WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB EM Validation Report (i)

Oct 16, 2024 – 12:23 AM JST

PDB ID	:	8HWS
EMDB ID	:	EMD-35063
Title	:	The complex structure of Omicron BA.4 RBD with BD604, S309, and S304
Authors	:	He, Q.W.; Xu, Z.P.; Xie, Y.F.
Deposited on	:	2023-01-02
Resolution	:	2.36 Å(reported)

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 2.36 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	Percentile Ranks	Value
Clashscore		7
Ramachandran outliers		0
Sidechain outliers		4.1%

Worse   *Better*

▮ Percentile relative to all structures
◻ Percentile relative to all EM structures
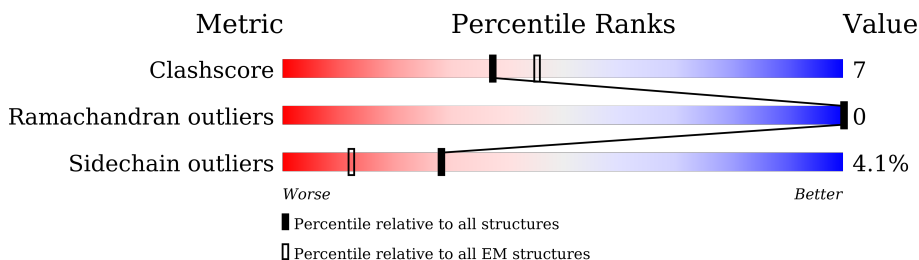
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	196	84% 15% •
2	H	229	74% 21% • •
3	L	215	79% 20% •
4	D	231	75% 19% • •
5	E	216	78% 20% • •
6	I	239	83% 12% • •
7	J	215	76% 22% •
8	B	3	67% 33%

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 11511 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 Spike protein S2'.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	196	Total 1563	C 1007	N 265	O 283	S 8	0	0

There are 17 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	339	ASP	GLY	variant	UNP P0DTC2
A	371	PHE	SER	variant	UNP P0DTC2
A	373	PRO	SER	variant	UNP P0DTC2
A	375	PHE	SER	variant	UNP P0DTC2
A	376	ALA	THR	variant	UNP P0DTC2
A	405	ASN	ASP	variant	UNP P0DTC2
A	408	SER	ARG	variant	UNP P0DTC2
A	417	ASN	LYS	variant	UNP P0DTC2
A	440	LYS	ASN	variant	UNP P0DTC2
A	452	ARG	LEU	variant	UNP P0DTC2
A	477	ASN	SER	variant	UNP P0DTC2
A	478	LYS	THR	variant	UNP P0DTC2
A	484	ALA	GLU	variant	UNP P0DTC2
A	486	VAL	PHE	variant	UNP P0DTC2
A	498	ARG	GLN	variant	UNP P0DTC2
A	501	TYR	ASN	variant	UNP P0DTC2
A	505	HIS	TYR	variant	UNP P0DTC2

- Molecule 2 is a protein called BD-604 Fab Heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	219	Total 1617	C 1016	N 272	O 322	S 7	0	0

- Molecule 3 is a protein called BD-604 Fab Light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	L	213	Total 1632	C 1021	N 272	O 335	S 4	0	0

- Molecule 4 is a protein called S304 Fab Heavy Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	222	Total 1662	C 1048	N 276	O 331	S 7	0	0

- Molecule 5 is a protein called S304 Fab Light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	214	Total 1634	C 1025	N 271	O 332	S 6	0	0

- Molecule 6 is a protein called S309 Fab Heavy Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	I	230	Total 1732	C 1089	N 294	O 341	S 8	1	0

- Molecule 7 is a protein called S309 Fab Light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	J	214	Total 1633	C 1016	N 278	O 333	S 6	1	0

- Molecule 8 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.
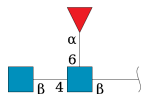

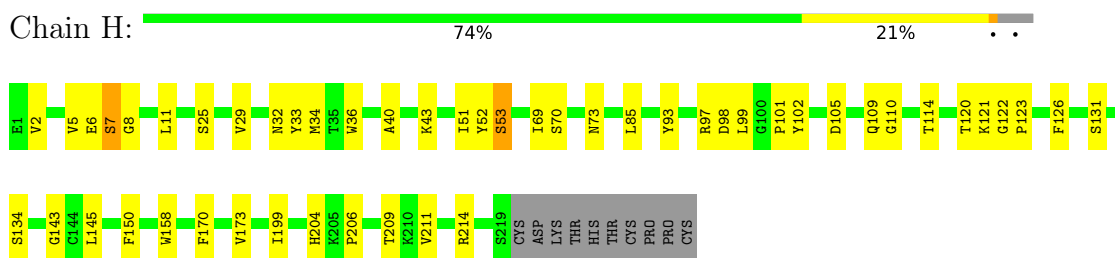| Mol	Chain	Residues	Atoms				AltConf	Trace
8	B	3	Total 38	C 22	N 2	O 14	0	0

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.
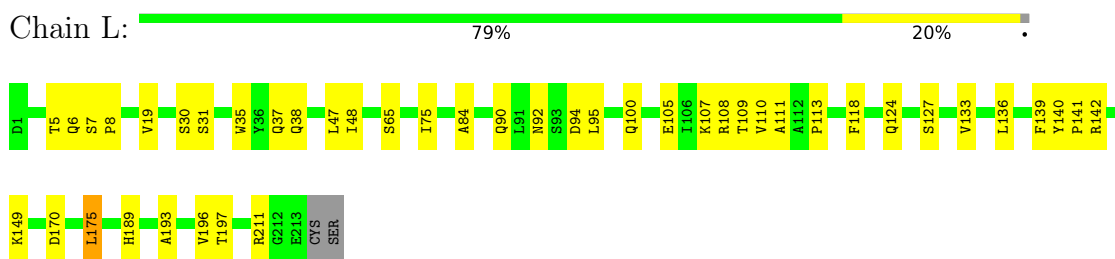
- Molecule 1: Spike protein S2'
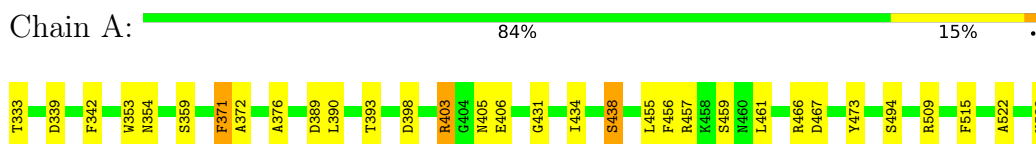
Chain A:

- Molecule 2: BD-604 Fab Heavy chain

Chain H:

- Molecule 3: BD-604 Fab Light chain

Chain L:

- Molecule 4: S304 Fab Heavy Chain
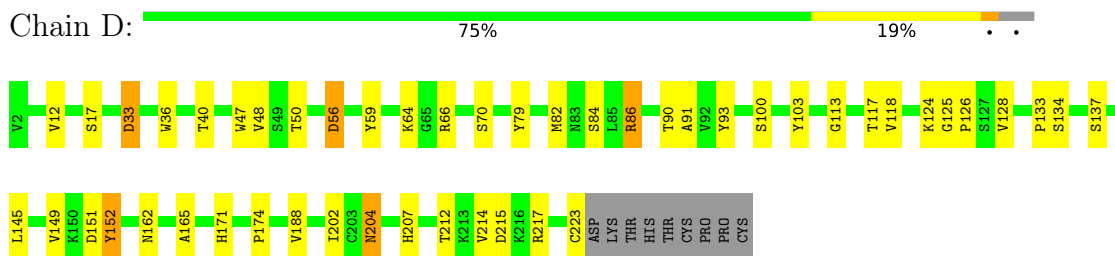
Chain D:

- Molecule 5: S304 Fab Light Chain

Chain E:

78%　　　　　20%

ASP I2 L11 R18 V19 T20 I21 L33 Q38 K42 K45 S52 S53 L54 R61 T69 L73 S76 D82 F83 A84 C88 T103 D106 R109 T110 P114 F119 D123 V134 N139 F140 R143 E144 A145 V151

N159 V164 T165 D168 S169 K170 D171 S172 T173 Y174 K191 V192 Y193 H199 F210 N211 R212 C215 SER
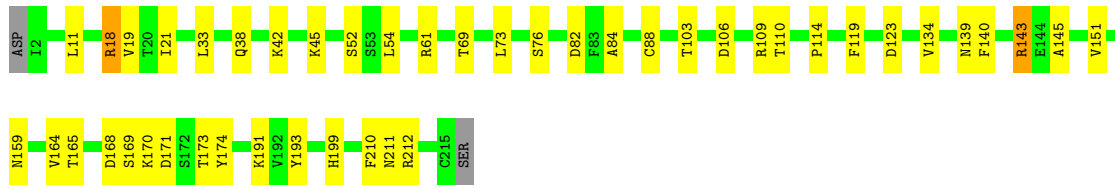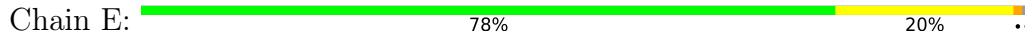
• Molecule 6: S309 Fab Heavy Chain

Chain I:

83%　　　　　12%

Q1 L4 K19 C22 F29 T30 A40 Q43 W50 N59 R67 T77 Y80 M81 E82 R85 D90 T91 D115 T124 P140 L152 V164 L192 S193 V196 T197 I209 C210 N211 H214 R224 V225 K228 S229 C230

ASP LYS THR HIS THR CYS PRO PRO CYS
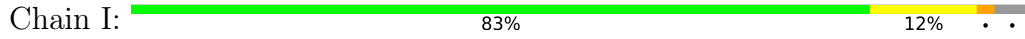
• Molecule 7: S309 Fab Light Chain

Chain J:

76%　　　　　22%

E1 Q6 S7 P8 L11 L21 V29 L34 Q39 R62 F63 S64 F72 T73 L74 T75 L79 F84 A85 D93 G99 V104 E105 I106 K107 R108 T109 P113 S114 V115 Q124 L125 K126 S131 C134 L135 L136 F139 A144 K145 V146

Q147 W148 K149 L154 S171 L175 S176 D185 K188 H189 K190 A193 V196 T197 H198 P204 S208 R211 C214 SER
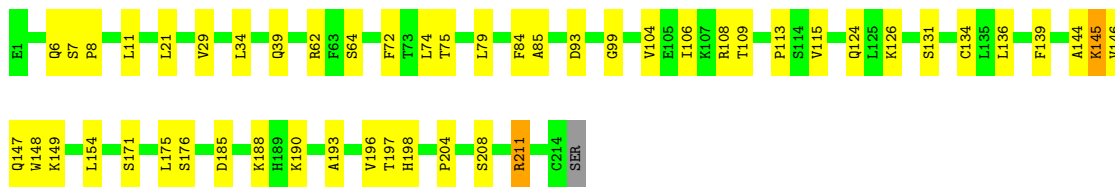
• Molecule 8: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-ace
tamido-2-deoxy-beta-D-glucopyranose

Chain B:

67%　　　　　33%

NAG1 NAG2 FUC3

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	662631	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 $(e^-/\text{Å}^2)$	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k 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: FUC, NAG

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	0.31	0/1610	0.49	0/2191
2	H	0.28	0/1653	0.51	0/2252
3	L	0.27	0/1665	0.48	0/2261
4	D	0.28	0/1704	0.51	0/2321
5	E	0.28	0/1670	0.47	0/2269
6	I	0.30	0/1778	0.52	1/2422 (0.0%)
7	J	0.28	0/1669	0.52	0/2266
All	All	0.29	0/11749	0.50	1/15982 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	I	192	LEU	CA-CB-CG	5.04	126.89	115.30

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	1563	0	1489	17	0
2	H	1617	0	1596	27	0
3	L	1632	0	1586	24	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	1662	0	1601	26	0
5	E	1634	0	1588	26	0
6	I	1732	0	1687	19	0
7	J	1633	0	1590	32	0
8	B	38	0	34	1	0
All	All	11511	0	11171	166	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 (166) 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)
4:D:90:THR:HG23	4:D:117:THR:HA	1.61	0.81
3:L:30:SER:OG	3:L:31:SER:N	2.17	0.75
3:L:136:LEU:HD11	3:L:196:VAL:HG21	1.73	0.70
2:H:5:VAL:HG13	2:H:109:GLN:HE22	1.57	0.68
6:I:209:ILE:HG12	6:I:224:ARG:HG2	1.75	0.68
1:A:353:TRP:O	1:A:466:ARG:NH1	2.28	0.66
4:D:66:ARG:CZ	4:D:86:ARG:HH12	2.08	0.66
3:L:118:PHE:HB2	3:L:133:VAL:HB	1.77	0.65
1:A:457:ARG:NH1	1:A:467:ASP:OD2	2.30	0.65
4:D:12:VAL:HG13	4:D:118:VAL:HG23	1.78	0.65
4:D:126:PRO:HB3	4:D:152:TYR:HB3	1.78	0.64
4:D:47:TRP:HE1	4:D:50:THR:HG1	1.44	0.64
5:E:21:ILE:HD11	5:E:73:LEU:HD12	1.81	0.63
4:D:202:ILE:HG12	4:D:217:ARG:HG2	1.79	0.62
2:H:2:VAL:HA	2:H:25:SER:O	2.00	0.62
4:D:33:ASP:N	4:D:33:ASP:OD1	2.32	0.62
3:L:35:TRP:HB2	3:L:48:ILE:HB	1.82	0.62
2:H:204:HIS:HD2	2:H:206:PRO:HD2	1.65	0.60
1:A:455:LEU:HD21	2:H:101:PRO:HD2	1.83	0.60
2:H:51:ILE:HB	2:H:69:ILE:HG21	1.85	0.59
7:J:29:VAL:HG23	7:J:93:ASP:HB2	1.84	0.59
3:L:19:VAL:HG22	3:L:75:ILE:HB	1.85	0.59
3:L:6:GLN:O	3:L:100:GLN:NE2	2.36	0.59
2:H:99:LEU:HB3	2:H:102:TYR:HB2	1.85	0.58
3:L:136:LEU:HB2	3:L:175:LEU:HD23	1.85	0.58
7:J:115:VAL:HG21	7:J:196:VAL:HG21	1.85	0.58
1:A:390:LEU:HD22	4:D:103:TYR:HE1	1.69	0.58
5:E:61:ARG:NE	5:E:82:ASP:OD2	2.31	0.57

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:J:6:GLN:HE21	7:J:99:GLY:HA3	1.68	0.57
6:I:67:ARG:NH2	6:I:90:ASP:OD2	2.37	0.57
2:H:93:TYR:O	2:H:110:GLY:HA2	2.04	0.56
6:I:115:ASP:OD1	6:I:115:ASP:N	2.37	0.56
5:E:119:PHE:HB2	5:E:134:VAL:HB	1.87	0.55
5:E:21:ILE:HG13	5:E:73:LEU:HB3	1.87	0.55
1:A:405:ASN:OD1	1:A:405:ASN:N	2.40	0.55
7:J:145:LYS:NZ	7:J:147:GLN:HE22	2.05	0.55
2:H:209:THR:HG22	2:H:211:VAL:HG23	1.89	0.55
4:D:59:TYR:HB2	4:D:64:LYS:HG3	1.89	0.55
1:A:438:SER:OG	1:A:438:SER:O	2.25	0.54
7:J:190:LYS:O	7:J:211:ARG:N	2.41	0.54
2:H:199:ILE:HG12	2:H:214:ARG:HG2	1.89	0.54
4:D:134:SER:N	4:D:137:SER:OG	2.38	0.54
6:I:192:LEU:HD12	6:I:193[A]:SER:H	1.72	0.53
7:J:84:PHE:HA	7:J:104:VAL:HG23	1.90	0.53
3:L:105:GLU:OE2	3:L:142:ARG:NH2	2.39	0.53
3:L:189:HIS:O	3:L:211:ARG:NE	2.41	0.53
6:I:140:PRO:HD3	6:I:152:LEU:HB3	1.90	0.53
4:D:174:PRO:HD3	5:E:165:THR:HG22	1.91	0.53
4:D:47:TRP:NE1	4:D:50:THR:OG1	2.36	0.53
6:I:192:LEU:HD12	6:I:193[B]:SER:H	1.73	0.53
3:L:149:LYS:HB2	3:L:193:ALA:HB3	1.91	0.52
7:J:84:PHE:CE1	7:J:106:ILE:HG12	2.44	0.52
7:J:171:SER:O	7:J:171:SER:OG	2.28	0.52
3:L:90:GLN:NE2	3:L:92:ASN:HB2	2.24	0.52
2:H:52:TYR:OH	3:L:94:ASP:OD1	2.24	0.52
7:J:144:ALA:HB2	7:J:198:HIS:CD2	2.45	0.52
6:I:164:VAL:HG12	6:I:214:HIS:HD2	1.75	0.51
7:J:64:SER:OG	7:J:75:THR:OG1	2.24	0.51
3:L:113:PRO:HB3	3:L:139:PHE:HB3	1.92	0.51
5:E:114:PRO:HB3	5:E:140:PHE:HB3	1.93	0.51
7:J:144:ALA:HB2	7:J:198:HIS:HD2	1.75	0.51
7:J:8:PRO:HD2	7:J:11:LEU:HD21	1.93	0.50
1:A:393:THR:HA	1:A:522:ALA:HA	1.93	0.50
1:A:431:GLY:HA2	1:A:515:PHE:CD2	2.47	0.50
4:D:56:ASP:N	4:D:56:ASP:OD1	2.45	0.50
2:H:170:PHE:HE2	3:L:175:LEU:HA	1.76	0.50
4:D:162:ASN:HB2	4:D:165:ALA:HB3	1.94	0.50
3:L:124:GLN:O	3:L:127:SER:OG	2.24	0.50
5:E:193:TYR:HB2	5:E:210:PHE:CE1	2.47	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:J:193:ALA:HB2	7:J:208:SER:HB3	1.94	0.50
1:A:342:PHE:HB2	8:B:1:NAG:H82	1.94	0.49
5:E:106:ASP:OD2	5:E:174:TYR:OH	2.31	0.49
7:J:145:LYS:HZ3	7:J:147:GLN:HE22	1.60	0.49
1:A:403:ARG:HG3	1:A:406:GLU:HG3	1.95	0.49
2:H:123:PRO:HD3	2:H:204:HIS:ND1	2.28	0.49
2:H:131:SER:H	2:H:134:SER:HG	1.59	0.49
1:A:339:ASP:N	1:A:339:ASP:OD1	2.46	0.48
4:D:124:LYS:NZ	4:D:151:ASP:O	2.33	0.48
3:L:108:ARG:HH21	3:L:111:ALA:HB2	1.78	0.47
5:E:109:ARG:HG2	5:E:110:THR:N	2.30	0.47
2:H:29:VAL:HG13	2:H:34:MET:HG3	1.97	0.47
2:H:53:SER:O	2:H:53:SER:OG	2.27	0.47
3:L:37:GLN:HB2	3:L:47:LEU:HD11	1.97	0.47
4:D:124:LYS:NZ	4:D:125:GLY:O	2.47	0.46
4:D:204:ASN:ND2	4:D:215:ASP:OD1	2.38	0.46
6:I:19:LYS:HE2	6:I:82:GLU:HB2	1.97	0.46
4:D:93:TYR:O	4:D:113:GLY:HA2	2.16	0.46
6:I:152:LEU:HD13	6:I:225:VAL:HG11	1.97	0.46
5:E:159:ASN:OD1	5:E:159:ASN:N	2.48	0.45
6:I:50:TRP:HB3	6:I:59:ASN:OD1	2.17	0.45
7:J:147:GLN:N	7:J:147:GLN:OE1	2.50	0.45
5:E:38:GLN:O	5:E:84:ALA:HB1	2.15	0.45
2:H:32:ASN:OD1	2:H:97:ARG:NH1	2.39	0.45
6:I:85:ARG:NH1	6:I:85:ARG:HG3	2.32	0.45
7:J:124:GLN:OE1	7:J:131:SER:N	2.50	0.45
2:H:40:ALA:HB3	2:H:43:LYS:HB2	1.99	0.45
2:H:7:SER:OG	2:H:8:GLY:N	2.49	0.44
4:D:84:SER:O	4:D:84:SER:OG	2.32	0.44
5:E:191:LYS:O	5:E:212:ARG:N	2.37	0.44
6:I:85:ARG:HG3	6:I:85:ARG:HH11	1.83	0.44
5:E:54:LEU:HA	5:E:54:LEU:HD23	1.83	0.44
4:D:128:VAL:HG22	4:D:149:VAL:HG22	1.99	0.44
6:I:19:LYS:HE3	6:I:19:LYS:HB2	1.81	0.44
6:I:91:THR:HG23	6:I:124:THR:HA	1.98	0.44
5:E:145:ALA:HB2	5:E:199:HIS:HD2	1.83	0.44
5:E:191:LYS:HE3	5:E:211:ASN:HB3	1.98	0.44
7:J:39:GLN:O	7:J:85:ALA:HB1	2.18	0.44
5:E:139:ASN:HA	5:E:173:THR:HB	2.01	0.43
2:H:143:GLY:HA2	2:H:158:TRP:CZ2	2.52	0.43
3:L:108:ARG:HD2	3:L:170:ASP:O	2.18	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:109:THR:OG1	3:L:110:VAL:N	2.51	0.43
1:A:376:ALA:O	1:A:434:ILE:HA	2.19	0.43
1:A:354:ASN:O	1:A:398:ASP:HA	2.18	0.43
5:E:21:ILE:HG21	5:E:103:THR:HG21	1.99	0.43
5:E:151:VAL:HG22	5:E:193:TYR:HD1	1.83	0.43
7:J:34:LEU:HD22	7:J:72:PHE:CD2	2.54	0.43
4:D:17:SER:HA	4:D:82:MET:O	2.18	0.43
4:D:40:THR:HG22	4:D:91:ALA:HB2	1.99	0.43
5:E:171:ASP:OD2	5:E:171:ASP:N	2.43	0.43
5:E:143:ARG:HE	5:E:164:VAL:HG11	1.83	0.43
3:L:38:GLN:O	3:L:84:ALA:HB1	2.19	0.43
1:A:456:PHE:HB3	1:A:473:TYR:CD1	2.53	0.43
4:D:171:HIS:HB2	4:D:188:VAL:HG22	2.01	0.42
2:H:36:TRP:CZ3	2:H:93:TYR:HB3	2.54	0.42
2:H:121:LYS:NZ	2:H:122:GLY:O	2.51	0.42
7:J:134:CYS:HB2	7:J:148:TRP:CH2	2.54	0.42
7:J:149:LYS:HE2	7:J:154:LEU:HD11	2.00	0.42
5:E:18:ARG:HG2	5:E:76:SER:O	2.20	0.42
7:J:146:VAL:HG12	7:J:196:VAL:HA	2.01	0.42
1:A:528:LYS:HB2	1:A:528:LYS:HE2	1.72	0.42
2:H:32:ASN:OD1	2:H:97:ARG:HD3	2.19	0.42
2:H:36:TRP:HD1	2:H:69:ILE:HD11	1.85	0.42
7:J:21:LEU:HD12	7:J:74:LEU:HD23	2.00	0.42
3:L:95:LEU:HD23	3:L:95:LEU:HA	1.88	0.42
7:J:7:SER:HA	7:J:8:PRO:HA	1.77	0.42
2:H:105:ASP:OD1	2:H:105:ASP:N	2.33	0.42
7:J:126:LYS:HB2	7:J:126:LYS:HE2	1.92	0.42
1:A:371:PHE:HB3	1:A:372:ALA:H	1.37	0.42
3:L:140:TYR:CG	3:L:141:PRO:HA	2.55	0.42
6:I:4:LEU:HD23	6:I:22:CYS:SG	2.60	0.42
5:E:11:LEU:HD22	5:E:19:VAL:HG13	2.01	0.41
5:E:109:ARG:HE	5:E:173:THR:HG22	1.85	0.41
7:J:190:LYS:HA	7:J:211:ARG:HB2	2.02	0.41
4:D:133:PRO:HD3	4:D:145:LEU:HB3	2.02	0.41
6:I:29:PHE:CG	6:I:77:THR:HG23	2.54	0.41
7:J:79:LEU:HD22	7:J:84:PHE:HE2	1.85	0.41
4:D:207:HIS:HB3	4:D:212:THR:HB	2.02	0.41
2:H:126:PHE:HD2	2:H:145:LEU:HD23	1.85	0.41
7:J:185:ASP:HA	7:J:188:LYS:HD3	2.03	0.41
5:E:123:ASP:N	5:E:123:ASP:OD1	2.53	0.41
7:J:108:ARG:NH1	7:J:109:THR:O	2.54	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:7:SER:HB3	3:L:8:PRO:HD3	2.02	0.41
4:D:36:TRP:O	4:D:48:VAL:HG22	2.20	0.41
6:I:40:ALA:HB3	6:I:43:GLN:HG3	2.02	0.41
1:A:438:SER:HB3	1:A:509:ARG:HG3	2.02	0.41
6:I:19:LYS:HD2	6:I:80:TYR:HB3	2.02	0.41
7:J:84:PHE:CD1	7:J:106:ILE:HG12	2.56	0.41
7:J:113:PRO:HB3	7:J:139:PHE:HB3	2.03	0.41
2:H:11:LEU:HD11	2:H:150:PHE:HE1	1.87	0.40
7:J:197:THR:HG22	7:J:204:PRO:HB3	2.03	0.40
7:J:136:LEU:HD13	7:J:175:LEU:HD22	2.04	0.40
2:H:33:TYR:HB2	2:H:98:ASP:O	2.22	0.40
5:E:33:LEU:HD11	5:E:88:CYS:HB2	2.04	0.40
3:L:108:ARG:NH2	3:L:111:ALA:HB2	2.36	0.40
5:E:168:ASP:OD1	5:E:170:LYS:NZ	2.54	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	194/196 (99%)	185 (95%)	9 (5%)	0	100	100
2	H	217/229 (95%)	207 (95%)	10 (5%)	0	100	100
3	L	211/215 (98%)	202 (96%)	9 (4%)	0	100	100
4	D	220/231 (95%)	214 (97%)	6 (3%)	0	100	100
5	E	212/216 (98%)	208 (98%)	4 (2%)	0	100	100
6	I	229/239 (96%)	225 (98%)	4 (2%)	0	100	100
7	J	213/215 (99%)	204 (96%)	9 (4%)	0	100	100
All	All	1496/1541 (97%)	1445 (97%)	51 (3%)	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	168/168 (100%)	159 (95%)	9 (5%)	18	21
2	H	183/193 (95%)	174 (95%)	9 (5%)	21	25
3	L	186/188 (99%)	181 (97%)	5 (3%)	40	50
4	D	185/194 (95%)	175 (95%)	10 (5%)	18	21
5	E	187/189 (99%)	180 (96%)	7 (4%)	29	38
6	I	193/201 (96%)	184 (95%)	9 (5%)	22	27
7	J	186/186 (100%)	182 (98%)	4 (2%)	47	59
All	All	1288/1319 (98%)	1235 (96%)	53 (4%)	28	33

All (53) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	333	THR
1	A	359	SER
1	A	371	PHE
1	A	389	ASP
1	A	403	ARG
1	A	438	SER
1	A	459	SER
1	A	461	LEU
1	A	494	SER
2	H	6	GLU
2	H	7	SER
2	H	53	SER
2	H	70	SER
2	H	73	ASN
2	H	85	LEU
2	H	114	THR
2	H	120	THR
2	H	173	VAL
3	L	5	THR
3	L	65	SER

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
3	L	107	LYS
3	L	175	LEU
3	L	197	THR
4	D	33	ASP
4	D	56	ASP
4	D	70	SER
4	D	79	TYR
4	D	86	ARG
4	D	100	SER
4	D	152	TYR
4	D	204	ASN
4	D	214	VAL
4	D	223	CYS
5	E	18	ARG
5	E	42	LYS
5	E	45	LYS
5	E	52	SER
5	E	69	THR
5	E	143	ARG
5	E	169	SER
6	I	30	THR
6	I	115	ASP
6	I	124	THR
6	I	152	LEU
6	I	196	VAL
6	I	197	THR
6	I	210	CYS
6	I	211	ASN
6	I	228	LYS
7	J	62	ARG
7	J	145	LYS
7	J	176	SER
7	J	211	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
3	L	100	GLN
7	J	6	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

3 monosaccharides 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	$\#|Z| > 2$
8	NAG	B	1	8,1	14,14,15	0.33	0	17,19,21	0.48	0
8	NAG	B	2	8	14,14,15	0.25	0	17,19,21	0.45	0
8	FUC	B	3	8	10,10,11	0.52	0	14,14,16	0.80	0

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
8	NAG	B	1	8,1	-	0/6/23/26	0/1/1/1
8	NAG	B	2	8	-	<mark>2/6/23/26</mark>	0/1/1/1
8	FUC	B	3	8	-	-	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	B	2	NAG	O5-C5-C6-O6
8	B	2	NAG	C4-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	1	NAG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

Oligosaccharide Chain B

Bond lengths

Bond angles

Torsions

Rings
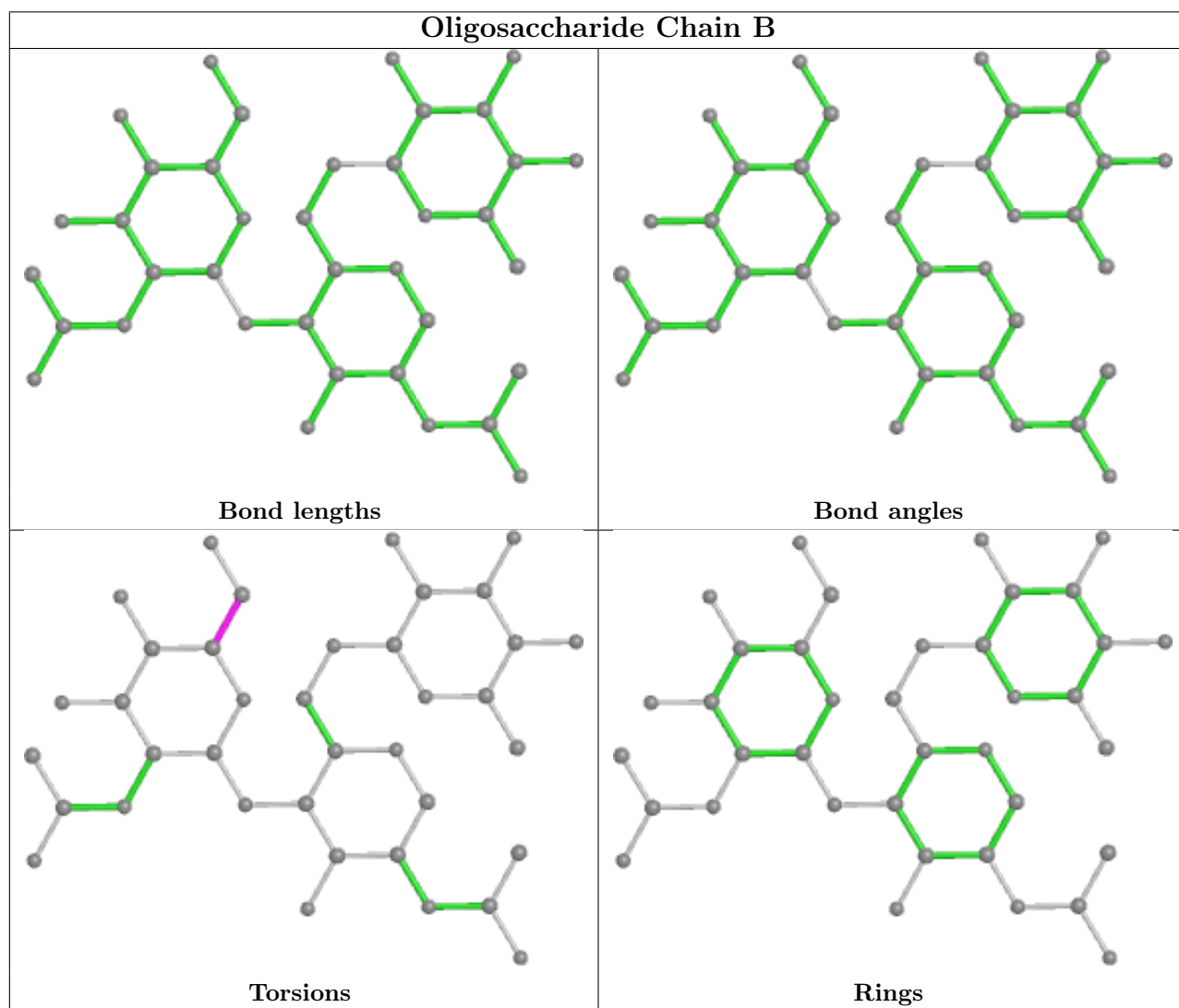
5.6 Ligand geometry ⓘ

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.