



wwPDB EM Validation Summary Report ⓘ

Oct 13, 2024 – 12:31 am BST

PDB ID : 7BAN
EMDB ID : EMD-12125
Title : human Teneurin4 Mut C2
Authors : Meijer, D.H.; Janssen, B.J.C.
Deposited on : 2020-12-16
Resolution : 2.70 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev113
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

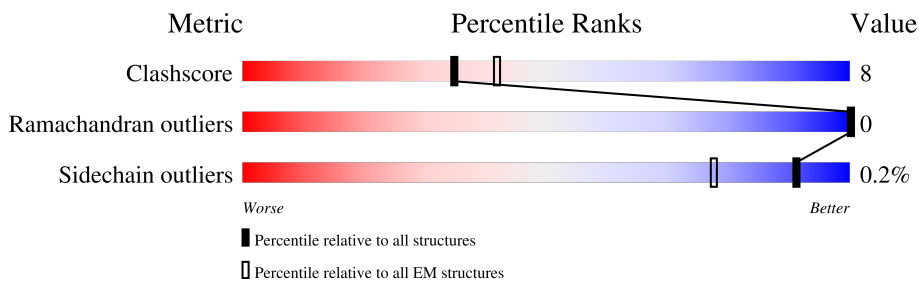
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



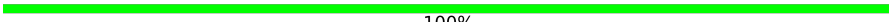
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	1932	 21% 79% 19%
1	B	1932	 21% 79% 19%
2	C	2	 100%
2	D	2	 100%
2	E	2	 100%
2	F	2	 100%
2	G	2	 100%
2	H	2	 100%

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Mol	Chain	Length	Quality of chain
2	I	2	 100%
2	J	2	 100%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 30612 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 Teneurin-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1904	Total	C	N	O	S	0	0
			15093	9515	2625	2879	74		
1	B	1904	Total	C	N	O	S	0	0
			15093	9515	2625	2879	74		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2585	CYS	SER	engineered mutation	UNP Q6N022
B	2585	CYS	SER	engineered mutation	UNP Q6N022

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



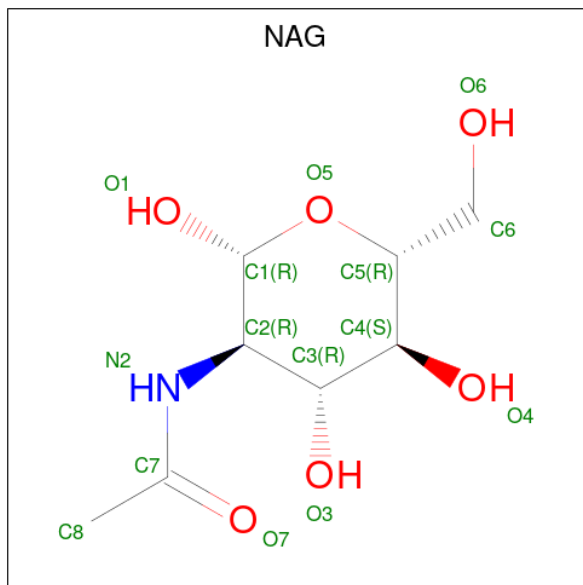
Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	C	2	Total	C	N	O	0	0
			28	16	2	10		
2	D	2	Total	C	N	O	0	0
			28	16	2	10		
2	E	2	Total	C	N	O	0	0
			28	16	2	10		
2	F	2	Total	C	N	O	0	0
			28	16	2	10		
2	G	2	Total	C	N	O	0	0
			28	16	2	10		
2	H	2	Total	C	N	O	0	0
			28	16	2	10		
2	I	2	Total	C	N	O	0	0
			28	16	2	10		

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

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$) (labeled as "Ligand of Interest" by depositor).



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

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

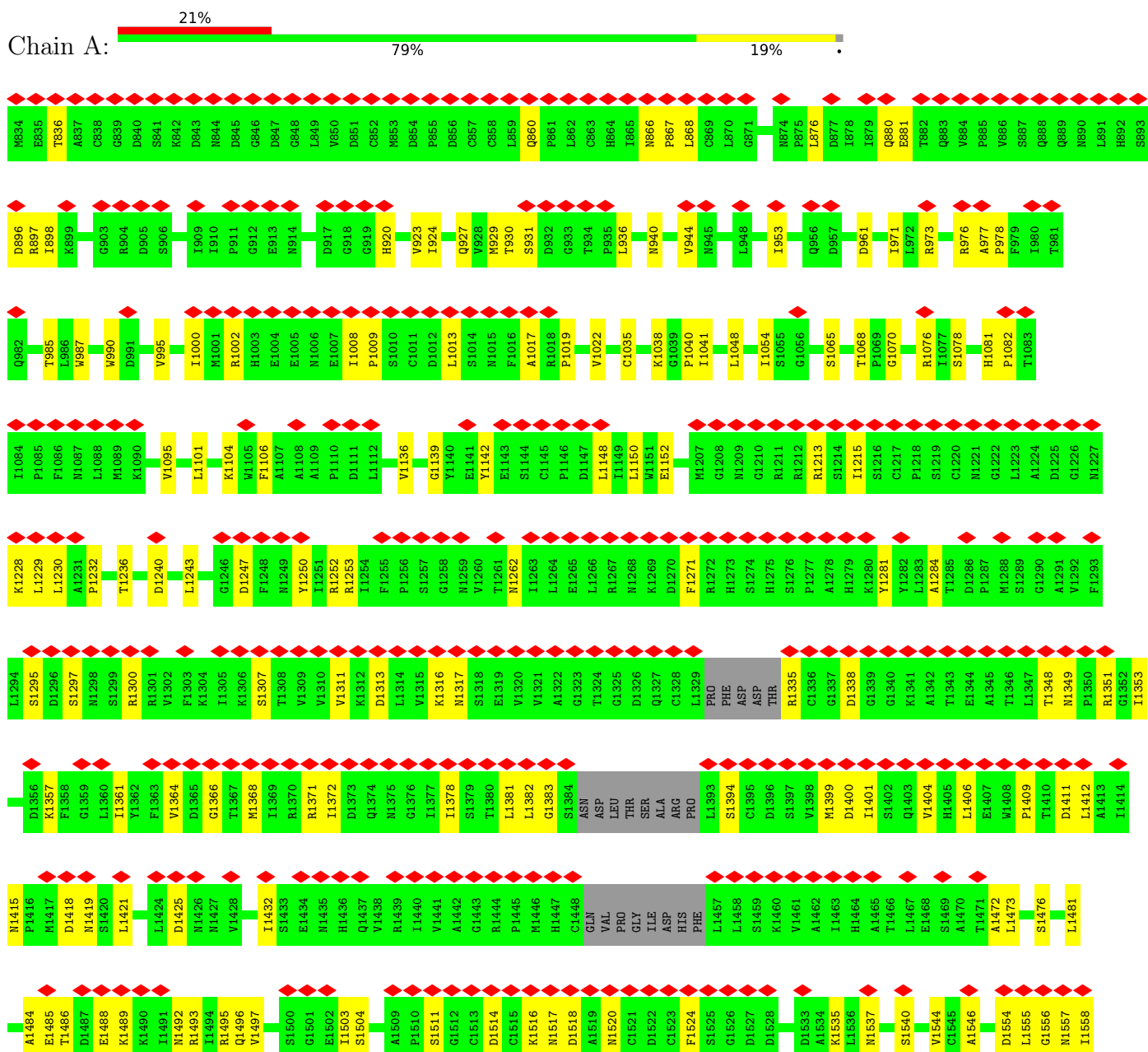
- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

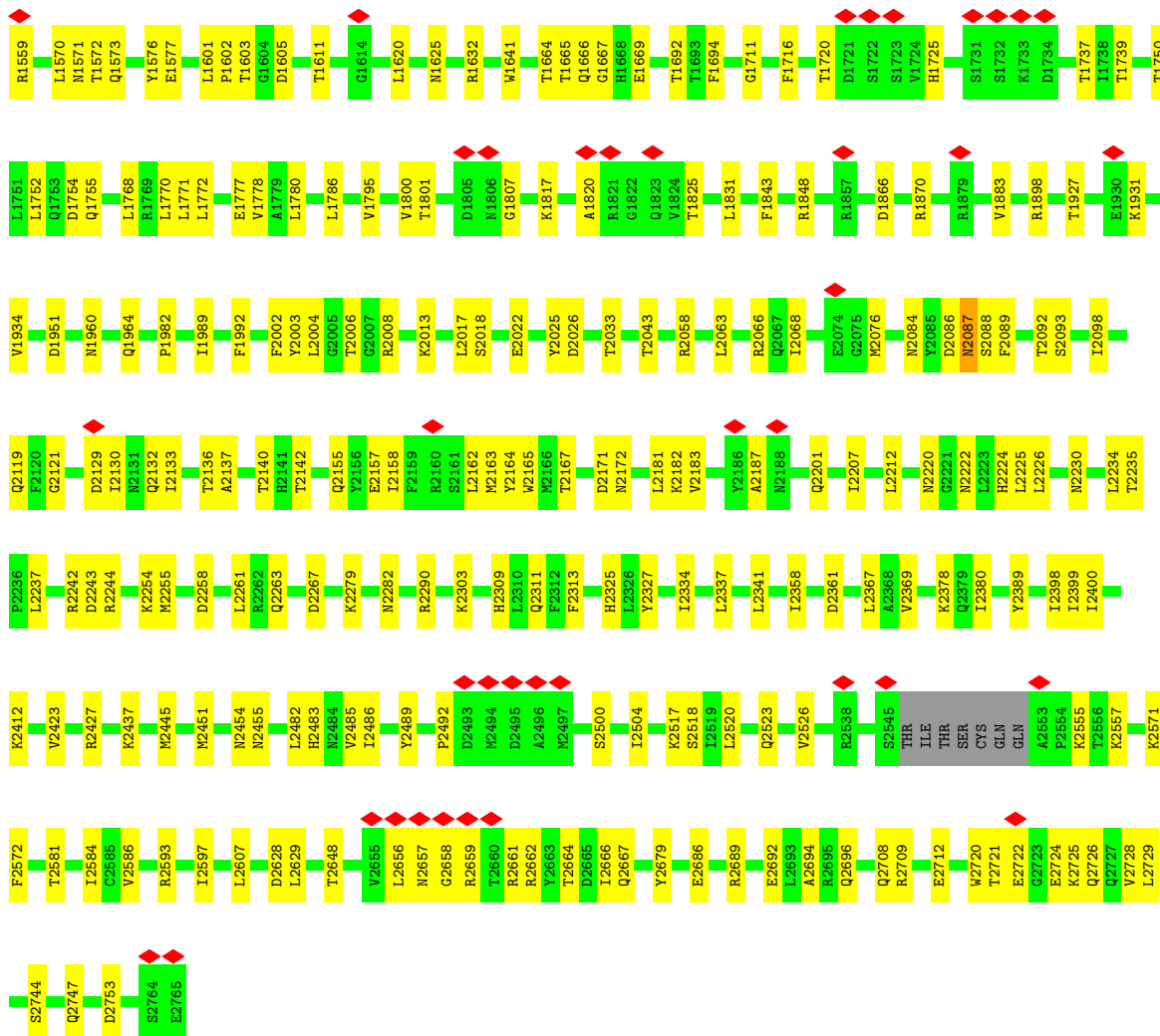
Mol	Chain	Residues	Atoms		AltConf
4	A	3	Total	Ca	0
			3	3	
4	B	3	Total	Ca	0
			3	3	

3 Residue-property plots

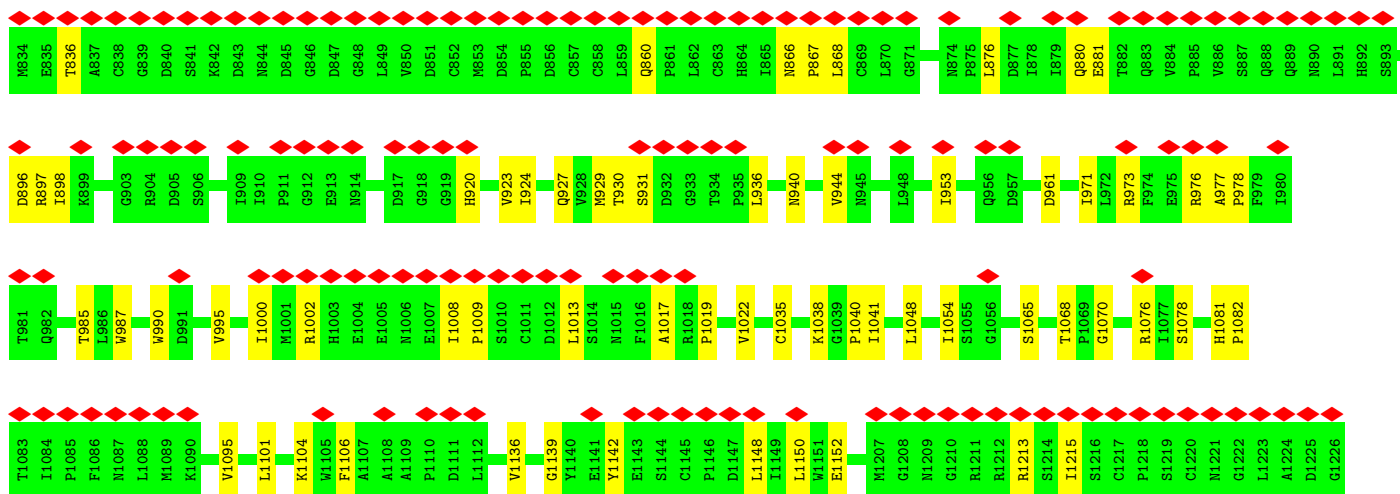
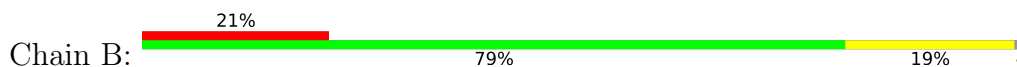
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Teneurin-4





• Molecule 1: Teneurin-4



Q2747	T2881	R2427	L2237	E2130	V1934	D1764	L1570	E1485	M1415	I1953	F1293	M1227
D2753	I2584	K2437	R2242	G2121	M1960	Q1755	M1571	T1486	P1416	D1356	L1294	K1228
S2764	C2585	I2130	R2244	D2129	Q1964	L1768	Y1576	D1487	M1417	L1357	S1295	L1229
E2765	V2586	M2445	K2254	M2131	P1982	L1770	E1577	E1488	D1418	F1559	D1296	L1230
R2893	M2451	M2256	K2254	Q2132	L1772	L1771	L1601	K1489	S1420	L1359	S1297	A1231
I2597	M2454	D2258	D2258	I2133	I1989	L1772	P1602	K1490	L1421	L1360	N1298	P1232
D2628	M2455	L2261	F1992	T2136	E1777	V1778	G1604	I1491	T1362	I1361	R1300	T1236
L2629	F2262	A2137	F1992	A2137	V1778	L1780	D1605	N1492	D1425	F1362	R1301	D1240
T2648	H2483	Q2263	F2002	H2141	A1779	L1786	D1605	R1493	V1364	V1364	V1302	
V2655	M2484	D2267	G2005	T2142	L1786	G1614	G1614	Q1496	M1426	D1365	K1304	L1243
L2656	L2486	Q2155	T2007	Q2155	V1795	L1620	L1620	V1497	I1432	G1366	I1305	G1246
N2657	Y2489	E2157	G2007	E2157	G1807	M1625	E1434	S1500	E1434	M1368	K1306	D1247
G2658	P2492	F2158	R2008	F2158	T1801	R1632	N1435	E1501	N1435	I1369	S1307	F1248
R2659	D2493	R2159	K2013	R2159	D1805	R1632	H1436	E1502	H1436	R1370	N1308	N1249
T2660	M2494	S2161	L2017	R2160	G1807	M1641	V1438	I1503	Q1437	I1372	V1309	V1250
R2661	D2495	L2162	S2018	S2161	M1806	G1817	R1439	S1504	V1438	I1372	V1310	I1251
R2662	A2496	N2163	E2022	N2162	K1817	T1664	I1440	A1509	I1440	D1373	V1311	R1252
Y2663	M2497	M2164	Y2025	Q1666	A1820	Q1666	V1441	S1511	V1441	M1375	K1312	R1253
T2664	M2497	H2165	D2026	H2166	R1821	H1668	A1442	G1512	A1442	G1376	D1313	F1255
D2665	S2500	H2167	T2033	E1669	G1822	E1669	R1444	C1513	G1443	I1377	V1315	P1256
I2666	L2504	D2171	L2041	T1692	R1821	T1692	P1445	D1514	R1444	I1378	K1316	S1257
Q2667	T2510	N2172	K2042	Q1823	G1822	Q1823	M1446	M1517	M1446	S1379	V1317	G1258
Y2679	T2510	L2181	T2043	V1824	V1824	F1694	H1447	M1518	H1447	L1381	E1319	N1259
E2686	K2517	L2182	R2058	L1831	L1831	G1711	C1448	A1519	C1448	L1382	V1320	V1260
R2689	S2518	V2183	L2063	L1841	L1841	F1716	GLN	A1520	VAL	G1383	V1321	N1261
E2692	I2519	Y2186	L2063	D1842	D1842	F1716	PRO	M1520	PRO	S1384	A1322	I1263
L2693	Q2523	A2187	R2066	D1842	D1842	F1716	GLY	C1521	GLY	ASN	A1322	L1264
R2695	V2526	N2188	Q2067	F1843	F1843	T1720	ILE	C1522	ASP	ASP	G1323	E1265
Q2696	V2526	Q2201	I2068	R1848	R1848	D1721	ASP	C1523	LEU	ASP	G1325	L1266
Q2708	R2538	Q2201	E2074	I1852	I1852	S1722	HIS	F1524	THR	THR	G1326	R1267
R2709	S2545	I2207	G2075	R1857	R1857	S1723	PHE	S1525	SER	SER	Q1327	N1268
E2712	THR	L2212	M2076	D1866	D1866	H1725	L1457	D1527	ALA	ALA	C1328	N1269
W2720	ILE	N2220	M2084	D1866	D1866	S1731	L4458	D1528	L4458	ARG	D1270	D1270
T2721	THR	G2221	Y2085	R1870	R1870	S1732	S1459	D1528	K1460	PRO	L1329	F1271
E2722	SER	N2222	D2086	R1870	R1870	K1733	K1460	D1528	V1461	L1394	PRO	R1272
G2723	CYS	L2223	N2087	R1879	R1879	D1734	V1461	D1528	A1462	C1395	PHE	H1273
E2724	GLN	H2224	S2088	R1879	R1879	D1736	T1463	D1528	A1462	D1396	ASP	S1274
K2725	GLN	L2225	F2089	V1883	V1883	V1736	H1464	D1528	H1464	S1397	THR	H1275
Q2726	A2553	L2226	S2093	V1883	V1883	V1737	A1465	D1528	A1465	V1398	C1336	S1276
Q2727	P2554	N2230	I2098	R1898	R1898	I1738	A1465	D1528	A1465	M1399	G1337	P1277
V2728	K2555	L2234	I2098	R1898	R1898	T1739	T1466	D1528	T1466	D1400	D1338	A1278
L2729	K2557	L2235	Q2119	T1927	T1927	L1739	E1468	D1528	E1468	I1401	G1339	H1279
S2744	K2571	T2235	Q2119	T1927	T1927	T1750	S1468	D1528	S1468	I1401	G1340	K1280
F2572	F2572	P2236	Q2119	E1930	E1930	L1751	C1945	D1528	A1470	Q1403	K1341	Y1281
						L1752	A1546	D1528	A1471	V1404	A1342	Y1281
						Q1753	A1546	D1528	A1472	H1405	T1343	T1285
							D1564	D1528	L1473	H1405	T1343	T1285
							L1555	D1528	L1476	L1406	E1344	D1286
							G1556	D1528	S1476	L1406	E1344	D1286
							N1557	D1528	L1481	V1408	A1345	P1287
							I1558	D1528	L1481	P1409	T1346	M1288
							R1559	D1528	A1484	T1410	L1347	S1289
										D1411	T1348	G1290
										L1412	N1349	A1291
											Y1350	V1292
											G1352	G1352

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

Chain C:  100%

NAG1
NAG2

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

Chain D:  100%

NAG1
NAG2

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

Chain E:  100%

NAG1
NAG2

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

Chain F:  100%
100%

NAG1
NAG2

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

Chain G:  100%


NAG1
NAG2

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

Chain H:  100%

NAG1
NAG2

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

Chain I:  100%

MAG1
MAG2

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

Chain J:  100%

MAG1
MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	242300	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50.6	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.208	Depositor
Minimum map value	-0.131	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.028	Depositor
Map size (\AA)	303.12, 303.12, 303.12	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.842, 0.842, 0.842	Depositor

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: NAG, CA

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	0.30	0/15425	0.53	0/20912
1	B	0.30	0/15425	0.53	0/20912
All	All	0.30	0/30850	0.53	0/41824

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	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	2025	TYR	Peptide
1	B	2025	TYR	Peptide

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	15093	0	14709	240	0
1	B	15093	0	14709	238	0
2	C	28	0	25	0	0
2	D	28	0	25	0	0
2	E	28	0	25	0	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	0	0
2	I	28	0	25	0	0
2	J	28	0	25	0	0
3	A	98	0	91	1	0
3	B	98	0	91	1	0
4	A	3	0	0	0	0
4	B	3	0	0	0	0
All	All	30612	0	29800	472	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 8.

The worst 5 of 472 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2242:ARG:HH21	1:B:2244:ARG:HH21	1.25	0.84
1:A:2242:ARG:HH21	1:A:2244:ARG:HH21	1.25	0.83
1:B:1300:ARG:NH1	1:B:1349:ASN:OD1	2.18	0.77
1:B:2119:GLN:NE2	1:B:2121:GLY:O	2.18	0.77
1:B:1300:ARG:NH1	1:B:1348:THR:O	2.19	0.76

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	1894/1932 (98%)	1785 (94%)	109 (6%)	0	100	100
1	B	1894/1932 (98%)	1785 (94%)	109 (6%)	0	100	100
All	All	3788/3864 (98%)	3570 (94%)	218 (6%)	0	100	100

There are no Ramachandran outliers to report.

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	1663/1689 (98%)	1659 (100%)	4 (0%)	92	98
1	B	1663/1689 (98%)	1659 (100%)	4 (0%)	92	98
All	All	3326/3378 (98%)	3318 (100%)	8 (0%)	91	98

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	2517	LYS
1	B	2445	MET
1	B	1419	ASN
1	A	2517	LYS
1	B	2087	ASN

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

Mol	Chain	Res	Type
1	A	1725	HIS
1	B	1725	HIS
1	B	2155	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](#)

16 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	C	1	1,2	14,14,15	0.28	0	17,19,21	0.50	0
2	NAG	C	2	2	14,14,15	0.20	0	17,19,21	0.42	0
2	NAG	D	1	1,2	14,14,15	0.35	0	17,19,21	0.55	0
2	NAG	D	2	2	14,14,15	0.41	0	17,19,21	0.45	0
2	NAG	E	1	1,2	14,14,15	0.38	0	17,19,21	0.44	0
2	NAG	E	2	2	14,14,15	0.19	0	17,19,21	0.47	0
2	NAG	F	1	1,2	14,14,15	0.28	0	17,19,21	0.38	0
2	NAG	F	2	2	14,14,15	0.22	0	17,19,21	0.40	0
2	NAG	G	1	1,2	14,14,15	0.28	0	17,19,21	0.50	0
2	NAG	G	2	2	14,14,15	0.20	0	17,19,21	0.42	0
2	NAG	H	1	1,2	14,14,15	0.36	0	17,19,21	0.56	0
2	NAG	H	2	2	14,14,15	0.42	0	17,19,21	0.45	0
2	NAG	I	1	1,2	14,14,15	0.39	0	17,19,21	0.44	0
2	NAG	I	2	2	14,14,15	0.19	0	17,19,21	0.46	0
2	NAG	J	1	1,2	14,14,15	0.29	0	17,19,21	0.38	0
2	NAG	J	2	2	14,14,15	0.23	0	17,19,21	0.41	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
2	NAG	C	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	NAG	D	1	1,2	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	NAG	E	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1
2	NAG	F	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	F	2	2	-	2/6/23/26	0/1/1/1
2	NAG	G	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	G	2	2	-	0/6/23/26	0/1/1/1
2	NAG	H	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	2/6/23/26	0/1/1/1
2	NAG	I	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	I	2	2	-	0/6/23/26	0/1/1/1
2	NAG	J	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	J	2	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

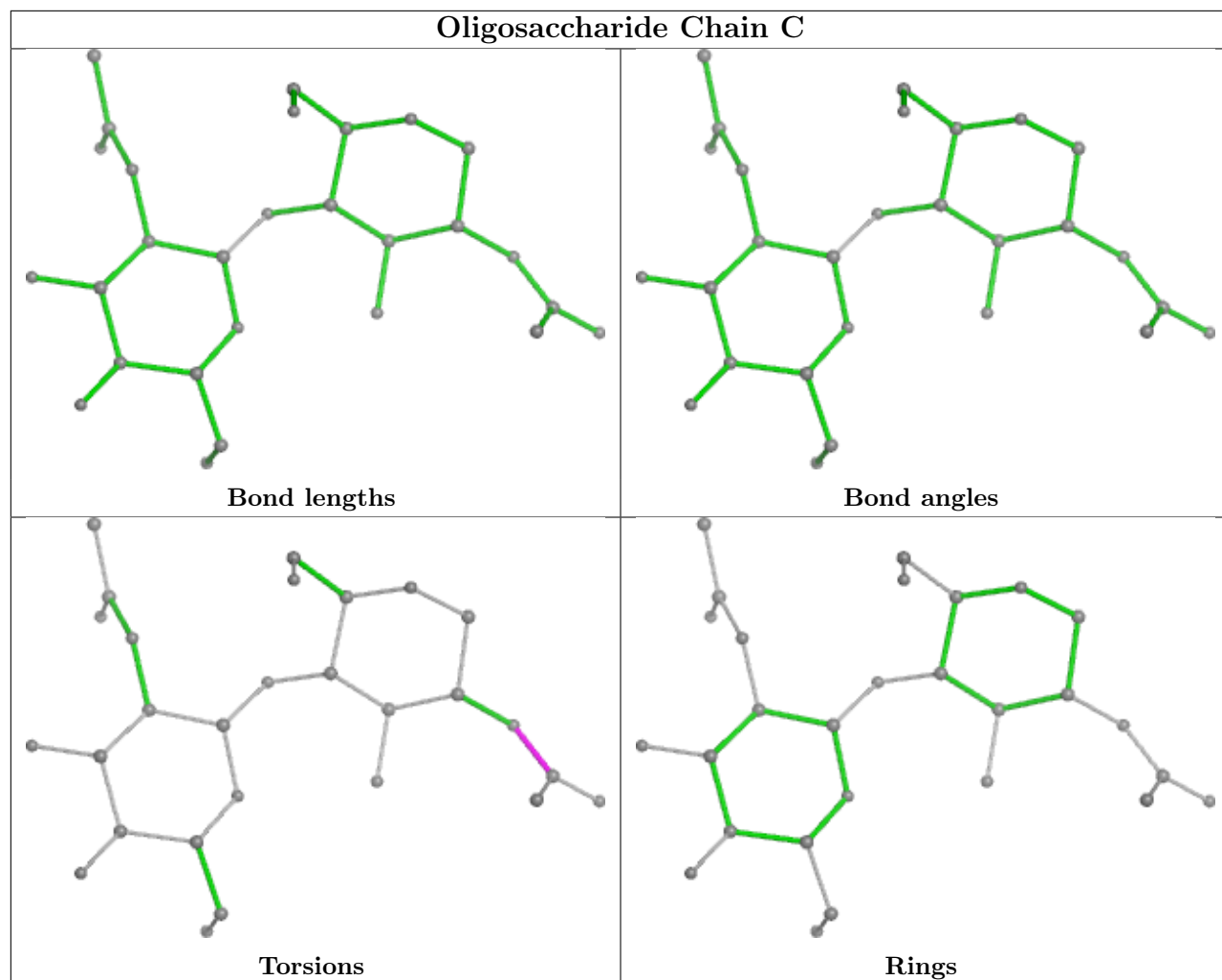
5 of 16 torsion outliers are listed below:

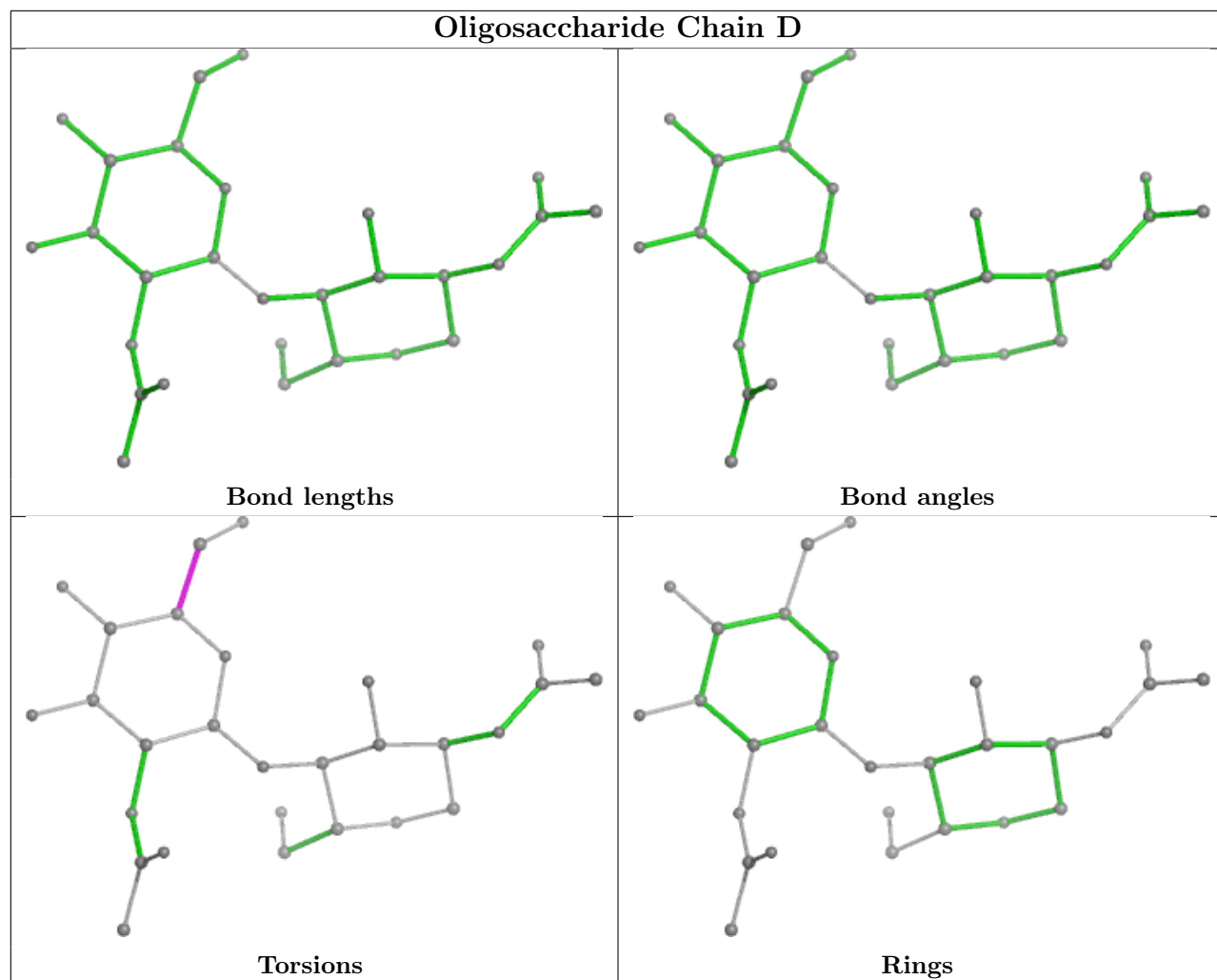
Mol	Chain	Res	Type	Atoms
2	F	2	NAG	C4-C5-C6-O6
2	J	2	NAG	C4-C5-C6-O6
2	F	2	NAG	O5-C5-C6-O6
2	J	2	NAG	O5-C5-C6-O6
2	F	1	NAG	O5-C5-C6-O6

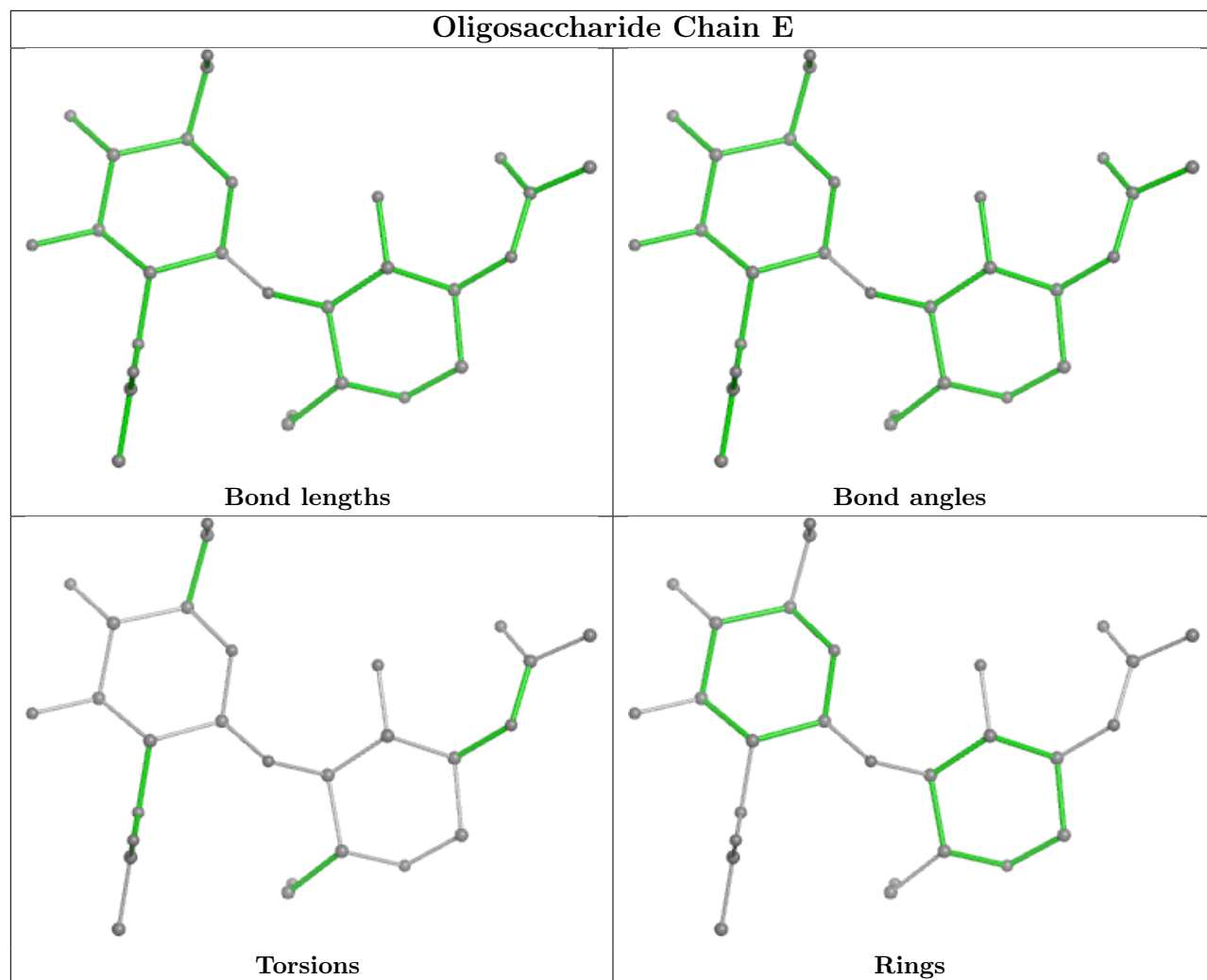
There are no ring outliers.

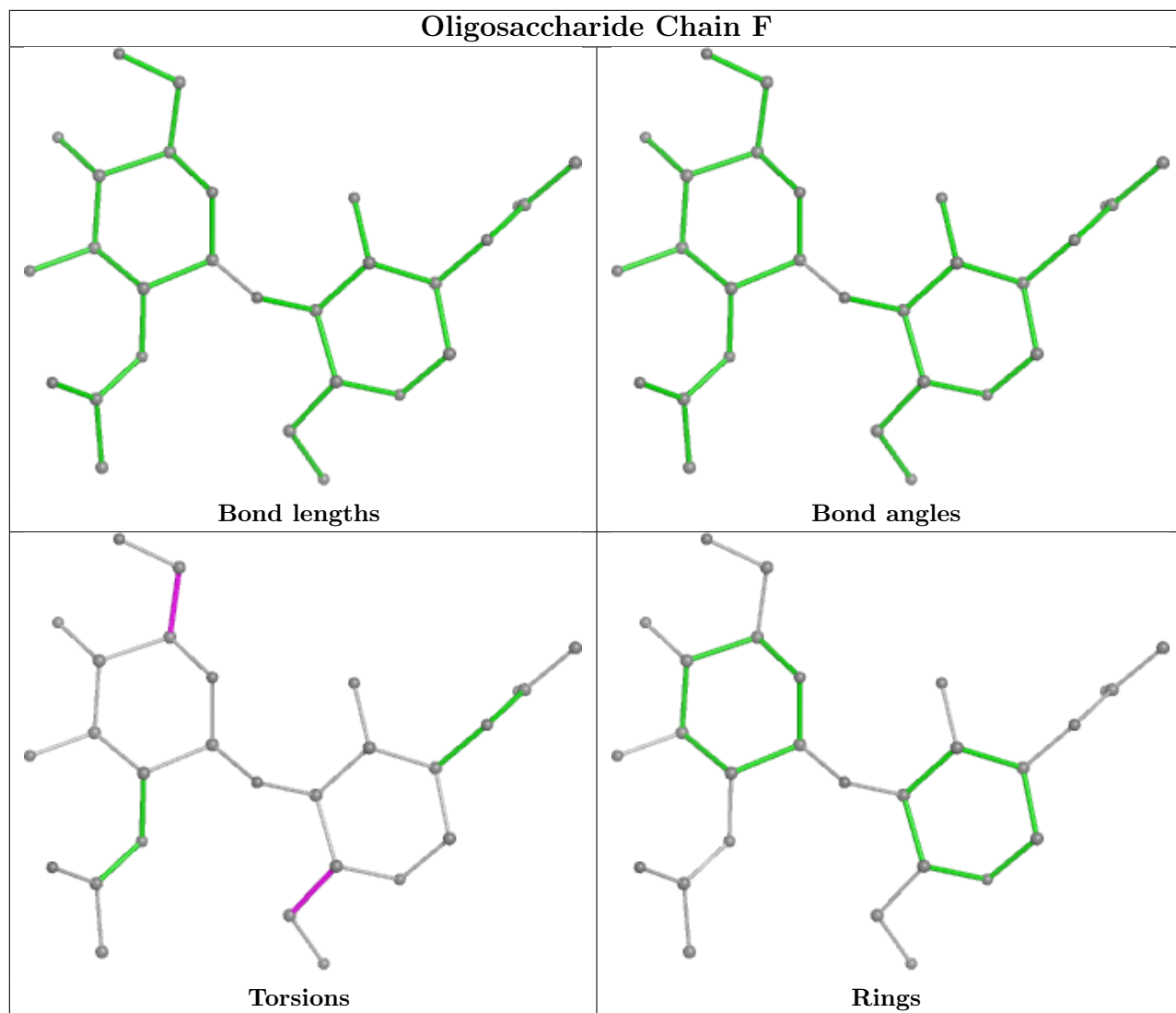
No monomer is involved in short contacts.

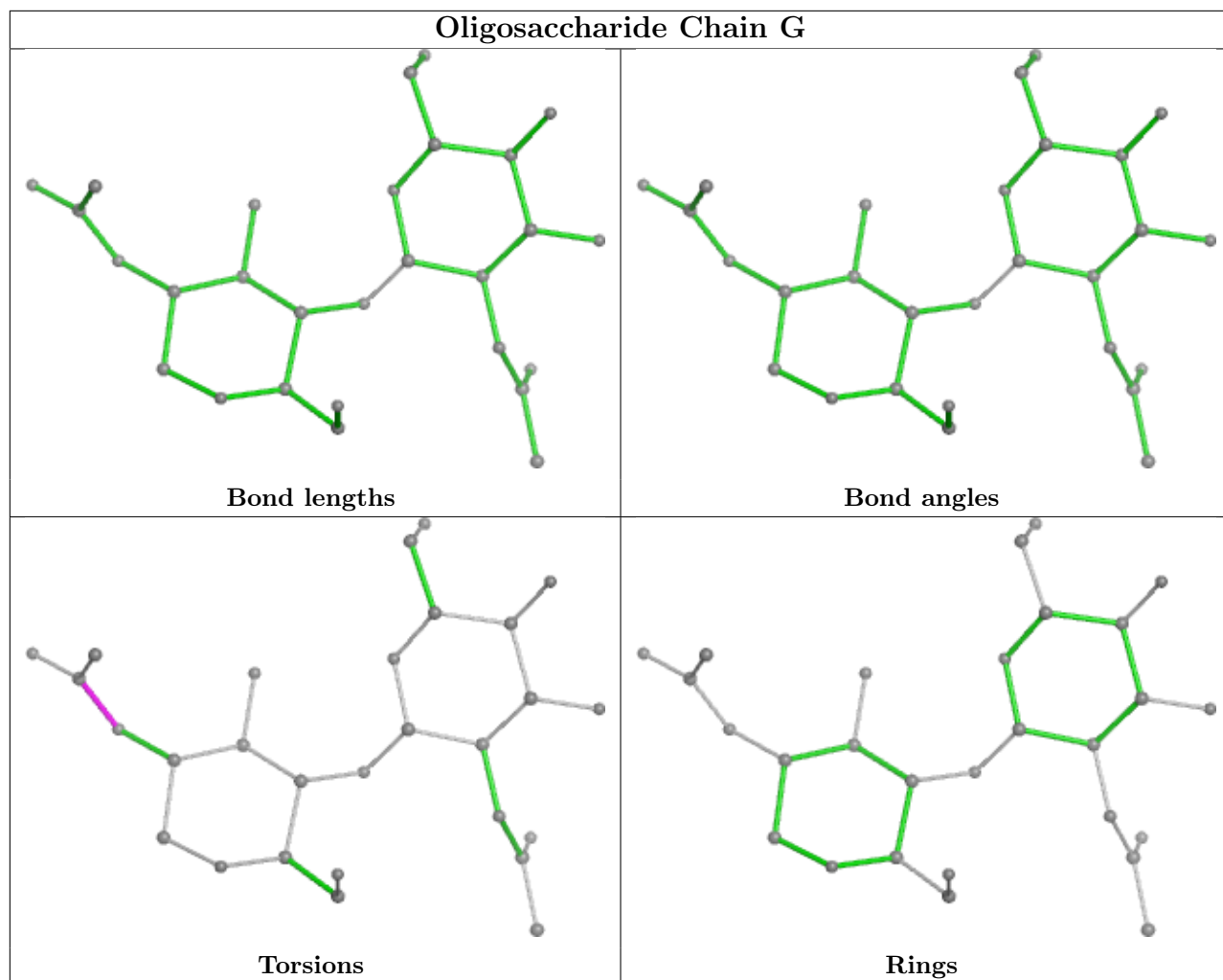
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

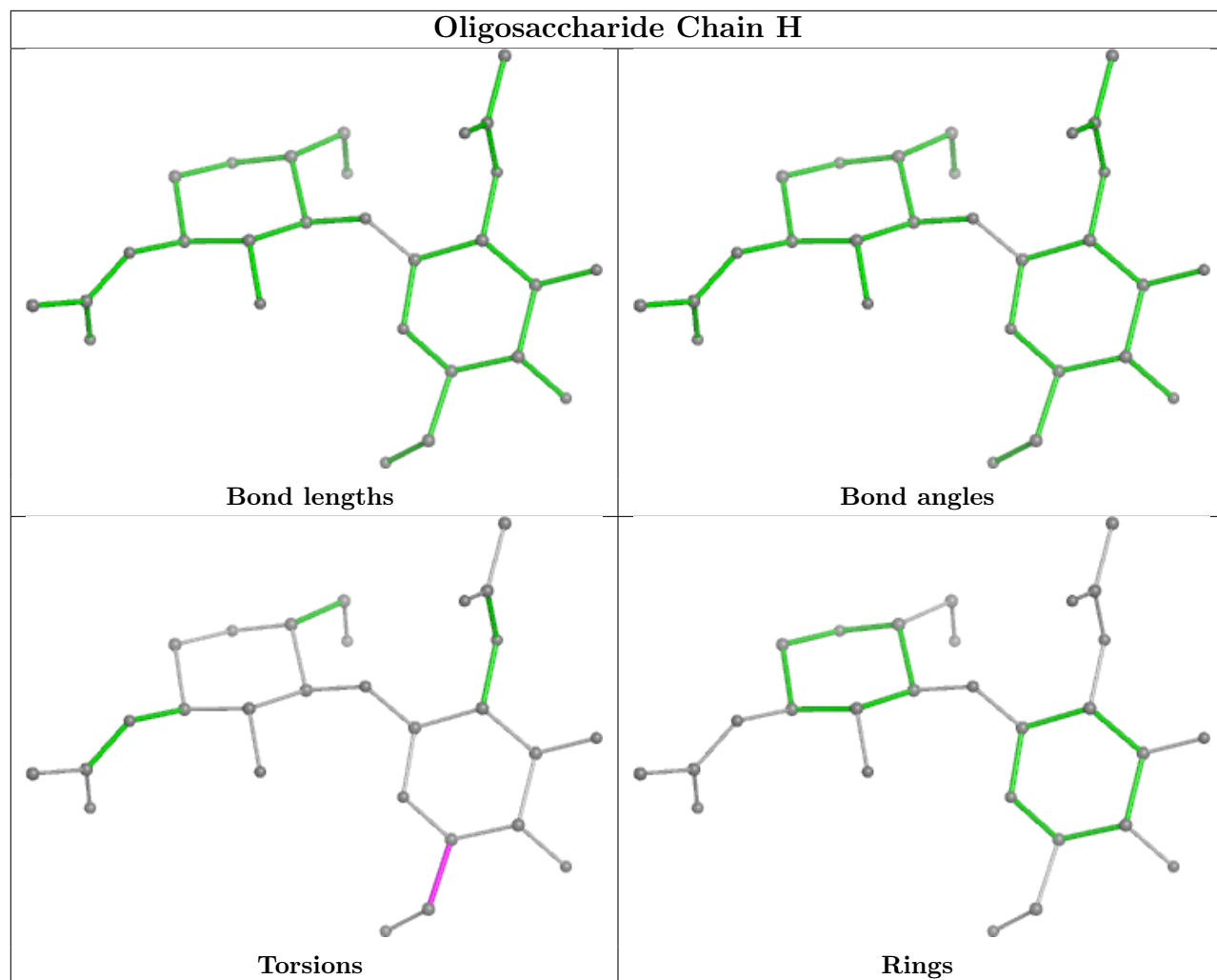


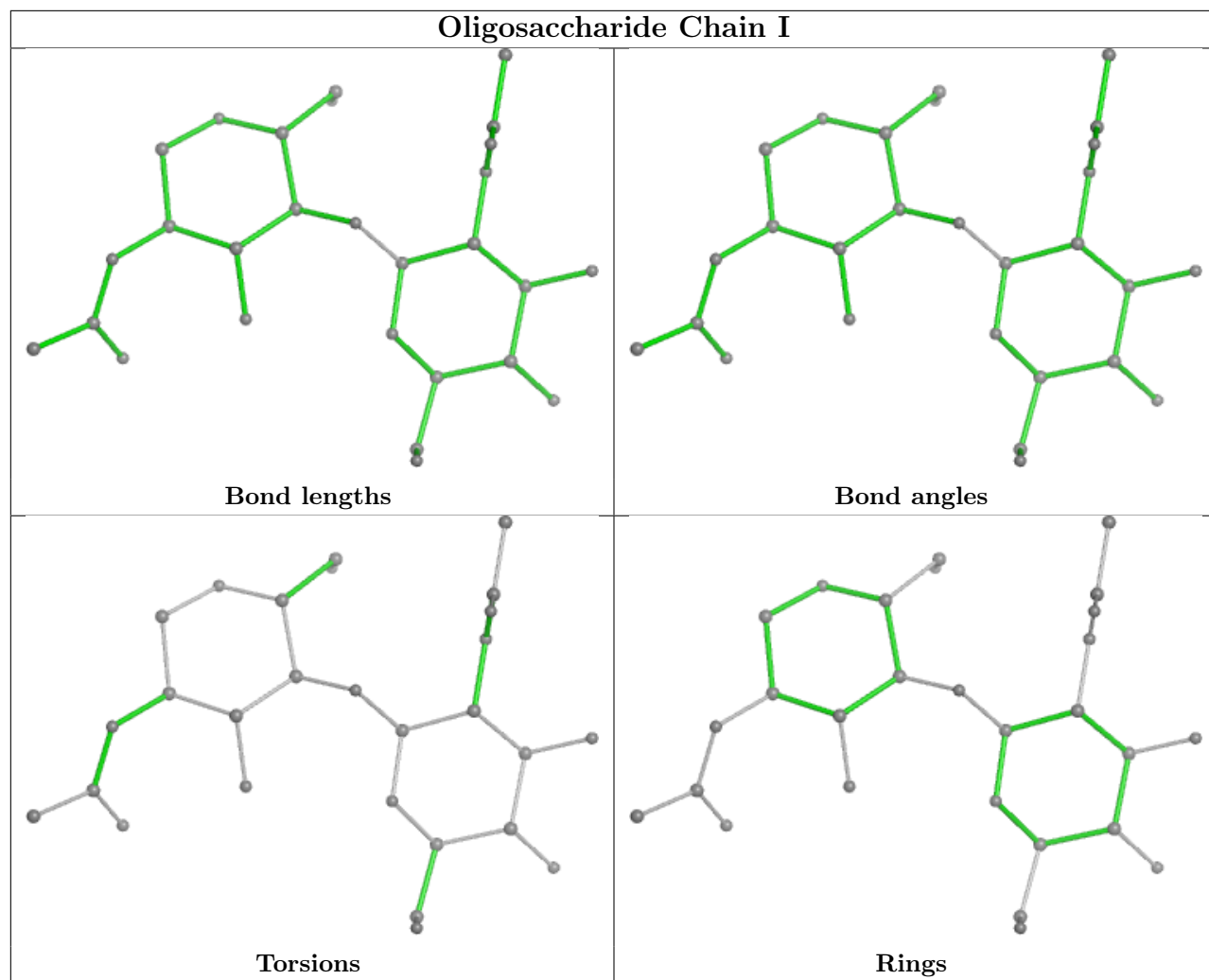


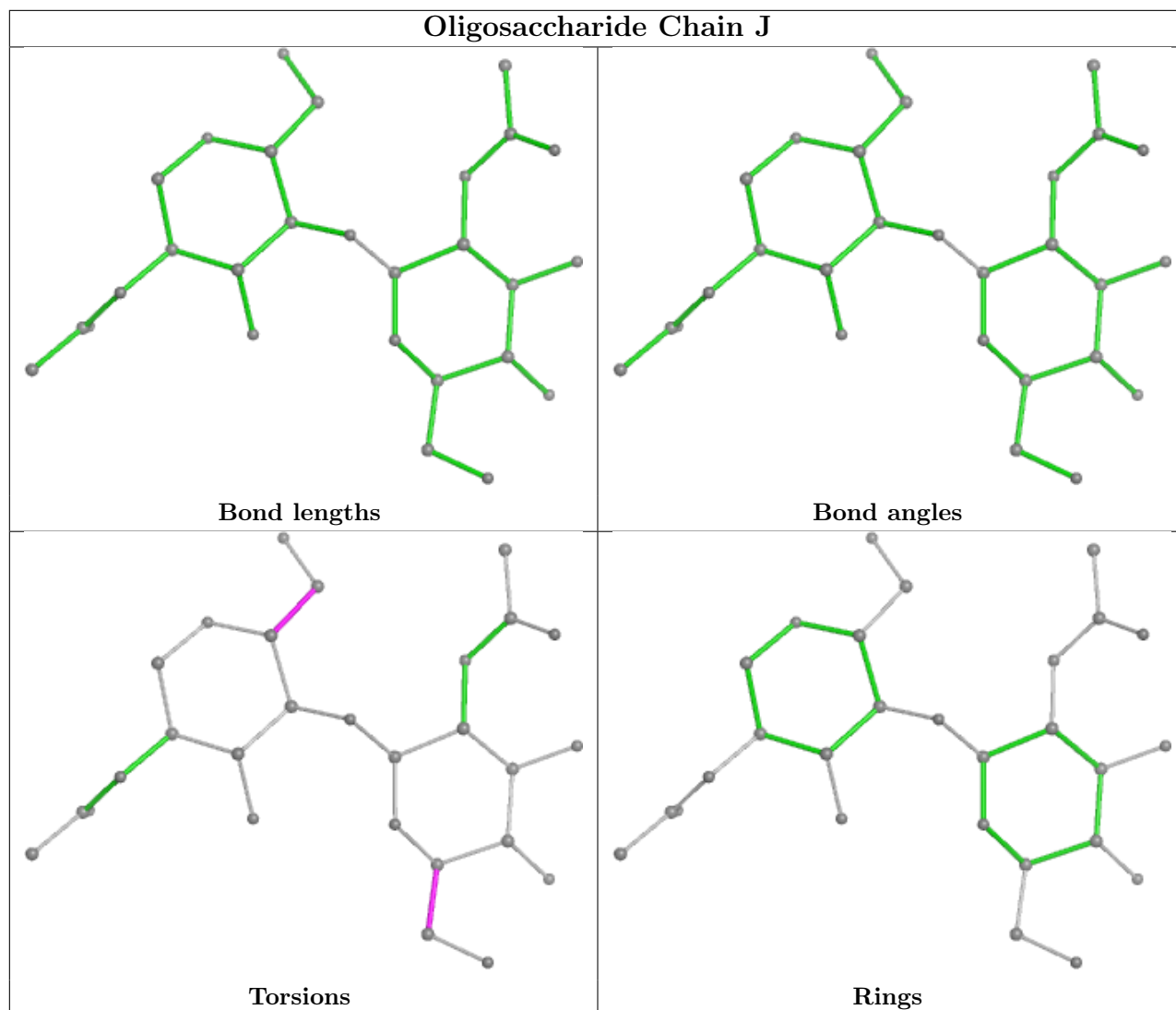












5.6 Ligand geometry [i](#)

Of 20 ligands modelled in this entry, 6 are monoatomic - leaving 14 for Mogul analysis.

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	NAG	B	2804	1	14,14,15	0.30	0	17,19,21	0.53	0
3	NAG	B	2805	1	14,14,15	0.25	0	17,19,21	0.41	0
3	NAG	A	2807	1	14,14,15	0.32	0	17,19,21	0.44	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	A	2802	1	14,14,15	0.15	0	17,19,21	0.44	0
3	NAG	A	2806	1	14,14,15	0.29	0	17,19,21	0.39	0
3	NAG	B	2801	1	14,14,15	0.33	0	17,19,21	0.36	0
3	NAG	B	2803	1	14,14,15	0.39	0	17,19,21	1.42	2 (11%)
3	NAG	A	2801	1	14,14,15	0.31	0	17,19,21	0.36	0
3	NAG	B	2802	1	14,14,15	0.15	0	17,19,21	0.44	0
3	NAG	B	2806	1	14,14,15	0.29	0	17,19,21	0.39	0
3	NAG	A	2805	1	14,14,15	0.25	0	17,19,21	0.41	0
3	NAG	A	2804	1	14,14,15	0.29	0	17,19,21	0.53	0
3	NAG	A	2803	1	14,14,15	0.39	0	17,19,21	1.41	2 (11%)
3	NAG	B	2807	1	14,14,15	0.32	0	17,19,21	0.45	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	B	2804	1	-	3/6/23/26	0/1/1/1
3	NAG	B	2805	1	-	2/6/23/26	0/1/1/1
3	NAG	A	2807	1	-	1/6/23/26	0/1/1/1
3	NAG	A	2802	1	-	2/6/23/26	0/1/1/1
3	NAG	A	2806	1	-	1/6/23/26	0/1/1/1
3	NAG	B	2801	1	-	2/6/23/26	0/1/1/1
3	NAG	B	2803	1	-	5/6/23/26	0/1/1/1
3	NAG	A	2801	1	-	2/6/23/26	0/1/1/1
3	NAG	B	2802	1	-	2/6/23/26	0/1/1/1
3	NAG	B	2806	1	-	1/6/23/26	0/1/1/1
3	NAG	A	2805	1	-	2/6/23/26	0/1/1/1
3	NAG	A	2804	1	-	3/6/23/26	0/1/1/1
3	NAG	A	2803	1	-	5/6/23/26	0/1/1/1
3	NAG	B	2807	1	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	2803	NAG	C2-N2-C7	4.33	129.07	122.90
3	A	2803	NAG	C2-N2-C7	4.32	129.05	122.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	2803	NAG	C1-O5-C5	2.80	115.98	112.19
3	A	2803	NAG	C1-O5-C5	2.78	115.96	112.19

There are no chirality outliers.

5 of 32 torsion outliers are listed below:

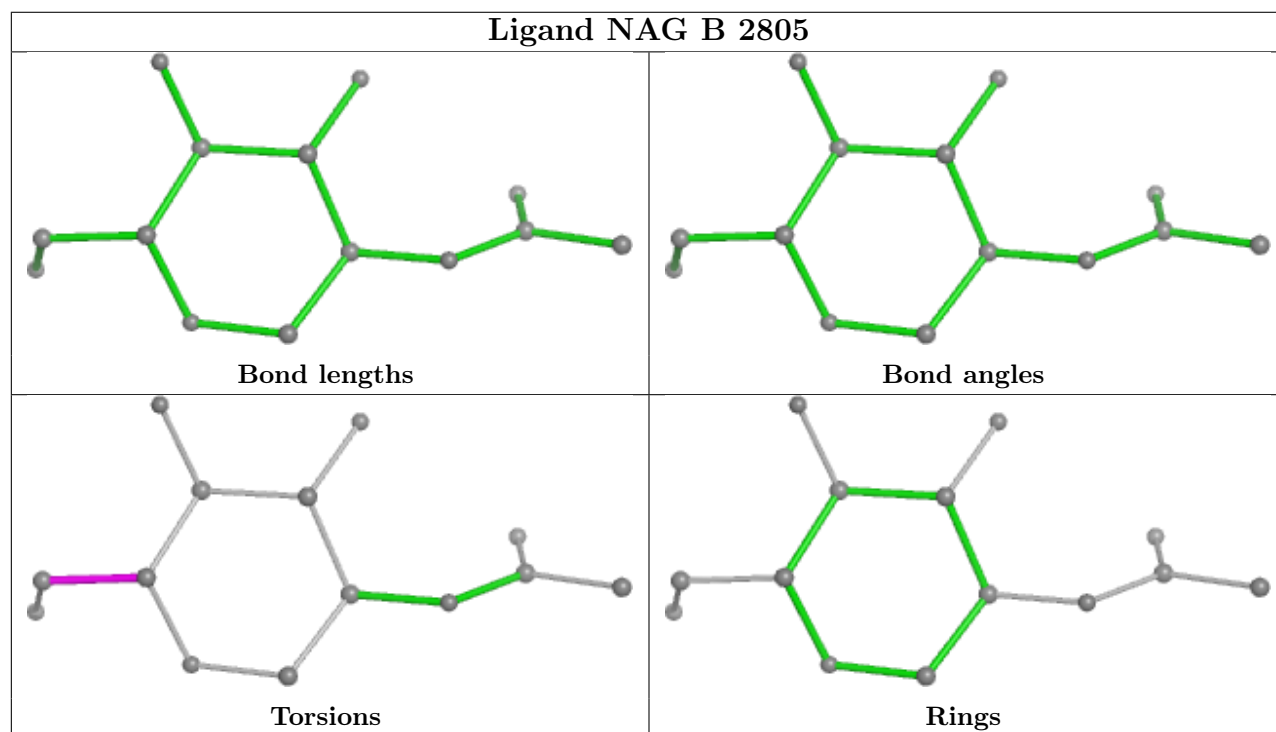
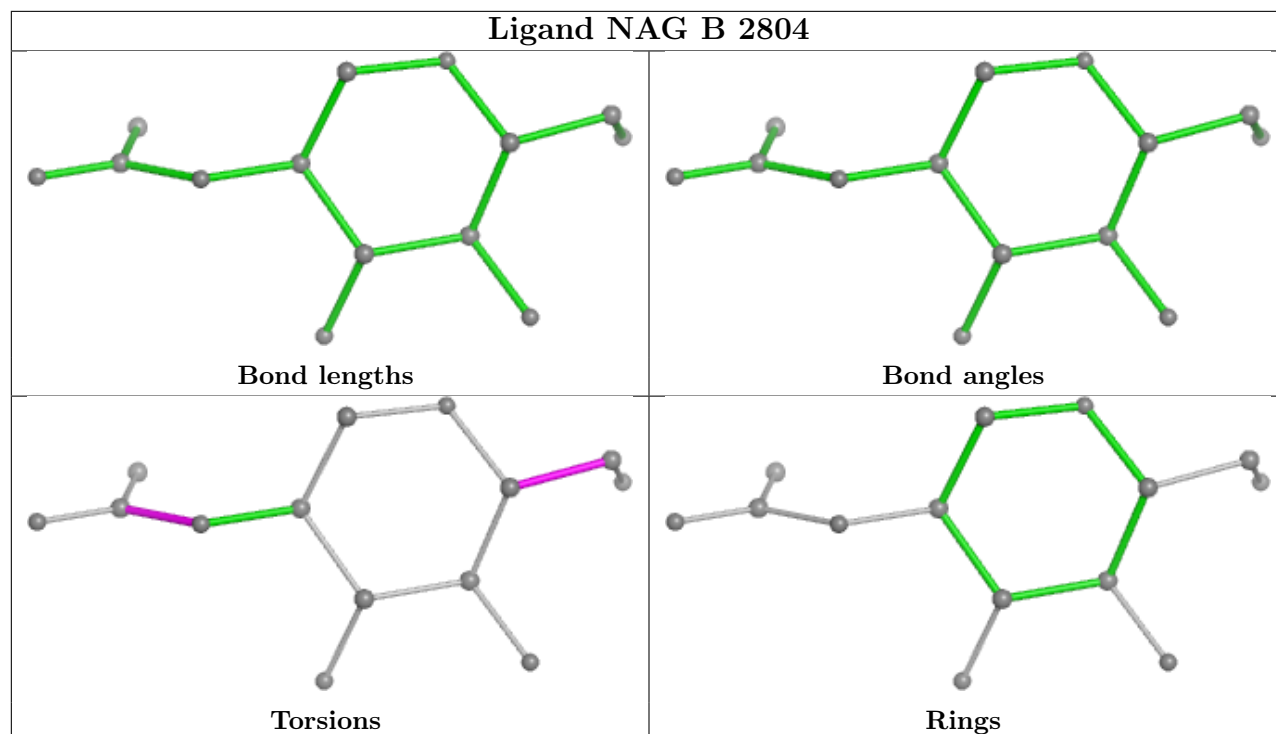
Mol	Chain	Res	Type	Atoms
3	A	2803	NAG	O5-C5-C6-O6
3	B	2803	NAG	O5-C5-C6-O6
3	A	2803	NAG	C4-C5-C6-O6
3	B	2803	NAG	C4-C5-C6-O6
3	A	2802	NAG	O5-C5-C6-O6

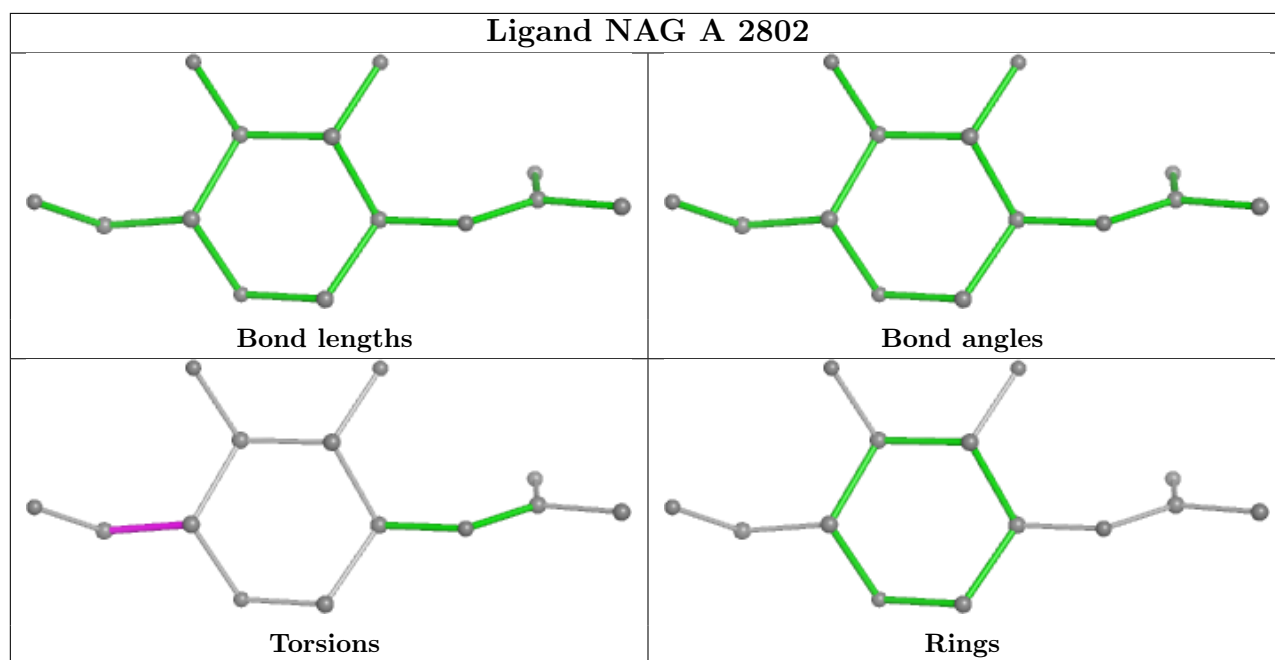
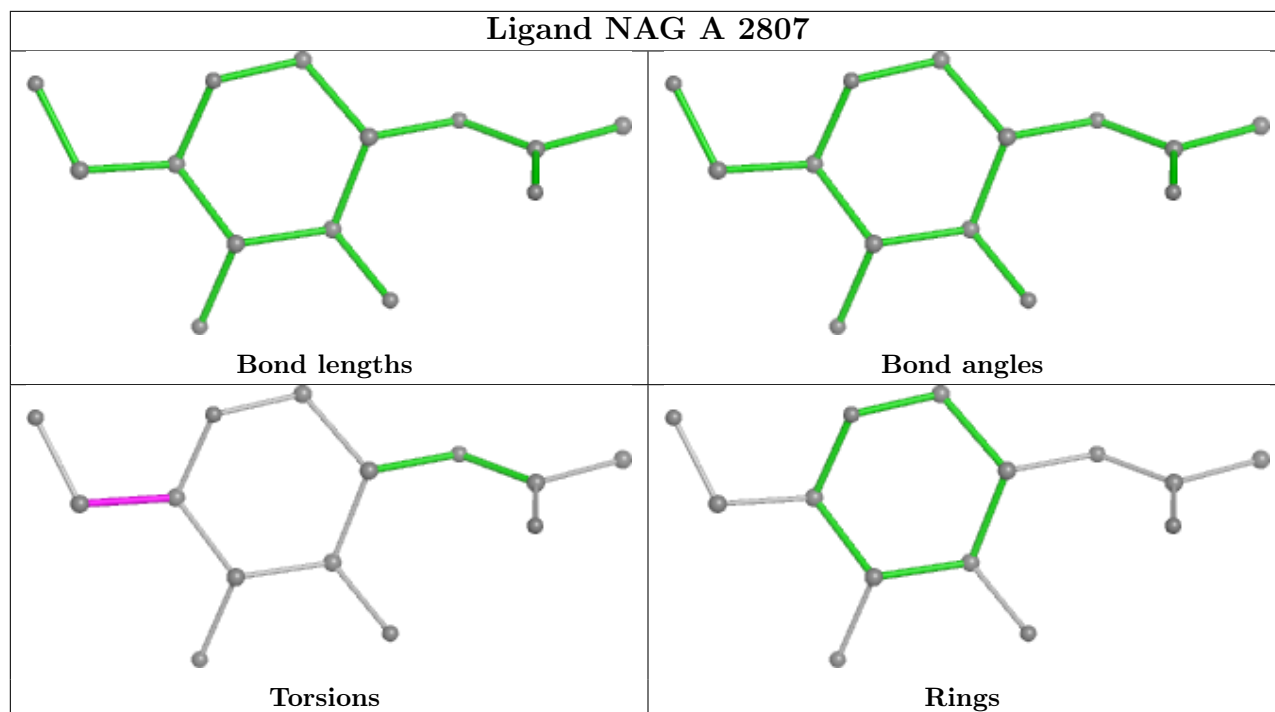
There are no ring outliers.

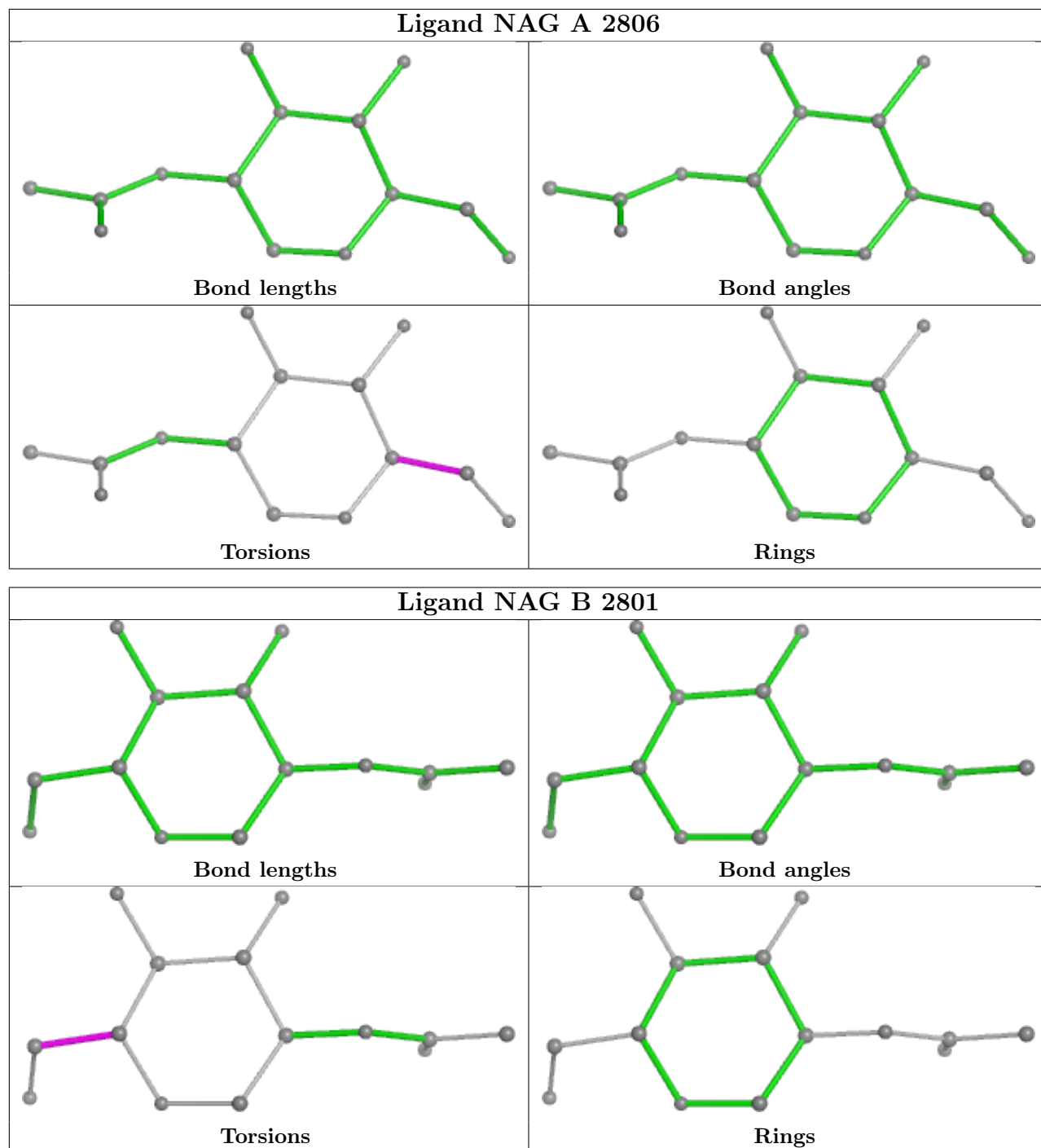
2 monomers are involved in 2 short contacts:

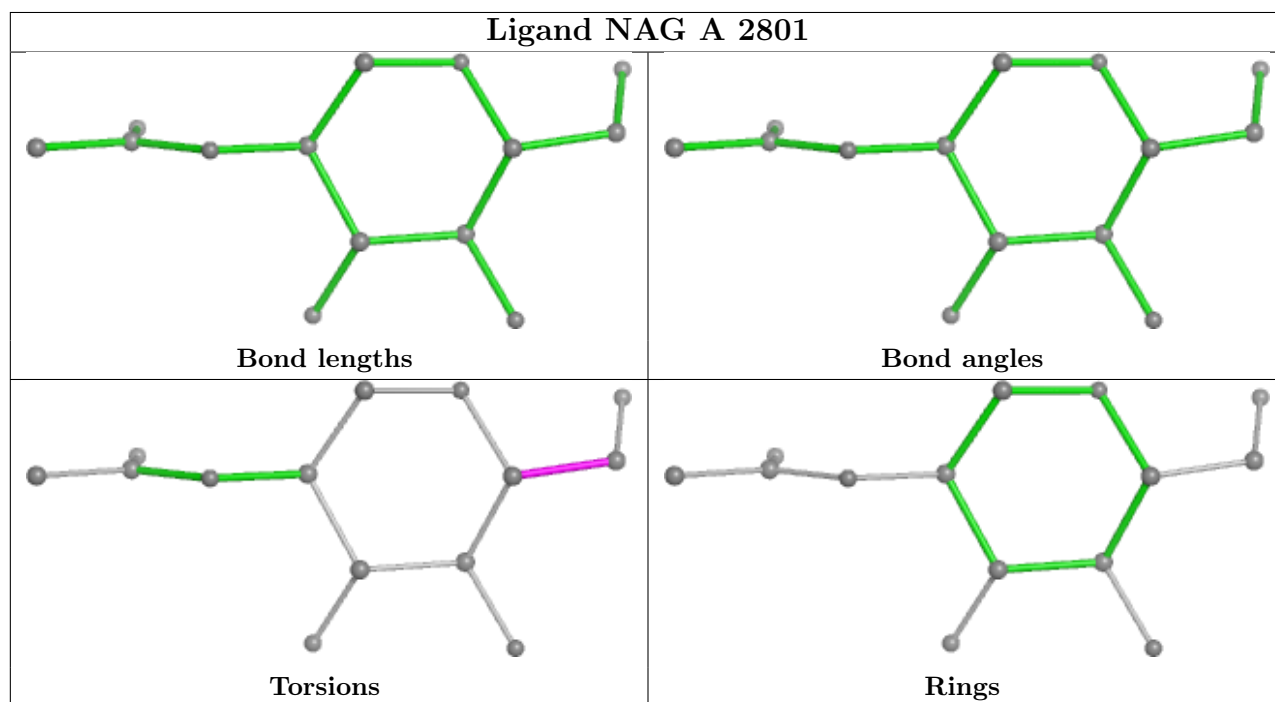
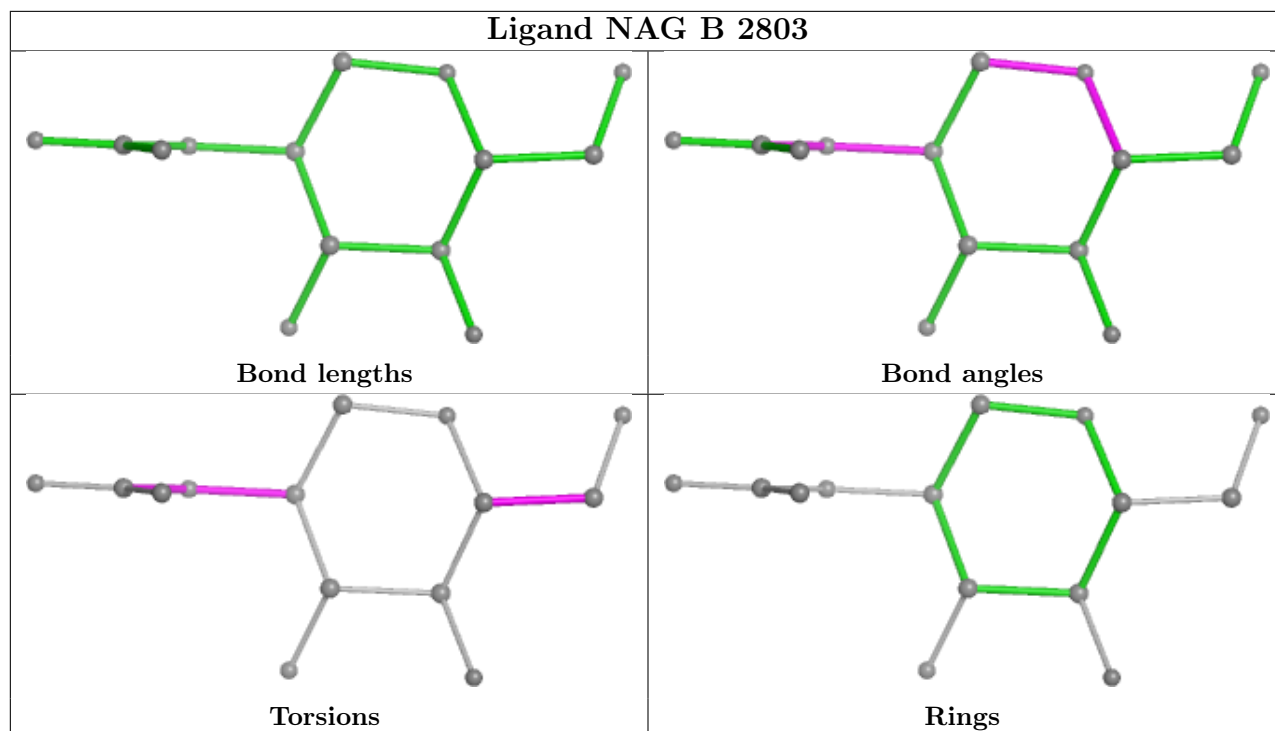
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	2803	NAG	1	0
3	A	2803	NAG	1	0

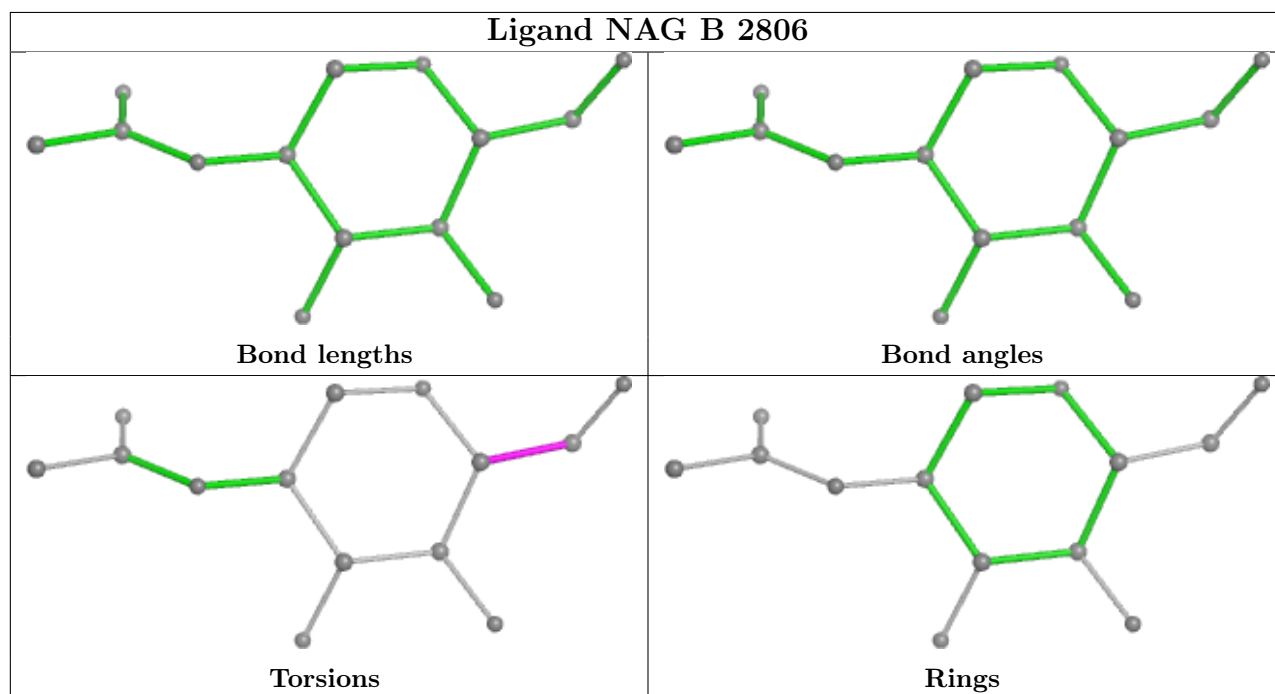
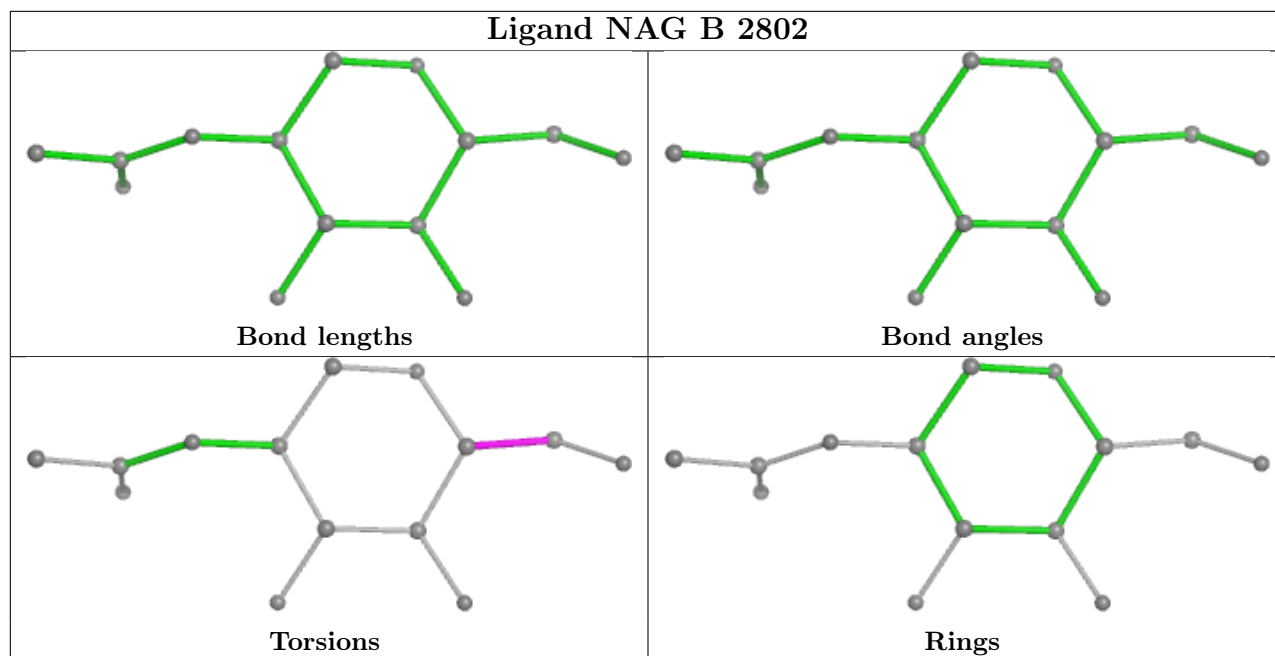
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

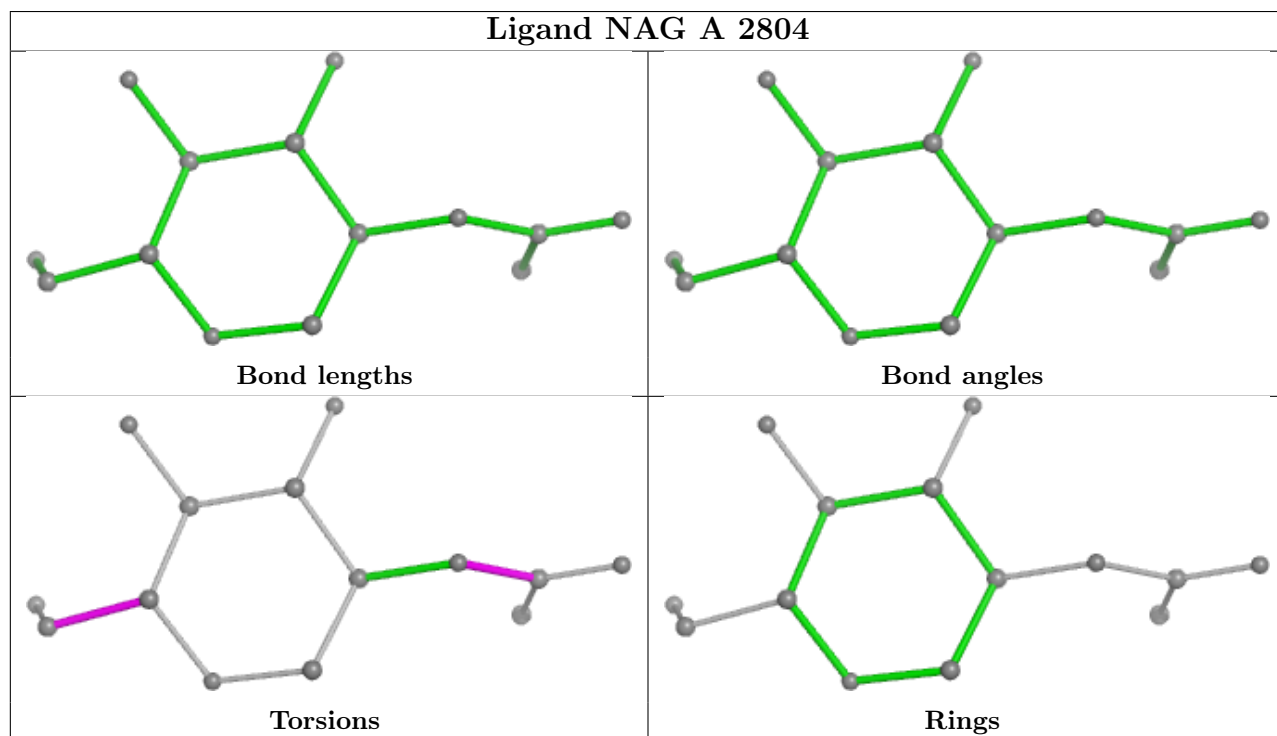
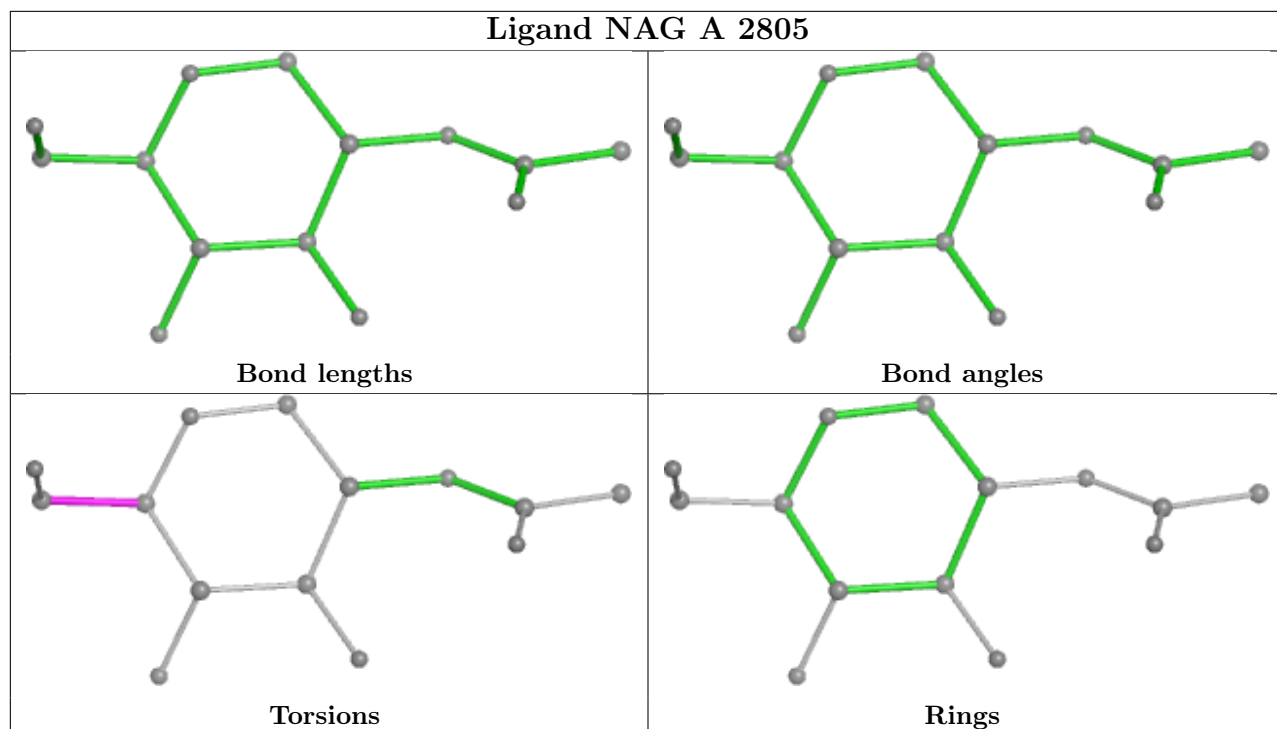


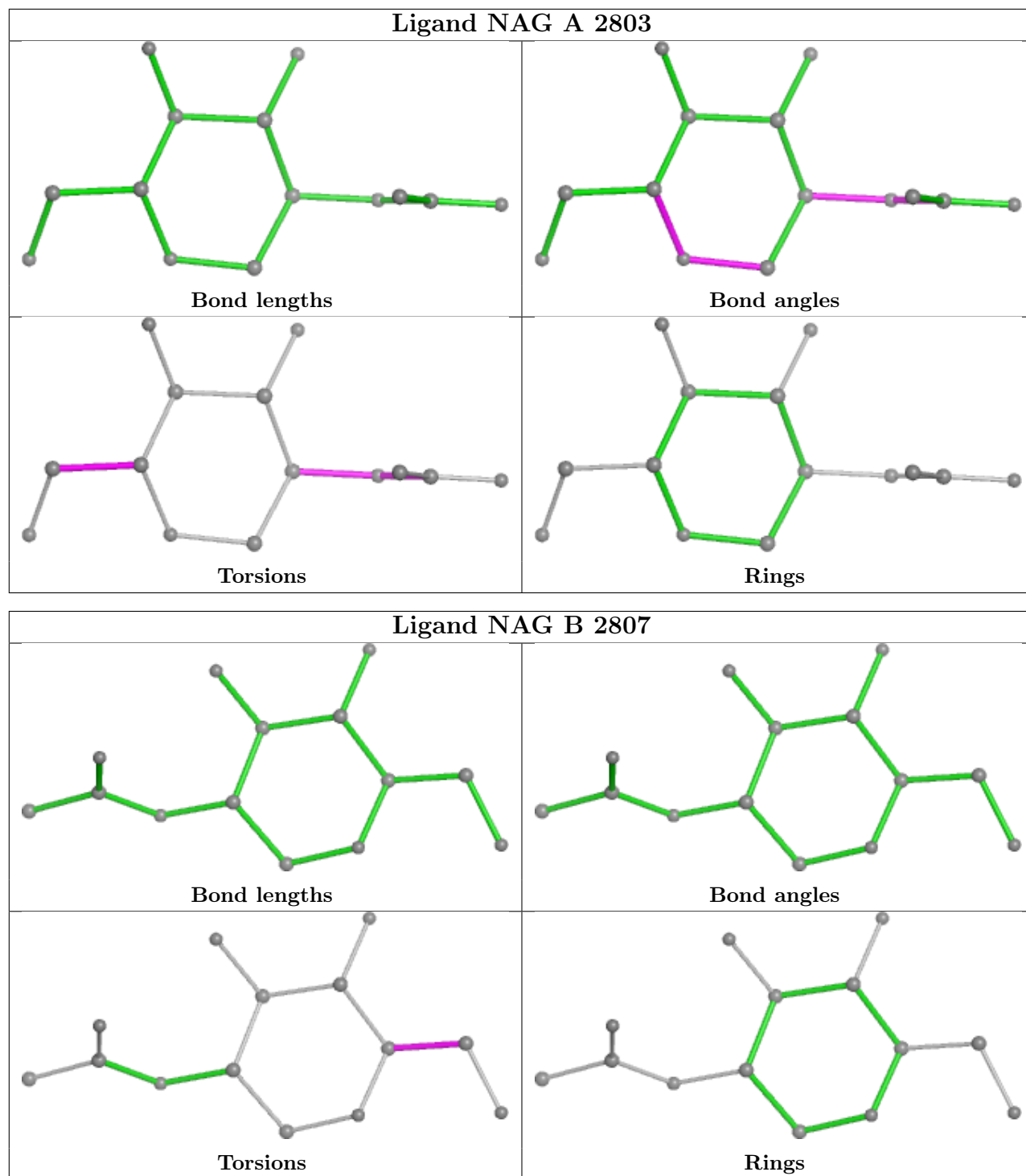












5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

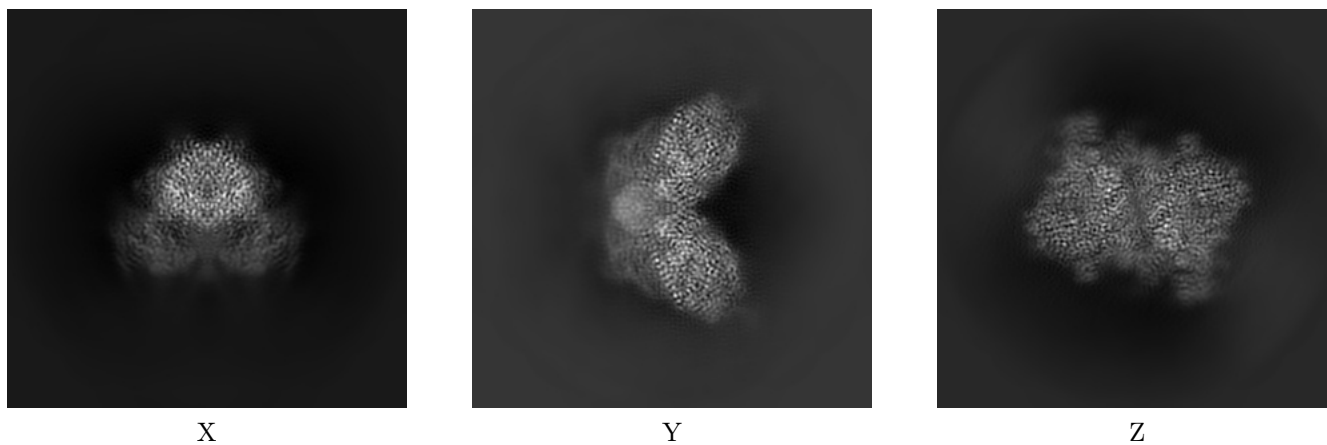
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12125. 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](#)

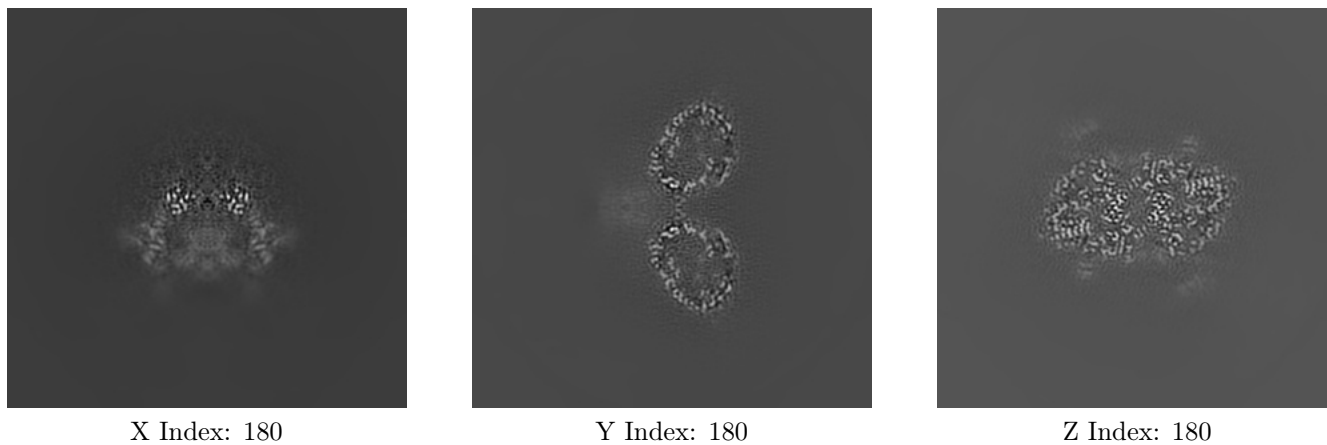
6.1.1 Primary map



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

6.2 Central slices [i](#)

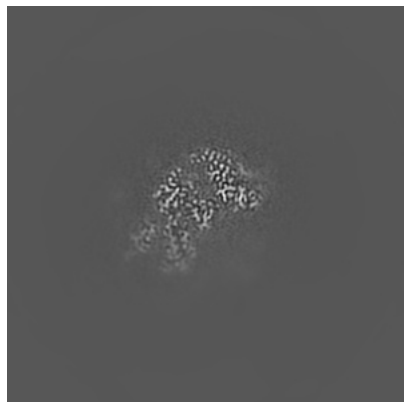
6.2.1 Primary map



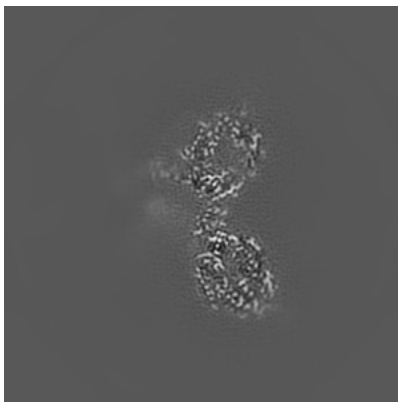
The images above show central slices of the map in three orthogonal directions.

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

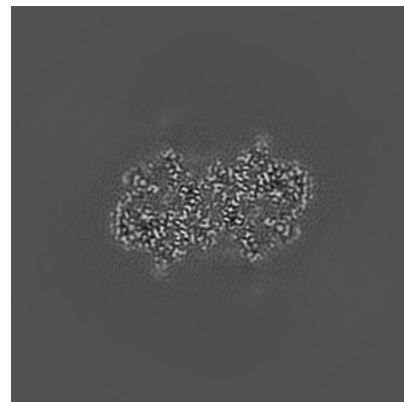
6.3.1 Primary map



X Index: 210



Y Index: 165

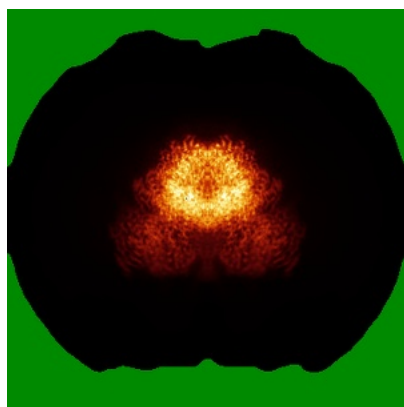


Z Index: 186

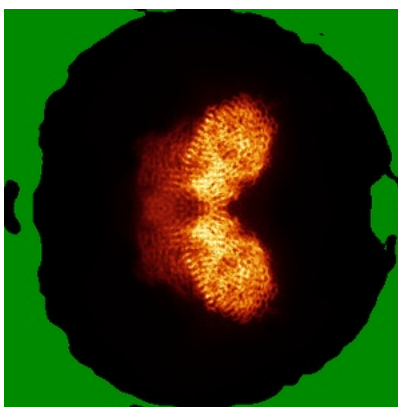
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [\(i\)](#)

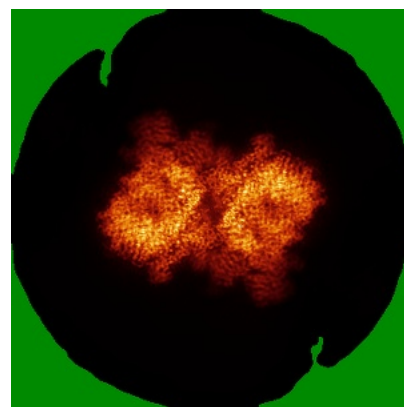
6.4.1 Primary map



X



Y

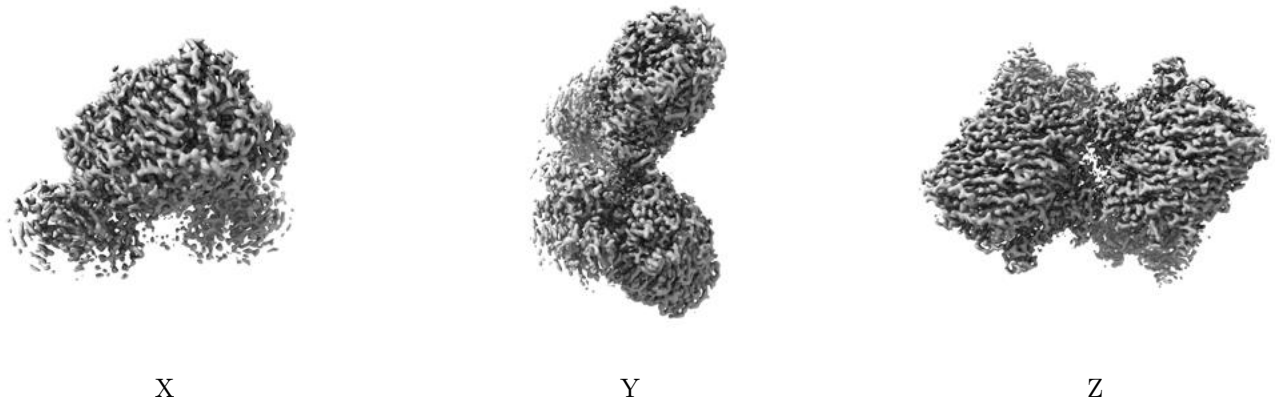


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.028. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

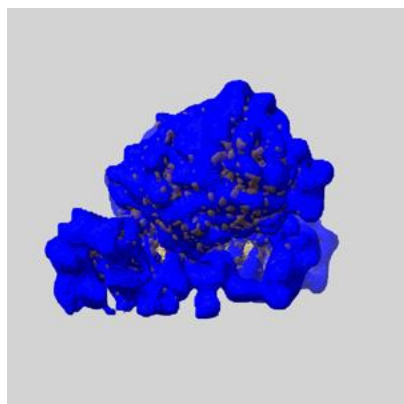
6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

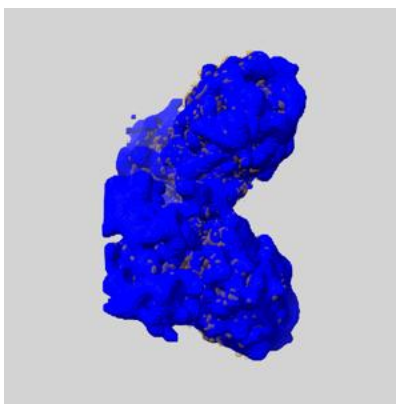
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

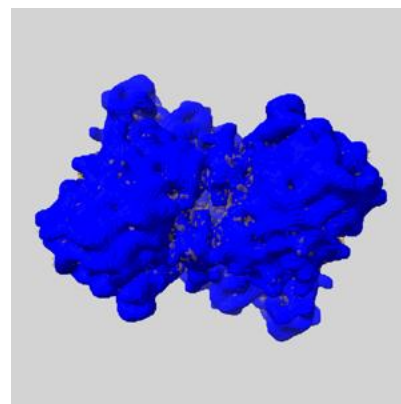
6.6.1 emd_12125_msk_1.map [i](#)



X



Y

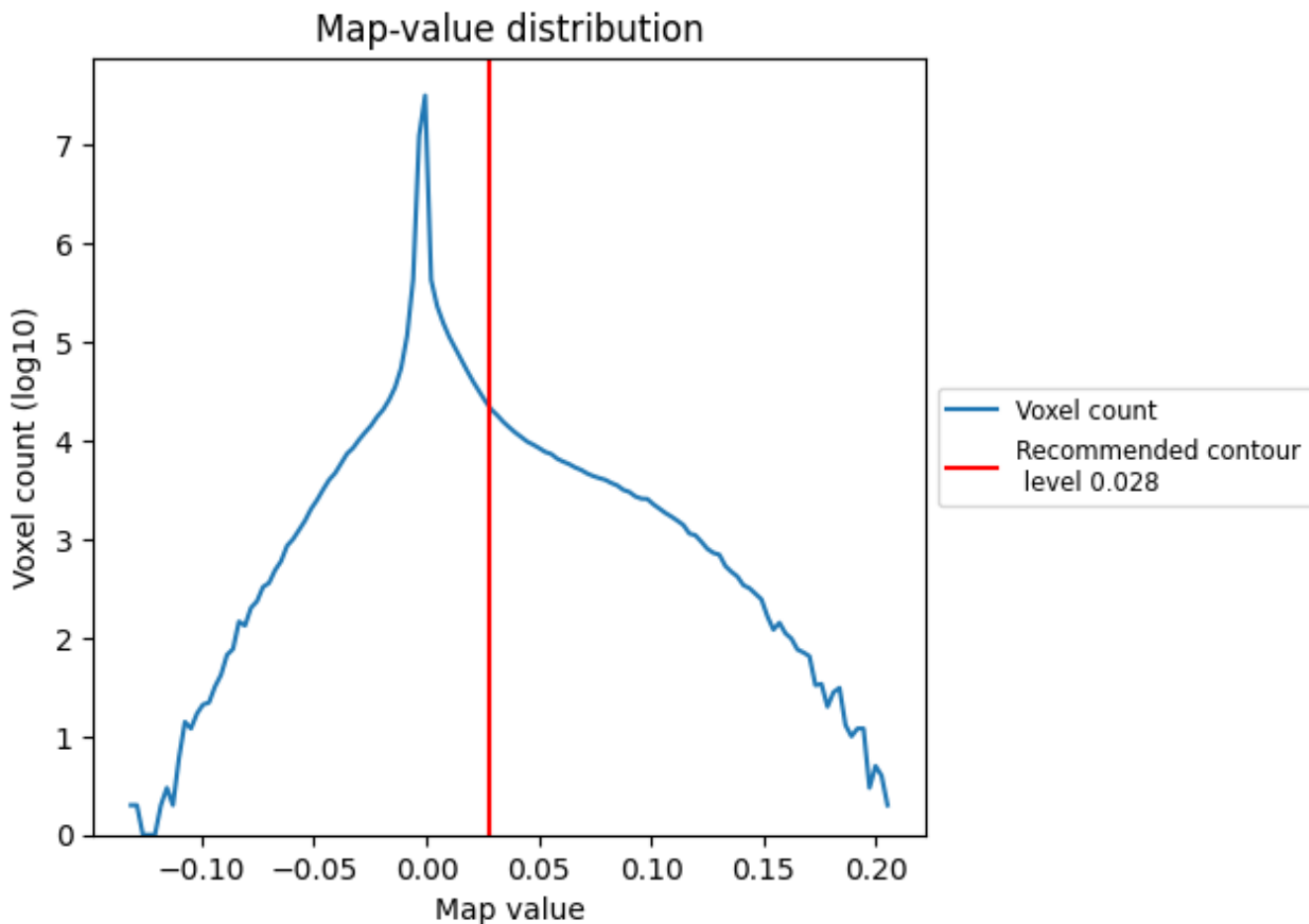


Z

7 Map analysis [i](#)

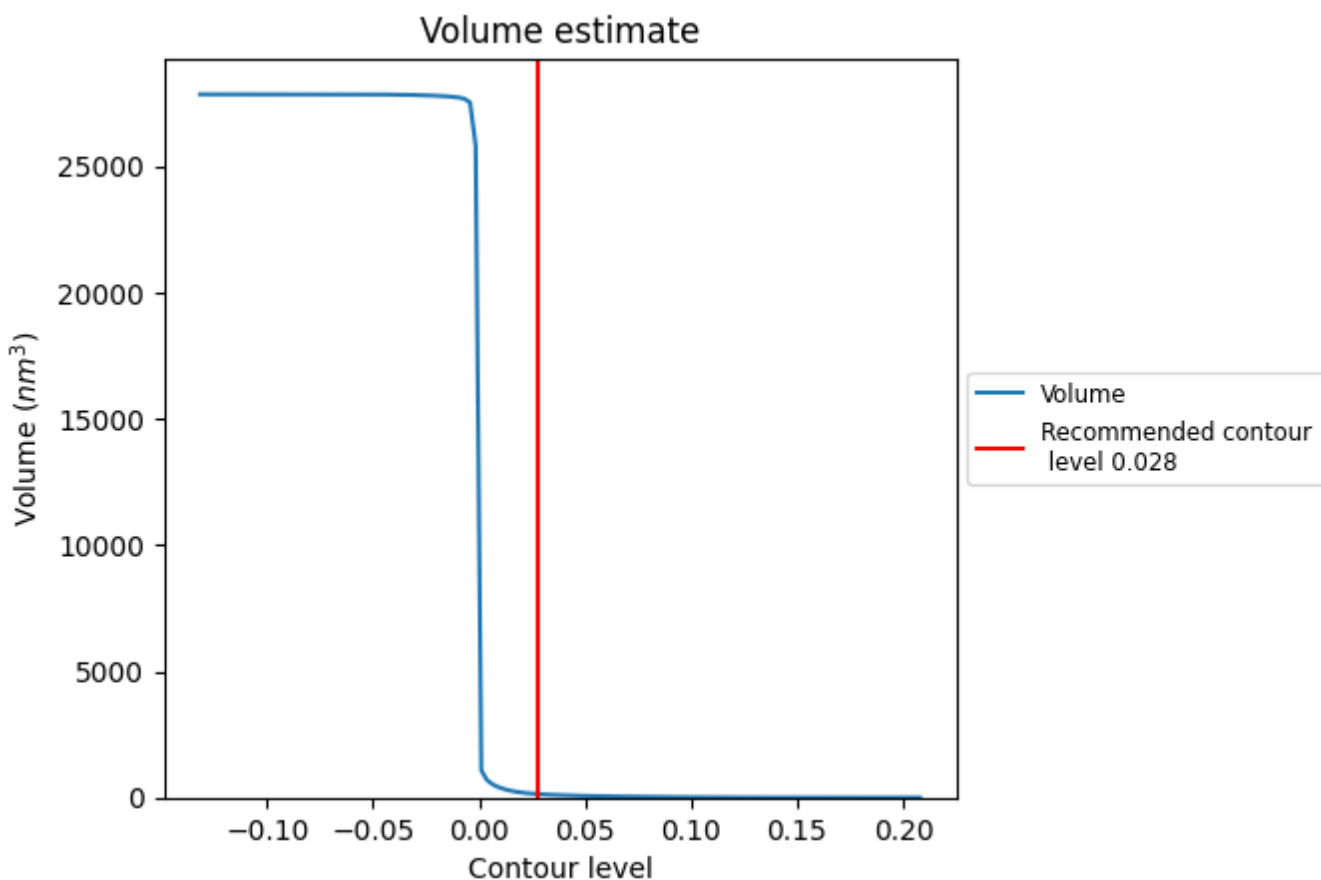
This section contains the results of statistical analysis of the map.

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.

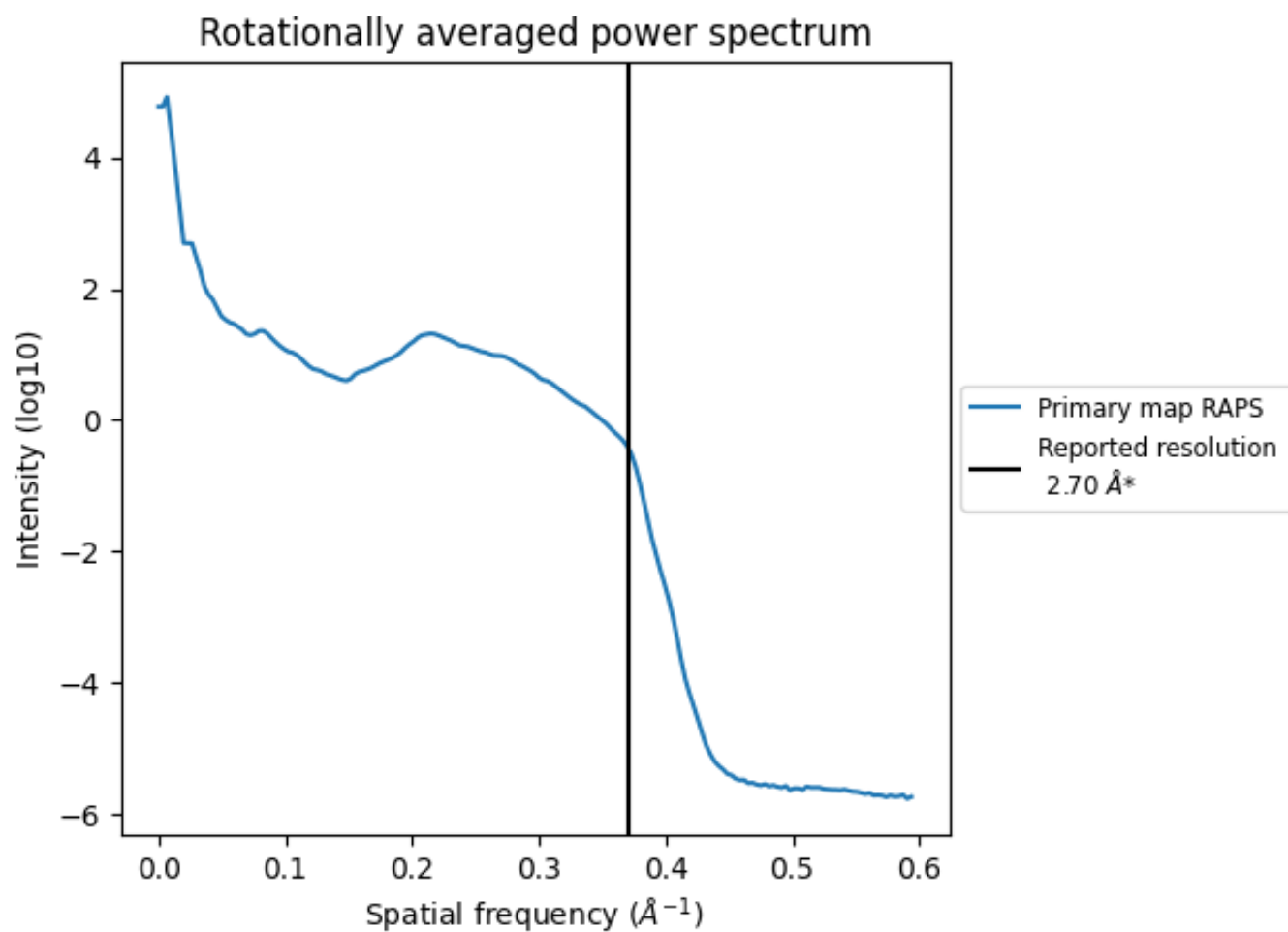
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 137 nm³; this corresponds to an approximate mass of 124 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](#)

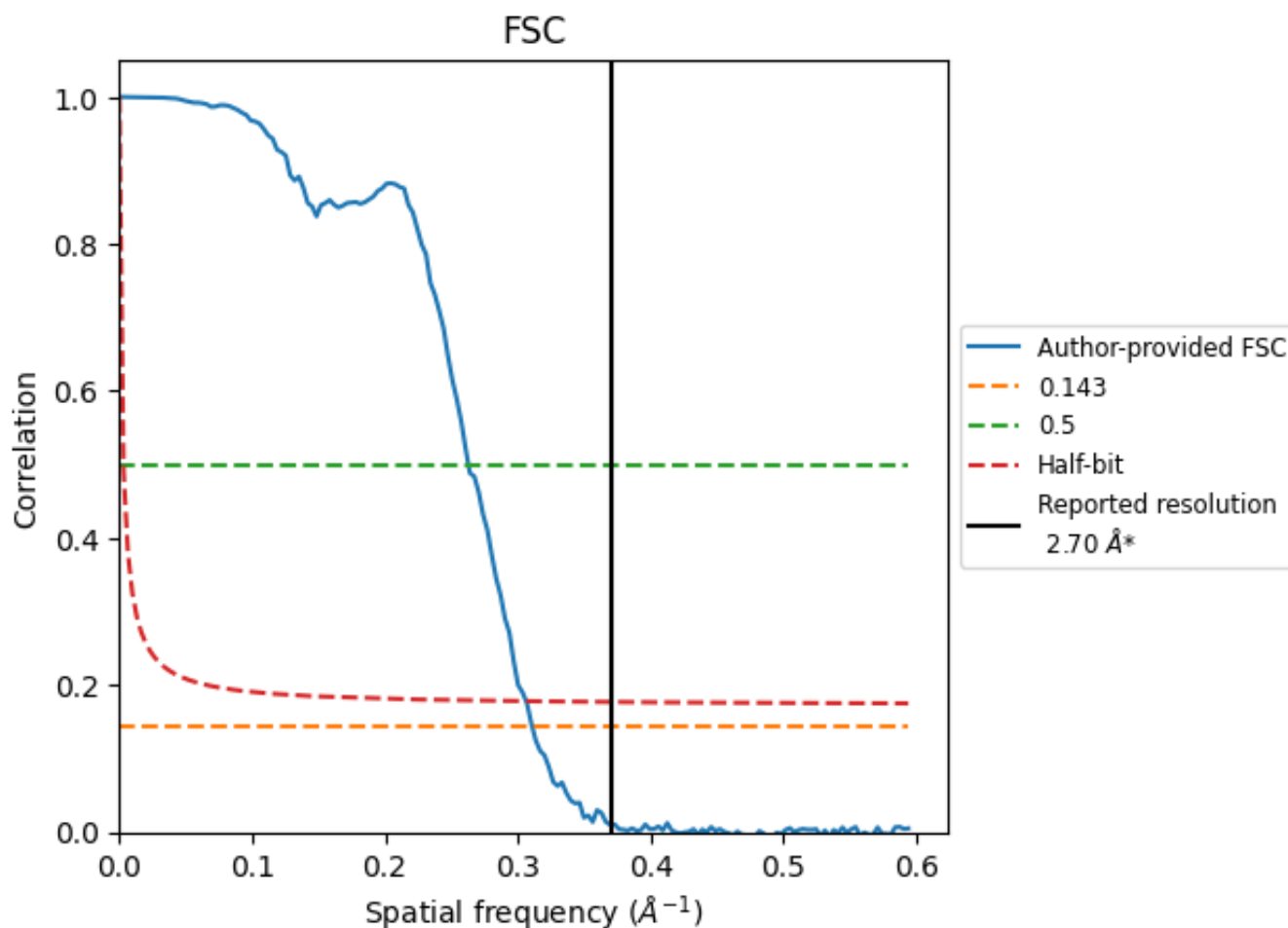


*Reported resolution corresponds to spatial frequency of 0.370\AA^{-1}

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.370 Å⁻¹

8.2 Resolution estimates [i](#)

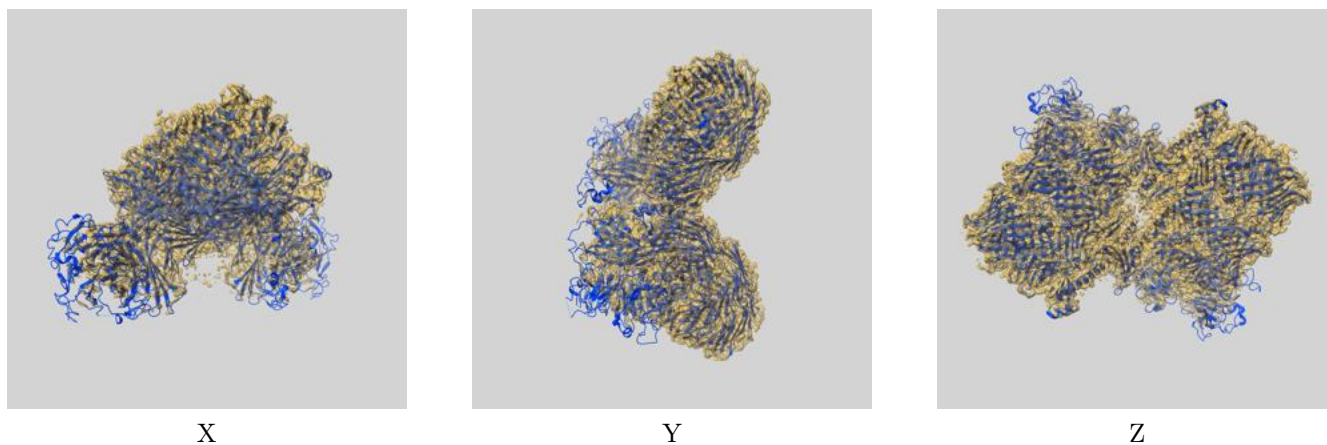
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.70	-	-
Author-provided FSC curve	3.22	3.81	3.27
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 3.22 differs from the reported value 2.7 by more than 10 %

9 Map-model fit [i](#)

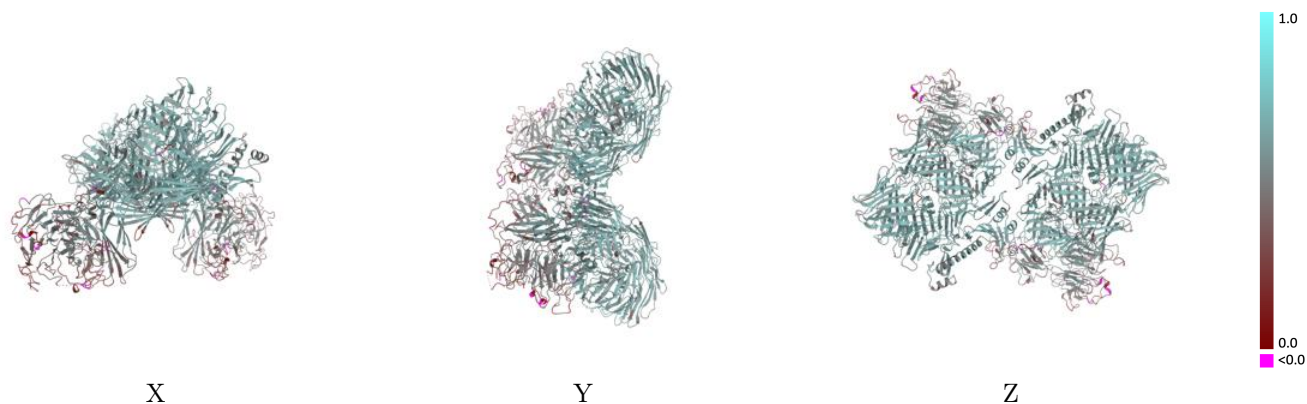
This section contains information regarding the fit between EMDB map EMD-12125 and PDB model 7BAN. Per-residue inclusion information can be found in section 3 on page 7.

9.1 Map-model overlay [i](#)



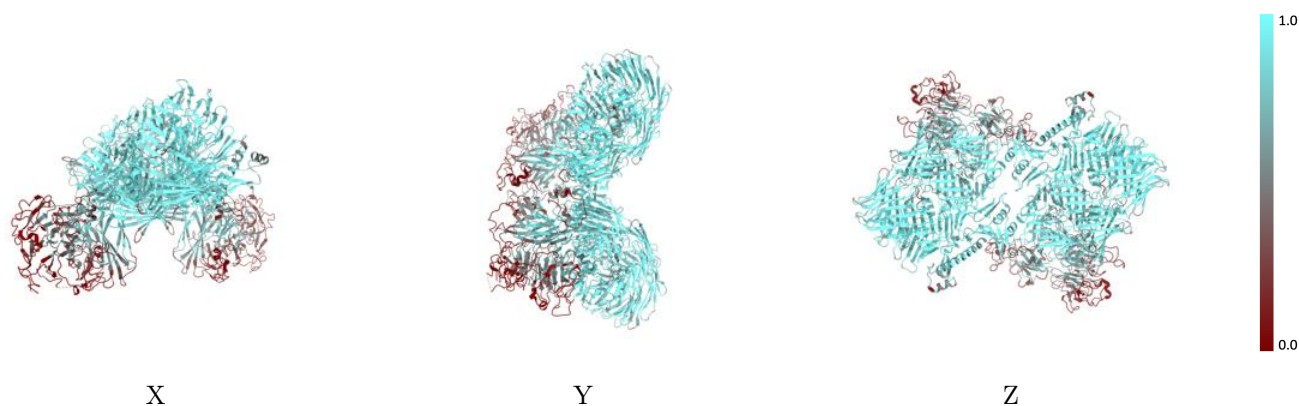
The images above show the 3D surface view of the map at the recommended contour level 0.028 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



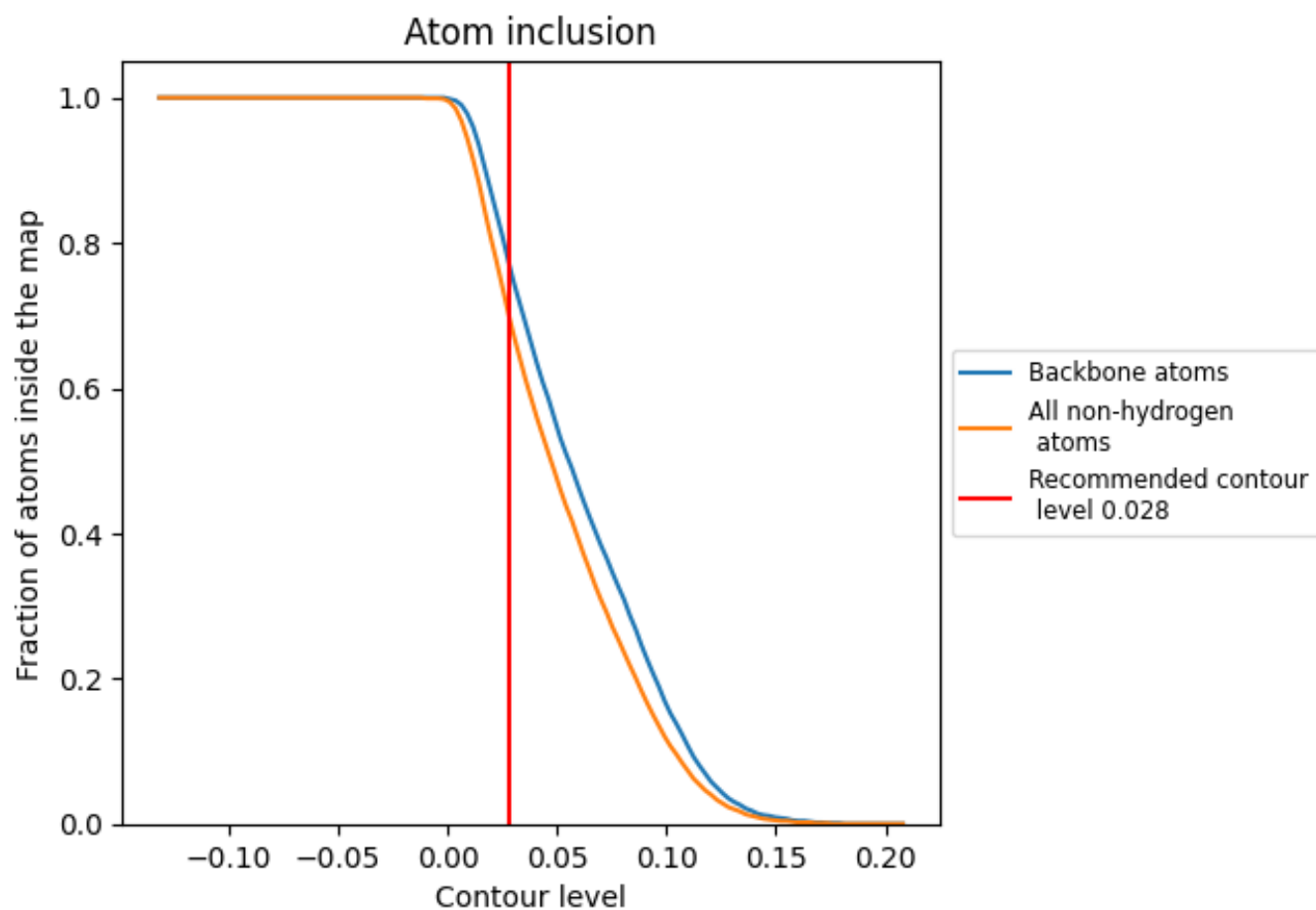
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.028).























9.4 Atom inclusion [i](#)



At the recommended contour level, 77% of all backbone atoms, 70% 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 (0.028) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7010	 0.5360
A	 0.7020	 0.5360
B	 0.7030	 0.5370
C	 0.7140	 0.5510
D	 0.7500	 0.6100
E	 0.7140	 0.5620
F	 0.1430	 0.3530
G	 0.7140	 0.5450
H	 0.7500	 0.6030
I	 0.7500	 0.5530
J	 0.1430	 0.3670

