



# Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

Oct 4, 2018 – 08:25 AM EDT

PDB ID : 6HJR  
EMDB ID: : EMD-0237  
Title : Structure of full-length Influenza Hemagglutinin with tilted transmembrane (A/duck/Alberta/35/76[H1N1])  
Authors : Benton, D.J.; Rosenthal, P.B.  
Deposited on : 2018-09-04  
Resolution : 4.20 Å(reported)

This is a Full wwPDB/EMDatabank EM Map/Model Validation Report for a publicly released PDB/EMDB 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.

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MolProbity : 4.02b-467  
Mogul : 1.7.3 (157068), CSD as539be (2018)  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20031633

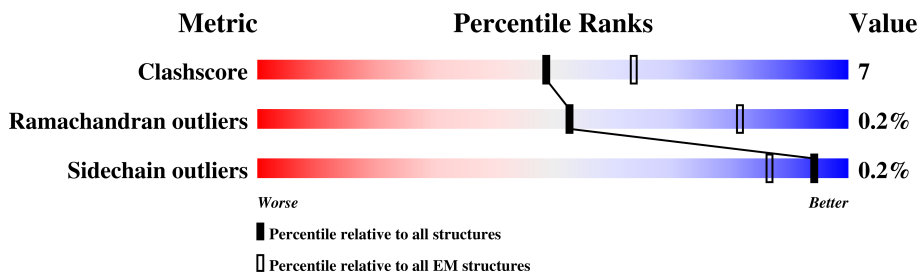
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 4.20 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	136327	1886
Ramachandran outliers	132723	1663
Sidechain outliers	132532	1531

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	323	84%	16%
1	C	323	83%	17%
1	E	323	86%	14%
2	B	203	83%	16%
2	D	203	90%	10%
2	F	203	87%	13%

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 12579 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.

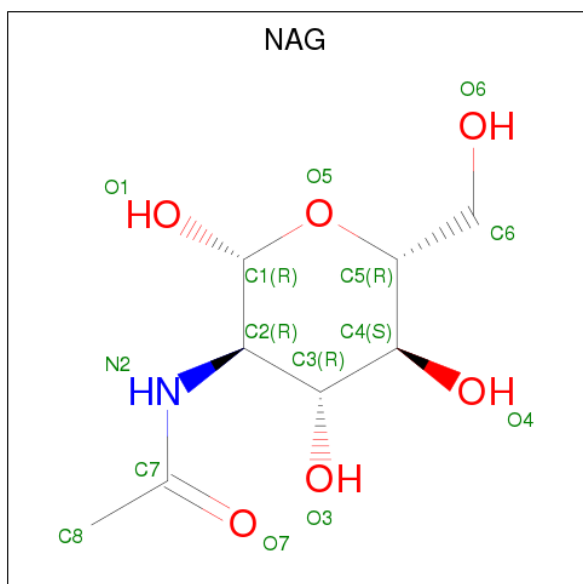
- Molecule 1 is a protein called Hemagglutinin.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	323	Total 2502	C 1574	N 429	O 488	S 11	0	0
1	C	323	Total 2502	C 1574	N 429	O 488	S 11	0	0
1	E	323	Total 2502	C 1574	N 429	O 488	S 11	0	0

- Molecule 2 is a protein called Hemagglutinin.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	203	Total 1553	C 966	N 268	O 313	S 6	0	0
2	D	203	Total 1553	C 966	N 268	O 313	S 6	0	0
2	F	203	Total 1554	C 966	N 268	O 314	S 6	0	0

- Molecule 3 is N-ACETYL-D-GLUCOSAMINE (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



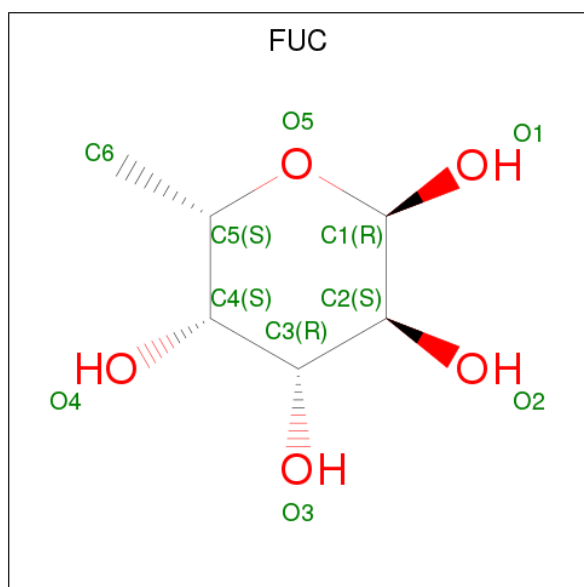
Mol	Chain	Residues	Atoms				AltConf
3	A	1	Total	C	N	O	0
			84	48	6	30	
3	A	1	Total	C	N	O	0
			84	48	6	30	
3	A	1	Total	C	N	O	0
			84	48	6	30	
3	A	1	Total	C	N	O	0
			84	48	6	30	
3	A	1	Total	C	N	O	0
			84	48	6	30	
3	B	1	Total	C	N	O	0
			28	16	2	10	
3	B	1	Total	C	N	O	0
			28	16	2	10	
3	C	1	Total	C	N	O	0
			98	56	7	35	
3	C	1	Total	C	N	O	0
			98	56	7	35	
3	C	1	Total	C	N	O	0
			98	56	7	35	
3	C	1	Total	C	N	O	0
			98	56	7	35	
3	C	1	Total	C	N	O	0
			98	56	7	35	
3	C	1	Total	C	N	O	0
			98	56	7	35	
3	D	1	Total	C	N	O	0
			28	16	2	10	
3	D	1	Total	C	N	O	0
			28	16	2	10	
3	E	1	Total	C	N	O	0
			84	48	6	30	
3	E	1	Total	C	N	O	0
			84	48	6	30	
3	E	1	Total	C	N	O	0
			84	48	6	30	
3	E	1	Total	C	N	O	0
			84	48	6	30	
3	E	1	Total	C	N	O	0
			84	48	6	30	

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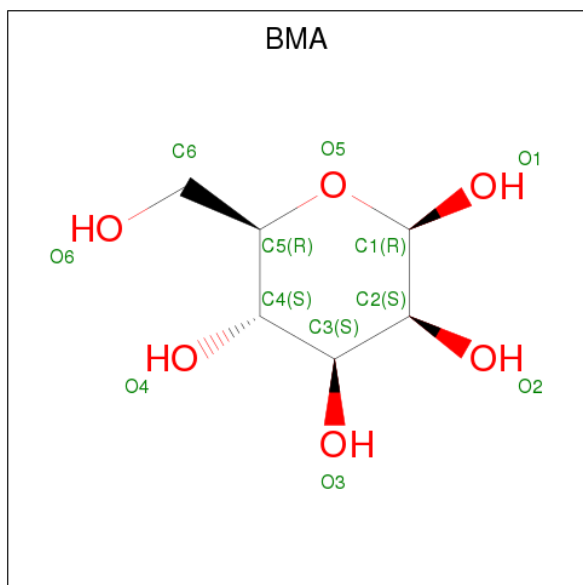
Mol	Chain	Residues	Atoms			AltConf	
			Total	C	N		O
3	E	1	Total	C	N	O	0
			84	48	6	30	
3	F	1	Total	C	N	O	0
			28	16	2	10	
3	F	1	Total	C	N	O	0
			28	16	2	10	

- Molecule 4 is ALPHA-L-FUCOSE (three-letter code: FUC) (formula: C<sub>6</sub>H<sub>12</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms			AltConf
			Total	C	O	
4	A	1	Total	C	O	0
			10	6	4	
4	C	1	Total	C	O	0
			10	6	4	
4	E	1	Total	C	O	0
			10	6	4	

- Molecule 5 is BETA-D-MANNOSE (three-letter code: BMA) (formula: C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>).

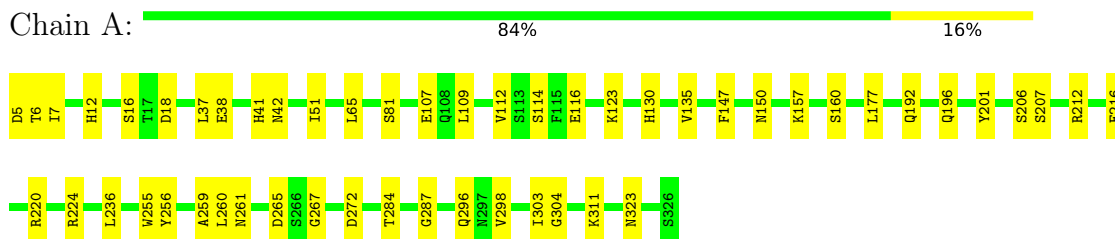


Mol	Chain	Residues	Atoms			AltConf
5	A	1	Total	C	O	0
			11	6	5	
5	C	1	Total	C	O	0
			11	6	5	
5	E	1	Total	C	O	0
			11	6	5	

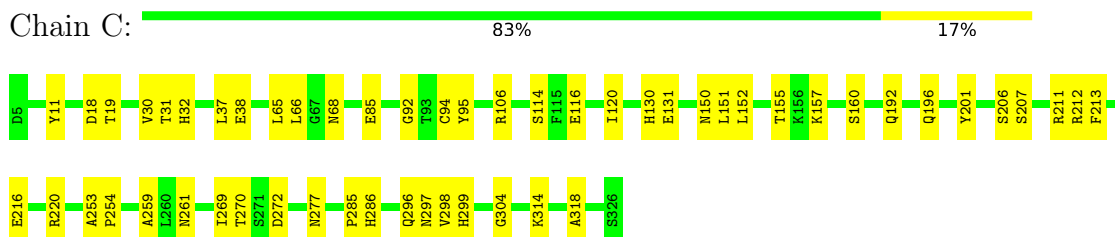
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

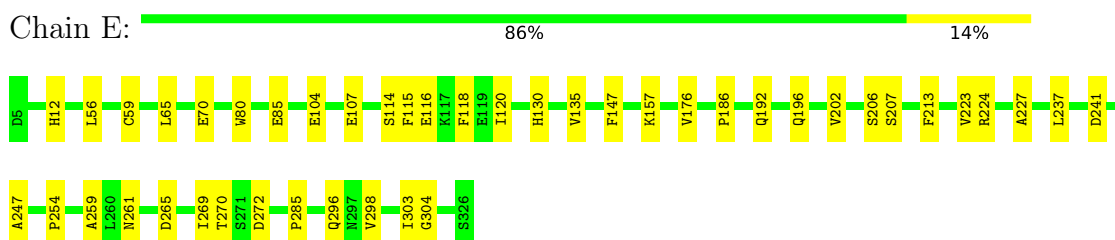
- Molecule 1: Hemagglutinin



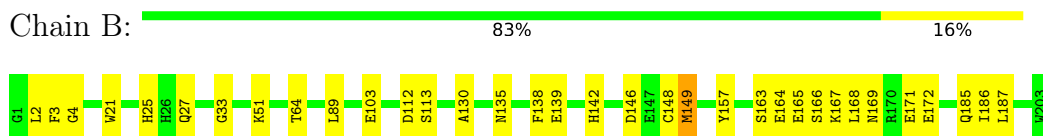
- Molecule 1: Hemagglutinin



- Molecule 1: Hemagglutinin



- Molecule 2: Hemagglutinin



- Molecule 2: Hemagglutinin





- Molecule 2: Hemagglutinin

Chain F: 87% 13%





## 4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	41043	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 ( $e^-/\text{\AA}^2$ )	43	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

## 5 Model quality i

### 5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: BMA, NAG, FUC

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  >2	RMSZ	# Z  >2
1	A	0.50	0/2565	0.63	0/3495
1	C	0.49	0/2565	0.61	0/3495
1	E	0.49	0/2565	0.62	0/3495
2	B	0.50	0/1581	0.61	0/2135
2	D	0.49	0/1581	0.61	0/2135
2	F	0.51	0/1582	0.65	0/2136
All	All	0.50	0/12439	0.62	0/16891

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	A	2502	0	2408	37	0
1	C	2502	0	2408	32	0
1	E	2502	0	2408	48	0
2	B	1553	0	1385	29	0
2	D	1553	0	1385	16	0
2	F	1554	0	1388	23	0
3	A	84	0	74	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	28	0	25	0	0
3	C	98	0	86	0	0
3	D	28	0	25	0	0
3	E	84	0	74	2	0
3	F	28	0	25	0	0
4	A	10	0	10	0	0
4	C	10	0	10	0	0
4	E	10	0	10	0	0
5	A	11	0	10	0	0
5	C	11	0	10	0	0
5	E	11	0	10	0	0
All	All	12579	0	11751	163	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 7.

All (163) 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:E:80:TRP:CH2	1:E:115:PHE:CZ	2.23	1.25
1:E:304:GLY:N	2:F:64:THR:HG22	1.54	1.23
1:E:80:TRP:HH2	1:E:115:PHE:CZ	1.59	1.15
1:E:269:ILE:HD12	1:E:303:ILE:CD1	1.82	1.09
1:E:304:GLY:H	2:F:64:THR:CG2	1.64	1.09
1:A:7:ILE:HG12	2:B:149:MET:HE1	1.41	0.99
1:E:269:ILE:HD12	1:E:303:ILE:HD11	1.38	0.99
1:E:80:TRP:CZ3	1:E:115:PHE:CE2	2.60	0.90
1:E:269:ILE:CD1	1:E:303:ILE:HD11	2.04	0.88
1:E:80:TRP:HH2	1:E:115:PHE:CE1	1.91	0.87
2:F:187:LEU:HA	2:F:190:TYR:HB3	1.60	0.84
1:E:80:TRP:CZ3	1:E:115:PHE:CZ	2.68	0.81
1:E:269:ILE:CD1	1:E:303:ILE:CD1	2.59	0.80
1:E:269:ILE:HD11	1:E:303:ILE:HG13	1.63	0.79
1:E:80:TRP:HZ3	1:E:115:PHE:CE2	1.99	0.79
1:A:7:ILE:HG12	2:B:149:MET:CE	2.16	0.76
2:D:183:VAL:CB	2:D:187:LEU:CB	2.66	0.74
2:F:189:ILE:O	2:F:193:VAL:N	2.20	0.74
1:A:304:GLY:H	2:B:64:THR:HG22	1.55	0.72
1:E:80:TRP:CH2	1:E:115:PHE:HZ	2.05	0.70
2:D:141:TYR:O	2:D:169:ASN:ND2	2.25	0.69
2:B:51:LYS:HE2	2:B:103:GLU:HG3	1.77	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:189:ILE:O	2:F:192:THR:CB	2.43	0.67
1:E:192:GLN:HE21	1:E:196:GLN:HG3	1.61	0.66
2:B:25:HIS:CD2	2:B:27:GLN:HE21	2.15	0.65
1:C:116:GLU:HB2	1:C:259:ALA:HB3	1.78	0.64
1:E:304:GLY:H	2:F:64:THR:HG22	0.68	0.64
1:A:7:ILE:CG1	2:B:149:MET:HE1	2.23	0.64
1:E:269:ILE:CD1	1:E:303:ILE:HG13	2.28	0.64
1:A:6:THR:HG22	2:B:138:PHE:O	1.97	0.64
1:A:116:GLU:HB2	1:A:259:ALA:HB3	1.81	0.62
1:E:85:GLU:HB2	1:E:270:THR:HG22	1.81	0.61
1:A:114:SER:OG	1:A:261:ASN:ND2	2.34	0.60
2:F:51:LYS:HE2	2:F:103:GLU:HG3	1.84	0.60
1:A:192:GLN:HE21	1:A:196:GLN:HG3	1.67	0.60
2:B:165:GLU:O	2:B:169:ASN:N	2.35	0.59
2:D:130:ALA:HB1	2:D:138:PHE:HB3	1.83	0.59
1:E:269:ILE:HD12	1:E:303:ILE:HD12	1.77	0.59
1:E:116:GLU:HB3	1:E:259:ALA:HB3	1.86	0.58
1:A:6:THR:OG1	2:B:27:GLN:OE1	2.20	0.58
2:D:51:LYS:HE2	2:D:103:GLU:HG3	1.85	0.58
2:B:149:MET:HE3	2:B:149:MET:HA	1.85	0.58
1:C:152:LEU:HB3	1:C:253:ALA:HB3	1.86	0.58
1:C:304:GLY:H	2:D:64:THR:HG22	1.67	0.58
1:E:206:SER:OG	1:E:207:SER:N	2.33	0.58
1:C:94:CYS:SG	1:C:95:TYR:N	2.78	0.57
1:E:269:ILE:CD1	1:E:303:ILE:CG1	2.82	0.57
1:E:269:ILE:HD11	1:E:303:ILE:CG1	2.33	0.55
1:A:272:ASP:OD1	1:A:272:ASP:N	2.37	0.55
1:E:114:SER:OG	1:E:261:ASN:ND2	2.37	0.55
1:E:296:GLN:OE1	1:E:298:VAL:N	2.38	0.55
1:C:19:THR:O	1:C:314:LYS:NZ	2.35	0.54
2:F:174:ASP:N	2:F:174:ASP:OD1	2.37	0.54
1:A:216:GLU:OE2	1:A:220:ARG:NH2	2.41	0.54
1:E:70:GLU:HG3	3:E:405:NAG:HN2	1.73	0.54
2:D:185:GLN:C	2:D:187:LEU:H	2.11	0.53
1:C:206:SER:OG	1:C:207:SER:N	2.39	0.53
1:E:116:GLU:HG2	1:E:116:GLU:O	2.07	0.53
1:A:206:SER:OG	1:A:207:SER:N	2.41	0.53
2:D:76:ARG:HG2	1:E:107:GLU:HG3	1.91	0.52
1:C:65:LEU:O	1:C:150:ASN:ND2	2.42	0.52
2:B:148:CYS:SG	2:B:149:MET:N	2.83	0.52
2:B:167:LYS:O	2:B:171:GLU:N	2.39	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:202:VAL:HG22	1:E:213:PHE:HB2	1.92	0.52
2:B:168:LEU:O	2:B:172:GLU:N	2.41	0.52
2:B:130:ALA:HB1	2:B:139:GLU:H	1.75	0.51
2:B:185:GLN:C	2:B:187:LEU:H	2.14	0.51
1:A:107:GLU:HG3	2:F:76:ARG:HG2	1.92	0.51
1:C:114:SER:OG	1:C:261:ASN:ND2	2.34	0.51
1:C:157:LYS:O	1:C:160:SER:OG	2.25	0.50
2:B:2:LEU:HD13	2:B:4:GLY:H	1.76	0.50
1:E:272:ASP:OD1	1:E:272:ASP:N	2.43	0.50
2:D:187:LEU:HA	2:D:190:TYR:HB3	1.94	0.50
2:B:169:ASN:HA	2:B:172:GLU:HG3	1.93	0.50
1:A:265:ASP:HB3	2:B:64:THR:HG21	1.94	0.49
2:B:164:GLU:O	2:B:168:LEU:N	2.36	0.49
1:C:130:HIS:HA	1:C:157:LYS:HB2	1.94	0.49
2:F:189:ILE:HA	2:F:192:THR:CB	2.42	0.49
1:A:192:GLN:HG2	1:A:196:GLN:HA	1.94	0.49
2:D:2:LEU:HD13	2:D:4:GLY:H	1.77	0.49
1:A:224:ARG:NH2	3:A:405:NAG:O7	2.46	0.49
1:C:66:LEU:HD22	1:C:151:LEU:HD11	1.94	0.49
1:E:135:VAL:HG23	1:E:147:PHE:HB2	1.95	0.49
2:B:142:HIS:NE2	2:B:157:TYR:OH	2.35	0.49
2:F:130:ALA:HB1	2:F:139:GLU:H	1.79	0.48
1:A:16:SER:OG	1:A:323:ASN:ND2	2.46	0.48
2:D:2:LEU:O	2:F:113:SER:OG	2.30	0.48
1:E:192:GLN:HG2	1:E:196:GLN:HA	1.95	0.48
2:F:26:HIS:CD2	2:F:33:GLY:HA2	2.49	0.48
1:C:85:GLU:HB2	1:C:270:THR:HG22	1.96	0.47
2:B:113:SER:OG	2:F:2:LEU:O	2.33	0.47
1:E:265:ASP:HB3	2:F:64:THR:HG21	1.97	0.47
1:A:296:GLN:OE1	1:A:298:VAL:N	2.48	0.47
2:F:189:ILE:O	2:F:192:THR:CA	2.63	0.47
1:E:56:LEU:HB3	1:E:59:CYS:HB2	1.96	0.47
1:E:207:SER:OG	1:E:241:ASP:OD1	2.31	0.47
2:F:130:ALA:HB1	2:F:138:PHE:HB3	1.97	0.46
2:B:163:SER:O	2:B:166:SER:OG	2.31	0.46
1:A:5:ASP:OD1	1:A:5:ASP:N	2.47	0.46
1:C:37:LEU:HD11	1:C:297:ASN:HD22	1.80	0.46
1:A:130:HIS:HA	1:A:157:LYS:HB2	1.98	0.46
1:A:18:ASP:N	1:A:18:ASP:OD1	2.48	0.46
1:C:277:ASN:OD1	1:C:277:ASN:N	2.48	0.46
1:C:269:ILE:HG23	1:C:285:PRO:HG3	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:31:THR:OG1	1:C:32:HIS:N	2.49	0.46
1:E:202:VAL:HA	1:E:247:ALA:HA	1.98	0.46
1:A:37:LEU:HD22	1:A:38:GLU:H	1.80	0.46
1:A:157:LYS:O	1:A:160:SER:OG	2.33	0.46
1:C:192:GLN:HG2	1:C:196:GLN:HA	1.98	0.46
1:C:131:GLU:O	1:C:155:THR:OG1	2.28	0.45
1:C:216:GLU:OE2	1:C:220:ARG:NH2	2.48	0.45
1:E:186:PRO:HG3	1:E:227:ALA:HB3	1.98	0.45
1:A:135:VAL:HG23	1:A:147:PHE:HB2	1.98	0.45
1:A:267:GLY:HA3	1:A:303:ILE:HD11	1.99	0.45
2:D:130:ALA:HB1	2:D:139:GLU:H	1.82	0.45
1:A:201:TYR:HB2	1:A:212:ARG:HE	1.82	0.45
2:B:25:HIS:HA	2:B:33:GLY:HA3	1.98	0.44
1:A:51:ILE:O	1:A:81:SER:OG	2.32	0.44
1:E:224:ARG:NH2	3:E:405:NAG:O7	2.51	0.44
1:A:12:HIS:HB2	2:B:21:TRP:HA	2.00	0.44
1:C:272:ASP:N	1:C:272:ASP:OD1	2.51	0.44
2:B:185:GLN:C	2:B:187:LEU:N	2.71	0.44
1:E:176:VAL:HB	1:E:237:LEU:HB2	2.00	0.44
1:E:269:ILE:HG23	1:E:285:PRO:HG3	1.99	0.44
1:A:41:HIS:ND1	1:A:42:ASN:O	2.37	0.43
1:A:284:THR:OG1	1:A:287:GLY:N	2.49	0.43
1:C:201:TYR:HB2	1:C:212:ARG:HE	1.83	0.43
1:E:130:HIS:HA	1:E:157:LYS:HB2	1.99	0.43
1:E:269:ILE:CG1	1:E:303:ILE:HD11	2.49	0.43
1:C:120:ILE:HD12	1:C:254:PRO:HB2	2.01	0.43
1:C:296:GLN:OE1	1:C:298:VAL:N	2.51	0.43
1:A:65:LEU:HD23	1:A:65:LEU:HA	1.88	0.43
1:A:150:ASN:HA	1:A:256:TYR:HD2	1.84	0.43
1:C:18:ASP:N	1:C:18:ASP:OD1	2.51	0.43
1:C:30:VAL:HG11	1:C:318:ALA:HB1	2.01	0.43
2:F:189:ILE:O	2:F:192:THR:N	2.50	0.43
2:F:37:ASP:OD2	2:F:40:SER:N	2.38	0.43
1:A:112:VAL:HG11	1:A:260:LEU:HD22	2.00	0.43
2:F:146:ASP:OD1	2:F:146:ASP:N	2.53	0.42
2:B:3:PHE:N	2:B:112:ASP:OD2	2.46	0.42
2:D:76:ARG:NH1	1:E:104:GLU:OE2	2.52	0.42
1:C:106:ARG:NE	2:D:69:GLU:HG3	2.36	0.41
1:A:123:LYS:HB2	1:A:255:TRP:NE1	2.35	0.41
1:E:116:GLU:O	1:E:118:PHE:HD1	2.03	0.41
1:A:177:LEU:HD23	1:A:236:LEU:HD23	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:120:ILE:HD12	1:E:254:PRO:HB2	2.03	0.41
2:F:128:ASN:O	2:F:170:ARG:NH1	2.53	0.41
2:D:150:GLU:HA	2:D:153:LYS:HE3	2.03	0.41
1:A:311:LYS:HB2	2:B:89:LEU:HD21	2.01	0.41
1:C:11:TYR:CZ	2:D:6:ILE:HG23	2.56	0.41
1:E:65:LEU:HA	1:E:65:LEU:HD23	1.85	0.41
2:B:135:ASN:N	2:B:135:ASN:OD1	2.53	0.41
1:C:285:PRO:HD2	1:C:299:HIS:CD2	2.56	0.41
1:C:286:HIS:HD2	1:C:299:HIS:HB2	1.85	0.41
1:C:37:LEU:HD22	1:C:38:GLU:H	1.86	0.41
2:D:130:ALA:O	2:D:139:GLU:N	2.54	0.41
1:A:109:LEU:HD13	1:A:109:LEU:HA	1.94	0.40
2:B:146:ASP:OD1	2:B:146:ASP:N	2.53	0.40
1:E:223:VAL:HG12	1:E:224:ARG:HG3	2.03	0.40
1:C:68:ASN:ND2	1:C:92:GLY:O	2.53	0.40
1:C:211:ARG:HD2	1:C:213:PHE:CZ	2.56	0.40
1:E:12:HIS:HB2	2:F:21:TRP:HA	2.02	0.40
2:F:58:LYS:HA	2:F:58:LYS:HD3	1.90	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	321/323 (99%)	287 (89%)	34 (11%)	0	100	100
1	C	321/323 (99%)	285 (89%)	36 (11%)	0	100	100
1	E	321/323 (99%)	288 (90%)	33 (10%)	0	100	100
2	B	201/203 (99%)	181 (90%)	19 (10%)	1 (0%)	31	72
2	D	201/203 (99%)	180 (90%)	20 (10%)	1 (0%)	31	72
2	F	201/203 (99%)	176 (88%)	24 (12%)	1 (0%)	31	72

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	1566/1578 (99%)	1397 (89%)	166 (11%)	3 (0%)	53 84

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	F	186	ILE
2	B	186	ILE
2	D	186	ILE

### 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	279/279 (100%)	279 (100%)	0	100 100
1	C	279/279 (100%)	279 (100%)	0	100 100
1	E	279/279 (100%)	279 (100%)	0	100 100
2	B	151/175 (86%)	150 (99%)	1 (1%)	85 92
2	D	151/175 (86%)	151 (100%)	0	100 100
2	F	152/175 (87%)	151 (99%)	1 (1%)	85 92
All	All	1291/1362 (95%)	1289 (100%)	2 (0%)	94 96

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	149	MET
2	F	27	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	108	GLN
1	A	192	GLN

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Mol	Chain	Res	Type
1	A	261	ASN
1	A	283	GLN
1	A	286	HIS
1	A	323	ASN
1	C	32	HIS
1	C	108	GLN
1	C	130	HIS
1	C	183	HIS
1	C	226	GLN
1	C	286	HIS
1	E	32	HIS
1	E	108	GLN
1	E	191	GLN
1	E	192	GLN
1	E	261	ASN
1	E	283	GLN
2	F	53	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 carbohydrates in this entry.

### 5.6 Ligand geometry [i](#)

31 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	A	401	1	14,14,15	0.25	0	17,19,21	0.41	0
3	NAG	A	402	1,3,4	14,14,15	0.57	1 (7%)	17,19,21	1.18	1 (5%)
3	NAG	A	403	3	14,14,15	0.35	0	17,19,21	0.44	0
4	FUC	A	404	3	9,10,11	0.67	0	13,14,16	1.05	1 (7%)
3	NAG	A	405	1,3	14,14,15	0.47	0	17,19,21	0.74	1 (5%)
3	NAG	A	406	3,5	14,14,15	0.61	1 (7%)	17,19,21	0.76	0
5	BMA	A	407	3	11,11,12	0.75	0	15,15,17	0.97	1 (6%)
3	NAG	A	408	1	14,14,15	0.37	0	17,19,21	0.95	1 (5%)
3	NAG	B	301	3,2	14,14,15	0.45	0	17,19,21	1.04	1 (5%)
3	NAG	B	302	3	14,14,15	0.72	1 (7%)	17,19,21	2.16	3 (17%)
3	NAG	C	401	1	14,14,15	0.47	0	17,19,21	0.45	0
3	NAG	C	402	1,3,4	14,14,15	0.62	1 (7%)	17,19,21	1.17	2 (11%)
3	NAG	C	403	3	14,14,15	0.41	0	17,19,21	1.11	2 (11%)
4	FUC	C	404	3	9,10,11	0.49	0	13,14,16	1.01	1 (7%)
3	NAG	C	405	1,3	14,14,15	0.39	0	17,19,21	0.64	0
3	NAG	C	406	3,5	14,14,15	0.26	0	17,19,21	0.50	0
5	BMA	C	407	3	11,11,12	0.66	0	15,15,17	1.03	1 (6%)
3	NAG	C	408	1,3	14,14,15	0.33	0	17,19,21	0.97	1 (5%)
3	NAG	C	409	3	14,14,15	0.23	0	17,19,21	0.57	0
3	NAG	D	301	3,2	14,14,15	0.34	0	17,19,21	0.95	1 (5%)
3	NAG	D	302	3	14,14,15	0.60	0	17,19,21	2.21	3 (17%)
3	NAG	E	401	1	14,14,15	0.20	0	17,19,21	0.48	0
3	NAG	E	402	1,3,4	14,14,15	0.37	0	17,19,21	1.17	2 (11%)
3	NAG	E	403	3	14,14,15	0.55	0	17,19,21	0.96	1 (5%)
4	FUC	E	404	3	9,10,11	0.93	1 (11%)	13,14,16	0.98	1 (7%)
3	NAG	E	405	1,3	14,14,15	0.46	0	17,19,21	0.59	0
3	NAG	E	406	3,5	14,14,15	0.61	1 (7%)	17,19,21	0.67	0
5	BMA	E	407	3	11,11,12	0.61	0	15,15,17	0.77	0
3	NAG	E	408	1	14,14,15	0.38	0	17,19,21	1.03	1 (5%)
3	NAG	F	301	3,2	14,14,15	0.30	0	17,19,21	0.97	1 (5%)
3	NAG	F	302	3	14,14,15	0.62	0	17,19,21	2.20	3 (17%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	401	1	-	0/6/23/26	0/1/1/1
3	NAG	A	402	1,3,4	-	0/6/23/26	0/1/1/1
3	NAG	A	403	3	-	0/6/23/26	0/1/1/1
4	FUC	A	404	3	-	0/0/17/20	0/1/1/1
3	NAG	A	405	1,3	-	0/6/23/26	0/1/1/1
3	NAG	A	406	3,5	-	0/6/23/26	0/1/1/1
5	BMA	A	407	3	-	0/2/19/22	0/1/1/1
3	NAG	A	408	1	-	0/6/23/26	0/1/1/1
3	NAG	B	301	3,2	-	0/6/23/26	0/1/1/1
3	NAG	B	302	3	-	0/6/23/26	0/1/1/1
3	NAG	C	401	1	-	0/6/23/26	0/1/1/1
3	NAG	C	402	1,3,4	-	0/6/23/26	0/1/1/1
3	NAG	C	403	3	-	0/6/23/26	0/1/1/1
4	FUC	C	404	3	-	0/0/17/20	0/1/1/1
3	NAG	C	405	1,3	-	0/6/23/26	0/1/1/1
3	NAG	C	406	3,5	-	0/6/23/26	0/1/1/1
5	BMA	C	407	3	-	0/2/19/22	0/1/1/1
3	NAG	C	408	1,3	-	0/6/23/26	0/1/1/1
3	NAG	C	409	3	-	0/6/23/26	0/1/1/1
3	NAG	D	301	3,2	-	0/6/23/26	0/1/1/1
3	NAG	D	302	3	-	0/6/23/26	0/1/1/1
3	NAG	E	401	1	-	0/6/23/26	0/1/1/1
3	NAG	E	402	1,3,4	-	0/6/23/26	0/1/1/1
3	NAG	E	403	3	-	0/6/23/26	0/1/1/1
4	FUC	E	404	3	-	0/0/17/20	0/1/1/1
3	NAG	E	405	1,3	-	0/6/23/26	0/1/1/1
3	NAG	E	406	3,5	-	0/6/23/26	0/1/1/1
5	BMA	E	407	3	-	0/2/19/22	0/1/1/1
3	NAG	E	408	1	-	0/6/23/26	0/1/1/1
3	NAG	F	301	3,2	-	0/6/23/26	0/1/1/1
3	NAG	F	302	3	-	0/6/23/26	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	402	NAG	O5-C1	-2.20	1.40	1.43
3	E	406	NAG	O5-C1	-2.19	1.40	1.43
3	A	402	NAG	O5-C1	-2.09	1.40	1.43
3	A	406	NAG	O5-C1	-2.05	1.40	1.43
4	E	404	FUC	C2-C3	2.11	1.55	1.52
3	B	302	NAG	C1-C2	2.12	1.55	1.52

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	407	BMA	C1-C2-C3	-2.22	106.85	109.66
3	F	302	NAG	C8-C7-N2	2.04	119.67	116.10
3	E	402	NAG	C1-O5-C5	2.06	115.02	112.19
3	A	405	NAG	C1-O5-C5	2.11	115.08	112.19
3	D	302	NAG	C8-C7-N2	2.12	119.82	116.10
3	B	302	NAG	C8-C7-N2	2.14	119.85	116.10
3	C	403	NAG	C2-N2-C7	2.15	126.08	122.94
4	E	404	FUC	C1-O5-C5	2.24	117.34	112.39
3	C	402	NAG	C1-O5-C5	2.32	115.38	112.19
5	C	407	BMA	C1-O5-C5	2.58	115.73	112.19
4	C	404	FUC	C1-O5-C5	2.70	118.36	112.39
3	C	402	NAG	C2-N2-C7	2.77	126.99	122.94
3	A	408	NAG	C2-N2-C7	2.86	127.11	122.94
3	F	301	NAG	C2-N2-C7	2.86	127.12	122.94
3	E	408	NAG	C2-N2-C7	2.90	127.17	122.94
4	A	404	FUC	C1-O5-C5	2.92	118.86	112.39
3	C	408	NAG	C2-N2-C7	2.94	127.23	122.94
3	D	301	NAG	C2-N2-C7	2.95	127.24	122.94
3	B	301	NAG	C2-N2-C7	2.95	127.25	122.94
3	C	403	NAG	C1-O5-C5	3.04	116.37	112.19
3	B	302	NAG	C1-C2-N2	3.44	116.36	110.49
3	E	403	NAG	C1-O5-C5	3.48	116.98	112.19
3	D	302	NAG	C1-C2-N2	3.50	116.47	110.49
3	E	402	NAG	C2-N2-C7	3.65	128.28	122.94
3	F	302	NAG	C1-C2-N2	3.73	116.85	110.49
3	A	402	NAG	C1-O5-C5	4.06	117.78	112.19
3	B	302	NAG	C2-N2-C7	7.65	134.10	122.94
3	F	302	NAG	C2-N2-C7	7.65	134.10	122.94
3	D	302	NAG	C2-N2-C7	7.70	134.18	122.94

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	405	NAG	1	0
3	E	405	NAG	2	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.