wwPDB EM Validation Summary Report

Jul 16, 2025 – 11:06 AM JST

PDB ID	:	8ZHQ / pdb_00008zhq
EMDB ID	:	EMD-60112
Title	:	SFTSV Gn in complex with JK-8/12 Fab
Authors	:	Shang, H.; Guo, Y.; Zhang, N.; Liu, W.; Li, H.
Deposited on	:	2024-05-11
Resolution	:	2.37 Å(reported)

This is a wwPDB EM Validation Summary 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/EMValidationReportHelp
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:

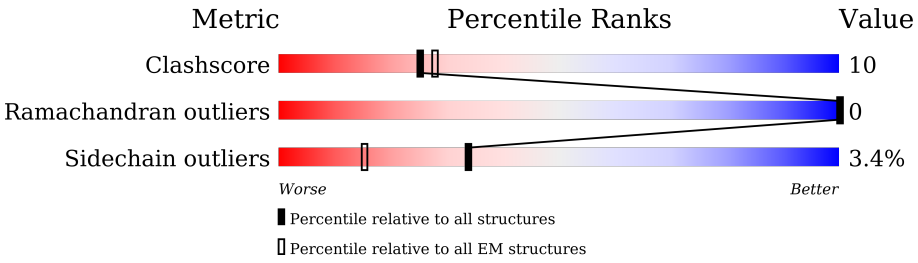
EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.37 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	A	210	76% 23% •
2	B	212	78% 21% •
3	C	219	73% 23% • •
4	D	210	65% 31% • •
5	E	347	78% 14% 7%
6	G	3	67% 33%
7	F	2	50% 50%

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 8904 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called JK-12 Fab light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	210	Total	C	N	O	S	0	0
			1580	982	272	322	4		

- Molecule 2 is a protein called JK-8 Fab light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	212	Total	C	N	O	S	0	0
			1621	1010	273	333	5		

- Molecule 3 is a protein called JK-8 Fab heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	214	Total	C	N	O	S	0	0
			1591	1005	265	315	6		

- Molecule 4 is a protein called JK-12 Fab heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	207	Total	C	N	O	S	0	0
			1567	994	264	302	7		

- Molecule 5 is a protein called Envelopment polyprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	321	Total	C	N	O	S	0	0
			2464	1540	426	472	26		

There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	341	GLY	-	expression tag	UNP A0A2Z4HIM0
E	342	LEU	-	expression tag	UNP A0A2Z4HIM0
E	343	ASN	-	expression tag	UNP A0A2Z4HIM0

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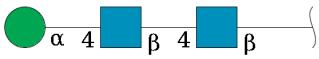
Chain	Residue	Modelled	Actual	Comment	Reference
E	344	ASP	-	expression tag	UNP A0A2Z4HIM0
E	345	ILE	-	expression tag	UNP A0A2Z4HIM0
E	346	PHE	-	expression tag	UNP A0A2Z4HIM0
E	347	GLU	-	expression tag	UNP A0A2Z4HIM0
E	348	ALA	-	expression tag	UNP A0A2Z4HIM0
E	349	GLN	-	expression tag	UNP A0A2Z4HIM0
E	350	LYS	-	expression tag	UNP A0A2Z4HIM0
E	351	ILE	-	expression tag	UNP A0A2Z4HIM0
E	352	GLU	-	expression tag	UNP A0A2Z4HIM0
E	353	TRP	-	expression tag	UNP A0A2Z4HIM0
E	354	HIS	-	expression tag	UNP A0A2Z4HIM0
E	355	GLU	-	expression tag	UNP A0A2Z4HIM0
E	356	ALA	-	expression tag	UNP A0A2Z4HIM0
E	357	ALA	-	expression tag	UNP A0A2Z4HIM0
E	358	ALA	-	expression tag	UNP A0A2Z4HIM0
E	359	HIS	-	expression tag	UNP A0A2Z4HIM0
E	360	HIS	-	expression tag	UNP A0A2Z4HIM0
E	361	HIS	-	expression tag	UNP A0A2Z4HIM0
E	362	HIS	-	expression tag	UNP A0A2Z4HIM0
E	363	HIS	-	expression tag	UNP A0A2Z4HIM0
E	364	HIS	-	expression tag	UNP A0A2Z4HIM0
E	365	HIS	-	expression tag	UNP A0A2Z4HIM0
E	366	HIS	-	expression tag	UNP A0A2Z4HIM0

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

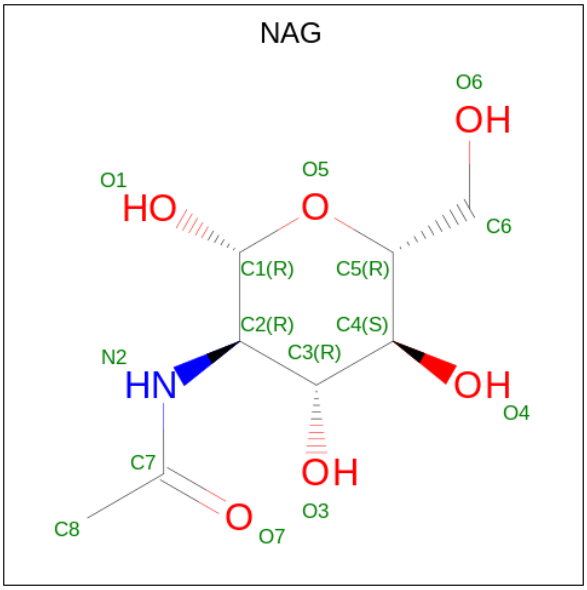


Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
6	G	3	39	22	2	15	0	0

- Molecule 7 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	F	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 8 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



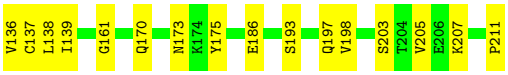
Mol	Chain	Residues	Atoms				AltConf
8	D	1	Total	C	N	O	0
			14	8	1	5	

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. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

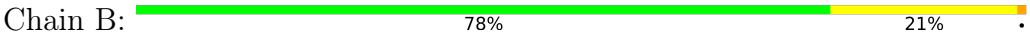
• Molecule 1: JK-12 Fab light chain

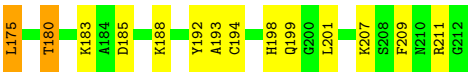
Chain A:



• Molecule 2: JK-8 Fab light chain

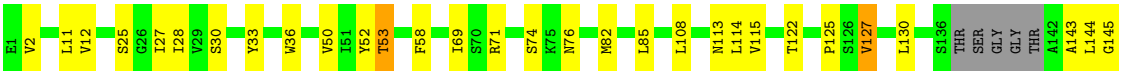
Chain B:





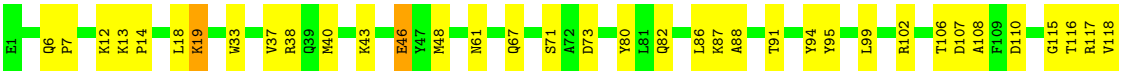
• Molecule 3: JK-8 Fab heavy chain

Chain C:



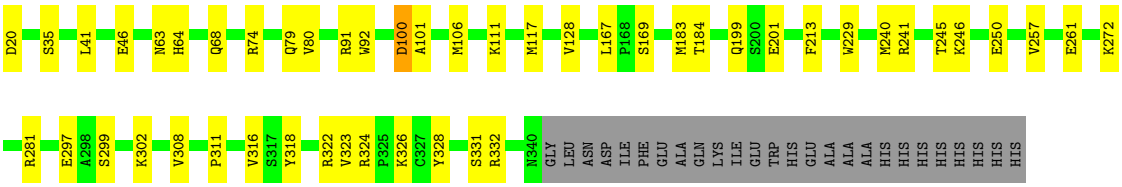
• Molecule 4: JK-12 Fab heavy chain

Chain D:



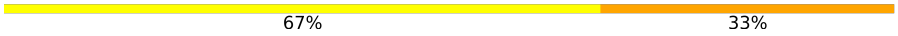
• Molecule 5: Envelopment polyprotein

Chain E:



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

Chain G:



• Molecule 7: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	400209	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MAN, 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	0.13	0/1616	0.35	0/2207
2	B	0.12	0/1655	0.30	0/2246
3	C	0.15	0/1626	0.37	0/2215
4	D	0.17	0/1608	0.43	2/2188 (0.1%)
5	E	0.14	0/2526	0.30	0/3407
All	All	0.14	0/9031	0.35	2/12263 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	D	156	PRO	CA-C-N	-5.38	116.79	122.28
4	D	156	PRO	C-N-CA	-5.38	116.79	122.28

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	1580	0	1530	34	0
2	B	1621	0	1574	30	0
3	C	1591	0	1565	36	0
4	D	1567	0	1530	51	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	E	2464	0	2354	32	0
6	G	39	0	34	1	0
7	F	28	0	25	0	0
8	D	14	0	13	0	0
All	All	8904	0	8625	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 10.

The worst 5 of 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)
4:D:91:THR:HA	4:D:118:VAL:O	1.75	0.85
5:E:229:TRP:HE1	5:E:331:SER:HB3	1.46	0.77
3:C:200:TYR:HA	3:C:215:LYS:HD2	1.67	0.76
1:A:79:ALA:HA	1:A:108:VAL:HG21	1.66	0.76
3:C:27:ILE:O	3:C:76:ASN:ND2	2.18	0.75

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	208/210 (99%)	182 (88%)	26 (12%)	0	100	100
2	B	210/212 (99%)	197 (94%)	13 (6%)	0	100	100
3	C	210/219 (96%)	192 (91%)	18 (9%)	0	100	100
4	D	203/210 (97%)	174 (86%)	29 (14%)	0	100	100
5	E	319/347 (92%)	309 (97%)	10 (3%)	0	100	100
All	All	1150/1198 (96%)	1054 (92%)	96 (8%)	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 PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	176/176 (100%)	170 (97%)	6 (3%)	32	49
2	B	187/187 (100%)	181 (97%)	6 (3%)	34	51
3	C	178/181 (98%)	167 (94%)	11 (6%)	15	23
4	D	172/175 (98%)	165 (96%)	7 (4%)	26	41
5	E	275/297 (93%)	271 (98%)	4 (2%)	60	76
All	All	988/1016 (97%)	954 (97%)	34 (3%)	34	49

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	D	198	LEU
4	D	207	VAL
5	E	240	MET
3	C	53	THR
2	B	180	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	197	GLN
4	D	32	ASN
5	E	68	GLN

5.3.3 RNA

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)

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	$\#\|Z\| > 2$
7	NAG	F	1	5,7	14,14,15	1.15	2 (14%)	17,19,21	1.37	1 (5%)
7	NAG	F	2	7	14,14,15	0.27	0	17,19,21	0.62	0
6	NAG	G	1	5,6	14,14,15	0.59	1 (7%)	17,19,21	0.61	0
6	NAG	G	2	6	14,14,15	0.41	0	17,19,21	0.43	0
6	MAN	G	3	6	11,11,12	1.15	1 (9%)	15,15,17	1.70	4 (26%)

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
7	NAG	F	1	5,7	-	2/6/23/26	0/1/1/1
7	NAG	F	2	7	-	3/6/23/26	0/1/1/1
6	NAG	G	1	5,6	-	2/6/23/26	0/1/1/1
6	NAG	G	2	6	-	4/6/23/26	0/1/1/1
6	MAN	G	3	6	-	0/2/19/22	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	F	1	NAG	O5-C1	3.53	1.49	1.43
6	G	3	MAN	C1-C2	3.46	1.60	1.52
7	F	1	NAG	C1-C2	2.42	1.55	1.52
6	G	1	NAG	O5-C1	-2.10	1.40	1.43

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	F	1	NAG	C1-O5-C5	5.18	119.22	112.19
6	G	3	MAN	C1-O5-C5	4.03	117.65	112.19
6	G	3	MAN	C1-C2-C3	3.25	113.67	109.67
6	G	3	MAN	O2-C2-C3	-2.43	105.28	110.14
6	G	3	MAN	O5-C1-C2	2.09	113.99	110.77

There are no chirality outliers.

5 of 11 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	F	2	NAG	C4-C5-C6-O6
6	G	1	NAG	O5-C5-C6-O6
6	G	2	NAG	O5-C5-C6-O6
6	G	2	NAG	C4-C5-C6-O6
6	G	1	NAG	C4-C5-C6-O6

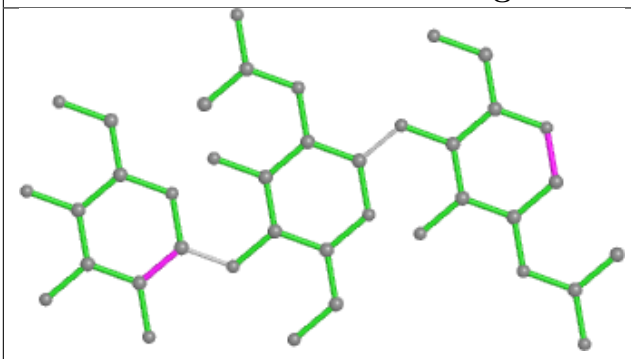
There are no ring outliers.

2 monomers are involved in 1 short contact:

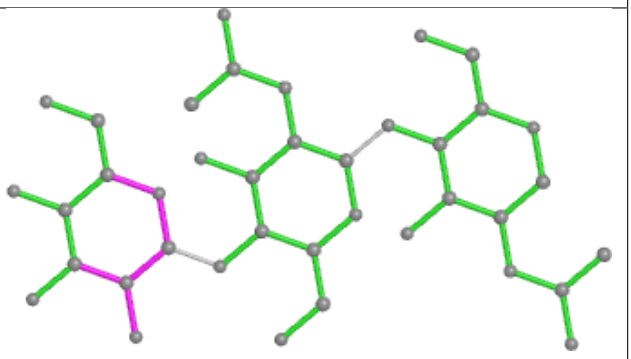
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	G	1	NAG	1	0
6	G	2	NAG	1	0

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

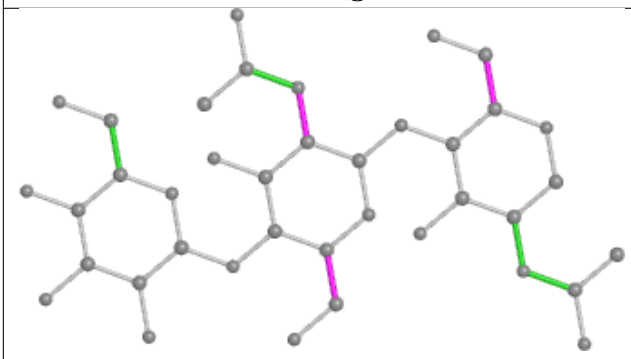
Oligosaccharide Chain G



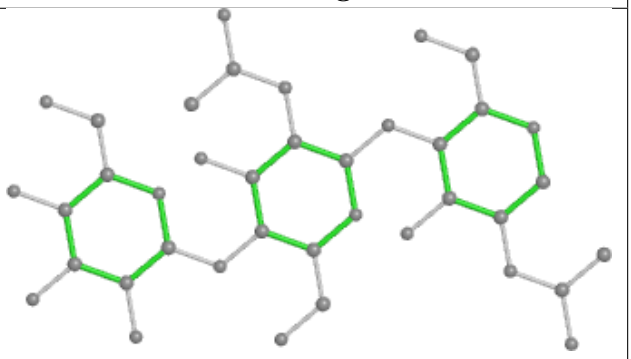
Bond lengths



Bond angles

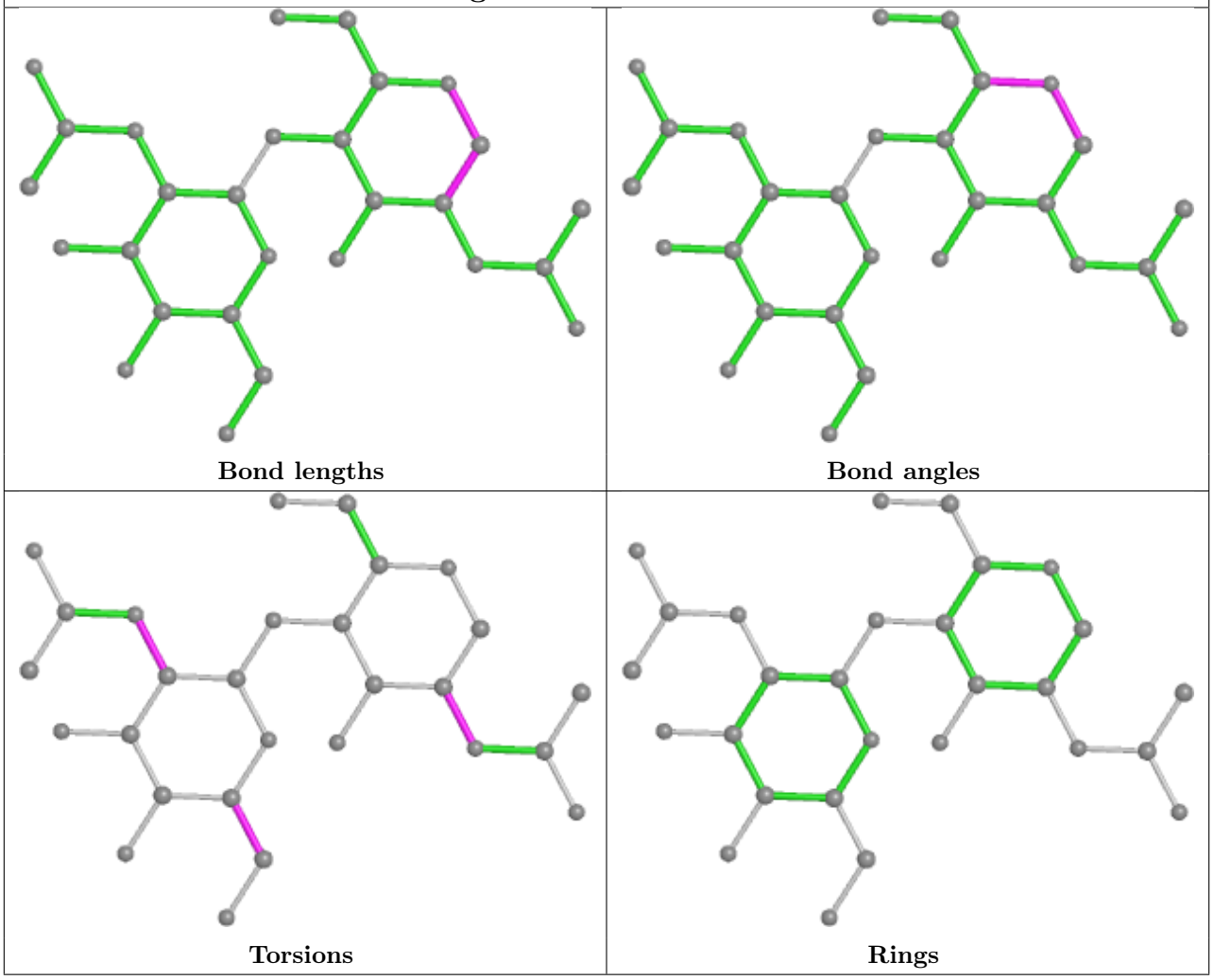


Torsions



Rings

Oligosaccharide Chain F



5.6 Ligand geometry (i)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
8	NAG	D	301	4	14,14,15	0.21	0	17,19,21	0.40	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	NAG	D	301	4	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	D	301	NAG	C4-C5-C6-O6
8	D	301	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.