



wwPDB EM Validation Summary Report ⓘ

Dec 19, 2022 – 12:13 am GMT

PDB ID : 7BAM
EMDB ID : EMD-12124
Title : human Teneurin4 WT C2
Authors : Meijer, D.H.; Janssen, B.J.C.
Deposited on : 2020-12-16
Resolution : 3.50 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.dev43
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
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) : 2.31.3

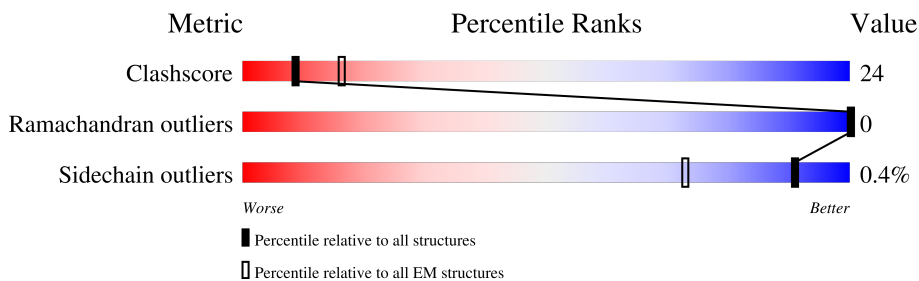
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.50 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.



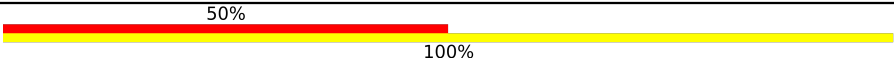

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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 ≥ 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	<div style="display: flex; justify-content: space-between;"> 16% 64% 35% </div>
1	B	1932	<div style="display: flex; justify-content: space-between;"> 16% 63% 35% </div>
2	C	2	<div style="display: flex; justify-content: space-between;"> 50% 50% </div>
2	D	2	<div style="display: flex; justify-content: space-between;"> 50% 50% </div>
2	E	2	<div style="display: flex; justify-content: space-between;"> 50% 100% </div>
2	F	2	<div style="display: flex; justify-content: space-between;"> 50% 100% </div>
2	G	2	<div style="display: flex; justify-content: space-between;"> 50% 50% </div>
2	H	2	<div style="display: flex; justify-content: space-between;"> 50% 50% </div>

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

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	2880	73		
1	B	1904	Total	C	N	O	S	0	0
			15093	9515	2625	2880	73		

- 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		
2	J	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf	
			Total	C	N		O
3	A	1	98	56	7	35	0
3	A	1	98	56	7	35	0
3	A	1	98	56	7	35	0
3	A	1	98	56	7	35	0
3	A	1	98	56	7	35	0
3	A	1	98	56	7	35	0
3	A	1	98	56	7	35	0
3	A	1	98	56	7	35	0
3	B	1	98	56	7	35	0
3	B	1	98	56	7	35	0
3	B	1	98	56	7	35	0
3	B	1	98	56	7	35	0
3	B	1	98	56	7	35	0
3	B	1	98	56	7	35	0
3	B	1	98	56	7	35	0
3	B	1	98	56	7	35	0

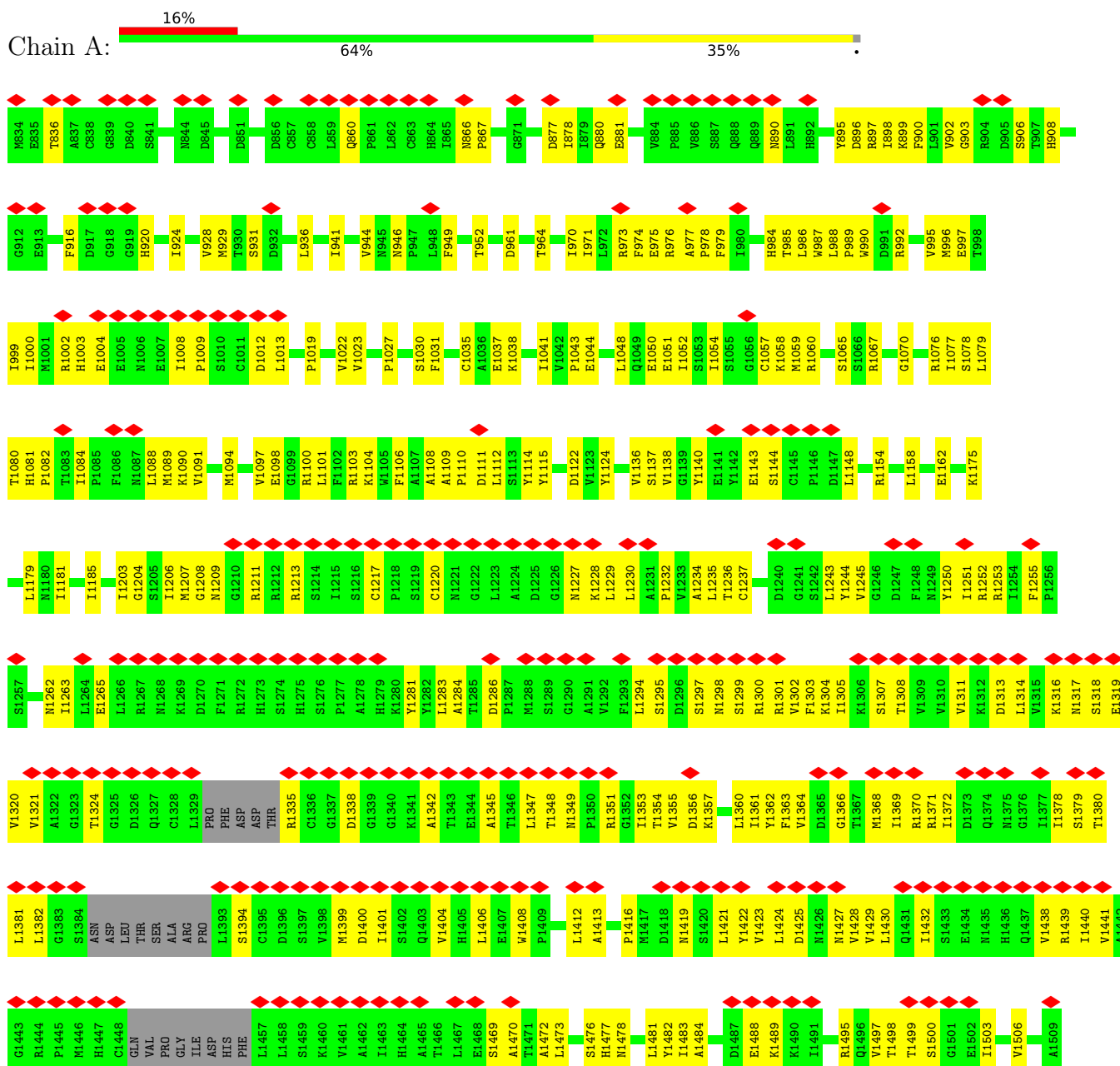
- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

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

3 Residue-property plots [i](#)

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

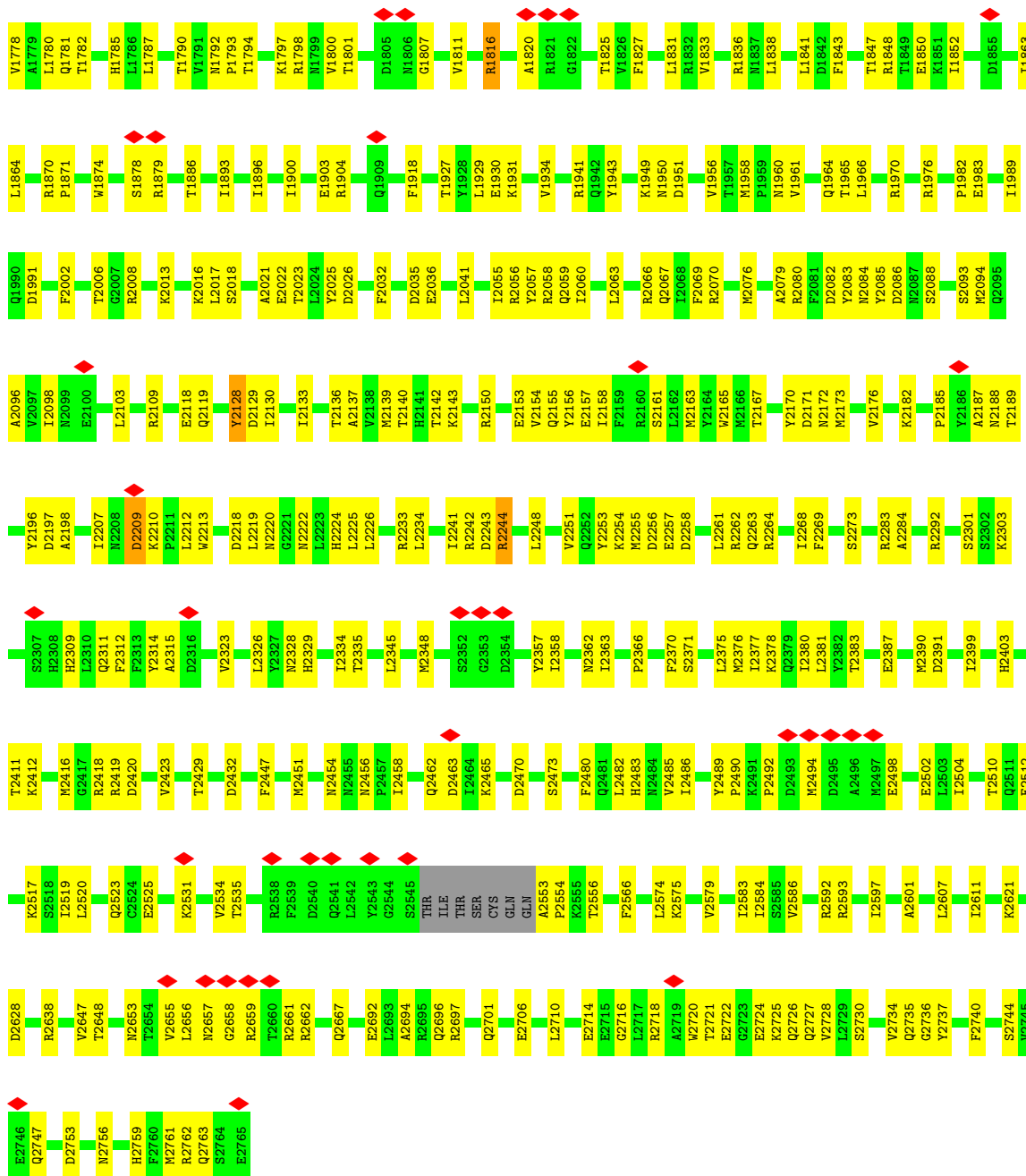


P1510	S1511	G1512	C1513	D1514	C1515	K1516	N1517	D1518	A1519	T1603	N1520	C1521	D1522	C1523	F1524	S1525	G1526	D1527	Y1530	D1533	A1534	K1535	L1536	N1537	S1540	S1541	L1542	A1543	V1544	C1545	A1546	L1550	V1551	V1552	A1553	D1554	L1555	G1556	N1557	I1558	R1559	I1560	R1561	F1562	I1563	R1564	K1567	L1570	N1571	Y1576	E1577	L1578	S1579																																																																																																																																																																																																																																																																																																																																																					
S1580	P1581	I1582	D1583	D1590	L1596	L1601	P1602	T1603	G1604	D1605	N1609	C1621	C1622	T1613	D1617	L1618	L1619	L1620	L1621	T1622	M1625	M1628	L1632	R1633	L1640	D1646	G1647	Q1648	M1654	S1658	T1664	T1665	Q1666	G1667	L1668	H1668	E1669	L1670	N1678	S1679	F1681	E1688	T1692	T1693	F1694	Y1695	V1706	P1709	V1713	R1717	T1720	D1721	S1722	S1723	V1724	H1725	V1726	Q1727	V1728	K1733	D1734	D1735	V1736	T1737	T1740	M1741	L1742	S1743	A1744	L1751	L1752	Q1753	D1754	Q1755	V1756	R1757	I1762	D1765	G1766	S1767	L1768	R1769	L1770	M1776	E1777	V1778	A1779	L1780	Q1781	T1782	H1785	L1786	L1787	A1788																																																																																																																																																																																																																																																																																																												
G1789	T1790	V1791	N1792	P1793	T1794	K1797	R1798	N1799	V1800	T1801	D1805	N1806	G1807	V1811	R1816	A1820	R1821	G1822	T1825	V1826	F1827	L1831	R1832	V1833	R1836	N1837	L1838	L1841	D1842	F1843	T1847	R1848	T1849	E1850	K1851	I1852	D1855	T1863	L1864	R1870	P1871	W1874	S1878	R1879	T1886	Y1887	I1893	I1896	T1900	E1903	R1904	Q1909	I1913	F1918	T1927	Y1928	L1929	E1930	K1931	V1934	R1941	Q1942	Y1943	K1949	N1950	D1951	V1956	T1957	M1958	P1959	N1960	V1961	Q1964	T1965	L1966	R1970	R1976	P1982	E1983	I1989	T2006	G2007	R2008	K2013	K2016	L2017	S2018	A2021	E2022	T2023	L2024	Y2025	D2026	F2032	E2036	L2041	T2055	R2056	R2057	R2058	Q2059	I2060	L2063	R2066	Q2067	I2068	F2069	R2070	M2076	A2079	R2080	F2081	Y2083	N2084	Y2085	D2086	S2088	T2092	S2093	M2094	Q2095	A2096	Y2097	L2098	N2099	E2100	L2103	R2109	E2118	Q2119	Y2128	D2129	I2130	I2133	T2136	L2219	V2138	M2139	T2140	H2141	T2142	R2150	E2153	V2154	Q2155	Y2156	E2157	I2158	F2159	R2160	L2162	M2163	Y2164	M2165	M2166	T2167	Y2170	D2171	N2172	M2173	V2176	L2181	K2182	V2183	G2184	P2185	Y2186	A2187	N2188	T2189	Y2196	D2197	A2198	I2207	N2208	D2209	K2210	R2216	L2217	M2213	D2218	N2220	G2221	N2222	L2223	H2224	L2225	L2226	R2233	L2234	I2241	R2242	D2243	D2244	L2248	V2251	Q2252	Y2253	K2254	M2255	D2256	E2257	D2258	L2261	R2262	Q2263	R2264	L2268	F2269	S2273	R2283	A2284	R2292	S2301	S2302	K2303	S2307	H2308	H2309	Q2311	R2312	F2313	Y2314	A2315	D2316	V2323	L2326	Y2327	N2328	I2334	T2335	L2345	M2348	S2352	G2353	D2354	Y2357	I2358	M2362	I2363	P2366	F2370	S2371	L2375	M2376	I2377	K2378	Q2379	I2380	L2381	Y2382	T2383	E2387	M2390	D2391	I2399	H2403	T2411	K2412	M2416	G2417	R2418	R2419	L2520	Q2523	C2524	R2427	W2428	T2429	D2432	F2447	M2451	N2454	M2455	N2456	P2457	I2458	Q2462	D2463	I2464	K2465	D2470	S2473	F2480	Q2481	L2482	H2483	R2484	V2485	I2486	Y2489	P2490	R2491	P2492	D2493	M2494	D2495	A2496	M2497	E2498	E2502	L2503	I2504	T2510	Q2511	E2512	K2517	S2518	L2519	L2520	Q2523	C2524	T2655	V2656	L2657	T2658	N2653	T2654	V2655	T2656	F2656	L2657	R2658	K2659	V2659	L2660	R2661	R2662	Q2667	E2692	Y2643	L2693	A2694	R2695	THR	ILE	THR	SER	CYS	GLN	GLN	A2553	P2554	K2555	T2556	F2556	L2574	K2575	V2579	L2583	L2584	S2585	V2586	R2592	R2593	L2597	A2601	L2607	L2611	K2621	D2628	R2638	V2647	T2648	N2653	T2760	M2761	R2762	Q2763	S2764	E2765	T2760	V2761	L2762	M2763	R2764	Q2765	Q2766	Q2767	Q2768	L2729	S2730	V2734	Q2735	Q2736	Y2737	F2740	S2744	V2745	E2746	Q2747	D2753	M2756	H2759

● Molecule 1: Teneurin-4



M634	E835	T836	A837	C838	G839	D840	S841	N844	D845	D851	D856	C857	C858	Q860	P861	L862	C863	H864	N866	P867	G871	D877	I878	I879	Q880	E881	V884	P885	V886	S887	Q888	Q889	N890	L891	H892	Y895	D896	R897	I898	K899	F900	L901	G902	G903	R904	D905	S906	T907	H908												
G912	E913	F916	D917	G918	G919	H920	T924	V928	N929	T930	S931	D932	L936	T941	V944	N945	N946	F947	L948	F949	T952	D961	T964	I970	I971	L972	R973	F974	E975	R976	A977	P978	F979	T980	H984	T985	L986	W987	L988	P989	V990	D991	R992	V995	M996	E997	T998														
I999	I1000	M1001	R1002	H1003	E1004	E1005	N1006	E1007	I1008	P1009	S1010	C1011	D1012	L1013	S1014	M1015	P1019	V1022	V1023	P1027	S1030	F1031	C1035	A1036	E1037	K1038	I1041	V1042	P1043	E1044	L1048	Q1049	E1050	E1051	I1052	S1053	I1054	S1055	G1056	C1057	K1058	M1059	R1060	S1065	S1066	R1067	G1070	R1076	I1077												
S1078	L1079	H1080	H1081	P1082	T1083	I1084	P1085	F1086	M1087	L1088	M1089	K1090	V1091	M1094	V1097	E1098	G1099	R1100	L1101	F1102	R1103	K1104	M1105	F1106	A1107	A1108	A1109	P1110	D1111	L1112	Y1114	Y1115	D1122	R1123	Y1124	V1136	S1137	G1138	G1139	Y1140	E1141	Y1142	E1143	S1144	G1145	P1146	D1147	L1148	R1154	L1158	E1162										
K1175	L1179	I1180	I1181	I1185	I1203	G1204	S1205	M1206	M1207	G1208	M1209	G1210	R1211	R1212	R1213	R1214	I1215	S1216	C1217	F1218	S1219	C1220	M1221	G1222	L1223	A1224	M1225	G1226	M1227	K1228	L1229	L1230	A1231	P1232	K1233	A1234	L1235	T1236	C1237	D1240	L1243	Y1244	V1245	G1246	D1247	F1248	M1249	Y1250	I1251	R1252	R1253	I1254	F1255								
P1256	S1257	G1258	M1262	I1263	L1264	E1265	L1266	R1267	M1268	K1269	D1270	F1271	H1272	H1273	S1274	H1275	S1276	P1277	A1278	H1279	K1280	Y1281	V1282	L1283	A1284	T1285	D1286	M1288	S1289	G1290	A1291	V1292	F1293	L1294	S1295	D1296	L1297	M1298	S1299	R1300	L1301	V1302	F1303	K1304	I1305	K1306	S1307	T1308	V1309	V1310	V1311	K1312	D1313	L1314	V1315	K1316	M1317				
S1318	E1319	V1320	V1321	A1322	G1323	L1324	R1325	D1326	Q1327	C1328	P1329	P1330	P1331	A1332	R1333	C1334	G1335	G1336	G1337	D1338	G1339	G1340	K1341	A1342	L1343	E1344	A1345	T1346	L1347	T1348	M1349	R1350	R1351	G1352	L1353	V1354	V1355	D1356	K1357	G1358	L1359	L1360	I1361	Y1362	F1363	V1364	D1365	K1366	T1367	M1368	V1369	R1370	R1371	I1372	D1373	Q1374	M1375	G1376	I1377		
I1378	S1379	T1380	L1381	L1382	G1383	S1384	ASN	ASP	LEU	THR	SER	ALA	ARG	PRO	PHE	ASP	ASP	THR	R1335	C1336	G1337	D1338	G1339	G1340	K1341	A1342	L1343	E1344	A1345	T1346	L1347	T1348	M1349	R1350	R1351	G1352	L1353	V1354	V1355	D1356	K1357	G1358	L1359	L1360	I1361	Y1362	F1363	V1364	D1365	K1366	T1367	M1368	V1369	R1370	R1371	I1372	D1373	Q1374	M1375	G1376	I1377
L1440	V1441	A1442	G1443	R1444	P1445	M1446	H1447	C1448	GLN	VAL	PRO	GLY	ILE	ASP	HIS	PHE	L1457	L1458	S1459	K1460	V1461	A1462	I1463	H1464	A1465	L1466	F1467	F1468	A1469	A1470	T1471	A1472	L1473	S1476	H1477	M1478	L1481	Y1482	I1483	A1484	D1487	E1488	K1489	K1490	I1491	R1495	Q1496	V1497	T1498	T1499	S1500	G1501	E1502	I1503							
V1506	A1509	P1510	S1511	G1512	C1513	D1514	C1515	K1516	M1517	D1518	A1519	M1520	C1521	D1522	C1523	F1524	S1525	G1526	D1527	Y1530	D1533	A1534	K1535	L1536	M1537	S1540	S1541	L1542	A1543	V1544	C1545	A1546	L1550	Y1551	V1552	A1553	D1554	L1555	G1556	M1557	I1558	R1559	I1560	F1561	I1563	R1564	K1567	L1570	M1571	Y1576											
E1577	L1578	S1579	S1580	P1581	I1582	D1583	D1590	H1595	L1596	L1601	P1602	T1603	G1604	D1605	M1609	Y1612	Y1613	V1614	V1617	I1618	L1619	L1620	I1621	T1622	M1625	M1628	R1632	R1633	L1640	D1646	Q1647	M1648	M1654	V1655	S1658	A1659	L1660	T1664	T1665	Q1666	G1667	H1668	E1669	L1670	M1678	S1679															
E1688	T1692	F1693	I1694	Y1695	T1704	M1705	V1706	P1709	V1713	R1717	T1720	D1721	S1722	S1723	V1724	H1725	V1726	Q1727	V1728	S1732	K1733	D1734	V1736	T1737	T1740	M1741	L1742	S1743	A1744	L1751	L1752	Q1753	D1754	Q1755	V1756	R1757	M1684	S1688	A1689	L1690	T1684	T1665	Q1666	G1667	H1668	E1669	L1670	M1678	S1679												
M1776	E1777																																																												



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



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

Chain D:  50% 50%



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

Chain E:  50% 100%



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

Chain F:  50% 100%



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

Chain G:  50% 50% 50%



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

Chain H:  50% 50%



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

Chain I:  50% 100%



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



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	35929	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	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.358	Depositor
Minimum map value	-0.177	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.010	Depositor
Recommended contour level	0.045	Depositor
Map size (Å)	273.936, 273.936, 273.936	wwPDB
Map dimensions	312, 312, 312	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.878, 0.878, 0.878	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	0.40	0/15425	0.53	0/20912
1	B	0.40	0/15425	0.53	0/20912
All	All	0.40	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	14710	704	0
1	B	15093	0	14710	708	0
2	C	28	0	25	1	0
2	D	28	0	25	1	0
2	E	28	0	25	4	0
2	F	28	0	25	0	0
2	G	28	0	25	1	0
2	H	28	0	25	1	0
2	I	28	0	25	4	0
2	J	28	0	25	0	0
3	A	98	0	91	7	0
3	B	98	0	91	6	0
4	A	3	0	0	0	0
4	B	3	0	0	0	0
All	All	30612	0	29802	1425	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 24.

The worst 5 of 1425 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:2485:VAL:HG23	1:A:2486:ILE:HD12	1.25	1.13
1:A:1816:ARG:HG2	1:A:1816:ARG:HH11	1.13	1.10
1:B:2485:VAL:HG23	1:B:2486:ILE:HD12	1.25	1.09
1:B:1816:ARG:HG2	1:B:1816:ARG:HH11	1.13	1.06
1:A:2489:TYR:CD1	1:A:2490:PRO:HD2	1.94	1.02

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%)	1657 (100%)	6 (0%)	91	96
1	B	1663/1689 (98%)	1657 (100%)	6 (0%)	91	96
All	All	3326/3378 (98%)	3314 (100%)	12 (0%)	91	96

5 of 12 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1776	MET
1	B	1816	ARG
1	B	2244	ARG
1	B	2128	TYR
1	A	2128	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1477	HIS
1	B	1792	ASN
1	B	2726	GLN
1	B	2483	HIS
1	B	2523	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	2,1	14,14,15	0.22	0	17,19,21	0.47	0
2	NAG	C	2	2	14,14,15	0.33	0	17,19,21	0.43	0
2	NAG	D	1	2,1	14,14,15	0.35	0	17,19,21	0.55	0
2	NAG	D	2	2	14,14,15	0.30	0	17,19,21	0.48	0
2	NAG	E	1	2,1	14,14,15	0.46	0	17,19,21	0.46	0
2	NAG	E	2	2	14,14,15	0.17	0	17,19,21	0.43	0
2	NAG	F	1	2,1	14,14,15	0.40	0	17,19,21	0.46	0
2	NAG	F	2	2	14,14,15	0.30	0	17,19,21	0.42	0
2	NAG	G	1	2,1	14,14,15	0.22	0	17,19,21	0.46	0
2	NAG	G	2	2	14,14,15	0.33	0	17,19,21	0.44	0
2	NAG	H	1	2,1	14,14,15	0.35	0	17,19,21	0.55	0
2	NAG	H	2	2	14,14,15	0.30	0	17,19,21	0.48	0
2	NAG	I	1	2,1	14,14,15	0.46	0	17,19,21	0.47	0
2	NAG	I	2	2	14,14,15	0.18	0	17,19,21	0.43	0
2	NAG	J	1	2,1	14,14,15	0.39	0	17,19,21	0.45	0
2	NAG	J	2	2	14,14,15	0.30	0	17,19,21	0.42	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	1	2,1	-	4/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	NAG	D	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	NAG	E	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1
2	NAG	F	1	2,1	-	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	2,1	-	4/6/23/26	0/1/1/1
2	NAG	G	2	2	-	0/6/23/26	0/1/1/1
2	NAG	H	1	2,1	-	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	2,1	-	2/6/23/26	0/1/1/1
2	NAG	I	2	2	-	0/6/23/26	0/1/1/1
2	NAG	J	1	2,1	-	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 24 torsion outliers are listed below:

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

There are no ring outliers.

8 monomers are involved in 12 short contacts:

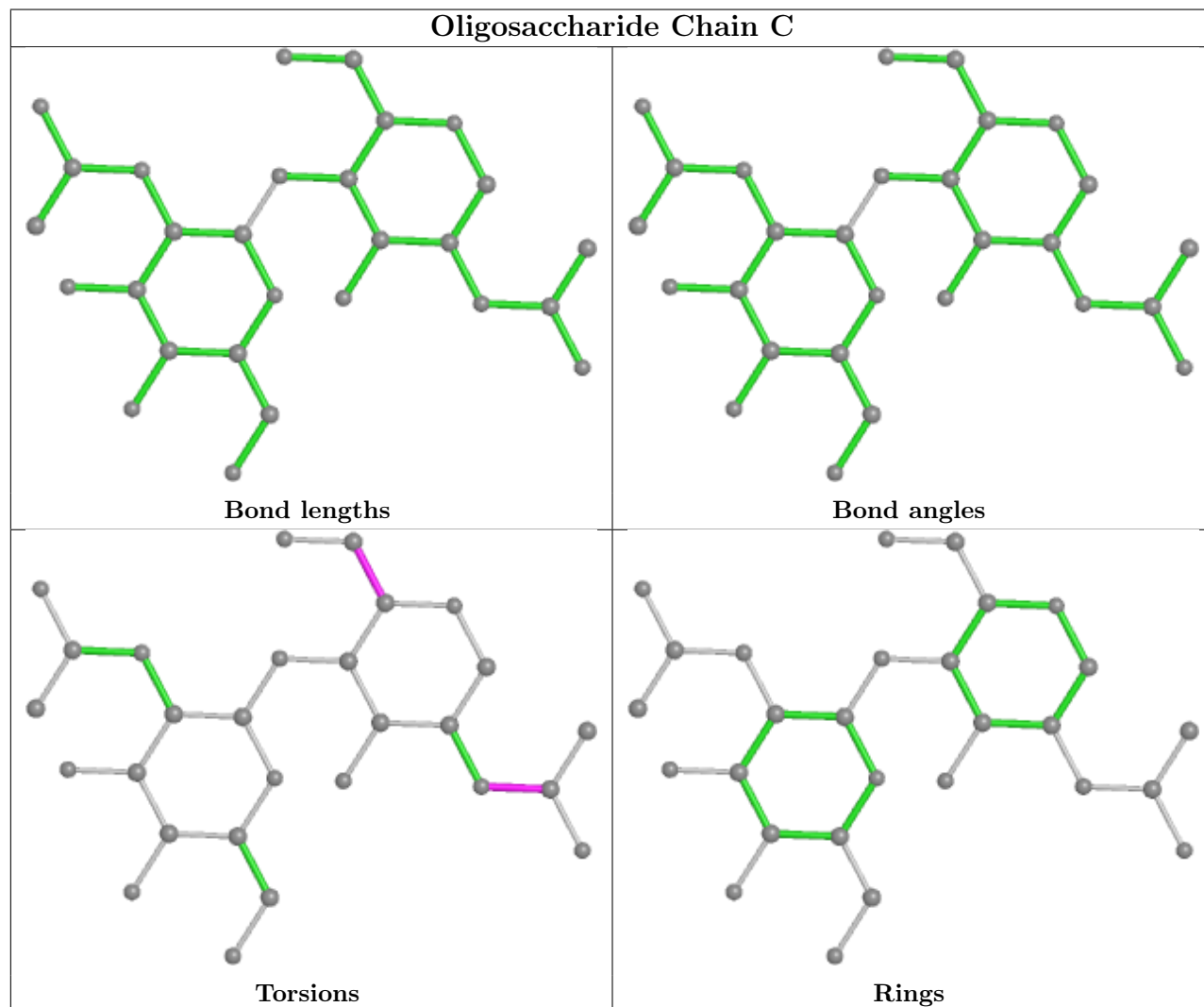
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	1	NAG	4	0
2	D	1	NAG	1	0
2	E	2	NAG	2	0
2	H	1	NAG	1	0
2	I	1	NAG	4	0
2	I	2	NAG	2	0

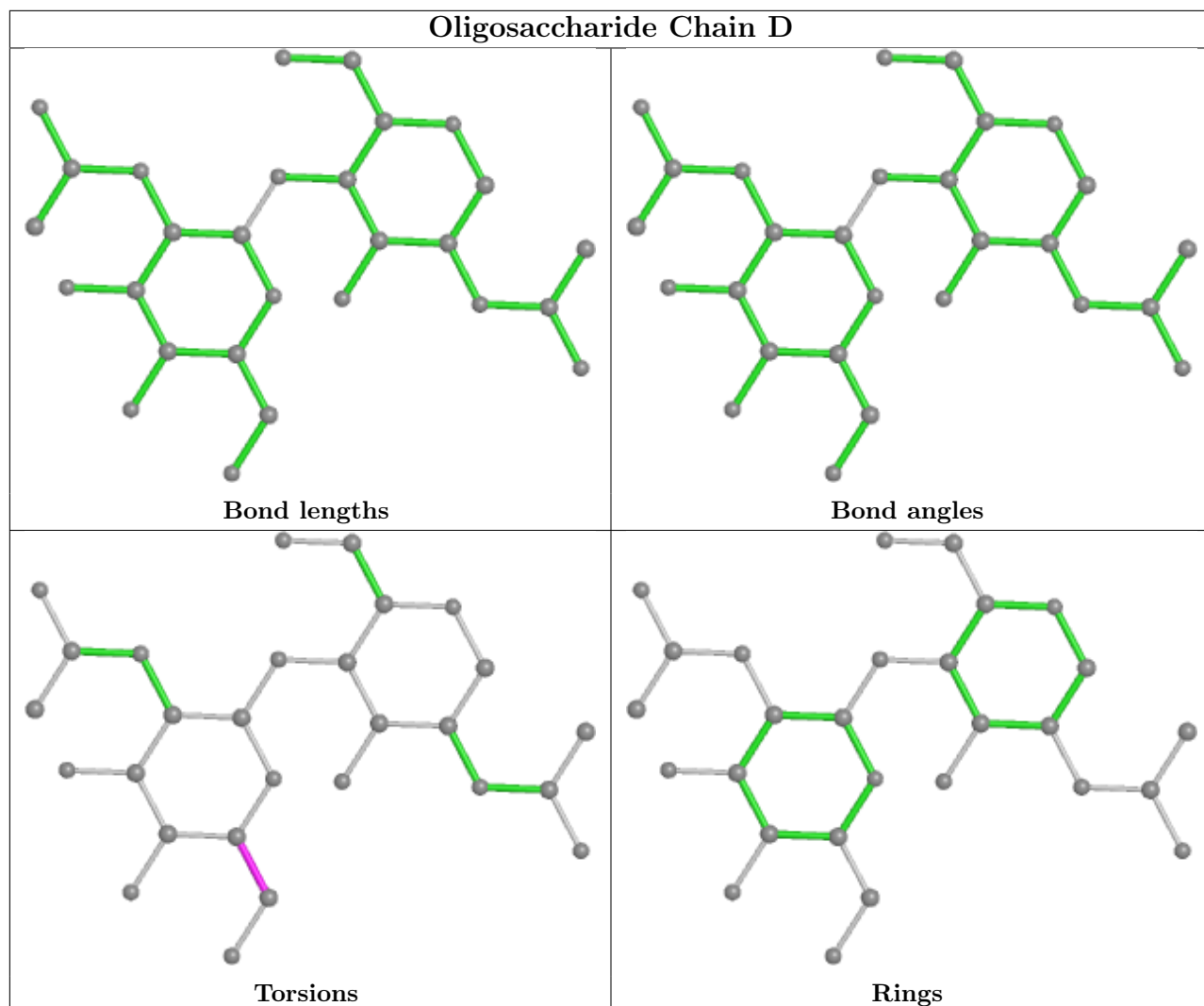
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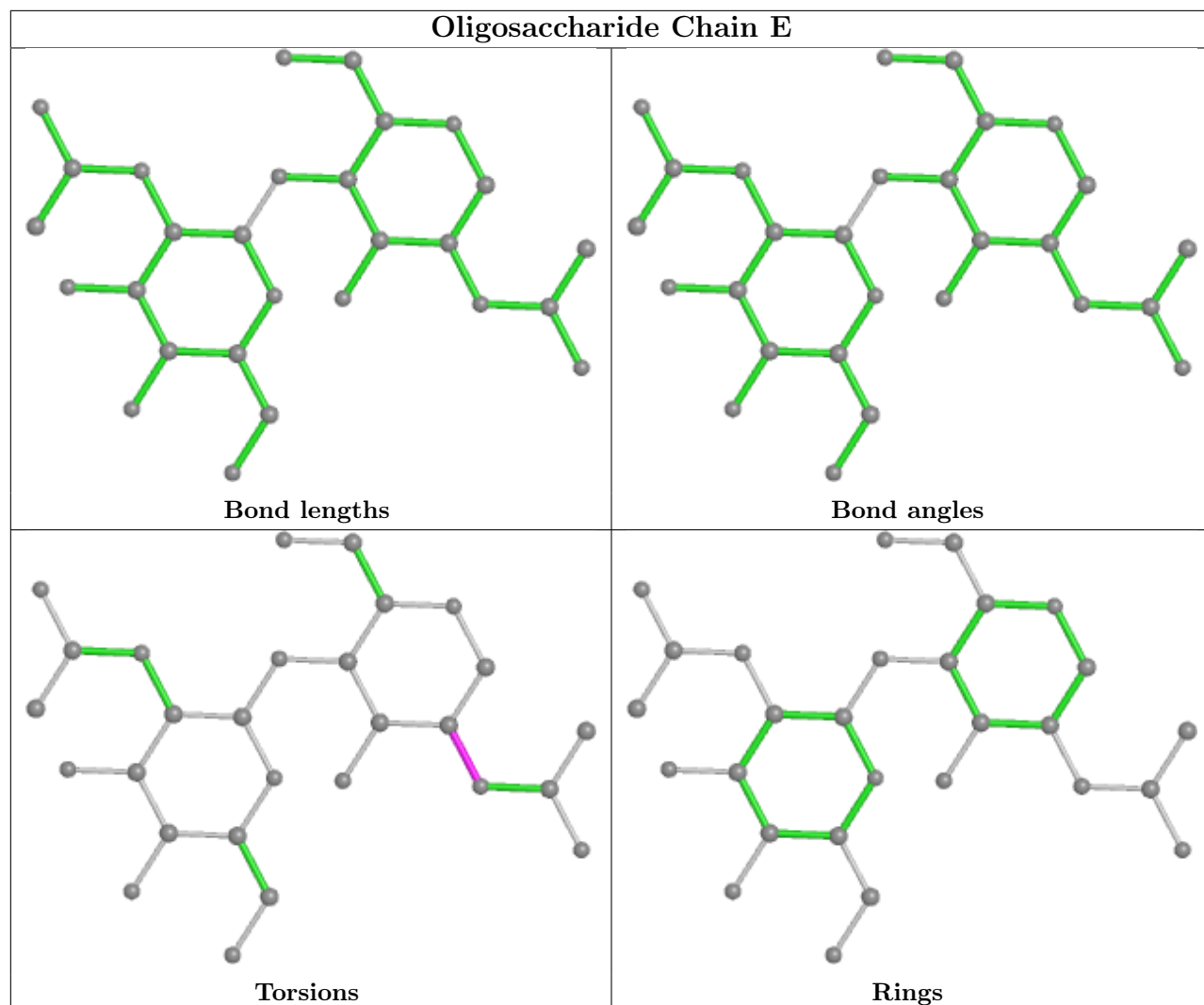
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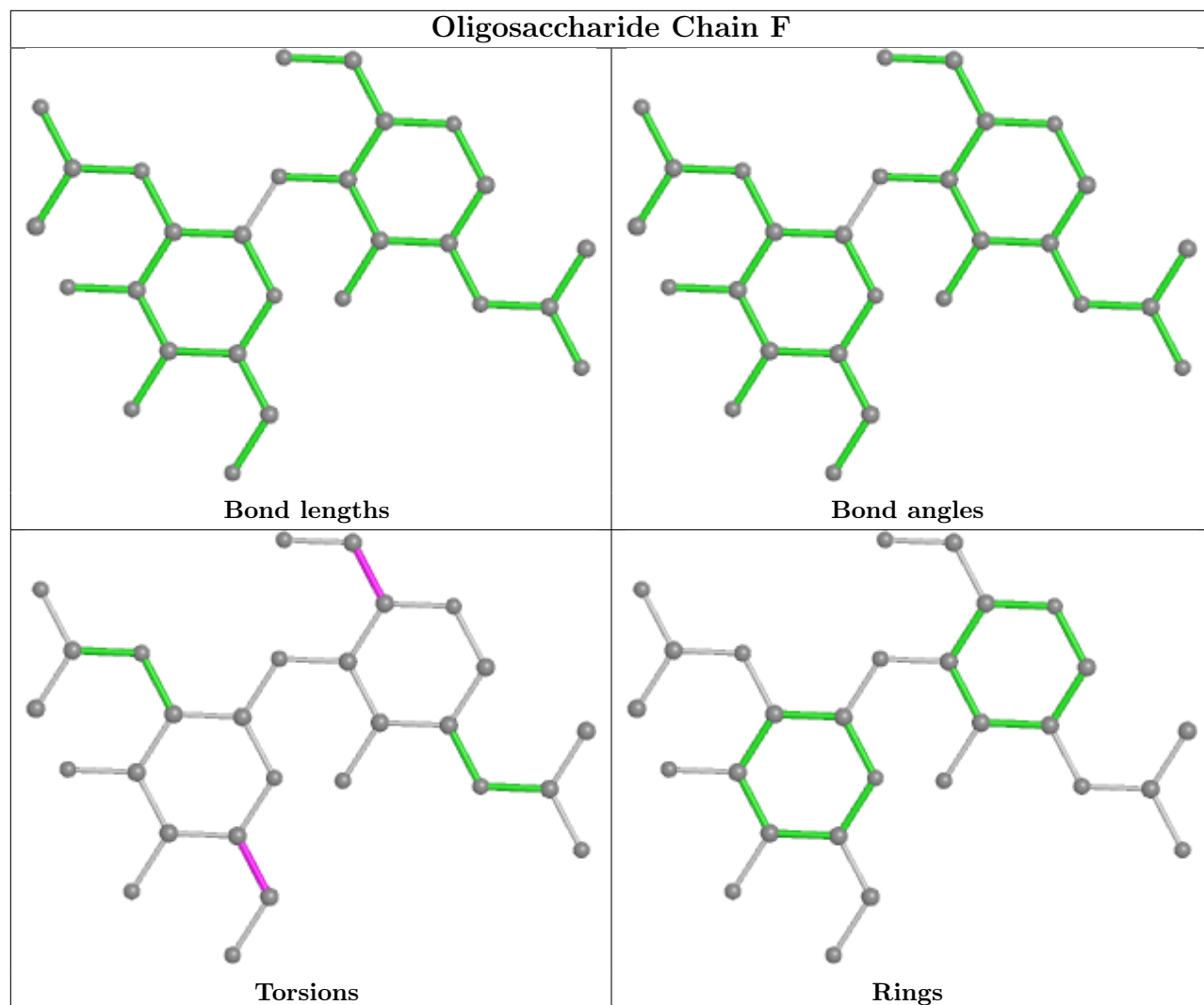
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	1	NAG	1	0
2	C	1	NAG	1	0

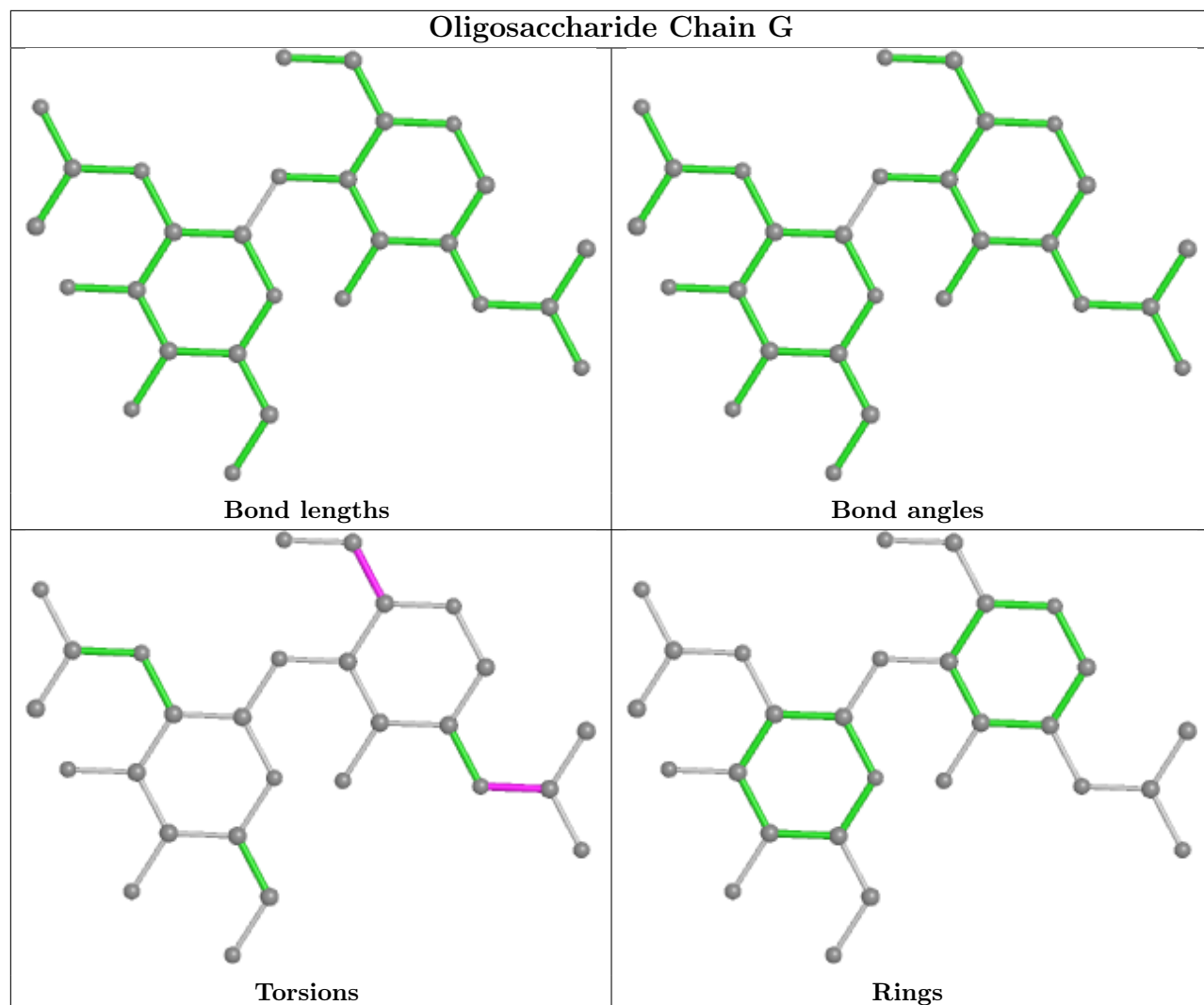
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

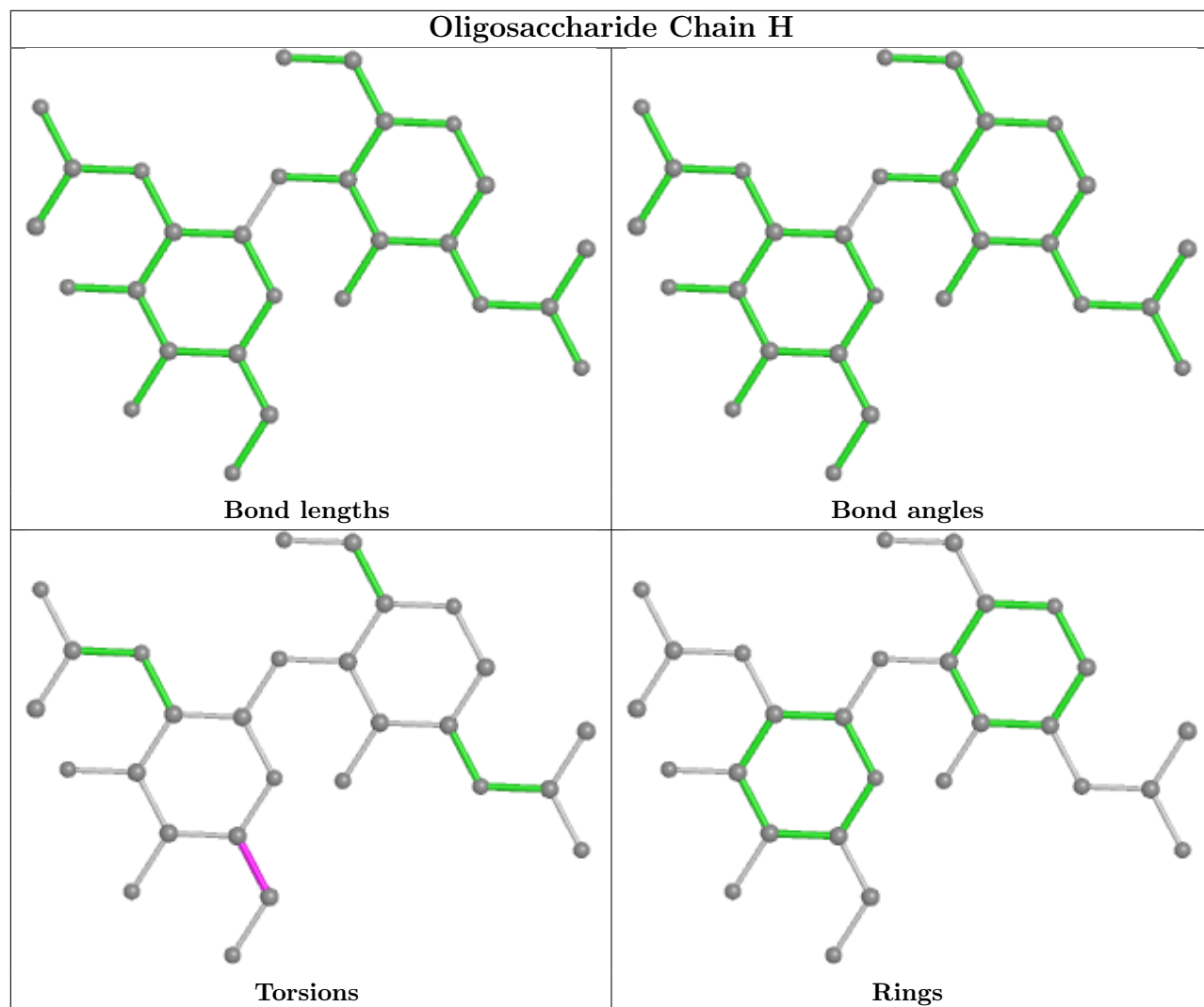


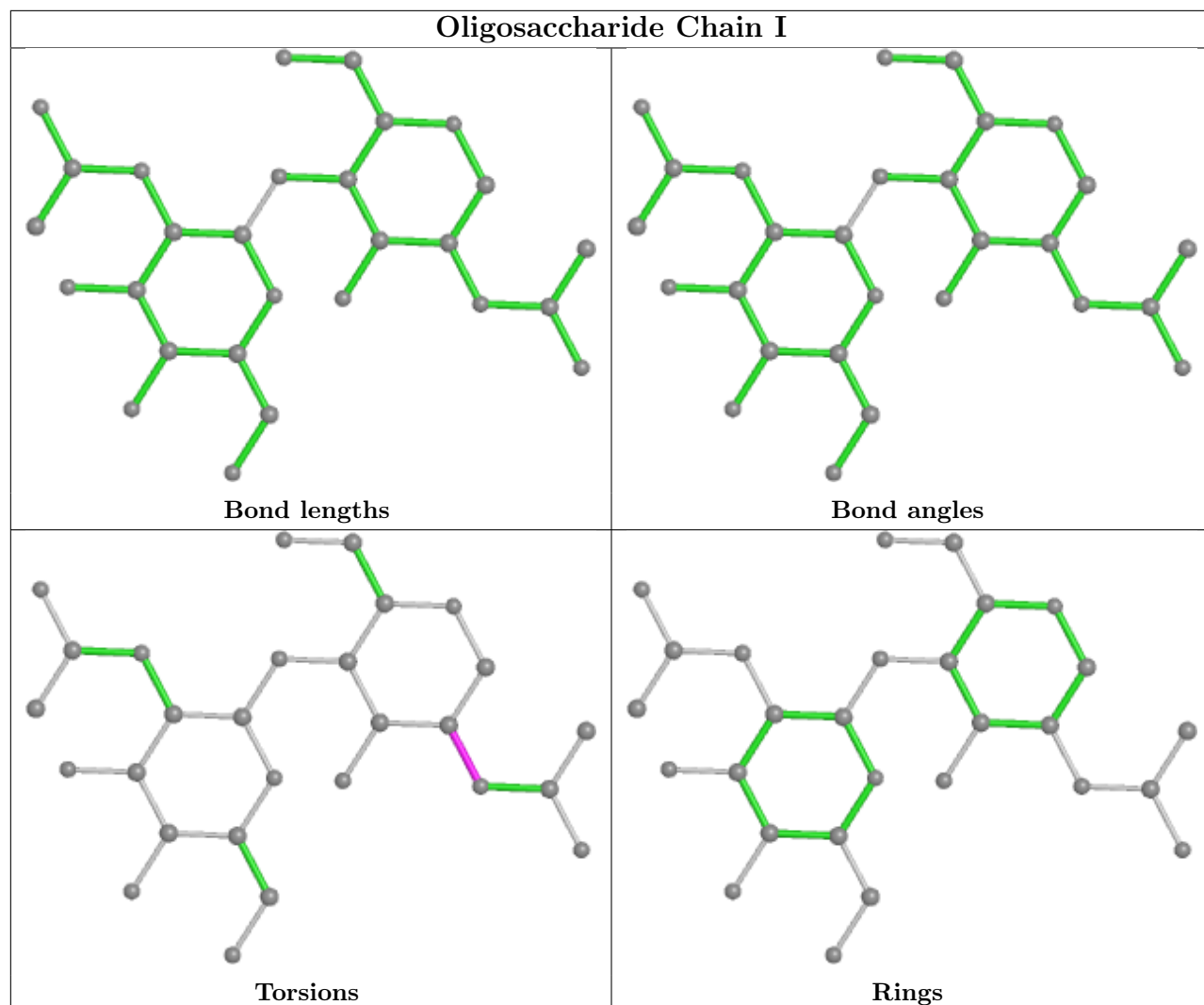


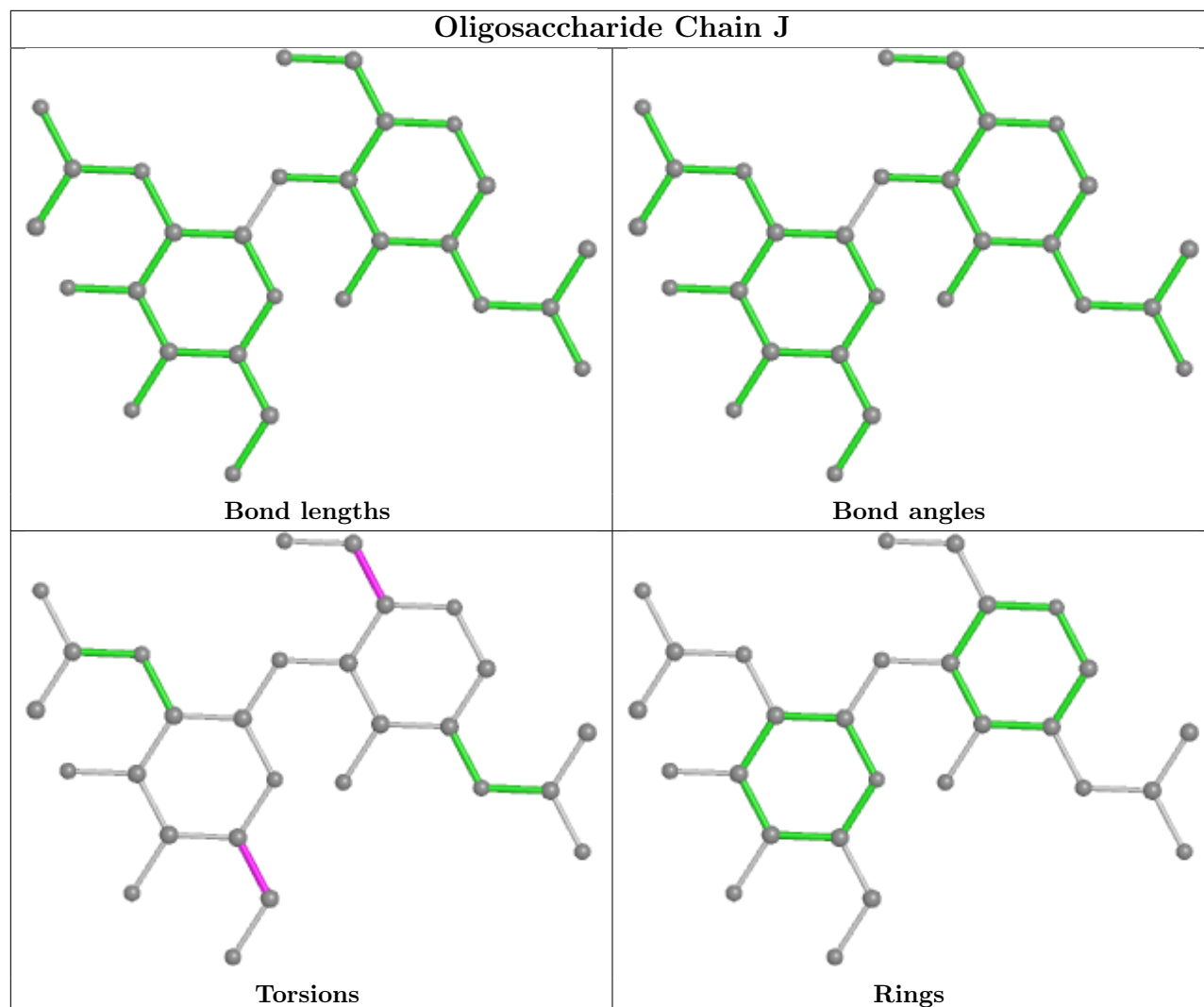












5.6 Ligand geometry [i](#)

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	2802	1	14,14,15	0.26	0	17,19,21	0.48	0
3	NAG	A	2802	1	14,14,15	0.26	0	17,19,21	0.48	0
3	NAG	A	2801	1	14,14,15	0.30	0	17,19,21	0.40	0
3	NAG	A	2806	1	14,14,15	0.34	0	17,19,21	0.47	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	A	2803	1	14,14,15	0.33	0	17,19,21	0.92	1 (5%)
3	NAG	A	2804	1	14,14,15	0.28	0	17,19,21	0.49	0
3	NAG	A	2805	1	14,14,15	0.29	0	17,19,21	0.37	0
3	NAG	A	2807	1	14,14,15	0.62	0	17,19,21	0.79	0
3	NAG	B	2801	1	14,14,15	0.30	0	17,19,21	0.40	0
3	NAG	B	2804	1	14,14,15	0.29	0	17,19,21	0.49	0
3	NAG	B	2803	1	14,14,15	0.32	0	17,19,21	0.91	1 (5%)
3	NAG	B	2806	1	14,14,15	0.36	0	17,19,21	0.47	0
3	NAG	B	2807	1	14,14,15	0.63	0	17,19,21	0.79	1 (5%)
3	NAG	B	2805	1	14,14,15	0.29	0	17,19,21	0.37	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	2802	1	-	2/6/23/26	0/1/1/1
3	NAG	A	2802	1	-	2/6/23/26	0/1/1/1
3	NAG	A	2801	1	-	2/6/23/26	0/1/1/1
3	NAG	A	2806	1	-	4/6/23/26	0/1/1/1
3	NAG	A	2803	1	-	5/6/23/26	0/1/1/1
3	NAG	A	2804	1	-	4/6/23/26	0/1/1/1
3	NAG	A	2805	1	-	4/6/23/26	0/1/1/1
3	NAG	A	2807	1	-	3/6/23/26	0/1/1/1
3	NAG	B	2801	1	-	2/6/23/26	0/1/1/1
3	NAG	B	2804	1	-	4/6/23/26	0/1/1/1
3	NAG	B	2803	1	-	5/6/23/26	0/1/1/1
3	NAG	B	2806	1	-	4/6/23/26	0/1/1/1
3	NAG	B	2807	1	-	3/6/23/26	0/1/1/1
3	NAG	B	2805	1	-	4/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	2803	NAG	C1-O5-C5	3.09	116.38	112.19
3	B	2803	NAG	C1-O5-C5	3.05	116.33	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	2807	NAG	C1-C2-N2	2.01	113.92	110.49

There are no chirality outliers.

5 of 48 torsion outliers are listed below:

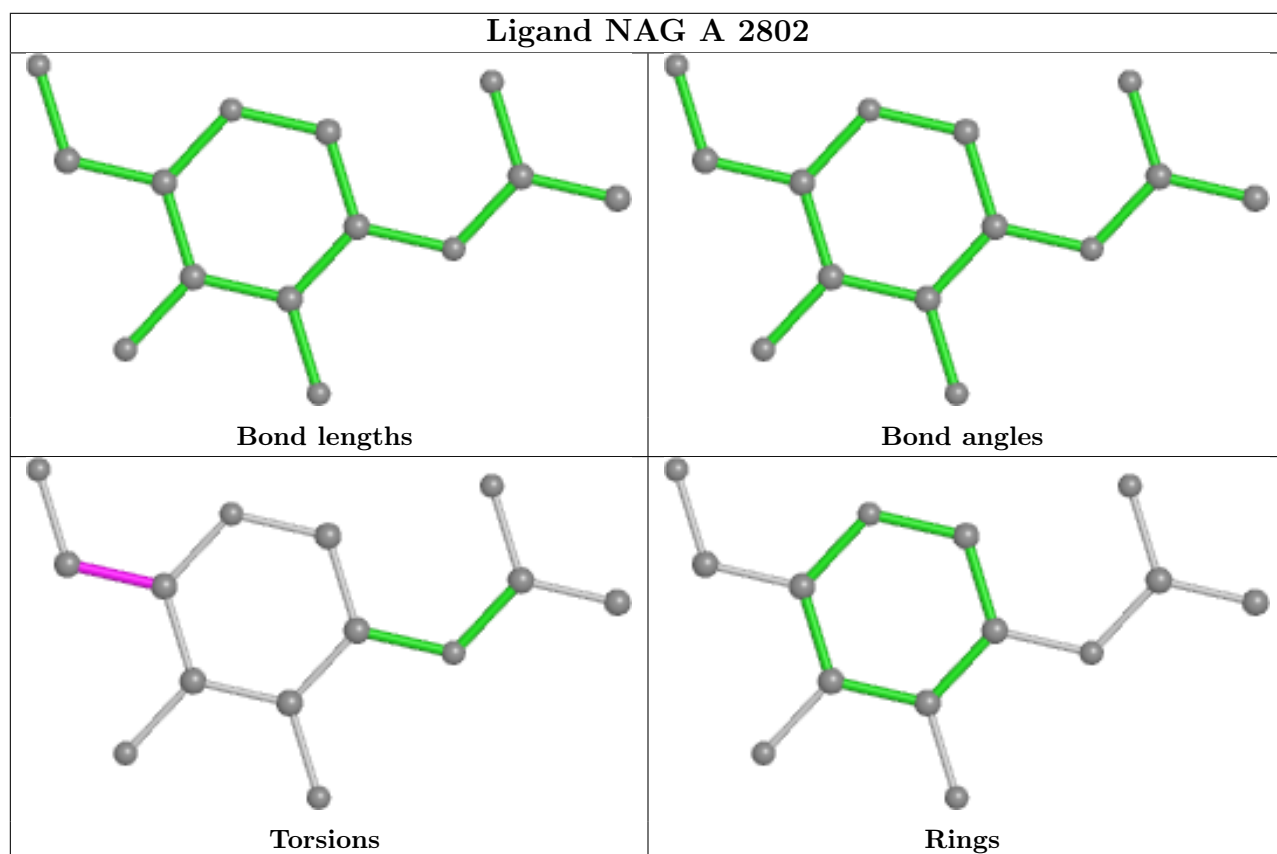
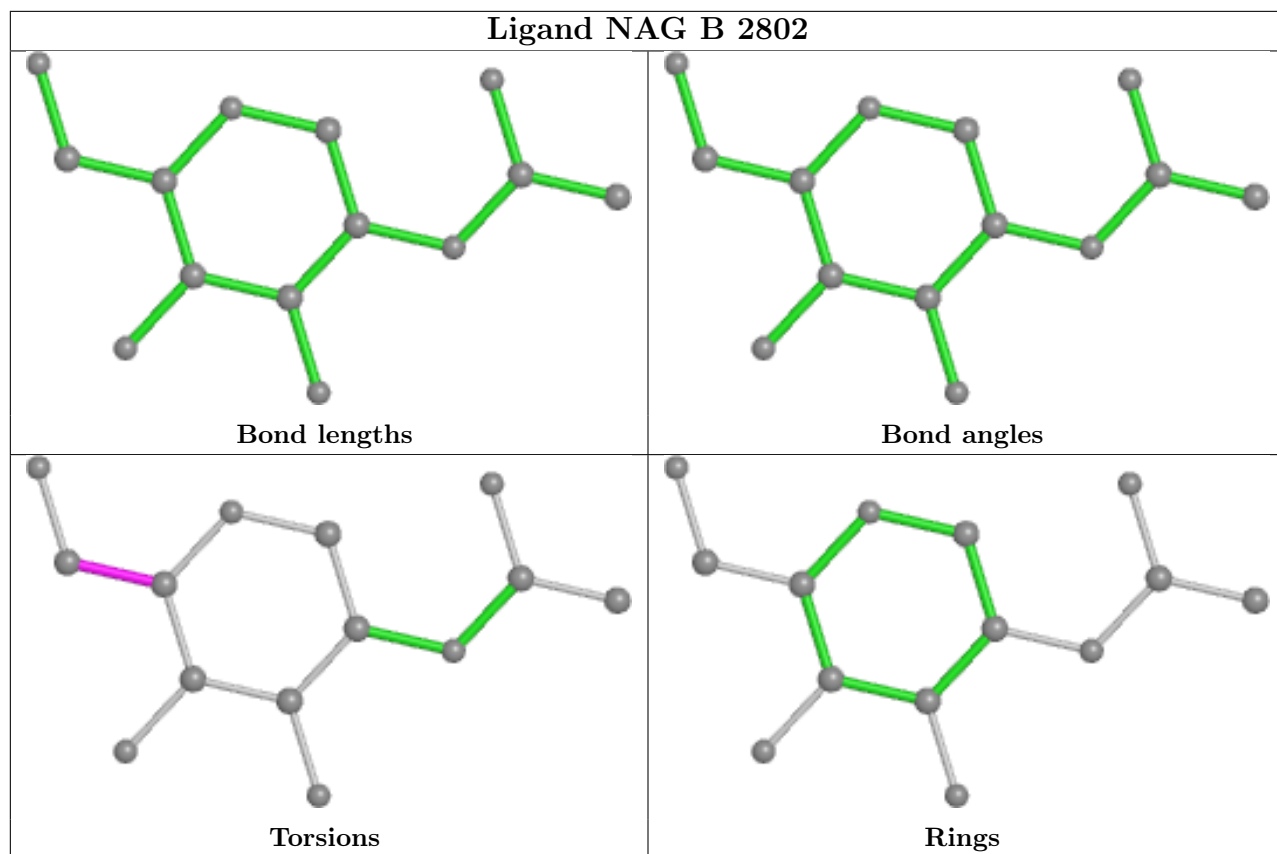
Mol	Chain	Res	Type	Atoms
3	A	2807	NAG	C1-C2-N2-C7
3	B	2807	NAG	C1-C2-N2-C7
3	A	2806	NAG	O5-C5-C6-O6
3	A	2807	NAG	O5-C5-C6-O6
3	B	2806	NAG	O5-C5-C6-O6

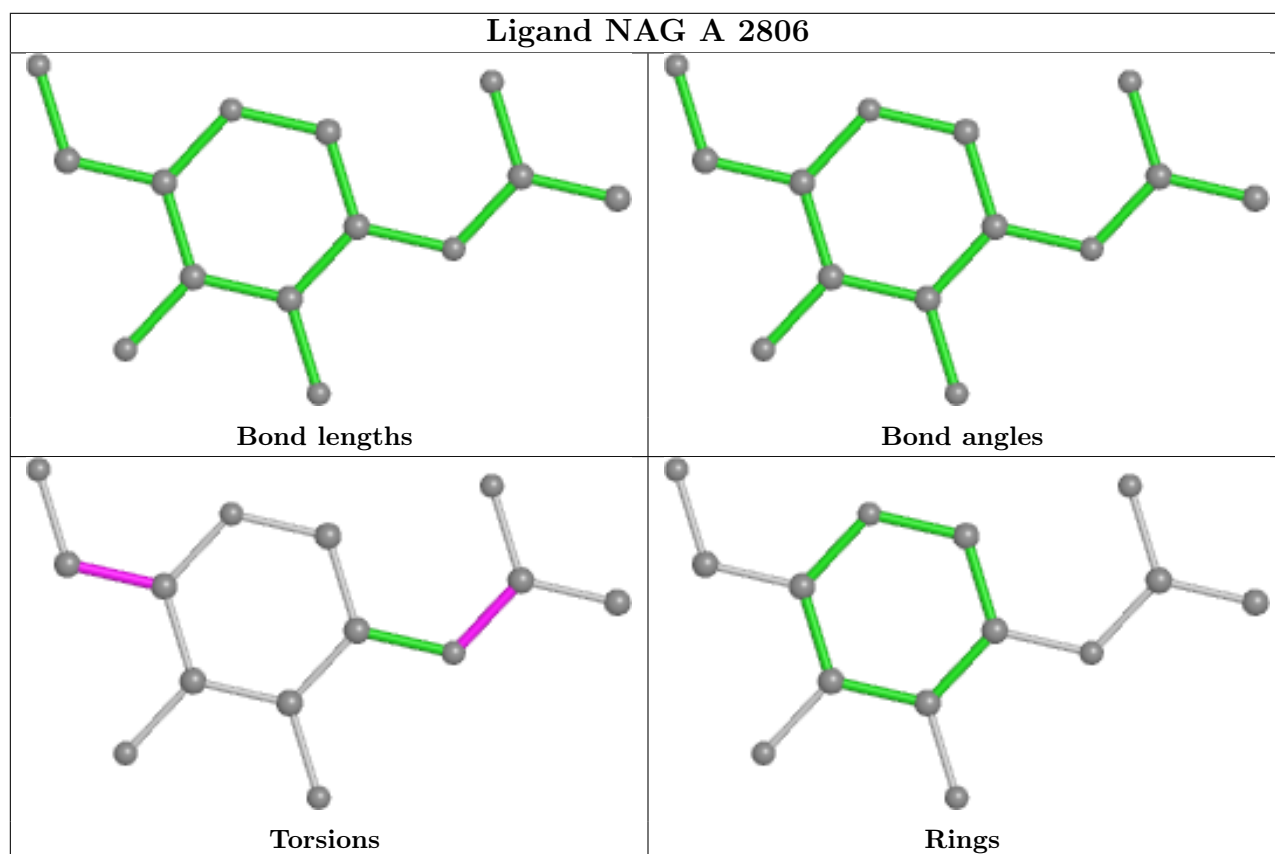
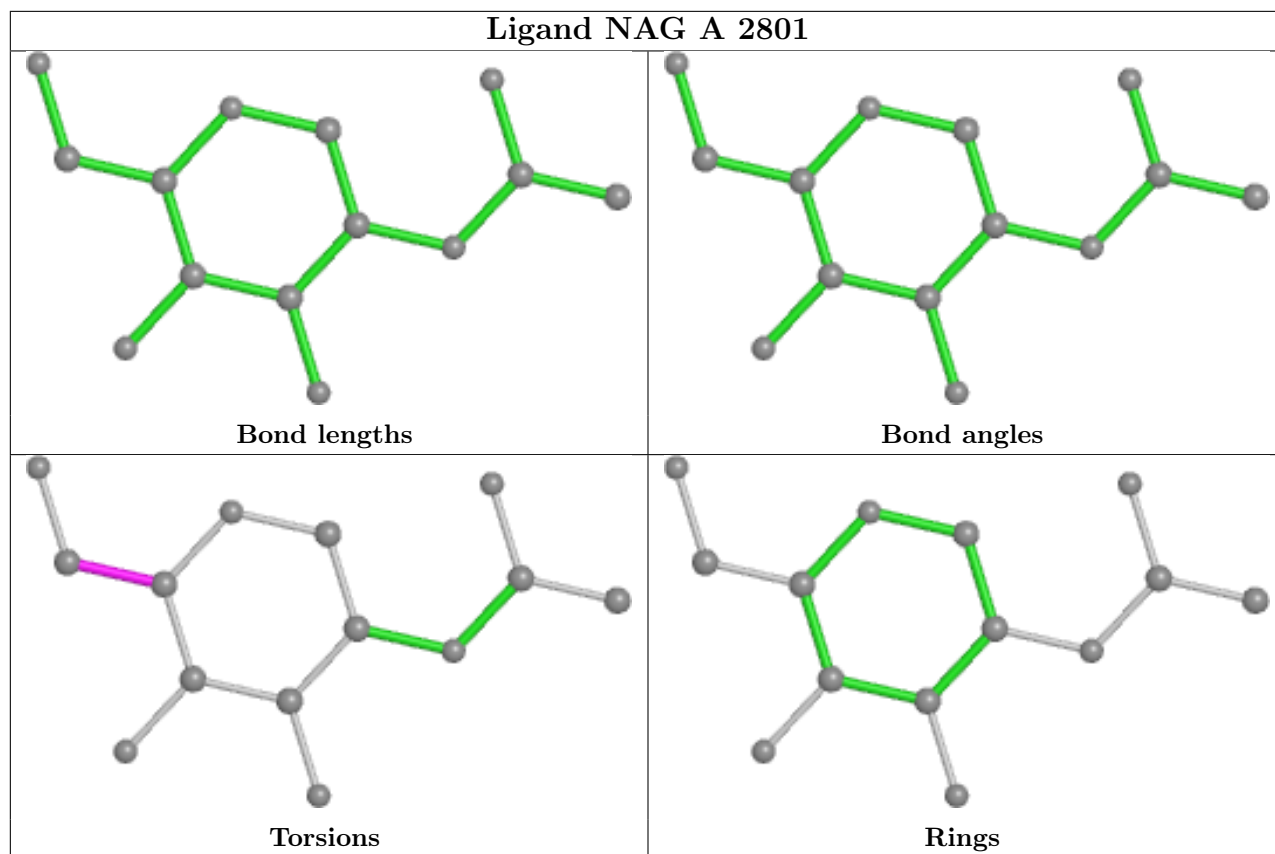
There are no ring outliers.

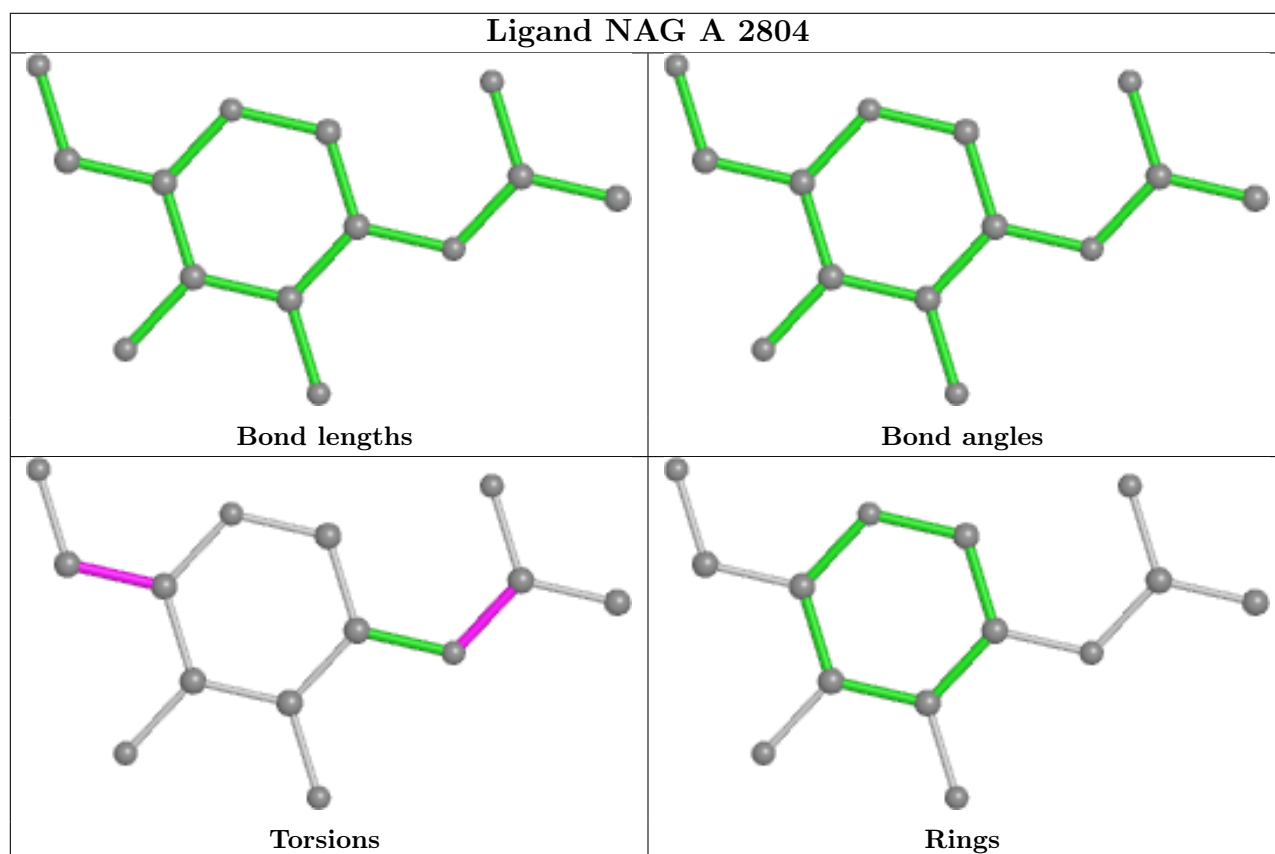
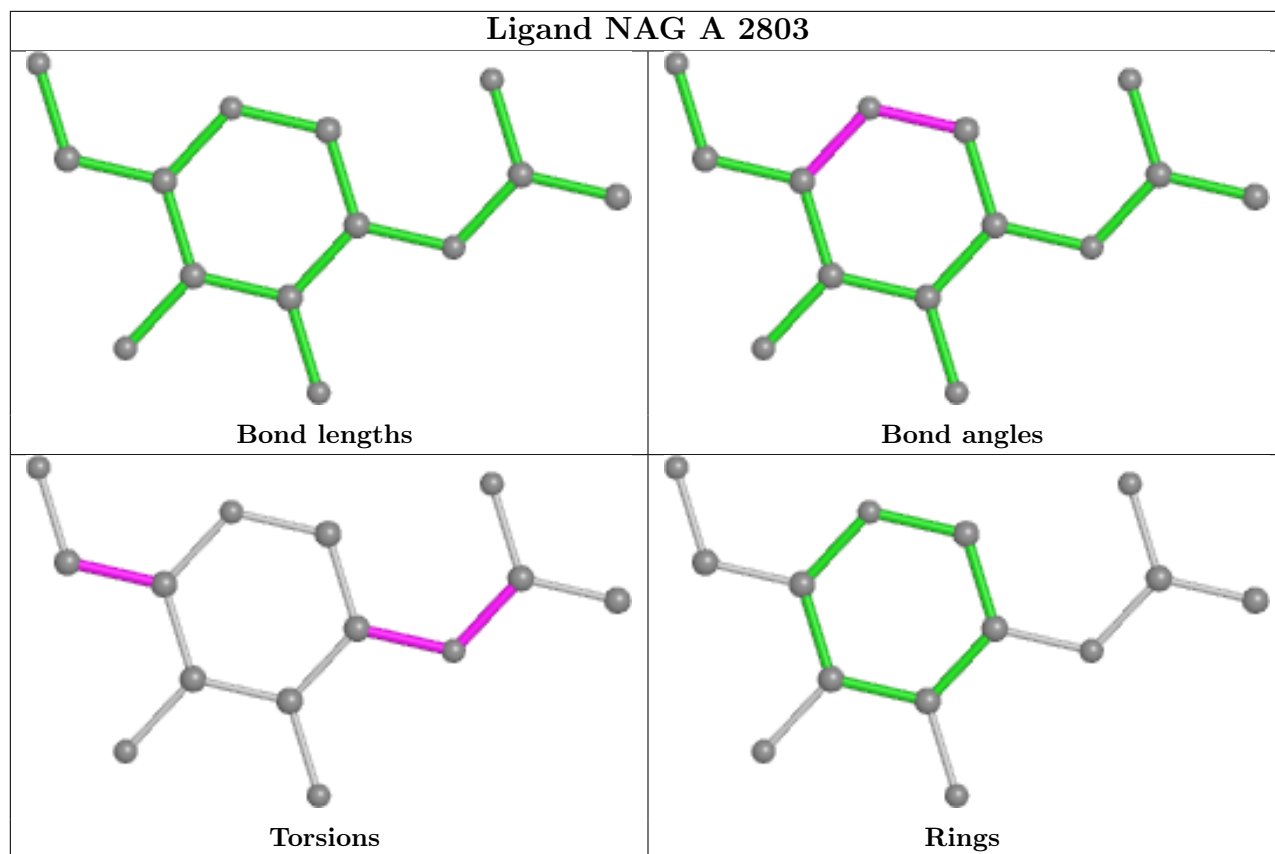
4 monomers are involved in 13 short contacts:

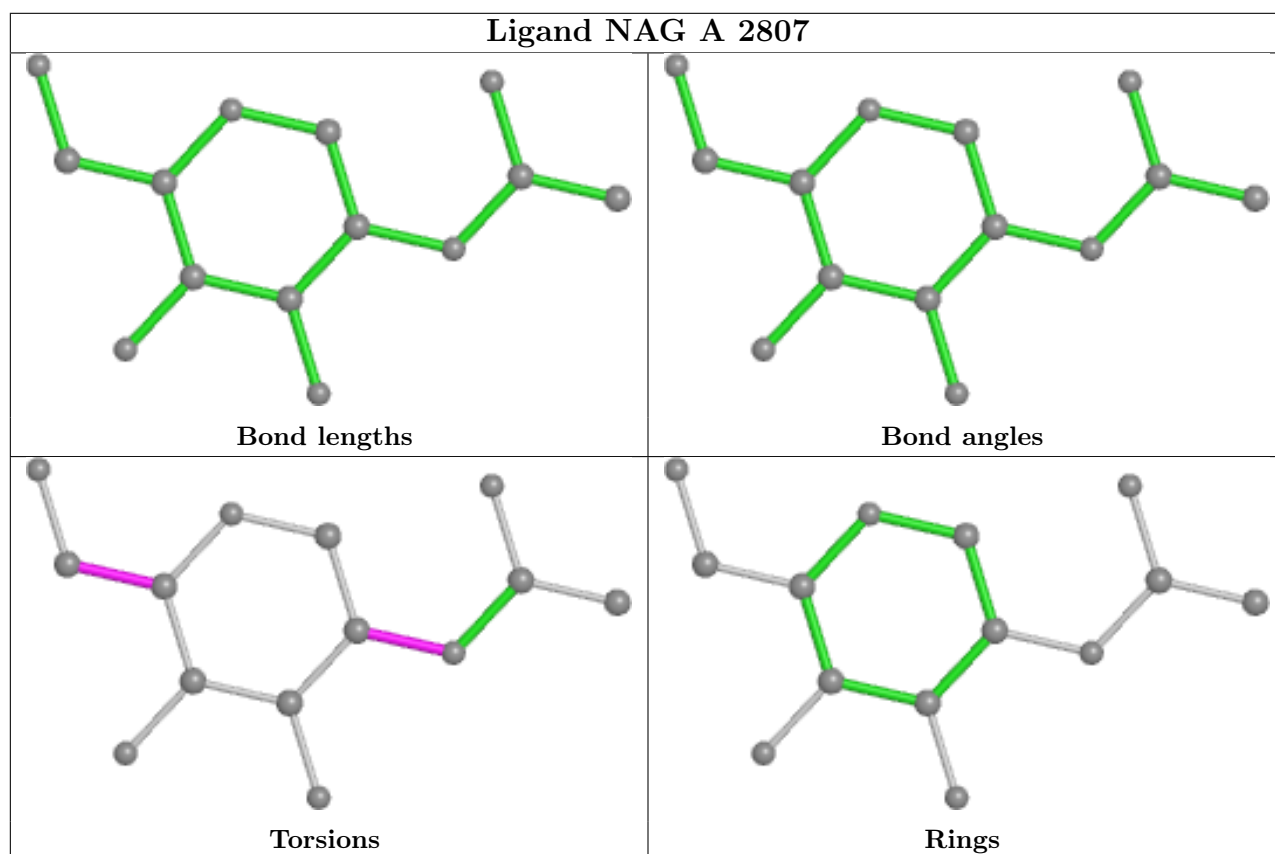
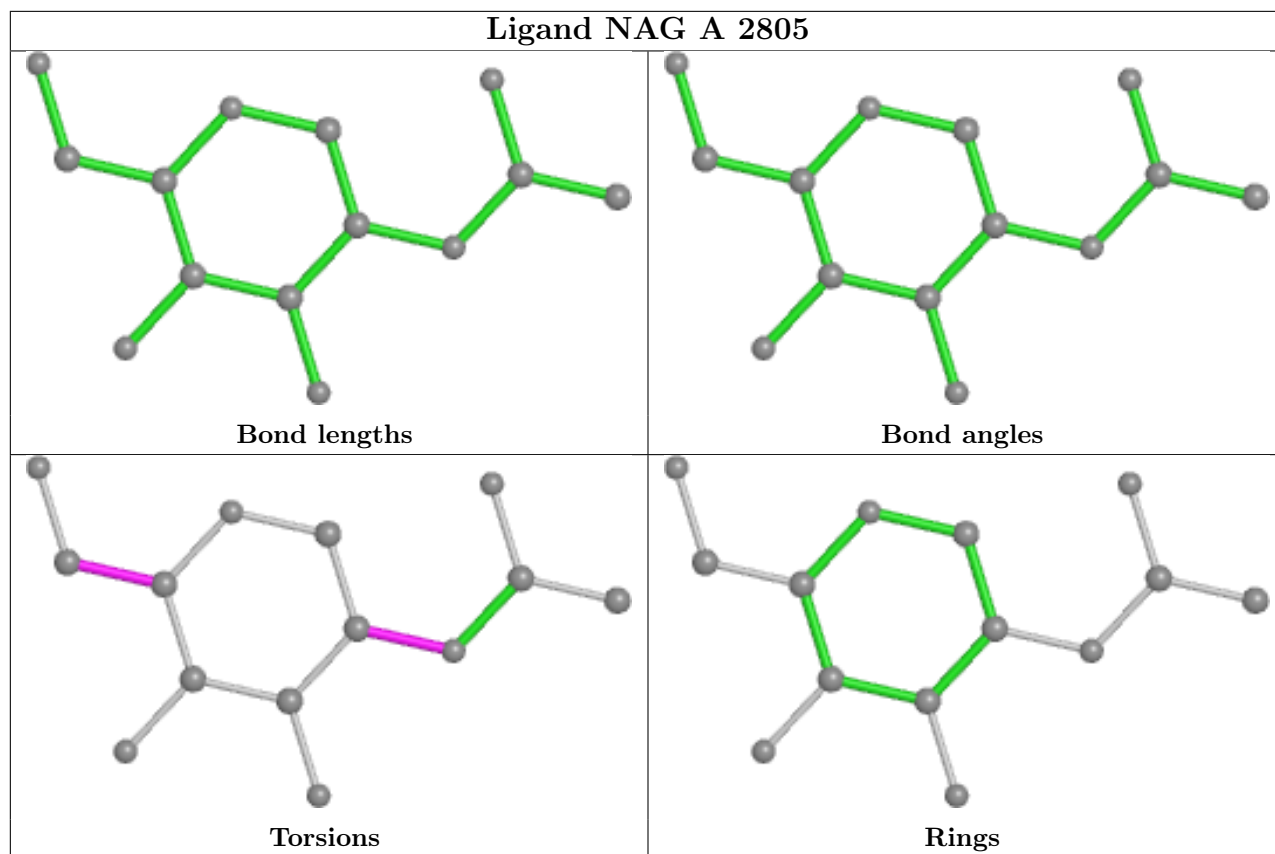
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	2803	NAG	5	0
3	A	2807	NAG	2	0
3	B	2803	NAG	4	0
3	B	2807	NAG	2	0

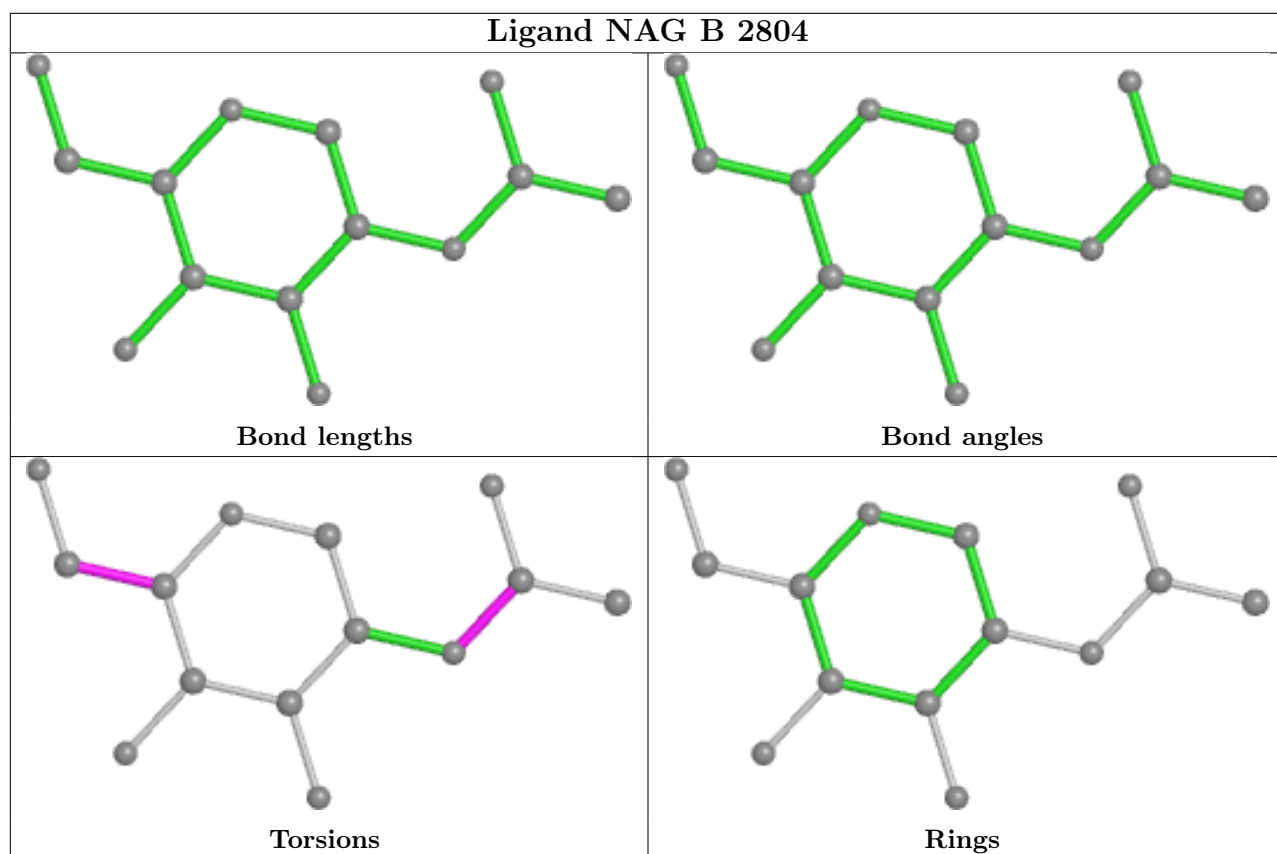
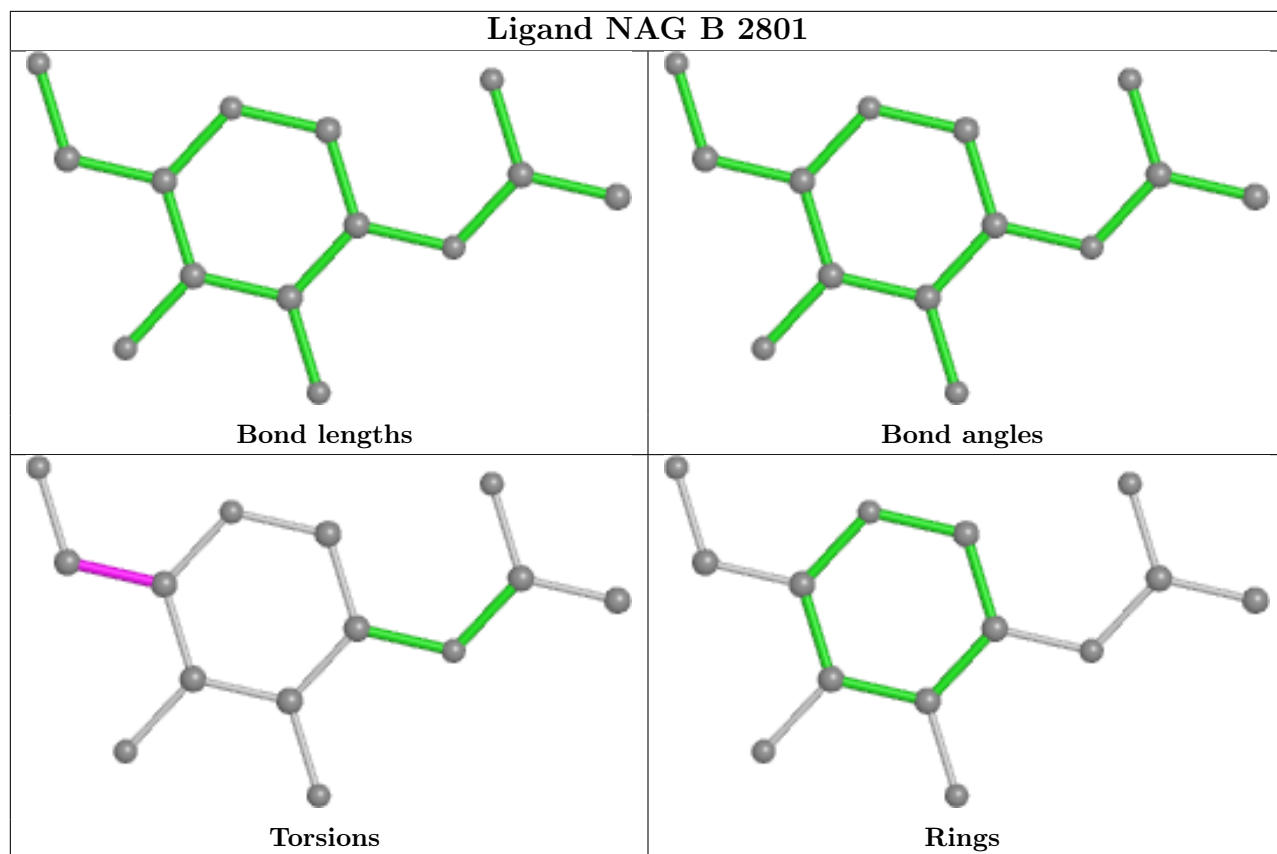
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

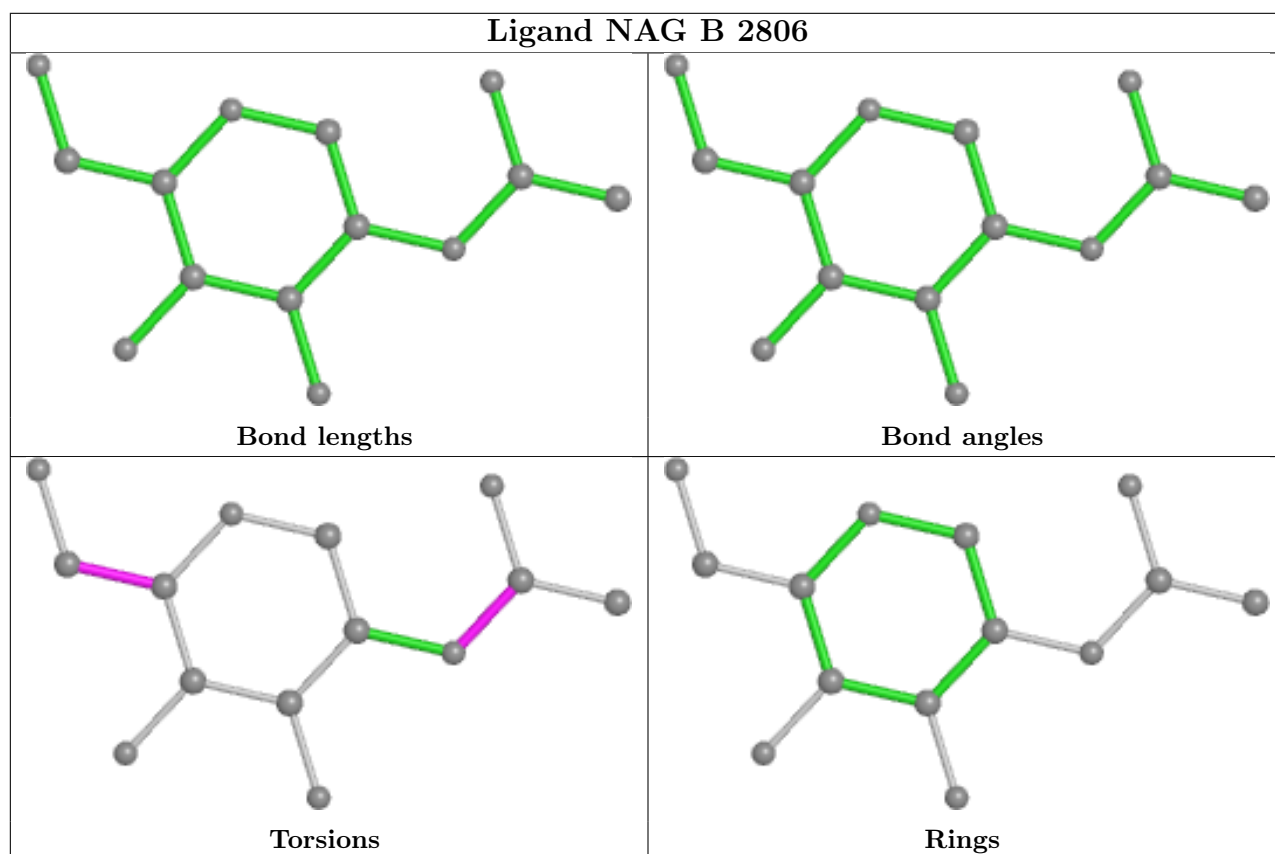
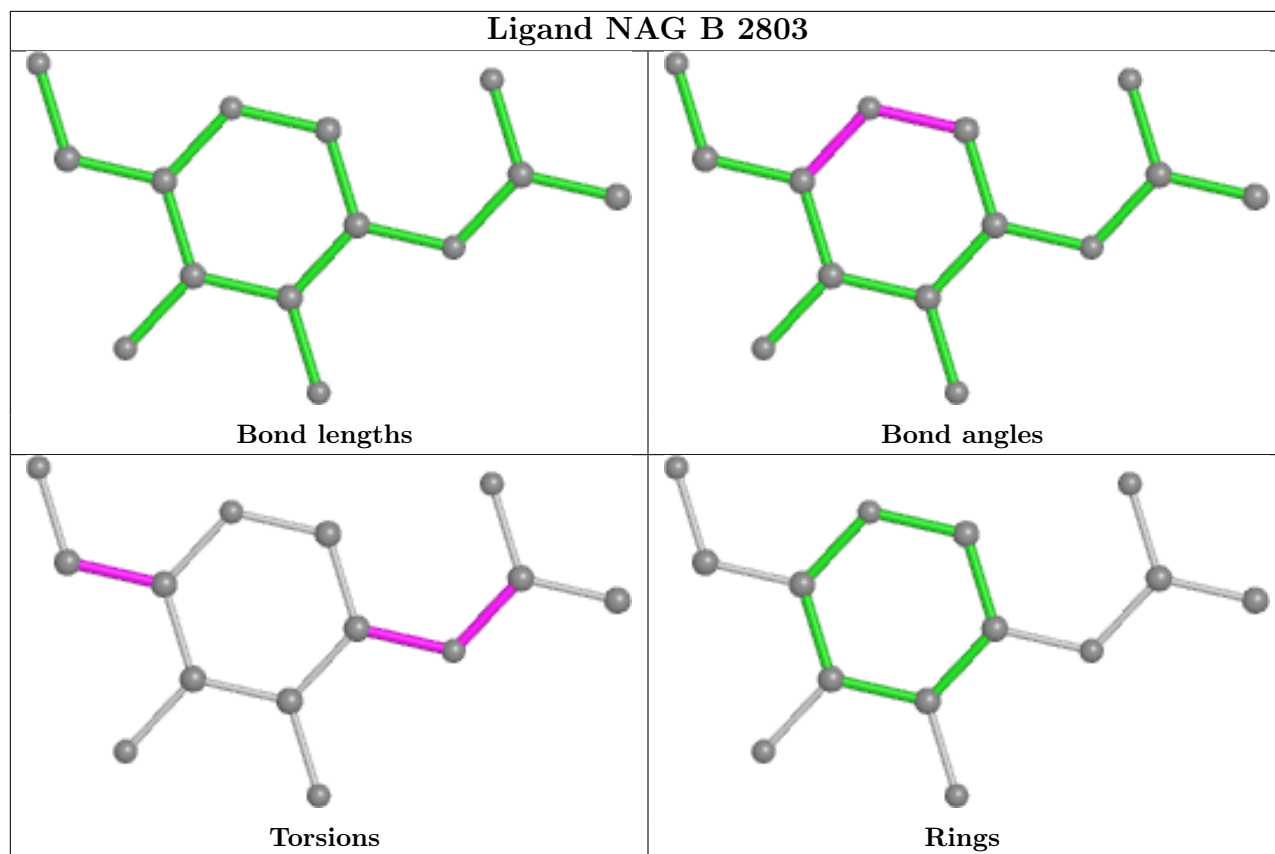


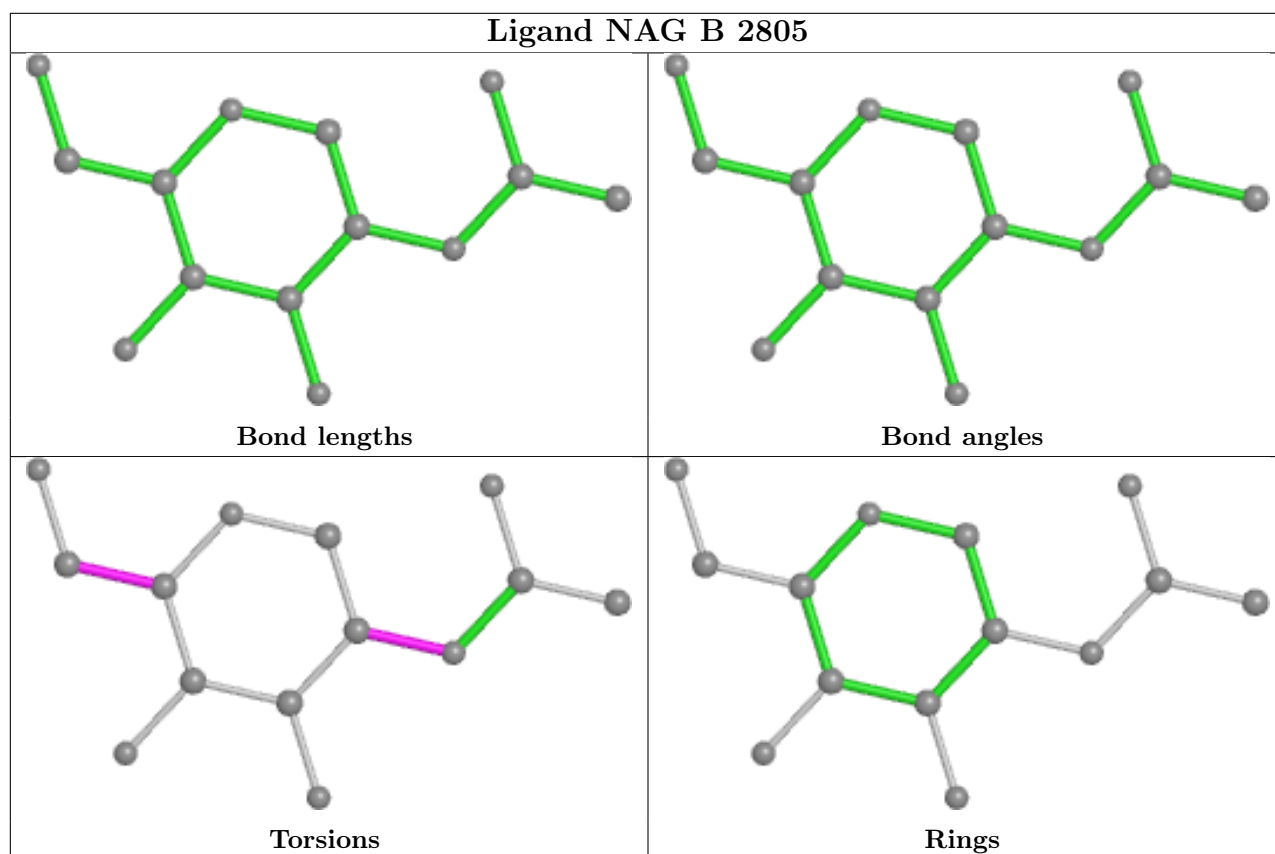
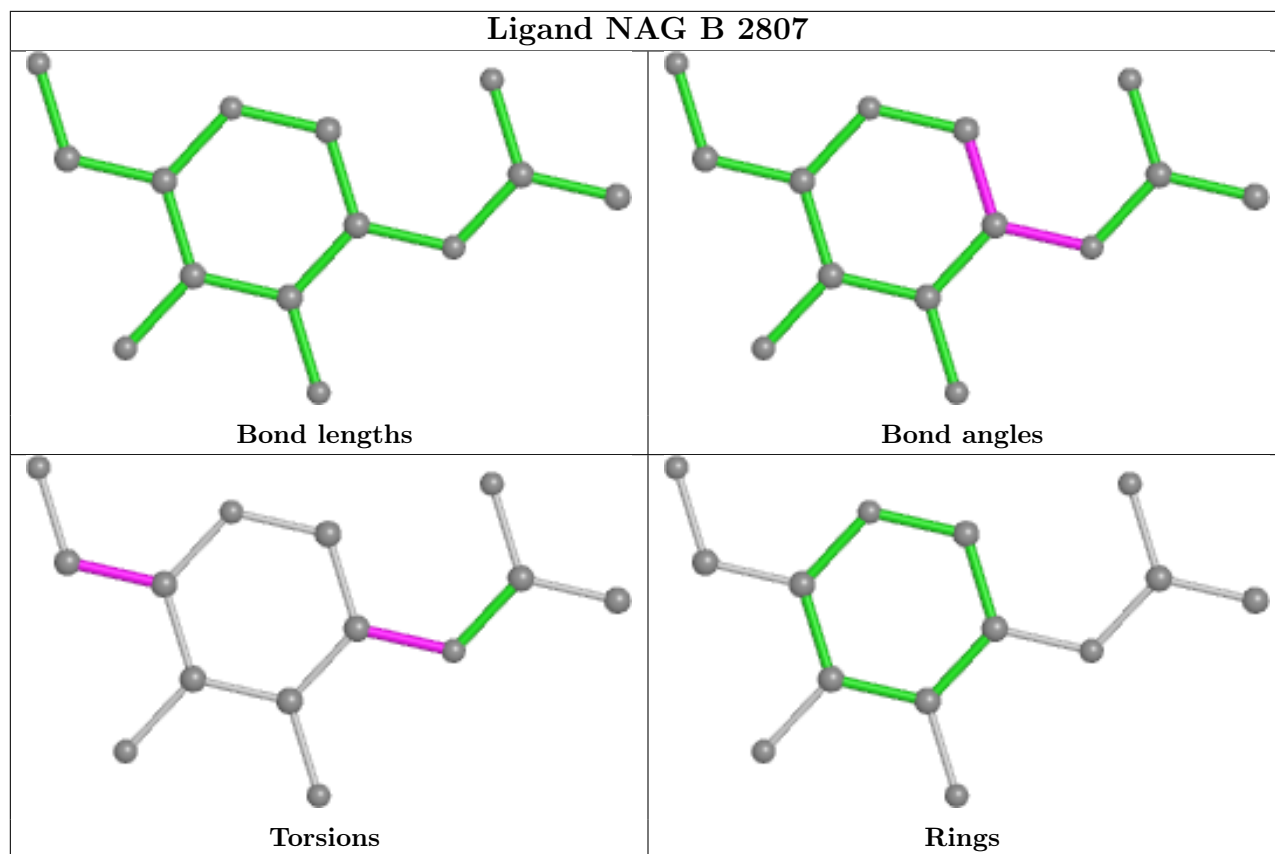












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

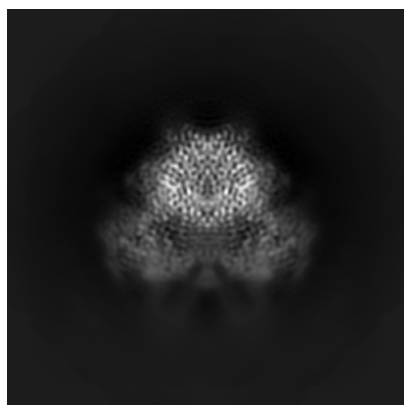
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12124. These allow visual inspection of the internal detail of the map and identification of artifacts.

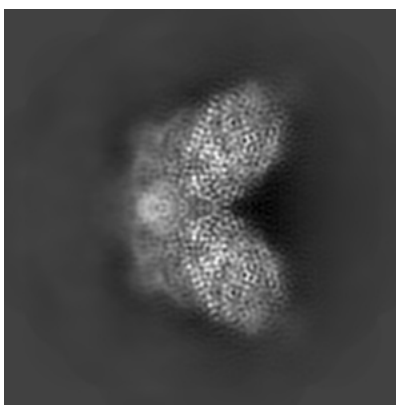
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

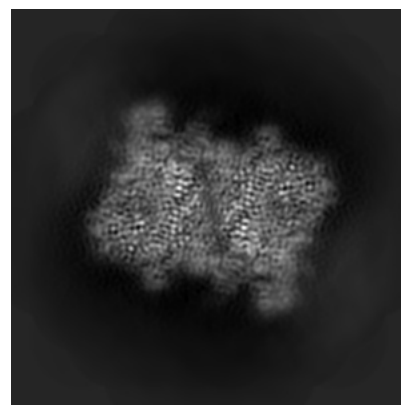
6.1.1 Primary map



X



Y

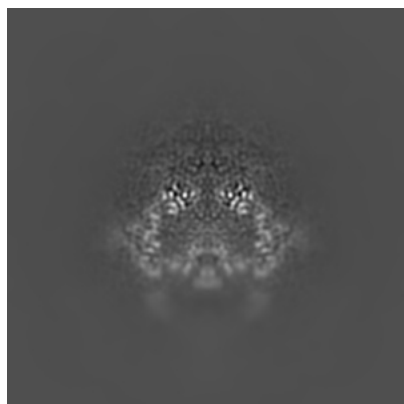


Z

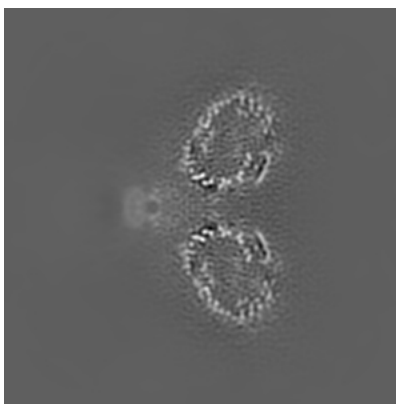
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

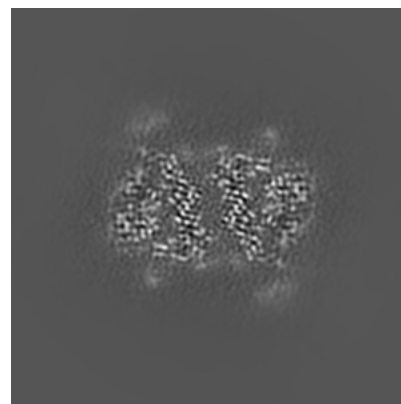
6.2.1 Primary map



X Index: 156



Y Index: 156

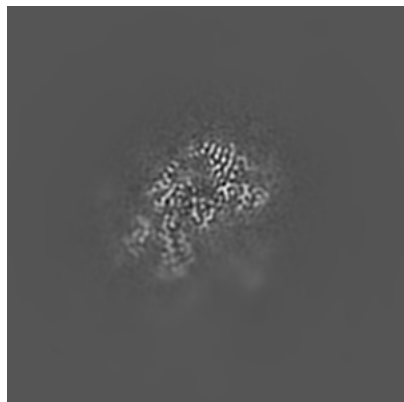


Z Index: 156

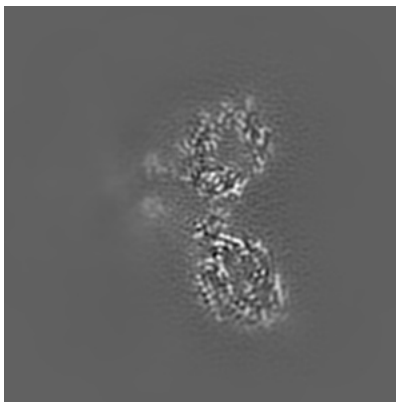
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

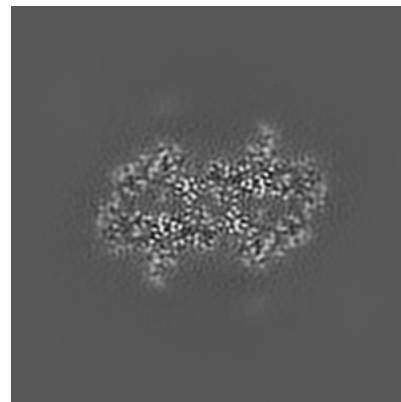
6.3.1 Primary map



X Index: 185



Y Index: 142

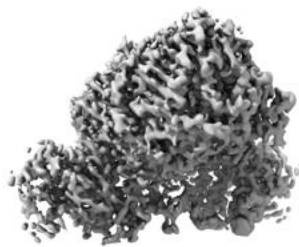


Z Index: 166

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

6.4 Orthogonal surface views [i](#)

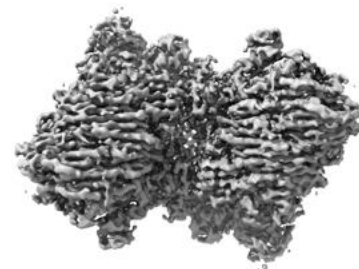
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.045. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

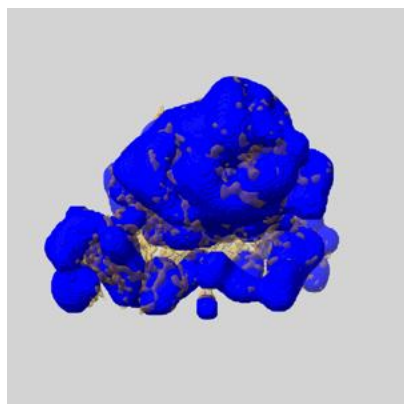
6.5 Mask visualisation [i](#)

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

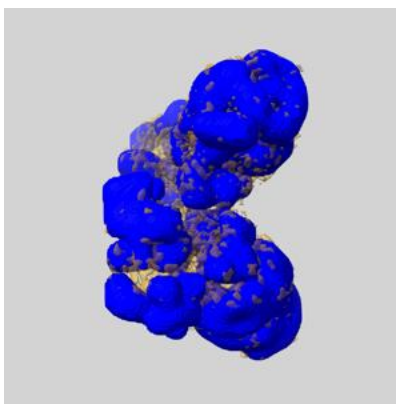
A mask typically either:

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

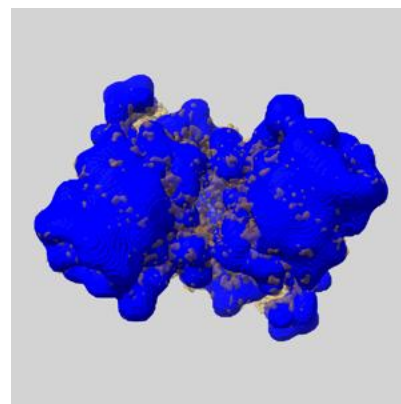
6.5.1 emd_12124_msk_1.map [i](#)



X



Y

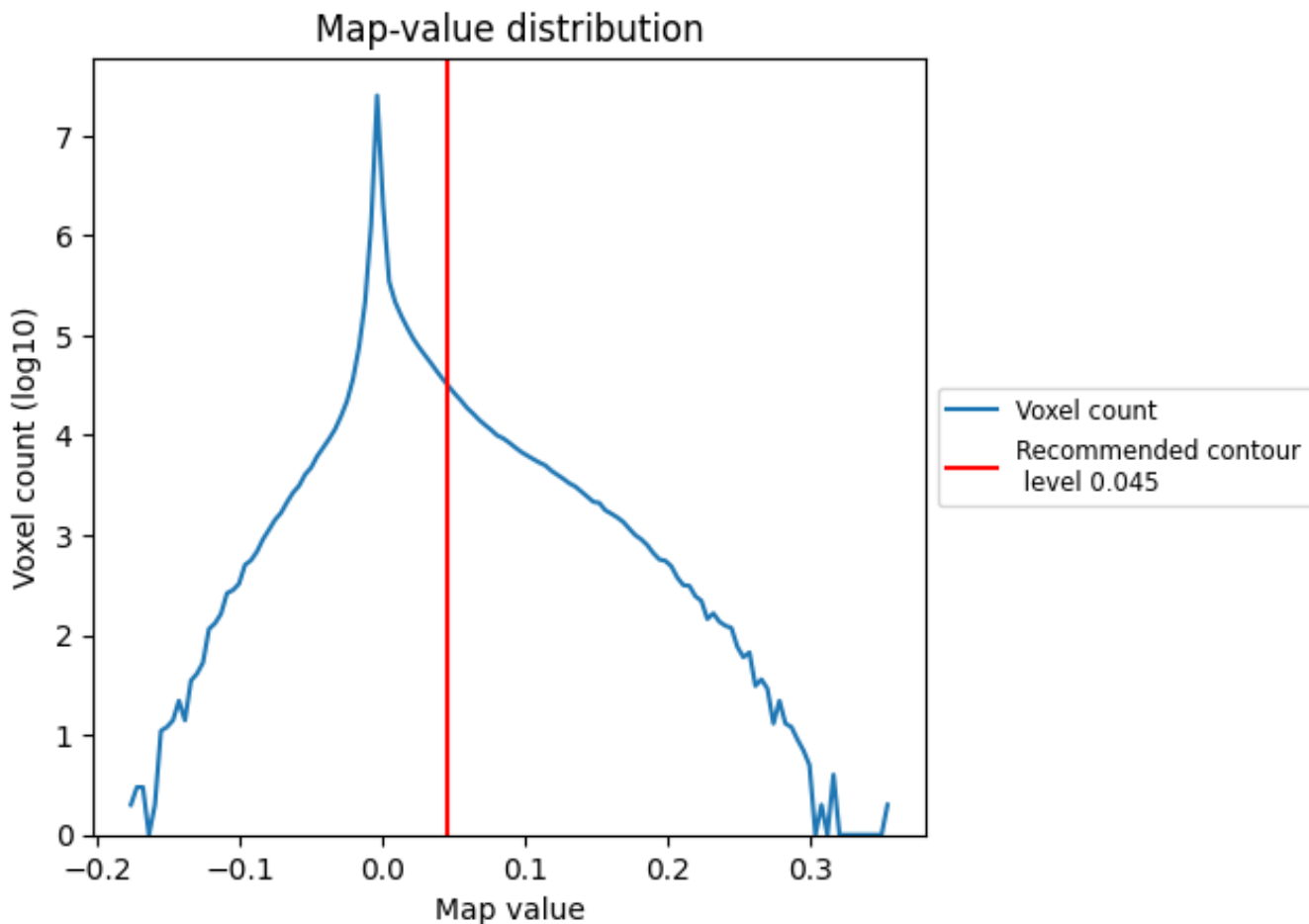


Z

7 Map analysis [i](#)

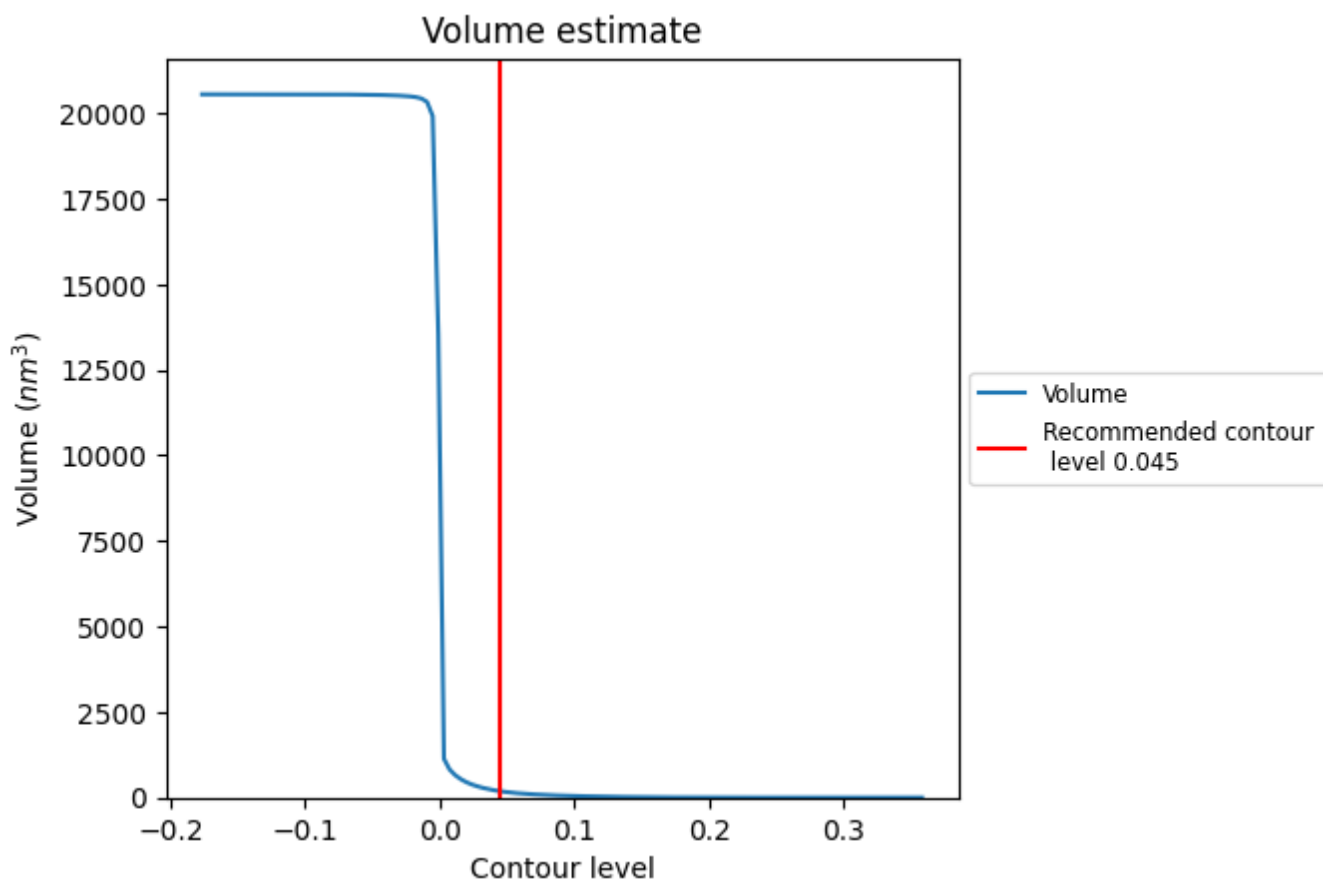
This section contains the results of statistical analysis of the map.

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.

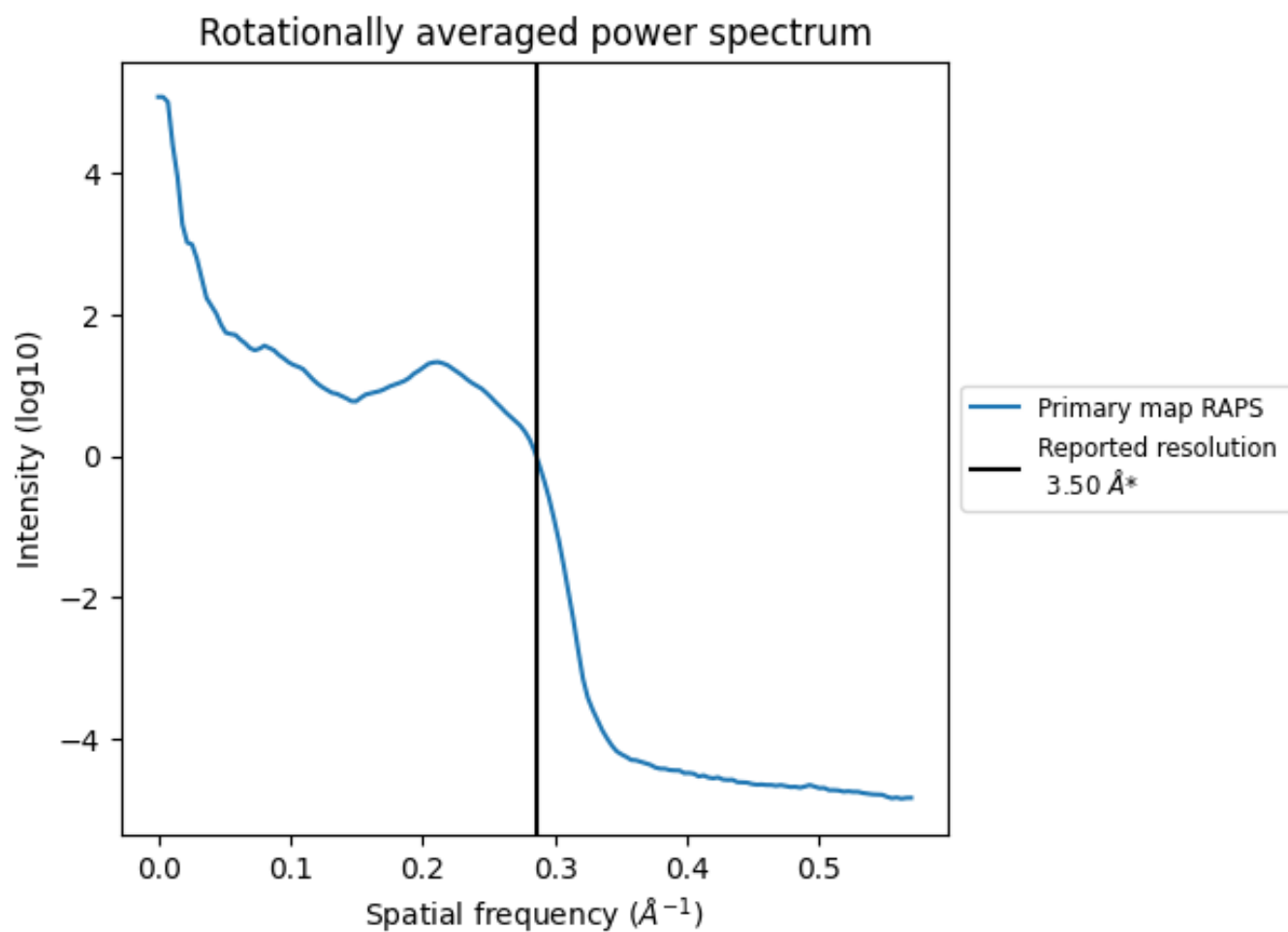
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 184 nm³; this corresponds to an approximate mass of 167 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](#)

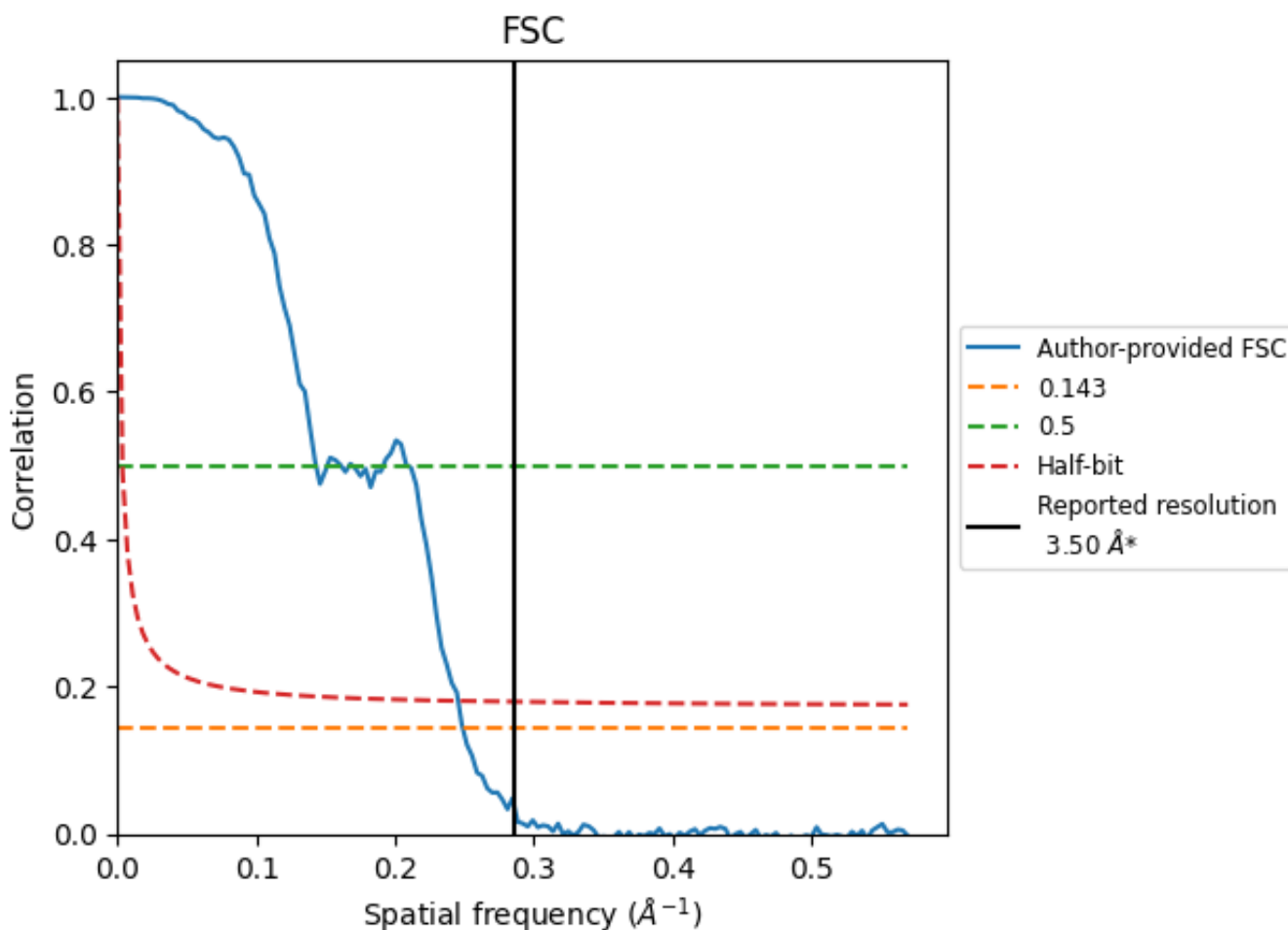


*Reported resolution corresponds to spatial frequency of 0.286\AA^{-1}

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 0.286 Å⁻¹

8.2 Resolution estimates [i](#)

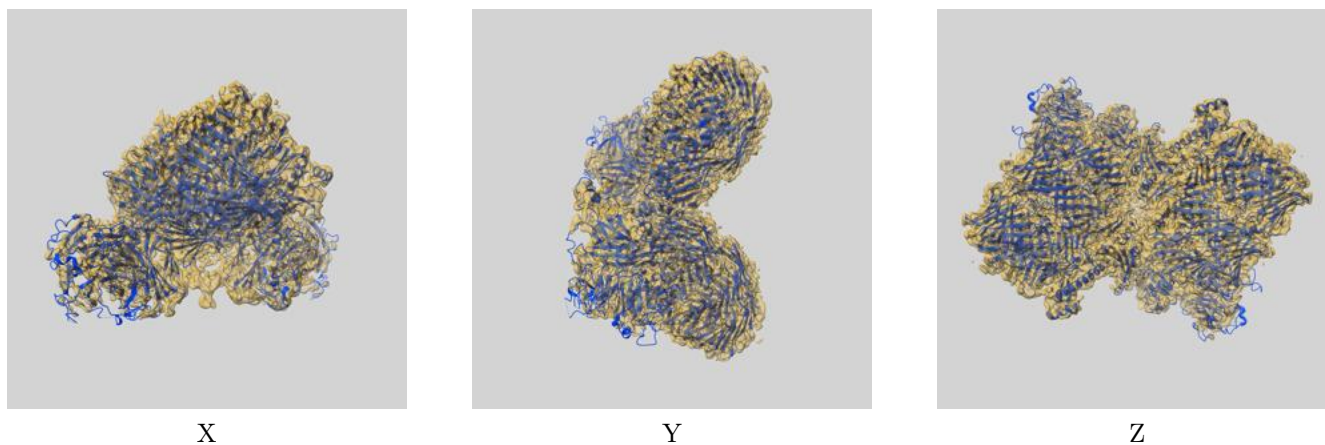
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.50	-	-
Author-provided FSC curve	4.02	6.99	4.07
Unmasked-calculated*	-	-	-

*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 4.02 differs from the reported value 3.5 by more than 10 %

9 Map-model fit [i](#)

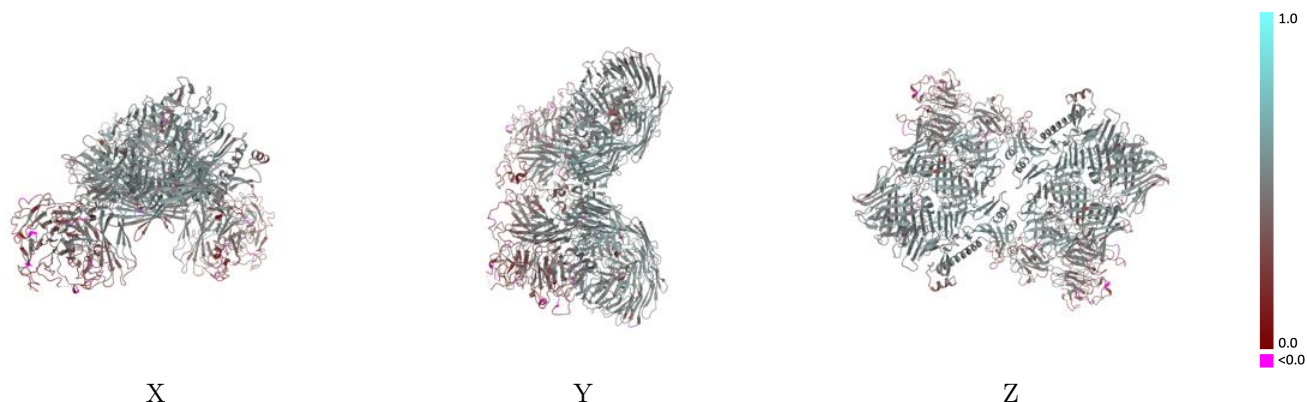
This section contains information regarding the fit between EMDB map EMD-12124 and PDB model 7BAM. Per-residue inclusion information can be found in section [3](#) on page [7](#).

9.1 Map-model overlay [i](#)



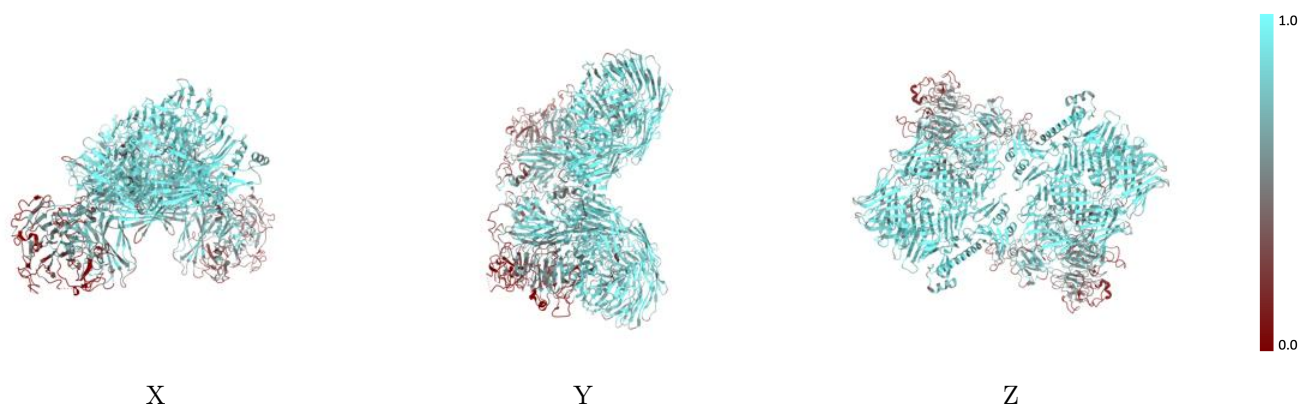
The images above show the 3D surface view of the map at the recommended contour level 0.045 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



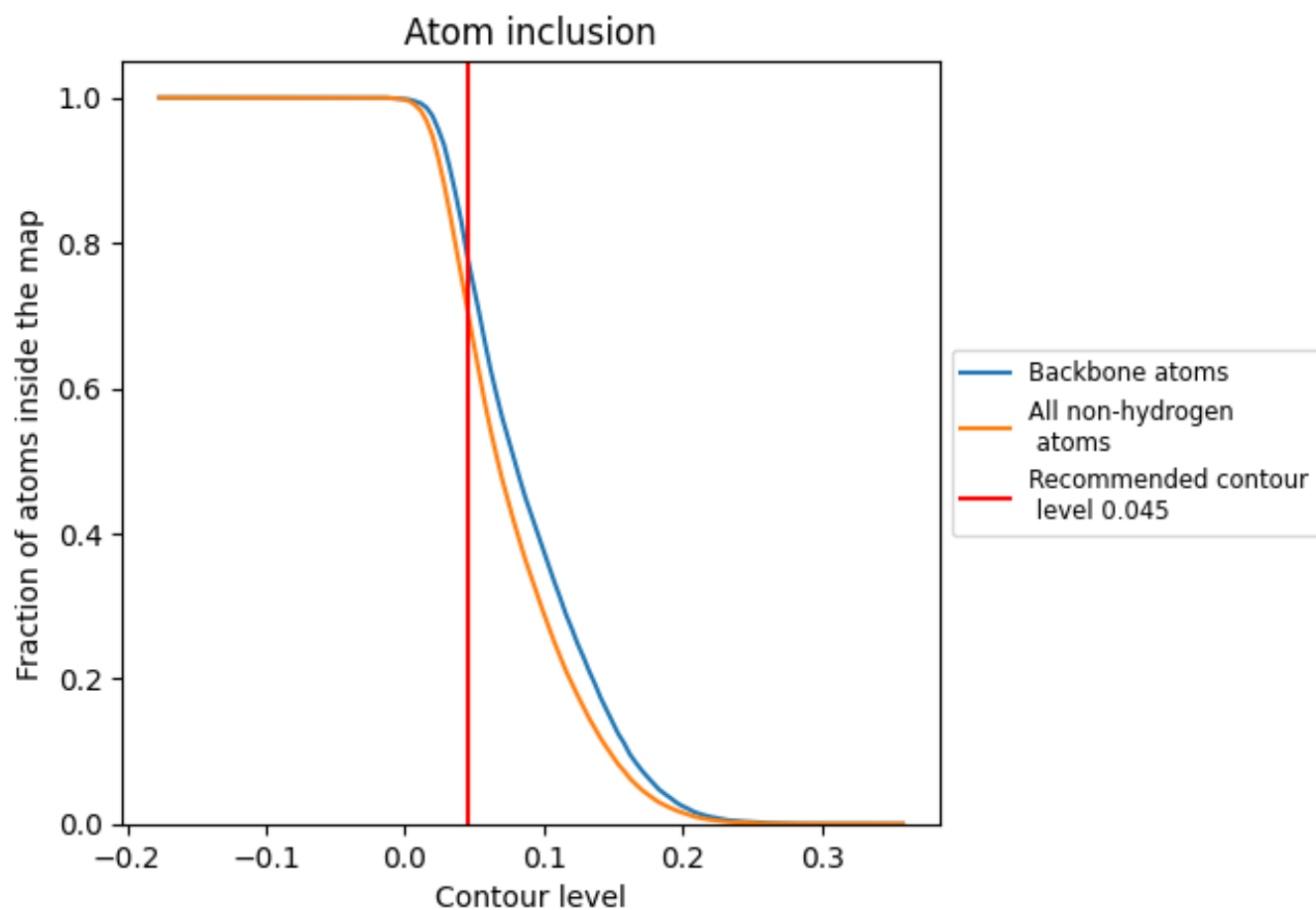
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.045).























9.4 Atom inclusion [i](#)



At the recommended contour level, 78% of all backbone atoms, 71% 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 (0.045) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7068	 0.4520
A	 0.7077	 0.4520
B	 0.7073	 0.4530
C	 0.6786	 0.3910
D	 0.7143	 0.4890
E	 0.6786	 0.4900
F	 0.4286	 0.3800
G	 0.6786	 0.3820
H	 0.7143	 0.4780
I	 0.6786	 0.4710
J	 0.4286	 0.3960

