



## wwPDB EM Validation Summary Report ⓘ

Nov 20, 2022 – 02:56 pm GMT

PDB ID : 5LDF  
EMDB ID : EMD-4039  
Title : Maltose binding protein genetically fused to dodecameric glutamine synthetase  
Authors : Coscia, F.; Petosa, C.; Schoehn, G.  
Deposited on : 2016-06-25  
Resolution : 6.20 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](mailto: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>.

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

EMDB validation analysis : 0.0.1.dev43  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.2

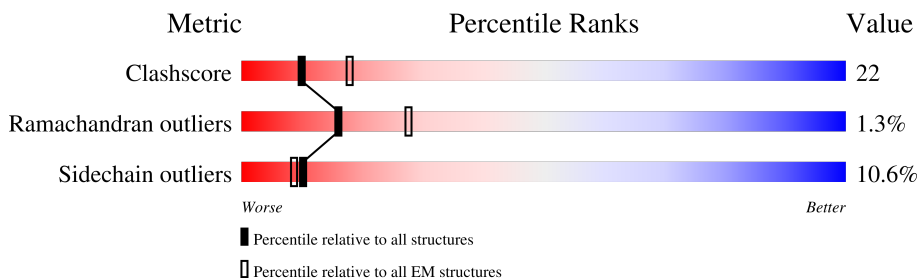
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 6.20 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.




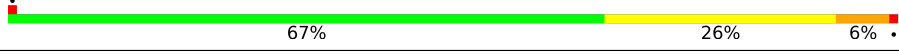

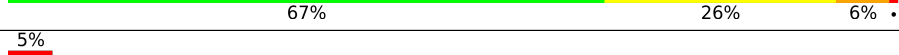
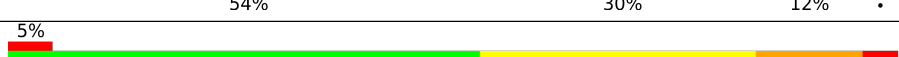
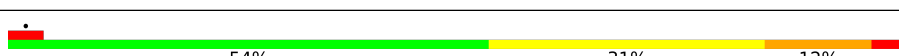








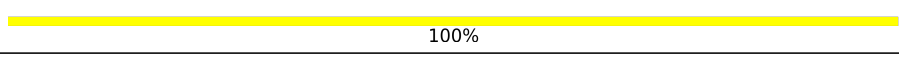
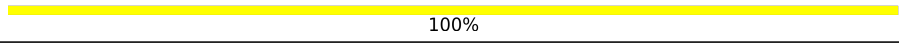
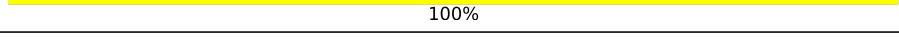
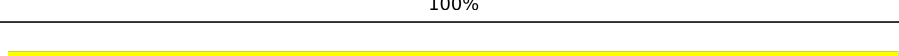
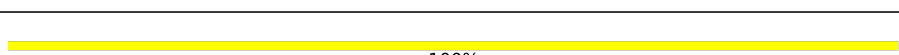
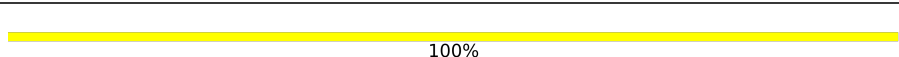
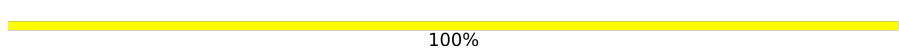
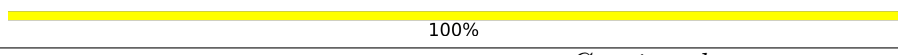



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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  $\geq 3$ , 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  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	466	
1	B	466	
1	C	466	
1	D	466	
1	E	466	
1	F	466	
1	G	466	
1	H	466	

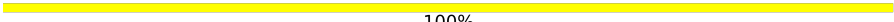
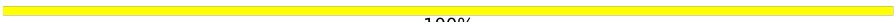

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Mol	Chain	Length	Quality of chain
1	I	466	 67% 26% 6%
1	J	466	 67% 26% 6%
1	K	466	 67% 26% 6%
1	L	466	 67% 26% 6%
2	M	370	 5% 54% 30% 12%
2	N	370	 5% 53% 31% 12%
2	O	370	 5% 54% 31% 12%
2	P	370	 5% 52% 33% 11%
2	Q	370	 5% 54% 31% 11%
2	R	370	 5% 54% 31% 11%
2	S	370	 5% 54% 31% 11%
2	T	370	 5% 54% 31% 11%
2	U	370	 5% 53% 32% 11%
2	V	370	 5% 53% 32% 11%
2	W	370	 5% 54% 31% 12%
2	X	370	 5% 54% 31% 12%
3	Y	2	 100%
3	Z	2	 100%
3	a	2	 100%
3	b	2	 100%
3	c	2	 100%
3	d	2	 100%
3	e	2	 100%
3	f	2	 100%
3	g	2	 100%

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Mol	Chain	Length	Quality of chain
3	h	2	 100%
3	i	2	 100%
3	j	2	 100%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 78120 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 Glutamine synthetase.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	466	3626	2295	622	689	20	0	0
1	B	466	3626	2295	622	689	20	0	0
1	C	466	3626	2295	622	689	20	0	0
1	D	466	3626	2295	622	689	20	0	0
1	E	466	3626	2295	622	689	20	0	0
1	F	466	3626	2295	622	689	20	0	0
1	G	466	3626	2295	622	689	20	0	0
1	H	466	3626	2295	622	689	20	0	0
1	I	466	3626	2295	622	689	20	0	0
1	J	466	3626	2295	622	689	20	0	0
1	K	466	3626	2295	622	689	20	0	0
1	L	466	3626	2295	622	689	20	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	391	PRO	ALA	conflict	UNP P0A1P7
B	391	PRO	ALA	conflict	UNP P0A1P7
C	391	PRO	ALA	conflict	UNP P0A1P7
D	391	PRO	ALA	conflict	UNP P0A1P7
E	391	PRO	ALA	conflict	UNP P0A1P7
F	391	PRO	ALA	conflict	UNP P0A1P7

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Chain	Residue	Modelled	Actual	Comment	Reference
G	391	PRO	ALA	conflict	UNP P0A1P7
H	391	PRO	ALA	conflict	UNP P0A1P7
I	391	PRO	ALA	conflict	UNP P0A1P7
J	391	PRO	ALA	conflict	UNP P0A1P7
K	391	PRO	ALA	conflict	UNP P0A1P7
L	391	PRO	ALA	conflict	UNP P0A1P7

- Molecule 2 is a protein called Maltose-binding periplasmic protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	M	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	N	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	O	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	P	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	Q	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	R	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	S	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	T	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	U	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	V	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	W	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		
2	X	370	Total	C	N	O	S	0	0
			2861	1843	468	544	6		

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

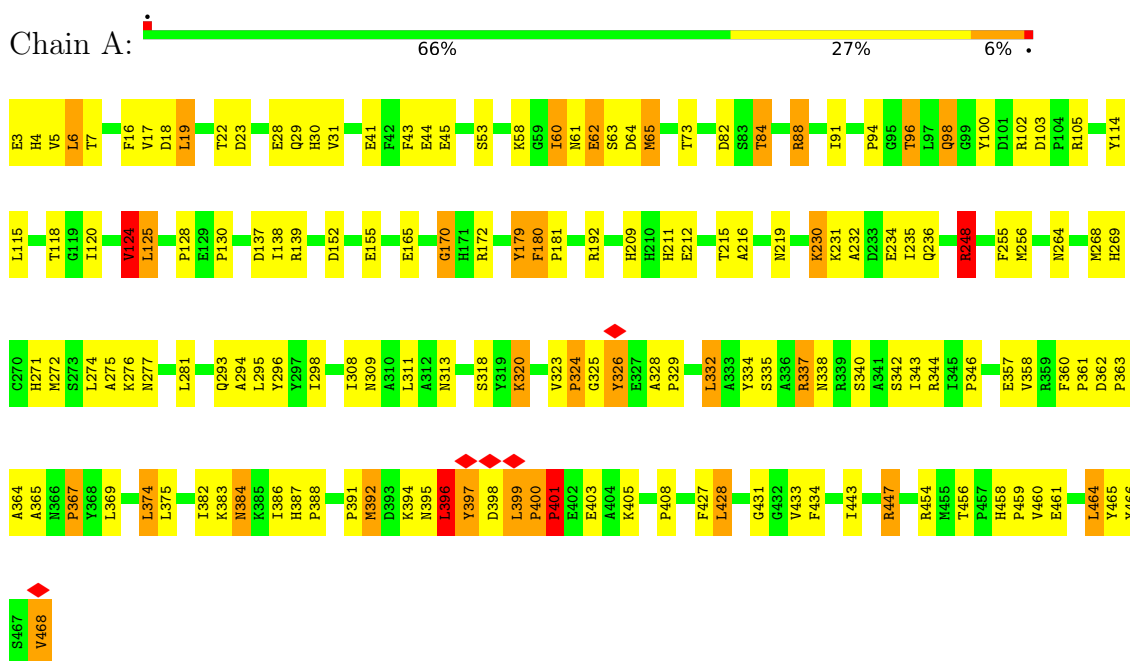


Mol	Chain	Residues	Atoms			AltConf	Trace
3	Y	2	Total 23	C 12	O 11	0	0
3	Z	2	Total 23	C 12	O 11	0	0
3	a	2	Total 23	C 12	O 11	0	0
3	b	2	Total 23	C 12	O 11	0	0
3	c	2	Total 23	C 12	O 11	0	0
3	d	2	Total 23	C 12	O 11	0	0
3	e	2	Total 23	C 12	O 11	0	0
3	f	2	Total 23	C 12	O 11	0	0
3	g	2	Total 23	C 12	O 11	0	0
3	h	2	Total 23	C 12	O 11	0	0
3	i	2	Total 23	C 12	O 11	0	0
3	j	2	Total 23	C 12	O 11	0	0

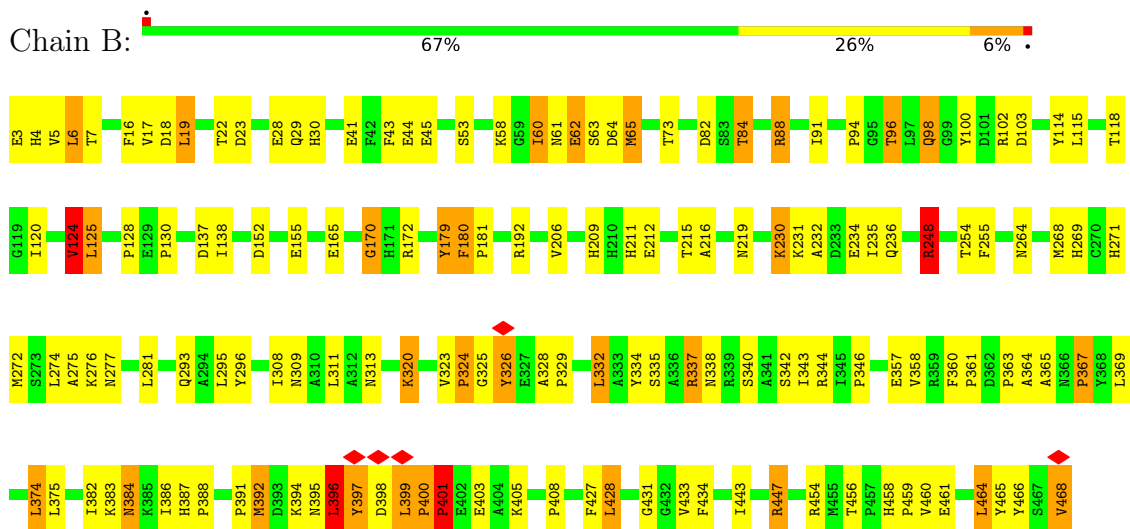
### 3 Residue-property plots

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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: Glutamine synthetase

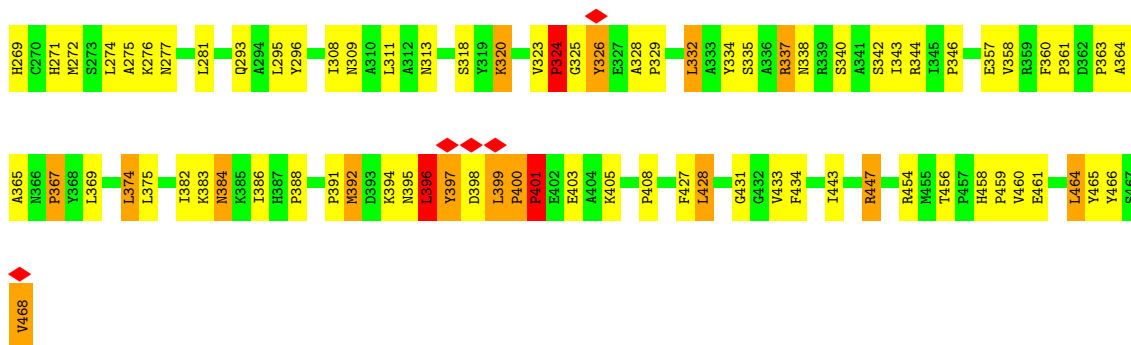


#### • Molecule 1: Glutamine synthetase

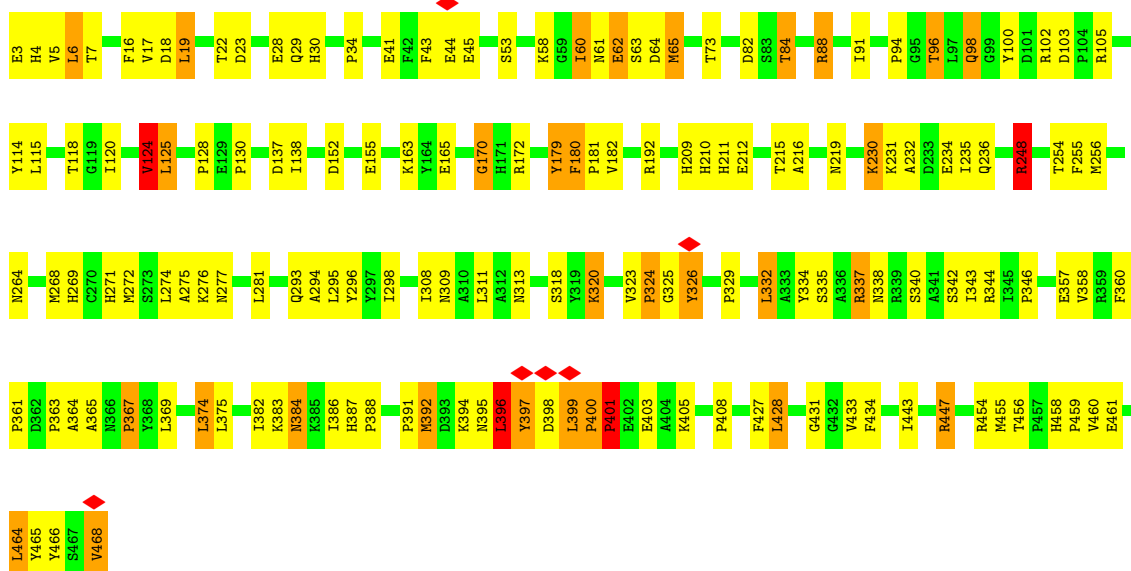




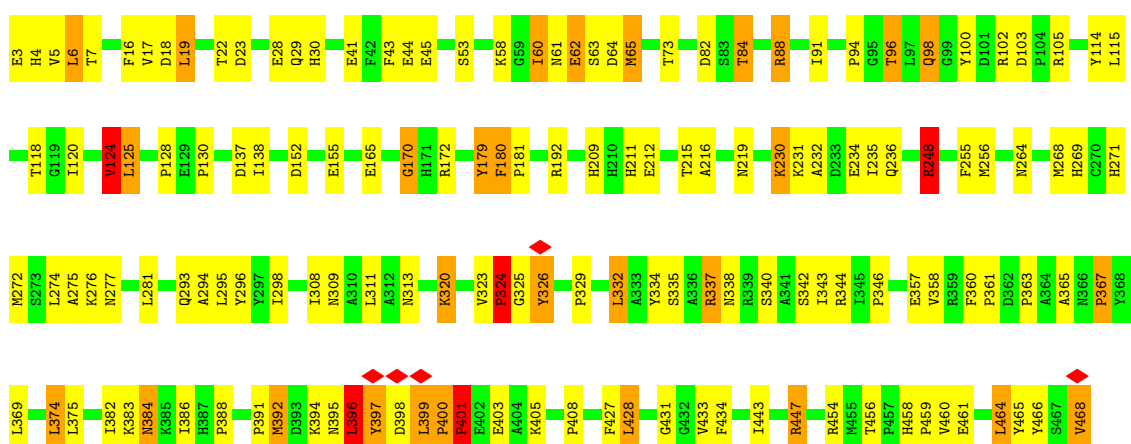




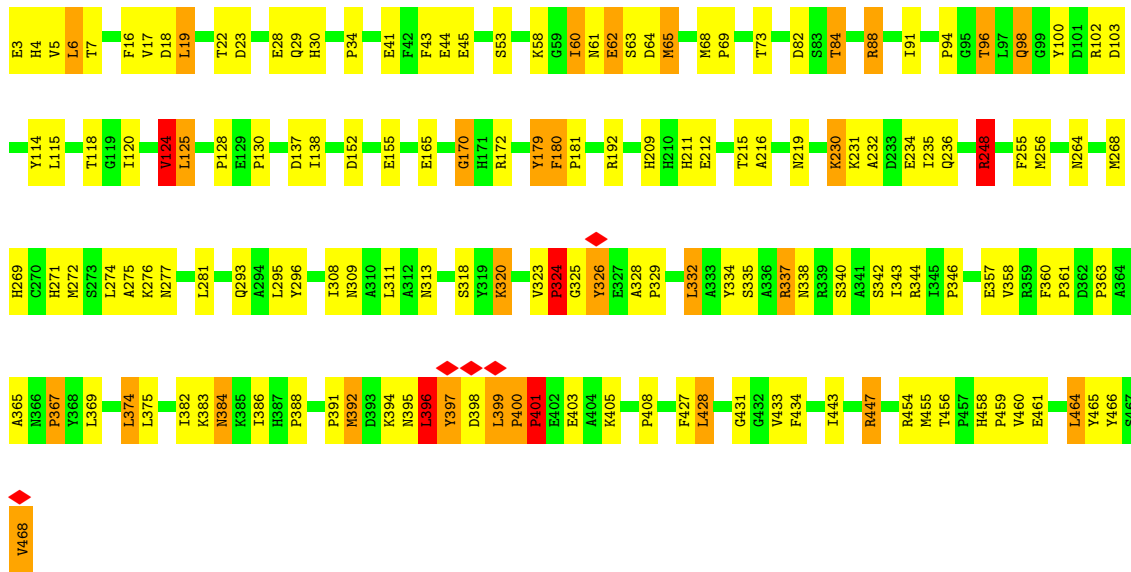
• Molecule 1: Glutamine synthetase



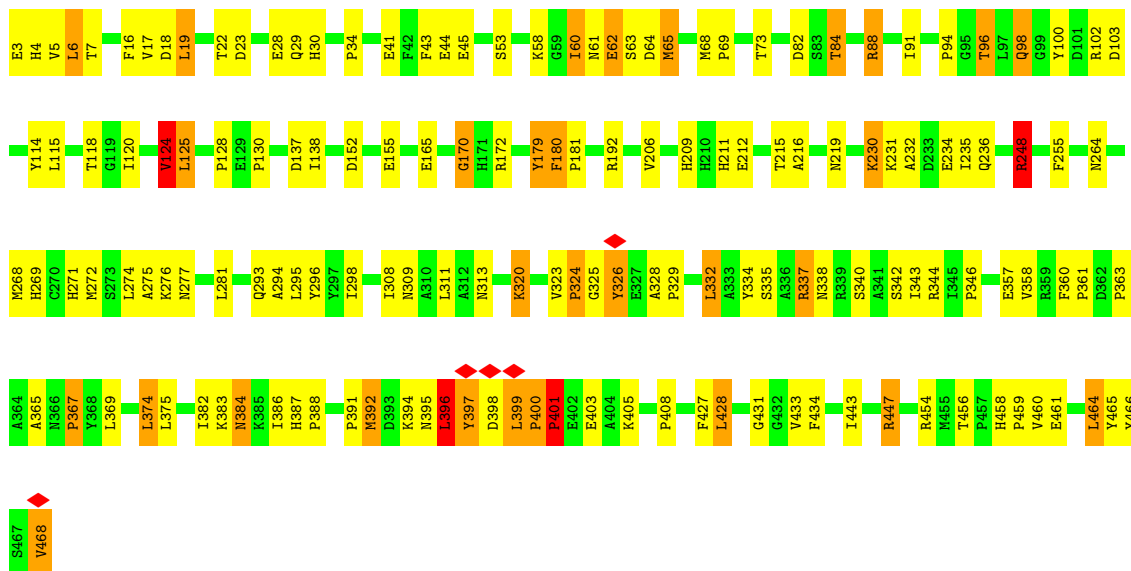
• Molecule 1: Glutamine synthetase



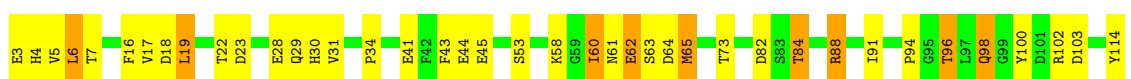
• Molecule 1: Glutamine synthetase

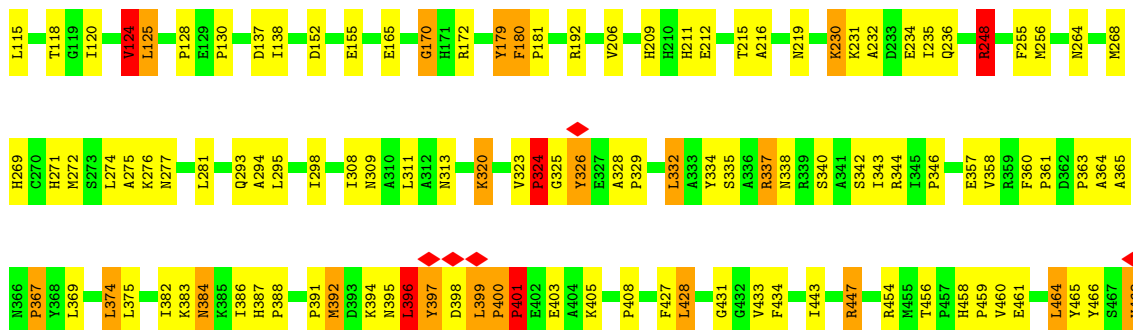


• Molecule 1: Glutamine synthetase

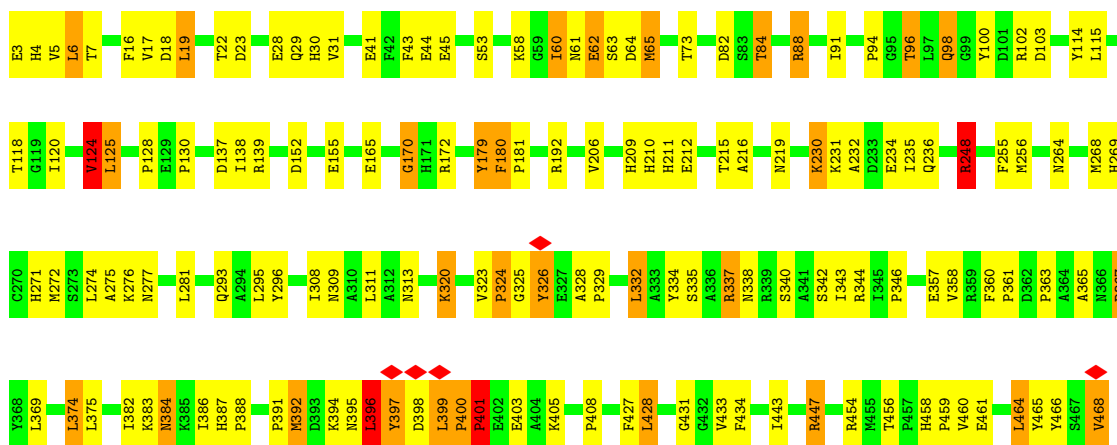


• Molecule 1: Glutamine synthetase

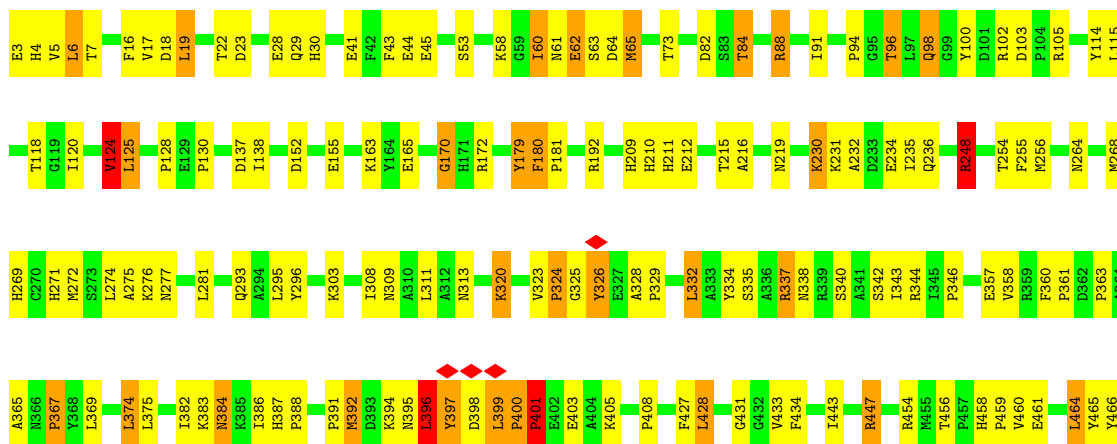




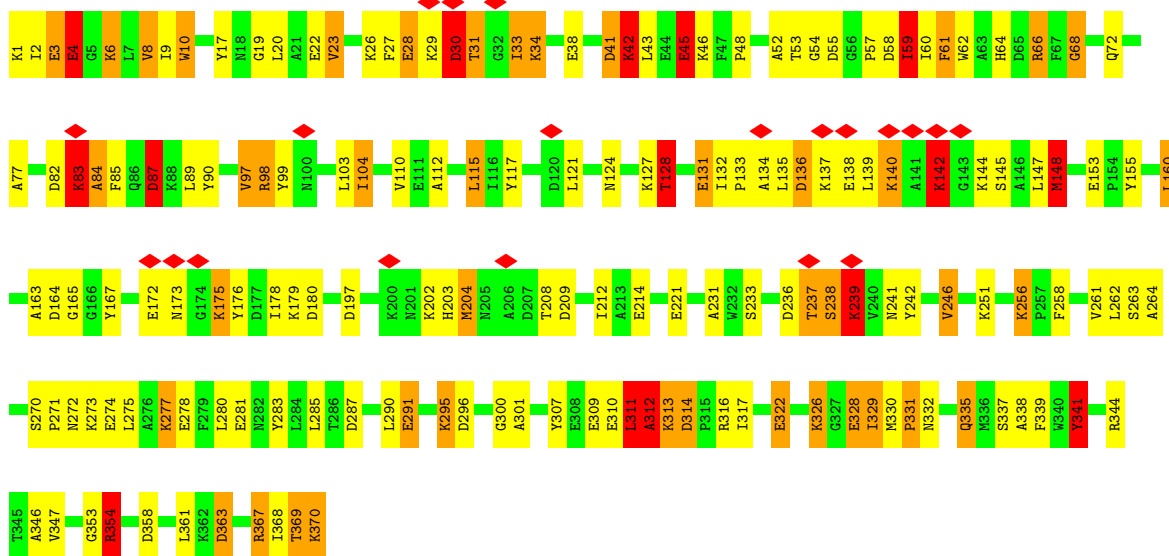
• Molecule 1: Glutamine synthetase



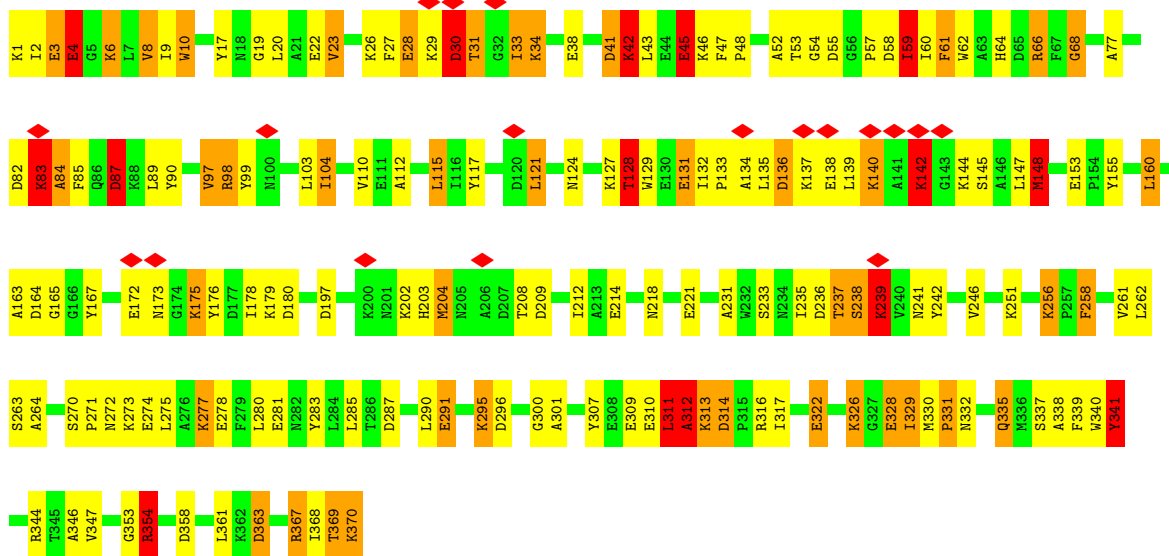
• Molecule 1: Glutamine synthetase



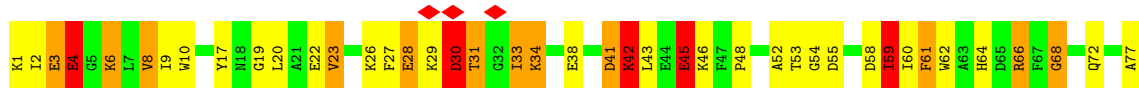
• Molecule 2: Maltose-binding periplasmic protein

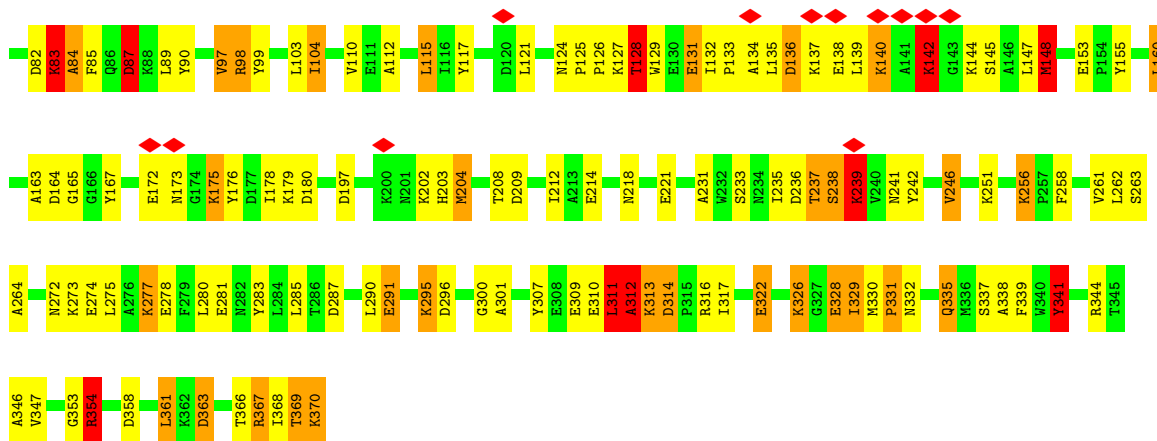


• Molecule 2: Maltose-binding periplasmic protein

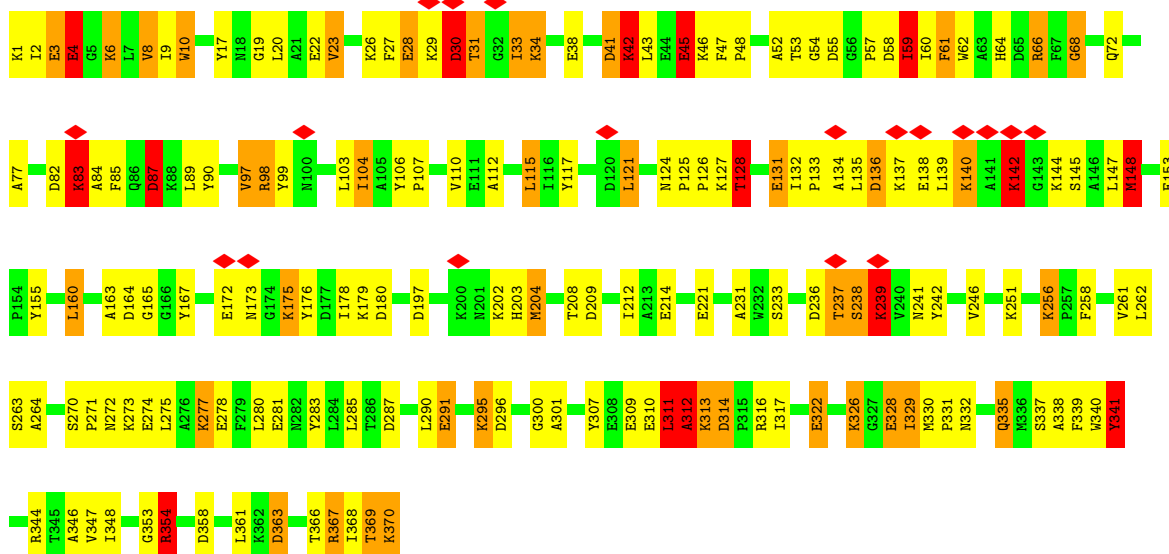


• Molecule 2: Maltose-binding periplasmic protein

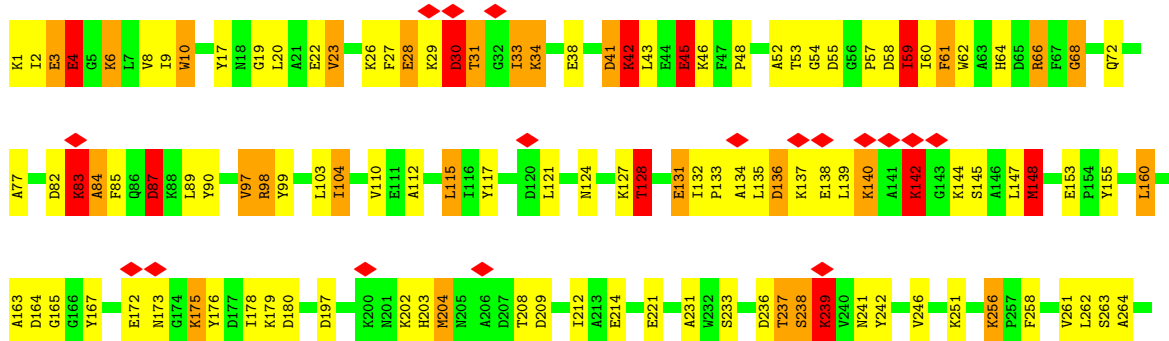


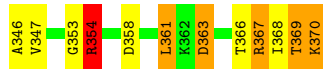


• Molecule 2: Maltose-binding periplasmic protein

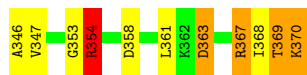
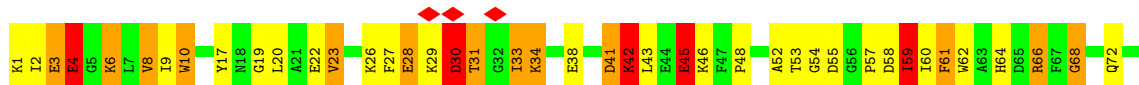


• Molecule 2: Maltose-binding periplasmic protein

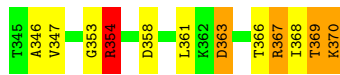
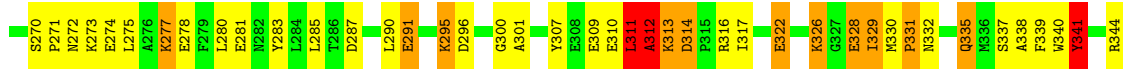
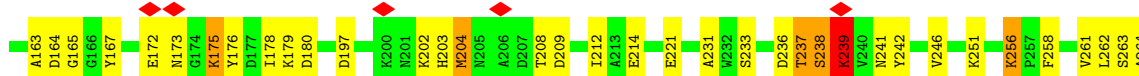




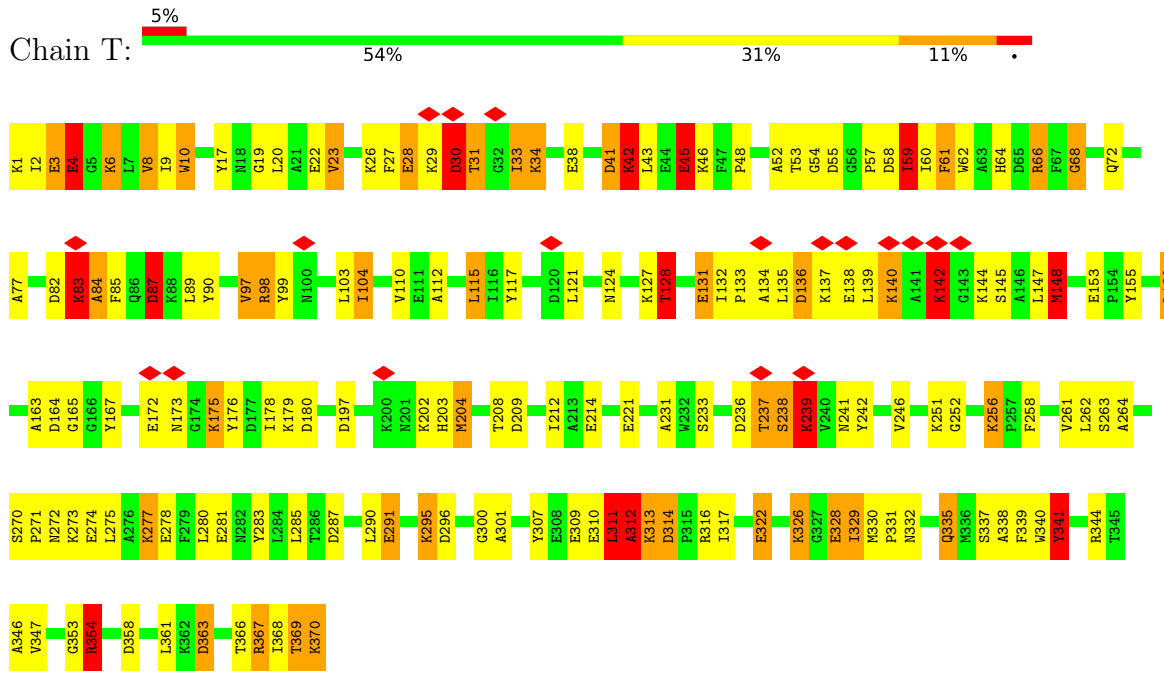
• Molecule 2: Maltose-binding periplasmic protein



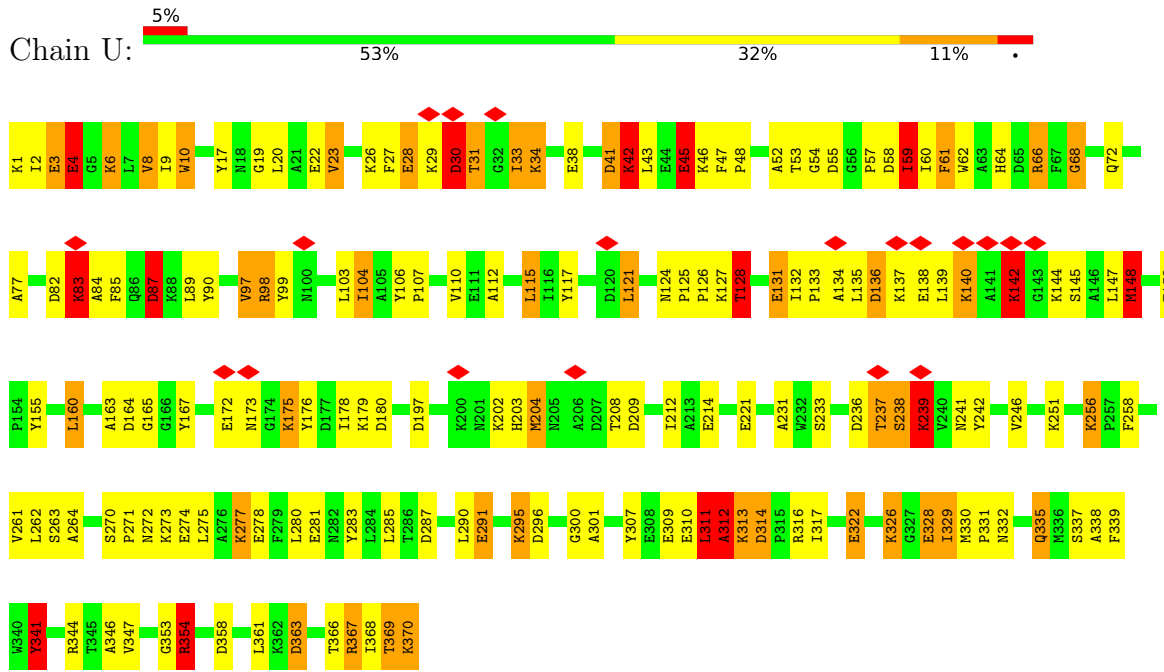
• Molecule 2: Maltose-binding periplasmic protein



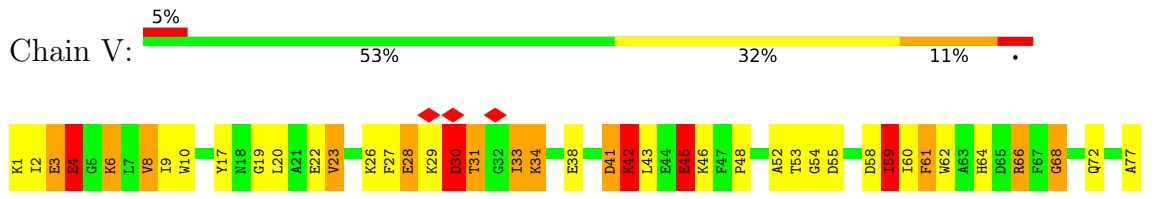
• Molecule 2: Maltose-binding periplasmic protein



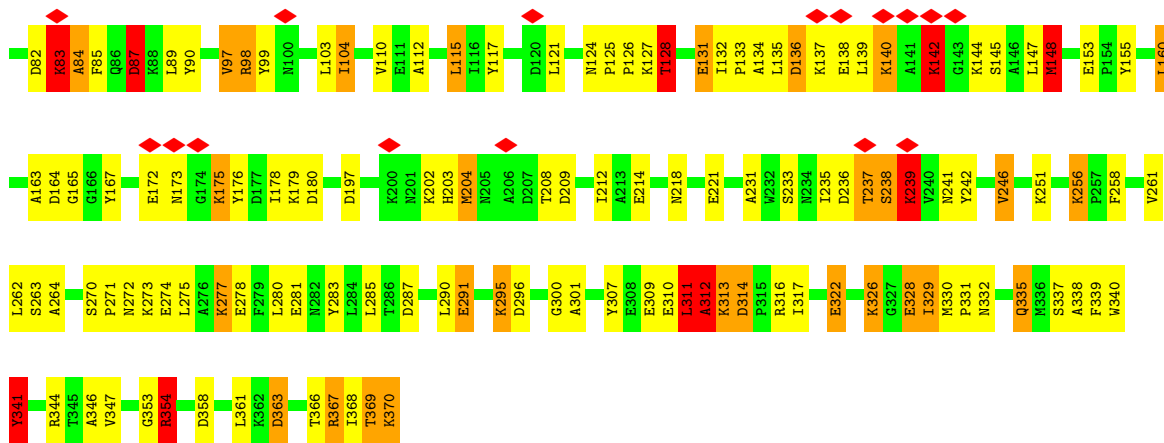
• Molecule 2: Maltose-binding periplasmic protein



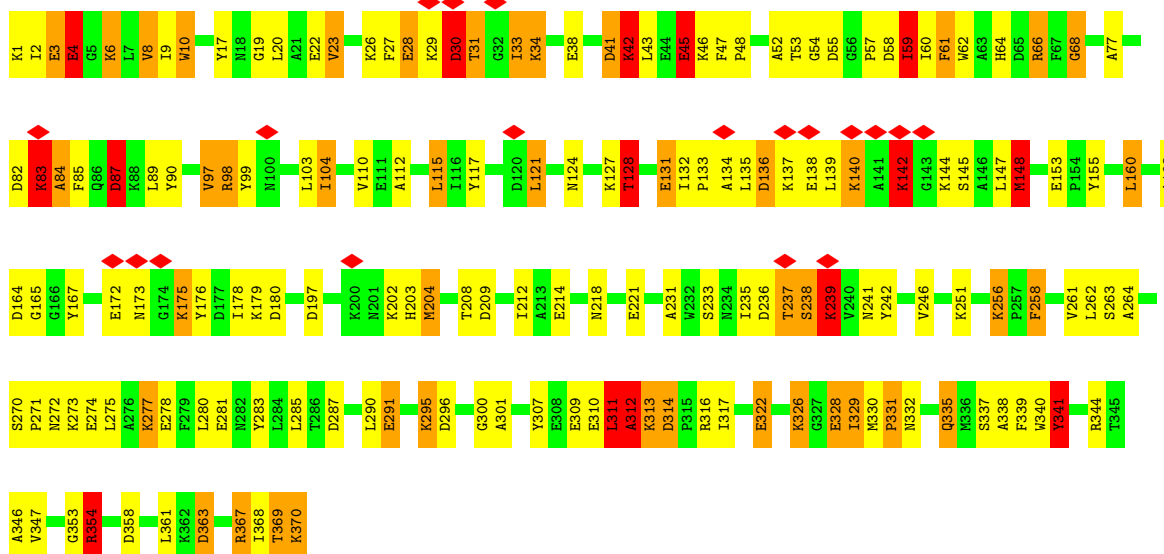
• Molecule 2: Maltose-binding periplasmic protein



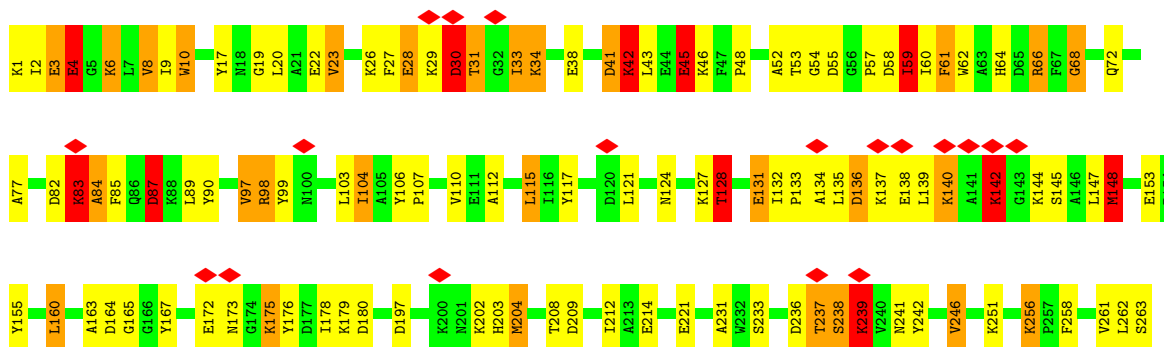


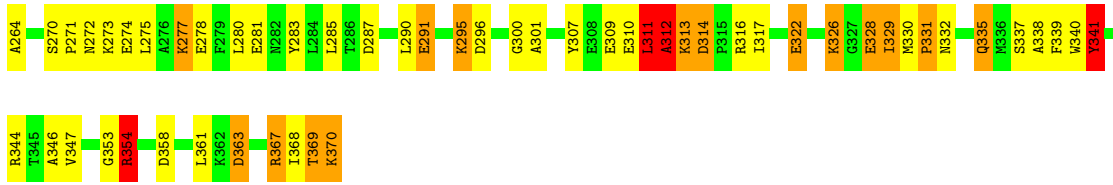


• Molecule 2: Maltose-binding periplasmic protein



• Molecule 2: Maltose-binding periplasmic protein






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

Chain Y:  100%


GLC1  
GLC2

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

Chain Z:  100%

GLC1  
GLC2

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

Chain a:  100%


GLC1  
GLC2

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

Chain b:  100%

GLC1  
GLC2

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

Chain c:  100%

GLC1  
GLC2

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

Chain d:  100%


GLC1  
GLC2

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

Chain e:  100%

GLC1  
GLC2

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

Chain f:  100%GLC1  
GLC2


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

Chain g:  100%GLC1  
GLC2


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

Chain h:  100%GLC1  
GLC2

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

Chain i:  100%GLC1  
GLC2

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

Chain j:  100%GLC1  
GLC2

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, D6	Depositor
Number of particles used	13847	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	FEI TECNAI F30	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	25	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.009	Depositor
Minimum map value	-0.003	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.0015	Depositor
Map size ( $\text{\AA}$ )	326.2, 326.2, 326.2	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.8155, 0.8155, 0.8155	Depositor

## 5 Model quality

### 5.1 Standard geometry

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	0.53	0/3713	0.85	4/5028 (0.1%)
1	B	0.53	0/3713	0.85	4/5028 (0.1%)
1	C	0.53	0/3713	0.85	4/5028 (0.1%)
1	D	0.53	0/3713	0.85	4/5028 (0.1%)
1	E	0.53	0/3713	0.85	4/5028 (0.1%)
1	F	0.53	0/3713	0.85	4/5028 (0.1%)
1	G	0.53	0/3713	0.85	4/5028 (0.1%)
1	H	0.53	0/3713	0.85	4/5028 (0.1%)
1	I	0.53	0/3713	0.85	4/5028 (0.1%)
1	J	0.53	0/3713	0.85	4/5028 (0.1%)
1	K	0.53	0/3713	0.85	4/5028 (0.1%)
1	L	0.53	0/3713	0.85	4/5028 (0.1%)
2	M	1.51	12/2930 (0.4%)	2.43	146/3979 (3.7%)
2	N	1.51	11/2930 (0.4%)	2.43	146/3979 (3.7%)
2	O	1.51	11/2930 (0.4%)	2.43	147/3979 (3.7%)
2	P	1.51	11/2930 (0.4%)	2.43	145/3979 (3.6%)
2	Q	1.51	11/2930 (0.4%)	2.43	144/3979 (3.6%)
2	R	1.51	13/2930 (0.4%)	2.43	148/3979 (3.7%)
2	S	1.51	11/2930 (0.4%)	2.43	146/3979 (3.7%)
2	T	1.51	12/2930 (0.4%)	2.43	147/3979 (3.7%)
2	U	1.51	11/2930 (0.4%)	2.43	145/3979 (3.6%)
2	V	1.51	11/2930 (0.4%)	2.43	146/3979 (3.7%)
2	W	1.51	11/2930 (0.4%)	2.43	146/3979 (3.7%)
2	X	1.51	12/2930 (0.4%)	2.43	145/3979 (3.6%)
All	All	1.08	137/79716 (0.2%)	1.74	1799/108084 (1.7%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	M	0	2
2	N	0	2
2	O	0	2
2	P	0	2
2	Q	0	2
2	R	0	2
2	S	0	2
2	T	0	2
2	U	0	2
2	V	0	2
2	W	0	2
2	X	0	2
All	All	0	24

The worst 5 of 137 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	M	369	THR	C-N	15.02	1.68	1.34
2	O	369	THR	C-N	14.75	1.68	1.34
2	T	369	THR	C-N	14.75	1.68	1.34
2	P	369	THR	C-N	14.75	1.68	1.34
2	Q	369	THR	C-N	14.74	1.68	1.34

The worst 5 of 1799 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	P	354	ARG	NE-CZ-NH1	40.58	140.59	120.30
2	N	354	ARG	NE-CZ-NH1	40.56	140.58	120.30
2	S	354	ARG	NE-CZ-NH1	40.55	140.57	120.30
2	R	354	ARG	NE-CZ-NH1	40.53	140.56	120.30
2	T	354	ARG	NE-CZ-NH1	40.52	140.56	120.30

There are no chirality outliers.

5 of 24 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	M	312	ALA	Peptide
2	M	354	ARG	Sidechain
2	N	312	ALA	Peptide
2	N	354	ARG	Sidechain
2	O	312	ALA	Peptide

## 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	3626	0	3531	193	0
1	B	3626	0	3531	187	0
1	C	3626	0	3531	183	0
1	D	3626	0	3531	194	0
1	E	3626	0	3531	187	0
1	F	3626	0	3531	193	0
1	G	3626	0	3531	190	0
1	H	3626	0	3531	192	0
1	I	3626	0	3531	189	0
1	J	3626	0	3531	192	0
1	K	3626	0	3531	188	0
1	L	3626	0	3531	193	0
2	M	2861	0	2826	144	0
2	N	2861	0	2826	152	0
2	O	2861	0	2826	149	0
2	P	2861	0	2826	155	0
2	Q	2861	0	2826	149	0
2	R	2861	0	2826	147	0
2	S	2861	0	2826	152	0
2	T	2861	0	2826	146	0
2	U	2861	0	2826	153	0
2	V	2861	0	2826	151	0
2	W	2861	0	2826	152	0
2	X	2861	0	2826	144	0
3	Y	23	0	20	0	0
3	Z	23	0	20	0	0
3	a	23	0	20	0	0
3	b	23	0	20	0	0
3	c	23	0	20	0	0
3	d	23	0	20	0	0
3	e	23	0	20	0	0
3	f	23	0	20	0	0
3	g	23	0	20	0	0
3	h	23	0	20	0	0
3	i	23	0	20	0	0
3	j	23	0	20	0	0
All	All	78120	0	76524	3377	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 22.

The worst 5 of 3377 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:K:43:PHE:HB3	2:W:370:LYS:CE	1.36	1.55
1:B:43:PHE:HB3	2:N:370:LYS:CE	1.36	1.55
1:L:43:PHE:HB3	2:X:370:LYS:CE	1.36	1.54
1:A:43:PHE:HB3	2:M:370:LYS:CE	1.36	1.54
1:E:43:PHE:HB3	2:Q:370:LYS:CE	1.36	1.51

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	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	B	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	C	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	D	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	E	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	F	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	G	464/466 (100%)	425 (92%)	31 (7%)	8 (2%)	9	42
1	H	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	I	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	J	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	K	464/466 (100%)	424 (91%)	32 (7%)	8 (2%)	9	42
1	L	464/466 (100%)	425 (92%)	31 (7%)	8 (2%)	9	42

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	M	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	N	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	O	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	P	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	Q	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	R	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	S	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	T	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	U	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	V	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	W	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
2	X	368/370 (100%)	349 (95%)	16 (4%)	3 (1%)	19	60
All	All	9984/10032 (100%)	9278 (93%)	574 (6%)	132 (1%)	16	48

5 of 132 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	180	PHE
1	A	400	PRO
1	A	401	PRO
1	B	180	PHE
1	B	400	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 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	383/383 (100%)	348 (91%)	35 (9%)	9	30
1	B	383/383 (100%)	348 (91%)	35 (9%)	9	30
1	C	383/383 (100%)	348 (91%)	35 (9%)	9	30
1	D	383/383 (100%)	348 (91%)	35 (9%)	9	30

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	383/383 (100%)	347 (91%)	36 (9%)	8	28
1	F	383/383 (100%)	348 (91%)	35 (9%)	9	30
1	G	383/383 (100%)	347 (91%)	36 (9%)	8	28
1	H	383/383 (100%)	347 (91%)	36 (9%)	8	28
1	I	383/383 (100%)	348 (91%)	35 (9%)	9	30
1	J	383/383 (100%)	347 (91%)	36 (9%)	8	28
1	K	383/383 (100%)	348 (91%)	35 (9%)	9	30
1	L	383/383 (100%)	348 (91%)	35 (9%)	9	30
2	M	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	N	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	O	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	P	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	Q	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	R	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	S	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	T	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	U	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	V	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	W	292/297 (98%)	256 (88%)	36 (12%)	4	20
2	X	292/297 (98%)	256 (88%)	36 (12%)	4	20
All	All	8100/8160 (99%)	7244 (89%)	856 (11%)	10	24

5 of 856 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	N	31	THR
2	Q	42	LYS
2	W	128	THR
2	N	140	LYS
2	N	30	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 186 such sidechains are listed below:

Mol	Chain	Res	Type
1	K	244	ASN
2	O	203	HIS
1	K	384	ASN
1	L	384	ASN
2	Q	49	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](#)

24 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	Y	1	3	12,12,12	1.20	1 (8%)	17,17,17	2.25	5 (29%)
3	GLC	Y	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.47	1 (6%)
3	GLC	Z	1	3	12,12,12	1.20	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	Z	2	3	11,11,12	1.57	1 (9%)	15,15,17	1.46	1 (6%)
3	GLC	a	1	3	12,12,12	1.20	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	a	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.47	1 (6%)
3	GLC	b	1	3	12,12,12	1.19	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	b	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.48	1 (6%)
3	GLC	c	1	3	12,12,12	1.19	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	c	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.48	1 (6%)
3	GLC	d	1	3	12,12,12	1.20	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	d	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.48	1 (6%)

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	1.19	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	e	2	3	11,11,12	1.57	1 (9%)	15,15,17	1.47	1 (6%)
3	GLC	f	1	3	12,12,12	1.19	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	f	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.47	1 (6%)
3	GLC	g	1	3	12,12,12	1.19	1 (8%)	17,17,17	2.25	5 (29%)
3	GLC	g	2	3	11,11,12	1.59	1 (9%)	15,15,17	1.48	1 (6%)
3	GLC	h	1	3	12,12,12	1.19	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	h	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.47	1 (6%)
3	GLC	i	1	3	12,12,12	1.18	1 (8%)	17,17,17	2.25	5 (29%)
3	GLC	i	2	3	11,11,12	1.58	1 (9%)	15,15,17	1.47	1 (6%)
3	GLC	j	1	3	12,12,12	1.20	1 (8%)	17,17,17	2.26	5 (29%)
3	GLC	j	2	3	11,11,12	1.59	1 (9%)	15,15,17	1.47	1 (6%)

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	Y	1	3	-	0/2/22/22	0/1/1/1
3	GLC	Y	2	3	-	0/2/19/22	0/1/1/1
3	GLC	Z	1	3	-	0/2/22/22	0/1/1/1
3	GLC	Z	2	3	-	0/2/19/22	0/1/1/1
3	GLC	a	1	3	-	0/2/22/22	0/1/1/1
3	GLC	a	2	3	-	0/2/19/22	0/1/1/1
3	GLC	b	1	3	-	0/2/22/22	0/1/1/1
3	GLC	b	2	3	-	0/2/19/22	0/1/1/1
3	GLC	c	1	3	-	0/2/22/22	0/1/1/1
3	GLC	c	2	3	-	0/2/19/22	0/1/1/1
3	GLC	d	1	3	-	0/2/22/22	0/1/1/1
3	GLC	d	2	3	-	0/2/19/22	0/1/1/1
3	GLC	e	1	3	-	0/2/22/22	0/1/1/1
3	GLC	e	2	3	-	0/2/19/22	0/1/1/1
3	GLC	f	1	3	-	0/2/22/22	0/1/1/1
3	GLC	f	2	3	-	0/2/19/22	0/1/1/1
3	GLC	g	1	3	-	0/2/22/22	0/1/1/1
3	GLC	g	2	3	-	0/2/19/22	0/1/1/1
3	GLC	h	1	3	-	0/2/22/22	0/1/1/1
3	GLC	h	2	3	-	0/2/19/22	0/1/1/1
3	GLC	i	1	3	-	0/2/22/22	0/1/1/1

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

The worst 5 of 24 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	g	2	GLC	O5-C1	-4.19	1.37	1.43
3	j	2	GLC	O5-C1	-4.19	1.37	1.43
3	c	2	GLC	O5-C1	-4.17	1.37	1.43
3	f	2	GLC	O5-C1	-4.16	1.37	1.43
3	h	2	GLC	O5-C1	-4.16	1.37	1.43

The worst 5 of 72 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	a	1	GLC	C1-O5-C5	6.22	125.41	113.66
3	Z	1	GLC	C1-O5-C5	6.21	125.38	113.66
3	d	1	GLC	C1-O5-C5	6.21	125.38	113.66
3	j	1	GLC	C1-O5-C5	6.21	125.37	113.66
3	c	1	GLC	C1-O5-C5	6.20	125.36	113.66

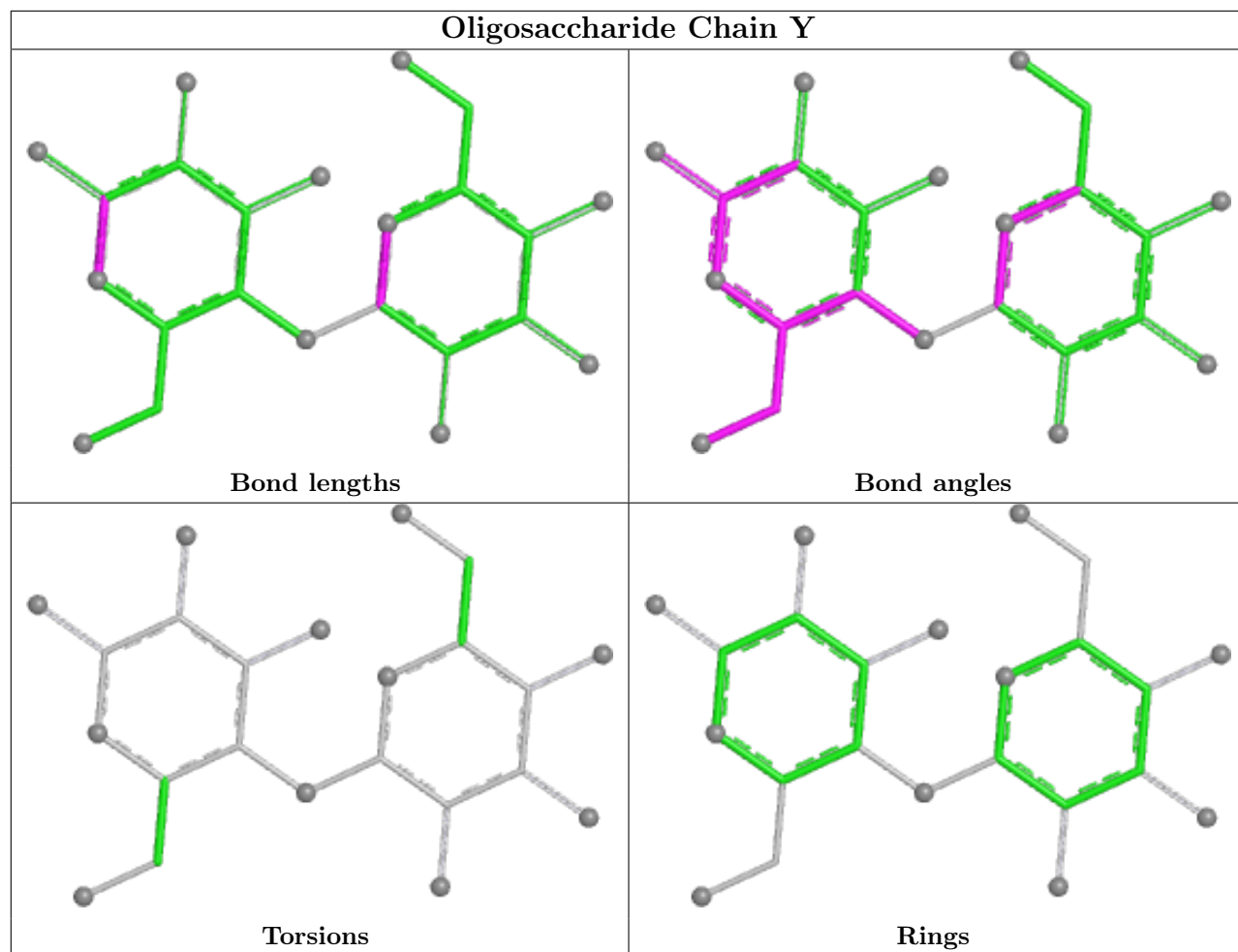
There are no chirality outliers.

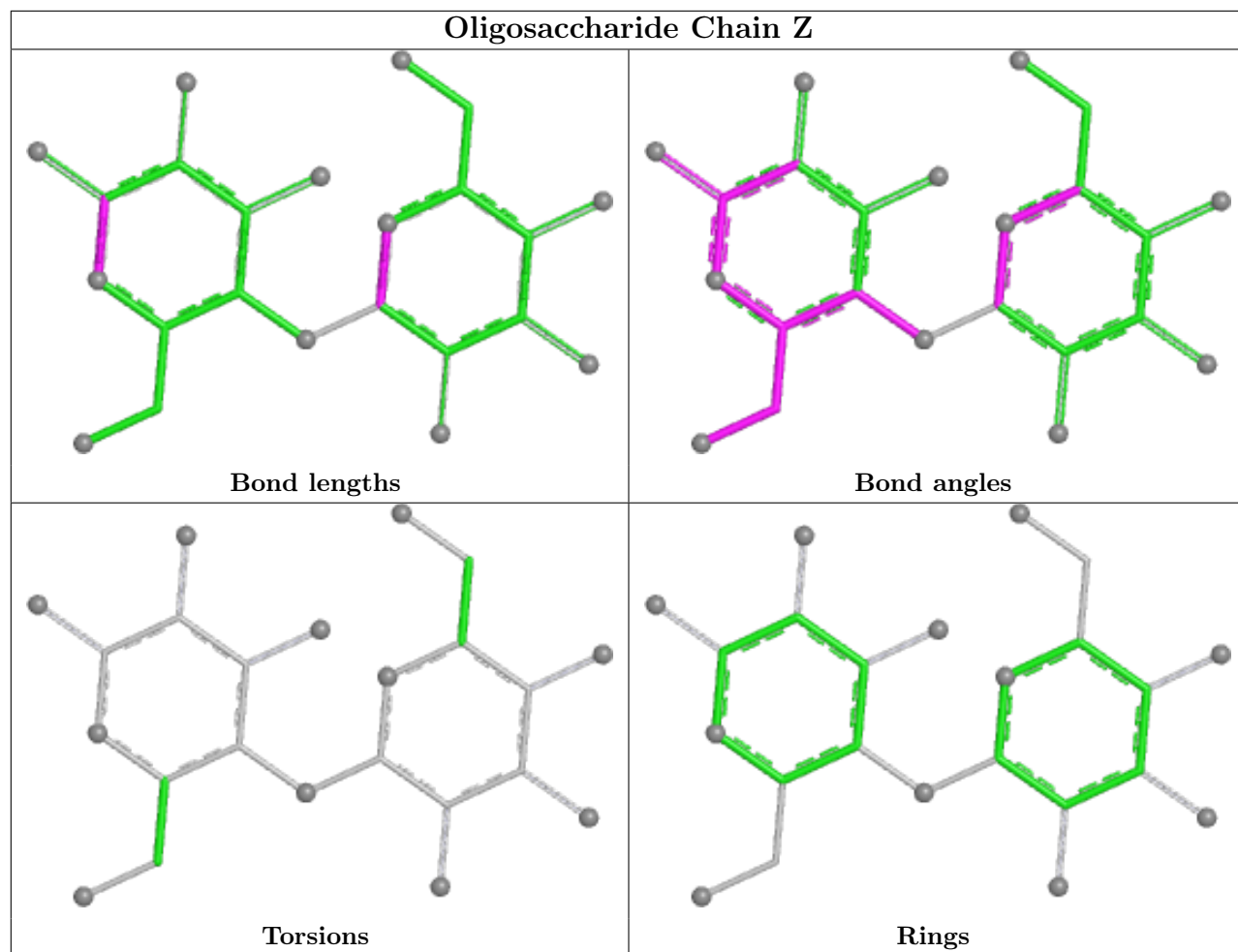
There are no torsion outliers.

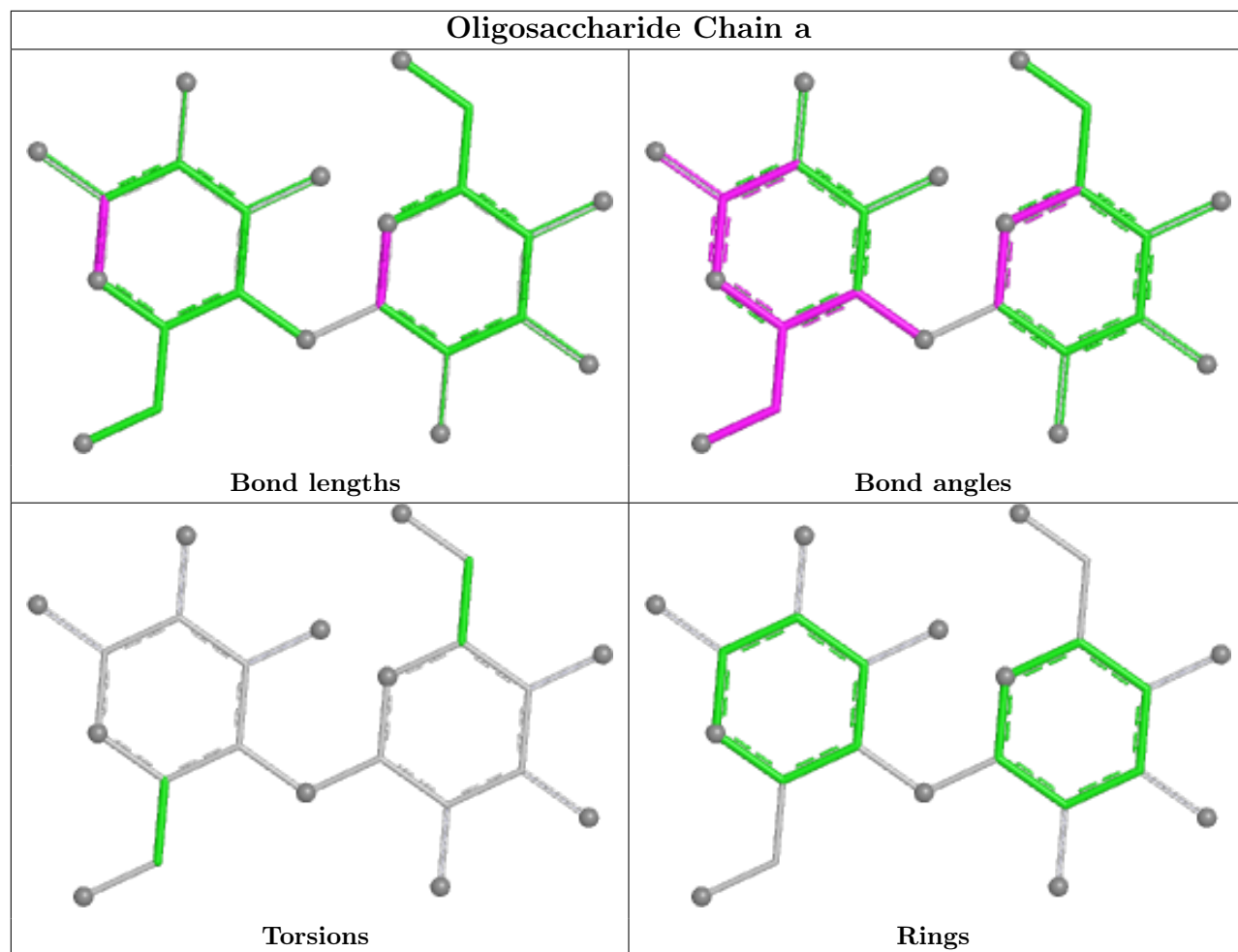
There are no ring outliers.

No monomer is involved in short contacts.

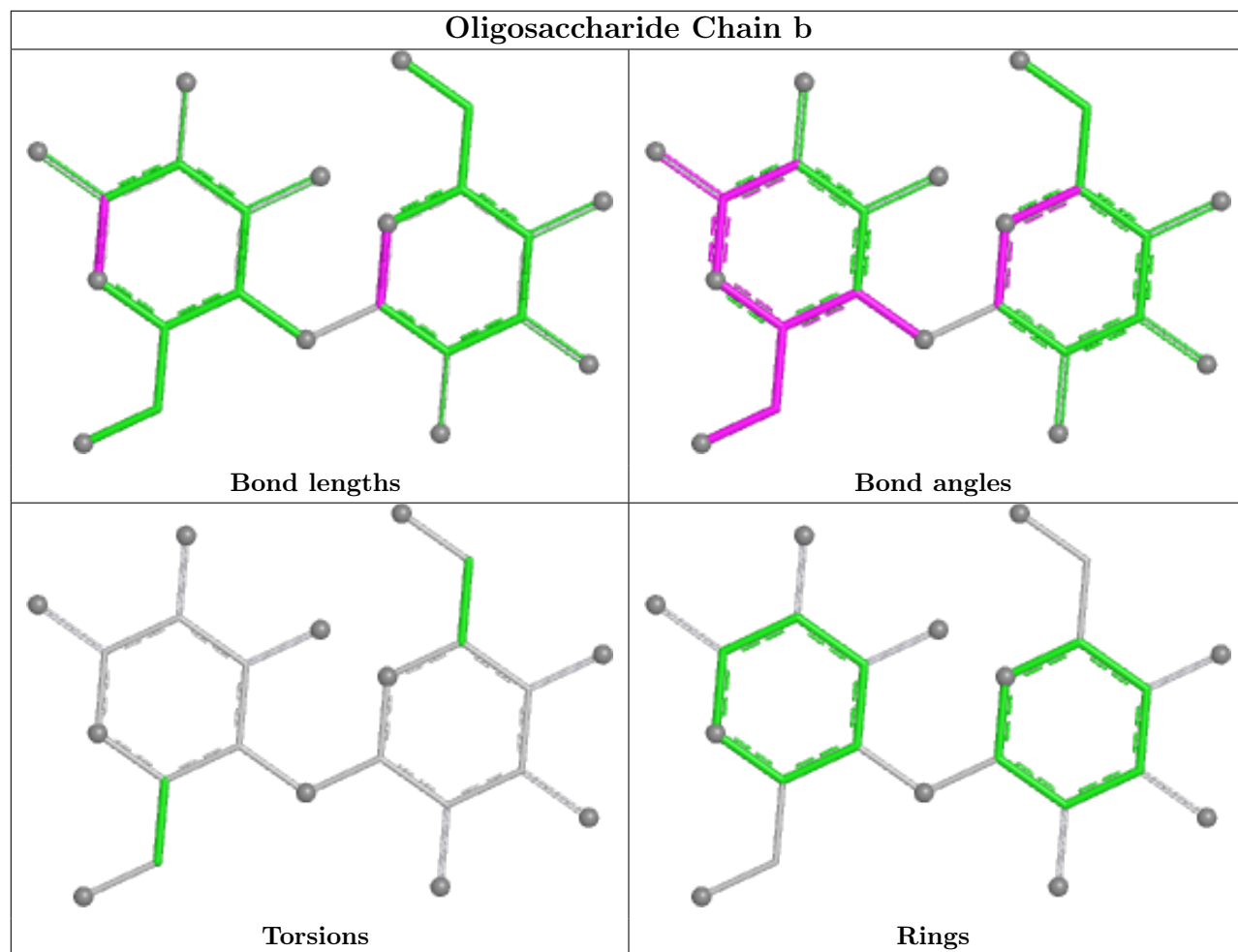
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

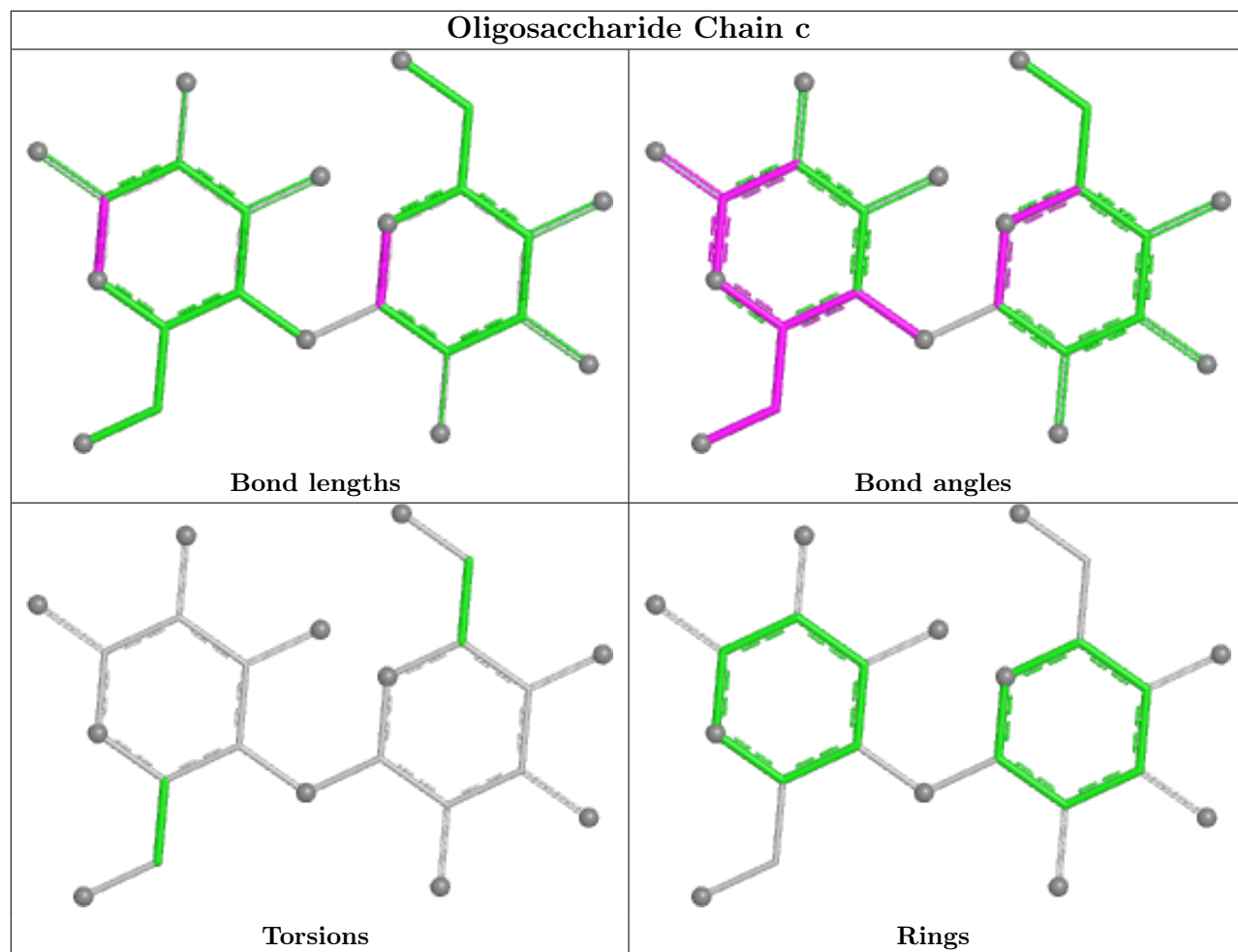


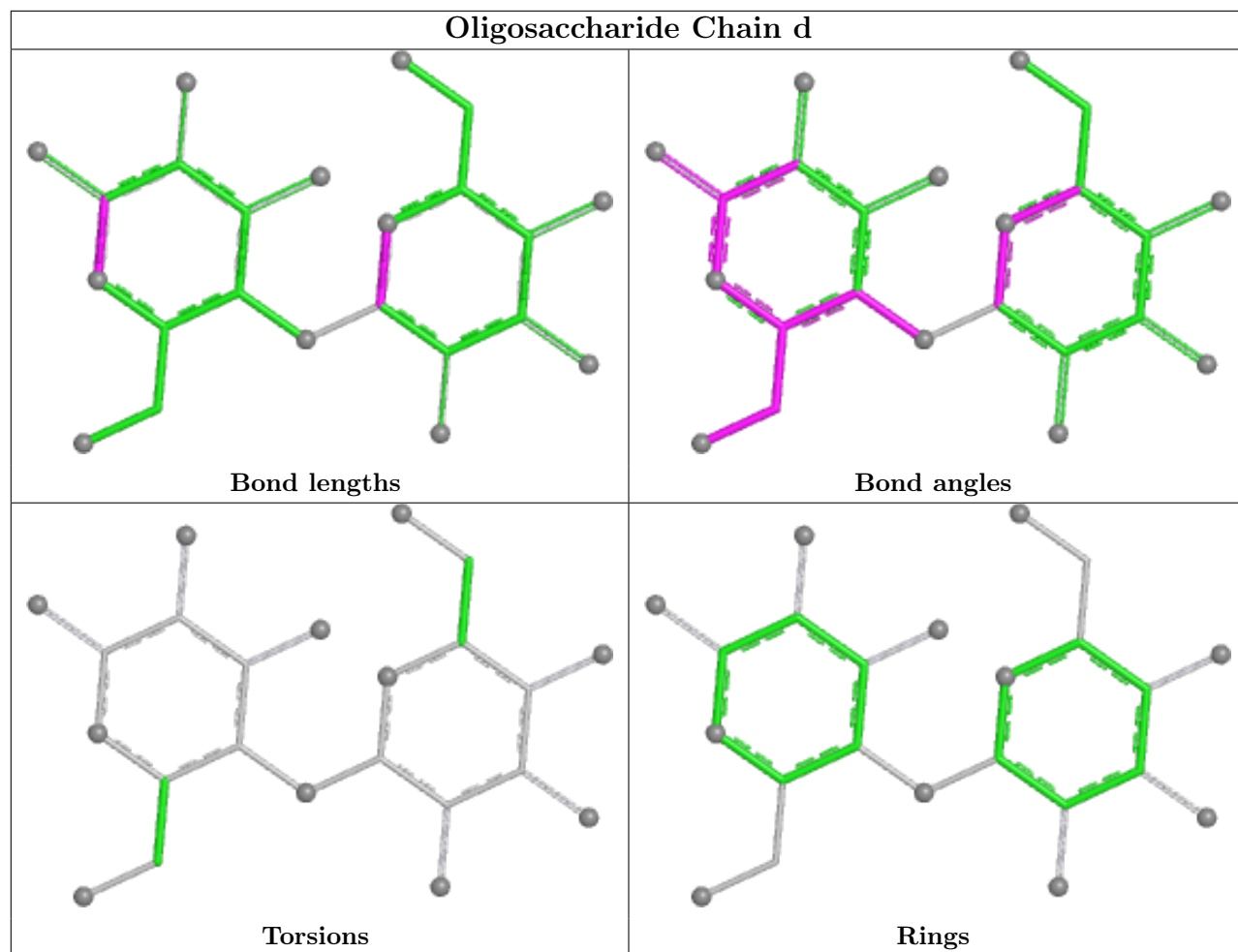


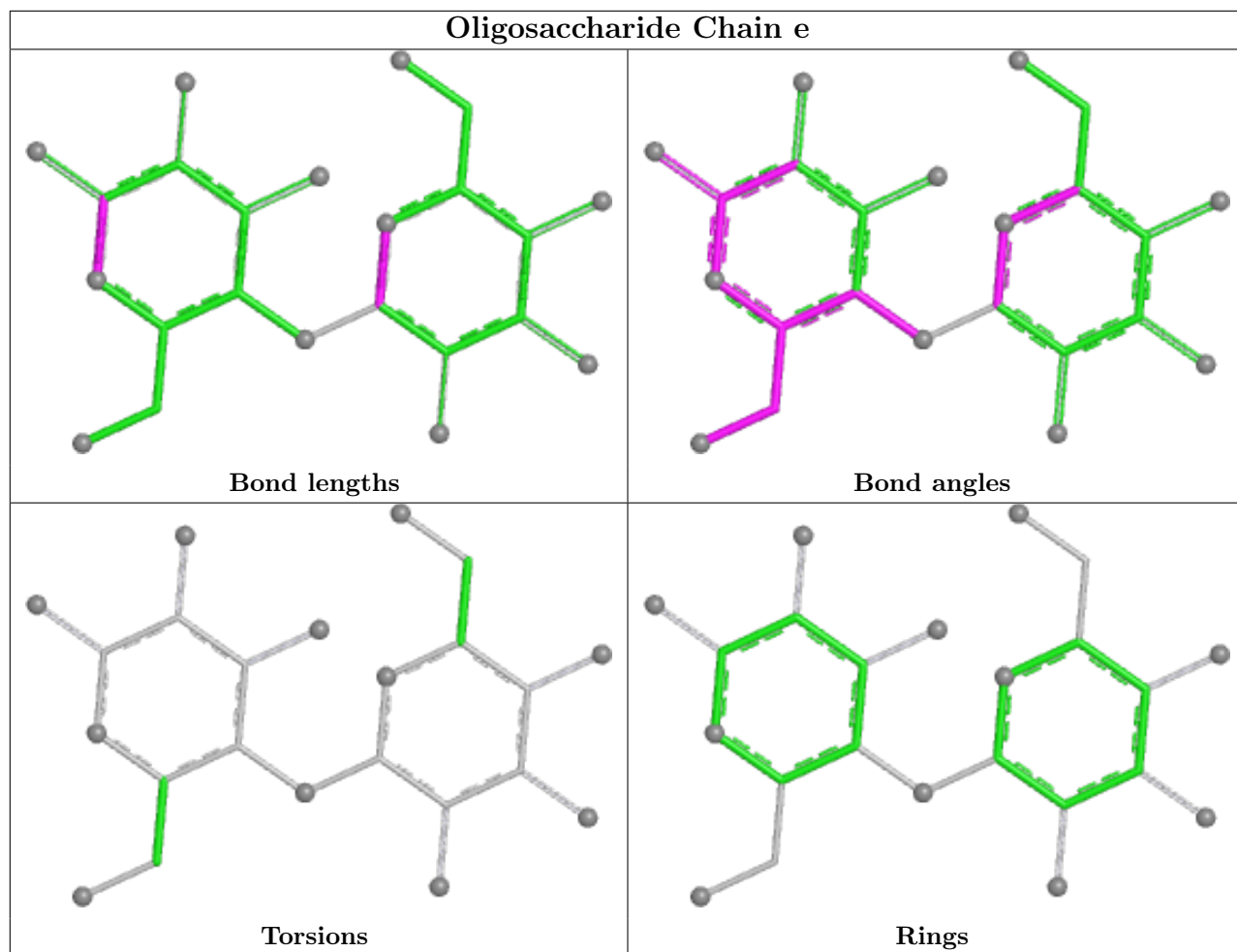


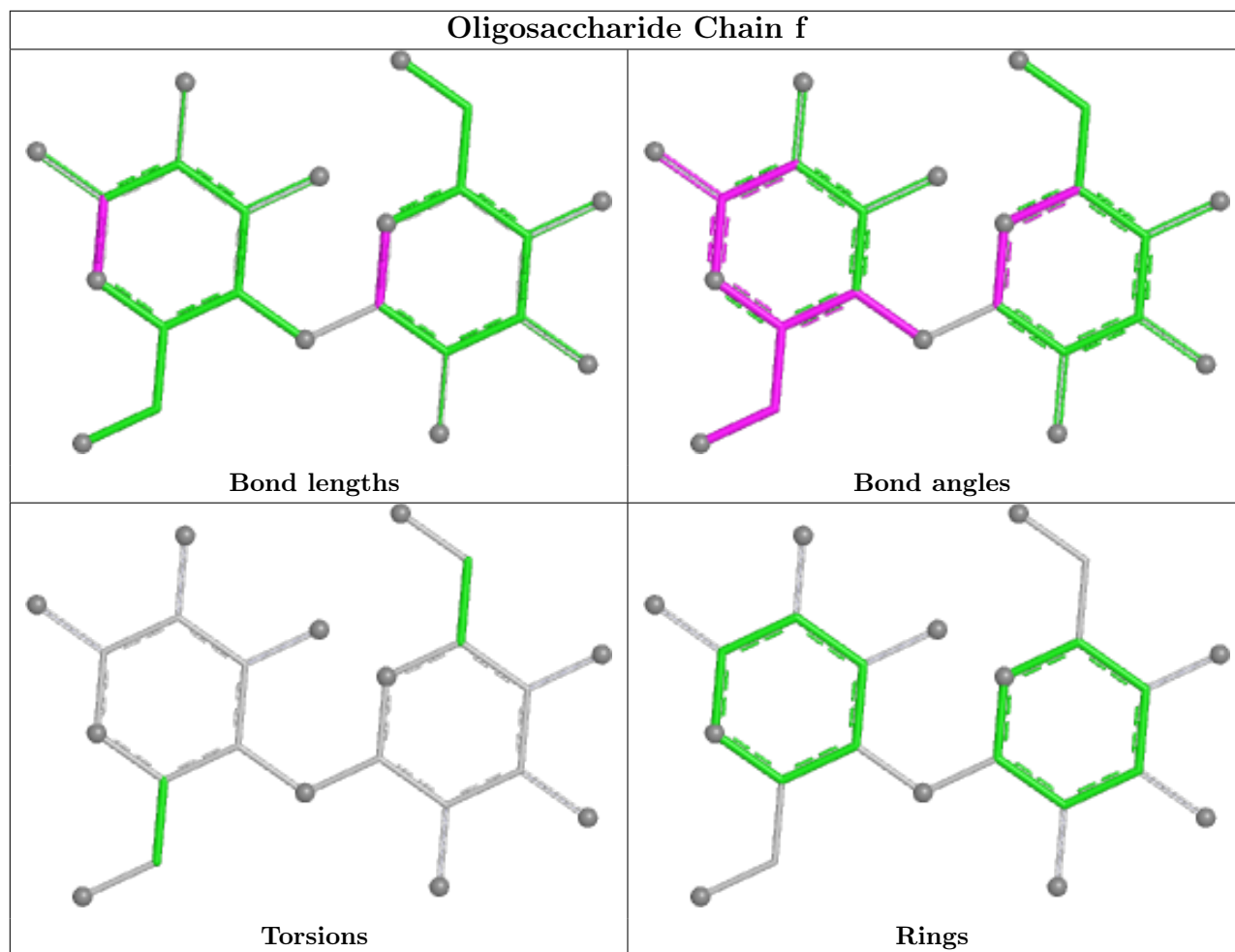


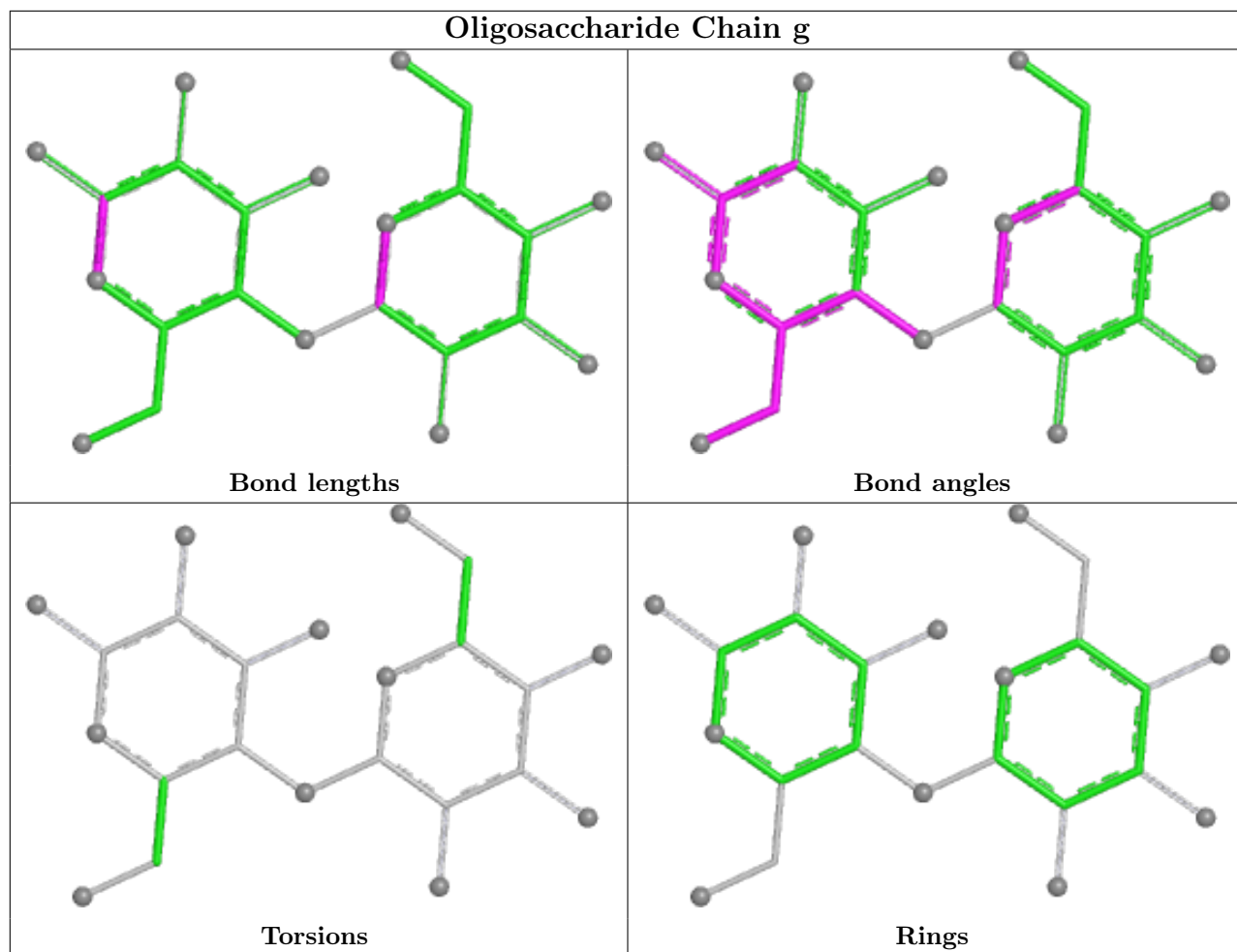


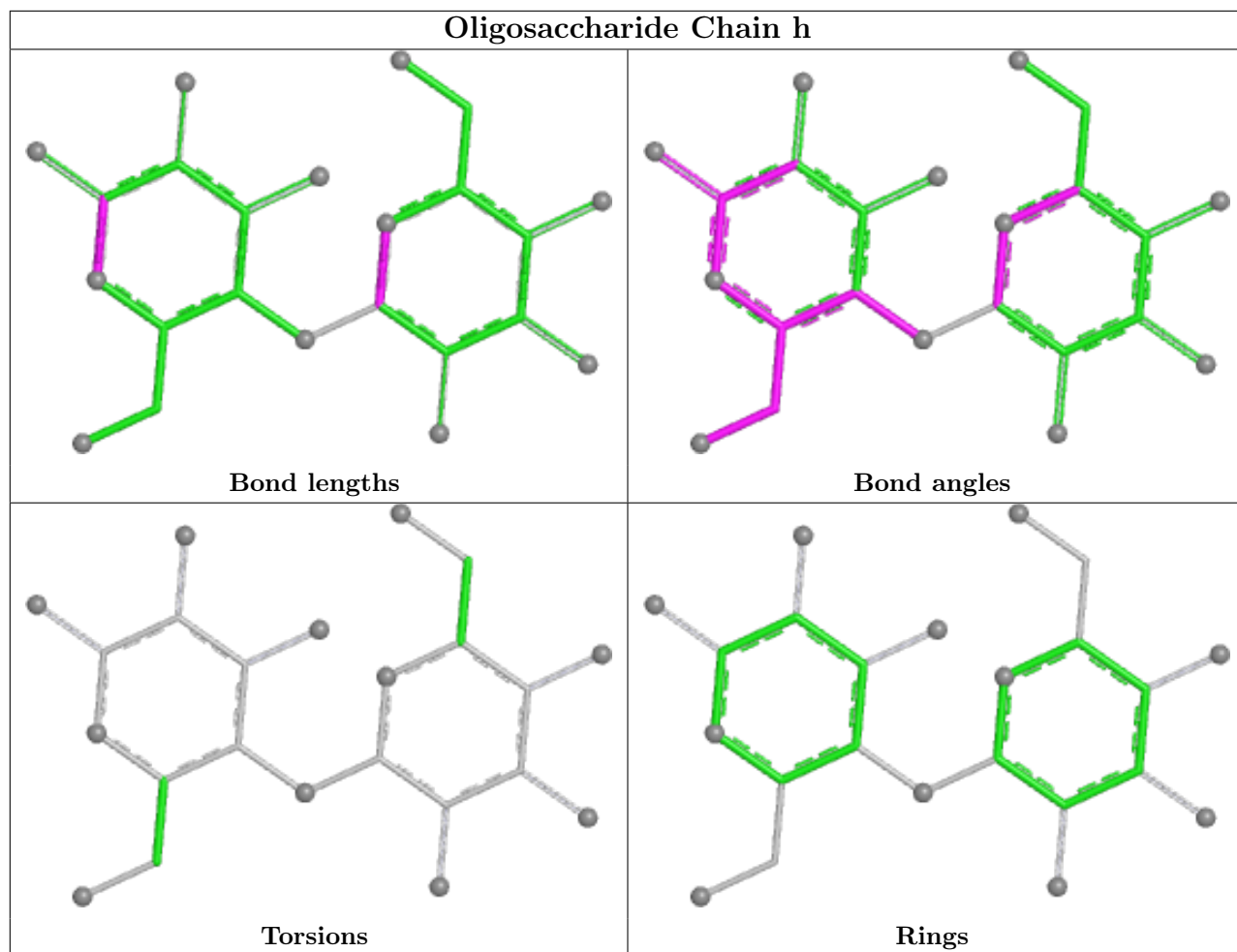


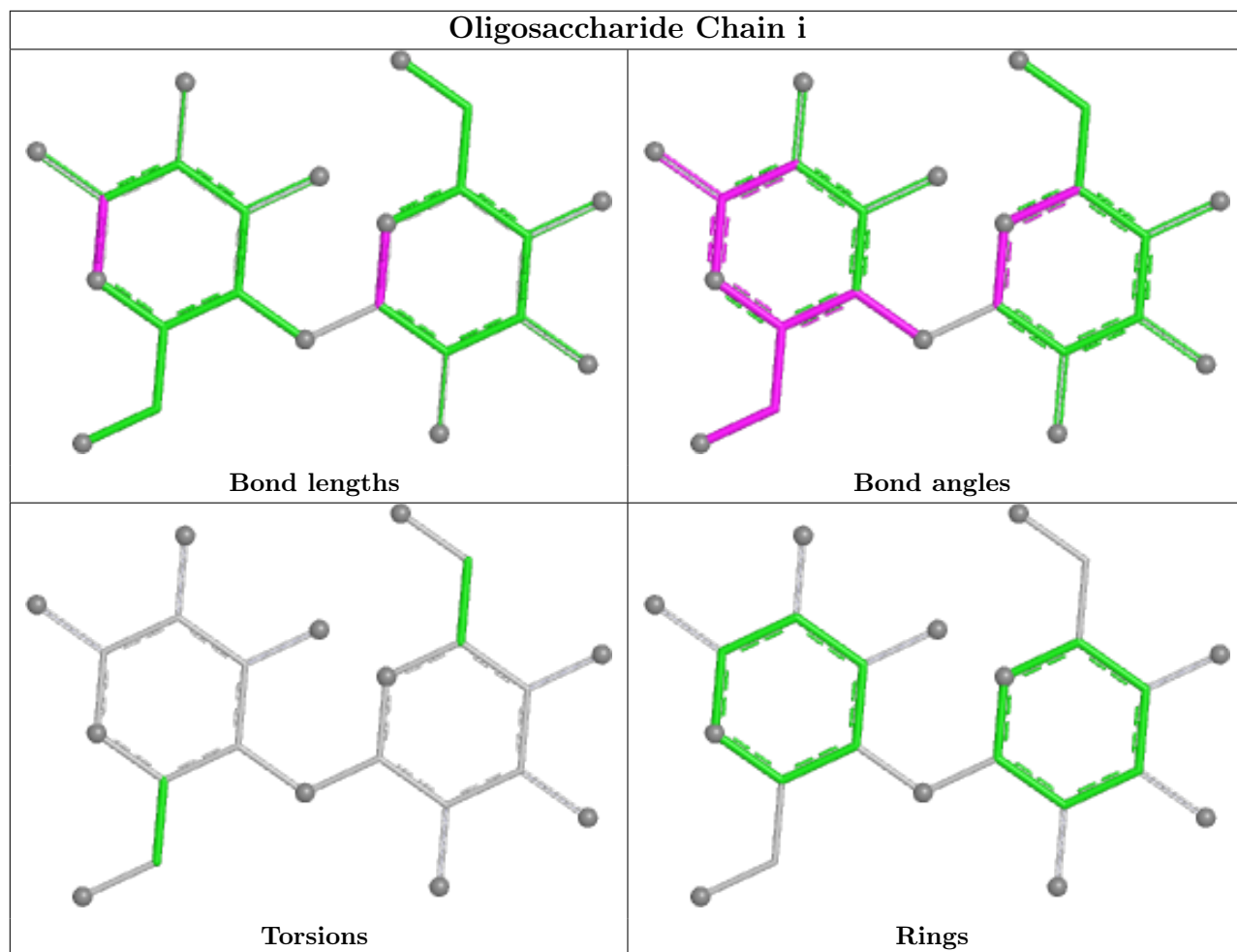




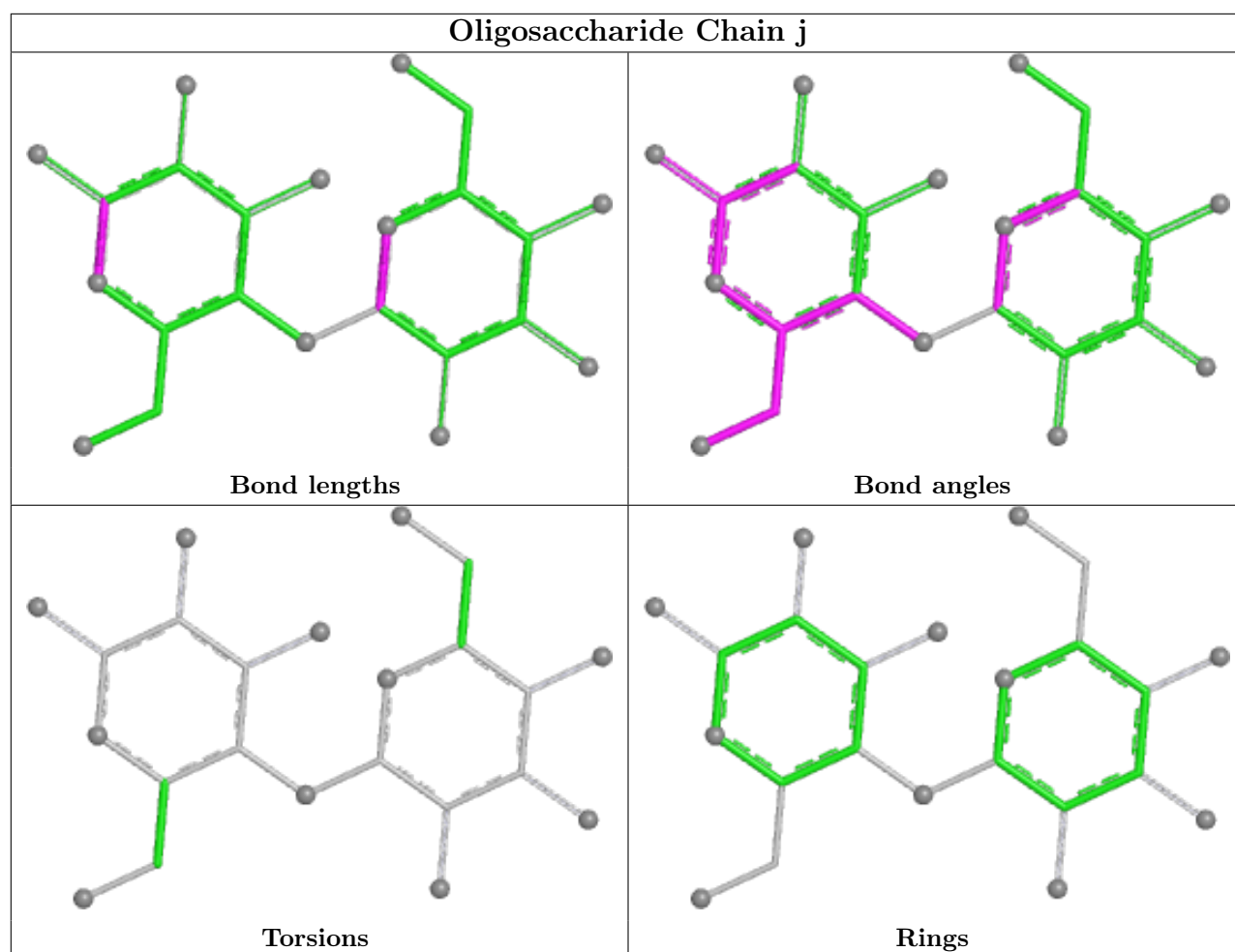












## 5.6 Ligand geometry [i](#)

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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	M	1
2	O	1
2	P	1
2	Q	1

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Mol	Chain	Number of breaks
2	T	1
2	N	1
2	R	1
2	S	1
2	U	1
2	V	1
2	W	1
2	X	1

The worst 5 of 12 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	M	369:THR	C	370:LYS	N	1.68
1	O	369:THR	C	370:LYS	N	1.68
1	P	369:THR	C	370:LYS	N	1.68
1	Q	369:THR	C	370:LYS	N	1.68
1	T	369:THR	C	370:LYS	N	1.68

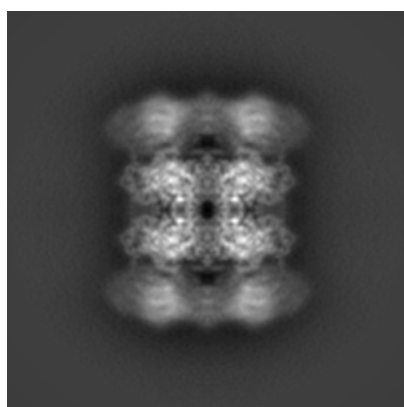
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-4039. These allow visual inspection of the internal detail of the map and identification of artifacts.

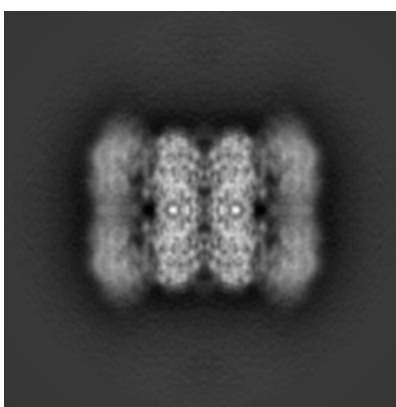
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

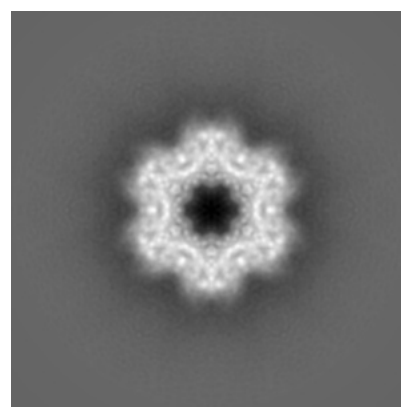
#### 6.1.1 Primary map



X



Y

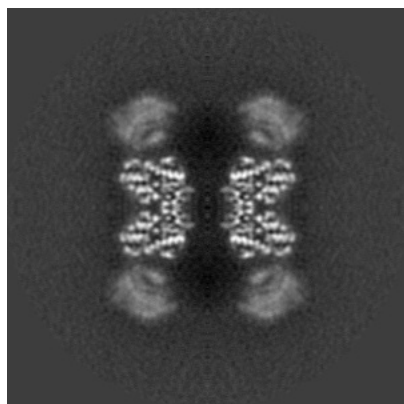


Z

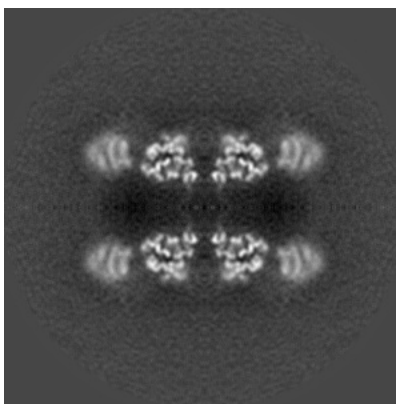
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

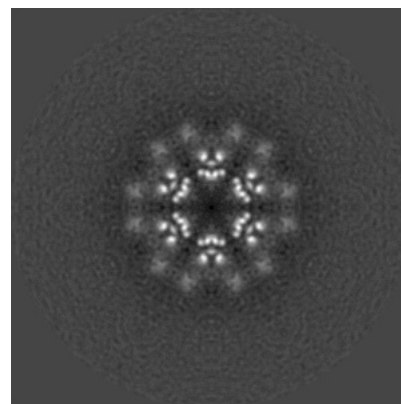
#### 6.2.1 Primary map



X Index: 200



Y Index: 200

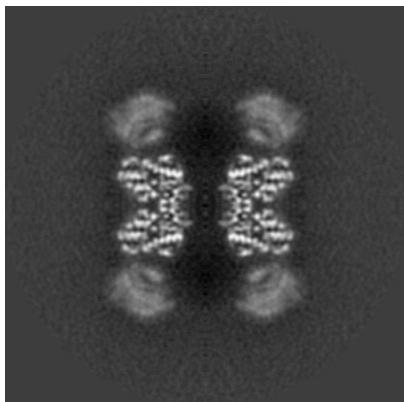


Z Index: 200

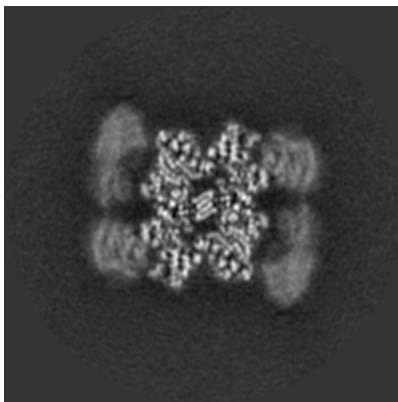
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

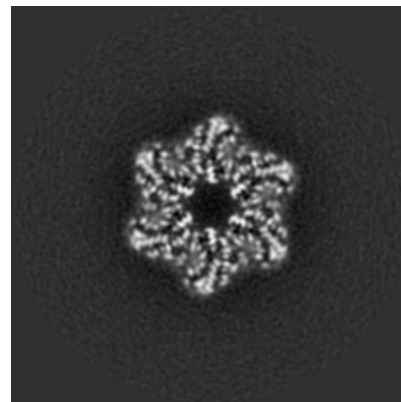
### 6.3.1 Primary map



X Index: 200



Y Index: 166



Z Index: 169

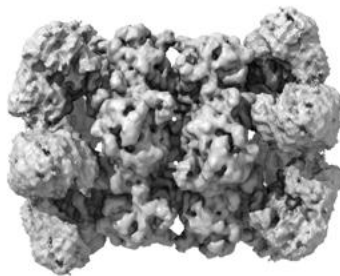
The images above show the largest variance slices of the map in three orthogonal directions.

## 6.4 Orthogonal surface views [i](#)

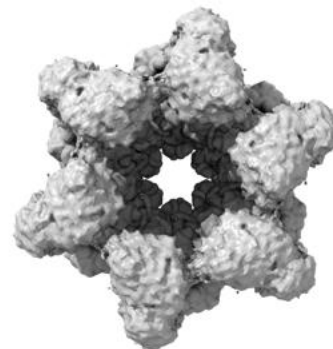
### 6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0015. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

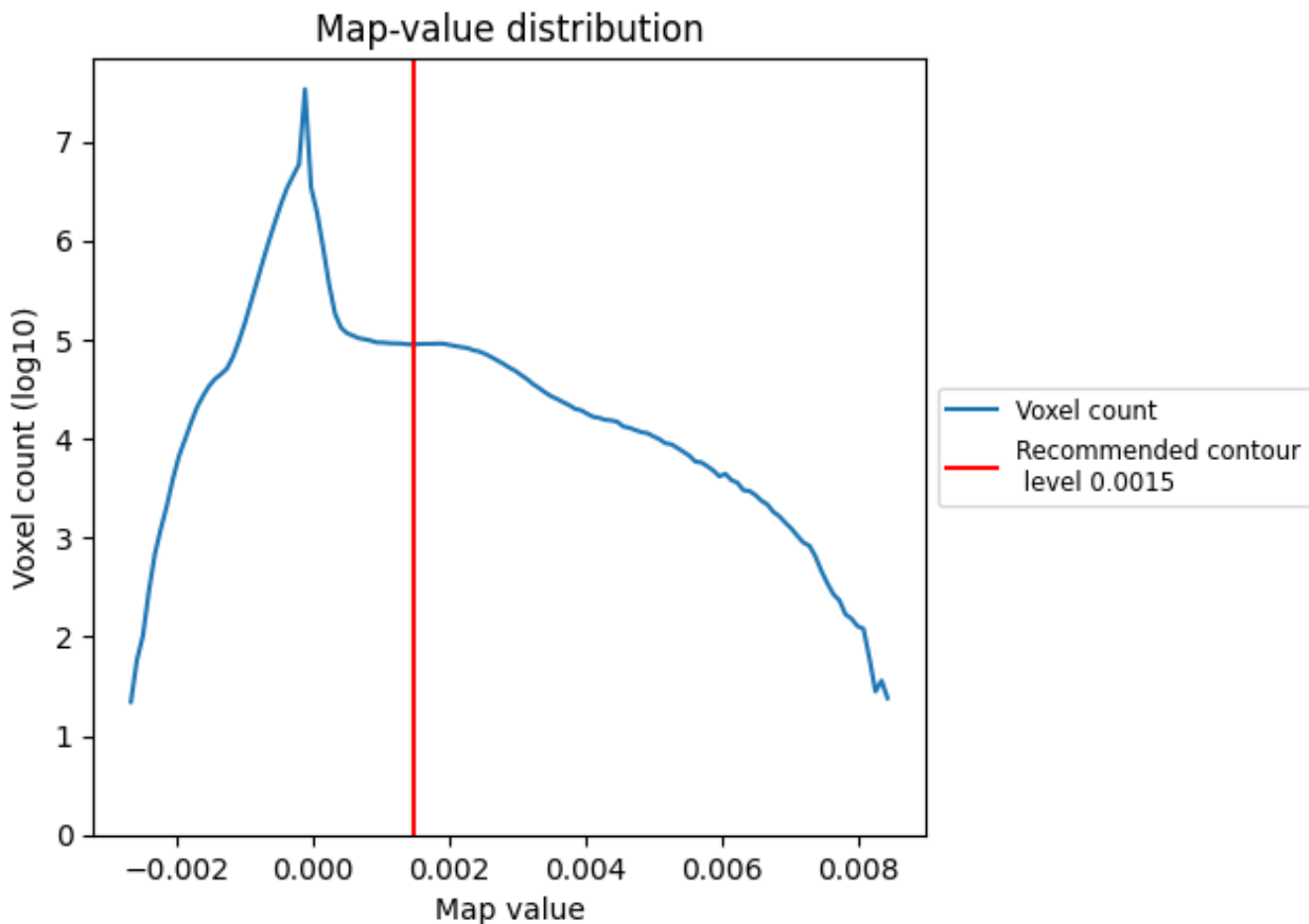
## 6.5 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

## 7 Map analysis [i](#)

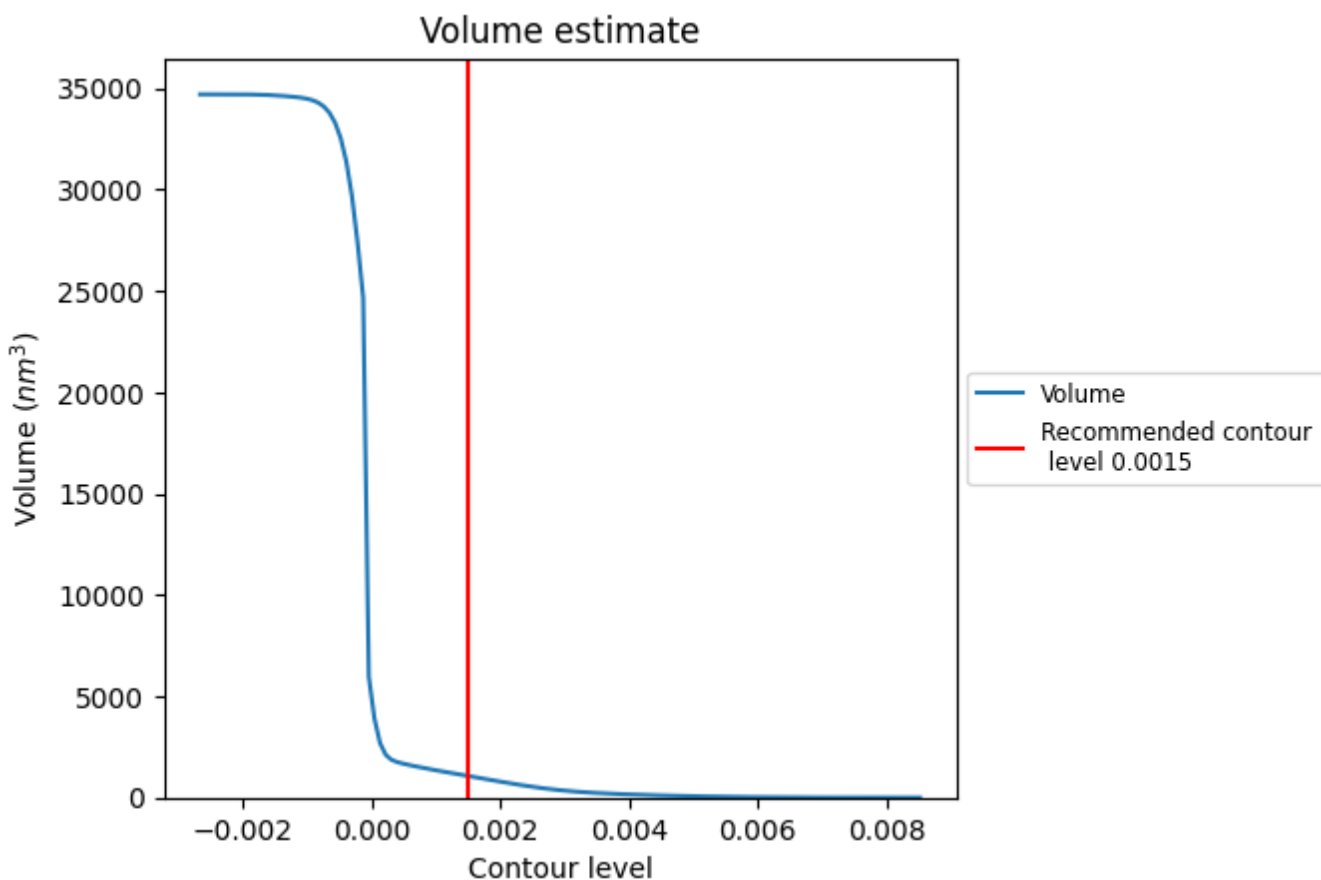
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

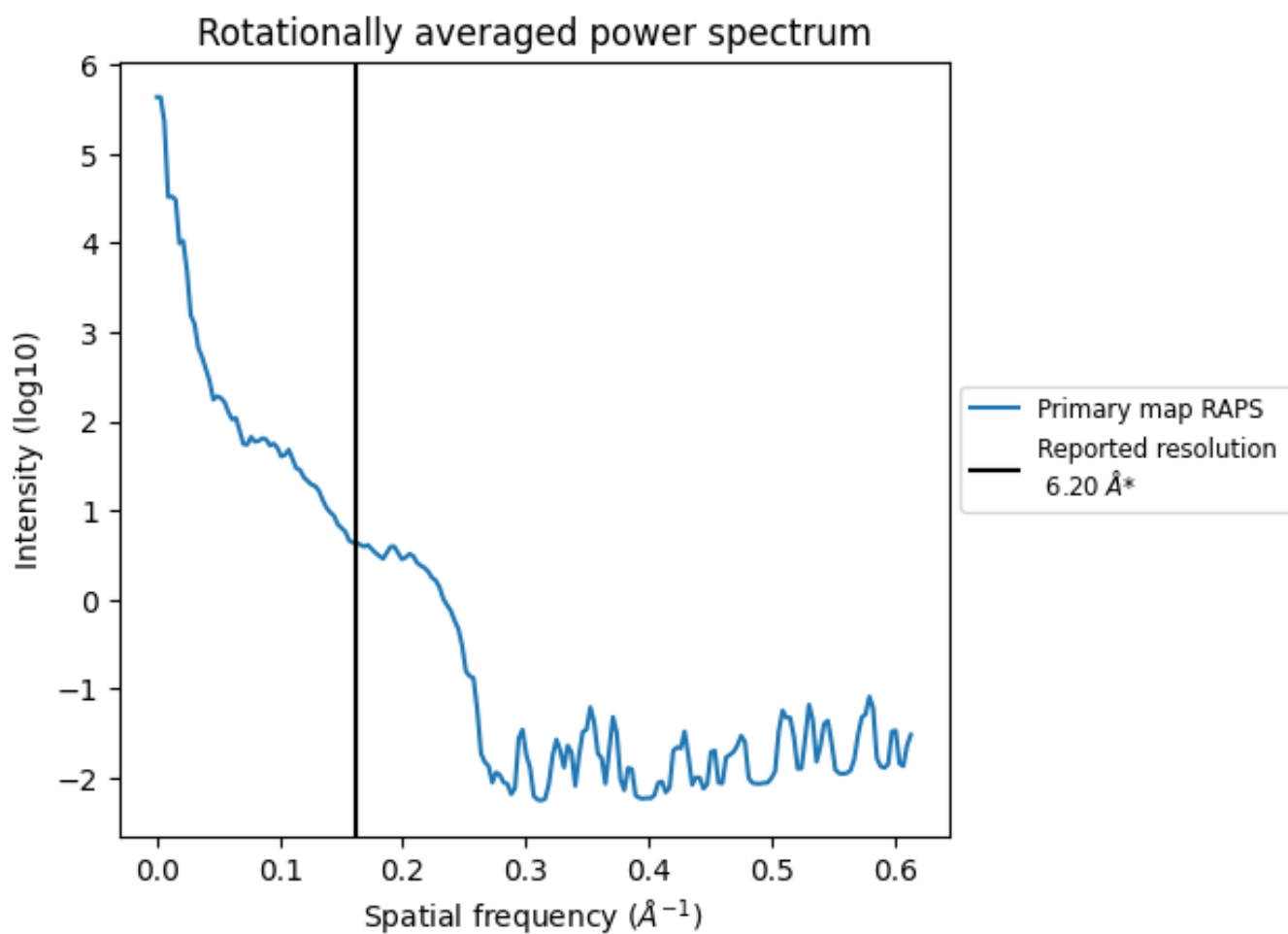
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1067 nm<sup>3</sup>; this corresponds to an approximate mass of 964 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum i



\*Reported resolution corresponds to spatial frequency of 0.161 Å<sup>-1</sup>



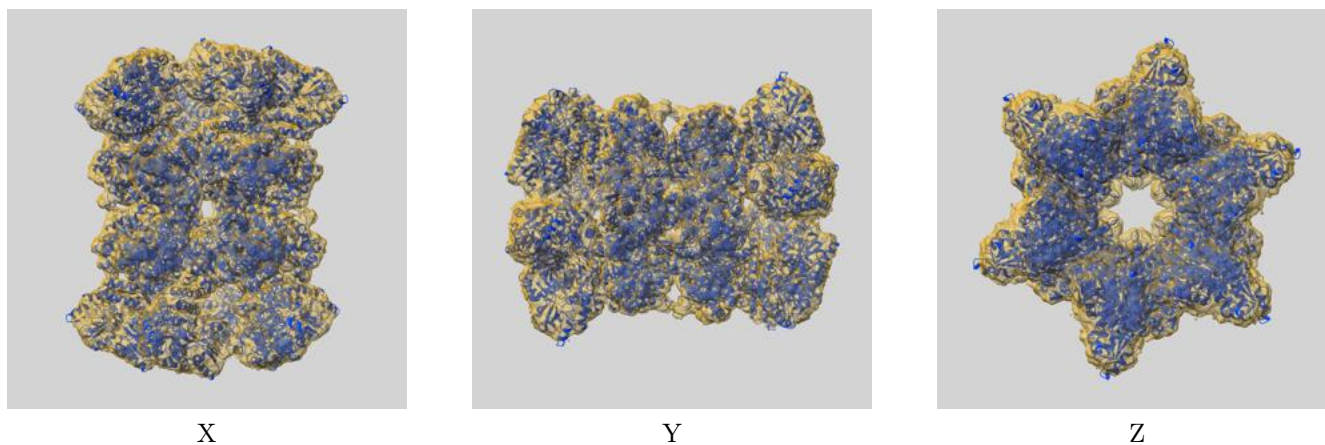
## 8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

## 9 Map-model fit [i](#)

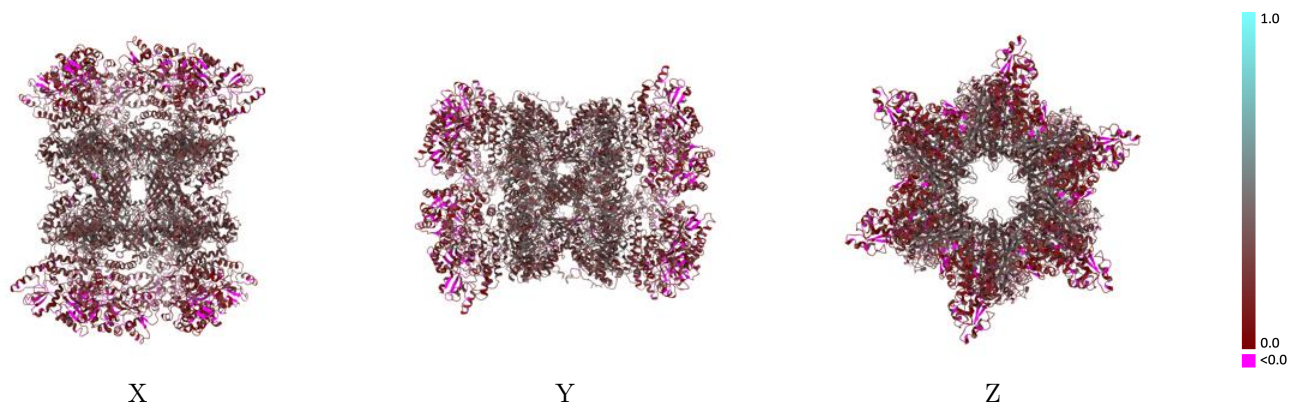
This section contains information regarding the fit between EMDB map EMD-4039 and PDB model 5LDF. Per-residue inclusion information can be found in section 3 on page 8.

### 9.1 Map-model overlay [i](#)



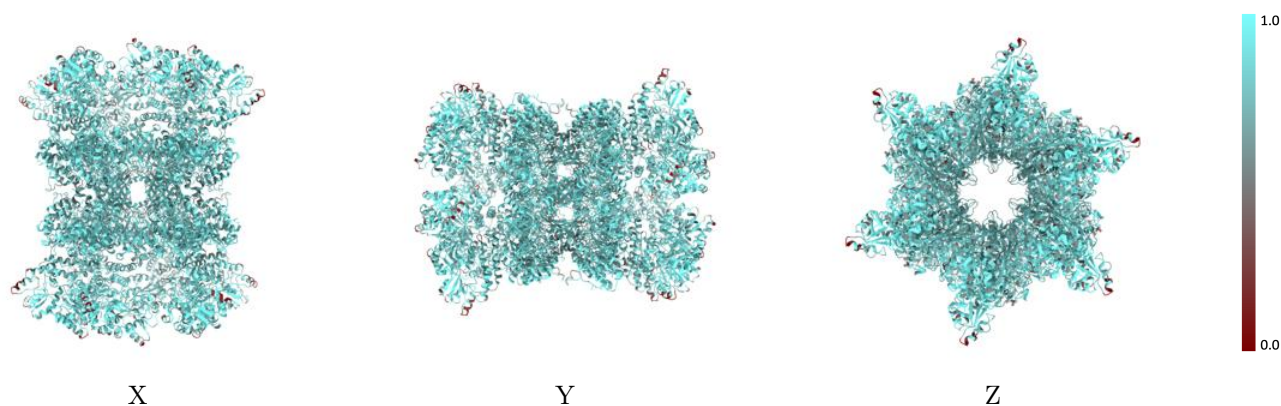
The images above show the 3D surface view of the map at the recommended contour level 0.0015 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [\(i\)](#)



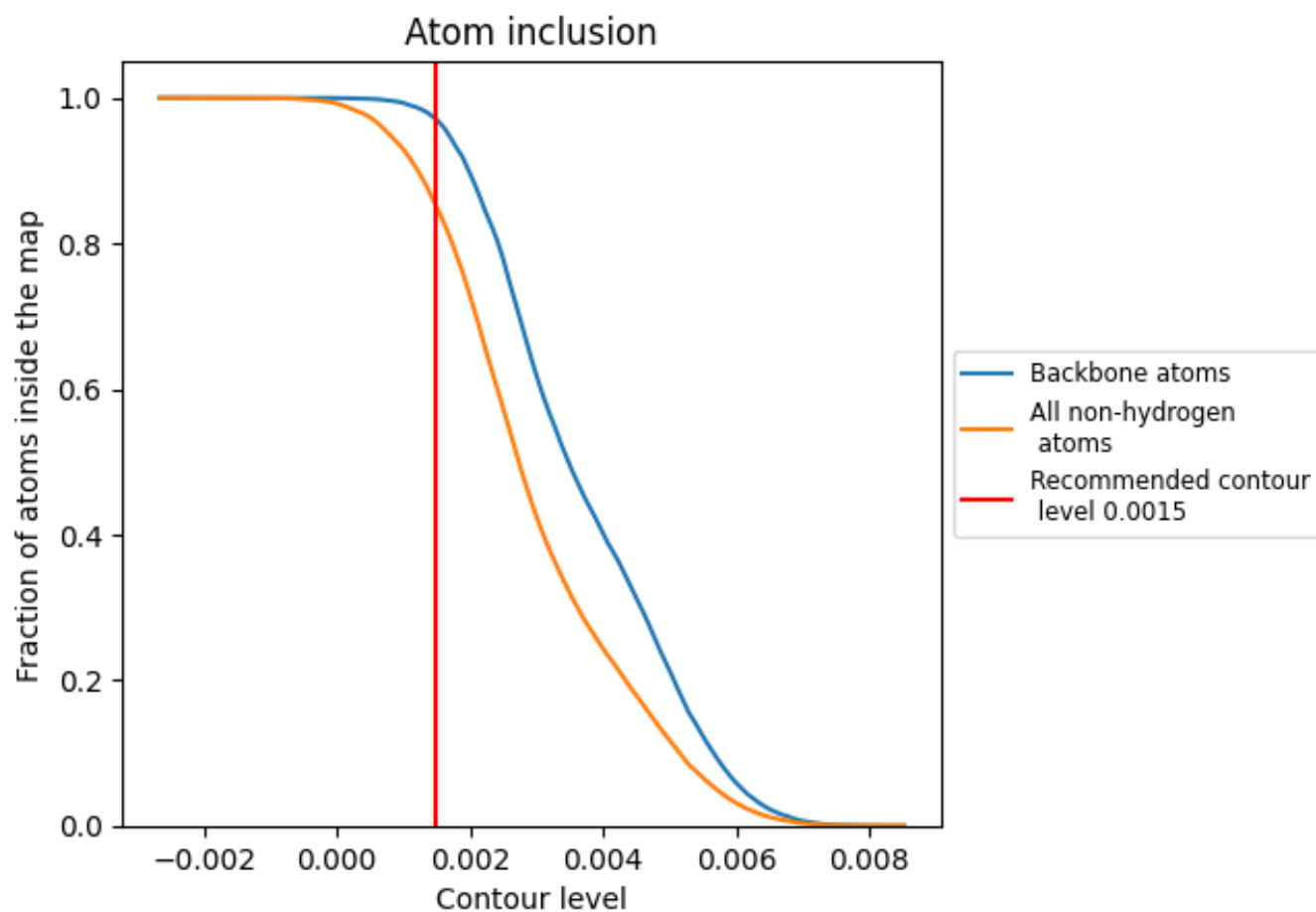
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

## 9.3 Atom inclusion mapped to coordinate model [\(i\)](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0015).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 85% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary



The table lists the average atom inclusion at the recommended contour level (0.0015) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8506	 0.2390
A	 0.8568	 0.3150
B	 0.8562	 0.3110
C	 0.8529	 0.3040
D	 0.8557	 0.3080
E	 0.8545	 0.3110
F	 0.8543	 0.3050
G	 0.8576	 0.3150
H	 0.8531	 0.3080
I	 0.8565	 0.3140
J	 0.8559	 0.3150
K	 0.8557	 0.3130
L	 0.8529	 0.3070
M	 0.8436	 0.1500
N	 0.8443	 0.1500
O	 0.8457	 0.1440
P	 0.8436	 0.1430
Q	 0.8454	 0.1450
R	 0.8461	 0.1460
S	 0.8447	 0.1480
T	 0.8454	 0.1470
U	 0.8436	 0.1490
V	 0.8457	 0.1510
W	 0.8457	 0.1500
X	 0.8436	 0.1500
Y	 0.8696	 0.2270
Z	 0.8696	 0.2200
a	 0.8261	 0.1720
b	 0.8261	 0.1850
c	 0.8696	 0.2010
d	 0.8261	 0.1720
e	 0.8696	 0.2320
f	 0.8696	 0.2180
g	 0.8696	 0.2260
h	 0.9130	 0.2260



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Chain	Atom inclusion	Q-score
i	 0.8696	 0.2350
j	 0.8696	 0.2230