



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 30, 2024 – 04:45 pm BST

PDB ID : 8QRF  
Title : SARS-CoV-2 delta RBD complexed with XBB-6 and beta-49 Fabs  
Authors : Zhou, D.; Ren, J.; Stuart, D.I.  
Deposited on : 2023-10-06  
Resolution : 3.70 Å(reported)

This is a Full wwPDB X-ray Structure 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/XrayValidationReportHelp>

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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36.2  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

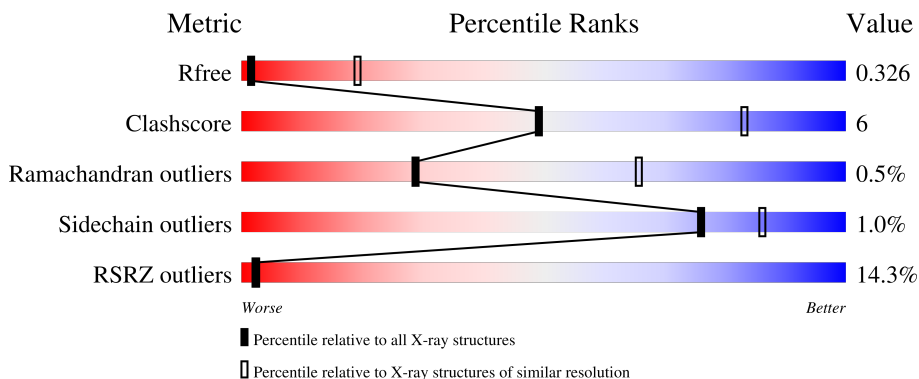
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.70 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)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1049 (3.88-3.52)
Clashscore	141614	1027 (3.86-3.54)
Ramachandran outliers	138981	1069 (3.88-3.52)
Sidechain outliers	138945	1065 (3.88-3.52)
RSRZ outliers	127900	1578 (3.90-3.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower 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  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	E	202	 6% 83% 15%
2	B	216	 10% 85% 14%
3	A	223	 11% 87% 9%
4	H	230	 26% 76% 20%
5	L	216	 15% 89% 9%

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Mol	Chain	Length	Quality of chain
6	C	4	

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8096 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 S1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	E	198	1576	1007	270	291	8	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	327	HIS	-	expression tag	UNP P0DTC2
E	328	HIS	-	expression tag	UNP P0DTC2
E	329	HIS	-	expression tag	UNP P0DTC2
E	330	HIS	-	expression tag	UNP P0DTC2
E	331	HIS	-	expression tag	UNP P0DTC2
E	332	HIS	-	expression tag	UNP P0DTC2
E	452	ARG	LEU	variant	UNP P0DTC2
E	478	LYS	THR	variant	UNP P0DTC2
E	527	LYS	-	expression tag	UNP P0DTC2
E	528	LYS	-	expression tag	UNP P0DTC2

- Molecule 2 is a protein called Beta-49 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	216	1656	1033	283	334	6	0	0	0

- Molecule 3 is a protein called Beta-49 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	A	215	1584	1005	260	312	7	0	0	0

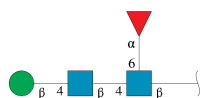
- Molecule 4 is a protein called XBB-6 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	H	220	1666	1055	277	329	5	0	1	0

- Molecule 5 is a protein called XBB-6 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	L	212	1565	977	258	326	4	0	0	0

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

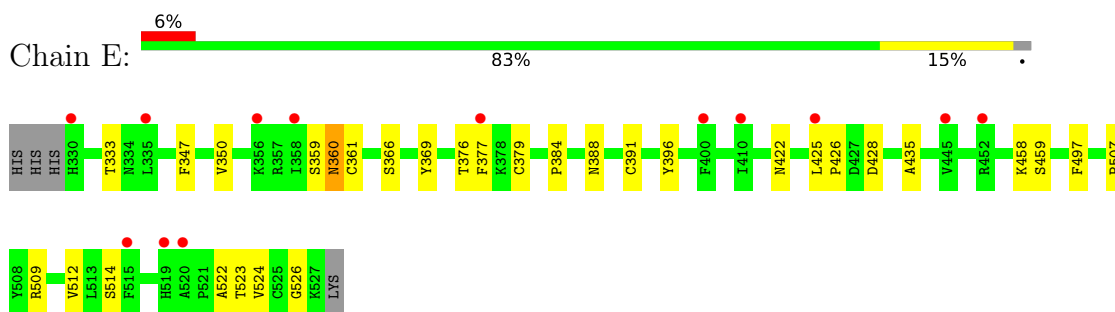


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
6	C	4	49	28	2	19	0	0	0

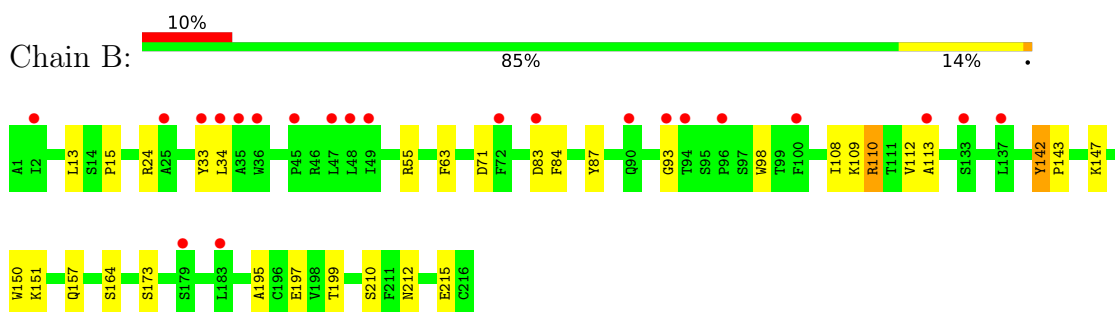
### 3 Residue-property plots [i](#)

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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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.

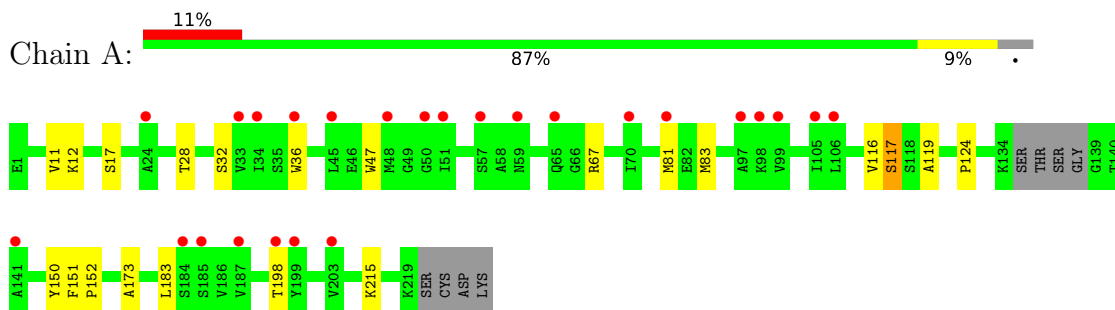
- Molecule 1: Spike protein S1



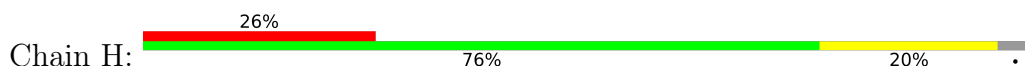
- Molecule 2: Beta-49 light chain

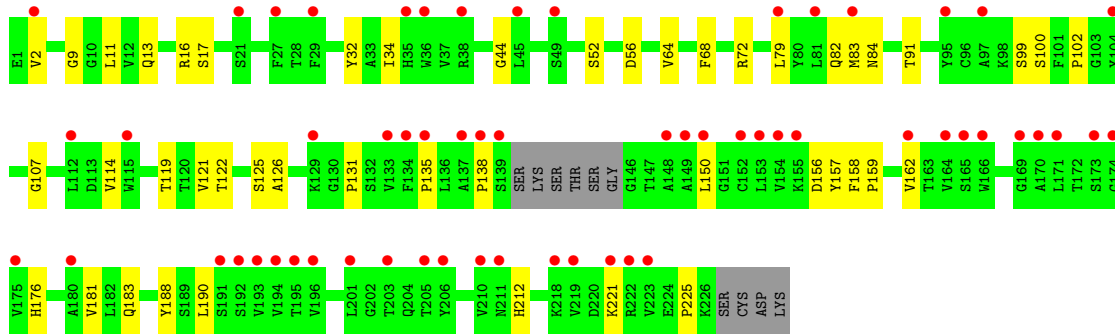


- Molecule 3: Beta-49 heavy chain

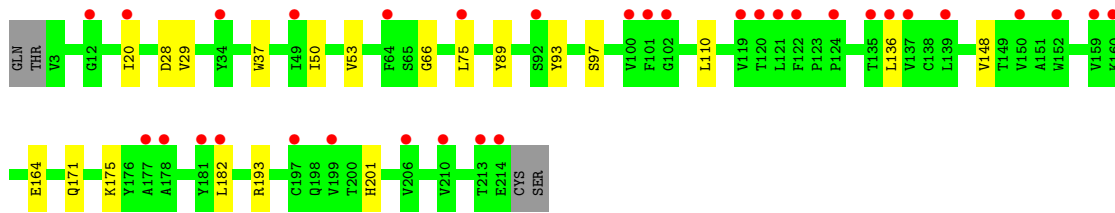
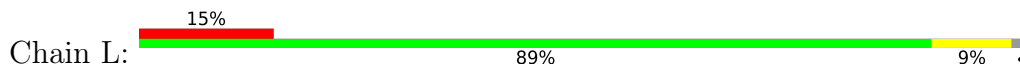


- Molecule 4: XBB-6 heavy chain





- Molecule 5: XBB-6 light chain



- Molecule 6: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	189.11Å 146.54Å 51.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	57.92 – 3.70 63.04 – 3.70	Depositor EDS
% Data completeness (in resolution range)	99.0 (57.92-3.70) 99.2 (63.04-3.70)	Depositor EDS
$R_{merge}$	0.78	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.07 (at 3.67Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.272 , 0.317 0.276 , 0.326	Depositor DCC
$R_{free}$ test set	832 reflections (5.26%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	131.9	Xtrriage
Anisotropy	0.453	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 129.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.37$ , $\langle L^2 \rangle = 0.20$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.88	EDS
Total number of atoms	8096	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	169.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.09% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: FUC, BMA, 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	E	0.27	0/1622	0.48	0/2205
2	B	0.28	0/1693	0.52	0/2298
3	A	0.25	0/1620	0.48	0/2208
4	H	0.27	0/1712	0.53	0/2335
5	L	0.28	0/1602	0.49	0/2190
All	All	0.27	0/8249	0.50	0/11236

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	B	0	1
4	H	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	110	ARG	Peptide
4	H	125	SER	Peptide

## 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	E	1576	0	1483	15	0
2	B	1656	0	1605	27	0
3	A	1584	0	1566	14	0
4	H	1666	0	1608	28	0
5	L	1565	0	1507	14	0
6	C	49	0	43	0	0
All	All	8096	0	7812	93	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 6.

All (93) 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:H:16:ARG:HG2	4:H:17:SER:H	1.35	0.92
4:H:99:SER:HB3	4:H:107:GLY:HA2	1.60	0.82
2:B:110:ARG:CZ	2:B:112:VAL:HA	2.19	0.73
3:A:124:PRO:HB3	3:A:150:TYR:HB3	1.73	0.69
2:B:142:TYR:CD1	2:B:143:PRO:HA	2.31	0.65
4:H:52:SER:O	4:H:72:ARG:NH1	2.30	0.65
4:H:131:PRO:HB3	4:H:157:TYR:HB3	1.79	0.64
5:L:136:LEU:HD12	5:L:182:LEU:HD23	1.79	0.64
2:B:110:ARG:NH1	2:B:143:PRO:HD3	2.15	0.61
2:B:212:ASN:HB2	2:B:215:GLU:HG3	1.83	0.61
2:B:151:LYS:NZ	2:B:197:GLU:OE1	2.34	0.60
4:H:138:PRO:HG3	4:H:150:LEU:HB3	1.82	0.60
5:L:20:ILE:HD12	5:L:75:LEU:HD23	1.84	0.60
3:A:173:ALA:HB2	3:A:183:LEU:HD23	1.86	0.57
4:H:126:ALA:HB1	4:H:158:PHE:CE2	2.40	0.57
4:H:32:TYR:OH	4:H:100:SER:O	2.14	0.57
2:B:110:ARG:NH2	2:B:142:TYR:O	2.38	0.56
1:E:388:ASN:HA	1:E:526:GLY:HA3	1.86	0.56
4:H:52:SER:OG	4:H:56:ASP:OD1	2.13	0.55
4:H:135:PRO:HD3	4:H:221:LYS:HD3	1.89	0.55
4:H:34:ILE:HB	4:H:79:LEU:HD22	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:H:16:ARG:HG2	4:H:17:SER:N	2.14	0.53
2:B:110:ARG:HD2	2:B:142:TYR:CD2	2.44	0.53
4:H:158:PHE:CE2	4:H:159:PRO:HB3	2.44	0.52
2:B:110:ARG:HH11	2:B:110:ARG:HG2	1.74	0.52
1:E:360:ASN:HA	1:E:523:THR:HB	1.91	0.52
1:E:396:TYR:HB2	1:E:514:SER:HB2	1.90	0.52
1:E:379:CYS:SG	1:E:384:PRO:HG3	2.51	0.51
2:B:110:ARG:CZ	2:B:143:PRO:HD3	2.41	0.50
3:A:36:TRP:CE2	3:A:81:MET:HB2	2.46	0.50
2:B:83:ASP:O	2:B:87:TYR:OH	2.17	0.50
2:B:110:ARG:HA	2:B:142:TYR:CE2	2.46	0.50
1:E:361:CYS:O	1:E:524:VAL:HA	2.12	0.50
2:B:15:PRO:HD3	2:B:108:ILE:HG23	1.93	0.49
2:B:147:LYS:HB2	2:B:199:THR:HB	1.92	0.49
4:H:11:LEU:HD21	4:H:126:ALA:HB3	1.93	0.49
1:E:376:THR:HB	1:E:435:ALA:HB3	1.95	0.49
5:L:37:TRP:CD2	5:L:75:LEU:HB2	2.48	0.48
1:E:458:LYS:HA	4:H:102:PRO:HB2	1.93	0.48
5:L:28:ASP:OD1	5:L:29:VAL:N	2.47	0.48
4:H:17:SER:HA	4:H:84:ASN:HB3	1.95	0.48
2:B:13:LEU:O	2:B:108:ILE:HA	2.13	0.48
4:H:44:GLY:HA2	5:L:89:TYR:HE2	1.78	0.48
4:H:91:THR:HG23	4:H:122:THR:HA	1.96	0.48
2:B:150:TRP:HB2	2:B:157:GLN:HB2	1.95	0.48
5:L:28:ASP:CG	5:L:29:VAL:H	2.17	0.48
3:A:173:ALA:HA	3:A:183:LEU:HB3	1.96	0.47
4:H:13:GLN:OE1	4:H:16:ARG:NE	2.44	0.47
2:B:55:ARG:NH1	2:B:63:PHE:O	2.47	0.47
5:L:148:VAL:HG23	5:L:201:HIS:HB2	1.96	0.47
5:L:193:ARG:HE	5:L:193:ARG:HB2	1.60	0.47
2:B:110:ARG:HH21	2:B:113:ALA:H	1.62	0.46
3:A:11:VAL:HG21	3:A:152:PRO:HG3	1.96	0.46
3:A:198:THR:HG23	3:A:215:LYS:HE3	1.97	0.46
4:H:2:VAL:HG12	4:H:114:VAL:HG11	1.97	0.46
3:A:28:THR:O	3:A:32:SER:OG	2.24	0.46
1:E:347:PHE:CE2	1:E:509:ARG:HB3	2.51	0.46
5:L:171:GLN:HG2	5:L:175:LYS:O	2.16	0.46
2:B:33:TYR:CD1	2:B:93:GLY:HA2	2.51	0.45
2:B:98:TRP:HB2	3:A:47:TRP:CD1	2.52	0.45
4:H:183:GLN:HG2	5:L:164:GLU:HG3	1.98	0.45
2:B:108:ILE:HD12	2:B:173:SER:HB3	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:67:ARG:O	3:A:83:MET:HA	2.17	0.45
4:H:56:ASP:OD1	4:H:56:ASP:N	2.49	0.45
2:B:110:ARG:CZ	2:B:142:TYR:O	2.65	0.44
3:A:12:LYS:O	3:A:116:VAL:HA	2.18	0.44
1:E:350:VAL:HG22	1:E:422:ASN:HB3	1.98	0.44
2:B:109:LYS:HG3	2:B:110:ARG:H	1.83	0.44
4:H:162:VAL:HG12	4:H:212:HIS:HB2	2.00	0.44
4:H:181:VAL:O	4:H:188:TYR:HA	2.19	0.43
3:A:117:SER:HB3	3:A:151:PHE:CZ	2.54	0.43
4:H:138:PRO:HD2	4:H:225:PRO:HA	2.01	0.43
1:E:497:PHE:CE2	1:E:507:PRO:HB3	2.54	0.43
3:A:117:SER:HB3	3:A:151:PHE:HZ	1.84	0.43
2:B:195:ALA:HB2	2:B:210:SER:HB3	2.01	0.43
4:H:9:GLY:HA3	4:H:119:THR:HG22	2.01	0.42
4:H:64:VAL:HB	4:H:68:PHE:CG	2.54	0.42
1:E:391:CYS:HB3	1:E:522:ALA:HB1	2.00	0.42
1:E:366:SER:HA	1:E:369:TYR:CZ	2.54	0.42
5:L:53:VAL:O	5:L:66:GLY:HA3	2.19	0.42
5:L:50:ILE:HD13	5:L:50:ILE:HA	1.94	0.42
1:E:425:LEU:HD21	1:E:512:VAL:HG11	2.02	0.41
2:B:84:PHE:CE1	2:B:108:ILE:HG12	2.54	0.41
5:L:93:TYR:CZ	5:L:97:SER:HA	2.55	0.41
4:H:44:GLY:HA2	5:L:89:TYR:CE2	2.55	0.41
4:H:83:MET:HE1	4:H:121:VAL:HG21	2.03	0.41
2:B:24:ARG:NH1	2:B:71:ASP:OD1	2.54	0.41
3:A:12:LYS:HE2	3:A:17:SER:O	2.21	0.41
2:B:110:ARG:NE	2:B:112:VAL:HA	2.36	0.41
3:A:124:PRO:CB	3:A:150:TYR:HB3	2.47	0.41
1:E:426:PRO:HB2	1:E:428:ASP:OD1	2.21	0.40
2:B:13:LEU:O	2:B:109:LYS:N	2.52	0.40
1:E:359:SER:O	1:E:360:ASN:ND2	2.54	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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	E	196/202 (97%)	182 (93%)	13 (7%)	1 (0%)	29	66
2	B	214/216 (99%)	202 (94%)	11 (5%)	1 (0%)	29	66
3	A	211/223 (95%)	204 (97%)	6 (3%)	1 (0%)	29	66
4	H	217/230 (94%)	207 (95%)	9 (4%)	1 (0%)	29	66
5	L	210/216 (97%)	198 (94%)	11 (5%)	1 (0%)	29	66
All	All	1048/1087 (96%)	993 (95%)	50 (5%)	5 (0%)	29	66

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	333	THR
3	A	119	ALA
5	L	110	LEU
2	B	142	TYR
4	H	156	ASP

### 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 X-ray entries followed by that with respect to entries of similar resolution.

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	E	170/175 (97%)	167 (98%)	3 (2%)	59	77
2	B	186/186 (100%)	184 (99%)	2 (1%)	73	85
3	A	178/187 (95%)	177 (99%)	1 (1%)	86	93
4	H	186/194 (96%)	183 (98%)	3 (2%)	62	80
5	L	178/183 (97%)	178 (100%)	0	100	100
All	All	898/925 (97%)	889 (99%)	9 (1%)	76	86

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	360	ASN
1	E	377	PHE
1	E	459	SER
2	B	34	LEU
2	B	164	SER
3	A	117	SER
4	H	82	GLN
4	H	176	HIS
4	H	190	LEU

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

Mol	Chain	Res	Type
1	E	334	ASN
4	H	39	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](#)

4 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
6	NAG	C	1	6,1	14,14,15	0.28	0	17,19,21	0.41	0
6	NAG	C	2	6	14,14,15	0.40	0	17,19,21	0.41	0
6	BMA	C	3	6	11,11,12	0.64	0	15,15,17	1.03	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	FUC	C	4	6	10,10,11	0.92	0	14,14,16	1.11	2 (14%)

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
6	NAG	C	1	6,1	-	0/6/23/26	0/1/1/1
6	NAG	C	2	6	-	2/6/23/26	0/1/1/1
6	BMA	C	3	6	-	2/2/19/22	0/1/1/1
6	FUC	C	4	6	-	-	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	3	BMA	C1-C2-C3	2.26	112.45	109.67
6	C	4	FUC	C1-O5-C5	2.14	117.63	112.78
6	C	4	FUC	O2-C2-C1	2.11	113.46	109.15

There are no chirality outliers.

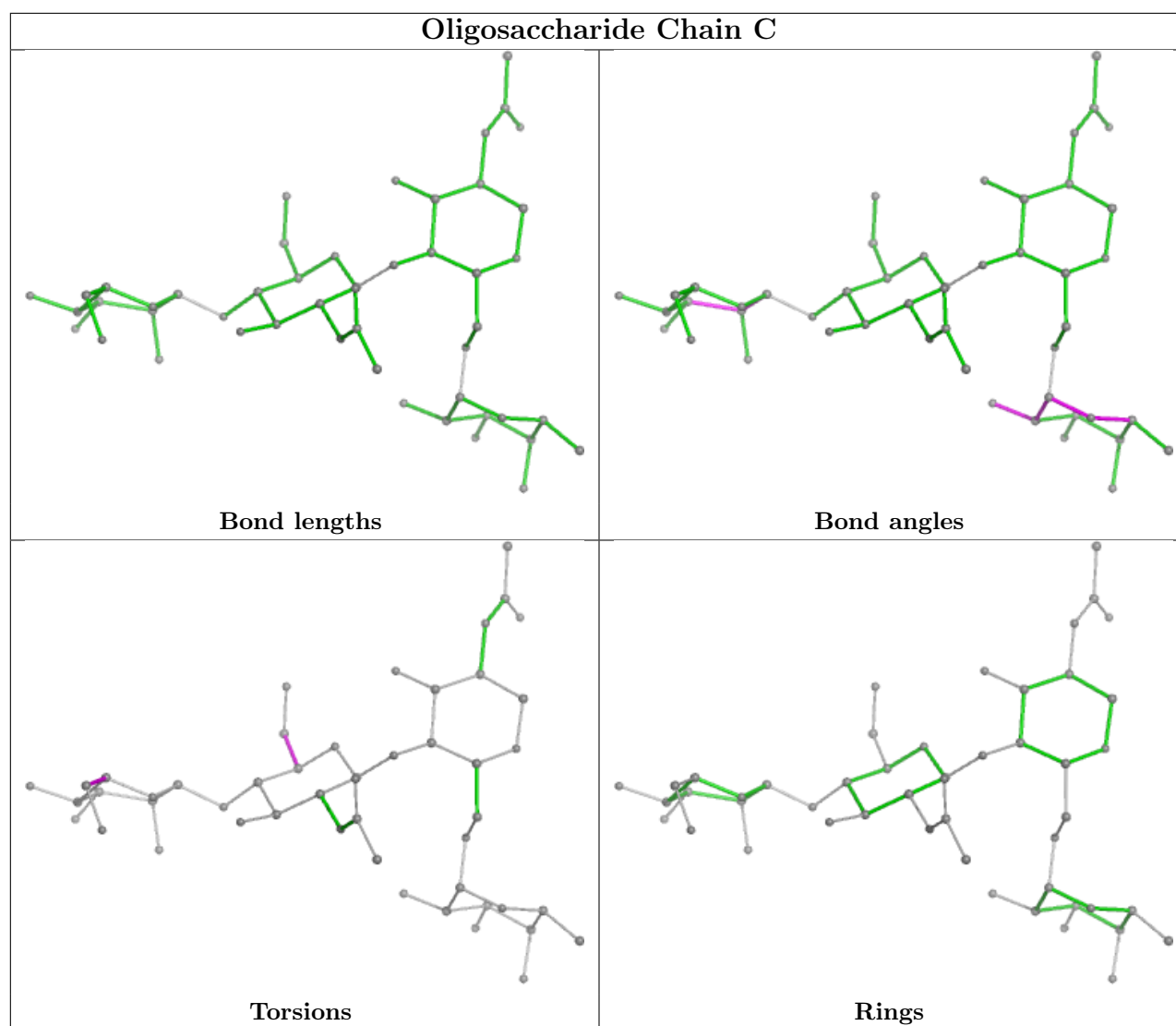
All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	C	2	NAG	O5-C5-C6-O6
6	C	3	BMA	O5-C5-C6-O6
6	C	2	NAG	C4-C5-C6-O6
6	C	3	BMA	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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



## 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.



## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	E	198/202 (98%)	0.56	13 (6%) 18 12	107, 143, 213, 378	0
2	B	216/216 (100%)	0.63	22 (10%) 6 5	105, 170, 218, 305	0
3	A	215/223 (96%)	0.57	25 (11%) 4 4	104, 174, 241, 291	0
4	H	220/230 (95%)	1.11	59 (26%) 0 0	104, 171, 249, 308	0
5	L	212/216 (98%)	0.74	33 (15%) 2 1	101, 185, 239, 312	0
All	All	1061/1087 (97%)	0.72	152 (14%) 2 2	101, 168, 237, 378	0

All (152) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	H	149	ALA	9.5
5	L	178	ALA	7.0
4	H	150	LEU	6.7
5	L	150	VAL	6.2
5	L	120	THR	6.0
5	L	121	LEU	6.0
4	H	138	PRO	5.7
5	L	199	VAL	5.6
4	H	206	TYR	5.4
4	H	194	VAL	5.2
4	H	154	VAL	5.0
4	H	210	VAL	4.8
4	H	153	LEU	4.8
5	L	152	TRP	4.5
5	L	137	VAL	4.5
4	H	191[A]	SER	4.4
3	A	98	LYS	4.4
5	L	101	PHE	4.4
3	A	199	TYR	4.3
5	L	214	GLU	4.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
4	H	81	LEU	4.3
4	H	223	VAL	4.1
4	H	148	ALA	4.0
2	B	94	THR	4.0
1	E	520	ALA	4.0
4	H	171	LEU	3.9
4	H	97	ALA	3.8
4	H	36	TRP	3.8
4	H	45	LEU	3.8
4	H	164	VAL	3.7
4	H	38	ARG	3.7
5	L	206	VAL	3.7
1	E	330	HIS	3.6
3	A	184	SER	3.5
4	H	175	VAL	3.5
4	H	192	SER	3.5
1	E	445	VAL	3.5
3	A	59	ASN	3.5
5	L	177	ALA	3.5
3	A	45	LEU	3.4
2	B	34	LEU	3.4
5	L	136	LEU	3.4
4	H	169	GLY	3.4
3	A	185	SER	3.4
4	H	196	VAL	3.3
4	H	211	ASN	3.3
4	H	203	THR	3.3
1	E	335	LEU	3.2
3	A	51	ILE	3.2
5	L	160	LYS	3.2
4	H	174	GLY	3.2
5	L	119	VAL	3.2
3	A	48	MET	3.1
5	L	34	TYR	3.1
1	E	452	ARG	3.1
4	H	129	LYS	3.1
2	B	35	ALA	3.0
2	B	96	PRO	3.0
5	L	12	GLY	3.0
4	H	193	VAL	3.0
4	H	139	SER	3.0
4	H	135	PRO	3.0

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
5	L	135	THR	2.9
2	B	93	GLY	2.9
4	H	35	HIS	2.8
4	H	166	TRP	2.8
4	H	195	THR	2.8
5	L	100	VAL	2.8
3	A	99	VAL	2.8
4	H	173	SER	2.8
5	L	49	ILE	2.8
4	H	222	ARG	2.8
4	H	115	TRP	2.8
4	H	134	PHE	2.7
2	B	48	LEU	2.7
4	H	79	LEU	2.6
2	B	25	ALA	2.6
3	A	106	LEU	2.6
1	E	356	LYS	2.6
4	H	137	ALA	2.6
1	E	400	PHE	2.6
2	B	90	GLN	2.6
4	H	21	SER	2.6
3	A	105	ILE	2.6
5	L	75	LEU	2.6
4	H	218	LYS	2.6
4	H	83	MET	2.6
4	H	219	VAL	2.6
3	A	50	GLY	2.5
2	B	72	PHE	2.5
4	H	112	LEU	2.5
3	A	81	MET	2.5
1	E	410	ILE	2.5
2	B	2	ILE	2.5
4	H	27	PHE	2.5
5	L	197	CYS	2.5
5	L	181	TYR	2.5
5	L	122	PHE	2.5
4	H	165	SER	2.5
2	B	47	LEU	2.4
4	H	221	LYS	2.4
3	A	33	VAL	2.4
2	B	36	TRP	2.4
5	L	92	SER	2.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	B	137	LEU	2.4
2	B	133	SER	2.4
4	H	29	PHE	2.4
5	L	124	PRO	2.4
3	A	97	ALA	2.4
3	A	141	ALA	2.4
3	A	187	VAL	2.4
2	B	183	LEU	2.4
1	E	377	PHE	2.4
2	B	113	ALA	2.3
4	H	152	CYS	2.3
5	L	139	LEU	2.3
3	A	34	ILE	2.3
3	A	70	ILE	2.3
1	E	519	HIS	2.3
4	H	155	LYS	2.3
4	H	2	VAL	2.3
4	H	180	ALA	2.2
1	E	358	ILE	2.2
5	L	20	ILE	2.2
3	A	198	THR	2.2
2	B	100	PHE	2.2
5	L	64	PHE	2.2
5	L	102	GLY	2.2
3	A	203	VAL	2.2
1	E	515	PHE	2.2
5	L	159	VAL	2.2
5	L	182	LEU	2.2
2	B	33	TYR	2.1
2	B	49	ILE	2.1
2	B	83	ASP	2.1
3	A	57	SER	2.1
5	L	210	VAL	2.1
1	E	425	LEU	2.1
3	A	36	TRP	2.1
2	B	179	SER	2.1
4	H	104	TYR	2.1
2	B	45	PRO	2.1
4	H	49	SER	2.1
5	L	213	THR	2.1
4	H	133	VAL	2.1
3	A	24	ALA	2.0

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Mol	Chain	Res	Type	RSRZ
3	A	65	GLN	2.0
4	H	162	VAL	2.0
4	H	95	TYR	2.0
4	H	201	LEU	2.0
4	H	170	ALA	2.0
4	H	205	THR	2.0

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

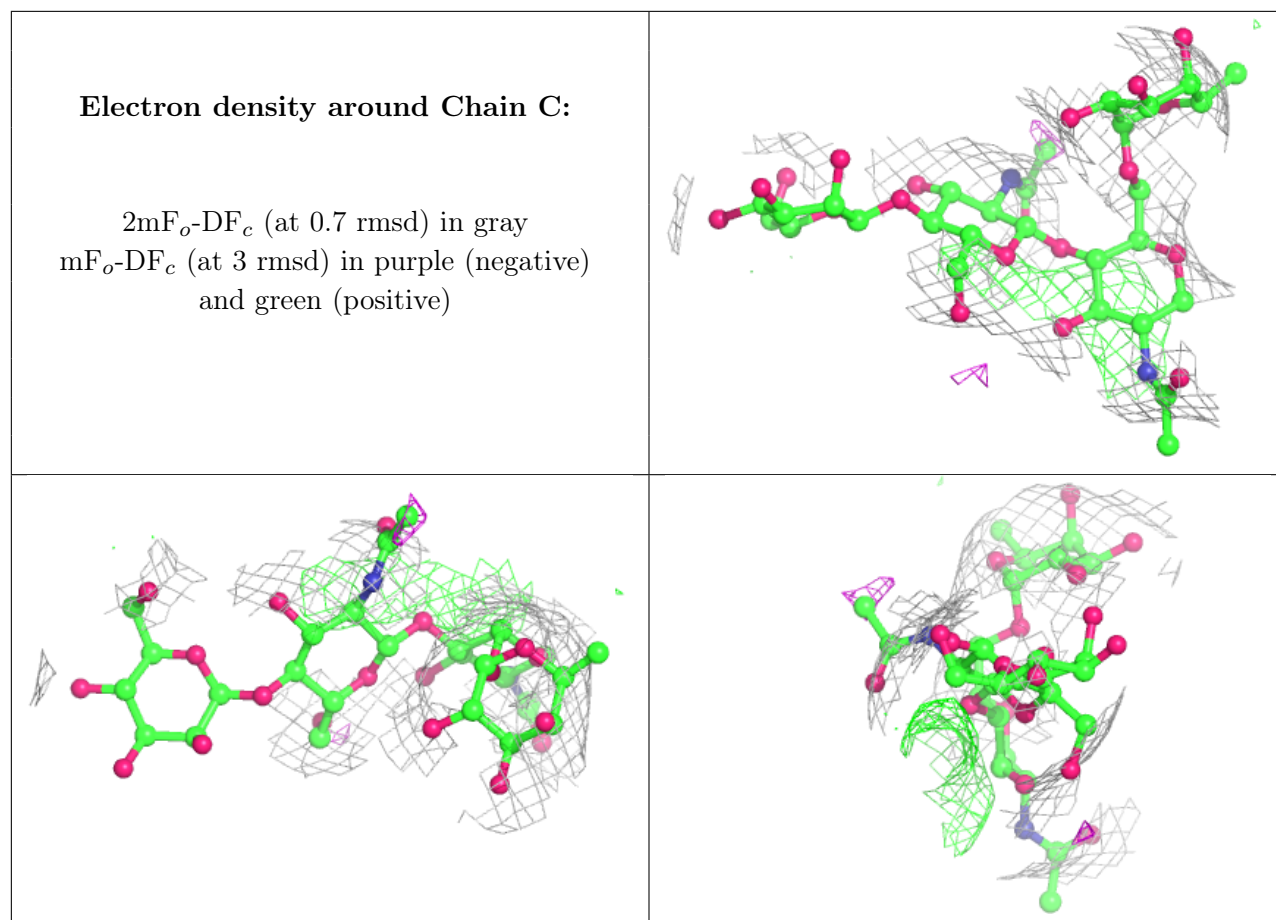
There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q < 0.9
6	NAG	C	1	14/15	0.84	0.24	131,142,150,157	0
6	NAG	C	2	14/15	0.85	0.34	133,138,143,145	0
6	FUC	C	4	10/11	0.85	0.25	128,135,140,149	0
6	BMA	C	3	11/12	0.88	0.37	137,141,145,148	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



## 6.4 Ligands [i](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.