



wwPDB X-ray Structure Validation Summary Report ⓘ

Jul 13, 2021 – 10:06 am BST

PDB ID : 5N09
Title : Crystal structure of L107C/A313C covalently linked dengue 2 virus envelope glycoprotein dimer in complex with the Fab fragment of the broadly neutralizing human antibody EDE2 A11
Authors : Duquerroy, S.; Rouvinski, A.; Guardado-Calvo, P.; Vaney, M.-C.; Sharma, A.; Rey, F.
Deposited on : 2017-02-02
Resolution : 3.90 Å(reported)

This is a wwPDB X-ray Structure 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/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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 : 2.22
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) : 2.22

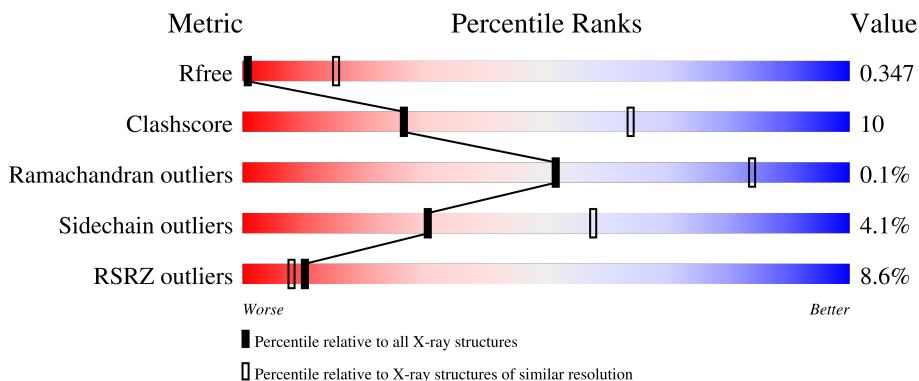
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.90 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	1002 (4.14-3.66)
Clashscore	141614	1004 (4.12-3.68)
Ramachandran outliers	138981	1021 (4.14-3.66)
Sidechain outliers	138945	1014 (4.14-3.66)
RSRZ outliers	127900	1275 (4.20-3.60)

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	430	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 56%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 33%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 9%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">2% 56% 33% • 9%</p>
1	B	430	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 60%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 28%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">3% 60% 28% • 10%</p>
2	H	283	<div style="display: flex; align-items: center;"> <div style="width: 8%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 64%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 15%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">8% 64% 15% • 20%</p>
2	I	283	<div style="display: flex; align-items: center;"> <div style="width: 13%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 65%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 14%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">13% 65% 14% 20%</p>
3	L	218	<div style="display: flex; align-items: center;"> <div style="width: 13%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 81%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 17%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">13% 81% 17% •</p>

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Mol	Chain	Length	Quality of chain
3	M	218	
4	C	6	
4	D	6	

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
4	MAN	C	4	-	-	-	X
4	MAN	D	4	-	-	-	X

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 12841 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 Envelope Glycoprotein E.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	391	3047	1920	523	578	26	0	0	0
1	B	388	3020	1903	517	574	26	0	0	0

There are 76 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	107	CYS	LEU	engineered mutation	UNP C3VXD1
A	118	LYS	MET	conflict	UNP C3VXD1
A	313	CYS	ALA	engineered mutation	UNP C3VXD1
A	396	LEU	-	expression tag	UNP C3VXD1
A	397	VAL	-	expression tag	UNP C3VXD1
A	398	PRO	-	expression tag	UNP C3VXD1
A	399	ARG	-	expression tag	UNP C3VXD1
A	400	GLY	-	expression tag	UNP C3VXD1
A	401	SER	-	expression tag	UNP C3VXD1
A	402	SER	-	expression tag	UNP C3VXD1
A	403	ALA	-	expression tag	UNP C3VXD1
A	404	TRP	-	expression tag	UNP C3VXD1
A	405	SER	-	expression tag	UNP C3VXD1
A	406	HIS	-	expression tag	UNP C3VXD1
A	407	PRO	-	expression tag	UNP C3VXD1
A	408	GLN	-	expression tag	UNP C3VXD1
A	409	PHE	-	expression tag	UNP C3VXD1
A	410	GLU	-	expression tag	UNP C3VXD1
A	411	LYS	-	expression tag	UNP C3VXD1
A	412	GLY	-	expression tag	UNP C3VXD1
A	413	GLY	-	expression tag	UNP C3VXD1
A	414	SER	-	expression tag	UNP C3VXD1
A	415	GLY	-	expression tag	UNP C3VXD1
A	416	GLY	-	expression tag	UNP C3VXD1
A	417	GLY	-	expression tag	UNP C3VXD1

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Chain	Residue	Modelled	Actual	Comment	Reference
A	418	SER	-	expression tag	UNP C3VXD1
A	419	GLY	-	expression tag	UNP C3VXD1
A	420	GLY	-	expression tag	UNP C3VXD1
A	421	SER	-	expression tag	UNP C3VXD1
A	422	ALA	-	expression tag	UNP C3VXD1
A	423	TRP	-	expression tag	UNP C3VXD1
A	424	SER	-	expression tag	UNP C3VXD1
A	425	HIS	-	expression tag	UNP C3VXD1
A	426	PRO	-	expression tag	UNP C3VXD1
A	427	GLN	-	expression tag	UNP C3VXD1
A	428	PHE	-	expression tag	UNP C3VXD1
A	429	GLU	-	expression tag	UNP C3VXD1
A	430	LYS	-	expression tag	UNP C3VXD1
B	107	CYS	LEU	engineered mutation	UNP C3VXD1
B	118	LYS	MET	conflict	UNP C3VXD1
B	313	CYS	ALA	engineered mutation	UNP C3VXD1
B	396	LEU	-	expression tag	UNP C3VXD1
B	397	VAL	-	expression tag	UNP C3VXD1
B	398	PRO	-	expression tag	UNP C3VXD1
B	399	ARG	-	expression tag	UNP C3VXD1
B	400	GLY	-	expression tag	UNP C3VXD1
B	401	SER	-	expression tag	UNP C3VXD1
B	402	SER	-	expression tag	UNP C3VXD1
B	403	ALA	-	expression tag	UNP C3VXD1
B	404	TRP	-	expression tag	UNP C3VXD1
B	405	SER	-	expression tag	UNP C3VXD1
B	406	HIS	-	expression tag	UNP C3VXD1
B	407	PRO	-	expression tag	UNP C3VXD1
B	408	GLN	-	expression tag	UNP C3VXD1
B	409	PHE	-	expression tag	UNP C3VXD1
B	410	GLU	-	expression tag	UNP C3VXD1
B	411	LYS	-	expression tag	UNP C3VXD1
B	412	GLY	-	expression tag	UNP C3VXD1
B	413	GLY	-	expression tag	UNP C3VXD1
B	414	SER	-	expression tag	UNP C3VXD1
B	415	GLY	-	expression tag	UNP C3VXD1
B	416	GLY	-	expression tag	UNP C3VXD1
B	417	GLY	-	expression tag	UNP C3VXD1
B	418	SER	-	expression tag	UNP C3VXD1
B	419	GLY	-	expression tag	UNP C3VXD1
B	420	GLY	-	expression tag	UNP C3VXD1
B	421	SER	-	expression tag	UNP C3VXD1

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Chain	Residue	Modelled	Actual	Comment	Reference
B	422	ALA	-	expression tag	UNP C3VXD1
B	423	TRP	-	expression tag	UNP C3VXD1
B	424	SER	-	expression tag	UNP C3VXD1
B	425	HIS	-	expression tag	UNP C3VXD1
B	426	PRO	-	expression tag	UNP C3VXD1
B	427	GLN	-	expression tag	UNP C3VXD1
B	428	PHE	-	expression tag	UNP C3VXD1
B	429	GLU	-	expression tag	UNP C3VXD1
B	430	LYS	-	expression tag	UNP C3VXD1

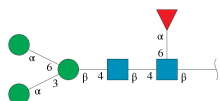
- Molecule 2 is a protein called BROADLY NEUTRALIZING HUMAN ANTIBODY EDE2 A11 - Heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	226	1728	1093	292	336	7	0	0	0
2	I	226	1724	1091	292	334	7	0	0	0

- Molecule 3 is a protein called BROADLY NEUTRALIZING HUMAN ANTIBODY EDE2 A11 - Light chain.

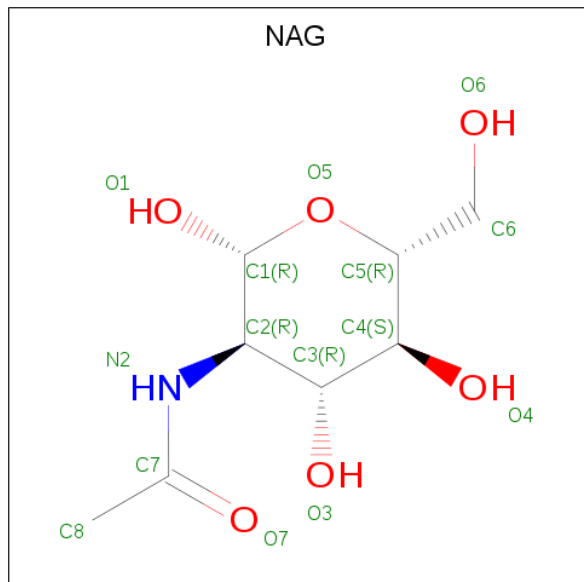
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	L	213	1582	987	265	324	6	0	0	0
3	M	213	1582	987	265	324	6	0	0	0

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	C	6	71	40	2	29	0	0	0
4	D	6	71	40	2	29	0	0	0

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



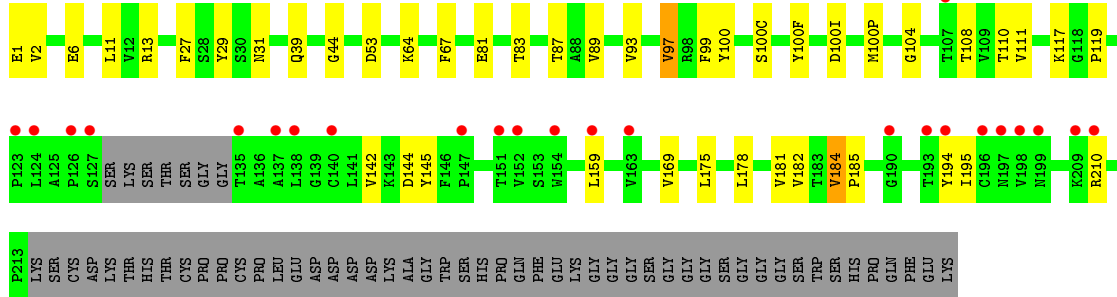
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	B	1	14	8	1	5	0	0

- Molecule 6 is water.

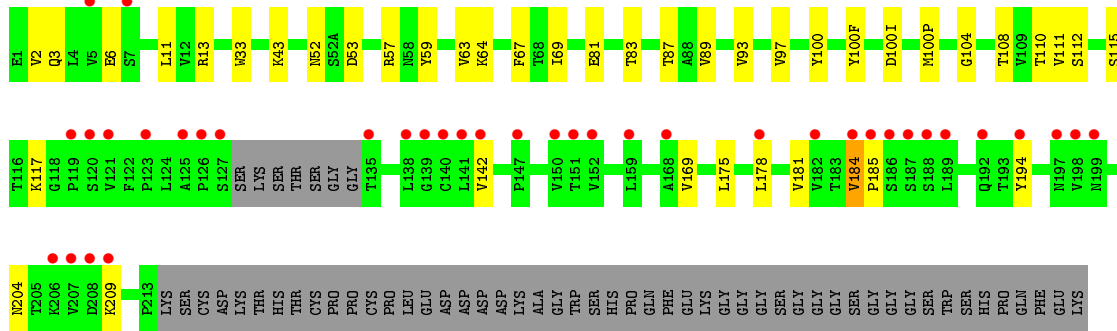
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
6	A	1	1	1	0	0
6	H	1	1	1	0	0

SER SER ALA TRP SER HIS PRO PHE GLU GLY SER GLY SER GLY TRP TRP TRP HIS PRO PHE GLU LYS

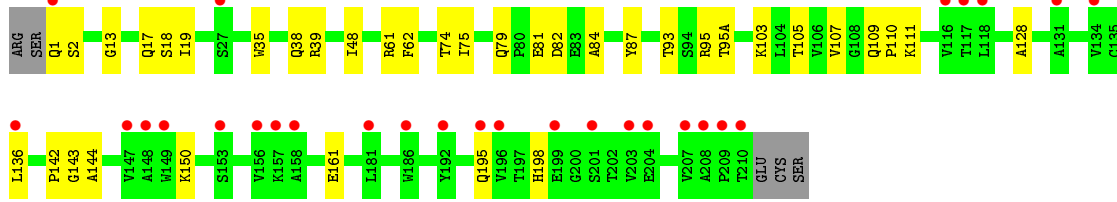
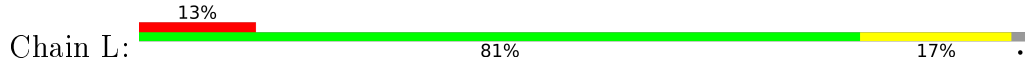
• Molecule 2: BROADLY NEUTRALIZING HUMAN ANTIBODY EDE2 A11 - Heavy chain



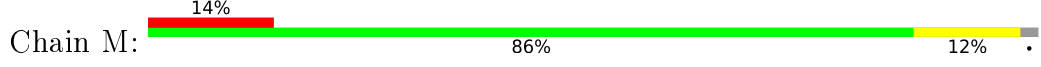
• Molecule 2: BROADLY NEUTRALIZING HUMAN ANTIBODY EDE2 A11 - Heavy chain

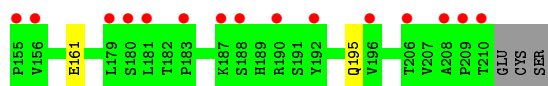


• Molecule 3: BROADLY NEUTRALIZING HUMAN ANTIBODY EDE2 A11 - Light chain



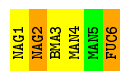
• Molecule 3: BROADLY NEUTRALIZING HUMAN ANTIBODY EDE2 A11 - Light chain





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

Chain C: 17% 50% 33%



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

Chain D: 83% 17%



4 Data and refinement statistics

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α , β , γ	58.90Å 180.60Å 205.04Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.99 – 3.90 39.99 – 3.90	Depositor EDS
% Data completeness (in resolution range)	93.1 (39.99-3.90) 93.1 (39.99-3.90)	Depositor EDS
R_{merge}	0.69	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.13 (at 3.87Å)	Xtrriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, R_{free}	0.304 , 0.347 0.304 , 0.347	Depositor DCC
R_{free} test set	945 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	88.8	Xtrriage
Anisotropy	0.863	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 16.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.38$, $\langle L^2 \rangle = 0.21$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.81	EDS
Total number of atoms	12841	wwPDB-VP
Average B, all atoms (Å ²)	113.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.75% 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: MAN, NAG, FUC, BMA

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	0.40	1/3108 (0.0%)	0.75	1/4198 (0.0%)
1	B	0.37	0/3080	0.76	1/4161 (0.0%)
2	H	0.29	0/1774	0.60	1/2419 (0.0%)
2	I	0.28	0/1770	0.61	1/2414 (0.0%)
3	L	0.30	0/1618	0.64	0/2209
3	M	0.29	0/1618	0.60	0/2209
All	All	0.34	1/12968 (0.0%)	0.68	4/17610 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	216	LEU	C-N	10.34	1.53	1.34

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	287	LEU	CA-CB-CG	8.10	133.94	115.30
1	A	287	LEU	CA-CB-CG	6.48	130.20	115.30
2	I	178	LEU	CA-CB-CG	6.25	129.68	115.30
2	H	178	LEU	CA-CB-CG	6.25	129.66	115.30

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	3047	0	3041	86	0
1	B	3020	0	3005	91	0
2	H	1728	0	1656	31	0
2	I	1724	0	1652	29	0
3	L	1582	0	1553	26	0
3	M	1582	0	1553	16	0
4	C	71	0	61	3	0
4	D	71	0	61	4	0
5	B	14	0	13	0	0
6	A	1	0	0	1	0
6	H	1	0	0	0	0
All	All	12841	0	12595	263	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 263 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:B:99:ARG:NH1	1:B:103:ASN:O	1.83	1.10
1:A:99:ARG:NH1	1:A:103:ASN:O	1.89	1.04
1:B:99:ARG:NH1	1:B:103:ASN:OD1	1.95	0.97
1:A:99:ARG:NH1	1:A:103:ASN:OD1	2.03	0.92
2:H:117:LYS:HZ1	2:I:115:SER:H	1.06	0.91

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	387/430 (90%)	368 (95%)	19 (5%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	382/430 (89%)	365 (96%)	17 (4%)	0	100	100
2	H	222/283 (78%)	214 (96%)	7 (3%)	1 (0%)	29	67
2	I	222/283 (78%)	212 (96%)	9 (4%)	1 (0%)	29	67
3	L	211/218 (97%)	205 (97%)	6 (3%)	0	100	100
3	M	211/218 (97%)	207 (98%)	4 (2%)	0	100	100
All	All	1635/1862 (88%)	1571 (96%)	62 (4%)	2 (0%)	51	84

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	64	LYS
2	I	64	LYS

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	342/368 (93%)	316 (92%)	26 (8%)	13	42
1	B	339/368 (92%)	317 (94%)	22 (6%)	17	46
2	H	192/236 (81%)	189 (98%)	3 (2%)	62	79
2	I	191/236 (81%)	187 (98%)	4 (2%)	53	73
3	L	180/185 (97%)	178 (99%)	2 (1%)	73	84
3	M	180/185 (97%)	178 (99%)	2 (1%)	73	84
All	All	1424/1578 (90%)	1365 (96%)	59 (4%)	30	58

5 of 59 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	46	ILE
3	L	19	ILE
1	B	282	HIS
2	I	184	VAL

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Mol	Chain	Res	Type
2	H	97	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	52	GLN
1	A	346	HIS
2	H	39	GLN
3	L	189	HIS

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](#)

12 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$
4	NAG	C	1	4,1	14,14,15	0.33	0	17,19,21	0.58	0
4	NAG	C	2	4	14,14,15	0.56	0	17,19,21	1.54	2 (11%)
4	BMA	C	3	4	11,11,12	1.05	1 (9%)	15,15,17	1.06	1 (6%)
4	MAN	C	4	4	11,11,12	0.80	0	15,15,17	1.30	2 (13%)
4	MAN	C	5	4	11,11,12	0.84	0	15,15,17	0.86	0
4	FUC	C	6	4	10,10,11	1.04	1 (10%)	14,14,16	1.16	2 (14%)
4	NAG	D	1	4,1	14,14,15	0.34	0	17,19,21	0.64	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	D	2	4	14,14,15	0.46	0	17,19,21	1.59	2 (11%)
4	BMA	D	3	4	11,11,12	1.08	1 (9%)	15,15,17	1.04	1 (6%)
4	MAN	D	4	4	11,11,12	0.83	0	15,15,17	1.26	2 (13%)
4	MAN	D	5	4	11,11,12	0.63	0	15,15,17	0.89	1 (6%)
4	FUC	D	6	4	10,10,11	0.90	0	14,14,16	1.06	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
4	NAG	C	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	C	2	4	-	0/6/23/26	0/1/1/1
4	BMA	C	3	4	-	2/2/19/22	1/1/1/1
4	MAN	C	4	4	-	1/2/19/22	1/1/1/1
4	MAN	C	5	4	-	0/2/19/22	0/1/1/1
4	FUC	C	6	4	-	-	0/1/1/1
4	NAG	D	1	4,1	-	3/6/23/26	0/1/1/1
4	NAG	D	2	4	-	0/6/23/26	0/1/1/1
4	BMA	D	3	4	-	2/2/19/22	1/1/1/1
4	MAN	D	4	4	-	1/2/19/22	1/1/1/1
4	MAN	D	5	4	-	0/2/19/22	0/1/1/1
4	FUC	D	6	4	-	-	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	3	BMA	O5-C5	2.39	1.48	1.43
4	C	6	FUC	C2-C3	2.23	1.55	1.52
4	D	3	BMA	O5-C5	2.11	1.47	1.43

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	2	NAG	C1-O5-C5	4.46	118.23	112.19
4	C	2	NAG	C1-O5-C5	4.31	118.04	112.19
4	D	4	MAN	C1-O5-C5	3.83	117.39	112.19
4	C	4	MAN	C1-O5-C5	3.79	117.32	112.19
4	D	2	NAG	O4-C4-C5	3.17	117.16	109.30

There are no chirality outliers.

5 of 11 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	3	BMA	C4-C5-C6-O6
4	D	3	BMA	C4-C5-C6-O6
4	C	1	NAG	O5-C5-C6-O6
4	C	3	BMA	O5-C5-C6-O6
4	D	3	BMA	O5-C5-C6-O6

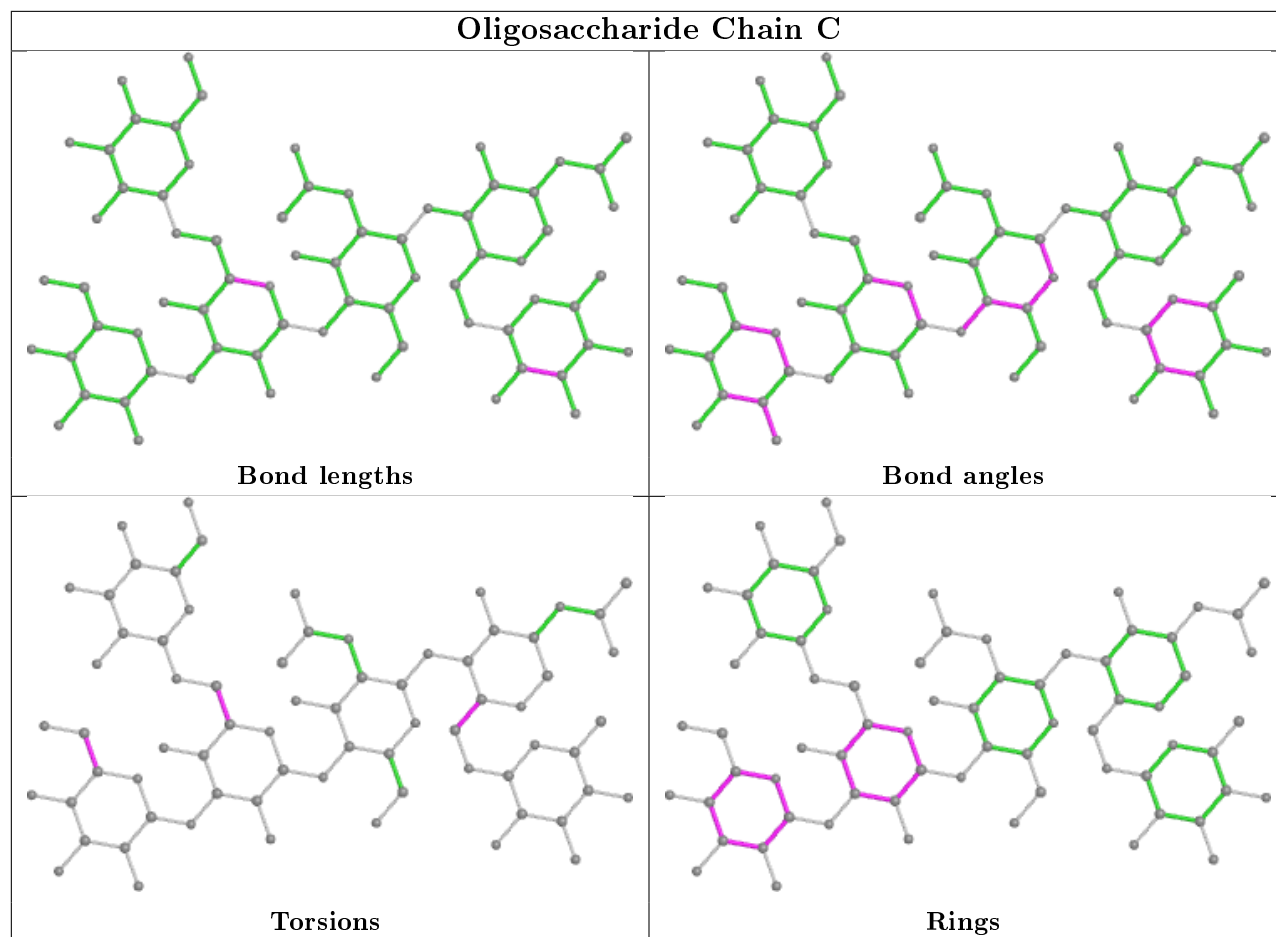
All (4) ring outliers are listed below:

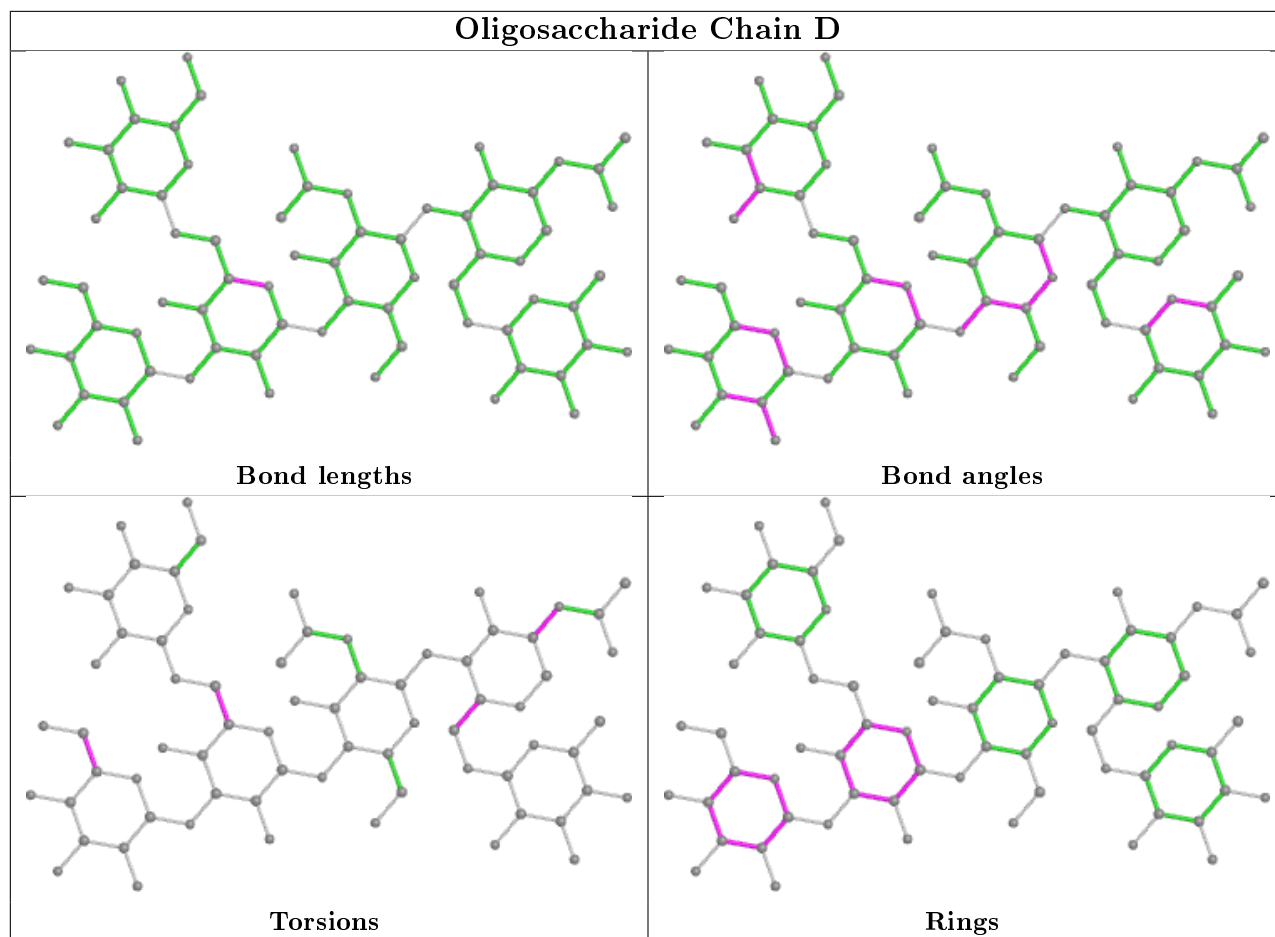
Mol	Chain	Res	Type	Atoms
4	D	3	BMA	C1-C2-C3-C4-C5-O5
4	C	3	BMA	C1-C2-C3-C4-C5-O5
4	C	4	MAN	C1-C2-C3-C4-C5-O5
4	D	4	MAN	C1-C2-C3-C4-C5-O5

5 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	2	NAG	1	0
4	C	6	FUC	1	0
4	D	1	NAG	3	0
4	D	2	NAG	1	0
4	C	1	NAG	2	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](#)

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
5	NAG	B	507	1	14,14,15	0.27	0	17,19,21	0.33	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	B	507	1	-	0/6/23/26	0/1/1/1

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 [i](#)

There are no chain breaks in this entry.

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

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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	391/430 (90%)	0.05	7 (1%) 68 59	59, 80, 145, 246	0
1	B	388/430 (90%)	0.19	15 (3%) 39 30	59, 85, 161, 262	0
2	H	226/283 (79%)	0.61	24 (10%) 6 5	67, 117, 203, 324	0
2	I	226/283 (79%)	0.91	38 (16%) 1 1	62, 127, 253, 380	0
3	L	213/218 (97%)	0.67	28 (13%) 3 3	72, 128, 207, 288	0
3	M	213/218 (97%)	0.60	30 (14%) 2 3	67, 126, 252, 315	0
All	All	1657/1862 (88%)	0.43	142 (8%) 10 8	59, 96, 209, 380	0

The worst 5 of 142 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	I	139	GLY	7.9
2	I	140	CYS	7.6
2	I	127	SER	7.4
2	I	126	PRO	7.2
2	I	185	PRO	6.0

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(\AA^2)	Q<0.9
4	MAN	D	4	11/12	0.69	0.59	206,210,215,216	0
4	MAN	C	4	11/12	0.75	0.53	115,125,146,175	0
4	MAN	C	5	11/12	0.82	0.36	100,104,137,141	0
4	FUC	D	6	10/11	0.84	0.26	99,103,119,136	0
4	MAN	D	5	11/12	0.88	0.28	79,81,84,87	0
4	NAG	C	2	14/15	0.89	0.22	70,72,98,104	0
4	FUC	C	6	10/11	0.90	0.23	70,70,114,115	0
4	BMA	D	3	11/12	0.91	0.16	81,83,103,170	0
4	NAG	D	2	14/15	0.91	0.21	89,102,130,137	0
4	NAG	D	1	14/15	0.92	0.22	75,78,114,130	0
4	BMA	C	3	11/12	0.93	0.15	86,91,116,138	0
4	NAG	C	1	14/15	0.93	0.19	66,68,106,109	0

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(\AA^2)	Q<0.9
5	NAG	B	507	14/15	0.76	0.30	107,126,139,142	0

6.5 Other polymers [i](#)

There are no such residues in this entry.