



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:52 PM UTC

PDB ID : 2FFD / pdb_00002ffd
Title : Fibrinogen Fragment D with "A" knob peptide mimic GPRVVE
Authors : Betts, L.
Deposited on : 2005-12-19
Resolution : 2.89 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)
Xtrriage (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

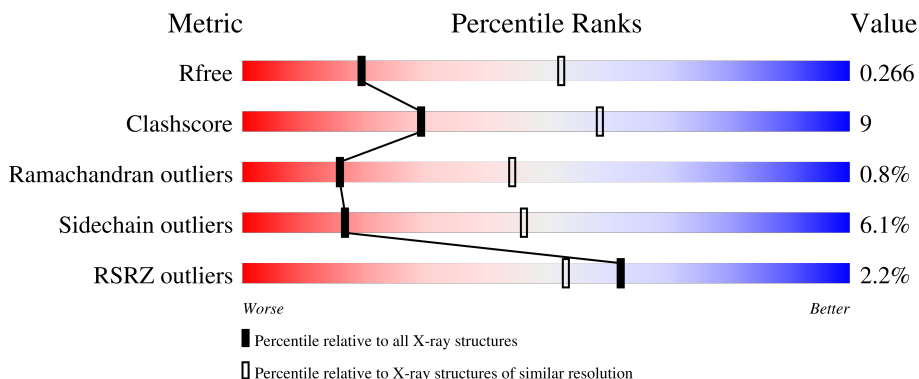
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

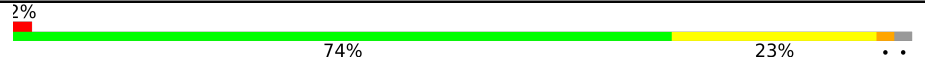



The reported resolution of this entry is 2.89 Å.

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.



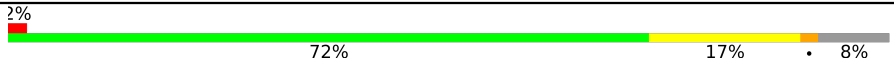
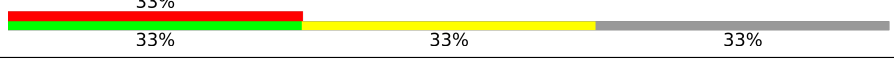
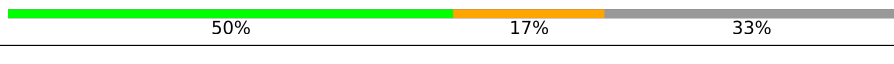

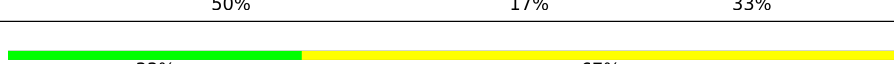


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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	66	
1	D	66	
2	B	313	
2	E	313	
3	C	311	

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Mol	Chain	Length	Quality of chain
3	F	311	 <p>2% 72% 17% 8%</p>
4	G	6	 <p>33% 33% 33% 33%</p>
4	H	6	 <p>50% 17% 33%</p>
4	I	6	 <p>33% 17% 17% 33%</p>
4	J	6	 <p>17% 50% 17% 33%</p>
5	K	3	 <p>33% 67%</p>
5	L	3	 <p>33% 67%</p>

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 10894 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 Fibrinogen alpha/alpha-E Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	65	530	327	100	100	3	0	0	0
1	D	57	466	286	88	89	3	0	0	0

- Molecule 2 is a protein called Fibrinogen beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	303	2428	1515	429	462	22	0	0	0
2	E	295	2369	1480	418	449	22	0	0	0

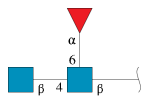
- Molecule 3 is a protein called Fibrinogen gamma chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	298	2391	1517	402	461	11	0	0	0
3	F	285	2283	1450	384	438	11	0	0	0

- Molecule 4 is a protein called GLY-PRO-ARG-VAL-VAL-GLU peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	G	4	29	18	7	4	0	0	0
4	H	4	29	18	7	4	0	0	0
4	I	4	29	18	7	4	0	0	0
4	J	4	29	18	7	4	0	0	0

- Molecule 5 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	
			Total	C	N				O
5	K	3	38	22	2	14	0	0	0
5	L	3	38	22	2	14	0	0	0

- Molecule 6 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
6	B	1	1	1	0	0
6	C	1	1	1	0	0
6	E	1	1	1	0	0
6	F	1	1	1	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	10	10	10	0	0
7	B	57	57	57	0	0
7	C	26	26	26	0	0
7	D	6	6	6	0	0
7	E	76	76	76	0	0
7	F	52	52	52	0	0
7	H	1	1	1	0	0
7	I	2	2	2	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	J	1	Total	O	0	0
			1	1		

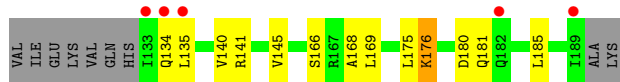
3 Residue-property plots [i](#)

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.

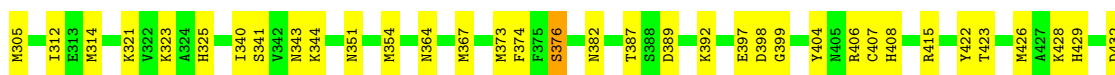
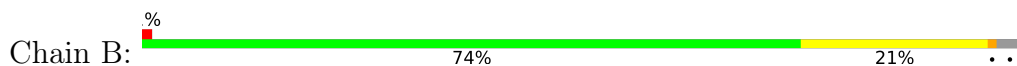
- Molecule 1: Fibrinogen alpha/alpha-E Chain



- Molecule 1: Fibrinogen alpha/alpha-E Chain

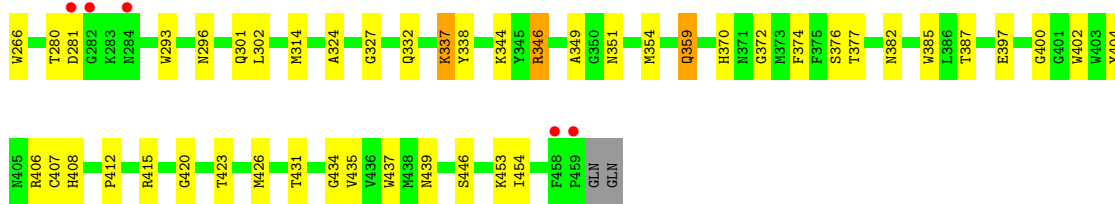


- Molecule 2: Fibrinogen beta chain

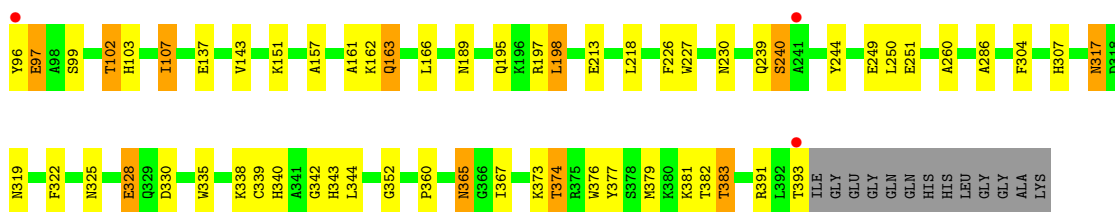
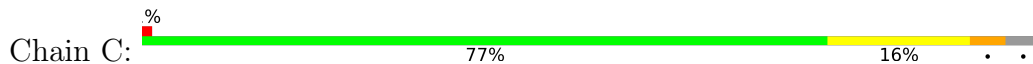


- Molecule 2: Fibrinogen beta chain

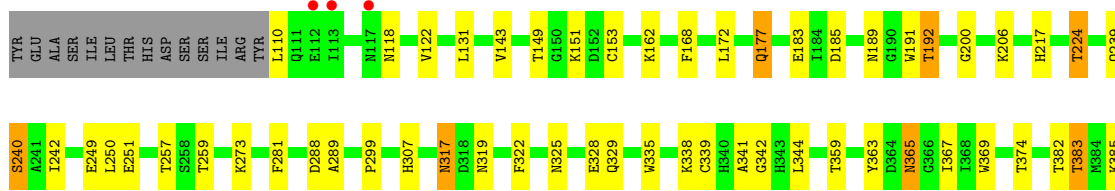
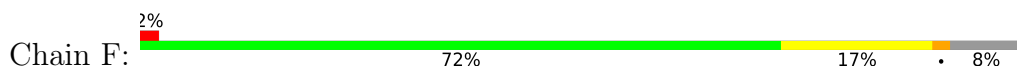




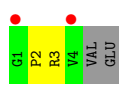
• Molecule 3: Fibrinogen gamma chain



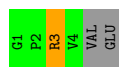
• Molecule 3: Fibrinogen gamma chain



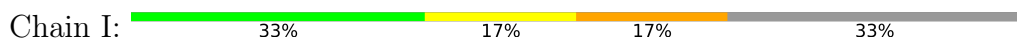
• Molecule 4: GLY-PRO-ARG-VAL-VAL-GLU peptide



• Molecule 4: GLY-PRO-ARG-VAL-VAL-GLU peptide



• Molecule 4: GLY-PRO-ARG-VAL-VAL-GLU peptide





- Molecule 4: GLY-PRO-ARG-VAL-VAL-GLU peptide



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: 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 21	Depositor
Cell constants a, b, c, α , β , γ	89.52Å 94.65Å 227.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.89 20.00 – 2.90	Depositor EDS
% Data completeness (in resolution range)	97.7 (20.00-2.89) 97.7 (20.00-2.90)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.70 (at 2.87Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.211 , 0.268 0.210 , 0.266	Depositor DCC
R_{free} test set	2160 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å ²)	36.7	Xtrriage
Anisotropy	0.493	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 33.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	10894	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.26% 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 [i](#)

5.1 Standard geometry [i](#)

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

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.49	0/531	0.87	0/709
1	D	0.49	0/466	0.92	1/621 (0.2%)
2	B	0.50	0/2490	0.83	1/3364 (0.0%)
2	E	0.52	0/2430	0.82	0/3280
3	C	0.49	0/2457	0.77	0/3324
3	F	0.52	0/2346	0.77	0/3173
4	G	0.80	0/29	0.86	0/38
4	H	0.74	0/29	0.66	0/38
4	I	0.80	0/29	0.90	0/38
4	J	0.54	0/29	0.75	0/38
All	All	0.51	0/10836	0.81	2/14623 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	141	ARG	N-CA-C	-5.55	106.64	113.41
2	B	408	HIS	N-CA-C	5.09	116.80	108.76

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	530	0	556	12	0
1	D	466	0	488	7	0
2	B	2428	0	2295	44	0
2	E	2369	0	2238	50	0
3	C	2391	0	2235	39	0
3	F	2283	0	2138	42	0
4	G	29	0	34	0	0
4	H	29	0	34	5	0
4	I	29	0	34	2	0
4	J	29	0	34	2	0
5	K	38	0	34	2	0
5	L	38	0	34	4	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	E	1	0	0	0	0
6	F	1	0	0	0	0
7	A	10	0	0	0	0
7	B	57	0	0	0	0
7	C	26	0	0	0	0
7	D	6	0	0	0	0
7	E	76	0	0	2	0
7	F	52	0	0	4	0
7	H	1	0	0	0	0
7	I	2	0	0	0	0
7	J	1	0	0	1	0
All	All	10894	0	10154	179	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 9.

All (179) 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)
2:B:343:ASN:OD1	2:B:344:LYS:HE3	1.70	0.92
3:F:153:CYS:SG	3:F:192:THR:HB	2.16	0.85
2:E:359:GLN:HE21	2:E:359:GLN:H	1.22	0.83
1:A:169:LEU:H	2:B:189:GLN:HE22	1.31	0.78
1:A:164:SER:HB3	3:C:137:GLU:O	1.85	0.76
2:B:351:ASN:HD21	2:B:354:MET:HG3	1.53	0.72
3:C:307:HIS:HD2	3:C:335:TRP:O	1.73	0.70
2:E:359:GLN:H	2:E:359:GLN:NE2	1.89	0.70
2:B:397:GLU:OE1	4:J:3:ARG:NH1	2.26	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:F:325:ASN:HD22	3:F:325:ASN:C	2.01	0.68
3:C:304:PHE:HB3	3:C:338:LYS:HB3	1.77	0.67
1:A:169:LEU:H	2:B:189:GLN:NE2	1.92	0.66
3:F:307:HIS:HE1	3:F:341:ALA:H	1.44	0.65
2:E:415:ARG:O	2:E:434:GLY:HA2	1.98	0.64
3:F:189:ASN:HD22	3:F:391:ARG:HG3	1.63	0.64
3:F:191:TRP:CE3	3:F:385:LYS:HG3	2.33	0.64
3:F:307:HIS:HD2	3:F:335:TRP:O	1.82	0.63
3:C:251:GLU:HB3	3:C:381:LYS:HB2	1.80	0.62
3:C:197:ARG:HB2	3:C:382:THR:HB	1.83	0.61
3:C:322:PHE:HB2	3:C:338:LYS:HG3	1.81	0.61
1:A:153:ASP:O	1:A:157:LYS:HG2	2.00	0.60
5:L:1:NAG:H61	5:L:3:FUC:H3	1.81	0.60
3:F:149:THR:HG22	3:F:168:PHE:O	2.02	0.60
2:B:376:SER:HB3	2:B:382:ASN:H	1.67	0.59
2:B:415:ARG:O	2:B:434:GLY:HA2	2.00	0.59
3:C:189:ASN:ND2	3:C:391:ARG:HE	1.99	0.59
3:F:249:GLU:HG3	3:F:259:THR:HG22	1.83	0.59
1:D:169:LEU:H	2:E:189:GLN:HE22	1.49	0.59
3:F:359:THR:HG21	3:F:363:TYR:O	2.02	0.59
3:F:249:GLU:HB3	3:F:383:THR:HG23	1.85	0.58
2:E:431:THR:HG21	4:H:3:ARG:NH1	2.18	0.58
2:B:280:THR:O	2:B:281:ASP:HB3	2.02	0.58
3:F:365:ASN:HD22	3:F:365:ASN:H	1.51	0.58
2:E:439:ASN:HD22	2:E:439:ASN:H	1.53	0.57
2:E:397:GLU:OE1	4:H:3:ARG:NH1	2.37	0.56
3:F:307:HIS:CE1	3:F:341:ALA:H	2.22	0.56
1:D:176:LYS:HD2	1:D:180:ASP:OD2	2.05	0.56
2:E:241:ASP:OD2	2:E:453:LYS:HE2	2.05	0.56
3:F:183:GLU:HB3	3:F:191:TRP:HB2	1.87	0.56
2:E:337:LYS:HG2	2:E:382:ASN:ND2	2.21	0.56
4:J:3:ARG:NH2	7:J:19:HOH:O	2.39	0.56
2:B:217:LYS:HE3	3:C:213:GLU:CD	2.31	0.55
2:B:312:ILE:HG12	2:B:452:MET:HG2	1.87	0.55
2:E:302:LEU:HD13	2:E:454:ILE:HD11	1.89	0.55
3:F:239:GLN:HA	7:F:606:HOH:O	2.07	0.54
2:E:314:MET:HE1	2:E:437:TRP:CD2	2.42	0.54
1:D:140:VAL:HG11	2:E:172:LEU:HD12	1.87	0.54
2:B:423:THR:OG1	2:B:426:MET:HE3	2.08	0.54
3:F:389:PHE:C	3:F:391:ARG:H	2.15	0.54
3:C:344:LEU:HA	3:C:367:ILE:HG23	1.90	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:140:VAL:HG23	1:A:185:LEU:HD11	1.90	0.53
2:B:351:ASN:C	2:B:351:ASN:HD22	2.16	0.53
1:D:166:SER:HB3	2:E:195:THR:HB	1.91	0.53
3:F:338:LYS:N	3:F:339:CYS:HA	2.24	0.53
2:E:406:ARG:HG3	2:E:406:ARG:O	2.09	0.53
2:B:217:LYS:HG2	3:C:213:GLU:HG3	1.90	0.53
3:F:344:LEU:HB3	3:F:382:THR:HG21	1.91	0.52
3:F:151:LYS:HB3	3:F:239:GLN:HE22	1.74	0.52
3:F:317:ASN:ND2	3:F:319:ASN:OD1	2.42	0.52
2:E:212:GLU:O	2:E:215:ILE:HG22	2.09	0.52
2:E:400:GLY:O	2:E:404:TYR:HE2	1.91	0.52
3:C:307:HIS:HE1	3:C:342:GLY:H	1.58	0.52
3:C:317:ASN:ND2	3:C:319:ASN:OD1	2.42	0.52
2:B:209:LYS:HD2	2:B:305:MET:HE1	1.91	0.51
3:C:325:ASN:HB3	3:C:328:GLU:HB3	1.93	0.51
2:E:351:ASN:HD21	2:E:354:MET:HG3	1.76	0.51
3:F:325:ASN:ND2	3:F:328:GLU:H	2.08	0.51
2:B:159:SER:O	2:B:163:THR:HB	2.11	0.51
2:B:435:VAL:O	2:B:447:MET:HG2	2.11	0.51
1:A:168:ALA:HA	2:B:189:GLN:HE22	1.76	0.51
2:E:265:LYS:HB3	7:E:606:HOH:O	2.11	0.51
3:C:151:LYS:HB3	3:C:239:GLN:HE22	1.76	0.50
1:D:169:LEU:H	2:E:189:GLN:NE2	2.09	0.50
2:E:406:ARG:N	2:E:407:CYS:HA	2.26	0.50
3:F:200:GLY:HA2	7:F:604:HOH:O	2.11	0.50
2:B:323:LYS:NZ	2:B:325:HIS:HD2	2.10	0.50
2:E:346:ARG:O	2:E:346:ARG:HG2	2.12	0.50
2:B:340:ILE:HG12	2:B:341:SER:N	2.27	0.50
2:E:370:HIS:CE1	2:E:402:TRP:HE1	2.30	0.49
2:E:423:THR:O	2:E:426:MET:HB2	2.12	0.49
2:B:251:VAL:HG22	2:B:453:LYS:HG2	1.94	0.49
2:B:432:ASP:OD2	2:B:443:SER:OG	2.31	0.49
3:C:365:ASN:C	3:C:365:ASN:HD22	2.21	0.49
1:D:168:ALA:HA	2:E:189:GLN:HE22	1.78	0.49
2:E:180:GLN:O	2:E:184:SER:HB2	2.13	0.48
2:B:389:ASP:HB3	2:B:392:LYS:HD2	1.95	0.48
3:C:189:ASN:HD22	3:C:391:ARG:HE	1.60	0.48
2:B:229:PRO:CB	2:B:301:GLN:HE22	2.26	0.48
1:A:127:ILE:HG22	1:A:130:VAL:HG23	1.95	0.48
1:A:169:LEU:N	2:B:189:GLN:HE22	2.07	0.48
3:C:103:HIS:O	3:C:107:ILE:HB	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:332:GLN:O	2:E:338:TYR:HA	2.14	0.47
3:C:338:LYS:N	3:C:339:CYS:HA	2.29	0.47
1:D:181:GLN:HE22	2:E:174:ASN:ND2	2.13	0.47
5:L:1:NAG:H62	5:L:3:FUC:O2	2.14	0.47
2:E:230:ASP:HB3	2:E:233:VAL:HG12	1.97	0.47
2:E:372:GLY:HA2	7:E:661:HOH:O	2.14	0.47
2:E:415:ARG:N	2:E:434:GLY:HA2	2.30	0.47
3:F:307:HIS:HE1	3:F:342:GLY:H	1.62	0.47
2:E:190:MET:HE3	3:F:131:LEU:HA	1.96	0.47
3:F:149:THR:HG23	7:F:636:HOH:O	2.14	0.47
2:B:280:THR:HG22	2:B:288:LEU:HG	1.97	0.46
2:B:373:MET:HE2	2:B:404:TYR:O	2.15	0.46
3:F:251:GLU:HB2	3:F:257:THR:HG22	1.95	0.46
2:B:267:ASP:HB3	2:B:268:PRO:HD3	1.98	0.46
1:A:132:HIS:HB3	3:C:107:ILE:HD12	1.96	0.46
3:F:217:HIS:O	3:F:224:THR:HG23	2.15	0.46
2:E:385:TRP:CH2	4:H:3:ARG:HD2	2.51	0.46
2:E:266:TRP:HA	2:E:377:THR:HG21	1.98	0.46
3:F:363:TYR:HB2	7:F:625:HOH:O	2.15	0.46
1:A:164:SER:CB	3:C:137:GLU:O	2.60	0.45
2:B:364:ASN:ND2	5:K:1:NAG:C7	2.79	0.45
3:C:195:GLN:OE1	3:C:382:THR:HG22	2.16	0.45
2:B:224:MET:HE3	2:B:277:ALA:HB3	1.98	0.45
3:C:249:GLU:CB	3:C:383:THR:HG23	2.46	0.45
1:A:152:VAL:HG21	2:B:426:MET:HG2	1.98	0.45
2:E:327:GLY:HA3	2:E:344:LYS:HB2	1.97	0.45
3:C:343:HIS:O	3:C:367:ILE:HA	2.17	0.45
2:B:373:MET:HE3	2:B:374:PHE:H	1.81	0.45
3:F:389:PHE:C	3:F:391:ARG:N	2.74	0.45
2:E:234:LYS:H	2:E:234:LYS:HE2	1.82	0.45
3:C:227:TRP:HZ2	3:C:230:ASN:ND2	2.14	0.45
3:C:260:ALA:HB2	3:C:286:ALA:HB3	1.99	0.45
2:B:212:GLU:HA	2:B:215:ILE:HG22	1.97	0.44
3:C:157:ALA:HA	3:C:161:ALA:HB3	1.98	0.44
3:C:374:THR:C	3:C:376:TRP:H	2.25	0.44
2:B:175:LEU:O	2:B:176:ARG:C	2.61	0.44
2:B:229:PRO:HB2	2:B:301:GLN:HE22	1.81	0.44
2:E:420:GLY:HA2	2:E:446:SER:O	2.18	0.44
3:F:289:ALA:HB3	3:F:369:TRP:CE2	2.52	0.44
3:C:325:ASN:HD22	3:C:325:ASN:C	2.25	0.44
5:L:1:NAG:C6	5:L:3:FUC:H3	2.48	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:96:TYR:O	3:C:97:GLU:CB	2.66	0.44
2:B:184:SER:O	2:B:187:SER:HB2	2.18	0.44
2:B:428:LYS:HG2	2:B:429:HIS:CD2	2.53	0.44
3:F:365:ASN:HD22	3:F:365:ASN:N	2.13	0.44
2:E:406:ARG:O	2:E:406:ARG:CG	2.66	0.43
2:B:422:TYR:O	2:B:444:TRP:HB3	2.17	0.43
3:C:99:SER:O	3:C:102:THR:HB	2.18	0.43
2:B:398:ASP:HA	2:B:433:ASP:HB3	2.01	0.43
3:C:96:TYR:O	3:C:97:GLU:HB3	2.18	0.43
2:E:402:TRP:CH2	2:E:412:PRO:HG2	2.54	0.43
3:F:338:LYS:O	4:I:2:PRO:HA	2.19	0.43
3:F:162:LYS:NZ	3:F:185:ASP:O	2.51	0.43
3:F:151:LYS:HB3	3:F:239:GLN:NE2	2.33	0.43
2:B:367:MET:HB2	2:B:406:ARG:HB3	2.01	0.42
3:C:166:LEU:HD22	3:C:218:LEU:HB3	2.01	0.42
3:C:330:ASP:OD2	3:C:340:HIS:NE2	2.52	0.42
3:F:344:LEU:HA	3:F:367:ILE:HG23	2.01	0.42
2:E:374:PHE:HB2	2:E:382:ASN:HB3	2.00	0.42
2:B:314:MET:HE1	2:B:437:TRP:CD2	2.54	0.42
2:E:168:LEU:HD23	3:F:110:LEU:HD13	2.01	0.42
3:F:281:PHE:CD2	3:F:288:ASP:HB2	2.54	0.42
2:E:423:THR:H	2:E:426:MET:HE3	1.84	0.42
3:F:273:LYS:NZ	3:F:319:ASN:HD21	2.18	0.42
3:F:307:HIS:CE1	3:F:342:GLY:H	2.37	0.42
3:C:352:GLY:HA3	3:C:377:TYR:CE1	2.54	0.42
2:E:324:ALA:HB2	2:E:349:ALA:HB3	2.02	0.42
3:C:373:LYS:HG3	3:C:379:MET:HE1	2.01	0.42
2:E:210:GLU:OE1	2:E:212:GLU:HB3	2.19	0.41
2:E:385:TRP:CZ3	4:H:3:ARG:HD2	2.55	0.41
2:B:364:ASN:HD22	5:K:1:NAG:C7	2.33	0.41
2:E:254:ASN:O	2:E:255:ARG:HD2	2.19	0.41
3:F:118:ASN:O	3:F:122:VAL:HG23	2.20	0.41
2:E:229:PRO:HB2	2:E:301:GLN:HE22	1.86	0.41
3:F:239:GLN:O	3:F:240:SER:C	2.64	0.41
2:E:408:HIS:CD2	2:E:408:HIS:C	2.99	0.41
2:E:431:THR:HG21	4:H:3:ARG:HH12	1.84	0.41
3:F:322:PHE:CZ	4:I:3:ARG:HG2	2.56	0.41
2:B:406:ARG:N	2:B:407:CYS:HA	2.35	0.41
3:C:163:GLN:HE21	3:C:163:GLN:HB2	1.66	0.41
2:E:171:ILE:HG13	2:E:172:LEU:N	2.35	0.41
2:E:293:TRP:HE1	2:E:296:ASN:ND2	2.19	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:205:VAL:HG21	3:C:226:PHE:HB2	2.03	0.40
5:L:1:NAG:H61	5:L:3:FUC:H5	2.04	0.40
1:A:178:TYR:CZ	2:B:178:LYS:HD3	2.56	0.40
3:C:239:GLN:O	3:C:240:SER:C	2.64	0.40
3:C:249:GLU:HB2	3:C:383:THR:HG23	2.03	0.40
3:F:177:GLN:HE21	3:F:177:GLN:HB2	1.64	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	63/66 (96%)	61 (97%)	2 (3%)	0	100	100
1	D	55/66 (83%)	53 (96%)	2 (4%)	0	100	100
2	B	301/313 (96%)	280 (93%)	19 (6%)	2 (1%)	18	48
2	E	293/313 (94%)	271 (92%)	21 (7%)	1 (0%)	36	65
3	C	296/311 (95%)	271 (92%)	21 (7%)	4 (1%)	9	30
3	F	283/311 (91%)	264 (93%)	17 (6%)	2 (1%)	18	48
4	G	2/6 (33%)	1 (50%)	0	1 (50%)	0	0
4	H	2/6 (33%)	1 (50%)	1 (50%)	0	100	100
4	I	2/6 (33%)	1 (50%)	1 (50%)	0	100	100
4	J	2/6 (33%)	0	2 (100%)	0	100	100
All	All	1299/1404 (92%)	1203 (93%)	86 (7%)	10 (1%)	16	44

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	198	LEU

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Mol	Chain	Res	Type
3	C	240	SER
2	E	281	ASP
4	G	2	PRO
3	C	97	GLU
3	F	240	SER
2	B	281	ASP
2	B	399	GLY
3	C	360	PRO
3	F	299	PRO

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	A	60/61 (98%)	55 (92%)	5 (8%)	10	32
1	D	53/61 (87%)	47 (89%)	6 (11%)	5	19
2	B	261/271 (96%)	252 (97%)	9 (3%)	32	66
2	E	253/271 (93%)	236 (93%)	17 (7%)	15	43
3	C	251/259 (97%)	237 (94%)	14 (6%)	19	50
3	F	239/259 (92%)	224 (94%)	15 (6%)	16	45
4	G	3/5 (60%)	2 (67%)	1 (33%)	0	0
4	H	3/5 (60%)	2 (67%)	1 (33%)	0	0
4	I	3/5 (60%)	2 (67%)	1 (33%)	0	0
4	J	3/5 (60%)	3 (100%)	0	100	100
All	All	1129/1202 (94%)	1060 (94%)	69 (6%)	17	46

All (69) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	133	ILE
1	A	173	VAL
1	A	175	LEU
1	A	176	LYS

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Mol	Chain	Res	Type
1	A	185	LEU
2	B	163	THR
2	B	178	LYS
2	B	210	GLU
2	B	233	VAL
2	B	253	GLN
2	B	284	ASN
2	B	321	LYS
2	B	376	SER
2	B	387	THR
3	C	102	THR
3	C	107	ILE
3	C	143	VAL
3	C	162	LYS
3	C	163	GLN
3	C	198	LEU
3	C	244	TYR
3	C	250	LEU
3	C	317	ASN
3	C	328	GLU
3	C	365	ASN
3	C	374	THR
3	C	383	THR
3	C	393	THR
1	D	134	GLN
1	D	135	LEU
1	D	145	VAL
1	D	175	LEU
1	D	176	LYS
1	D	185	LEU
2	E	165	LEU
2	E	184	SER
2	E	187	SER
2	E	190	MET
2	E	195	THR
2	E	210	GLU
2	E	234	LYS
2	E	238	VAL
2	E	253	GLN
2	E	257	ASP
2	E	280	THR
2	E	337	LYS

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Mol	Chain	Res	Type
2	E	346	ARG
2	E	359	GLN
2	E	376	SER
2	E	387	THR
2	E	435	VAL
3	F	143	VAL
3	F	172	LEU
3	F	177	GLN
3	F	192	THR
3	F	206	LYS
3	F	224	THR
3	F	242	ILE
3	F	250	LEU
3	F	317	ASN
3	F	329	GLN
3	F	365	ASN
3	F	374	THR
3	F	383	THR
3	F	390	ASN
3	F	394	ILE
4	G	3	ARG
4	H	3	ARG
4	I	3	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (62) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	131	GLN
1	A	187	GLN
2	B	160	ASN
2	B	164	ASN
2	B	189	GLN
2	B	253	GLN
2	B	256	GLN
2	B	284	ASN
2	B	296	ASN
2	B	301	GLN
2	B	325	HIS
2	B	339	GLN
2	B	351	ASN
2	B	421	GLN
2	B	439	ASN

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Mol	Chain	Res	Type
3	C	111	GLN
3	C	115	ASN
3	C	117	ASN
3	C	136	GLN
3	C	146	HIS
3	C	163	GLN
3	C	177	GLN
3	C	189	ASN
3	C	230	ASN
3	C	239	GLN
3	C	307	HIS
3	C	311	GLN
3	C	317	ASN
3	C	319	ASN
3	C	325	ASN
3	C	365	ASN
1	D	134	GLN
1	D	143	GLN
1	D	181	GLN
1	D	184	GLN
2	E	189	GLN
2	E	253	GLN
2	E	256	GLN
2	E	271	GLN
2	E	296	ASN
2	E	301	GLN
2	E	325	HIS
2	E	336	ASN
2	E	339	GLN
2	E	351	ASN
2	E	359	GLN
2	E	439	ASN
3	F	115	ASN
3	F	117	ASN
3	F	136	GLN
3	F	144	GLN
3	F	176	GLN
3	F	177	GLN
3	F	189	ASN
3	F	230	ASN
3	F	239	GLN
3	F	307	HIS

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Mol	Chain	Res	Type
3	F	317	ASN
3	F	319	ASN
3	F	325	ASN
3	F	365	ASN
3	F	390	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

6 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	$\# Z > 2$
5	NAG	K	1	2,5	14,14,15	0.71	0	17,19,21	0.71	0
5	NAG	K	2	5	14,14,15	0.79	1 (7%)	17,19,21	0.72	0
5	FUC	K	3	5	10,10,11	0.63	0	14,14,16	0.32	0
5	NAG	L	1	2,5	14,14,15	0.64	0	17,19,21	1.32	2 (11%)
5	NAG	L	2	5	14,14,15	0.60	0	17,19,21	0.64	0
5	FUC	L	3	5	10,10,11	0.75	0	14,14,16	0.70	1 (7%)

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	K	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	K	2	5	-	6/6/23/26	0/1/1/1
5	FUC	K	3	5	-	-	0/1/1/1
5	NAG	L	1	2,5	-	2/6/23/26	0/1/1/1
5	NAG	L	2	5	-	4/6/23/26	0/1/1/1
5	FUC	L	3	5	-	-	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	K	2	NAG	C1-C2	2.17	1.55	1.52

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	L	1	NAG	C3-C4-C5	2.55	114.85	110.23
5	L	1	NAG	C2-N2-C7	-2.25	119.89	122.90
5	L	3	FUC	C1-C2-C3	2.15	112.77	109.64

There are no chirality outliers.

All (14) torsion outliers are listed below:

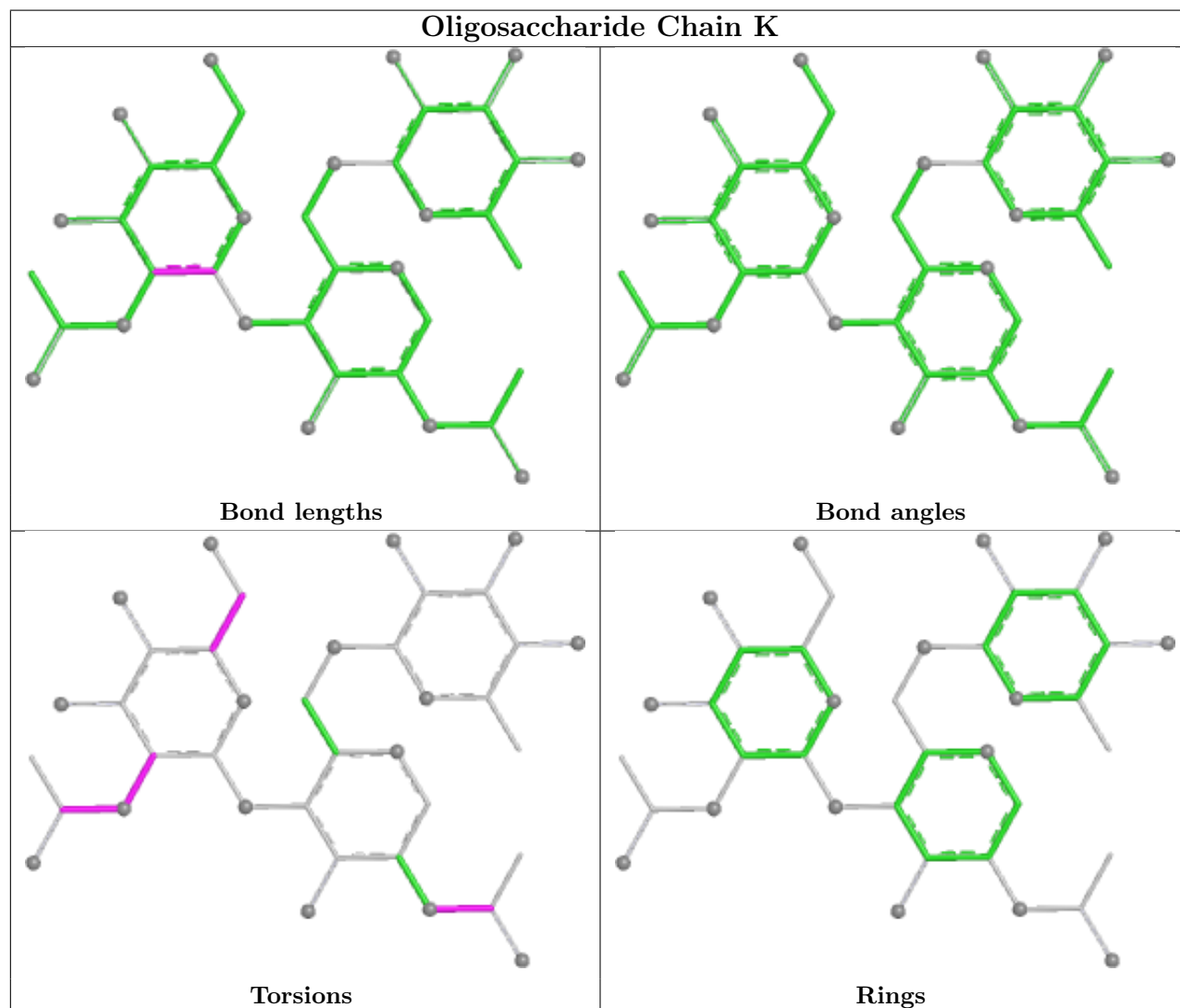
Mol	Chain	Res	Type	Atoms
5	K	1	NAG	O7-C7-N2-C2
5	K	2	NAG	C8-C7-N2-C2
5	K	2	NAG	O7-C7-N2-C2
5	L	2	NAG	C3-C2-N2-C7
5	L	2	NAG	C8-C7-N2-C2
5	L	2	NAG	O7-C7-N2-C2
5	K	1	NAG	C8-C7-N2-C2
5	K	2	NAG	C4-C5-C6-O6
5	L	1	NAG	C4-C5-C6-O6
5	K	2	NAG	O5-C5-C6-O6
5	L	1	NAG	O5-C5-C6-O6
5	K	2	NAG	C1-C2-N2-C7
5	K	2	NAG	C3-C2-N2-C7
5	L	2	NAG	O5-C5-C6-O6

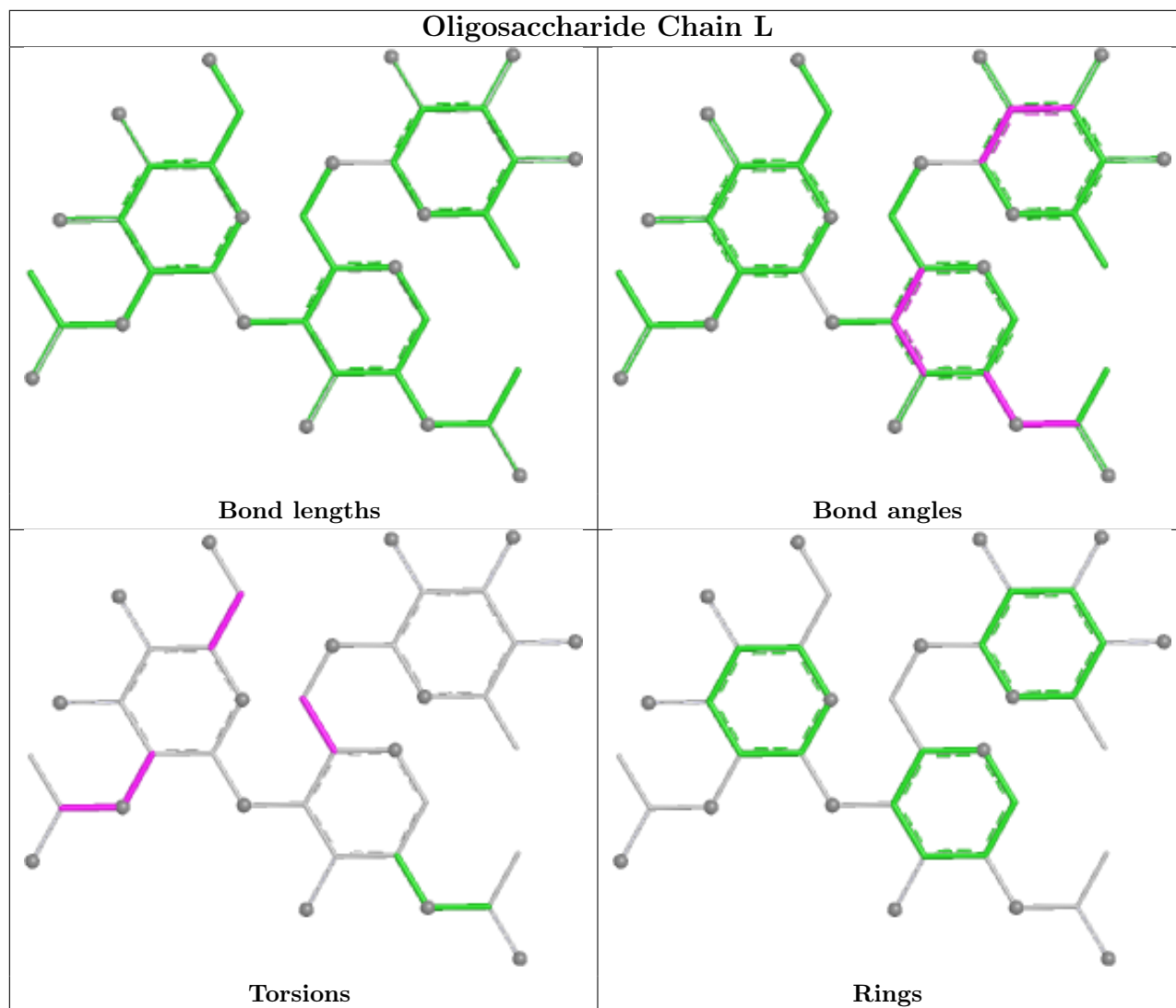
There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	L	3	FUC	4	0
5	K	1	NAG	2	0
5	L	1	NAG	4	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](#)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

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

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	65/66 (98%)	0.33	1 (1%) 72 64	26, 53, 78, 81	0
1	D	57/66 (86%)	0.47	5 (8%) 15 13	27, 56, 96, 99	0
2	B	303/313 (96%)	-0.10	4 (1%) 75 67	22, 35, 55, 82	0
2	E	295/313 (94%)	-0.34	8 (2%) 56 47	14, 23, 53, 88	0
3	C	298/311 (95%)	-0.05	3 (1%) 79 73	25, 41, 65, 82	0
3	F	285/311 (91%)	-0.29	5 (1%) 67 59	17, 29, 50, 84	0
4	G	4/6 (66%)	1.59	2 (50%) 0 0	72, 72, 72, 73	0
4	H	4/6 (66%)	0.38	0 100 100	31, 31, 32, 33	0
4	I	4/6 (66%)	0.56	0 100 100	33, 34, 34, 37	0
4	J	4/6 (66%)	1.61	1 (25%) 2 1	53, 54, 54, 55	0
All	All	1319/1404 (93%)	-0.13	29 (2%) 62 53	14, 33, 72, 99	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	J	4	VAL	4.1
1	A	190	ALA	3.9
2	E	165	LEU	3.2
1	D	189	ILE	3.2
3	F	393	THR	3.0
3	C	96	TYR	2.9
1	D	134	GLN	2.9
2	E	458	PHE	2.9
3	F	394	ILE	2.8
2	B	157	VAL	2.8
2	E	284	ASN	2.8
2	E	459	PRO	2.7
3	C	393	THR	2.6

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Mol	Chain	Res	Type	RSRZ
1	D	182	GLN	2.6
3	F	117	ASN	2.5
2	E	281	ASP	2.5
2	E	282	GLY	2.5
1	D	135	LEU	2.4
2	E	168	LEU	2.4
4	G	1	GLY	2.4
3	F	112	GLU	2.3
3	F	113	ILE	2.2
3	C	241	ALA	2.2
1	D	133	ILE	2.1
4	G	4	VAL	2.1
2	B	458	PHE	2.1
2	B	459	PRO	2.1
2	E	232	SER	2.1
2	B	159	SER	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](#)

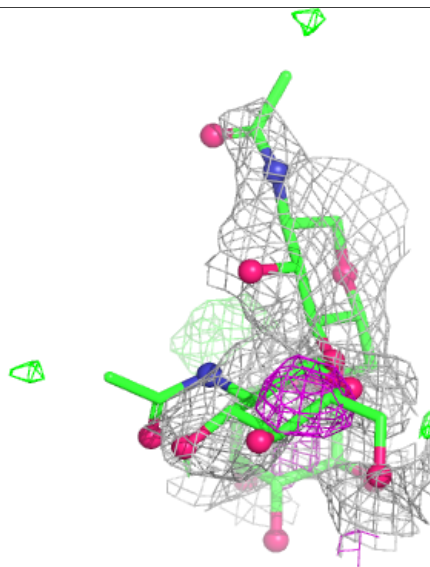
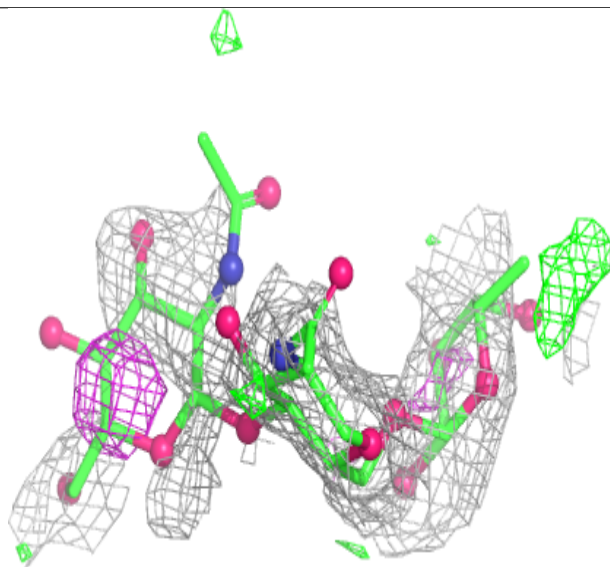
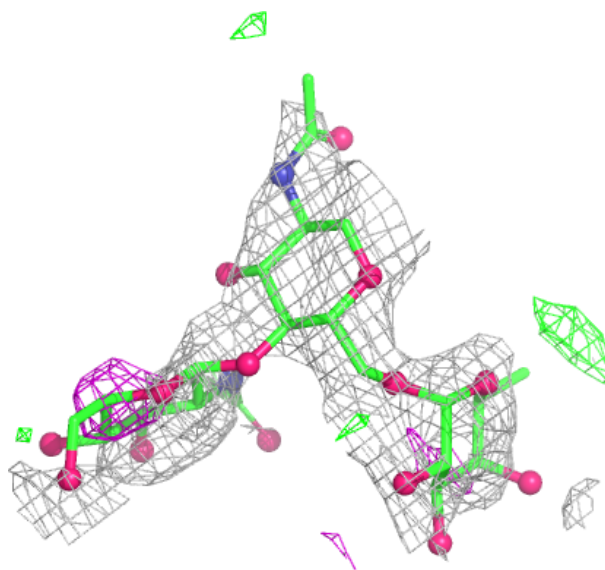
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

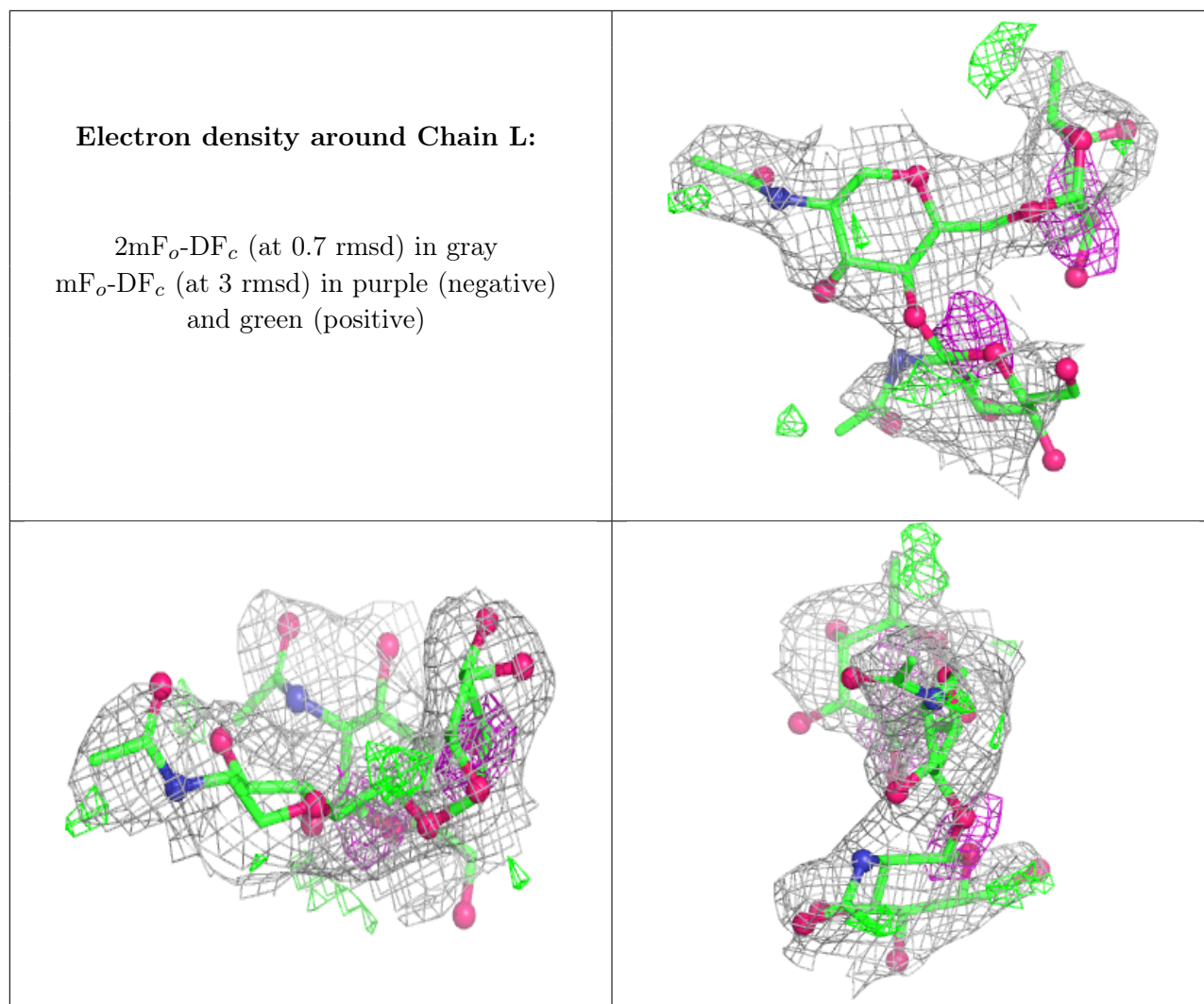
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	FUC	K	3	10/11	0.12	0.21	96,97,98,99	0
5	NAG	K	2	14/15	0.37	0.22	100,102,103,103	0
5	FUC	L	3	10/11	0.37	0.20	71,72,72,73	0
5	NAG	L	2	14/15	0.48	0.16	76,78,79,81	0
5	NAG	K	1	14/15	0.52	0.17	85,88,95,96	0
5	NAG	L	1	14/15	0.63	0.14	53,58,69,70	0

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 K:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (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, 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
6	CA	B	600	1/1	0.97	0.10	44,44,44,44	0
6	CA	C	601	1/1	0.97	0.03	33,33,33,33	0
6	CA	E	602	1/1	0.97	0.09	28,28,28,28	0
6	CA	F	603	1/1	0.99	0.02	24,24,24,24	0

6.5 Other polymers [i](#)

There are no such residues in this entry.