



# wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 10, 2022 – 04:45 PM EST

PDB ID : 1NMU  
Title : MBP-L30  
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Deposited on : 2003-01-10  
Resolution : 2.31 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<https://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.2

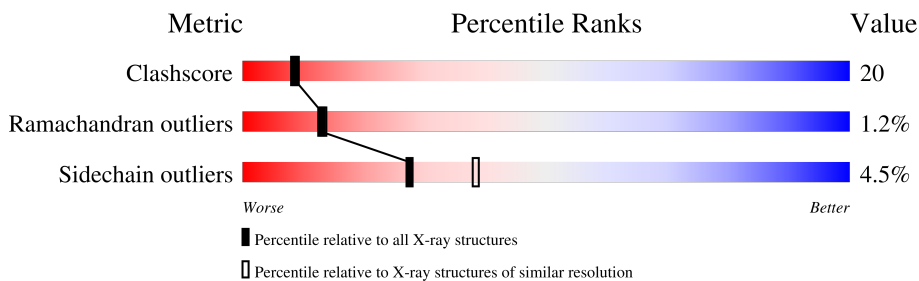
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.31 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))
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	382	73% 22% . .
1	C	382	71% 24% . .
2	B	104	62% 35% .
2	D	104	31% 56% 12% .
3	E	4	25% 75%
3	F	4	25% 75%

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7593 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 maltose-binding periplasmic protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	368	2843	1828	463	546	6	0	0	0
1	C	368	2843	1828	463	546	6	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P02928
A	367	ASN	-	cloning artifact	UNP P02928
A	368	SER	-	cloning artifact	UNP P02928
A	369	SER	-	cloning artifact	UNP P02928
A	370	SER	-	cloning artifact	UNP P02928
A	371	VAL	-	cloning artifact	UNP P02928
A	372	PRO	-	cloning artifact	UNP P02928
A	373	GLY	-	cloning artifact	UNP P02928
A	374	ARG	-	cloning artifact	UNP P02928
A	375	GLY	-	cloning artifact	UNP P02928
A	376	SER	-	cloning artifact	UNP P02928
A	377	ILE	-	cloning artifact	UNP P02928
A	378	GLU	-	cloning artifact	UNP P02928
A	379	GLY	-	cloning artifact	UNP P02928
A	380	ARG	-	cloning artifact	UNP P02928
A	381	ALA	-	cloning artifact	UNP P02928
C	0	MET	-	initiating methionine	UNP P02928
C	367	ASN	-	cloning artifact	UNP P02928
C	368	SER	-	cloning artifact	UNP P02928
C	369	SER	-	cloning artifact	UNP P02928
C	370	SER	-	cloning artifact	UNP P02928
C	371	VAL	-	cloning artifact	UNP P02928
C	372	PRO	-	cloning artifact	UNP P02928
C	373	GLY	-	cloning artifact	UNP P02928
C	374	ARG	-	cloning artifact	UNP P02928

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Chain	Residue	Modelled	Actual	Comment	Reference
C	375	GLY	-	cloning artifact	UNP P02928
C	376	SER	-	cloning artifact	UNP P02928
C	377	ILE	-	cloning artifact	UNP P02928
C	378	GLU	-	cloning artifact	UNP P02928
C	379	GLY	-	cloning artifact	UNP P02928
C	380	ARG	-	cloning artifact	UNP P02928
C	381	ALA	-	cloning artifact	UNP P02928

- Molecule 2 is a protein called 60S ribosomal protein L30.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	104	Total 795	C 511	N 133	O 150	S 1	0	0	0
2	D	103	Total 790	C 508	N 132	O 149	S 1	0	0	0

- Molecule 3 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
3	E	4	Total 45	C 24	O 21	0	0	0
3	F	4	Total 45	C 24	O 21	0	0	0

- Molecule 4 is water.

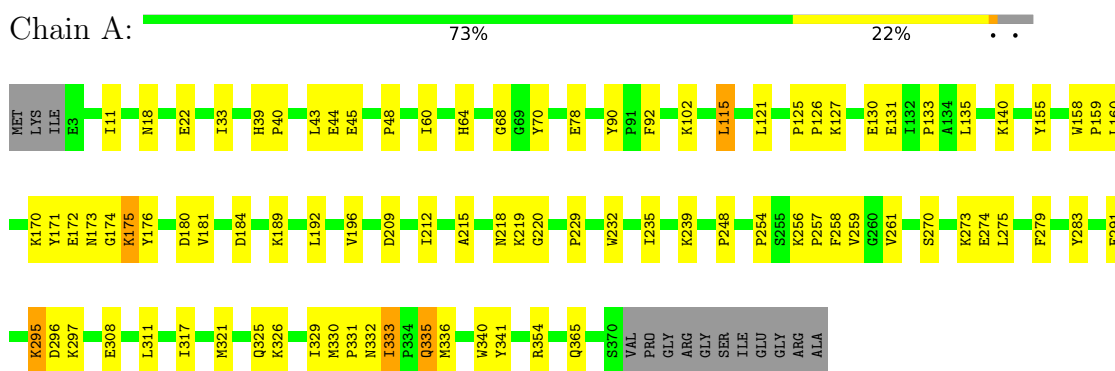
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	130	Total 130	O 130	0	0
4	B	26	Total 26	O 26	0	0
4	C	75	Total 75	O 75	0	0
4	D	1	Total 1	O 1	0	0

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

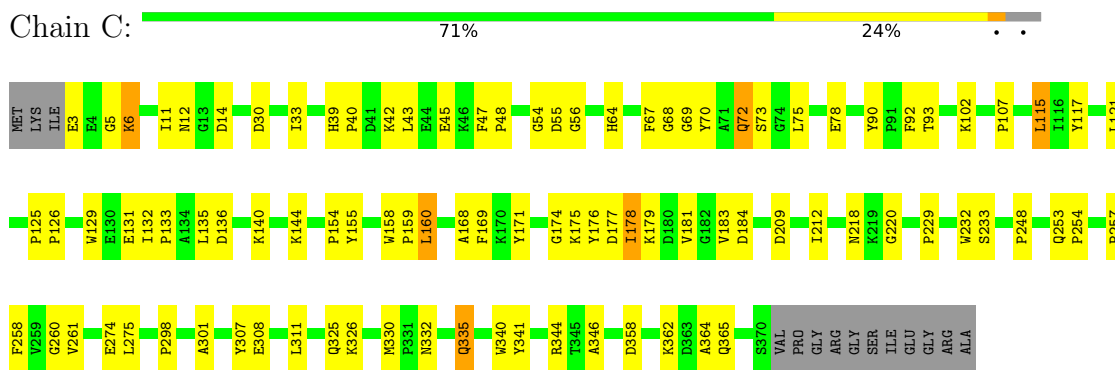
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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.

Note EDS was not executed.

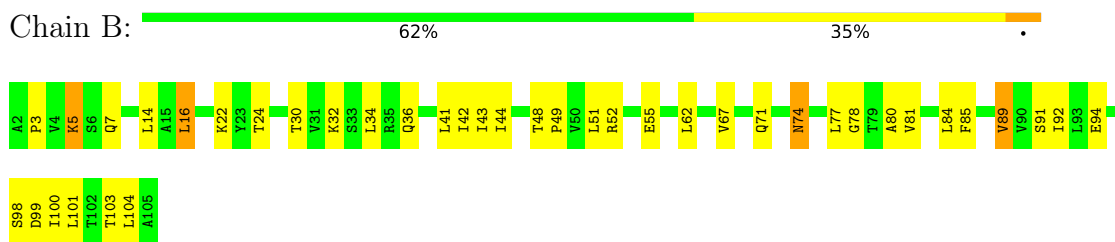
- Molecule 1: maltose-binding periplasmic protein



- Molecule 1: maltose-binding periplasmic protein

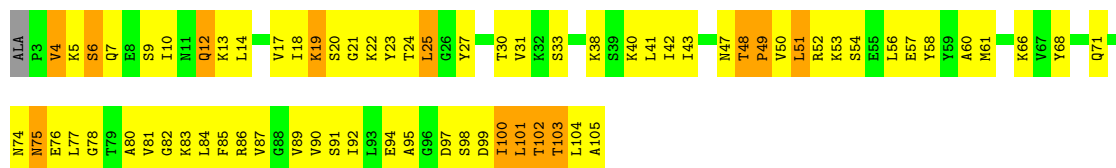


- Molecule 2: 60S ribosomal protein L30



- Molecule 2: 60S ribosomal protein L30

Chain D:  31% 56% 12%



- Molecule 3: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain E:  25% 75%



- Molecule 3: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain F:  25% 75%



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	79.65Å 118.39Å 153.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	18.00 – 2.31	Depositor
% Data completeness (in resolution range)	(Not available) (18.00-2.31)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS	Depositor
R, $R_{free}$	0.214 , 0.254	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	7593	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	50.0	wwPDB-VP

## 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: GLC

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	0.36	0/2912	0.59	0/3955
1	C	0.34	0/2912	0.57	0/3955
2	B	0.36	0/804	0.66	0/1080
2	D	0.31	0/799	0.54	0/1072
All	All	0.35	0/7427	0.59	0/10062

There are no bond length outliers.

There are no bond angle outliers.

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	2843	0	2801	78	0
1	C	2843	0	2801	91	0
2	B	795	0	850	36	0
2	D	790	0	846	105	0
3	E	45	0	38	7	0
3	F	45	0	39	7	0
4	A	130	0	0	4	0
4	B	26	0	0	0	0
4	C	75	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	1	0	0	0	0
All	All	7593	0	7375	302	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 20.

The worst 5 of 302 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:155:TYR:HB2	3:E:3:GLC:H62	1.28	1.14
2:D:20:SER:HB2	2:D:97:ASP:H	1.20	1.06
1:C:335:GLN:H	1:C:335:GLN:NE2	1.60	0.99
1:A:64:HIS:HD2	1:A:261:VAL:H	1.12	0.97
1:C:155:TYR:HB2	3:F:3:GLC:H62	1.47	0.96

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	366/382 (96%)	355 (97%)	10 (3%)	1 (0%)	41	50
1	C	366/382 (96%)	346 (94%)	19 (5%)	1 (0%)	41	50
2	B	102/104 (98%)	96 (94%)	5 (5%)	1 (1%)	15	17
2	D	101/104 (97%)	80 (79%)	13 (13%)	8 (8%)	1	0
All	All	935/972 (96%)	877 (94%)	47 (5%)	11 (1%)	13	13

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	49	PRO

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Mol	Chain	Res	Type
2	D	4	VAL
2	D	48	THR
2	D	102	THR
1	A	173	ASN

### 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	293/305 (96%)	283 (97%)	10 (3%)	37	51
1	C	293/305 (96%)	283 (97%)	10 (3%)	37	51
2	B	87/87 (100%)	79 (91%)	8 (9%)	9	10
2	D	87/87 (100%)	81 (93%)	6 (7%)	15	20
All	All	760/784 (97%)	726 (96%)	34 (4%)	27	38

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

Mol	Chain	Res	Type
2	D	12	GLN
2	D	19	LYS
2	D	100	ILE
2	B	34	LEU
2	B	16	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 23 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	173	ASN
1	C	325	GLN
1	C	218	ASN
1	C	335	GLN
1	A	335	GLN

### 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](#)

8 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	GLC	E	1	3	12,12,12	0.97	1 (8%)	17,17,17	2.11	5 (29%)
3	GLC	E	2	3	11,11,12	1.20	1 (9%)	15,15,17	3.41	8 (53%)
3	GLC	E	3	3	11,11,12	1.15	1 (9%)	15,15,17	3.38	9 (60%)
3	GLC	E	4	3	11,11,12	1.33	1 (9%)	15,15,17	2.53	5 (33%)
3	GLC	F	1	3	12,12,12	0.97	1 (8%)	17,17,17	2.10	5 (29%)
3	GLC	F	2	3	11,11,12	1.30	1 (9%)	15,15,17	3.41	8 (53%)
3	GLC	F	3	3	11,11,12	1.18	1 (9%)	15,15,17	3.29	8 (53%)
3	GLC	F	4	3	11,11,12	1.23	2 (18%)	15,15,17	2.30	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
3	GLC	E	1	3	-	2/2/22/22	0/1/1/1
3	GLC	E	2	3	-	2/2/19/22	0/1/1/1
3	GLC	E	3	3	-	0/2/19/22	0/1/1/1
3	GLC	E	4	3	-	0/2/19/22	0/1/1/1
3	GLC	F	1	3	-	0/2/22/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GLC	F	2	3	-	2/2/19/22	0/1/1/1
3	GLC	F	3	3	-	0/2/19/22	0/1/1/1
3	GLC	F	4	3	-	0/2/19/22	0/1/1/1

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	4	GLC	O4-C4	-2.98	1.36	1.43
3	F	4	GLC	O4-C4	-2.58	1.36	1.43
3	E	2	GLC	C4-C3	2.47	1.58	1.52
3	F	2	GLC	C4-C3	2.40	1.58	1.52
3	E	1	GLC	O3-C3	2.32	1.48	1.43

The worst 5 of 52 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	2	GLC	C1-O5-C5	8.64	123.90	112.19
3	E	2	GLC	C1-O5-C5	8.54	123.77	112.19
3	E	3	GLC	C1-O5-C5	7.43	122.26	112.19
3	F	3	GLC	C1-O5-C5	7.04	121.73	112.19
3	E	3	GLC	O2-C2-C3	5.64	121.44	110.14

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	E	2	GLC	O5-C5-C6-O6
3	F	2	GLC	O5-C5-C6-O6
3	E	2	GLC	C4-C5-C6-O6
3	F	2	GLC	C4-C5-C6-O6
3	E	1	GLC	O5-C5-C6-O6

There are no ring outliers.

6 monomers are involved in 14 short contacts:

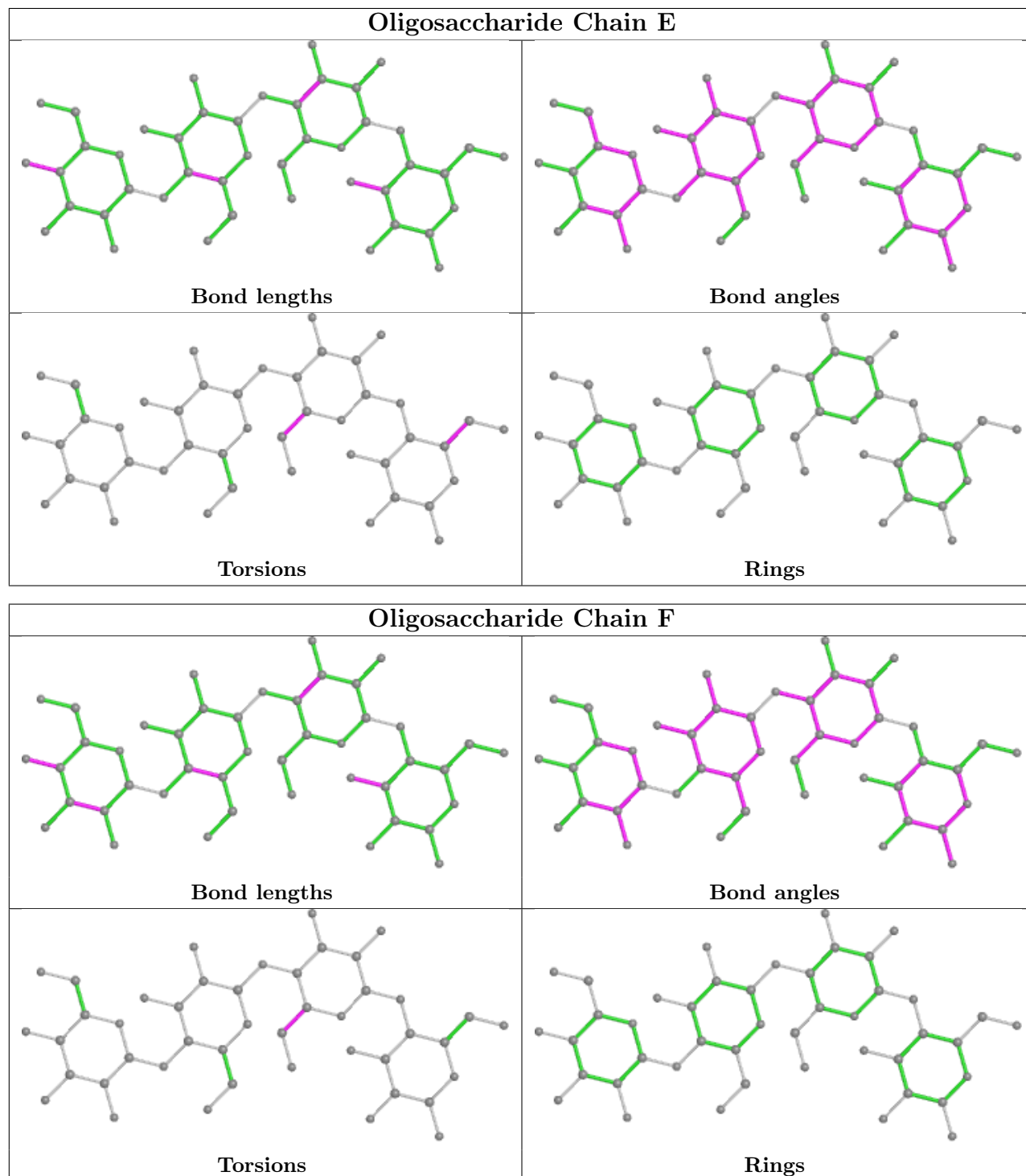
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	F	3	GLC	3	0
3	E	1	GLC	1	0
3	E	2	GLC	3	0
3	F	2	GLC	2	0
3	F	1	GLC	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	3	GLC	3	0

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



## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.