	B	391	ASN
1	B	401	CYS
1	C	252	LEU
1	C	254	VAL
1	C	260	GLN
1	C	270	TRP
1	C	311	PHE
1	C	331	ASN
1	C	348	ASP
1	D	160	PHE
1	D	192	ASP
1	D	285	MET
1	D	310	PHE
1	D	311	PHE
1	D	318	ARG
1	D	321	ASN
1	D	323	LEU
1	D	330	LEU
1	D	390	CYS

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	E	160	PHE
1	E	201	PHE
1	E	243	ARG
1	E	261	CYS
1	E	318	ARG
1	F	165	PHE
1	F	213	TYR
1	F	222	HIS
1	F	247	MET
1	F	248	PHE
1	F	280	TRP
1	F	297	MET
1	F	298	PHE
1	F	331	ASN
1	F	359	LEU
1	F	384	MET
1	F	399	GLU
1	F	400	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	181	GLN
1	C	398	ASN
1	D	181	GLN
1	F	222	HIS

### 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

There are no ligands in this entry.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.