



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 10, 2020 – 12:24 PM BST

PDB ID : 6R4N
Title : Crystal structure of *S. cerevisia* Niemann-Pick type C protein NPC2 with ergosterol bound
Authors : Winkler, M.B.L.; Kidmose, R.T.; Pedersen, B.P.
Deposited on : 2019-03-22
Resolution : 2.90 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 : 2.13.1
buster-report : 1.1.7 (2018)
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) : 2.13.1

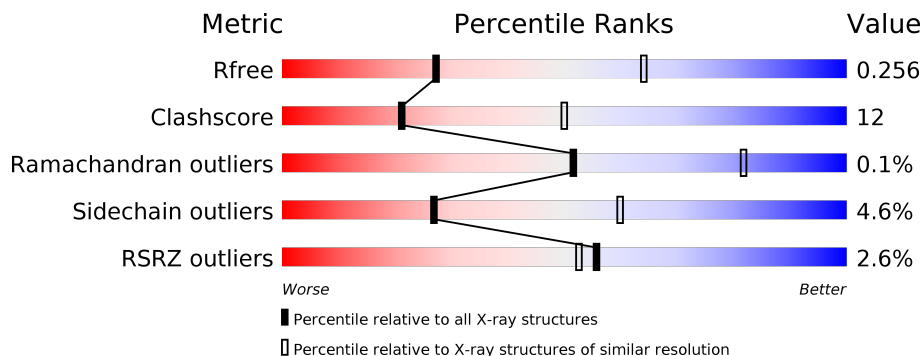
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on 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	201	
1	B	201	
1	C	201	
1	D	201	
1	E	201	
1	F	201	

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Mol	Chain	Length	Quality of chain
1	G	201	<p>%</p> <p>50% 19% 28%</p>
1	H	201	<p>56% 14% 28%</p>
1	I	201	<p>56% 14% 28%</p>
2	J	2	<p>100%</p>

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
2	NAG	J	2	-	-	-	X
5	SO4	A	303	-	-	-	X

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 10486 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 Phosphatidylglycerol/phosphatidylinositol transfer protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	144	1125	717	177	227	4	0	0	0
1	B	141	1103	701	174	224	4	0	0	0
1	C	147	1150	733	183	230	4	0	0	0
1	D	142	1106	705	172	225	4	0	0	0
1	E	143	1118	712	176	226	4	0	0	0
1	F	146	1139	727	179	229	4	0	0	0
1	G	144	1125	717	177	227	4	0	0	0
1	H	145	1130	720	178	228	4	0	0	0
1	I	144	1125	717	177	227	4	0	0	0

There are 252 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	174	LEU	-	expression tag	UNP Q12408
A	175	VAL	-	expression tag	UNP Q12408
A	176	PRO	-	expression tag	UNP Q12408
A	177	ARG	-	expression tag	UNP Q12408
A	178	GLY	-	expression tag	UNP Q12408
A	179	SER	-	expression tag	UNP Q12408
A	180	GLY	-	expression tag	UNP Q12408
A	181	GLY	-	expression tag	UNP Q12408
A	182	GLY	-	expression tag	UNP Q12408
A	183	GLY	-	expression tag	UNP Q12408
A	184	SER	-	expression tag	UNP Q12408

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Chain	Residue	Modelled	Actual	Comment	Reference
A	185	GLY	-	expression tag	UNP Q12408
A	186	GLY	-	expression tag	UNP Q12408
A	187	GLY	-	expression tag	UNP Q12408
A	188	GLY	-	expression tag	UNP Q12408
A	189	SER	-	expression tag	UNP Q12408
A	190	GLY	-	expression tag	UNP Q12408
A	191	GLY	-	expression tag	UNP Q12408
A	192	HIS	-	expression tag	UNP Q12408
A	193	HIS	-	expression tag	UNP Q12408
A	194	HIS	-	expression tag	UNP Q12408
A	195	HIS	-	expression tag	UNP Q12408
A	196	HIS	-	expression tag	UNP Q12408
A	197	HIS	-	expression tag	UNP Q12408
A	198	HIS	-	expression tag	UNP Q12408
A	199	HIS	-	expression tag	UNP Q12408
A	200	HIS	-	expression tag	UNP Q12408
A	201	HIS	-	expression tag	UNP Q12408
B	174	LEU	-	expression tag	UNP Q12408
B	175	VAL	-	expression tag	UNP Q12408
B	176	PRO	-	expression tag	UNP Q12408
B	177	ARG	-	expression tag	UNP Q12408
B	178	GLY	-	expression tag	UNP Q12408
B	179	SER	-	expression tag	UNP Q12408
B	180	GLY	-	expression tag	UNP Q12408
B	181	GLY	-	expression tag	UNP Q12408
B	182	GLY	-	expression tag	UNP Q12408
B	183	GLY	-	expression tag	UNP Q12408
B	184	SER	-	expression tag	UNP Q12408
B	185	GLY	-	expression tag	UNP Q12408
B	186	GLY	-	expression tag	UNP Q12408
B	187	GLY	-	expression tag	UNP Q12408
B	188	GLY	-	expression tag	UNP Q12408
B	189	SER	-	expression tag	UNP Q12408
B	190	GLY	-	expression tag	UNP Q12408
B	191	GLY	-	expression tag	UNP Q12408
B	192	HIS	-	expression tag	UNP Q12408
B	193	HIS	-	expression tag	UNP Q12408
B	194	HIS	-	expression tag	UNP Q12408
B	195	HIS	-	expression tag	UNP Q12408
B	196	HIS	-	expression tag	UNP Q12408
B	197	HIS	-	expression tag	UNP Q12408
B	198	HIS	-	expression tag	UNP Q12408

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Chain	Residue	Modelled	Actual	Comment	Reference
B	199	HIS	-	expression tag	UNP Q12408
B	200	HIS	-	expression tag	UNP Q12408
B	201	HIS	-	expression tag	UNP Q12408
C	174	LEU	-	expression tag	UNP Q12408
C	175	VAL	-	expression tag	UNP Q12408
C	176	PRO	-	expression tag	UNP Q12408
C	177	ARG	-	expression tag	UNP Q12408
C	178	GLY	-	expression tag	UNP Q12408
C	179	SER	-	expression tag	UNP Q12408
C	180	GLY	-	expression tag	UNP Q12408
C	181	GLY	-	expression tag	UNP Q12408
C	182	GLY	-	expression tag	UNP Q12408
C	183	GLY	-	expression tag	UNP Q12408
C	184	SER	-	expression tag	UNP Q12408
C	185	GLY	-	expression tag	UNP Q12408
C	186	GLY	-	expression tag	UNP Q12408
C	187	GLY	-	expression tag	UNP Q12408
C	188	GLY	-	expression tag	UNP Q12408
C	189	SER	-	expression tag	UNP Q12408
C	190	GLY	-	expression tag	UNP Q12408
C	191	GLY	-	expression tag	UNP Q12408
C	192	HIS	-	expression tag	UNP Q12408
C	193	HIS	-	expression tag	UNP Q12408
C	194	HIS	-	expression tag	UNP Q12408
C	195	HIS	-	expression tag	UNP Q12408
C	196	HIS	-	expression tag	UNP Q12408
C	197	HIS	-	expression tag	UNP Q12408
C	198	HIS	-	expression tag	UNP Q12408
C	199	HIS	-	expression tag	UNP Q12408
C	200	HIS	-	expression tag	UNP Q12408
C	201	HIS	-	expression tag	UNP Q12408
D	174	LEU	-	expression tag	UNP Q12408
D	175	VAL	-	expression tag	UNP Q12408
D	176	PRO	-	expression tag	UNP Q12408
D	177	ARG	-	expression tag	UNP Q12408
D	178	GLY	-	expression tag	UNP Q12408
D	179	SER	-	expression tag	UNP Q12408
D	180	GLY	-	expression tag	UNP Q12408
D	181	GLY	-	expression tag	UNP Q12408
D	182	GLY	-	expression tag	UNP Q12408
D	183	GLY	-	expression tag	UNP Q12408
D	184	SER	-	expression tag	UNP Q12408

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Chain	Residue	Modelled	Actual	Comment	Reference
D	185	GLY	-	expression tag	UNP Q12408
D	186	GLY	-	expression tag	UNP Q12408
D	187	GLY	-	expression tag	UNP Q12408
D	188	GLY	-	expression tag	UNP Q12408
D	189	SER	-	expression tag	UNP Q12408
D	190	GLY	-	expression tag	UNP Q12408
D	191	GLY	-	expression tag	UNP Q12408
D	192	HIS	-	expression tag	UNP Q12408
D	193	HIS	-	expression tag	UNP Q12408
D	194	HIS	-	expression tag	UNP Q12408
D	195	HIS	-	expression tag	UNP Q12408
D	196	HIS	-	expression tag	UNP Q12408
D	197	HIS	-	expression tag	UNP Q12408
D	198	HIS	-	expression tag	UNP Q12408
D	199	HIS	-	expression tag	UNP Q12408
D	200	HIS	-	expression tag	UNP Q12408
D	201	HIS	-	expression tag	UNP Q12408
E	174	LEU	-	expression tag	UNP Q12408
E	175	VAL	-	expression tag	UNP Q12408
E	176	PRO	-	expression tag	UNP Q12408
E	177	ARG	-	expression tag	UNP Q12408
E	178	GLY	-	expression tag	UNP Q12408
E	179	SER	-	expression tag	UNP Q12408
E	180	GLY	-	expression tag	UNP Q12408
E	181	GLY	-	expression tag	UNP Q12408
E	182	GLY	-	expression tag	UNP Q12408
E	183	GLY	-	expression tag	UNP Q12408
E	184	SER	-	expression tag	UNP Q12408
E	185	GLY	-	expression tag	UNP Q12408
E	186	GLY	-	expression tag	UNP Q12408
E	187	GLY	-	expression tag	UNP Q12408
E	188	GLY	-	expression tag	UNP Q12408
E	189	SER	-	expression tag	UNP Q12408
E	190	GLY	-	expression tag	UNP Q12408
E	191	GLY	-	expression tag	UNP Q12408
E	192	HIS	-	expression tag	UNP Q12408
E	193	HIS	-	expression tag	UNP Q12408
E	194	HIS	-	expression tag	UNP Q12408
E	195	HIS	-	expression tag	UNP Q12408
E	196	HIS	-	expression tag	UNP Q12408
E	197	HIS	-	expression tag	UNP Q12408
E	198	HIS	-	expression tag	UNP Q12408

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Chain	Residue	Modelled	Actual	Comment	Reference
E	199	HIS	-	expression tag	UNP Q12408
E	200	HIS	-	expression tag	UNP Q12408
E	201	HIS	-	expression tag	UNP Q12408
F	174	LEU	-	expression tag	UNP Q12408
F	175	VAL	-	expression tag	UNP Q12408
F	176	PRO	-	expression tag	UNP Q12408
F	177	ARG	-	expression tag	UNP Q12408
F	178	GLY	-	expression tag	UNP Q12408
F	179	SER	-	expression tag	UNP Q12408
F	180	GLY	-	expression tag	UNP Q12408
F	181	GLY	-	expression tag	UNP Q12408
F	182	GLY	-	expression tag	UNP Q12408
F	183	GLY	-	expression tag	UNP Q12408
F	184	SER	-	expression tag	UNP Q12408
F	185	GLY	-	expression tag	UNP Q12408
F	186	GLY	-	expression tag	UNP Q12408
F	187	GLY	-	expression tag	UNP Q12408
F	188	GLY	-	expression tag	UNP Q12408
F	189	SER	-	expression tag	UNP Q12408
F	190	GLY	-	expression tag	UNP Q12408
F	191	GLY	-	expression tag	UNP Q12408
F	192	HIS	-	expression tag	UNP Q12408
F	193	HIS	-	expression tag	UNP Q12408
F	194	HIS	-	expression tag	UNP Q12408
F	195	HIS	-	expression tag	UNP Q12408
F	196	HIS	-	expression tag	UNP Q12408
F	197	HIS	-	expression tag	UNP Q12408
F	198	HIS	-	expression tag	UNP Q12408
F	199	HIS	-	expression tag	UNP Q12408
F	200	HIS	-	expression tag	UNP Q12408
F	201	HIS	-	expression tag	UNP Q12408
G	174	LEU	-	expression tag	UNP Q12408
G	175	VAL	-	expression tag	UNP Q12408
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G	177	ARG	-	expression tag	UNP Q12408
G	178	GLY	-	expression tag	UNP Q12408
G	179	SER	-	expression tag	UNP Q12408
G	180	GLY	-	expression tag	UNP Q12408
G	181	GLY	-	expression tag	UNP Q12408
G	182	GLY	-	expression tag	UNP Q12408
G	183	GLY	-	expression tag	UNP Q12408
G	184	SER	-	expression tag	UNP Q12408

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Chain	Residue	Modelled	Actual	Comment	Reference
G	185	GLY	-	expression tag	UNP Q12408
G	186	GLY	-	expression tag	UNP Q12408
G	187	GLY	-	expression tag	UNP Q12408
G	188	GLY	-	expression tag	UNP Q12408
G	189	SER	-	expression tag	UNP Q12408
G	190	GLY	-	expression tag	UNP Q12408
G	191	GLY	-	expression tag	UNP Q12408
G	192	HIS	-	expression tag	UNP Q12408
G	193	HIS	-	expression tag	UNP Q12408
G	194	HIS	-	expression tag	UNP Q12408
G	195	HIS	-	expression tag	UNP Q12408
G	196	HIS	-	expression tag	UNP Q12408
G	197	HIS	-	expression tag	UNP Q12408
G	198	HIS	-	expression tag	UNP Q12408
G	199	HIS	-	expression tag	UNP Q12408
G	200	HIS	-	expression tag	UNP Q12408
G	201	HIS	-	expression tag	UNP Q12408
H	174	LEU	-	expression tag	UNP Q12408
H	175	VAL	-	expression tag	UNP Q12408
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H	177	ARG	-	expression tag	UNP Q12408
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H	182	GLY	-	expression tag	UNP Q12408
H	183	GLY	-	expression tag	UNP Q12408
H	184	SER	-	expression tag	UNP Q12408
H	185	GLY	-	expression tag	UNP Q12408
H	186	GLY	-	expression tag	UNP Q12408
H	187	GLY	-	expression tag	UNP Q12408
H	188	GLY	-	expression tag	UNP Q12408
H	189	SER	-	expression tag	UNP Q12408
H	190	GLY	-	expression tag	UNP Q12408
H	191	GLY	-	expression tag	UNP Q12408
H	192	HIS	-	expression tag	UNP Q12408
H	193	HIS	-	expression tag	UNP Q12408
H	194	HIS	-	expression tag	UNP Q12408
H	195	HIS	-	expression tag	UNP Q12408
H	196	HIS	-	expression tag	UNP Q12408
H	197	HIS	-	expression tag	UNP Q12408
H	198	HIS	-	expression tag	UNP Q12408

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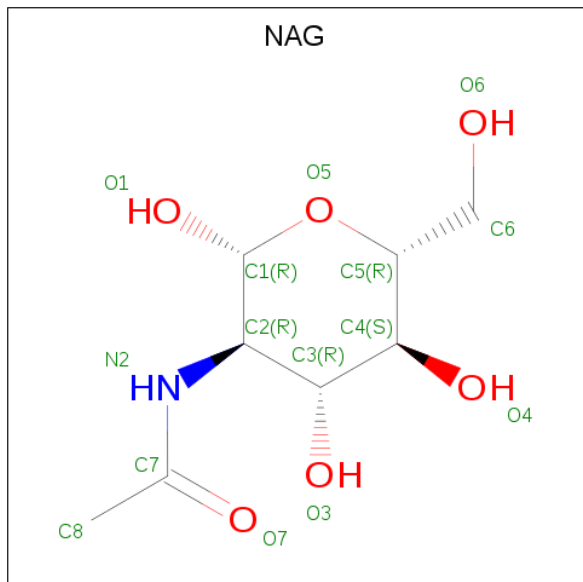
Chain	Residue	Modelled	Actual	Comment	Reference
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H	200	HIS	-	expression tag	UNP Q12408
H	201	HIS	-	expression tag	UNP Q12408
I	174	LEU	-	expression tag	UNP Q12408
I	175	VAL	-	expression tag	UNP Q12408
I	176	PRO	-	expression tag	UNP Q12408
I	177	ARG	-	expression tag	UNP Q12408
I	178	GLY	-	expression tag	UNP Q12408
I	179	SER	-	expression tag	UNP Q12408
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I	181	GLY	-	expression tag	UNP Q12408
I	182	GLY	-	expression tag	UNP Q12408
I	183	GLY	-	expression tag	UNP Q12408
I	184	SER	-	expression tag	UNP Q12408
I	185	GLY	-	expression tag	UNP Q12408
I	186	GLY	-	expression tag	UNP Q12408
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I	192	HIS	-	expression tag	UNP Q12408
I	193	HIS	-	expression tag	UNP Q12408
I	194	HIS	-	expression tag	UNP Q12408
I	195	HIS	-	expression tag	UNP Q12408
I	196	HIS	-	expression tag	UNP Q12408
I	197	HIS	-	expression tag	UNP Q12408
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I	199	HIS	-	expression tag	UNP Q12408
I	200	HIS	-	expression tag	UNP Q12408
I	201	HIS	-	expression tag	UNP Q12408

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



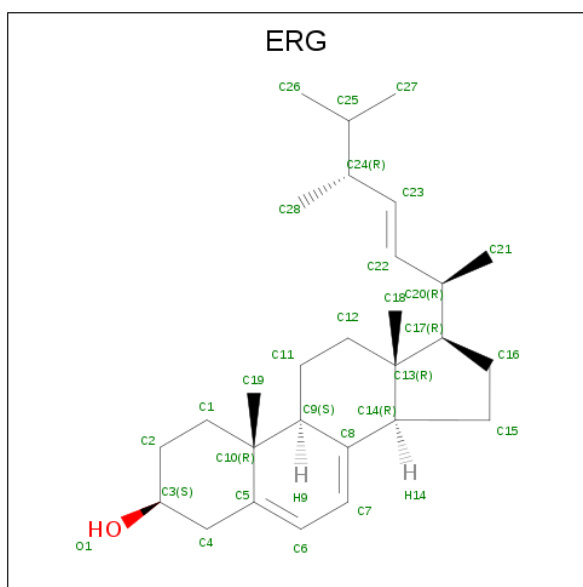
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
			Total	C	N				O
2	J	2	28	16	2	10	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



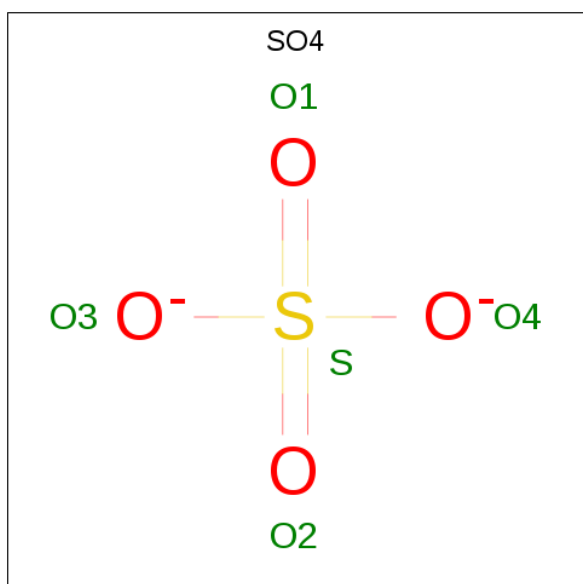
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	Total 14	C 8	N 1	O 5	0	0
3	B	1	Total 14	C 8	N 1	O 5	0	0
3	C	1	Total 14	C 8	N 1	O 5	0	0
3	D	1	Total 14	C 8	N 1	O 5	0	0
3	E	1	Total 14	C 8	N 1	O 5	0	0
3	F	1	Total 14	C 8	N 1	O 5	0	0
3	G	1	Total 14	C 8	N 1	O 5	0	0
3	H	1	Total 14	C 8	N 1	O 5	0	0

- Molecule 4 is ERGOSTEROL (three-letter code: ERG) (formula: $C_{28}H_{44}O$).

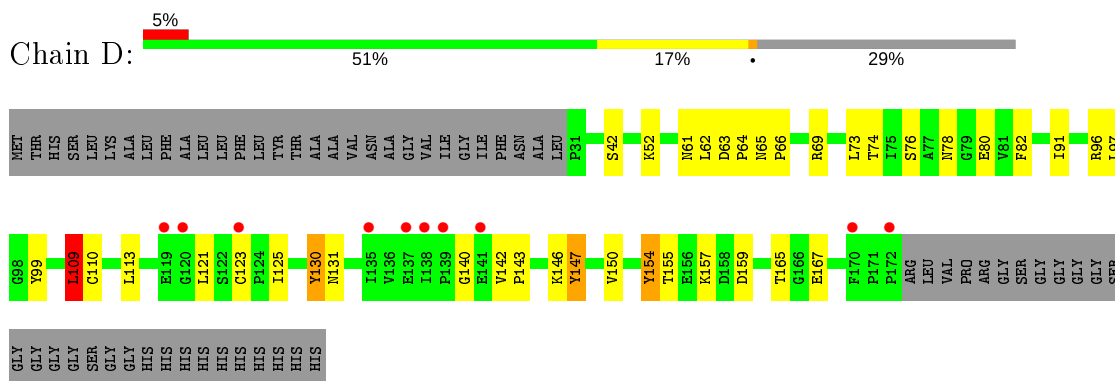


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 29 28 1	0	0
4	C	1	Total C O 29 28 1	0	0
4	C	1	Total C O 29 28 1	0	0
4	E	1	Total C O 29 28 1	0	0
4	I	1	Total C O 29 28 1	0	0

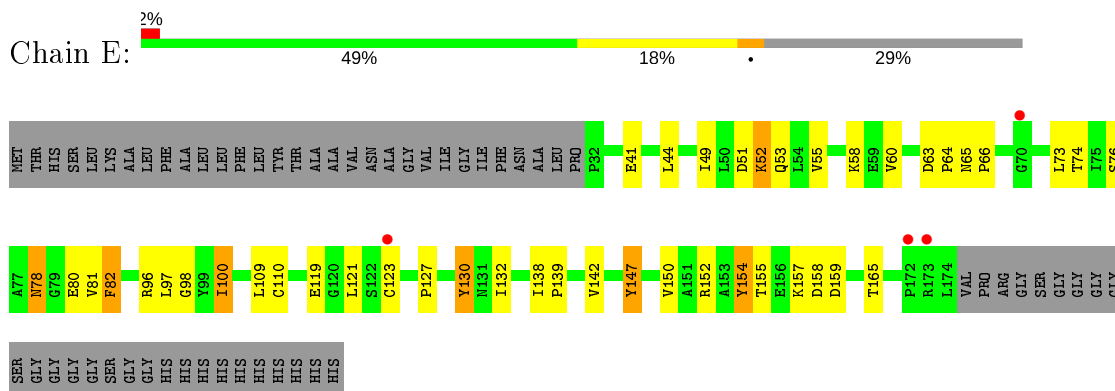
- Molecule 5 is SULFATE ION (three-letter code: SO₄) (formula: O₄S).



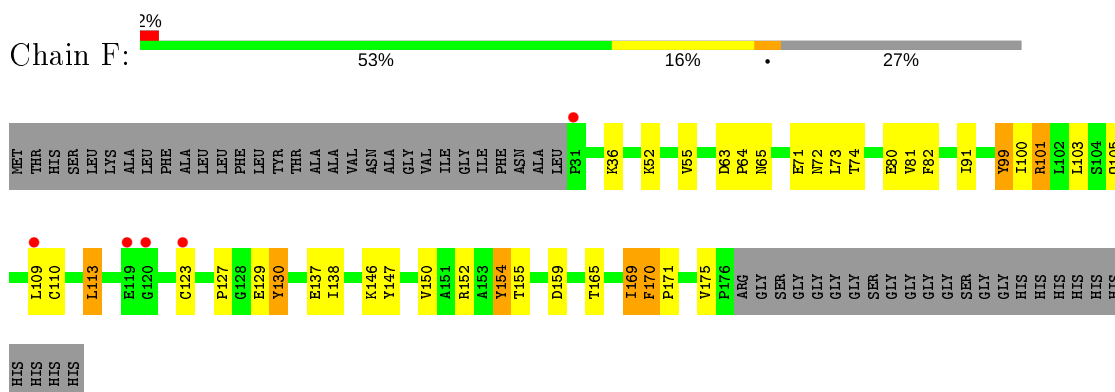
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	C	1	Total	O	S	0	0
			5	4	1		
5	C	1	Total	O	S	0	0
			5	4	1		
5	E	1	Total	O	S	0	0
			5	4	1		
5	F	1	Total	O	S	0	0
			5	4	1		
5	F	1	Total	O	S	0	0
			5	4	1		
5	F	1	Total	O	S	0	0
			5	4	1		
5	F	1	Total	O	S	0	0
			5	4	1		
5	G	1	Total	O	S	0	0
			5	4	1		
5	H	1	Total	O	S	0	0
			5	4	1		
5	H	1	Total	O	S	0	0
			5	4	1		
5	H	1	Total	O	S	0	0
			5	4	1		
5	I	1	Total	O	S	0	0
			5	4	1		
5	I	1	Total	O	S	0	0
			5	4	1		



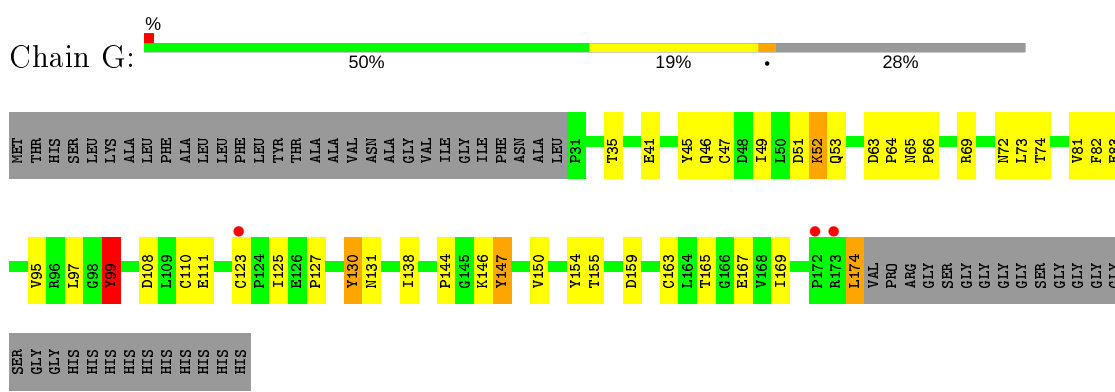
● Molecule 1: Phosphatidylglycerol/phosphatidylinositol transfer protein



● Molecule 1: Phosphatidylglycerol/phosphatidylinositol transfer protein



● Molecule 1: Phosphatidylglycerol/phosphatidylinositol transfer protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α , β , γ	215.39Å 215.39Å 129.81Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.75 – 2.90 48.06 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.75-2.90) 100.0 (48.06-2.90)	Depositor EDS
R_{merge}	0.33	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.24 (at 2.91Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.226 , 0.257 0.226 , 0.256	Depositor DCC
R_{free} test set	1990 reflections (2.62%)	wwPDB-VP
Wilson B-factor (Å ²)	65.8	Xtrriage
Anisotropy	0.026	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 55.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.023 for h,-h-k,-l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	10486	wwPDB-VP
Average B, all atoms (Å ²)	69.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.77% 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: ERG, NAG, SO4

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	0.47	0/1148	0.78	0/1568
1	B	0.57	1/1124 (0.1%)	0.88	2/1533 (0.1%)
1	C	0.50	0/1174	0.77	1/1604 (0.1%)
1	D	0.49	0/1129	0.82	4/1543 (0.3%)
1	E	0.50	0/1140	0.83	2/1556 (0.1%)
1	F	0.53	0/1163	0.85	3/1590 (0.2%)
1	G	0.52	0/1148	0.83	1/1568 (0.1%)
1	H	0.49	0/1153	0.79	0/1576
1	I	0.46	0/1148	0.75	0/1568
All	All	0.50	1/10327 (0.0%)	0.81	13/14106 (0.1%)

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
1	F	0	1
1	G	0	1
All	All	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	119	GLU	CB-CG	6.63	1.64	1.52

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	113	LEU	CB-CG-CD2	9.51	127.17	111.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	100	ILE	CA-CB-CG1	-8.28	95.27	111.00
1	D	96	ARG	CG-CD-NE	7.90	128.38	111.80
1	D	109	LEU	CB-CG-CD1	6.53	122.11	111.00
1	D	96	ARG	NE-CZ-NH1	-6.01	117.29	120.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	F	170	PHE	Peptide
1	G	99	TYR	Sidechain

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	1125	0	1115	37	0
1	B	1103	0	1090	25	0
1	C	1150	0	1144	31	0
1	D	1106	0	1091	25	1
1	E	1118	0	1108	36	0
1	F	1139	0	1131	31	1
1	G	1125	0	1115	34	0
1	H	1130	0	1119	22	0
1	I	1125	0	1115	23	0
2	J	28	0	25	0	0
3	A	14	0	13	0	0
3	B	14	0	13	0	0
3	C	14	0	13	0	0
3	D	14	0	13	0	0
3	E	14	0	13	0	0
3	F	14	0	13	1	0
3	G	14	0	13	1	0
3	H	14	0	13	0	0
4	A	29	0	44	1	0
4	C	58	0	88	9	0
4	E	29	0	44	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	I	29	0	43	6	0
5	A	15	0	0	0	0
5	C	10	0	0	0	0
5	E	5	0	0	0	0
5	F	20	0	0	2	0
5	G	5	0	0	0	0
5	H	15	0	0	0	0
5	I	10	0	0	0	0
All	All	10486	0	10376	253	1

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 12.

The worst 5 of 253 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:D:146:LYS:HE2	1:D:167:GLU:OE2	1.63	0.97
1:B:69:ARG:HH12	1:B:173:ARG:HA	1.38	0.88
4:C:302:ERG:H263	4:C:302:ERG:H22	1.60	0.84
1:E:63:ASP:HB2	1:E:74:THR:HB	1.64	0.80
1:B:155:THR:HG22	1:B:159:ASP:H	1.47	0.79

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:99:TYR:O	1:F:101:ARG:NH1[6_555]	2.02	0.18

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	142/201 (71%)	138 (97%)	4 (3%)	0	100	100
1	B	139/201 (69%)	134 (96%)	5 (4%)	0	100	100
1	C	145/201 (72%)	141 (97%)	4 (3%)	0	100	100
1	D	140/201 (70%)	137 (98%)	3 (2%)	0	100	100
1	E	141/201 (70%)	135 (96%)	6 (4%)	0	100	100
1	F	144/201 (72%)	140 (97%)	3 (2%)	1 (1%)	22	54
1	G	142/201 (71%)	136 (96%)	6 (4%)	0	100	100
1	H	143/201 (71%)	140 (98%)	3 (2%)	0	100	100
1	I	142/201 (71%)	138 (97%)	4 (3%)	0	100	100
All	All	1278/1809 (71%)	1239 (97%)	38 (3%)	1 (0%)	51	82

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	171	PRO

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	130/168 (77%)	125 (96%)	5 (4%)	33	67
1	B	127/168 (76%)	118 (93%)	9 (7%)	14	40
1	C	133/168 (79%)	129 (97%)	4 (3%)	41	75
1	D	128/168 (76%)	122 (95%)	6 (5%)	26	59
1	E	129/168 (77%)	122 (95%)	7 (5%)	22	54
1	F	132/168 (79%)	127 (96%)	5 (4%)	33	67
1	G	130/168 (77%)	122 (94%)	8 (6%)	18	47
1	H	130/168 (77%)	124 (95%)	6 (5%)	27	60
1	I	130/168 (77%)	126 (97%)	4 (3%)	40	74
All	All	1169/1512 (77%)	1115 (95%)	54 (5%)	27	60

5 of 54 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	52	LYS
1	E	154	TYR
1	H	154	TYR
1	E	78	ASN
1	E	100	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	65	ASN
1	C	46	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](#)

2 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
2	NAG	J	1	1,2	14,14,15	0.33	0	17,19,21	0.80	1 (5%)
2	NAG	J	2	2	14,14,15	0.30	0	17,19,21	0.71	1 (5%)

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
2	NAG	J	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	J	2	2	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	J	1	NAG	C1-O5-C5	2.71	115.86	112.19
2	J	2	NAG	C1-O5-C5	2.37	115.40	112.19

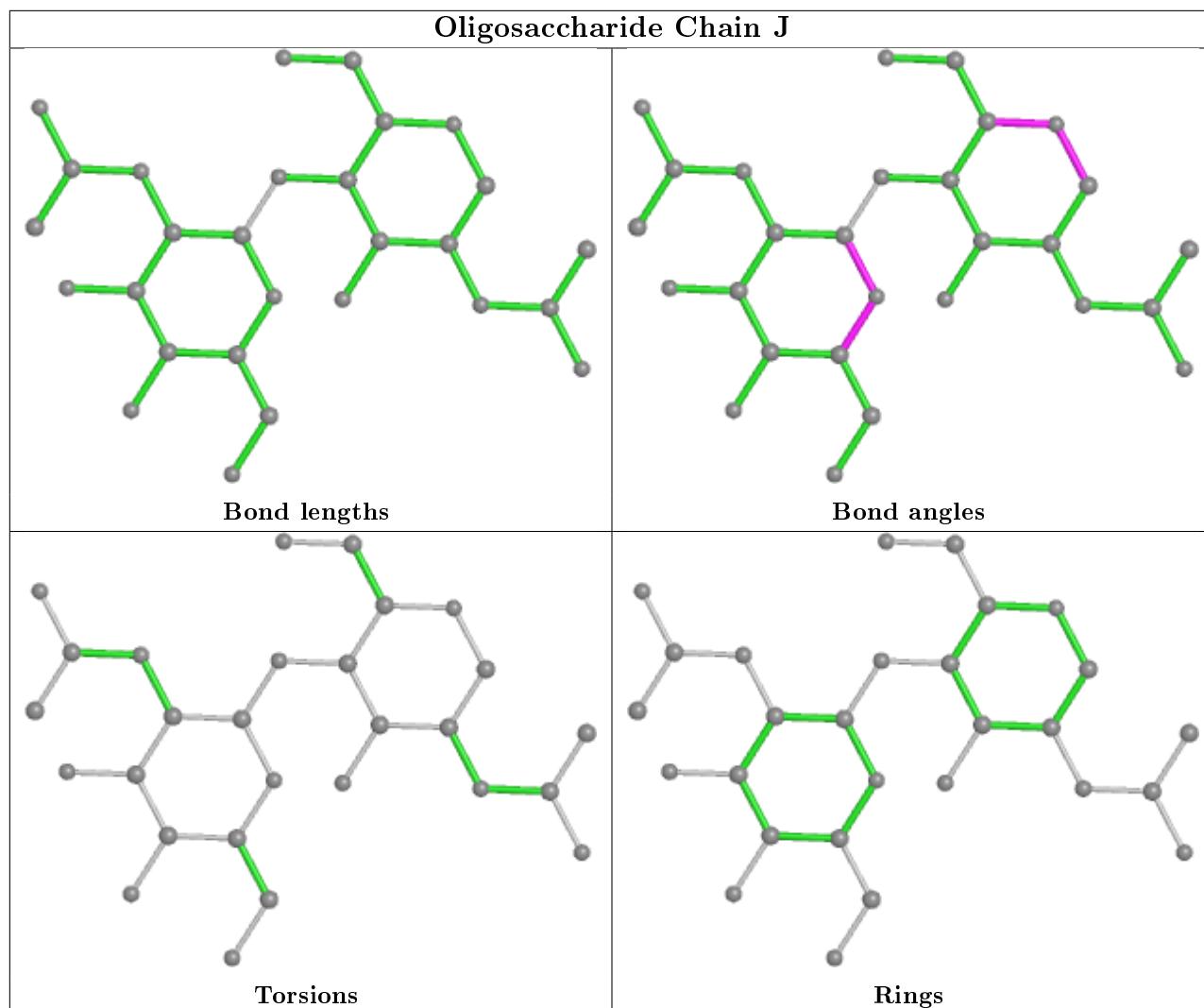
There are no chirality outliers.

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](#)

29 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	SO4	A	305	-	4,4,4	0.12	0	6,6,6	0.33	0
4	ERG	E	302	-	31,32,32	0.19	0	47,50,50	0.50	0
5	SO4	F	303	-	4,4,4	0.13	0	6,6,6	0.12	0
4	ERG	C	302	-	31,32,32	0.18	0	47,50,50	0.47	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	G	301	1	14,14,15	0.34	0	17,19,21	0.52	0
3	NAG	H	301	1	14,14,15	0.39	0	17,19,21	0.99	1 (5%)
5	SO4	H	304	-	4,4,4	0.13	0	6,6,6	0.19	0
3	NAG	F	301	1	14,14,15	0.38	0	17,19,21	0.64	1 (5%)
5	SO4	F	304	-	4,4,4	0.15	0	6,6,6	0.20	0
5	SO4	I	305	-	4,4,4	0.13	0	6,6,6	0.17	0
5	SO4	F	305	-	4,4,4	0.17	0	6,6,6	0.15	0
5	SO4	A	304	-	4,4,4	0.20	0	6,6,6	0.44	0
5	SO4	F	302	-	4,4,4	0.11	0	6,6,6	0.16	0
5	SO4	C	304	-	4,4,4	0.15	0	6,6,6	0.11	0
3	NAG	C	301	1	14,14,15	0.43	0	17,19,21	0.49	0
3	NAG	A	301	1	14,14,15	0.47	0	17,19,21	0.59	0
3	NAG	B	301	1	14,14,15	0.47	0	17,19,21	0.54	0
5	SO4	H	302	-	4,4,4	0.16	0	6,6,6	0.07	0
5	SO4	I	303	-	4,4,4	0.15	0	6,6,6	0.26	0
5	SO4	C	303	-	4,4,4	0.15	0	6,6,6	0.12	0
5	SO4	E	303	-	4,4,4	0.14	0	6,6,6	0.10	0
3	NAG	E	301	1	14,14,15	0.67	0	17,19,21	0.46	0
4	ERG	I	304	-	31,32,32	0.35	0	47,50,50	1.07	4 (8%)
5	SO4	H	303	-	4,4,4	0.12	0	6,6,6	0.17	0
4	ERG	A	302	-	31,32,32	0.21	0	47,50,50	0.47	0
5	SO4	A	303	-	4,4,4	0.15	0	6,6,6	0.21	0
3	NAG	D	301	1	14,14,15	0.62	0	17,19,21	0.70	1 (5%)
4	ERG	C	305	-	31,32,32	0.49	0	47,50,50	1.20	3 (6%)
5	SO4	G	302	-	4,4,4	0.12	0	6,6,6	0.17	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
3	NAG	F	301	1	-	2/6/23/26	0/1/1/1
3	NAG	E	301	1	-	1/6/23/26	0/1/1/1
4	ERG	E	302	-	-	8/13/71/71	0/4/4/4
3	NAG	A	301	1	-	2/6/23/26	0/1/1/1
4	ERG	A	302	-	-	5/13/71/71	0/4/4/4
3	NAG	C	301	1	-	2/6/23/26	0/1/1/1
3	NAG	D	301	1	-	0/6/23/26	0/1/1/1
4	ERG	C	305	-	-	11/13/71/71	0/4/4/4

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	B	301	1	-	2/6/23/26	0/1/1/1
3	NAG	G	301	1	-	3/6/23/26	0/1/1/1
3	NAG	H	301	1	-	1/6/23/26	0/1/1/1
4	ERG	C	302	-	-	3/13/71/71	0/4/4/4
4	ERG	I	304	-	-	8/13/71/71	0/4/4/4

There are no bond length outliers.

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	305	ERG	C16-C15-C14	-4.10	98.55	105.30
3	H	301	NAG	C1-O5-C5	3.43	116.85	112.19
4	C	305	ERG	C21-C20-C22	-3.04	102.64	109.99
4	I	304	ERG	C13-C14-C8	2.91	119.13	113.48
4	C	305	ERG	C11-C9-C8	2.90	117.83	111.33

There are no chirality outliers.

5 of 48 torsion outliers are listed below:

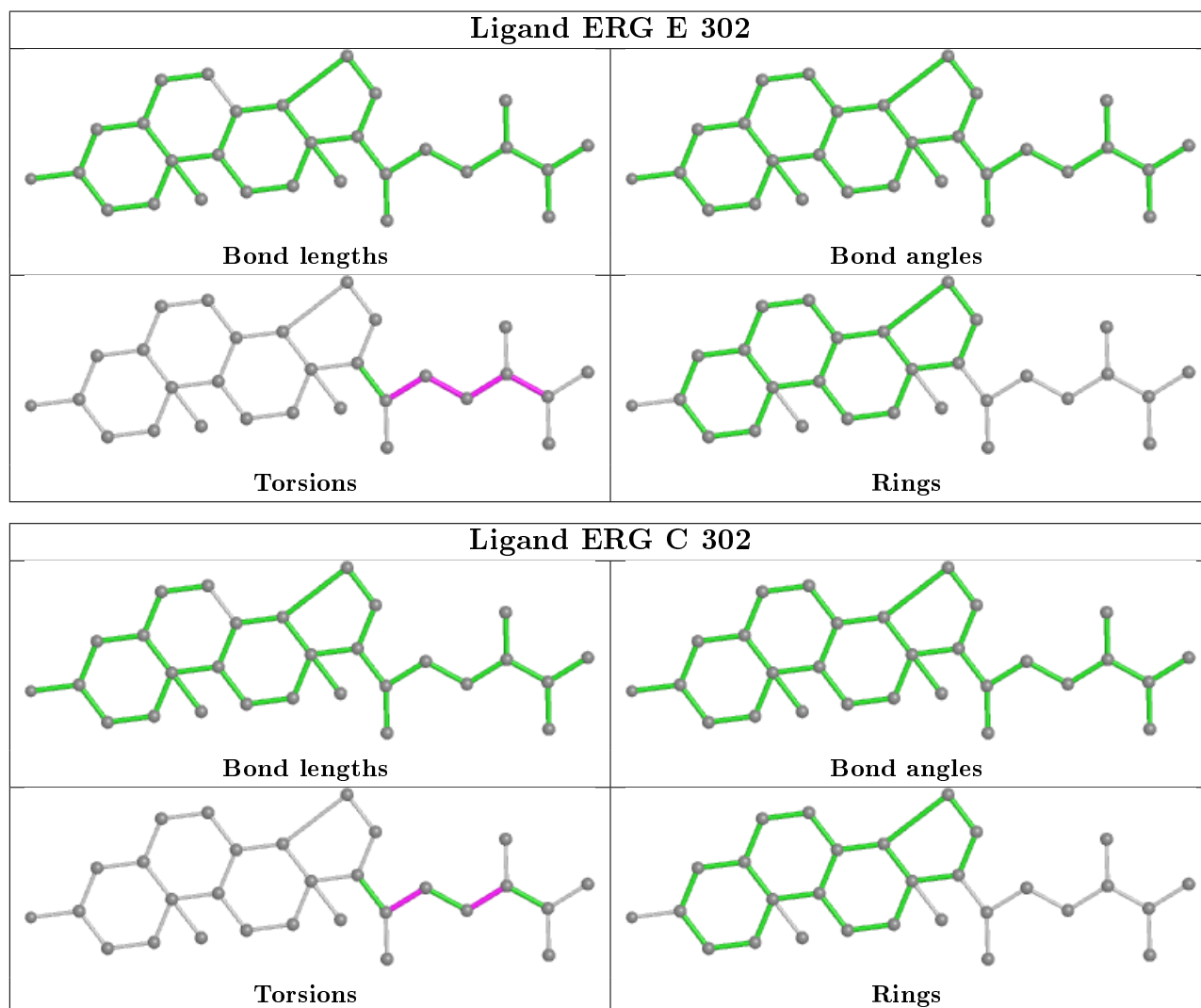
Mol	Chain	Res	Type	Atoms
4	E	302	ERG	C20-C22-C23-C24
4	C	302	ERG	C22-C23-C24-C25
4	I	304	ERG	C13-C17-C20-C21
4	I	304	ERG	C16-C17-C20-C21
4	I	304	ERG	C16-C17-C20-C22

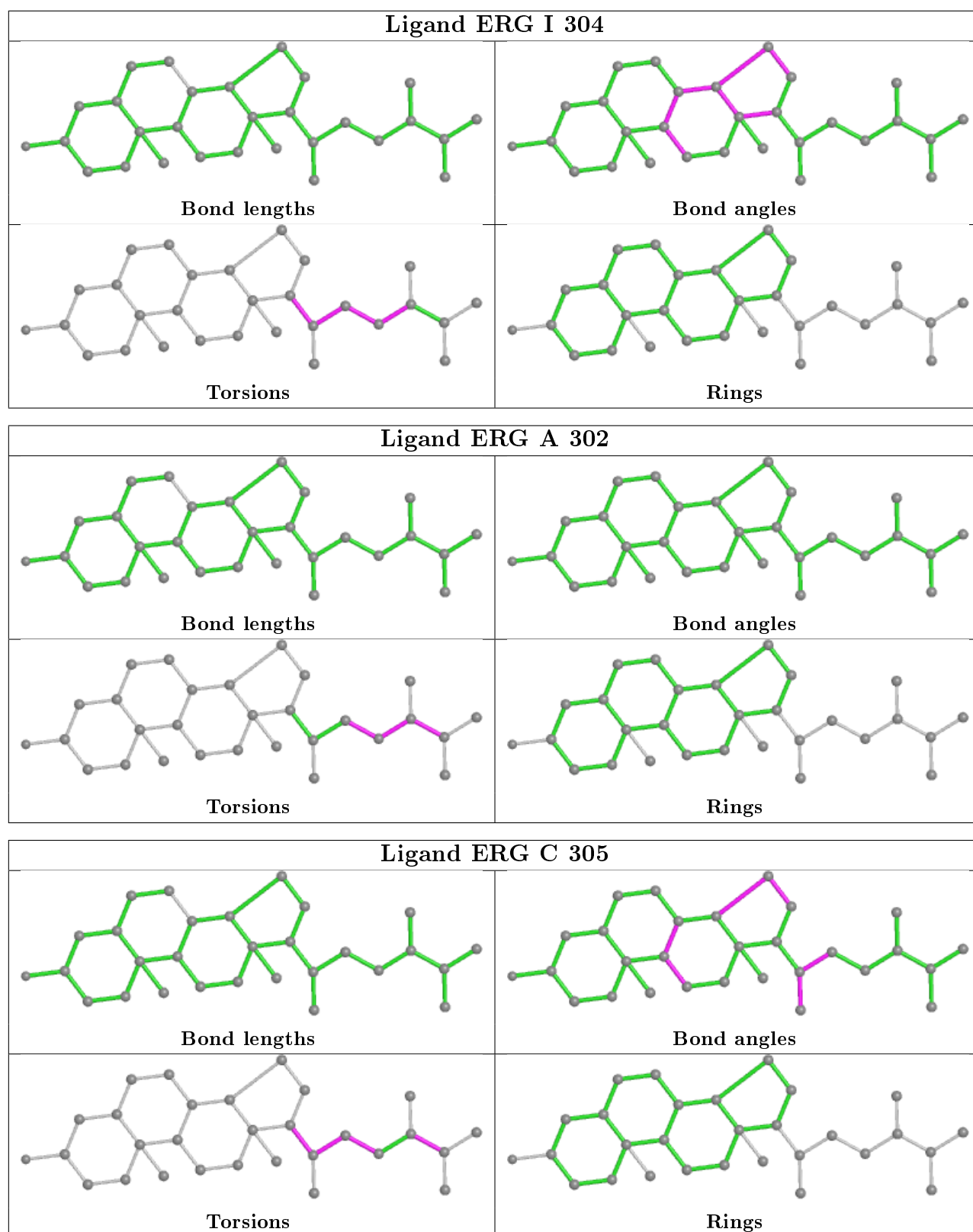
There are no ring outliers.

9 monomers are involved in 22 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	302	ERG	3	0
4	C	302	ERG	1	0
3	G	301	NAG	1	0
3	F	301	NAG	1	0
5	F	304	SO4	1	0
5	F	305	SO4	1	0
4	I	304	ERG	6	0
4	A	302	ERG	1	0
4	C	305	ERG	8	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data [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	144/201 (71%)	0.02	4 (2%) 53 49	33, 60, 117, 147	0
1	B	141/201 (70%)	-0.02	4 (2%) 53 49	28, 52, 94, 140	0
1	C	147/201 (73%)	-0.15	2 (1%) 75 75	27, 49, 95, 140	0
1	D	142/201 (70%)	0.30	10 (7%) 16 12	47, 97, 152, 172	0
1	E	143/201 (71%)	0.07	4 (2%) 53 49	42, 69, 116, 161	0
1	F	146/201 (72%)	0.11	5 (3%) 45 40	33, 63, 111, 162	0
1	G	144/201 (71%)	-0.14	3 (2%) 63 61	30, 52, 98, 144	0
1	H	145/201 (72%)	-0.11	1 (0%) 87 87	27, 50, 96, 142	0
1	I	144/201 (71%)	-0.08	1 (0%) 87 87	38, 62, 115, 137	0
All	All	1296/1809 (71%)	-0.00	34 (2%) 56 52	27, 60, 123, 172	0

The worst 5 of 34 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	119	GLU	4.7
1	D	139	PRO	4.1
1	F	123	CYS	4.0
1	D	141	GLU	3.6
1	E	123	CYS	3.6

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

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

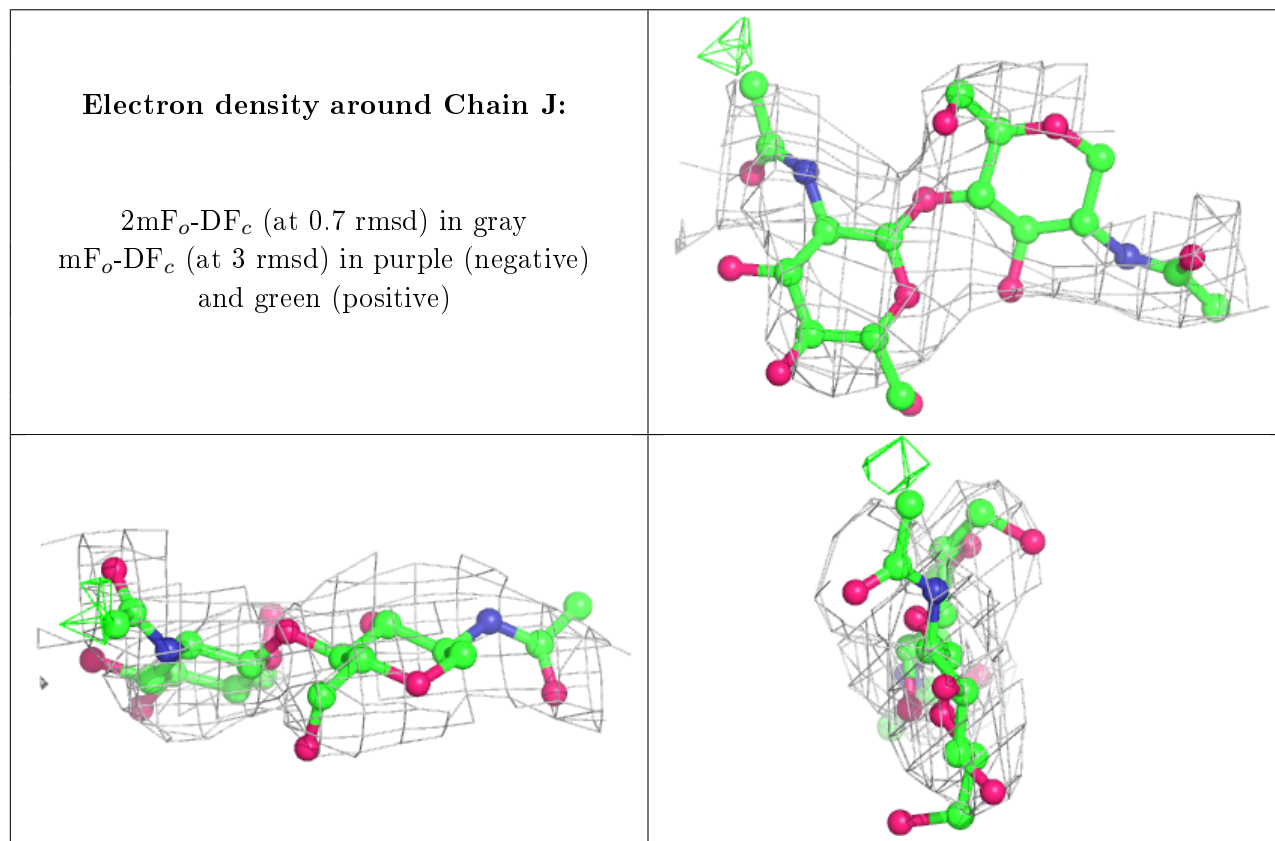
6.3 Carbohydrates [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	J	2	14/15	0.77	0.46	131,156,158,158	0
2	NAG	J	1	14/15	0.84	0.28	121,132,141,150	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	SO4	A	303	5/5	0.76	0.48	147,153,155,157	0
5	SO4	H	303	5/5	0.77	0.17	133,133,139,139	0
5	SO4	C	304	5/5	0.80	0.35	149,150,156,157	0
3	NAG	H	301	14/15	0.81	0.40	122,131,139,148	0

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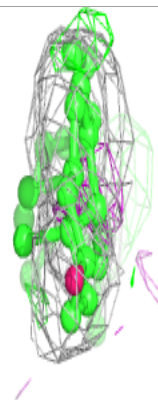
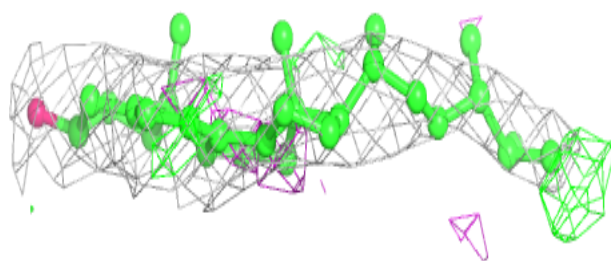
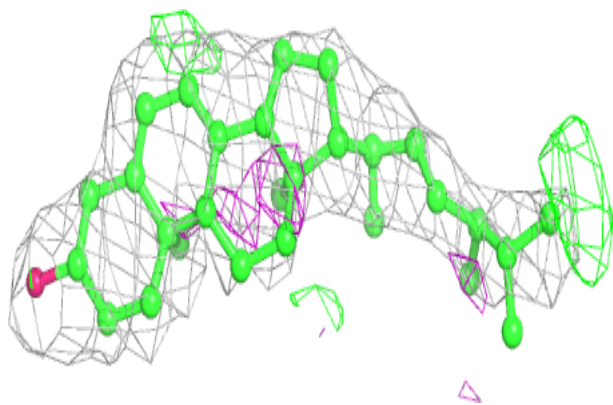
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	NAG	A	301	14/15	0.81	0.26	114,136,138,140	0
4	ERG	C	305	29/29	0.81	0.51	58,87,104,110	0
5	SO4	H	302	5/5	0.82	0.17	190,191,202,262	0
3	NAG	G	301	14/15	0.82	0.26	108,119,124,126	0
3	NAG	E	301	14/15	0.83	0.32	118,128,135,136	0
4	ERG	A	302	29/29	0.83	0.60	66,101,111,115	0
5	SO4	F	304	5/5	0.85	0.27	124,125,131,133	0
5	SO4	F	302	5/5	0.86	0.23	128,134,136,138	0
4	ERG	C	302	29/29	0.86	0.56	72,91,112,113	0
3	NAG	D	301	14/15	0.86	0.38	142,152,170,181	0
4	ERG	E	302	29/29	0.86	0.58	75,93,104,107	0
3	NAG	F	301	14/15	0.87	0.21	98,112,126,128	0
3	NAG	C	301	14/15	0.87	0.24	92,113,120,124	0
5	SO4	I	305	5/5	0.88	0.22	139,142,144,144	0
3	NAG	B	301	14/15	0.89	0.27	121,128,134,139	0
5	SO4	C	303	5/5	0.89	0.15	125,126,127,131	0
5	SO4	G	302	5/5	0.89	0.30	123,126,127,130	0
5	SO4	F	303	5/5	0.90	0.27	137,137,140,140	0
5	SO4	E	303	5/5	0.91	0.47	150,153,156,156	0
4	ERG	I	304	29/29	0.91	0.58	78,94,103,107	0
5	SO4	H	304	5/5	0.94	0.16	107,111,115,117	0
5	SO4	A	305	5/5	0.95	0.16	90,100,104,104	0
5	SO4	F	305	5/5	0.95	0.34	121,122,124,132	0
5	SO4	A	304	5/5	0.99	0.18	63,65,77,78	0
5	SO4	I	303	5/5	0.99	0.17	61,66,76,78	0

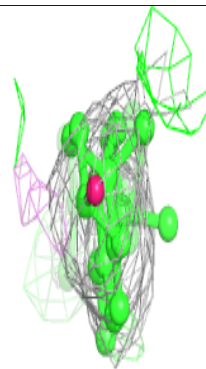
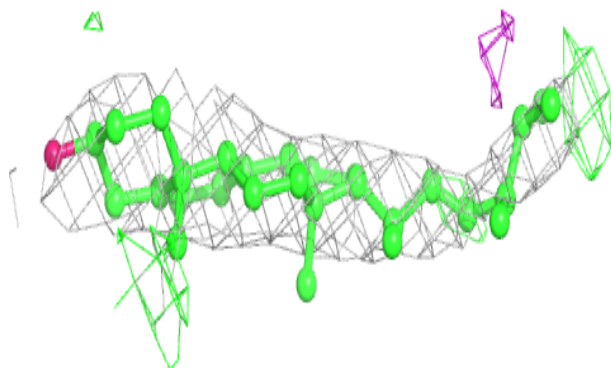
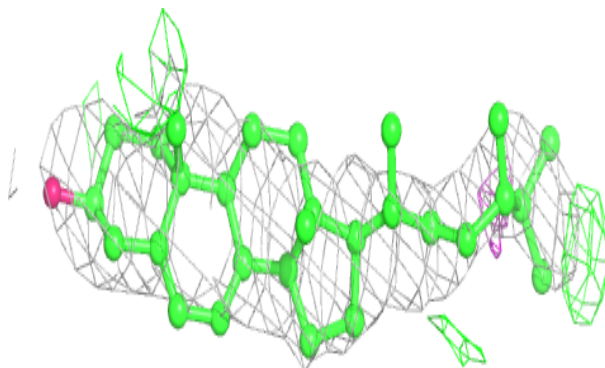
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

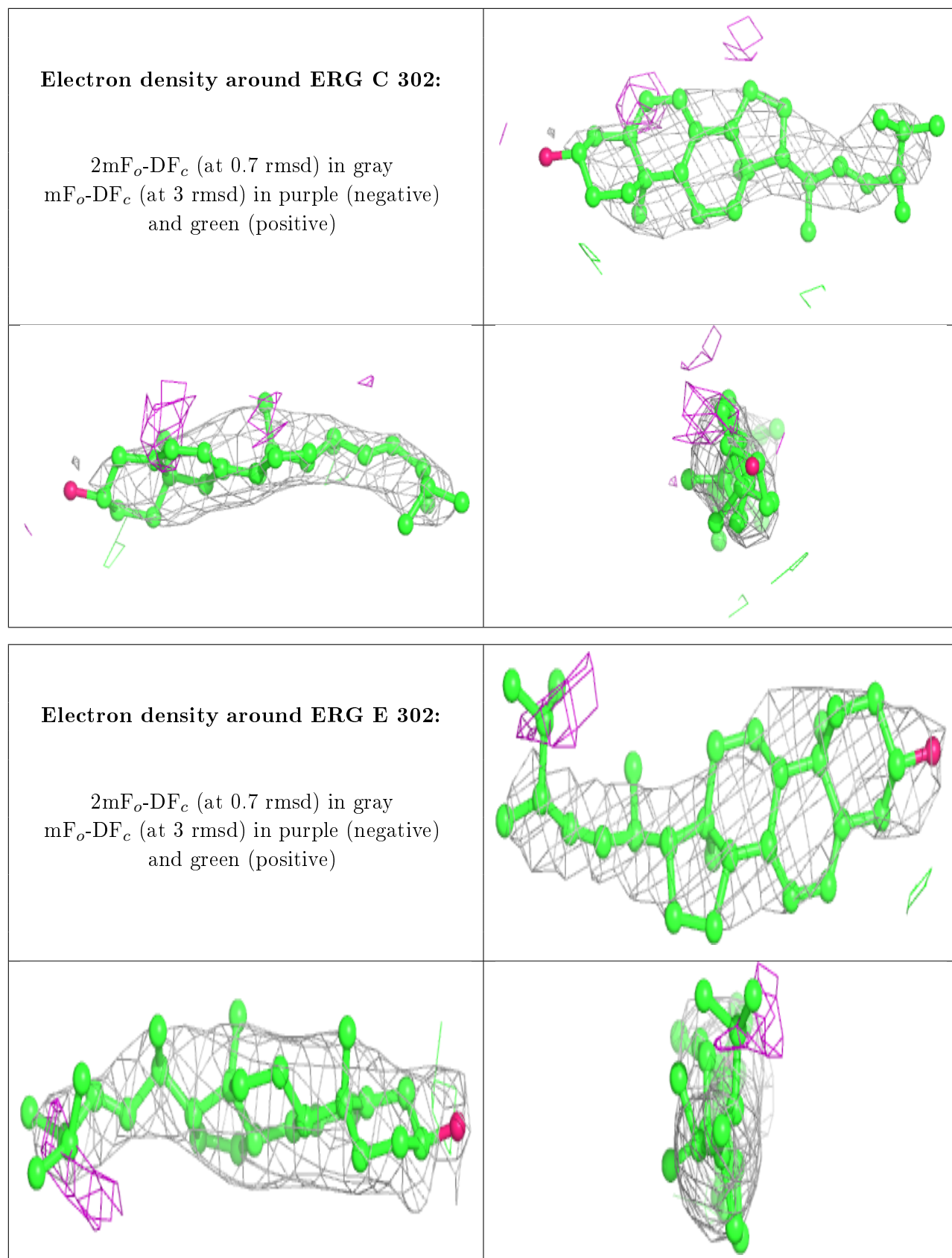
Electron density around ERG C 305:

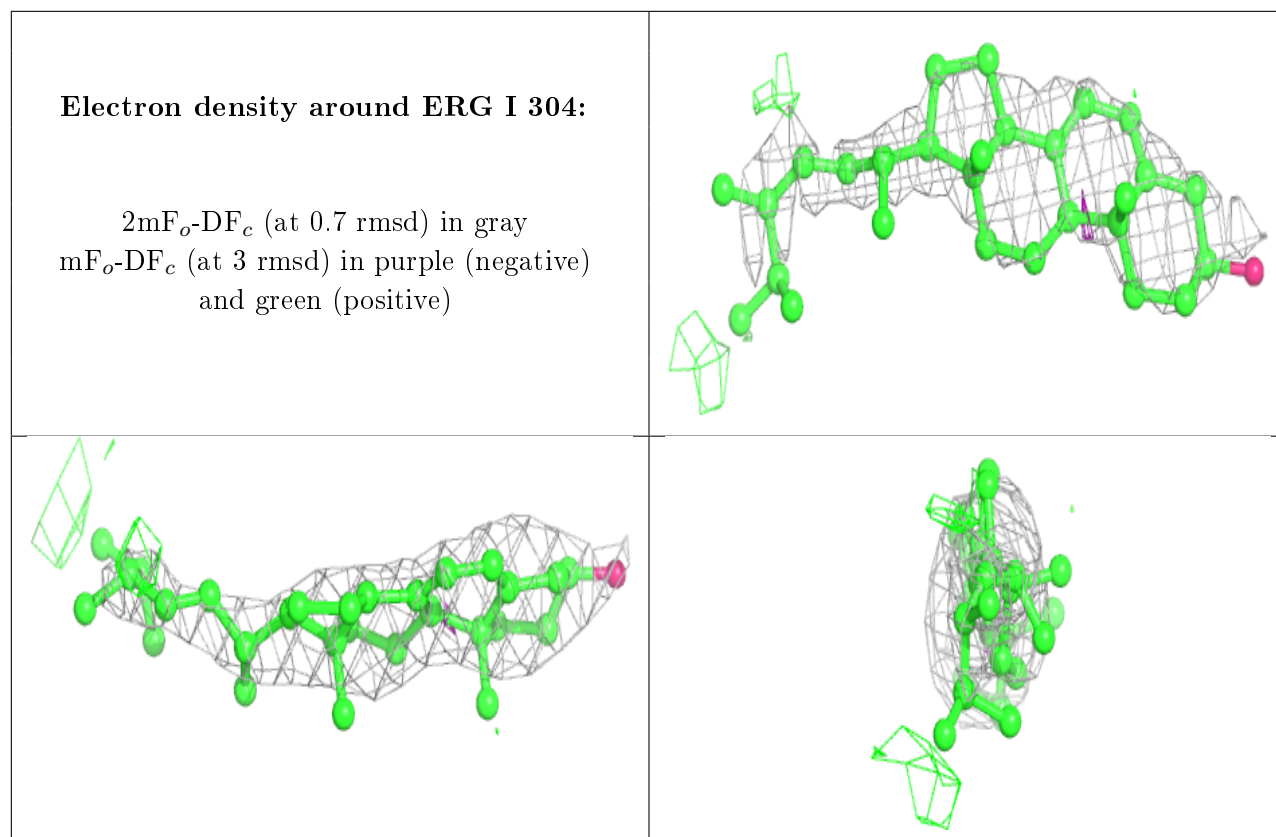
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around ERG A 302:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)







6.5 Other polymers [i](#)

There are no such residues in this entry.