



Full wwPDB EM Validation Report ⓘ

Jul 9, 2025 – 12:55 PM JST

PDB ID : 8KFA / pdb_00008kfa
EMDB ID : EMD-37203
Title : Cryo-EM structure of HSV-1 gB with D48 Fab complex
Authors : Yang, J.; Sun, C.; Fang, X.; Zeng, M.; Liu, Z.
Deposited on : 2023-08-15
Resolution : 3.04 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

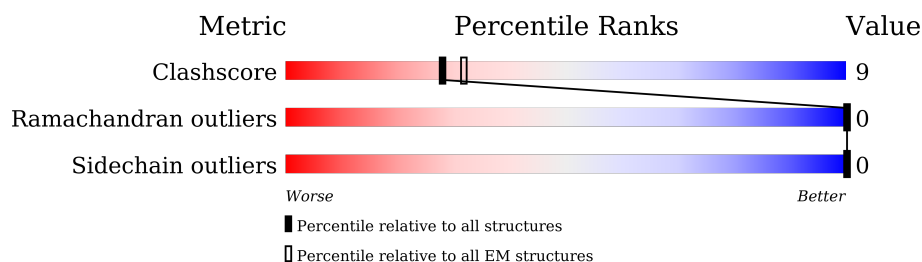
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.04 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	D	230	38% 16% 46%
1	E	230	39% 15% 46%
1	H	230	36% 18% 46%
2	F	214	43% 7% 50%
2	G	214	40% 10% 50%
2	L	214	42% 8% 50%
3	A	615	74% 20% 6%
3	B	615	71% 22% 6%
3	C	615	73% 21% 6%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 18665 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 D48 heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	H	124	Total	C	N	O	S	0	0
			946	596	169	177	4		
1	D	124	Total	C	N	O	S	0	0
			946	600	164	179	3		
1	E	124	Total	C	N	O	S	0	0
			958	606	170	179	3		

- Molecule 2 is a protein called D48 light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	L	107	Total	C	N	O	S	0	0
			787	498	135	153	1		
2	F	107	Total	C	N	O	S	0	0
			787	498	135	153	1		
2	G	107	Total	C	N	O	S	0	0
			781	495	132	153	1		

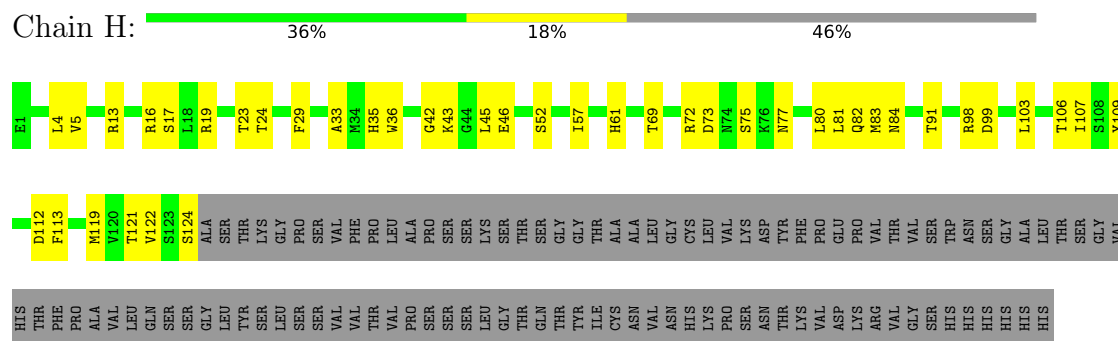
- Molecule 3 is a protein called Envelope glycoprotein B.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	A	576	Total	C	N	O	S	0	0
			4474	2848	766	850	10		
3	B	576	Total	C	N	O	S	0	0
			4498	2860	771	857	10		
3	C	576	Total	C	N	O	S	0	0
			4488	2850	769	860	9		

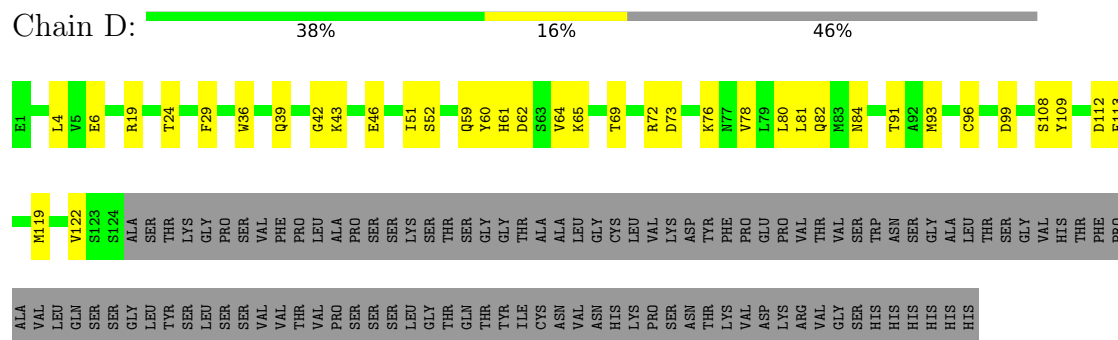
3 Residue-property plots [i](#)

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: D48 heavy chain



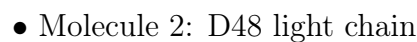
- Molecule 1: D48 heavy chain



- Molecule 1: D48 heavy chain



- Molecule 2: D48 light chain





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	168888	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	1.56	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k 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	D	0.09	0/968	0.27	0/1317
1	E	0.09	0/980	0.26	0/1331
1	H	0.09	0/967	0.28	0/1313
2	F	0.10	0/805	0.29	0/1099
2	G	0.10	0/799	0.29	0/1092
2	L	0.10	0/805	0.30	0/1099
3	A	0.10	0/4589	0.25	0/6261
3	B	0.11	0/4614	0.27	0/6292
3	C	0.10	0/4603	0.25	0/6279
All	All	0.10	0/19130	0.26	0/26083

There are no bond length outliers.

There are no bond angle outliers.

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	D	946	0	908	23	0
1	E	958	0	930	24	0
1	H	946	0	909	29	0
2	F	787	0	741	11	0
2	G	781	0	730	15	0
2	L	787	0	741	13	0
3	A	4474	0	4139	93	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	4498	0	4174	102	0
3	C	4488	0	4150	96	0
All	All	18665	0	17422	338	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 (338) 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:D:59:GLN:NE2	1:D:109:TYR:OH	2.25	0.69
1:H:52:SER:O	1:H:72:ARG:NH1	2.26	0.68
3:A:708:ARG:NH2	3:C:274:GLU:OE2	2.28	0.67
1:H:91:THR:HG22	1:H:122:VAL:H	1.59	0.67
3:A:516:HIS:O	3:A:520:MET:HG2	1.95	0.67
3:B:691:ARG:NH2	3:C:497:THR:O	2.29	0.66
2:L:38:ARG:HD3	2:L:44:PRO:HG3	1.77	0.65
1:D:60:TYR:HB3	1:D:64:VAL:HG23	1.78	0.65
3:B:342:ARG:NH1	3:B:355:ASP:OD1	2.30	0.65
1:D:91:THR:HG22	1:D:122:VAL:H	1.61	0.65
3:B:234:LEU:HD22	3:B:330:LEU:HD21	1.79	0.65
3:C:605:ARG:NH1	3:C:610:GLY:O	2.30	0.65
1:D:29:PHE:O	1:D:72:ARG:NH2	2.30	0.64
3:B:279:ARG:NH2	3:C:696:ASP:O	2.30	0.64
1:H:109:TYR:HB3	2:L:96:LEU:HD21	1.79	0.64
1:H:52:SER:HB3	1:H:57:ILE:HB	1.79	0.64
3:C:516:HIS:O	3:C:520:MET:HG2	1.98	0.64
3:B:285:ASP:OD1	3:B:311:HIS:ND1	2.31	0.64
1:E:13:ARG:HB2	1:E:16:ARG:HH12	1.62	0.64
3:A:696:ASP:O	3:C:279:ARG:NH2	2.31	0.63
3:A:279:ARG:NH2	3:B:696:ASP:O	2.31	0.63
3:A:285:ASP:OD1	3:A:311:HIS:ND1	2.32	0.63
3:A:224:HIS:HD2	3:A:232:MET:HE3	1.62	0.62
3:B:553:VAL:HG21	3:C:537:THR:HG21	1.80	0.62
2:L:38:ARG:NH2	2:L:87:TYR:OH	2.27	0.61
3:A:293:ASP:HA	3:C:710:GLN:HE22	1.64	0.61
3:C:559:VAL:HG12	3:C:572:THR:HA	1.81	0.61
3:C:115:VAL:HG22	3:C:623:LEU:HB2	1.82	0.61
3:A:661:ARG:NE	3:B:126:GLN:OE1	2.31	0.60
3:A:417:ALA:O	3:A:421:MET:HG3	2.01	0.60
1:H:13:ARG:HB2	1:H:16:ARG:HH12	1.66	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:585:ASN:OD1	3:A:586:SER:N	2.35	0.60
3:A:115:VAL:HG22	3:A:623:LEU:HB2	1.84	0.59
3:A:710:GLN:HE22	3:B:293:ASP:HA	1.67	0.59
3:B:375:MET:HE2	3:B:388:SER:HB2	1.85	0.59
2:L:34:ALA:N	2:L:89:GLN:O	2.32	0.59
1:D:19:ARG:HD2	1:D:80:LEU:HD12	1.84	0.59
3:C:149:VAL:HG12	3:C:450:ILE:HG12	1.85	0.59
3:B:145:GLY:HA2	3:B:455:LEU:HG	1.85	0.59
2:G:34:ALA:N	2:G:89:GLN:O	2.30	0.59
3:A:402:TYR:HE2	3:A:407:VAL:HG23	1.68	0.58
3:B:585:ASN:OD1	3:B:586:SER:N	2.36	0.58
2:G:39:ARG:HH12	2:G:83:PHE:H	1.48	0.58
1:H:17:SER:HB3	1:H:82:GLN:HE22	1.68	0.58
3:C:585:ASN:OD1	3:C:586:SER:N	2.36	0.58
1:D:69:THR:HB	1:D:82:GLN:HB3	1.84	0.58
3:A:673:LEU:HG	3:A:675:ILE:HG12	1.86	0.57
1:E:69:THR:HB	1:E:82:GLN:HB3	1.86	0.57
1:E:93:MET:HE1	1:E:119:MET:HA	1.85	0.57
2:G:4:MET:HE3	2:G:90:GLN:HG2	1.86	0.57
3:A:507:GLN:NE2	3:A:511:ASN:OD1	2.38	0.57
1:D:52:SER:O	1:D:72:ARG:NH1	2.37	0.57
2:G:49:TYR:OH	2:G:53:ARG:NE	2.32	0.57
2:G:89:GLN:NE2	2:G:90:GLN:O	2.38	0.57
3:B:143:THR:O	3:B:452:TYR:OH	2.23	0.56
3:B:115:VAL:HG22	3:B:623:LEU:HB2	1.86	0.56
3:C:417:ALA:HB1	3:C:421:MET:HE1	1.87	0.56
3:B:136:ARG:NH2	3:B:519:ASP:OD1	2.39	0.56
3:B:168:VAL:HG22	3:B:269:VAL:HG22	1.87	0.56
2:F:4:MET:HE3	2:F:90:GLN:HG2	1.88	0.56
1:D:73:ASP:OD2	1:D:76:LYS:NZ	2.34	0.55
1:E:59:GLN:NE2	1:E:109:TYR:OH	2.39	0.55
3:A:143:THR:O	3:A:452:TYR:OH	2.23	0.55
3:B:718:ASP:O	3:C:217:ASN:ND2	2.32	0.55
1:E:13:ARG:NH1	1:E:124:SER:O	2.40	0.55
3:C:499:SER:OG	3:C:500:SER:N	2.38	0.55
3:C:166:LYS:NZ	3:C:210:THR:O	2.32	0.55
1:D:109:TYR:HB3	2:F:96:LEU:HD21	1.89	0.55
3:A:553:VAL:HG21	3:B:537:THR:HG21	1.89	0.55
3:C:136:ARG:NH2	3:C:519:ASP:OD1	2.39	0.55
2:F:55:GLN:HE21	2:F:56:SER:H	1.55	0.55
3:B:599:ARG:HD3	3:B:600:PRO:HD2	1.89	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:599:ARG:NH1	3:A:618:GLY:O	2.39	0.55
3:A:718:ASP:O	3:B:217:ASN:ND2	2.30	0.55
1:E:19:ARG:HD2	1:E:80:LEU:HD12	1.89	0.55
3:C:234:LEU:HD22	3:C:330:LEU:HD21	1.90	0.54
2:F:89:GLN:NE2	2:F:90:GLN:O	2.40	0.54
3:C:599:ARG:HD3	3:C:600:PRO:HD2	1.88	0.54
3:A:402:TYR:OH	3:A:493:GLU:OE2	2.25	0.54
3:B:149:VAL:HG12	3:B:450:ILE:HG12	1.89	0.54
3:B:360:ARG:NE	3:B:411:ASP:OD2	2.37	0.54
3:C:346:THR:HA	3:C:351:THR:HG22	1.88	0.54
1:H:82:GLN:NE2	1:H:84:ASN:OD1	2.41	0.54
3:C:375:MET:HE2	3:C:388:SER:HB2	1.88	0.54
1:E:112:ASP:OD1	1:E:113:PHE:N	2.40	0.54
3:C:168:VAL:HG22	3:C:269:VAL:HG22	1.89	0.54
1:H:36:TRP:CG	1:H:81:LEU:HD22	2.43	0.54
3:C:219:GLU:OE1	3:C:219:GLU:N	2.35	0.54
2:G:21:ILE:HG21	2:G:102:THR:HG21	1.89	0.53
3:A:224:HIS:HB2	3:A:269:VAL:HB	1.90	0.53
3:B:599:ARG:NH1	3:B:618:GLY:O	2.40	0.53
2:L:49:TYR:OH	2:L:53:ARG:NE	2.32	0.53
3:A:166:LYS:NZ	3:A:210:THR:O	2.33	0.53
2:L:89:GLN:NE2	2:L:90:GLN:O	2.41	0.53
1:D:39:GLN:OE1	2:F:38:ARG:NH2	2.33	0.53
3:C:599:ARG:NH1	3:C:618:GLY:O	2.41	0.53
1:H:69:THR:N	1:H:82:GLN:O	2.35	0.53
3:C:660:SER:N	3:C:663:ASP:OD2	2.42	0.53
2:G:39:ARG:HB2	2:G:42:LYS:HB2	1.91	0.53
3:A:599:ARG:HH12	3:A:619:GLU:HG3	1.74	0.53
2:F:49:TYR:OH	2:F:53:ARG:NE	2.41	0.53
3:C:373:ASP:OD2	3:C:427:ARG:NH2	2.30	0.53
1:H:13:ARG:NH1	1:H:124:SER:O	2.42	0.52
3:A:599:ARG:HD3	3:A:600:PRO:HD2	1.91	0.52
3:B:519:ASP:OD2	3:B:523:ARG:NH2	2.42	0.52
3:B:402:TYR:HE2	3:B:407:VAL:HG23	1.74	0.52
3:B:166:LYS:NZ	3:B:210:THR:O	2.35	0.52
1:H:46:GLU:OE2	1:H:61:HIS:NE2	2.42	0.52
3:A:680:ASP:OD1	3:B:514:GLN:NE2	2.40	0.52
3:A:276:VAL:HB	3:A:290:ALA:HB3	1.91	0.52
3:C:224:HIS:HB2	3:C:269:VAL:HB	1.91	0.52
3:A:149:VAL:HG12	3:A:450:ILE:HG12	1.92	0.51
1:D:112:ASP:OD1	1:D:113:PHE:N	2.42	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:48:VAL:O	1:E:61:HIS:N	2.39	0.51
3:B:422:ASP:OD1	3:B:435:LYS:NZ	2.43	0.51
3:A:656:SER:OG	3:A:657:HIS:ND1	2.38	0.51
2:F:34:ALA:N	2:F:89:GLN:O	2.32	0.51
3:A:681:HIS:HE1	3:C:392:SER:HB2	1.76	0.51
1:H:5:VAL:O	1:H:23:THR:N	2.34	0.51
3:A:506:LEU:HD12	3:C:506:LEU:HD21	1.92	0.51
3:A:514:GLN:NE2	3:C:680:ASP:OD1	2.44	0.51
1:D:4:LEU:HD23	1:D:24:THR:HG22	1.93	0.51
3:C:248:HIS:ND1	3:C:250:THR:O	2.44	0.50
3:A:219:GLU:OE1	3:A:219:GLU:N	2.40	0.50
3:B:224:HIS:HB2	3:B:269:VAL:HB	1.92	0.50
3:A:174:TRP:N	3:A:181:GLN:O	2.44	0.50
3:C:507:GLN:NE2	3:C:511:ASN:OD1	2.44	0.49
1:D:36:TRP:CG	1:D:81:LEU:HD22	2.47	0.49
3:A:670:PHE:CD1	3:B:532:GLN:HB3	2.47	0.49
3:C:212:LYS:HA	3:C:221:THR:HG22	1.95	0.49
3:A:248:HIS:ND1	3:A:250:THR:O	2.46	0.49
3:A:545:LEU:HD11	3:B:545:LEU:HD11	1.95	0.49
3:C:402:TYR:HE2	3:C:407:VAL:HG23	1.76	0.49
3:C:656:SER:OG	3:C:657:HIS:ND1	2.39	0.49
1:D:62:ASP:HA	1:D:65:LYS:HZ3	1.78	0.49
3:B:670:PHE:CD1	3:C:532:GLN:HB3	2.48	0.49
3:C:365:THR:HG23	3:C:409:LEU:HB2	1.93	0.49
1:H:73:ASP:OD2	1:H:75:SER:OG	2.27	0.48
3:B:680:ASP:OD1	3:C:514:GLN:NE2	2.41	0.48
1:E:4:LEU:HD23	1:E:24:THR:HG22	1.96	0.48
3:B:516:HIS:CE1	3:C:678:LEU:HB2	2.48	0.48
3:B:702:TYR:CE1	3:C:702:TYR:HB2	2.48	0.48
1:H:33:ALA:HB2	1:H:107:ILE:HG22	1.94	0.48
2:F:21:ILE:HG21	2:F:102:THR:HG21	1.94	0.48
3:C:240:ALA:HB3	3:C:243:THR:HG21	1.96	0.48
3:A:560:SER:OG	3:A:561:ALA:O	2.31	0.48
3:B:711:LEU:HD22	3:C:296:TYR:CZ	2.49	0.48
1:E:36:TRP:CG	1:E:81:LEU:HD22	2.48	0.48
1:E:107:ILE:O	1:E:107:ILE:HG13	2.14	0.48
3:B:248:HIS:ND1	3:B:250:THR:O	2.44	0.48
1:H:106:THR:HG22	3:A:440:GLN:HE22	1.79	0.48
3:A:145:GLY:HA2	3:A:455:LEU:HG	1.94	0.48
3:B:507:GLN:NE2	3:B:511:ASN:OD1	2.46	0.48
3:A:234:LEU:HD22	3:A:330:LEU:HD21	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:297:MET:HE3	3:B:301:TYR:HB3	1.96	0.47
3:B:365:THR:HG23	3:B:409:LEU:HB2	1.96	0.47
3:B:523:ARG:NH1	3:C:674:ASN:O	2.47	0.47
3:A:521:LEU:HD13	3:B:520:MET:SD	2.53	0.47
3:B:277:ASP:OD1	3:B:277:ASP:N	2.43	0.47
3:A:240:ALA:HB3	3:A:243:THR:HG21	1.95	0.47
3:C:297:MET:HE3	3:C:301:TYR:HB3	1.96	0.47
3:A:301:TYR:O	3:A:343:ASN:ND2	2.47	0.47
3:A:674:ASN:HB3	3:C:523:ARG:HH11	1.80	0.47
1:D:36:TRP:NE1	1:D:81:LEU:HB2	2.30	0.47
3:B:240:ALA:HB3	3:B:243:THR:HG21	1.96	0.47
2:L:4:MET:HE2	2:L:4:MET:HA	1.97	0.47
2:L:21:ILE:HG21	2:L:102:THR:HG21	1.96	0.47
3:B:209:SER:HA	3:B:232:MET:HE1	1.97	0.47
1:E:82:GLN:NE2	1:E:84:ASN:OD1	2.37	0.47
1:H:19:ARG:HD2	1:H:80:LEU:HD12	1.96	0.46
3:A:355:ASP:OD1	3:A:355:ASP:N	2.45	0.46
3:B:539:TRP:HZ3	3:B:550:ILE:HD12	1.80	0.46
3:B:660:SER:N	3:B:663:ASP:OD2	2.41	0.46
3:C:277:ASP:OD1	3:C:277:ASP:N	2.43	0.46
1:E:119:MET:O	1:E:119:MET:HG3	2.14	0.46
3:A:346:THR:HA	3:A:351:THR:HG22	1.98	0.46
3:A:661:ARG:HH22	3:B:129:GLN:HG2	1.80	0.46
3:B:234:LEU:HD21	3:B:247:TRP:HB3	1.98	0.46
3:B:545:LEU:HD11	3:C:545:LEU:HD11	1.98	0.46
3:C:375:MET:SD	3:C:386:PHE:HB3	2.56	0.46
1:H:119:MET:HE3	1:H:121:THR:HB	1.97	0.46
1:H:112:ASP:OD1	1:H:113:PHE:N	2.49	0.46
1:E:91:THR:HG23	1:E:121:THR:HA	1.97	0.46
1:H:4:LEU:HD23	1:H:24:THR:HG22	1.97	0.46
3:A:519:ASP:OD2	3:A:523:ARG:NH2	2.47	0.46
2:G:53:ARG:HD3	3:C:434:ILE:HD13	1.98	0.46
3:C:371:GLU:HB3	3:C:424:ILE:HD11	1.98	0.46
3:A:411:ASP:OD1	3:A:411:ASP:N	2.48	0.46
3:A:545:LEU:HD11	3:C:545:LEU:HD11	1.97	0.46
3:B:295:VAL:HG22	3:B:347:THR:HG21	1.98	0.46
3:A:167:ASP:OD2	3:B:712:HIS:NE2	2.46	0.45
1:E:36:TRP:NE1	1:E:81:LEU:HB2	2.31	0.45
2:G:35:TRP:HB2	2:G:48:VAL:HB	1.97	0.45
1:H:103:LEU:HB2	1:H:106:THR:OG1	2.17	0.45
2:G:33:ILE:HG22	2:G:51:ALA:HB2	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:98:ARG:NH2	1:H:112:ASP:OD2	2.50	0.45
3:A:661:ARG:HE	3:B:126:GLN:CD	2.23	0.45
1:D:6:GLU:OE1	1:D:96:CYS:N	2.50	0.45
2:L:33:ILE:HG22	2:L:51:ALA:HB2	1.99	0.45
3:A:259:VAL:HG13	3:A:262:PHE:HB2	1.99	0.45
3:B:418:ARG:HH22	3:B:438:GLN:HG3	1.82	0.45
1:H:35:HIS:CD2	1:H:99:ASP:HB2	2.52	0.45
1:D:99:ASP:OD2	1:D:108:SER:N	2.47	0.45
3:C:293:ASP:OD1	3:C:293:ASP:N	2.48	0.45
3:A:252:LEU:HD13	3:B:723:ILE:HD11	1.98	0.45
3:A:666:THR:OG1	3:B:126:GLN:NE2	2.49	0.45
3:C:368:LYS:HE2	3:C:371:GLU:HG3	1.99	0.45
2:L:53:ARG:HD3	3:A:434:ILE:HD13	1.99	0.44
1:E:103:LEU:HB2	1:E:106:THR:OG1	2.16	0.44
3:B:539:TRP:CZ3	3:B:550:ILE:HD12	2.52	0.44
1:E:6:GLU:OE1	1:E:96:CYS:N	2.50	0.44
1:E:98:ARG:NH2	1:E:112:ASP:OD2	2.50	0.44
2:G:93:ASP:OD1	2:G:94:ASN:N	2.45	0.44
2:G:94:ASN:OD1	3:C:438:GLN:NE2	2.35	0.44
1:H:17:SER:HB3	1:H:82:GLN:NE2	2.32	0.44
1:D:46:GLU:OE2	1:D:61:HIS:NE2	2.50	0.44
3:B:666:THR:OG1	3:C:126:GLN:NE2	2.41	0.44
3:C:519:ASP:OD2	3:C:523:ARG:NH2	2.45	0.44
3:A:365:THR:HG23	3:A:409:LEU:HB2	1.99	0.44
1:E:109:TYR:HB3	2:G:96:LEU:HD21	2.00	0.44
3:C:297:MET:HE1	3:C:319:PHE:CD1	2.52	0.44
3:A:689:TYR:OH	3:C:152:GLU:O	2.28	0.44
3:C:225:ARG:HG2	3:C:254:TYR:HB2	1.98	0.44
3:A:532:GLN:HB3	3:C:670:PHE:CD1	2.52	0.44
3:B:546:ASN:O	3:B:550:ILE:HG12	2.18	0.44
3:B:699:LEU:HD23	3:B:699:LEU:HA	1.88	0.44
1:H:36:TRP:NE1	1:H:81:LEU:HB2	2.33	0.44
3:B:194:PHE:CZ	3:B:346:THR:HG23	2.53	0.44
3:B:402:TYR:OH	3:B:493:GLU:OE2	2.35	0.44
3:C:539:TRP:HZ3	3:C:550:ILE:HD12	1.83	0.44
3:B:170:VAL:HG11	3:C:183:MET:HA	2.00	0.43
3:A:212:LYS:HA	3:A:221:THR:HG22	2.00	0.43
3:B:130:PRO:HB3	3:B:533:ASN:HB3	2.00	0.43
3:B:196:GLU:CD	3:B:208:ARG:HD2	2.43	0.43
3:B:503:PHE:CG	3:B:504:ALA:N	2.86	0.43
3:B:700:LEU:H	3:C:703:THR:HG22	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:678:LEU:HB2	3:C:516:HIS:CE1	2.53	0.43
3:B:599:ARG:HG3	3:B:617:LEU:HB3	1.99	0.43
1:E:13:ARG:HB2	1:E:16:ARG:NH1	2.31	0.43
2:F:33:ILE:HG22	2:F:51:ALA:HB2	1.99	0.43
3:B:447:GLY:O	3:B:497:THR:OG1	2.24	0.43
3:C:688:VAL:HG23	3:C:689:TYR:CD2	2.53	0.43
1:H:45:LEU:HD12	1:H:45:LEU:H	1.83	0.43
2:F:32:SER:HB2	2:F:92:TYR:HB2	2.00	0.43
2:F:53:ARG:HD3	3:B:434:ILE:HD13	2.01	0.43
3:B:256:PRO:HG3	3:B:266:GLY:HA3	2.01	0.43
3:B:673:LEU:HG	3:B:675:ILE:HG12	1.99	0.43
1:H:83:MET:SD	1:H:83:MET:N	2.91	0.43
3:B:325:PHE:N	3:B:340:THR:O	2.36	0.43
3:A:194:PHE:CZ	3:A:346:THR:HG23	2.54	0.43
3:A:548:ASN:OD1	3:A:560:SER:OG	2.37	0.43
2:G:49:TYR:HE1	2:G:55:GLN:HG3	1.84	0.43
3:C:256:PRO:HG3	3:C:266:GLY:HA3	2.00	0.43
3:C:301:TYR:O	3:C:343:ASN:ND2	2.51	0.43
3:C:539:TRP:CZ3	3:C:550:ILE:HD12	2.53	0.43
2:L:49:TYR:HH	2:L:53:ARG:HE	1.62	0.43
3:A:528:TRP:O	3:A:532:GLN:HG2	2.18	0.43
3:C:215:ARG:N	3:C:218:LEU:O	2.50	0.43
3:A:217:ASN:ND2	3:C:718:ASP:O	2.51	0.42
3:A:530:GLU:O	3:A:534:HIS:HB2	2.19	0.42
3:B:211:ALA:O	3:B:221:THR:HA	2.19	0.42
3:C:196:GLU:CD	3:C:208:ARG:HD2	2.44	0.42
3:A:546:ASN:O	3:A:550:ILE:HG12	2.19	0.42
3:C:588:ARG:HH22	3:C:594:GLY:H	1.66	0.42
3:A:119:PRO:HG2	3:A:561:ALA:C	2.44	0.42
3:B:212:LYS:HA	3:B:221:THR:HG22	2.01	0.42
3:B:371:GLU:HB3	3:B:424:ILE:HD11	2.00	0.42
3:C:188:ASP:OD1	3:C:189:ARG:N	2.52	0.42
2:L:22:THR:HG21	2:L:24:ARG:HH21	1.84	0.42
3:A:170:VAL:HG21	3:B:183:MET:SD	2.59	0.42
3:B:174:TRP:N	3:B:181:GLN:O	2.49	0.42
3:B:375:MET:SD	3:B:386:PHE:HB3	2.59	0.42
3:C:689:TYR:HB3	3:C:694:ILE:HG13	2.01	0.42
2:L:32:SER:HB2	2:L:92:TYR:HB2	2.02	0.42
3:B:300:PHE:CG	3:B:359:LYS:HB2	2.54	0.42
3:A:539:TRP:CZ3	3:A:550:ILE:HD12	2.55	0.42
1:D:51:ILE:HD13	1:D:72:ARG:HB3	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:523:ARG:HH11	3:C:674:ASN:HB3	1.85	0.42
1:D:82:GLN:NE2	1:D:84:ASN:OD1	2.35	0.41
3:B:189:ARG:NH2	3:B:293:ASP:OD2	2.40	0.41
3:A:130:PRO:HG3	3:A:536:LEU:HD13	2.02	0.41
3:A:182:PHE:HD2	3:C:220:THR:HG21	1.84	0.41
3:A:702:TYR:HB2	3:B:702:TYR:CE1	2.56	0.41
3:B:656:SER:OG	3:B:657:HIS:ND1	2.39	0.41
3:C:177:HIS:ND1	3:C:178:ARG:HG2	2.35	0.41
3:C:366:MET:HB2	3:C:413:ILE:HD11	2.03	0.41
1:D:42:GLY:C	1:D:43:LYS:HD3	2.45	0.41
3:B:604:PHE:O	3:B:613:VAL:N	2.46	0.41
3:C:145:GLY:HA2	3:C:455:LEU:HG	2.02	0.41
3:A:703:THR:HG22	3:C:700:LEU:H	1.84	0.41
1:E:73:ASP:OD2	1:E:76:LYS:NZ	2.32	0.41
1:H:42:GLY:C	1:H:43:LYS:HD3	2.45	0.41
3:A:286:GLU:HB2	3:A:295:VAL:O	2.21	0.41
3:B:276:VAL:HB	3:B:290:ALA:HB3	2.01	0.41
1:E:60:TYR:HE1	1:E:70:ILE:HG22	1.84	0.41
1:H:107:ILE:HG13	1:H:107:ILE:O	2.20	0.41
3:A:184:GLY:HA2	3:C:186:PHE:CG	2.55	0.41
3:A:661:ARG:NH2	3:B:129:GLN:HG2	2.35	0.41
3:A:681:HIS:CE1	3:C:392:SER:HB2	2.55	0.41
2:G:6:GLN:OE1	2:G:88:CYS:N	2.49	0.41
3:C:130:PRO:HG3	3:C:536:LEU:HD13	2.02	0.41
3:C:530:GLU:O	3:C:534:HIS:HB2	2.20	0.41
3:A:291:THR:OG1	3:A:293:ASP:OD1	2.34	0.41
3:A:584:GLN:HB2	3:A:601:LEU:HB2	2.03	0.41
1:E:29:PHE:CD2	1:E:77:ASN:HA	2.56	0.41
1:H:29:PHE:CD2	1:H:77:ASN:HA	2.56	0.41
3:A:535:GLU:HG2	3:A:538:LEU:HD12	2.02	0.41
1:E:106:THR:HG22	3:C:440:GLN:HE22	1.86	0.41
3:C:146:ILE:HB	3:C:421:MET:HG3	2.02	0.41
3:C:163:MET:HE2	3:C:276:VAL:HG21	2.03	0.41
3:B:166:LYS:HG2	3:B:271:CYS:HA	2.03	0.41
3:B:169:THR:HG23	3:B:268:THR:HB	2.02	0.41
3:B:369:TRP:CE2	3:C:688:VAL:HG12	2.55	0.41
3:A:520:MET:HE1	3:B:676:THR:H	1.85	0.40
3:B:150:PHE:CB	3:B:366:MET:HE2	2.51	0.40
3:C:230:THR:HG23	3:C:232:MET:HE2	2.03	0.40
3:A:183:MET:SD	3:C:170:VAL:HG21	2.62	0.40
3:A:189:ARG:NH2	3:A:293:ASP:OD2	2.39	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:241:THR:HG23	3:B:707:ARG:HH22	1.86	0.40
3:A:502:GLU:HB3	3:C:502:GLU:OE1	2.21	0.40
3:A:599:ARG:HG3	3:A:617:LEU:HB3	2.03	0.40
3:A:637:HIS:N	3:A:652:GLU:OE2	2.54	0.40
1:D:76:LYS:HG3	1:D:78:VAL:HG23	2.03	0.40
3:B:155:ALA:HA	3:B:156:PRO:HD3	1.98	0.40
3:B:328:ARG:HA	3:B:328:ARG:HD2	1.95	0.40
3:B:415:LYS:HB3	3:B:415:LYS:HE3	1.79	0.40
3:A:186:PHE:CG	3:B:184:GLY:HA2	2.57	0.40
3:A:358:PRO:O	3:A:362:SER:CB	2.69	0.40
3:A:520:MET:CE	3:B:676:THR:H	2.33	0.40
3:B:248:HIS:HB3	3:C:716:PHE:HD1	1.86	0.40
3:C:163:MET:HE3	3:C:276:VAL:HG11	2.03	0.40
3:A:296:TYR:OH	3:C:707:ARG:O	2.39	0.40
1:D:93:MET:HE1	1:D:119:MET:HA	2.03	0.40
3:B:346:THR:HA	3:B:351:THR:HG22	2.04	0.40
3:B:584:GLN:HB2	3:B:601:LEU:HB2	2.02	0.40
3:A:711:LEU:HD12	3:A:714:LEU:HB3	2.02	0.40
3:B:152:GLU:O	3:C:689:TYR:OH	2.25	0.40
3:C:359:LYS:HE2	3:C:409:LEU:HD21	2.03	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	D	122/230 (53%)	119 (98%)	3 (2%)	0	100	100
1	E	122/230 (53%)	119 (98%)	3 (2%)	0	100	100
1	H	122/230 (53%)	119 (98%)	3 (2%)	0	100	100
2	F	105/214 (49%)	101 (96%)	4 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	G	105/214 (49%)	101 (96%)	4 (4%)	0	100	100
2	L	105/214 (49%)	100 (95%)	5 (5%)	0	100	100
3	A	570/615 (93%)	554 (97%)	16 (3%)	0	100	100
3	B	570/615 (93%)	555 (97%)	15 (3%)	0	100	100
3	C	570/615 (93%)	554 (97%)	16 (3%)	0	100	100
All	All	2391/3177 (75%)	2322 (97%)	69 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	D	100/196 (51%)	100 (100%)	0	100	100
1	E	102/196 (52%)	102 (100%)	0	100	100
1	H	99/196 (50%)	99 (100%)	0	100	100
2	F	77/185 (42%)	77 (100%)	0	100	100
2	G	76/185 (41%)	76 (100%)	0	100	100
2	L	77/185 (42%)	77 (100%)	0	100	100
3	A	452/534 (85%)	452 (100%)	0	100	100
3	B	458/534 (86%)	458 (100%)	0	100	100
3	C	456/534 (85%)	456 (100%)	0	100	100
All	All	1897/2745 (69%)	1897 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	H	3	GLN

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Mol	Chain	Res	Type
2	L	31	ASN
3	A	140	GLN
3	A	202	ASN
3	A	224	HIS
3	A	255	ASN
3	A	453	GLN
3	A	584	GLN
3	A	710	GLN
1	D	116	GLN
2	F	55	GLN
3	B	202	ASN
3	B	255	ASN
3	C	153	ASN
3	C	516	HIS
3	C	710	GLN

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.