



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 04:09 PM UTC

PDB ID : 5MDM / pdb_00005mdm
Title : Structural intermediates in the fusion associated transition of vesiculovirus glycoprotein
Authors : Baquero, E.; Albertini, A.A.; Gaudin, Y.; Bressanelli, S.
Deposited on : 2016-11-11
Resolution : 3.00 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

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>.

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

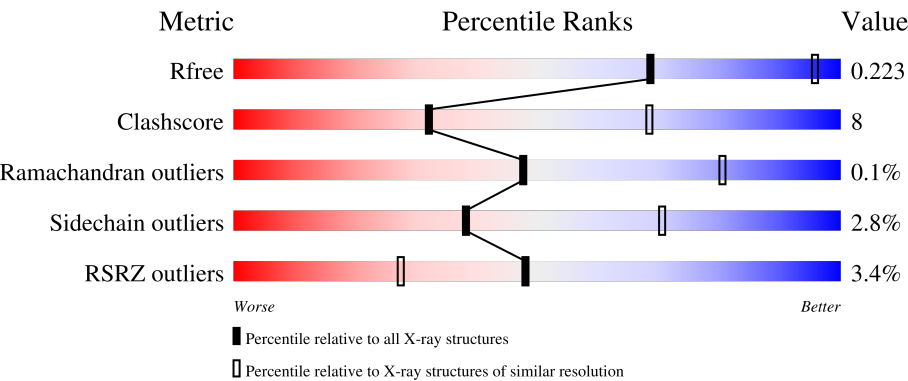
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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}	180053	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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 ≥ 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	A	419	3% 78% 19% .
1	C	419	3% 77% 18% . 5%
1	E	419	4% 75% 22% ..
1	F	419	3% 75% 19% . 5%
2	B	2	50% 50%

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Mol	Chain	Length	Quality of chain
3	D	3	 33%67%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 12825 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 Glycoprotein.

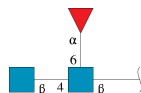
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	E	410	Total	C	N	O	S	0	0	0
			3223	2058	540	607	18			
1	F	398	Total	C	N	O	S	0	0	0
			3140	2009	526	587	18			
1	A	410	Total	C	N	O	S	0	0	0
			3223	2058	540	607	18			
1	C	398	Total	C	N	O	S	0	0	0
			3140	2009	526	587	18			

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 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				ZeroOcc	AltConf	Trace
3	D	3	Total	C	N	O	0	0	0
			38	22	2	14			

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	E	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).

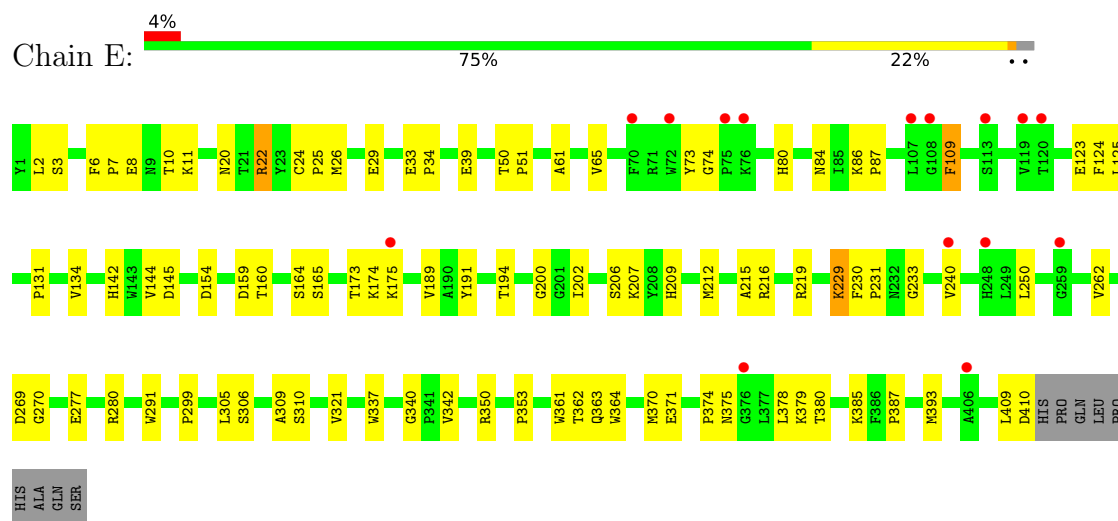


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	C	1	Total	C	N	O	0	0
			14	8	1	5		

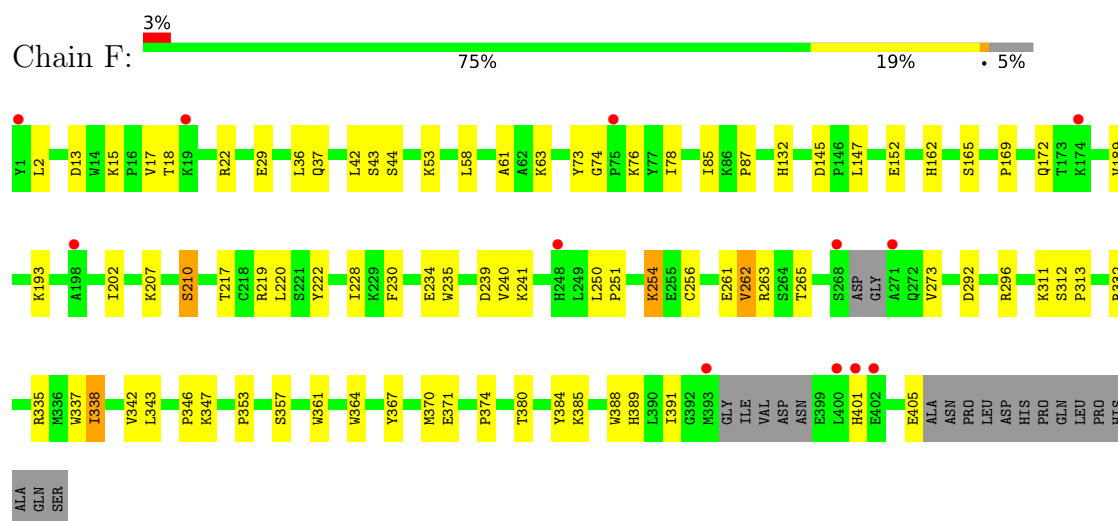
3 Residue-property plots [i](#)

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.

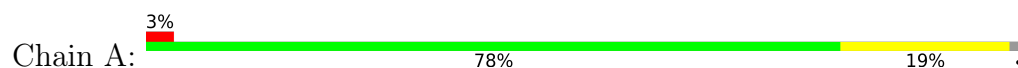
• Molecule 1: Glycoprotein

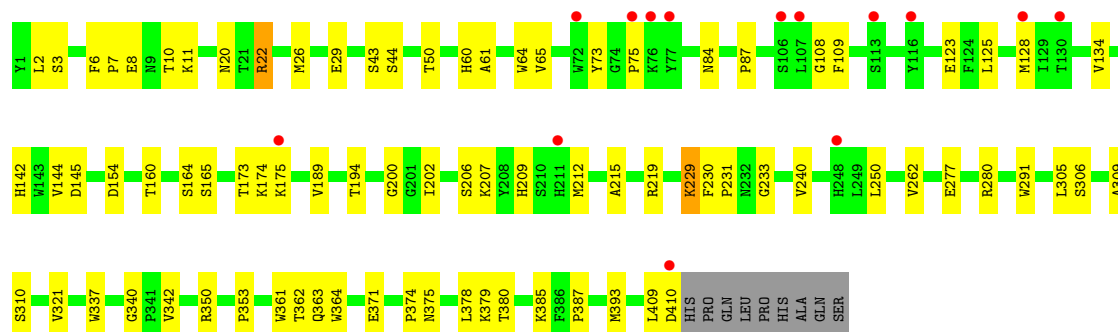


• Molecule 1: Glycoprotein

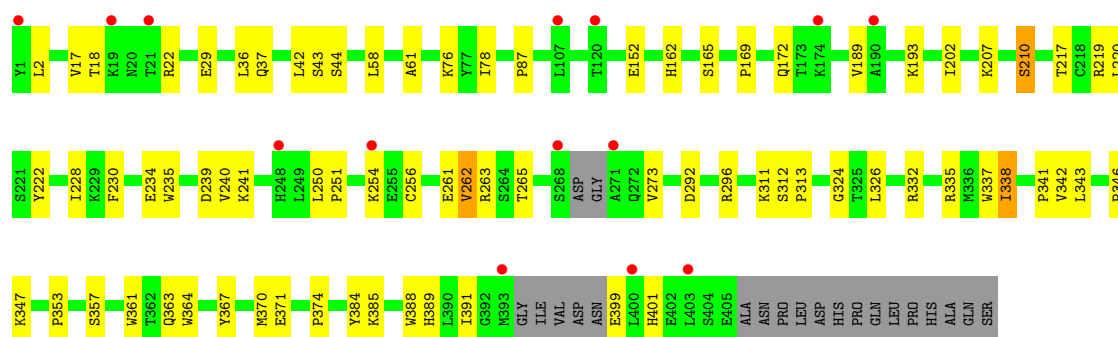
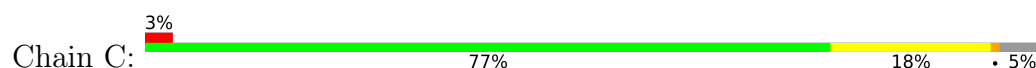


• Molecule 1: Glycoprotein





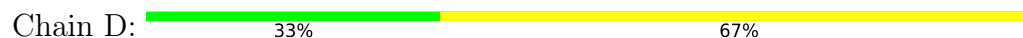
• Molecule 1: Glycoprotein



• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



• Molecule 3: 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, α , β , γ	150.34Å 228.21Å 78.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.11 – 3.00 49.11 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.7 (49.11-3.00) 99.6 (49.11-3.00)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.91 (at 3.01Å)	Xtriage
Refinement program	PHENIX 1.8.1_1168	Depositor
R, R_{free}	0.188 , 0.222 0.191 , 0.223	Depositor DCC
R_{free} test set	2760 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	84.6	Xtriage
Anisotropy	0.192	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 91.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	12825	wwPDB-VP
Average B, all atoms (Å ²)	112.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.26% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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, SO4, 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	0.34	0/3317	0.72	4/4510 (0.1%)
1	C	0.32	0/3231	0.68	1/4388 (0.0%)
1	E	0.33	0/3317	0.72	2/4510 (0.0%)
1	F	0.32	0/3231	0.68	1/4388 (0.0%)
All	All	0.33	0/13096	0.70	8/17796 (0.0%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	18	THR	N-CA-C	-6.26	105.41	114.12
1	C	18	THR	N-CA-C	-6.15	105.57	114.12
1	E	109	PHE	CA-C-N	6.04	124.01	119.66
1	E	109	PHE	C-N-CA	6.04	124.01	119.66
1	A	109	PHE	CA-C-N	5.23	123.43	119.66
1	A	109	PHE	C-N-CA	5.23	123.43	119.66
1	A	50	THR	CA-C-N	5.19	124.99	119.28
1	A	50	THR	C-N-CA	5.19	124.99	119.28

There are no chirality outliers.

There are no planarity outliers.

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	A	3223	0	3127	53	2
1	C	3140	0	3052	56	0
1	E	3223	0	3128	56	2
1	F	3140	0	3050	59	0
2	B	28	0	25	1	0
3	D	38	0	34	0	0
4	E	5	0	0	0	0
5	A	14	0	13	0	0
5	C	14	0	13	0	0
All	All	12825	0	12442	201	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 8.

All (201) 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:A:212:MET:HG3	1:A:231:PRO:HD2	1.68	0.74
1:E:409:LEU:O	1:A:73:TYR:OH	2.04	0.74
1:E:212:MET:HG3	1:E:231:PRO:HD2	1.70	0.72
1:F:22:ARG:NH2	1:F:292:ASP:OD1	2.19	0.72
1:F:76:LYS:HD3	1:A:125:LEU:HD23	1.71	0.70
1:E:305:LEU:HD11	1:E:321:VAL:HG23	1.74	0.69
1:A:305:LEU:HD11	1:A:321:VAL:HG23	1.74	0.69
1:E:131:PRO:HB2	1:A:75:PRO:HB3	1.76	0.67
1:C:169:PRO:HG2	1:C:172:GLN:HG2	1.78	0.66
1:C:219:ARG:HG3	1:C:250:LEU:HD11	1.75	0.66
1:F:169:PRO:HG2	1:F:172:GLN:HG2	1.77	0.66
1:A:380:THR:OG1	1:A:385:LYS:NZ	2.30	0.65
1:C:22:ARG:NH2	1:C:292:ASP:OD1	2.22	0.64
1:F:219:ARG:HG3	1:F:250:LEU:HD11	1.78	0.64
1:E:125:LEU:HD23	1:C:76:LYS:HD3	1.79	0.64
1:C:361:TRP:CE2	1:C:374:PRO:HD3	2.33	0.64
1:E:380:THR:OG1	1:E:385:LYS:NZ	2.31	0.63
1:E:229:LYS:HE2	1:E:233:GLY:HA2	1.81	0.63
1:A:229:LYS:HE2	1:A:233:GLY:HA2	1.82	0.62
1:E:84:ASN:HB3	1:E:164:SER:HB3	1.82	0.62
1:F:361:TRP:CE2	1:F:374:PRO:HD3	2.34	0.61
1:E:123:GLU:HG3	1:C:78:ILE:HB	1.82	0.60
1:A:410:ASP:N	1:C:324:GLY:O	2.26	0.59
1:A:22:ARG:HG2	1:A:291:TRP:CG	2.38	0.58
1:E:22:ARG:HG2	1:E:291:TRP:CG	2.38	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:410:ASP:HB2	1:A:73:TYR:CE2	2.39	0.58
1:E:361:TRP:CE2	1:E:374:PRO:HD3	2.40	0.57
1:A:361:TRP:CE2	1:A:374:PRO:HD3	2.40	0.57
1:E:189:VAL:HG13	1:E:202:ILE:HG23	1.87	0.57
1:A:189:VAL:HG13	1:A:202:ILE:HG23	1.87	0.57
1:C:37:GLN:HG3	1:C:193:LYS:HD3	1.87	0.57
1:F:13:ASP:OD2	1:F:53:LYS:HD2	2.05	0.56
1:F:207:LYS:HA	1:F:335:ARG:HG3	1.87	0.56
1:F:78:ILE:HB	1:A:123:GLU:HG3	1.88	0.56
1:A:61:ALA:HB2	1:A:87:PRO:HB3	1.87	0.56
1:E:364:TRP:HB3	1:E:371:GLU:HB3	1.87	0.56
1:C:207:LYS:HA	1:C:335:ARG:HG3	1.88	0.56
1:F:37:GLN:HG3	1:F:193:LYS:HD3	1.87	0.55
1:E:393:MET:HE2	1:F:388:TRP:HE3	1.72	0.55
1:F:210:SER:HB3	1:F:313:PRO:HD2	1.88	0.55
1:A:364:TRP:HB3	1:A:371:GLU:HB3	1.88	0.55
2:B:1:NAG:H5	2:B:1:NAG:H83	1.89	0.55
1:C:338:ILE:HG13	1:C:343:LEU:HD11	1.89	0.54
1:E:277:GLU:HA	1:E:280:ARG:NH1	2.22	0.54
1:A:277:GLU:HA	1:A:280:ARG:NH1	2.22	0.54
1:C:217:THR:HG22	1:C:228:ILE:HG12	1.90	0.54
1:F:338:ILE:HG13	1:F:343:LEU:HD11	1.90	0.54
1:A:2:LEU:HD12	1:A:340:GLY:HA2	1.90	0.54
1:E:2:LEU:HD12	1:E:340:GLY:HA2	1.90	0.53
1:F:61:ALA:HB2	1:F:87:PRO:HB3	1.90	0.53
1:F:337:TRP:CD1	1:F:353:PRO:HG3	2.43	0.53
1:F:76:LYS:HB2	1:A:125:LEU:HB3	1.90	0.53
1:C:189:VAL:HG13	1:C:202:ILE:HG23	1.91	0.52
1:C:210:SER:HB3	1:C:313:PRO:HD2	1.91	0.52
1:C:337:TRP:CD1	1:C:353:PRO:HG3	2.45	0.52
1:A:380:THR:HG21	1:C:401:HIS:HD2	1.74	0.52
1:A:409:LEU:HD13	1:C:326:LEU:HB2	1.92	0.52
1:E:160:THR:OG1	1:E:165:SER:O	2.23	0.51
1:F:63:LYS:HB2	1:F:63:LYS:NZ	2.25	0.51
1:F:189:VAL:HG13	1:F:202:ILE:HG23	1.92	0.51
1:C:222:TYR:HB3	1:C:235:TRP:CE2	2.46	0.51
1:A:160:THR:OG1	1:A:165:SER:O	2.24	0.51
1:A:11:LYS:HG2	1:A:363:GLN:HB2	1.93	0.50
1:E:11:LYS:HG2	1:E:363:GLN:HB2	1.94	0.50
1:E:80:HIS:HB3	1:E:109:PHE:CZ	2.46	0.50
1:E:309:ALA:HB2	1:E:375:ASN:HB3	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:393:MET:HE2	1:C:388:TRP:HB3	1.93	0.50
1:E:125:LEU:HB3	1:C:76:LYS:HB2	1.94	0.50
1:F:58:LEU:HD22	1:F:165:SER:HB3	1.94	0.50
1:C:29:GLU:OE1	1:C:335:ARG:NH2	2.45	0.50
1:C:58:LEU:HD22	1:C:165:SER:HB3	1.94	0.50
1:E:393:MET:HE2	1:F:388:TRP:CE3	2.47	0.49
1:F:217:THR:HG22	1:F:228:ILE:HG12	1.93	0.49
1:F:222:TYR:HB3	1:F:235:TRP:CE2	2.47	0.49
1:E:299:PRO:HB2	1:F:405:GLU:O	2.12	0.49
1:F:29:GLU:OE1	1:F:335:ARG:NH2	2.46	0.49
1:F:219:ARG:HH21	1:F:251:PRO:HA	1.78	0.49
1:A:173:THR:O	1:A:175:LYS:N	2.46	0.49
1:A:309:ALA:HB2	1:A:375:ASN:HB3	1.95	0.48
1:C:2:LEU:HD13	1:C:391:ILE:HD13	1.94	0.48
1:C:234:GLU:OE1	1:C:332:ARG:NH2	2.46	0.48
1:E:39:GLU:OE2	1:E:191:TYR:OH	2.23	0.48
1:E:173:THR:O	1:E:175:LYS:N	2.46	0.48
1:E:200:GLY:HA2	1:E:215:ALA:HB2	1.95	0.48
1:A:84:ASN:HB3	1:A:164:SER:HB3	1.96	0.48
1:F:311:LYS:HD2	1:F:389:HIS:CE1	2.49	0.48
1:F:193:LYS:HA	1:F:193:LYS:HD2	1.75	0.47
1:F:313:PRO:HG3	1:F:335:ARG:HG2	1.95	0.47
1:C:313:PRO:HG3	1:C:335:ARG:HG2	1.95	0.47
1:C:219:ARG:HH21	1:C:251:PRO:HA	1.79	0.47
1:F:2:LEU:HD13	1:F:391:ILE:HD13	1.95	0.47
1:C:193:LYS:HA	1:C:193:LYS:HD2	1.76	0.47
1:E:306:SER:CB	1:E:387:PRO:HG3	2.45	0.47
1:F:234:GLU:OE1	1:F:332:ARG:NH2	2.46	0.47
1:A:306:SER:CB	1:A:387:PRO:HG3	2.44	0.47
1:C:364:TRP:HB3	1:C:371:GLU:HB3	1.97	0.47
1:E:337:TRP:NE1	1:E:353:PRO:HG3	2.29	0.47
1:F:364:TRP:HB3	1:F:371:GLU:HB3	1.97	0.47
1:C:292:ASP:HB3	1:C:296:ARG:NH1	2.29	0.47
1:C:347:LYS:HB3	1:C:357:SER:HB3	1.96	0.47
1:C:261:GLU:OE1	1:C:263:ARG:NH2	2.48	0.46
1:F:342:VAL:HG22	1:F:385:LYS:HG2	1.97	0.46
1:F:63:LYS:HE3	1:F:85:ILE:HG21	1.98	0.46
1:F:347:LYS:HB3	1:F:357:SER:HB3	1.96	0.46
1:F:261:GLU:OE1	1:F:263:ARG:NH2	2.49	0.46
1:C:311:LYS:HD2	1:C:389:HIS:CE1	2.50	0.46
1:A:134:VAL:HB	1:A:145:ASP:HB2	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:123:GLU:CG	1:C:78:ILE:HB	2.46	0.45
1:F:239:ASP:OD2	1:F:241:LYS:HG2	2.15	0.45
1:A:200:GLY:HA2	1:A:215:ALA:HB2	1.98	0.45
1:E:134:VAL:HB	1:E:145:ASP:HB2	1.97	0.45
1:E:61:ALA:HB2	1:E:87:PRO:HB3	1.98	0.45
1:E:299:PRO:HB2	1:F:405:GLU:C	2.41	0.45
1:C:152:GLU:OE2	1:C:265:THR:HG21	2.16	0.45
1:C:342:VAL:HG22	1:C:385:LYS:HG2	1.99	0.45
1:F:78:ILE:HB	1:A:123:GLU:CG	2.47	0.45
1:F:292:ASP:HB3	1:F:296:ARG:NH1	2.32	0.45
1:F:217:THR:HG23	1:F:230:PHE:HA	1.98	0.45
1:E:26:MET:HG3	1:E:310:SER:HB2	1.99	0.44
1:A:337:TRP:NE1	1:A:353:PRO:HG3	2.33	0.44
1:E:371:GLU:HB2	1:E:379:LYS:HD3	2.00	0.44
1:F:2:LEU:HB2	1:F:338:ILE:HG22	1.99	0.44
1:A:22:ARG:HG2	1:A:291:TRP:CD1	2.52	0.44
1:A:219:ARG:HD2	1:A:250:LEU:HG	2.00	0.44
1:C:239:ASP:OD2	1:C:241:LYS:HG2	2.16	0.44
1:E:212:MET:HG2	1:E:230:PHE:HB3	2.00	0.44
1:E:371:GLU:HB2	1:E:379:LYS:HB3	2.00	0.44
1:F:220:LEU:HD13	1:F:256:CYS:HB2	2.00	0.44
1:E:24:CYS:HA	1:E:25:PRO:HA	1.81	0.43
1:A:371:GLU:HB2	1:A:379:LYS:HD3	2.00	0.43
1:C:43:SER:OG	1:C:44:SER:N	2.51	0.43
1:A:26:MET:HG3	1:A:310:SER:HB2	1.99	0.43
1:C:2:LEU:HB2	1:C:338:ILE:HG22	1.99	0.43
1:F:43:SER:OG	1:F:44:SER:N	2.51	0.43
1:F:152:GLU:OE2	1:F:265:THR:HG21	2.19	0.43
1:E:10:THR:HB	1:E:362:THR:HG22	2.01	0.43
1:A:6:PHE:CG	1:A:7:PRO:HD2	2.53	0.43
1:C:220:LEU:HD13	1:C:256:CYS:HB2	1.99	0.43
1:E:370:MET:HE1	1:F:401:HIS:CD2	2.53	0.43
1:F:222:TYR:CD2	1:F:262:VAL:HG11	2.53	0.43
1:C:61:ALA:HB2	1:C:87:PRO:HB3	2.00	0.43
1:C:222:TYR:CD2	1:C:262:VAL:HG11	2.54	0.43
1:A:60:HIS:HD2	1:A:128:MET:HE3	1.84	0.43
1:A:385:LYS:HE2	1:C:399:GLU:OE2	2.19	0.43
1:E:219:ARG:HD2	1:E:250:LEU:HG	2.01	0.43
1:F:337:TRP:NE1	1:F:353:PRO:HG3	2.33	0.43
1:A:212:MET:HG2	1:A:230:PHE:CG	2.54	0.43
1:E:73:TYR:HB2	1:E:74:GLY:H	1.69	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:210:SER:HB3	1:F:312:SER:HB2	2.00	0.42
1:A:378:LEU:HD23	1:A:378:LEU:HA	1.88	0.42
1:A:393:MET:HE1	1:C:341:PRO:CB	2.49	0.42
1:E:22:ARG:HG2	1:E:291:TRP:CD1	2.53	0.42
1:F:346:PRO:HD3	1:F:384:TYR:CE1	2.55	0.42
1:A:393:MET:HE2	1:C:388:TRP:HE3	1.83	0.42
1:C:367:TYR:HD2	1:C:370:MET:HE3	1.85	0.42
1:A:212:MET:HG2	1:A:230:PHE:HB3	2.00	0.42
1:A:10:THR:HB	1:A:362:THR:HG22	2.00	0.42
1:F:338:ILE:HD12	1:F:338:ILE:HA	1.88	0.42
1:C:337:TRP:NE1	1:C:353:PRO:HG3	2.35	0.42
1:F:380:THR:OG1	1:F:385:LYS:NZ	2.52	0.42
1:E:378:LEU:HD23	1:E:378:LEU:HA	1.87	0.42
1:C:217:THR:HG23	1:C:230:PHE:HA	2.01	0.42
1:F:313:PRO:CG	1:F:335:ARG:HG2	2.50	0.41
1:C:239:ASP:OD1	1:C:239:ASP:N	2.49	0.41
1:F:219:ARG:NH2	1:F:251:PRO:HA	2.34	0.41
1:A:43:SER:OG	1:A:44:SER:N	2.52	0.41
1:A:393:MET:CE	1:C:388:TRP:HB3	2.51	0.41
1:C:219:ARG:NH2	1:C:251:PRO:HA	2.35	0.41
1:E:6:PHE:CG	1:E:7:PRO:HD2	2.55	0.41
1:F:132:HIS:CD2	1:F:147:LEU:HD22	2.55	0.41
1:A:371:GLU:HB2	1:A:379:LYS:HB3	2.01	0.41
1:C:42:LEU:HD12	1:C:42:LEU:HA	1.96	0.41
1:F:15:LYS:NZ	1:F:145:ASP:OD2	2.53	0.41
1:F:254:LYS:HE2	1:F:254:LYS:HA	2.03	0.41
1:C:361:TRP:NE1	1:C:363:GLN:O	2.53	0.41
1:E:33:GLU:HA	1:E:34:PRO:HD3	1.85	0.41
1:E:142:HIS:HB3	1:E:154:ASP:HB3	2.02	0.41
1:A:142:HIS:HB3	1:A:154:ASP:HB3	2.03	0.41
1:C:162:HIS:HB2	1:C:165:SER:HB2	2.02	0.41
1:E:8:GLU:O	1:E:350:ARG:NH1	2.47	0.41
1:F:42:LEU:HD12	1:F:42:LEU:HA	1.94	0.41
1:C:210:SER:HB3	1:C:312:SER:HB2	2.02	0.41
1:C:346:PRO:HD3	1:C:384:TYR:CE1	2.56	0.41
1:E:206:SER:OG	1:E:209:HIS:ND1	2.45	0.41
1:F:367:TYR:HD2	1:F:370:MET:HE3	1.86	0.41
1:E:50:THR:HA	1:E:51:PRO:HD3	1.88	0.41
1:E:212:MET:CG	1:E:230:PHE:HB3	2.51	0.41
1:E:65:VAL:HG22	1:E:123:GLU:HB3	2.02	0.41
1:E:212:MET:HG2	1:E:230:PHE:CG	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:162:HIS:HB2	1:F:165:SER:HB2	2.03	0.41
1:A:64:TRP:CZ3	1:A:108:GLY:HA2	2.56	0.40
1:A:206:SER:OG	1:A:209:HIS:ND1	2.45	0.40
1:C:338:ILE:HD12	1:C:338:ILE:HA	1.89	0.40
1:E:86:LYS:NZ	1:E:159:ASP:CG	2.79	0.40
1:E:216:ARG:HB2	1:E:231:PRO:HG3	2.03	0.40
1:F:73:TYR:HB2	1:F:74:GLY:H	1.69	0.40
1:A:8:GLU:O	1:A:350:ARG:NH1	2.47	0.40
1:E:269:ASP:OD2	1:E:270:GLY:N	2.54	0.40
1:A:212:MET:CG	1:A:230:PHE:HB3	2.51	0.40
1:C:346:PRO:HD3	1:C:384:TYR:CZ	2.57	0.40
1:A:65:VAL:HG22	1:A:123:GLU:HB3	2.03	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)
1:E:277:GLU:OE2	1:A:280:ARG:NH1[3_545]	2.16	0.04
1:E:280:ARG:NH1	1:A:277:GLU:OE2[3_545]	2.17	0.03

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	A	408/419 (97%)	397 (97%)	10 (2%)	1 (0%)	43	76
1	C	392/419 (94%)	377 (96%)	15 (4%)	0	100	100
1	E	408/419 (97%)	397 (97%)	10 (2%)	1 (0%)	43	76
1	F	392/419 (94%)	378 (96%)	14 (4%)	0	100	100
All	All	1600/1676 (96%)	1549 (97%)	49 (3%)	2 (0%)	48	80

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	174	LYS
1	A	174	LYS

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	A	356/364 (98%)	345 (97%)	11 (3%)	35	68
1	C	347/364 (95%)	339 (98%)	8 (2%)	44	74
1	E	356/364 (98%)	344 (97%)	12 (3%)	32	66
1	F	347/364 (95%)	339 (98%)	8 (2%)	44	74
All	All	1406/1456 (97%)	1367 (97%)	39 (3%)	38	70

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	3	SER
1	E	20	ASN
1	E	22	ARG
1	E	29	GLU
1	E	124	PHE
1	E	144	VAL
1	E	194	THR
1	E	207	LYS
1	E	229	LYS
1	E	240	VAL
1	E	262	VAL
1	E	342	VAL
1	F	17	VAL
1	F	36	LEU
1	F	210	SER
1	F	240	VAL
1	F	254	LYS
1	F	262	VAL
1	F	273	VAL
1	F	338	ILE

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Mol	Chain	Res	Type
1	A	3	SER
1	A	20	ASN
1	A	22	ARG
1	A	29	GLU
1	A	144	VAL
1	A	194	THR
1	A	207	LYS
1	A	229	LYS
1	A	240	VAL
1	A	262	VAL
1	A	342	VAL
1	C	17	VAL
1	C	36	LEU
1	C	210	SER
1	C	240	VAL
1	C	254	LYS
1	C	262	VAL
1	C	273	VAL
1	C	338	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	80	HIS
1	E	132	HIS
1	E	172	GLN
1	E	180	GLN
1	E	289	ASN
1	F	132	HIS
1	F	401	HIS
1	A	60	HIS
1	A	132	HIS
1	A	180	GLN
1	C	60	HIS
1	C	401	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 ⓘ

5 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	$\# Z > 2$
2	NAG	B	1	2,1	14,14,15	0.42	0	17,19,21	1.14	1 (5%)
2	NAG	B	2	2	14,14,15	0.54	0	17,19,21	0.75	0
3	NAG	D	1	3,1	14,14,15	0.60	0	17,19,21	0.99	1 (5%)
3	NAG	D	2	3	14,14,15	0.47	0	17,19,21	1.02	1 (5%)
3	FUC	D	3	3	10,10,11	0.91	0	14,14,16	0.92	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
2	NAG	B	1	2,1	-	3/6/23/26	0/1/1/1
2	NAG	B	2	2	-	3/6/23/26	0/1/1/1
3	NAG	D	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	D	2	3	-	2/6/23/26	0/1/1/1
3	FUC	D	3	3	-	-	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(°)
2	B	1	NAG	C1-O5-C5	3.71	117.16	112.19
3	D	1	NAG	C4-C3-C2	2.67	114.94	111.02
3	D	2	NAG	O5-C1-C2	-2.33	107.69	111.29

There are no chirality outliers.

All (8) torsion outliers are listed below:

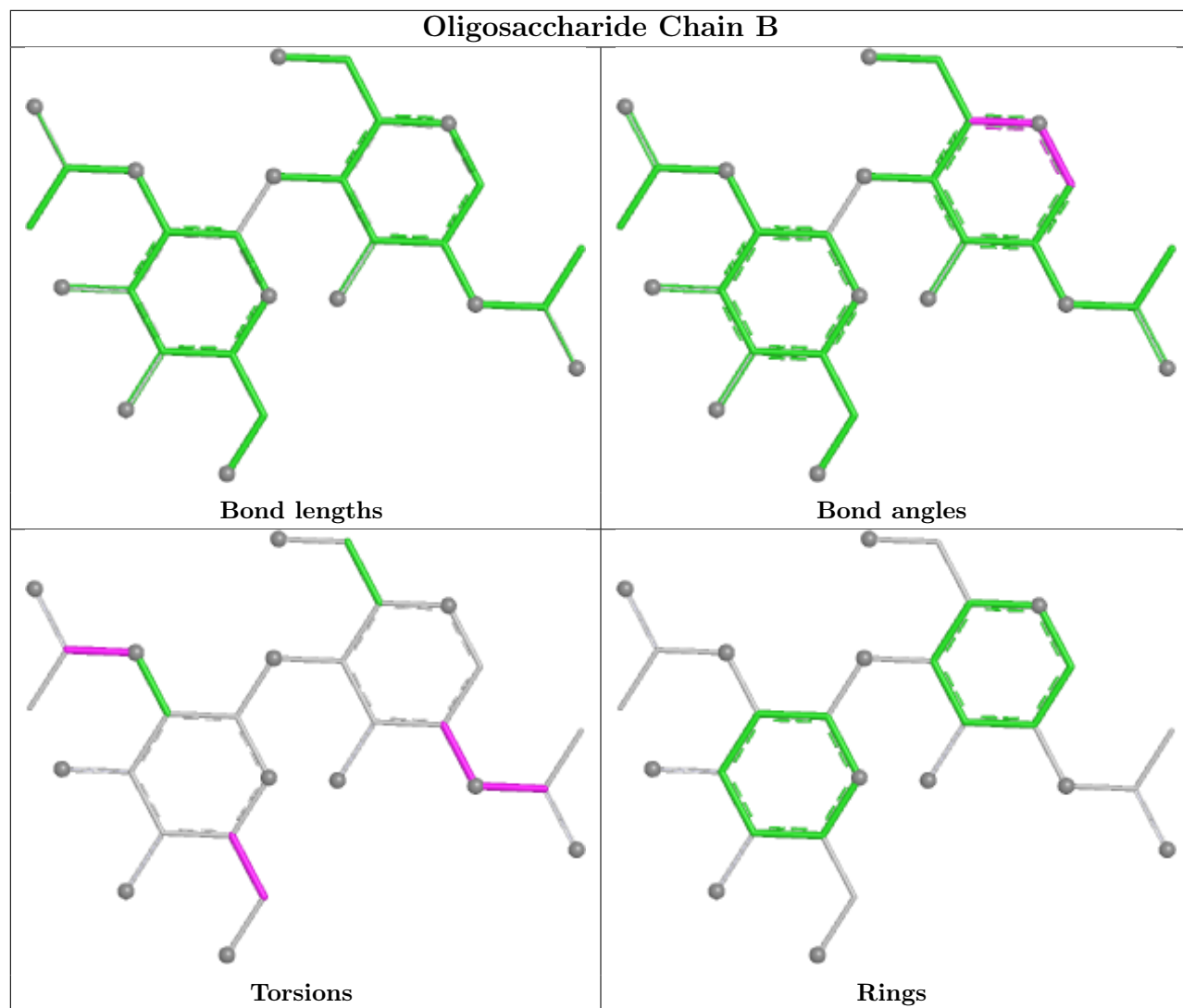
Mol	Chain	Res	Type	Atoms
2	B	1	NAG	C3-C2-N2-C7
2	B	1	NAG	C8-C7-N2-C2
2	B	1	NAG	O7-C7-N2-C2
3	D	2	NAG	C8-C7-N2-C2
3	D	2	NAG	O7-C7-N2-C2
2	B	2	NAG	C8-C7-N2-C2
2	B	2	NAG	O7-C7-N2-C2
2	B	2	NAG	O5-C5-C6-O6

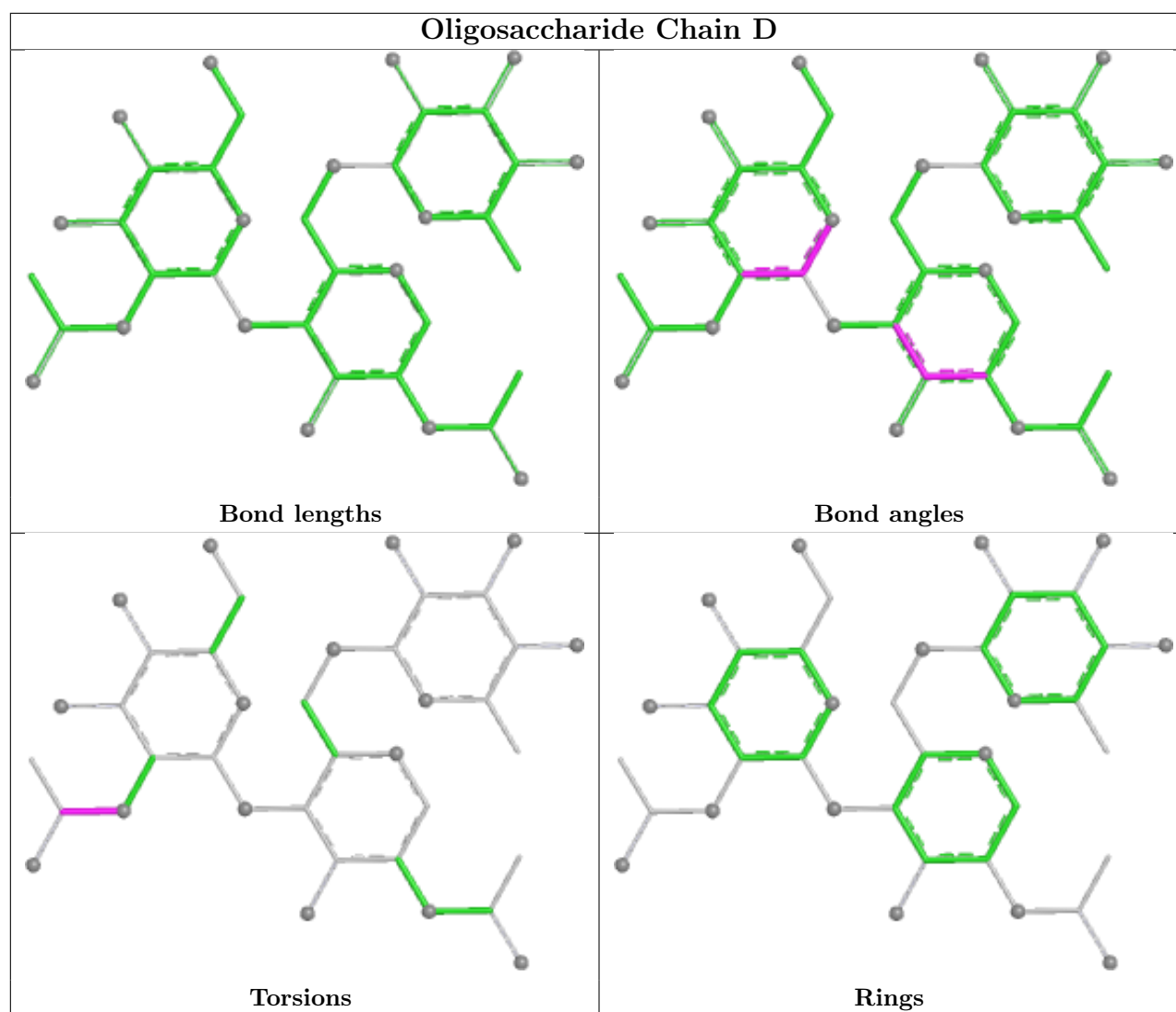
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	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.





5.6 Ligand geometry [i](#)

3 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	$\# Z > 2$
5	NAG	A	2001	1	14,14,15	0.55	0	17,19,21	1.04	1 (5%)
5	NAG	C	2001	1	14,14,15	0.59	0	17,19,21	1.00	1 (5%)
4	SO4	E	501	-	4,4,4	0.22	0	6,6,6	0.25	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
5	NAG	A	2001	1	-	3/6/23/26	0/1/1/1
5	NAG	C	2001	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	2001	NAG	C4-C3-C2	2.50	114.69	111.02
5	A	2001	NAG	C1-O5-C5	2.30	115.27	112.19

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	2001	NAG	C8-C7-N2-C2
5	A	2001	NAG	O7-C7-N2-C2
5	A	2001	NAG	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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, 95th 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 ²)	Q<0.9
1	A	410/419 (97%)	0.12	14 (3%)	48	27	57, 105, 180, 237	0
1	C	398/419 (94%)	0.08	14 (3%)	47	27	55, 102, 165, 228	0
1	E	410/419 (97%)	0.20	15 (3%)	45	25	54, 113, 185, 245	0
1	F	398/419 (94%)	0.08	12 (3%)	52	30	56, 103, 173, 237	0
All	All	1616/1676 (96%)	0.12	55 (3%)	48	27	54, 105, 175, 245	0

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	393	MET	5.1
1	F	393	MET	4.7
1	A	107	LEU	4.0
1	F	400	LEU	3.8
1	C	248	HIS	3.7
1	F	248	HIS	3.5
1	E	113	SER	3.4
1	F	174	LYS	3.4
1	F	271	ALA	3.3
1	E	120	THR	3.3
1	E	76	LYS	3.2
1	E	108	GLY	3.2
1	E	107	LEU	3.2
1	F	402	GLU	3.1
1	E	72	TRP	3.1
1	E	240	VAL	3.1
1	E	75	PRO	2.9
1	F	19	LYS	2.9
1	C	107	LEU	2.8
1	C	403	LEU	2.8
1	A	75	PRO	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	77	TYR	2.8
1	C	271	ALA	2.8
1	F	268	SER	2.8
1	A	72	TRP	2.7
1	F	401	HIS	2.6
1	C	1	TYR	2.6
1	E	248	HIS	2.6
1	A	211	HIS	2.6
1	A	248	HIS	2.6
1	A	106	SER	2.5
1	C	19	LYS	2.5
1	A	130	THR	2.5
1	C	268	SER	2.5
1	A	116	TYR	2.5
1	A	113	SER	2.5
1	A	76	LYS	2.4
1	E	376	GLY	2.4
1	E	119	VAL	2.3
1	C	254	LYS	2.3
1	F	198	ALA	2.3
1	A	175	LYS	2.3
1	A	128	MET	2.3
1	E	175	LYS	2.3
1	F	75	PRO	2.2
1	F	1	TYR	2.2
1	C	21	THR	2.2
1	C	400	LEU	2.1
1	C	174	LYS	2.1
1	E	70	PHE	2.1
1	C	190	ALA	2.1
1	E	259	GLY	2.1
1	E	406	ALA	2.1
1	C	120	THR	2.0
1	A	410	ASP	2.0

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

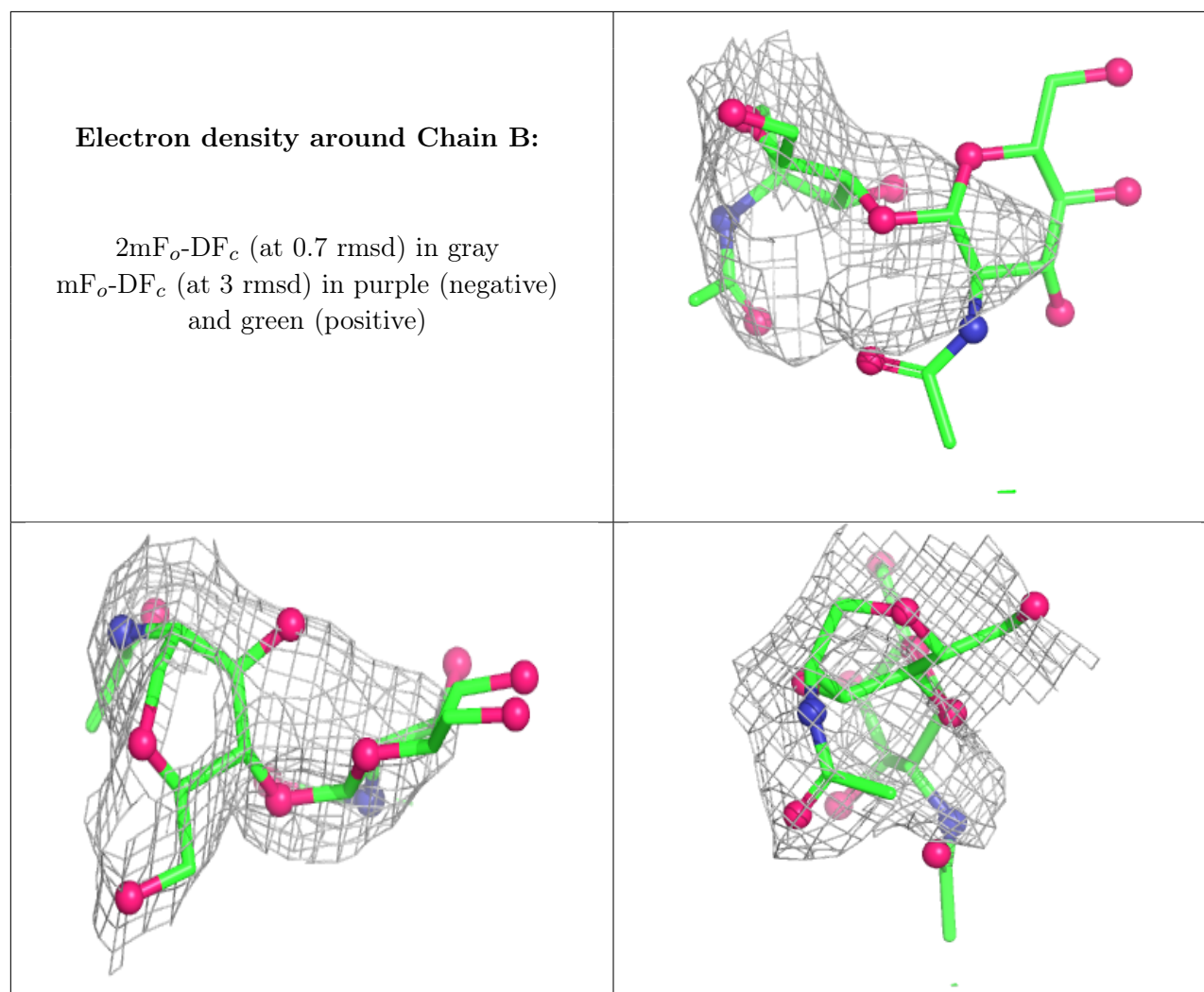
There are no non-standard protein/DNA/RNA residues in this entry.

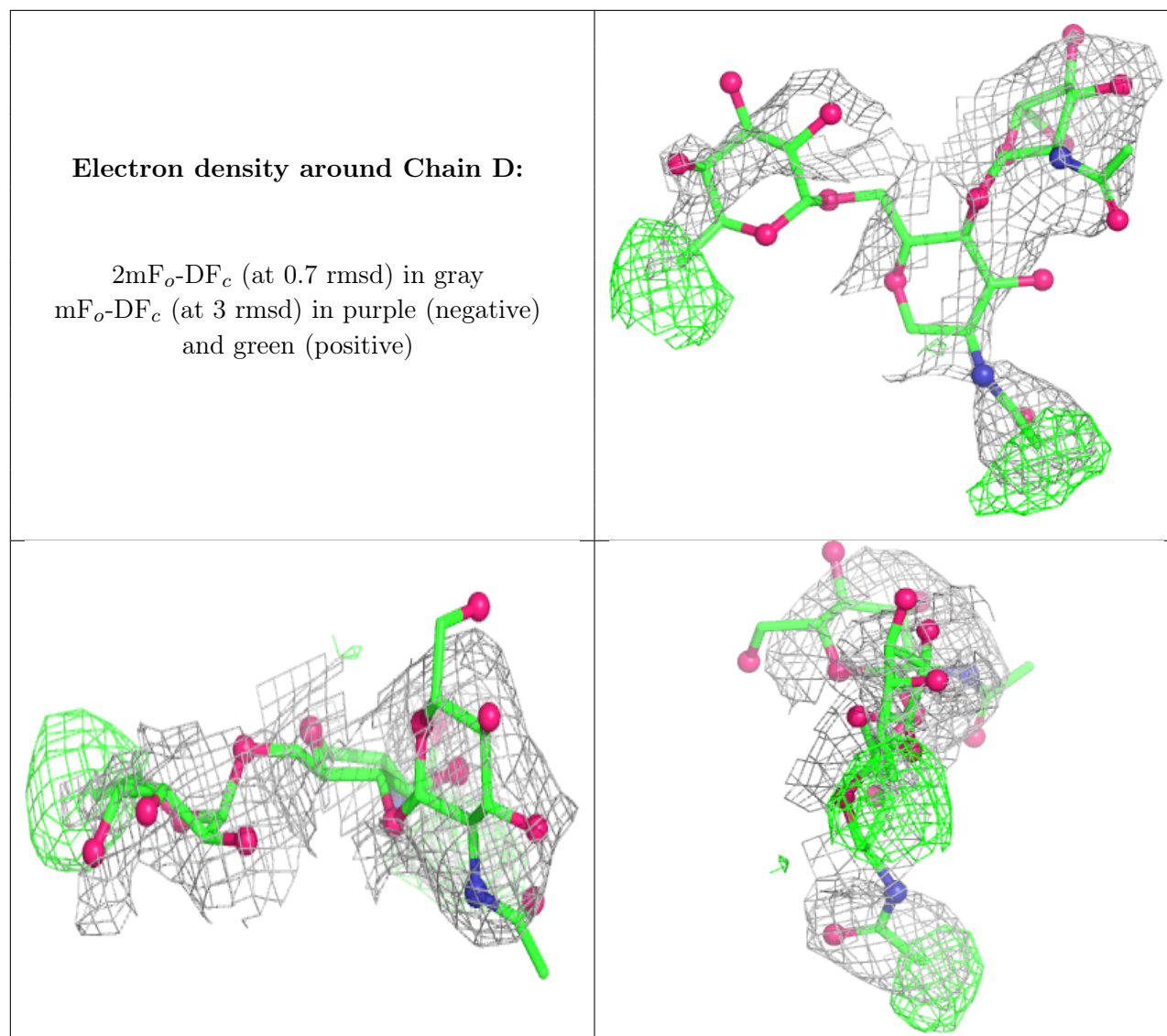
6.3 Carbohydrates [i](#)

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, 95th 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
2	NAG	B	1	14/15	-	-	175,203,214,218	0
2	NAG	B	2	14/15	-	-	202,211,216,217	0
3	NAG	D	1	14/15	-	-	92,173,204,212	0
3	NAG	D	2	14/15	-	-	170,187,192,195	0
3	FUC	D	3	10/11	-	-	197,204,211,211	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](#)

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, 95th 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 ²)	Q<0.9
5	NAG	A	2001	14/15	0.54	0.15	136,165,180,182	0
5	NAG	C	2001	14/15	0.70	0.16	79,167,185,189	0
4	SO4	E	501	5/5	0.98	0.08	62,69,77,80	0

6.5 Other polymers [i](#)

There are no such residues in this entry.