



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 10, 2020 – 11:15 AM BST

PDB ID : 6UQC  
Title : Mouse IgG2a Bispecific Fc  
Authors : Wang, F.; Tsai, J.C.; Davis, J.H.; West, S.M.; Strop, P.  
Deposited on : 2019-10-18  
Resolution : 1.87 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.

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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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13.1  
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) : 2.13.1

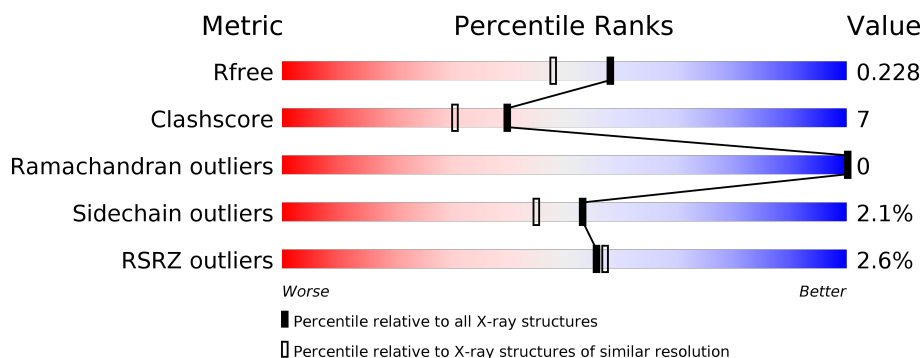
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.87 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	9470 (1.90-1.86)
Clashscore	141614	10282 (1.90-1.86)
Ramachandran outliers	138981	10152 (1.90-1.86)
Sidechain outliers	138945	10152 (1.90-1.86)
RSRZ outliers	127900	9303 (1.90-1.86)

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 on 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	C	215	<div> <div></div> <div> <div></div> <div>89%</div> <div>11%</div> </div> </div>
1	D	215	<div> <div></div> <div> <div></div> <div>87%</div> <div>12%</div> </div> </div>
2	E	215	<div> <div></div> <div> <div></div> <div>82%</div> <div>15%</div> <div>..</div> </div> </div>
2	F	215	<div> <div></div> <div> <div></div> <div>84%</div> <div>15%</div> <div>.</div> </div> </div>
3	A	6	<div> <div></div> <div> <div></div> <div>33%</div> <div>67%</div> </div> </div>
3	B	6	<div> <div></div> <div> <div></div> <div>33%</div> <div>67%</div> </div> </div>

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Mol	Chain	Length	Quality of chain
4	G	7	
4	H	7	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NAG	A	5	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 8155 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 Ig gamma-2A chain C region, membrane-bound form.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	207	Total	C	N	O	S	0	8	0
			1733	1096	292	335	10			
1	D	207	Total	C	N	O	S	0	8	0
			1733	1096	292	335	10			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	356	LYS	GLU	microheterogeneity	UNP P01865
C	364	SER	THR	microheterogeneity	UNP P01865
C	409	ASP	LYS	microheterogeneity	UNP P01865
C	411	THR	ARG	microheterogeneity	UNP P01865
D	356	LYS	GLU	microheterogeneity	UNP P01865
D	364	SER	THR	microheterogeneity	UNP P01865
D	409	ASP	LYS	microheterogeneity	UNP P01865
D	411	THR	ARG	microheterogeneity	UNP P01865

- Molecule 2 is a protein called Ig gamma-2A chain C region, membrane-bound form.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	207	Total	C	N	O	S	0	8	0
			1733	1096	292	335	10			
2	F	207	Total	C	N	O	S	0	8	0
			1733	1096	292	335	10			

There are 8 discrepancies between the modelled and reference sequences:

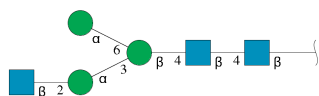
Chain	Residue	Modelled	Actual	Comment	Reference
E	368	LEU	MET	microheterogeneity	UNP P01865
E	370	LYS	THR	microheterogeneity	UNP P01865
E	399	LYS	ASP	microheterogeneity	UNP P01865
E	439	GLU	LYS	microheterogeneity	UNP P01865

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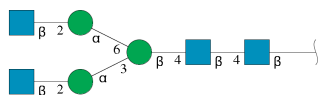
Chain	Residue	Modelled	Actual	Comment	Reference
F	368	LEU	MET	microheterogeneity	UNP P01865
F	370	LYS	THR	microheterogeneity	UNP P01865
F	399	LYS	ASP	microheterogeneity	UNP P01865
F	439	GLU	LYS	microheterogeneity	UNP P01865

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	A	6	Total	C	N	O	0	0	0
			75	42	3	30			
3	B	6	Total	C	N	O	0	0	0
			75	42	3	30			

- Molecule 4 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



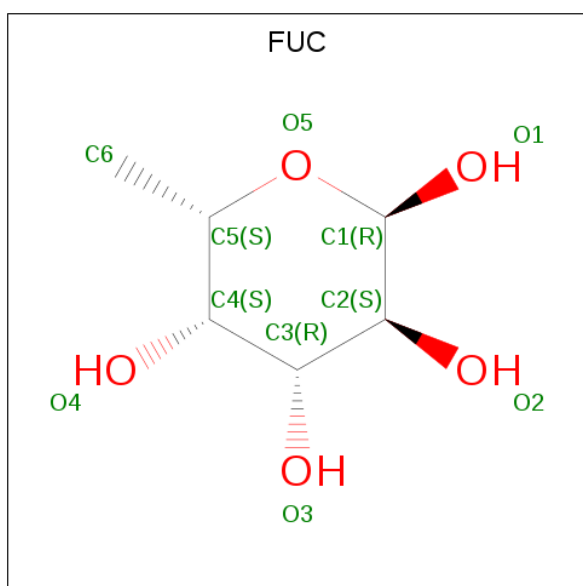
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	G	7	Total	C	N	O	0	0	0
			89	50	4	35			
4	H	7	Total	C	N	O	0	0	0
			89	50	4	35			

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	C	1	Total	C	N	O	0	0
			14	8	1	5		
5	D	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 6 is alpha-L-fucopyranose (three-letter code: FUC) (formula:  $C_6H_{12}O_5$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	C	O	0	0
			10	6	4		
6	D	1	Total	C	O	0	0
			10	6	4		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	F	1	Total	C	O	0	0
			10	6	4		
6	F	1	Total	C	O	0	0
			10	6	4		

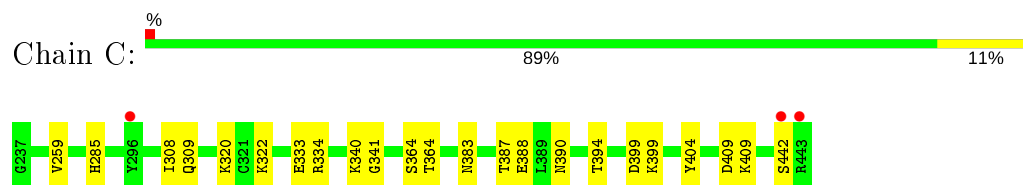
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	192	Total	O	0	0
			192	192		
7	D	190	Total	O	0	0
			190	190		
7	E	205	Total	O	0	0
			205	205		
7	F	240	Total	O	0	0
			240	240		

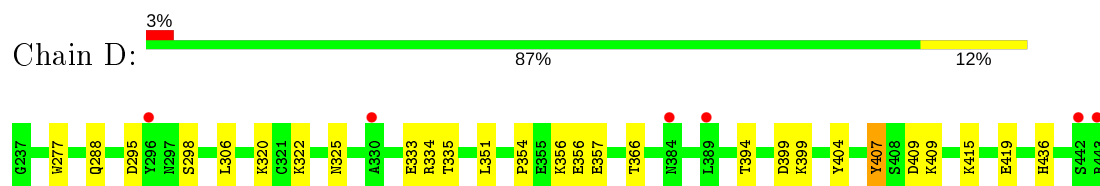
### 3 Residue-property plots [i](#)

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.

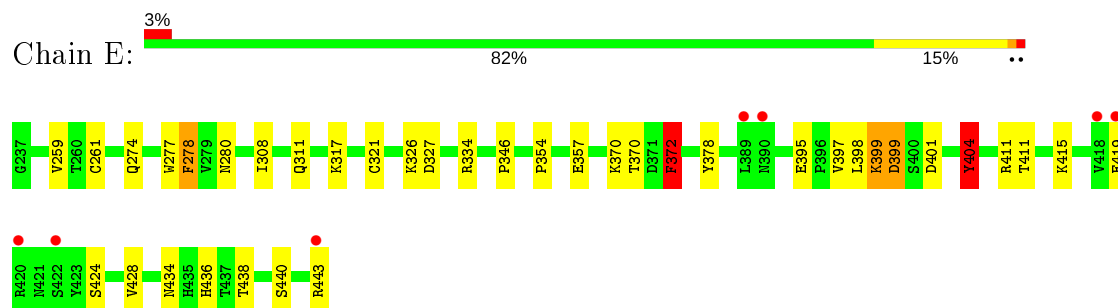
- Molecule 1: Ig gamma-2A chain C region, membrane-bound form



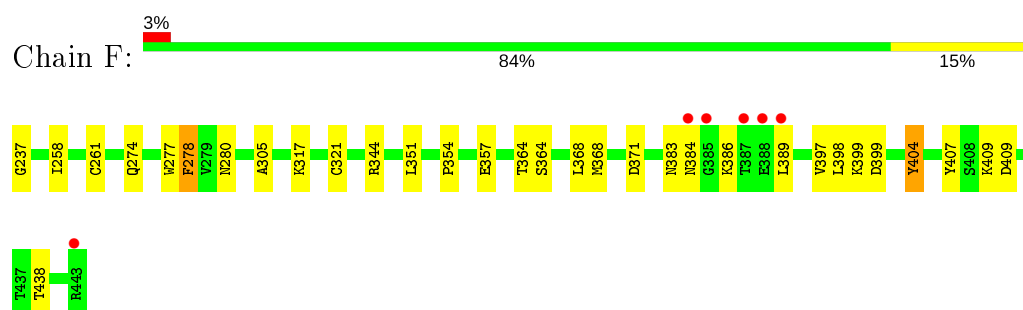
- Molecule 1: Ig gamma-2A chain C region, membrane-bound form



- Molecule 2: Ig gamma-2A chain C region, membrane-bound form



- Molecule 2: Ig gamma-2A chain C region, membrane-bound form

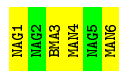


- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyra

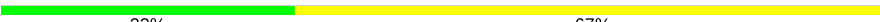


nose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain A:  33% 67%



- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain B:  33% 67%



- Molecule 4: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:  57% 43%



- Molecule 4: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H:  43% 57%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	64.27Å 64.40Å 88.98Å 76.19° 72.17° 61.48°	Depositor
Resolution (Å)	35.65 – 1.87 84.19 – 1.87	Depositor EDS
% Data completeness (in resolution range)	84.8 (35.65-1.87) 84.8 (84.19-1.87)	Depositor EDS
$R_{merge}$	0.03	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.11 (at 1.87Å)	Xtriage
Refinement program	PHENIX 1.17.1 _3660	Depositor
R, $R_{free}$	0.194 , 0.229 0.194 , 0.228	Depositor DCC
$R_{free}$ test set	4114 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	30.1	Xtriage
Anisotropy	0.542	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 42.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	8155	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.65% 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, MAN

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	C	0.38	0/1768	0.57	0/2389
1	D	0.40	0/1768	0.62	0/2389
2	E	0.38	0/1768	0.69	5/2389 (0.2%)
2	F	0.39	0/1768	0.61	1/2389 (0.0%)
All	All	0.39	0/7072	0.62	6/9556 (0.1%)

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	E	0	1

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
2	E	372	PHE	CB-CG-CD2	-10.92	113.15	120.80
2	E	372	PHE	CB-CG-CD1	6.54	125.38	120.80
2	E	372	PHE	CB-CA-C	5.83	122.05	110.40
2	E	372	PHE	N-CA-CB	-5.72	100.30	110.60
2	E	404	TYR	CB-CG-CD2	-5.70	117.58	121.00
2	F	404	TYR	CB-CG-CD2	-5.20	117.88	121.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	E	372	PHE	Sidechain

## 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1733	0	1685	14	0
1	D	1733	0	1687	18	0
2	E	1733	0	1684	34	0
2	F	1733	0	1687	27	0
3	A	75	0	63	3	0
3	B	75	0	63	2	0
4	G	89	0	76	3	0
4	H	89	0	76	3	0
5	C	14	0	13	0	0
5	D	14	0	13	0	0
6	C	10	0	10	3	0
6	D	10	0	10	2	0
6	F	20	0	20	6	0
7	C	192	0	0	7	1
7	D	190	0	0	7	1
7	E	205	0	0	17	2
7	F	240	0	0	9	0
All	All	8155	0	7087	97	2

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 (97) 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)
6:F:509:FUC:C1	4:H:1:NAG:O6	1.76	1.33
6:F:501:FUC:C1	4:G:1:NAG:O6	1.86	1.24
6:C:508:FUC:C1	3:A:1:NAG:O6	1.94	1.15
2:F:321:CYS:SG	7:F:811:HOH:O	2.07	1.10
2:E:321:CYS:SG	7:E:775:HOH:O	2.12	1.04
6:D:508:FUC:C1	3:B:1:NAG:O6	2.08	1.01

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:274:GLN:NE2	7:E:603:HOH:O	2.01	0.93
1:D:295:ASP:OD1	7:D:601:HOH:O	1.86	0.93
2:E:401:ASP:OD2	7:E:601:HOH:O	1.87	0.92
2:E:372:PHE:CE1	2:E:404:TYR:HB2	2.10	0.86
1:C:442:SER:OG	7:C:601:HOH:O	1.86	0.81
2:E:443:ARG:O	7:E:602:HOH:O	1.98	0.81
2:E:415:LYS:HE2	2:E:419:GLU:OE2	1.79	0.79
6:F:509:FUC:C1	4:H:1:NAG:C6	2.61	0.78
1:D:325:ASN:ND2	7:D:603:HOH:O	2.11	0.77
6:F:509:FUC:C2	4:H:1:NAG:O6	2.32	0.76
1:C:322:LYS:HG2	1:C:333:GLU:HG2	1.67	0.76
2:E:372:PHE:HE1	2:E:404:TYR:HB2	1.52	0.74
1:D:288:GLN:OE1	7:D:602:HOH:O	2.05	0.74
1:D:322:LYS:HG2	1:D:333:GLU:HG2	1.70	0.71
1:C:390:ASN:OD1	7:C:602:HOH:O	2.08	0.71
6:F:501:FUC:C1	4:G:1:NAG:C6	2.69	0.70
2:E:327:ASP:OD2	7:E:604:HOH:O	2.09	0.69
2:F:383:ASN:OD1	7:F:601:HOH:O	2.12	0.68
2:E:398:LEU:O	7:E:605:HOH:O	2.11	0.68
1:D:298:SER:O	7:D:604:HOH:O	2.13	0.67
6:D:508:FUC:C2	3:B:1:NAG:O6	2.42	0.66
6:C:508:FUC:C2	3:A:1:NAG:O6	2.43	0.66
2:E:334:ARG:NH2	7:E:609:HOH:O	2.28	0.66
6:F:501:FUC:C2	4:G:1:NAG:O6	2.43	0.65
2:E:424:SER:HG	2:E:440:SER:HG	1.39	0.63
6:C:508:FUC:C1	3:A:1:NAG:C6	2.77	0.62
2:E:354:PRO:HG2	2:E:357:GLU:HB2	1.81	0.62
2:E:280:ASN:HD21	2:E:317:LYS:HG2	1.67	0.59
2:F:354:PRO:HG2	2:F:357:GLU:HB2	1.84	0.59
2:E:395:GLU:O	7:E:606:HOH:O	2.17	0.58
1:D:354:PRO:HG3	2:F:351:LEU:HD21	1.86	0.58
2:F:436:HIS:CE1	2:F:438:THR:HG23	2.38	0.58
1:D:436:HIS:HD2	7:D:755:HOH:O	1.86	0.57
1:D:335:THR:HG21	7:D:743:HOH:O	2.04	0.57
1:C:387:THR:OG1	7:C:603:HOH:O	2.18	0.56
2:E:311:GLN:NE2	7:E:615:HOH:O	2.38	0.56
1:D:320:LYS:NZ	7:D:611:HOH:O	2.38	0.55
2:E:326:LYS:NZ	7:E:616:HOH:O	2.41	0.54
1:C:404:TYR:HE1	2:F:420:ARG:HH22	1.56	0.53
1:C:320:LYS:HE3	1:C:322:LYS:HE3	1.90	0.53
2:F:274:GLN:NE2	7:F:615:HOH:O	2.43	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:280:ASN:HD21	2:F:317:LYS:HG2	1.76	0.51
2:F:389:LEU:N	7:F:612:HOH:O	2.39	0.51
1:D:320:LYS:HB2	1:D:335:THR:HG22	1.92	0.51
1:C:285:HIS:O	7:C:604:HOH:O	2.19	0.50
2:E:436:HIS:CE1	2:E:438:THR:HG23	2.46	0.50
2:F:261:CYS:SG	7:F:811:HOH:O	2.59	0.50
2:E:370[A]:LYS:HD2	7:E:613:HOH:O	2.10	0.50
1:C:341:GLY:HA2	2:F:386:LYS:HD3	1.95	0.49
1:C:309:GLN:NE2	7:C:615:HOH:O	2.45	0.49
1:D:394:THR:HA	2:F:397:VAL:HG21	1.95	0.49
1:D:415:LYS:NZ	1:D:419:GLU:HG3	2.27	0.49
2:E:261:CYS:SG	7:E:775:HOH:O	2.59	0.48
2:F:399[A]:LYS:HD3	7:F:660:HOH:O	2.13	0.48
2:E:370[A]:LYS:NZ	7:E:613:HOH:O	2.37	0.48
2:F:278:PHE:CD1	2:F:278:PHE:N	2.82	0.47
2:E:280:ASN:ND2	2:E:317:LYS:HG2	2.28	0.47
2:E:277:TRP:C	2:E:278:PHE:CD1	2.87	0.47
2:E:278:PHE:CD1	2:E:278:PHE:N	2.82	0.47
2:F:344:ARG:HD3	2:F:371:ASP:OD2	2.15	0.47
1:D:351:LEU:HB2	1:D:366:THR:HB	1.96	0.46
2:F:280:ASN:ND2	2:F:317:LYS:HG2	2.31	0.46
2:F:258:ILE:HG21	2:F:305:ALA:HB1	1.97	0.46
1:D:354:PRO:HD2	1:D:357:GLU:OE1	2.16	0.46
2:E:346:PRO:HB3	2:E:372:PHE:HD2	1.81	0.46
2:F:237:GLY:N	7:F:621:HOH:O	2.49	0.46
7:C:719:HOH:O	2:F:384:ASN:HA	2.16	0.45
1:C:383:ASN:HB2	1:C:388:GLU:OE2	2.17	0.45
2:F:277:TRP:C	2:F:278:PHE:CD1	2.91	0.44
2:E:378:TYR:HB3	2:E:428:VAL:HB	1.99	0.44
2:E:261:CYS:CB	7:E:775:HOH:O	2.64	0.43
2:F:398:LEU:O	7:F:602:HOH:O	2.21	0.43
7:C:767:HOH:O	2:F:386:LYS:HE2	2.18	0.43
2:E:372:PHE:HD1	2:E:372:PHE:O	2.01	0.43
2:E:399[A]:LYS:HD2	7:E:653:HOH:O	2.18	0.43
1:C:340:LYS:NZ	2:F:386:LYS:HD2	2.34	0.43
2:F:261:CYS:CB	7:F:811:HOH:O	2.66	0.43
1:C:320:LYS:HA	1:C:334:ARG:O	2.17	0.43
2:E:434:ASN:ND2	7:E:618:HOH:O	2.44	0.42
2:F:368[A]:LEU:HD13	2:F:407:TYR:CE1	2.55	0.42
1:D:407:TYR:OH	2:F:409[A]:LYS:HB2	2.19	0.42
1:D:320:LYS:HA	1:D:334:ARG:O	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:414:LYS:HB3	2:F:414:LYS:HE2	1.70	0.41
1:C:259:VAL:HG23	1:C:308:ILE:HD13	2.03	0.41
1:C:394:THR:HA	2:E:397:VAL:HG21	2.02	0.41
2:E:278:PHE:N	2:E:278:PHE:HD1	2.19	0.41
1:D:277:TRP:CE3	1:D:306:LEU:HD22	2.56	0.41
2:E:443:ARG:NH1	7:E:625:HOH:O	2.54	0.41
1:D:356[A]:LYS:HE3	1:D:356[A]:LYS:HB2	1.94	0.40
2:E:259:VAL:HG23	2:E:308:ILE:HD13	2.03	0.40
2:E:261:CYS:HB2	2:E:277:TRP:CZ2	2.56	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:D:706:HOH:O	7:E:709:HOH:O[1_545]	2.07	0.13
7:C:774:HOH:O	7:E:759:HOH:O[1_565]	2.19	0.01

## 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 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	C	197/215 (92%)	196 (100%)	1 (0%)	0	100	100
1	D	197/215 (92%)	196 (100%)	1 (0%)	0	100	100
2	E	197/215 (92%)	196 (100%)	1 (0%)	0	100	100
2	F	197/215 (92%)	196 (100%)	1 (0%)	0	100	100
All	All	788/860 (92%)	784 (100%)	4 (0%)	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 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	C	205/205 (100%)	201 (98%)	4 (2%)	55	47
1	D	205/205 (100%)	200 (98%)	5 (2%)	49	39
2	E	205/205 (100%)	200 (98%)	5 (2%)	49	39
2	F	205/205 (100%)	202 (98%)	3 (2%)	65	59
All	All	820/820 (100%)	803 (98%)	17 (2%)	53	45

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	364[A]	SER
1	C	364[B]	THR
1	C	399[A]	ASP
1	C	409[B]	LYS
1	D	399[A]	ASP
1	D	399[B]	LYS
1	D	404	TYR
1	D	407	TYR
1	D	409[B]	LYS
2	E	278	PHE
2	E	372	PHE
2	E	399[B]	ASP
2	E	404	TYR
2	E	411[B]	THR
2	F	278	PHE
2	F	364[B]	SER
2	F	404	TYR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	436	HIS



### 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 ⓘ

26 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	$\# Z  > 2$
3	NAG	A	1	1,3	14,14,15	0.26	0	17,19,21	0.43	0
3	NAG	A	2	3	14,14,15	0.45	0	17,19,21	0.54	0
3	BMA	A	3	3	11,11,12	0.78	0	15,15,17	0.95	2 (13%)
3	MAN	A	4	3	11,11,12	0.81	0	15,15,17	1.29	2 (13%)
3	NAG	A	5	3	14,14,15	0.49	0	17,19,21	0.51	0
3	MAN	A	6	3	11,11,12	0.84	0	15,15,17	1.00	1 (6%)
3	NAG	B	1	1,3	14,14,15	0.22	0	17,19,21	0.46	0
3	NAG	B	2	3	14,14,15	0.39	0	17,19,21	0.56	0
3	BMA	B	3	3	11,11,12	0.63	0	15,15,17	0.93	1 (6%)
3	MAN	B	4	3	11,11,12	0.90	0	15,15,17	1.18	2 (13%)
3	NAG	B	5	3	14,14,15	0.40	0	17,19,21	0.46	0
3	MAN	B	6	3	11,11,12	0.79	0	15,15,17	0.94	1 (6%)
4	NAG	G	1	2,4	14,14,15	0.30	0	17,19,21	0.48	0
4	NAG	G	2	4	14,14,15	0.55	0	17,19,21	0.65	0
4	BMA	G	3	4	11,11,12	0.84	0	15,15,17	0.93	0
4	MAN	G	4	4	11,11,12	1.02	1 (9%)	15,15,17	1.24	2 (13%)
4	NAG	G	5	4	14,14,15	0.29	0	17,19,21	0.49	0
4	MAN	G	6	4	11,11,12	0.87	0	15,15,17	1.03	2 (13%)
4	NAG	G	7	4	14,14,15	0.38	0	17,19,21	0.44	0
4	NAG	H	1	2,4	14,14,15	0.19	0	17,19,21	0.55	0
4	NAG	H	2	4	14,14,15	0.57	0	17,19,21	0.66	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	BMA	H	3	4	11,11,12	0.95	1 (9%)	15,15,17	0.81	1 (6%)
4	MAN	H	4	4	11,11,12	0.94	0	15,15,17	1.11	2 (13%)
4	NAG	H	5	4	14,14,15	0.37	0	17,19,21	0.48	0
4	MAN	H	6	4	11,11,12	0.75	0	15,15,17	1.13	2 (13%)
4	NAG	H	7	4	14,14,15	0.33	0	17,19,21	0.43	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
3	NAG	A	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	A	2	3	-	0/6/23/26	0/1/1/1
3	BMA	A	3	3	-	0/2/19/22	0/1/1/1
3	MAN	A	4	3	-	1/2/19/22	0/1/1/1
3	NAG	A	5	3	-	0/6/23/26	0/1/1/1
3	MAN	A	6	3	-	0/2/19/22	0/1/1/1
3	NAG	B	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	B	2	3	-	0/6/23/26	0/1/1/1
3	BMA	B	3	3	-	0/2/19/22	0/1/1/1
3	MAN	B	4	3	-	1/2/19/22	0/1/1/1
3	NAG	B	5	3	-	0/6/23/26	0/1/1/1
3	MAN	B	6	3	-	0/2/19/22	0/1/1/1
4	NAG	G	1	2,4	-	0/6/23/26	0/1/1/1
4	NAG	G	2	4	-	0/6/23/26	0/1/1/1
4	BMA	G	3	4	-	0/2/19/22	0/1/1/1
4	MAN	G	4	4	-	1/2/19/22	0/1/1/1
4	NAG	G	5	4	-	2/6/23/26	0/1/1/1
4	MAN	G	6	4	-	1/2/19/22	0/1/1/1
4	NAG	G	7	4	-	2/6/23/26	0/1/1/1
4	NAG	H	1	2,4	-	0/6/23/26	0/1/1/1
4	NAG	H	2	4	-	0/6/23/26	0/1/1/1
4	BMA	H	3	4	-	0/2/19/22	0/1/1/1
4	MAN	H	4	4	-	2/2/19/22	0/1/1/1
4	NAG	H	5	4	-	0/6/23/26	0/1/1/1
4	MAN	H	6	4	-	0/2/19/22	0/1/1/1
4	NAG	H	7	4	-	2/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	G	4	MAN	O5-C1	-2.34	1.40	1.43
4	H	3	BMA	O5-C1	-2.30	1.40	1.43

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	4	MAN	C1-O5-C5	3.28	116.63	112.19
4	H	4	MAN	C1-O5-C5	3.10	116.39	112.19
4	G	4	MAN	O2-C2-C3	-3.07	103.98	110.14
4	H	6	MAN	O2-C2-C3	-2.99	104.14	110.14
3	A	4	MAN	O2-C2-C3	-2.94	104.25	110.14
4	G	4	MAN	C1-O5-C5	2.87	116.08	112.19
3	B	4	MAN	C1-O5-C5	2.84	116.05	112.19
4	G	6	MAN	C1-O5-C5	2.80	115.98	112.19
3	B	4	MAN	O2-C2-C3	-2.75	104.64	110.14
3	A	6	MAN	C1-O5-C5	2.52	115.61	112.19
3	B	6	MAN	C1-O5-C5	2.48	115.55	112.19
3	A	3	BMA	C1-O5-C5	2.33	115.35	112.19
3	B	3	BMA	C1-O5-C5	2.29	115.30	112.19
4	H	6	MAN	C1-O5-C5	2.18	115.15	112.19
4	H	3	BMA	C1-O5-C5	2.14	115.09	112.19
4	H	4	MAN	O2-C2-C3	-2.08	105.98	110.14
4	G	6	MAN	O2-C2-C3	-2.06	106.01	110.14
3	A	3	BMA	O2-C2-C3	-2.02	106.08	110.14

There are no chirality outliers.

All (12) torsion outliers are listed below:

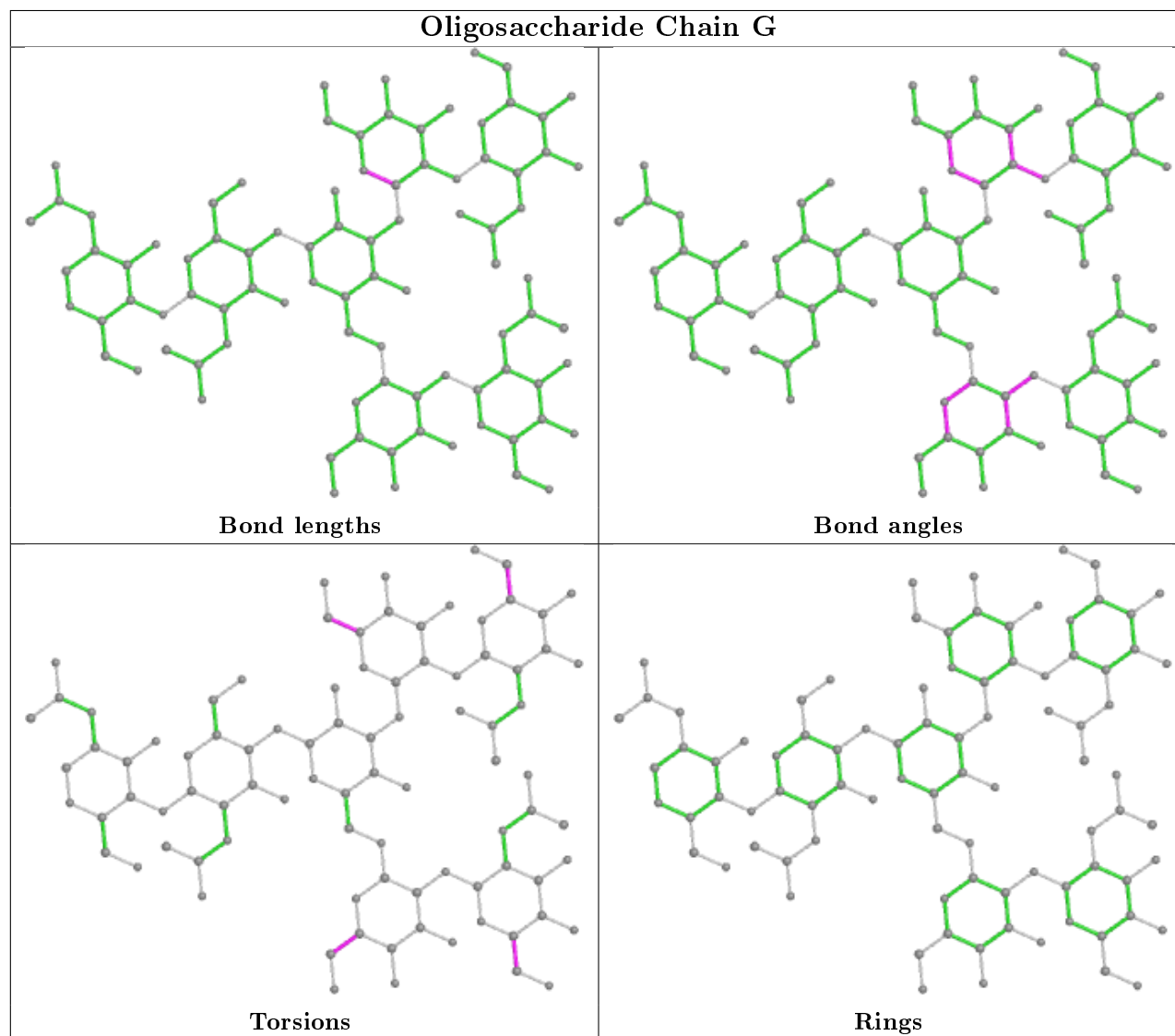
Mol	Chain	Res	Type	Atoms
4	G	5	NAG	O5-C5-C6-O6
4	G	5	NAG	C4-C5-C6-O6
4	H	7	NAG	O5-C5-C6-O6
4	H	7	NAG	C4-C5-C6-O6
4	G	7	NAG	O5-C5-C6-O6
4	G	7	NAG	C4-C5-C6-O6
4	H	4	MAN	C4-C5-C6-O6
3	B	4	MAN	C4-C5-C6-O6
3	A	4	MAN	C4-C5-C6-O6
4	G	4	MAN	C4-C5-C6-O6
4	H	4	MAN	O5-C5-C6-O6
4	G	6	MAN	O5-C5-C6-O6

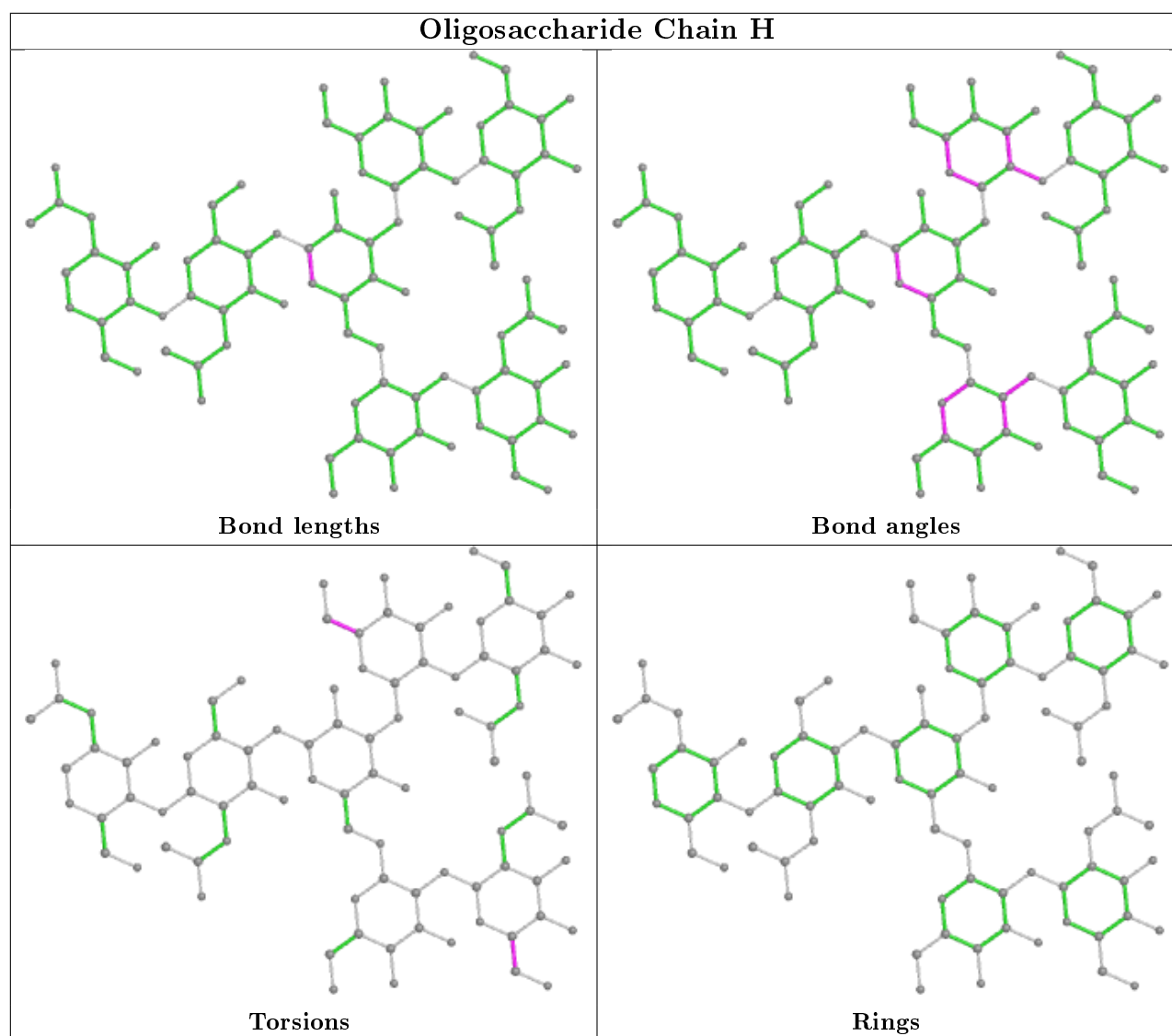
There are no ring outliers.

4 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	H	1	NAG	3	0
3	A	1	NAG	3	0
3	B	1	NAG	2	0
4	G	1	NAG	3	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.





## 5.6 Ligand geometry [i](#)

6 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	$\# Z  > 2$
6	FUC	F	501	-	10,10,11	1.08	2 (20%)	14,14,16	1.94	4 (28%)
5	NAG	C	507	-	14,14,15	0.40	0	17,19,21	0.46	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	NAG	D	507	-	14,14,15	0.35	0	17,19,21	0.47	0
6	FUC	F	509	-	10,10,11	0.79	0	14,14,16	1.91	3 (21%)
6	FUC	D	508	-	10,10,11	0.85	0	14,14,16	1.91	4 (28%)
6	FUC	C	508	-	10,10,11	0.78	0	14,14,16	1.90	3 (21%)

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	FUC	F	501	-	-	-	0/1/1/1
5	NAG	C	507	-	-	2/6/23/26	0/1/1/1
5	NAG	D	507	-	-	2/6/23/26	0/1/1/1
6	FUC	F	509	-	-	-	0/1/1/1
6	FUC	D	508	-	-	-	0/1/1/1
6	FUC	C	508	-	-	-	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	F	501	FUC	O5-C5	2.21	1.48	1.43
6	F	501	FUC	C1-C2	2.08	1.56	1.52

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	508	FUC	O5-C1-C2	4.25	117.33	110.77
6	F	509	FUC	O5-C1-C2	4.24	117.31	110.77
6	C	508	FUC	O5-C1-C2	4.20	117.26	110.77
6	F	501	FUC	O5-C1-C2	3.80	116.63	110.77
6	C	508	FUC	C1-O5-C5	3.73	121.23	112.78
6	F	509	FUC	C1-O5-C5	3.67	121.10	112.78
6	F	501	FUC	C1-C2-C3	3.64	114.14	109.67
6	D	508	FUC	C1-O5-C5	3.63	121.00	112.78
6	F	501	FUC	C1-O5-C5	3.59	120.91	112.78
6	F	509	FUC	C1-C2-C3	3.16	113.55	109.67
6	D	508	FUC	C1-C2-C3	3.08	113.46	109.67
6	C	508	FUC	C1-C2-C3	3.04	113.40	109.67
6	F	501	FUC	O5-C5-C4	2.20	113.47	109.52
6	D	508	FUC	O5-C5-C4	2.14	113.36	109.52

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	D	507	NAG	O5-C5-C6-O6
5	C	507	NAG	O5-C5-C6-O6
5	D	507	NAG	C4-C5-C6-O6
5	C	507	NAG	C4-C5-C6-O6

There are no ring outliers.

4 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	F	501	FUC	3	0
6	F	509	FUC	3	0
6	D	508	FUC	2	0
6	C	508	FUC	3	0

## 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 ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

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	C	215/215 (100%)	0.09	3 (1%) 75 77	22, 35, 65, 107	16 (7%)
1	D	215/215 (100%)	0.23	6 (2%) 53 54	22, 36, 71, 132	16 (7%)
2	E	215/215 (100%)	0.08	7 (3%) 46 47	23, 35, 66, 91	16 (7%)
2	F	215/215 (100%)	0.12	6 (2%) 53 54	22, 32, 60, 84	16 (7%)
All	All	860/860 (100%)	0.13	22 (2%) 56 57	22, 35, 69, 132	64 (7%)

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	443	ARG	11.8
1	C	443	ARG	7.4
2	F	387	THR	5.6
1	D	296	TYR	5.4
2	F	384	ASN	5.3
2	E	420	ARG	5.2
2	E	443	ARG	5.1
2	F	389	LEU	5.1
1	C	296	TYR	5.0
1	D	442	SER	4.4
2	F	443	ARG	4.0
1	D	384	ASN	3.7
1	C	442	SER	3.5
2	F	385	GLY	3.5
2	F	388	GLU	3.1
2	E	389	LEU	3.1
2	E	418	VAL	2.7
2	E	390	ASN	2.7
1	D	330	ALA	2.5
1	D	389	LEU	2.5
2	E	419	GLU	2.3
2	E	422	SER	2.1



## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 6.3 Carbohydrates ⓘ

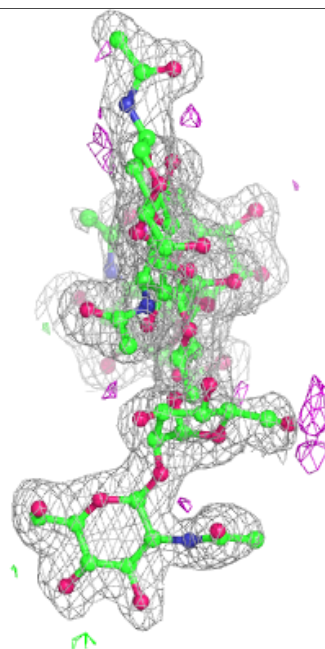
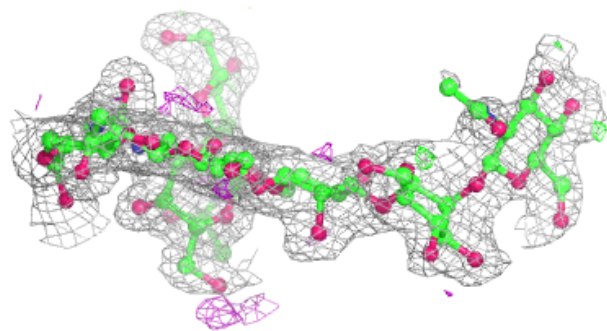
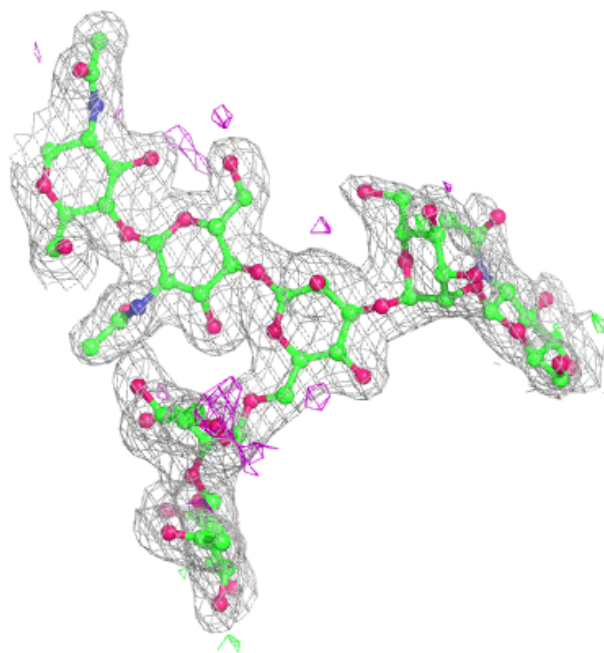
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	NAG	G	5	14/15	0.71	0.23	62,74,82,85	0
3	NAG	A	5	14/15	0.73	0.42	88,98,104,109	0
3	NAG	B	5	14/15	0.79	0.39	95,104,112,112	0
3	NAG	B	2	14/15	0.82	0.16	56,66,78,83	0
4	NAG	H	5	14/15	0.84	0.20	64,77,86,89	0
3	NAG	B	1	14/15	0.87	0.14	65,71,79,80	0
3	NAG	A	2	14/15	0.87	0.14	57,61,68,72	0
3	MAN	B	4	11/12	0.89	0.18	84,89,94,97	0
4	MAN	H	4	11/12	0.89	0.09	53,61,66,70	0
3	NAG	A	1	14/15	0.90	0.11	62,68,71,75	0
3	MAN	A	4	11/12	0.90	0.12	73,83,87,95	0
3	BMA	B	3	11/12	0.90	0.11	56,64,70,73	0
3	MAN	A	6	11/12	0.91	0.10	55,60,65,66	0
4	NAG	H	7	14/15	0.91	0.09	40,48,53,55	0
3	BMA	A	3	11/12	0.92	0.08	54,61,69,73	0
3	MAN	B	6	11/12	0.92	0.12	58,65,77,86	0
4	MAN	G	6	11/12	0.92	0.13	32,38,51,52	0
4	NAG	G	7	14/15	0.93	0.12	34,44,53,57	0
4	MAN	G	4	11/12	0.93	0.11	48,59,65,74	0
4	MAN	H	6	11/12	0.95	0.09	26,36,45,46	0
4	NAG	H	1	14/15	0.95	0.09	27,31,39,42	0
4	BMA	H	3	11/12	0.96	0.08	27,35,41,53	0
4	NAG	G	1	14/15	0.96	0.08	25,30,37,44	0
4	NAG	G	2	14/15	0.96	0.09	28,31,40,41	0
4	BMA	G	3	11/12	0.97	0.07	30,37,45,46	0
4	NAG	H	2	14/15	0.98	0.09	26,33,42,45	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.

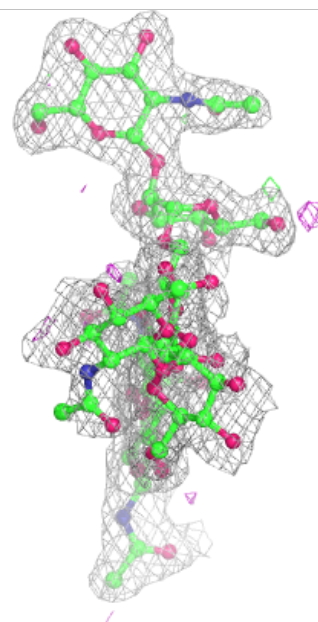
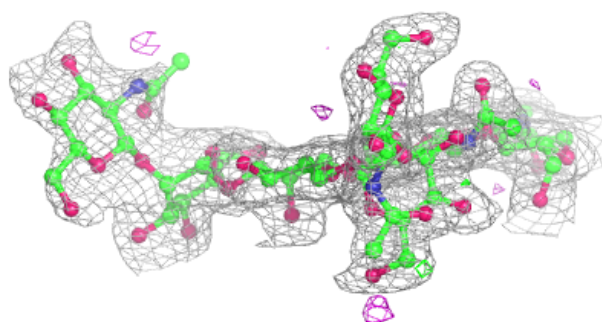
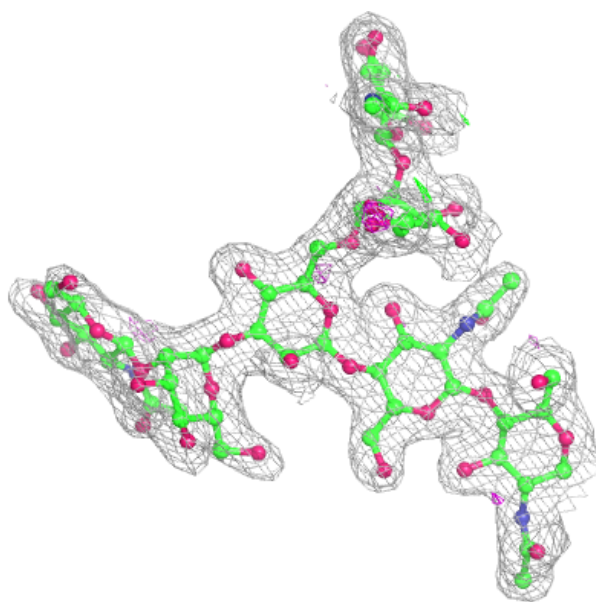
**Electron density around Chain G:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around Chain H:**

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
 mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
 and green (positive)

**6.4 Ligands** [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	FUC	C	508	10/11	0.74	0.22	82,95,100,110	0
6	FUC	D	508	10/11	0.79	0.27	87,97,103,108	0
5	NAG	C	507	14/15	0.89	0.24	47,62,73,80	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	NAG	D	507	14/15	0.89	0.14	53,65,73,74	0
6	FUC	F	509	10/11	0.94	0.10	39,46,52,56	0
6	FUC	F	501	10/11	0.95	0.09	35,43,46,47	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.