



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 12:12 AM UTC

PDB ID : 2Z65 / pdb_00002z65
Title : Crystal structure of the human TLR4 TV3 hybrid-MD-2-Eritoran complex
Authors : Lee, J.-O.; Kim, H.M.; Park, B.S.
Deposited on : 2007-07-22
Resolution : 2.70 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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 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:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

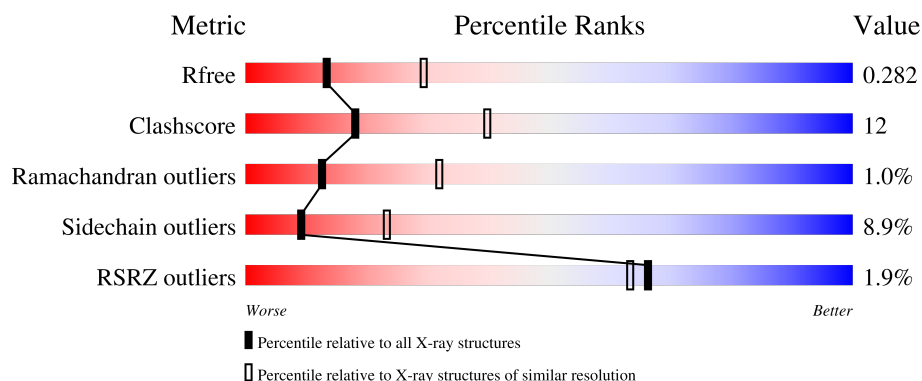
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 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	276	71% 26% .
1	B	276	72% 26% .
2	C	140	5% 61% 30% 9% .
2	D	140	5% 63% 29% 8% .
3	E	3	100%

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
4	NAG	A	1201	X	-	-	-
4	NAG	B	1201	X	-	-	-
4	NAG	B	1301	X	-	-	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7096 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 Toll-like receptor 4, Variable lymphocyte receptor B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	276	Total	C	N	O	S	0	0	0
			2189	1400	366	412	11			
1	B	276	Total	C	N	O	S	0	0	0
			2189	1400	366	412	11			

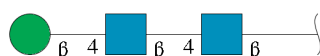
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	229	LYS	-	SEE REMARK 999	UNP O00206
A	230	GLU	-	SEE REMARK 999	UNP O00206
B	229	LYS	-	SEE REMARK 999	UNP O00206
B	230	GLU	-	SEE REMARK 999	UNP O00206

- Molecule 2 is a protein called Lymphocyte antigen 96.

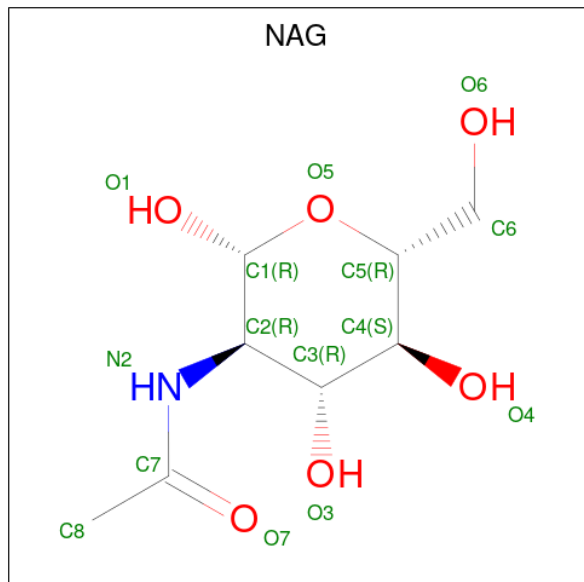
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	140	Total	C	N	O	S	0	0	0
			1134	730	186	208	10			
2	D	140	Total	C	N	O	S	0	0	0
			1134	730	186	208	10			

- Molecule 3 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



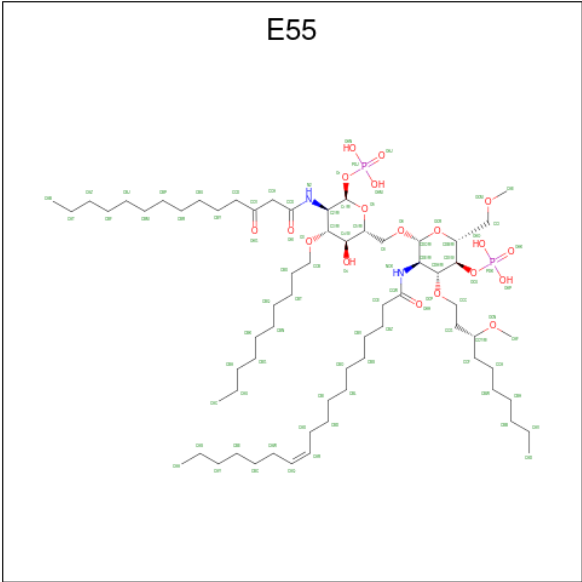
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	E	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 5 is 3-O-DECYL-2-DEOXY-6-O-{2-DEOXY-3-O-[(3R)-3-METHOXYDECYL]-6-O-METHYL-2-[(11Z)-OCTADEC-11-ENOYLAMINO]-4-O-PHOSPHONO-BETA-D-GLUCOPYRANOSYL}-2-[(3-OXOTETRADECANOYL)AMINO]-1-O-PHOSPHONO-ALPHA-D-GLUCOPYRANOSE (CCD ID: E55) (formula: $C_{66}H_{126}N_2O_{19}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	C	1	Total	C	N	O	P	0	0
			89	66	2	19	2		
5	D	1	Total	C	N	O	P	0	0
			89	66	2	19	2		

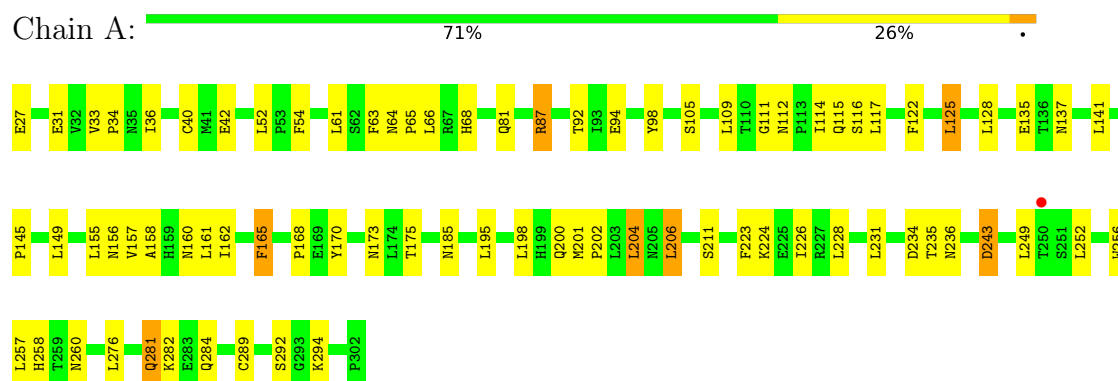
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	45	Total	O	0	0
			45	45		
6	B	54	Total	O	0	0
			54	54		
6	C	22	Total	O	0	0
			22	22		
6	D	42	Total	O	0	0
			42	42		

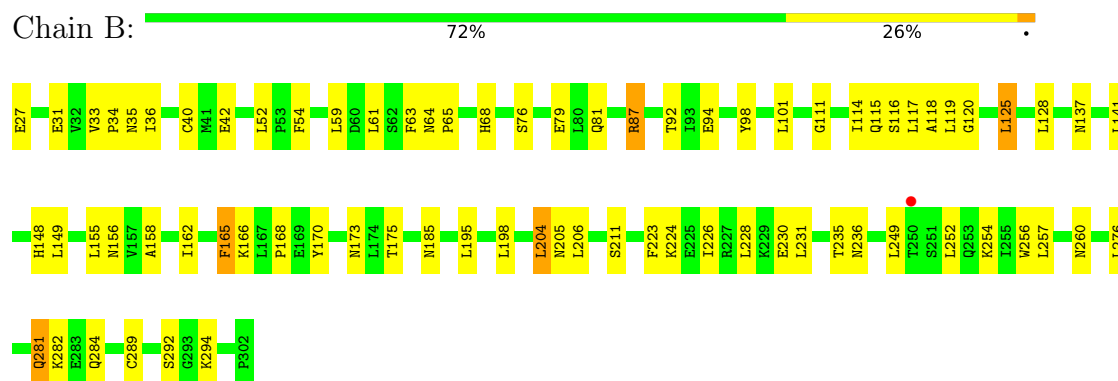
3 Residue-property plots

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 electron 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 dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

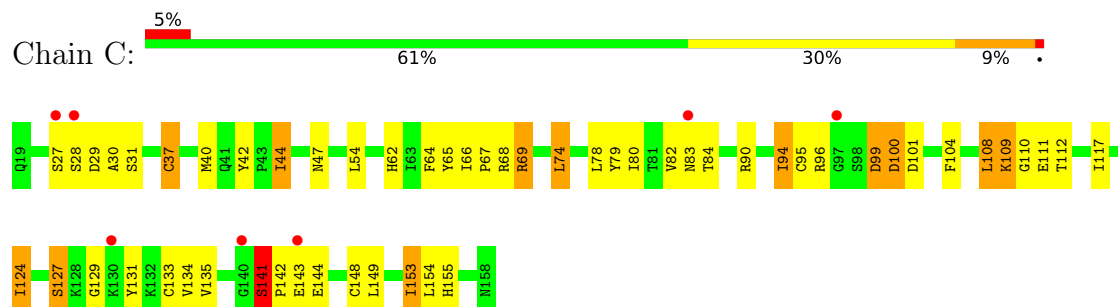
- Molecule 1: Toll-like receptor 4, Variable lymphocyte receptor B



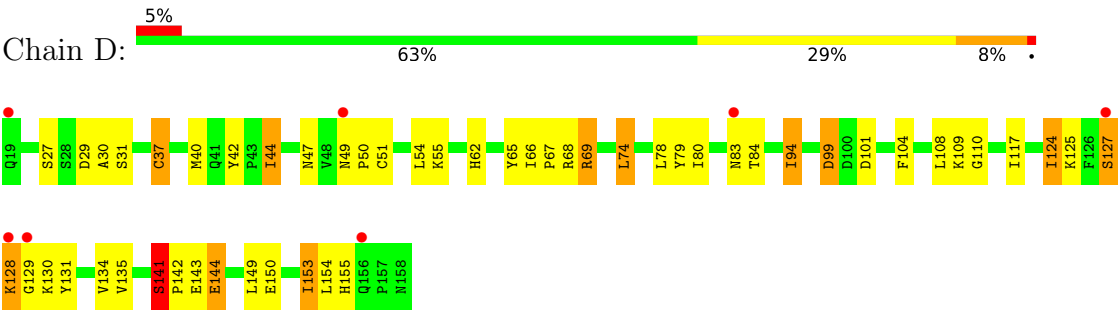
- Molecule 1: Toll-like receptor 4, Variable lymphocyte receptor B



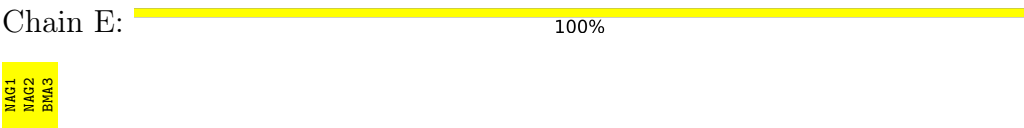
- Molecule 2: Lymphocyte antigen 96



● Molecule 2: Lymphocyte antigen 96



● Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	67.19Å 80.99Å 107.76Å 90.00° 93.01° 90.00°	Depositor
Resolution (Å)	20.00 – 2.70 20.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	92.3 (20.00-2.70) 92.1 (20.00-2.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.29 (at 2.61Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.238 , 0.289 0.231 , 0.282	Depositor DCC
R_{free} test set	1558 reflections (4.36%)	wwPDB-VP
Wilson B-factor (Å ²)	57.4	Xtriage
Anisotropy	0.253	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 62.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.24$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	7096	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.29% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: E55, BMA, NAG

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	0.59	0/2238	0.86	1/3039 (0.0%)
1	B	0.57	0/2238	0.85	0/3039
2	C	0.63	0/1160	0.95	5/1562 (0.3%)
2	D	0.68	0/1160	0.95	5/1562 (0.3%)
All	All	0.61	0/6796	0.89	11/9202 (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
2	C	0	1
2	D	0	1
All	All	0	2

There are no bond length outliers.

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	30	ALA	N-CA-C	6.45	117.95	108.14
2	D	30	ALA	N-CA-C	6.36	117.97	107.73
2	D	128	LYS	N-CA-C	6.06	123.70	110.80
2	C	94	ILE	N-CA-C	-5.67	101.24	109.29
2	C	141	SER	CA-C-N	-5.58	112.26	120.46
2	C	141	SER	C-N-CA	-5.58	112.26	120.46
1	A	206	LEU	N-CA-C	5.43	117.37	108.52
2	D	141	SER	CA-C-N	-5.28	112.70	120.46
2	D	141	SER	C-N-CA	-5.28	112.70	120.46
2	C	27	SER	N-CA-C	5.25	115.47	108.38

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
2	D	127	SER	N-CA-C	5.16	117.25	109.41

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	141	SER	Peptide
2	D	141	SER	Peptide

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2189	0	2193	48	0
1	B	2189	0	2194	44	0
2	C	1134	0	1132	39	0
2	D	1134	0	1132	38	0
3	E	39	0	34	0	0
4	A	28	0	26	0	0
4	B	42	0	39	2	0
5	C	89	0	122	3	0
5	D	89	0	122	3	0
6	A	45	0	0	3	0
6	B	54	0	0	6	0
6	C	22	0	0	0	0
6	D	42	0	0	5	0
All	All	7096	0	6994	169	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 12.

All (169) 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)
2:C:127:SER:HB2	2:C:131:TYR:OH	1.56	1.04

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:83:ASN:HB2	2:D:129:GLY:HA3	1.51	0.90
2:C:127:SER:CB	2:C:131:TYR:OH	2.21	0.87
2:C:29:ASP:O	2:C:155:HIS:CD2	2.32	0.82
2:D:49:ASN:HB2	6:D:163:HOH:O	1.76	0.82
2:C:141:SER:OG	2:C:142:PRO:HD3	1.85	0.76
1:B:228:LEU:HD23	1:B:249:LEU:HD11	1.71	0.72
1:A:105:SER:HB3	6:A:1435:HOH:O	1.89	0.72
2:D:124:ILE:HG22	2:D:125:LYS:N	2.06	0.71
2:D:131:TYR:HB2	2:D:153:ILE:HG23	1.73	0.71
2:D:141:SER:OG	2:D:142:PRO:HD3	1.91	0.70
2:D:29:ASP:O	2:D:155:HIS:CD2	2.44	0.70
2:C:83:ASN:HB2	2:C:129:GLY:HA3	1.74	0.70
1:B:87:ARG:HG2	2:D:66:ILE:HD11	1.75	0.69
2:C:131:TYR:HB2	2:C:153:ILE:HG23	1.74	0.68
1:A:228:LEU:HD23	1:A:249:LEU:HD11	1.76	0.67
2:C:104:PHE:HE2	2:C:117:ILE:HD11	1.61	0.66
1:A:42:GLU:OE2	1:A:63:PHE:HB3	1.97	0.65
1:B:87:ARG:HD2	6:B:1428:HOH:O	1.97	0.64
1:B:40:CYS:HB2	1:B:61:LEU:HD23	1.80	0.64
2:D:104:PHE:HE2	2:D:117:ILE:HD11	1.61	0.64
2:D:54:LEU:HD12	2:D:155:HIS:CG	2.33	0.64
2:C:29:ASP:O	2:C:155:HIS:HD2	1.78	0.63
2:D:124:ILE:HG22	2:D:125:LYS:H	1.64	0.63
1:B:252:LEU:O	1:B:282:LYS:HE3	1.98	0.63
2:C:141:SER:OG	2:C:142:PRO:CD	2.48	0.61
1:B:42:GLU:OE2	1:B:63:PHE:HB3	2.01	0.60
2:D:29:ASP:O	2:D:155:HIS:HD2	1.84	0.60
1:A:87:ARG:NH1	2:C:110:GLY:O	2.35	0.60
5:C:1:E55:HAD3	5:C:1:E55:HBD2	1.83	0.60
5:D:1:E55:HAD3	5:D:1:E55:HBD2	1.83	0.60
1:A:156:ASN:ND2	1:A:158:ALA:H	2.00	0.59
1:A:114:ILE:HG21	1:A:117:LEU:HD13	1.85	0.58
1:B:292:SER:OG	1:B:294:LYS:HD2	2.03	0.58
2:D:54:LEU:HD22	2:D:124:ILE:HD11	1.85	0.57
2:D:141:SER:OG	2:D:142:PRO:CD	2.52	0.57
1:A:31:GLU:CD	1:A:34:PRO:HA	2.30	0.57
1:B:87:ARG:CD	6:B:1428:HOH:O	2.52	0.57
1:B:92:THR:HG22	1:B:116:SER:OG	2.04	0.56
1:B:114:ILE:HG21	1:B:117:LEU:HD13	1.87	0.56
1:A:281:GLN:H	1:A:281:GLN:CD	2.13	0.56
1:A:40:CYS:HB2	1:A:61:LEU:HD23	1.88	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:156:ASN:HD22	1:A:156:ASN:C	2.13	0.56
1:B:165:PHE:O	1:B:165:PHE:CG	2.58	0.56
1:B:289:CYS:HB2	1:B:292:SER:HB3	1.87	0.56
2:C:79:TYR:HB2	2:C:134:VAL:HB	1.86	0.56
1:B:204:LEU:HD13	1:B:206:LEU:HB2	1.88	0.56
1:B:223:PHE:HA	1:B:226:ILE:HD12	1.88	0.56
1:A:92:THR:HG22	1:A:116:SER:OG	2.07	0.55
1:B:87:ARG:NH1	2:D:110:GLY:O	2.40	0.55
1:B:236:ASN:H	1:B:260:ASN:HD21	1.54	0.55
1:B:236:ASN:N	1:B:260:ASN:HD21	2.05	0.55
2:D:129:GLY:O	2:D:130:LYS:C	2.49	0.55
1:B:61:LEU:O	1:B:64:ASN:ND2	2.40	0.54
1:B:31:GLU:CD	1:B:34:PRO:HA	2.32	0.54
2:C:44:ILE:HD12	2:C:149:LEU:HD11	1.90	0.54
1:A:165:PHE:CG	1:A:165:PHE:O	2.59	0.54
1:A:204:LEU:HD13	1:A:206:LEU:HB2	1.89	0.54
2:D:79:TYR:HB2	2:D:134:VAL:HB	1.89	0.54
1:A:87:ARG:HG2	2:C:66:ILE:HD11	1.90	0.53
1:B:33:VAL:HG12	1:B:36:ILE:HB	1.90	0.53
1:A:87:ARG:NH2	6:A:1410:HOH:O	2.42	0.53
1:A:128:LEU:HD23	1:A:149:LEU:HD13	1.90	0.52
1:A:292:SER:OG	1:A:294:LYS:HD2	2.10	0.52
2:C:47:ASN:HB2	2:C:62:HIS:HB3	1.91	0.52
1:A:252:LEU:O	1:A:282:LYS:HE3	2.09	0.52
1:B:281:GLN:H	1:B:281:GLN:CD	2.16	0.51
2:D:78:LEU:HB3	2:D:80:ILE:HD11	1.93	0.51
1:B:166:LYS:HE3	6:B:1444:HOH:O	2.09	0.51
2:C:67:PRO:HG2	2:C:109:LYS:O	2.11	0.51
1:B:168:PRO:HG2	1:B:170:TYR:CE2	2.45	0.51
2:D:55:LYS:HA	6:D:184:HOH:O	2.10	0.51
1:A:162:ILE:H	1:A:185:ASN:HD22	1.59	0.51
1:B:87:ARG:NH1	1:B:111:GLY:HA3	2.26	0.51
2:D:74:LEU:O	2:D:94:ILE:O	2.28	0.51
1:A:236:ASN:N	1:A:260:ASN:HD21	2.09	0.50
1:B:98:TYR:HB3	1:B:101:LEU:HD12	1.94	0.50
5:D:1:E55:HCA2	5:D:1:E55:HBZ1	1.92	0.50
1:A:173:ASN:O	1:A:175:THR:N	2.40	0.50
1:A:289:CYS:HB2	1:A:292:SER:HB3	1.93	0.50
1:A:156:ASN:ND2	1:A:156:ASN:C	2.70	0.49
1:A:61:LEU:O	1:A:64:ASN:ND2	2.44	0.49
1:A:64:ASN:O	1:A:66:LEU:N	2.40	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:223:PHE:HA	1:A:226:ILE:HD12	1.95	0.49
2:D:99:ASP:OD1	2:D:99:ASP:N	2.45	0.49
2:C:104:PHE:CD1	2:C:104:PHE:C	2.90	0.49
2:D:54:LEU:HD12	2:D:155:HIS:CD2	2.47	0.49
1:A:236:ASN:H	1:A:260:ASN:HD21	1.61	0.48
2:C:54:LEU:HD12	2:C:155:HIS:CG	2.48	0.48
1:B:98:TYR:HB3	1:B:125:LEU:HD11	1.96	0.48
2:C:96:ARG:O	2:C:101:ASP:OD2	2.31	0.48
1:A:257:LEU:HD12	1:A:276:LEU:HD21	1.95	0.48
2:C:78:LEU:HB3	2:C:80:ILE:HD11	1.95	0.48
2:D:54:LEU:HD21	2:D:153:ILE:HD11	1.96	0.48
2:C:54:LEU:HD22	2:C:124:ILE:HD11	1.96	0.48
5:C:1:E55:HBZ1	5:C:1:E55:HCA2	1.96	0.48
2:C:74:LEU:O	2:C:94:ILE:O	2.31	0.48
1:B:156:ASN:ND2	1:B:158:ALA:H	2.12	0.47
1:A:156:ASN:HD22	1:A:157:VAL:N	2.13	0.47
2:D:27:SER:HB3	2:D:51:CYS:SG	2.54	0.47
1:A:87:ARG:NH1	1:A:111:GLY:HA3	2.30	0.47
1:A:226:ILE:HG22	1:A:228:LEU:HD22	1.97	0.46
2:D:42:TYR:HB2	6:D:179:HOH:O	2.16	0.46
1:A:33:VAL:HG12	1:A:36:ILE:HB	1.97	0.45
2:D:104:PHE:C	2:D:104:PHE:CD1	2.94	0.45
1:A:200:GLN:HB2	6:A:1437:HOH:O	2.16	0.45
1:B:162:ILE:H	1:B:185:ASN:HD22	1.64	0.45
1:A:135:GLU:OE1	2:C:112:THR:HB	2.17	0.45
2:C:67:PRO:HD2	2:C:111:GLU:O	2.16	0.45
5:C:1:E55:HCF1	5:C:1:E55:HAF3	1.69	0.45
1:A:243:ASP:OD1	1:A:243:ASP:N	2.48	0.45
1:A:200:GLN:C	1:A:202:PRO:HD3	2.42	0.45
1:B:195:LEU:HB3	1:B:198:LEU:HD12	1.98	0.45
2:C:99:ASP:N	2:C:99:ASP:OD1	2.49	0.45
1:A:201:MET:HB3	1:A:204:LEU:HG	1.99	0.44
1:B:230:GLU:HG2	1:B:254:LYS:HB2	1.99	0.44
1:A:122:PHE:HD2	1:A:145:PRO:O	2.00	0.44
2:C:65:TYR:CE2	2:C:67:PRO:HA	2.52	0.44
1:B:31:GLU:HB3	6:B:1431:HOH:O	2.16	0.44
1:B:148:HIS:CE1	4:B:1401:NAG:H2	2.53	0.44
2:D:44:ILE:HD12	2:D:149:LEU:HD11	2.00	0.44
2:D:68:ARG:O	2:D:69:ARG:HD2	2.18	0.44
1:A:42:GLU:OE2	1:A:42:GLU:HA	2.17	0.43
2:C:100:ASP:OD1	2:C:100:ASP:N	2.50	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:108:LEU:HD12	2:C:108:LEU:HA	1.64	0.43
2:C:142:PRO:O	2:C:144:GLU:HG3	2.18	0.43
2:D:47:ASN:HB2	2:D:62:HIS:HB3	1.99	0.43
1:A:256:TRP:CD1	1:A:284:GLN:HB2	2.54	0.43
1:A:168:PRO:HG2	1:A:170:TYR:CE2	2.54	0.43
2:C:80:ILE:HG13	2:C:133:CYS:SG	2.59	0.43
1:A:27:GLU:HG2	1:A:52:LEU:HD23	2.01	0.43
2:C:42:TYR:CE1	2:C:68:ARG:HG3	2.54	0.43
1:A:195:LEU:HB3	1:A:198:LEU:HD12	2.01	0.42
2:C:28:SER:OG	2:C:29:ASP:N	2.51	0.42
1:B:173:ASN:O	1:B:175:THR:N	2.42	0.42
1:A:109:LEU:O	1:A:112:ASN:ND2	2.47	0.42
2:C:68:ARG:O	2:C:69:ARG:HD2	2.20	0.42
2:C:78:LEU:N	2:C:90:ARG:O	2.51	0.42
2:D:65:TYR:CE2	2:D:67:PRO:HA	2.54	0.42
1:A:98:TYR:HB3	1:A:125:LEU:HD11	2.02	0.42
2:D:49:ASN:HA	2:D:50:PRO:HA	1.93	0.42
1:B:256:TRP:CD1	1:B:284:GLN:HB2	2.53	0.42
2:C:37:CYS:SG	2:C:148:CYS:C	3.03	0.42
2:C:124:ILE:H	2:C:124:ILE:HG13	1.72	0.42
1:B:128:LEU:HD23	1:B:149:LEU:HD13	2.01	0.42
1:B:257:LEU:HD12	1:B:276:LEU:HD21	2.01	0.42
2:C:44:ILE:HG12	2:C:65:TYR:CD1	2.54	0.41
2:C:82:VAL:HG12	2:C:83:ASN:N	2.35	0.41
2:D:142:PRO:O	2:D:144:GLU:HG3	2.20	0.41
1:A:87:ARG:HA	1:A:87:ARG:HD3	1.78	0.41
2:D:101:ASP:HA	6:D:183:HOH:O	2.19	0.41
1:B:59:LEU:HG	1:B:61:LEU:HG	2.03	0.41
1:B:205:ASN:HB3	4:B:1301:NAG:H82	2.02	0.41
1:B:27:GLU:HG2	1:B:52:LEU:HD23	2.03	0.41
1:B:79:GLU:HG3	6:B:1440:HOH:O	2.21	0.41
2:C:44:ILE:HG12	2:C:65:TYR:CE1	2.55	0.41
2:D:124:ILE:H	2:D:124:ILE:HG13	1.70	0.41
1:B:254:LYS:HE2	6:B:1413:HOH:O	2.20	0.41
2:D:69:ARG:NH2	6:D:190:HOH:O	2.54	0.41
1:A:160:ASN:HB3	1:A:161:LEU:H	1.71	0.40
1:B:87:ARG:HG2	2:D:66:ILE:CD1	2.49	0.40
2:D:37:CYS:SG	2:D:150:GLU:HG3	2.61	0.40
2:D:54:LEU:HD21	2:D:153:ILE:CD1	2.51	0.40
2:D:124:ILE:CG2	2:D:125:LYS:N	2.76	0.40
5:D:1:E55:HCF1	5:D:1:E55:HAF3	1.68	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:234:ASP:HB2	1:A:258:HIS:O	2.21	0.40
1:B:42:GLU:OE2	1:B:42:GLU:HA	2.22	0.40
1:B:118:ALA:C	1:B:120:GLY:H	2.29	0.40
2:C:64:PHE:CE1	2:C:112:THR:HG23	2.56	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	274/276 (99%)	240 (88%)	33 (12%)	1 (0%)	30	54
1	B	274/276 (99%)	240 (88%)	32 (12%)	2 (1%)	18	41
2	C	138/140 (99%)	123 (89%)	13 (9%)	2 (1%)	9	23
2	D	138/140 (99%)	121 (88%)	14 (10%)	3 (2%)	5	14
All	All	824/832 (99%)	724 (88%)	92 (11%)	8 (1%)	12	32

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	109	LYS
2	D	109	LYS
2	D	128	LYS
1	A	65	PRO
1	B	65	PRO
1	B	119	LEU
2	C	95	CYS
2	D	124	ILE

5.3.2 Protein sidechains ⓘ

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	256/256 (100%)	238 (93%)	18 (7%)	14	34
1	B	256/256 (100%)	237 (93%)	19 (7%)	13	32
2	C	130/130 (100%)	114 (88%)	16 (12%)	4	12
2	D	130/130 (100%)	114 (88%)	16 (12%)	4	12
All	All	772/772 (100%)	703 (91%)	69 (9%)	9	23

All (69) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	54	PHE
1	A	68	HIS
1	A	81	GLN
1	A	87	ARG
1	A	94	GLU
1	A	115	GLN
1	A	125	LEU
1	A	137	ASN
1	A	141	LEU
1	A	155	LEU
1	A	165	PHE
1	A	204	LEU
1	A	211	SER
1	A	224	LYS
1	A	231	LEU
1	A	235	THR
1	A	243	ASP
1	A	281	GLN
1	B	35	ASN
1	B	54	PHE
1	B	68	HIS
1	B	76	SER
1	B	81	GLN
1	B	87	ARG

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Mol	Chain	Res	Type
1	B	94	GLU
1	B	115	GLN
1	B	125	LEU
1	B	137	ASN
1	B	141	LEU
1	B	155	LEU
1	B	165	PHE
1	B	204	LEU
1	B	211	SER
1	B	224	LYS
1	B	231	LEU
1	B	235	THR
1	B	281	GLN
2	C	31	SER
2	C	37	CYS
2	C	40	MET
2	C	44	ILE
2	C	69	ARG
2	C	74	LEU
2	C	84	THR
2	C	99	ASP
2	C	100	ASP
2	C	108	LEU
2	C	124	ILE
2	C	127	SER
2	C	135	VAL
2	C	143	GLU
2	C	153	ILE
2	C	154	LEU
2	D	31	SER
2	D	37	CYS
2	D	40	MET
2	D	44	ILE
2	D	69	ARG
2	D	74	LEU
2	D	84	THR
2	D	94	ILE
2	D	99	ASP
2	D	108	LEU
2	D	127	SER
2	D	135	VAL
2	D	143	GLU

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Mol	Chain	Res	Type
2	D	144	GLU
2	D	153	ILE
2	D	154	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	99	GLN
1	A	156	ASN
1	A	173	ASN
1	A	185	ASN
1	A	237	GLN
1	A	260	ASN
1	A	284	GLN
1	B	148	HIS
1	B	156	ASN
1	B	185	ASN
1	B	237	GLN
1	B	260	ASN
1	B	284	GLN
2	C	19	GLN
2	C	41	GLN
2	C	62	HIS
2	C	155	HIS
2	D	41	GLN
2	D	62	HIS
2	D	155	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

3 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	NAG	E	1	1,3	14,14,15	0.62	0	17,19,21	1.55	3 (17%)
3	NAG	E	2	3	14,14,15	0.81	0	17,19,21	1.34	2 (11%)
3	BMA	E	3	3	11,11,12	0.60	0	15,15,17	2.09	2 (13%)

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	E	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	E	2	3	-	3/6/23/26	0/1/1/1
3	BMA	E	3	3	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	3	BMA	C1-O5-C5	6.94	121.49	112.19
3	E	1	NAG	C4-C3-C2	3.73	116.48	111.02
3	E	2	NAG	C2-N2-C7	3.47	127.54	122.90
3	E	1	NAG	O5-C5-C6	3.29	114.06	107.66
3	E	2	NAG	C4-C3-C2	2.56	114.78	111.02
3	E	3	BMA	C1-C2-C3	2.32	113.02	109.64
3	E	1	NAG	C2-N2-C7	2.05	125.65	122.90

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	E	2	NAG	C3-C2-N2-C7
3	E	2	NAG	C8-C7-N2-C2

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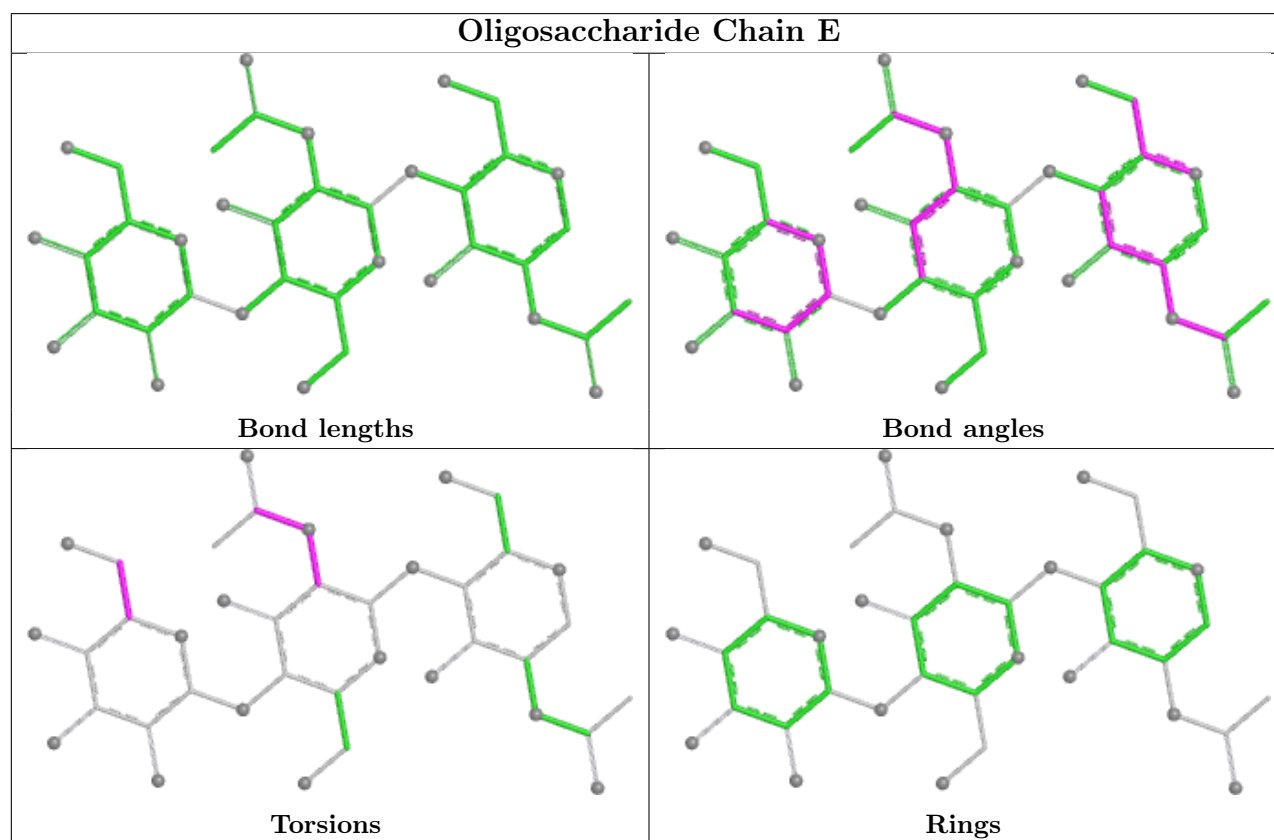
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Mol	Chain	Res	Type	Atoms
3	E	2	NAG	O7-C7-N2-C2
3	E	3	BMA	C4-C5-C6-O6

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](#)

7 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	E55	C	1	-	89,90,90	0.84	2 (2%)	109,111,111	1.21	7 (6%)
4	NAG	B	1301	1	14,14,15	0.58	0	17,19,21	1.24	1 (5%)
4	NAG	B	1201	1	14,14,15	0.57	0	17,19,21	0.75	1 (5%)
4	NAG	B	1401	-	14,14,15	0.60	0	17,19,21	1.09	1 (5%)
4	NAG	A	1201	1	14,14,15	0.68	0	17,19,21	0.99	1 (5%)
4	NAG	A	1401	-	14,14,15	0.69	0	17,19,21	1.11	1 (5%)
5	E55	D	1	-	89,90,90	0.86	2 (2%)	109,111,111	1.09	5 (4%)

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
5	E55	C	1	-	-	25/83/124/124	0/2/2/2
4	NAG	B	1301	1	1/1/5/7	4/6/23/26	0/1/1/1
4	NAG	B	1201	1	1/1/5/7	4/6/23/26	0/1/1/1
4	NAG	B	1401	-	-	3/6/23/26	0/1/1/1
4	NAG	A	1201	1	1/1/5/7	2/6/23/26	0/1/1/1
4	NAG	A	1401	-	-	3/6/23/26	0/1/1/1
5	E55	D	1	-	-	22/83/124/124	0/2/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	1	E55	O6-CDC	3.02	1.45	1.40
5	D	1	E55	PDK-OCU	2.55	1.64	1.59
5	D	1	E55	PDK-OAO	2.04	1.62	1.54
5	C	1	E55	PDK-OAP	2.03	1.62	1.54

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	1	E55	O3-C3-C4	-4.89	99.98	109.83
5	C	1	E55	O5-C1-O1	-4.74	105.17	111.36
5	D	1	E55	O3-C3-C4	-3.94	101.89	109.83
5	D	1	E55	OCR-CDC-CDE	-3.54	103.90	110.59
4	B	1301	NAG	C4-C3-C2	3.46	116.08	111.02
5	D	1	E55	CDC-OCR-CDB	-3.20	107.47	113.72

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1401	NAG	C4-C3-C2	3.13	115.60	111.02
5	C	1	E55	OCP-CCC-CCG	2.98	115.03	108.77
4	A	1401	NAG	O5-C5-C6	2.87	113.24	107.66
5	C	1	E55	OCR-CDC-CDE	-2.60	105.67	110.59
4	A	1201	NAG	C4-C3-C2	2.53	114.73	111.02
5	D	1	E55	C3-C2-N2	-2.51	106.90	110.91
5	C	1	E55	CDC-OCR-CDB	-2.35	109.13	113.72
5	C	1	E55	O3-C3-C2	2.27	114.78	109.83
5	D	1	E55	OCP-CDH-CDE	-2.14	105.14	109.83
4	B	1201	NAG	O5-C1-C2	-2.03	108.15	111.29
5	C	1	E55	O5-C1-C2	2.02	114.42	110.59

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	A	1201	NAG	C1
4	B	1301	NAG	C1
4	B	1201	NAG	C1

All (63) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1401	NAG	C8-C7-N2-C2
4	A	1401	NAG	O7-C7-N2-C2
4	A	1201	NAG	C8-C7-N2-C2
4	A	1201	NAG	O7-C7-N2-C2
4	B	1401	NAG	O7-C7-N2-C2
4	B	1301	NAG	C8-C7-N2-C2
4	B	1301	NAG	O7-C7-N2-C2
4	B	1201	NAG	C8-C7-N2-C2
4	B	1201	NAG	O7-C7-N2-C2
5	C	1	E55	CCF-CCY-OCN-CAF
5	C	1	E55	CCA-CCF-CCY-CCG
5	C	1	E55	CCA-CCF-CCY-OCN
5	D	1	E55	CCF-CCY-OCN-CAF
4	B	1401	NAG	C8-C7-N2-C2
5	C	1	E55	OCM-CCI-CDB-OCR
4	B	1201	NAG	O5-C5-C6-O6
5	D	1	E55	OCM-CCI-CDB-OCR
5	C	1	E55	OCM-CCI-CDB-CDI
5	D	1	E55	OCM-CCI-CDB-CDI
5	D	1	E55	CCA-CCF-CCY-CCG

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Mol	Chain	Res	Type	Atoms
5	D	1	E55	CCA-CCF-CCY-OCN
4	B	1201	NAG	C4-C5-C6-O6
5	C	1	E55	CBS-CBV-CBZ-CCE
5	D	1	E55	CBS-CBV-CBZ-CCE
5	C	1	E55	CBQ-CBT-CBX-CCB
5	D	1	E55	CBQ-CBT-CBX-CCB
4	B	1301	NAG	C4-C5-C6-O6
4	B	1401	NAG	C3-C2-N2-C7
5	D	1	E55	CBH-CBW-CCA-CCF
5	D	1	E55	CBD-CBI-CBL-CBO
5	C	1	E55	CAB-CAT-CAZ-CBF
5	C	1	E55	CBH-CBW-CCA-CCF
5	D	1	E55	CAB-CAT-CAZ-CBF
5	C	1	E55	CAZ-CBF-CBJ-CBM
5	D	1	E55	CAV-CBB-CBH-CBW
5	C	1	E55	CBD-CBI-CBL-CBO
5	D	1	E55	CAZ-CBF-CBJ-CBM
5	D	1	E55	CAU-CBA-CBG-CBK
5	C	1	E55	CAV-CBB-CBH-CBW
5	C	1	E55	CAU-CBA-CBG-CBK
4	B	1301	NAG	O5-C5-C6-O6
5	D	1	E55	CCV-CCH-CCX-OAI
5	D	1	E55	CCV-CCH-CCX-N2
5	D	1	E55	CAC-CAU-CBA-CBG
5	D	1	E55	CBB-CBH-CBW-CCA
5	C	1	E55	CAC-CAU-CBA-CBG
5	C	1	E55	CBL-CBO-CBS-CBV
5	C	1	E55	CBI-CBL-CBO-CBS
5	C	1	E55	CBK-CBN-CBQ-CBT
5	C	1	E55	CBB-CBH-CBW-CCA
5	C	1	E55	C1-O1-PDJ-OAN
5	D	1	E55	C1-O1-PDJ-OAN
5	D	1	E55	CBI-CBL-CBO-CBS
5	C	1	E55	CDI-OCU-PDK-OAK
5	D	1	E55	CDI-OCU-PDK-OAK
5	D	1	E55	CBK-CBN-CBQ-CBT
4	A	1401	NAG	C3-C2-N2-C7
5	D	1	E55	CAR-CAQ-CAW-CBC
5	C	1	E55	CAR-CAQ-CAW-CBC
5	C	1	E55	CCV-CCH-CCX-N2
5	C	1	E55	CCX-CCH-CCV-CCD
5	C	1	E55	CDI-OCU-PDK-OAO

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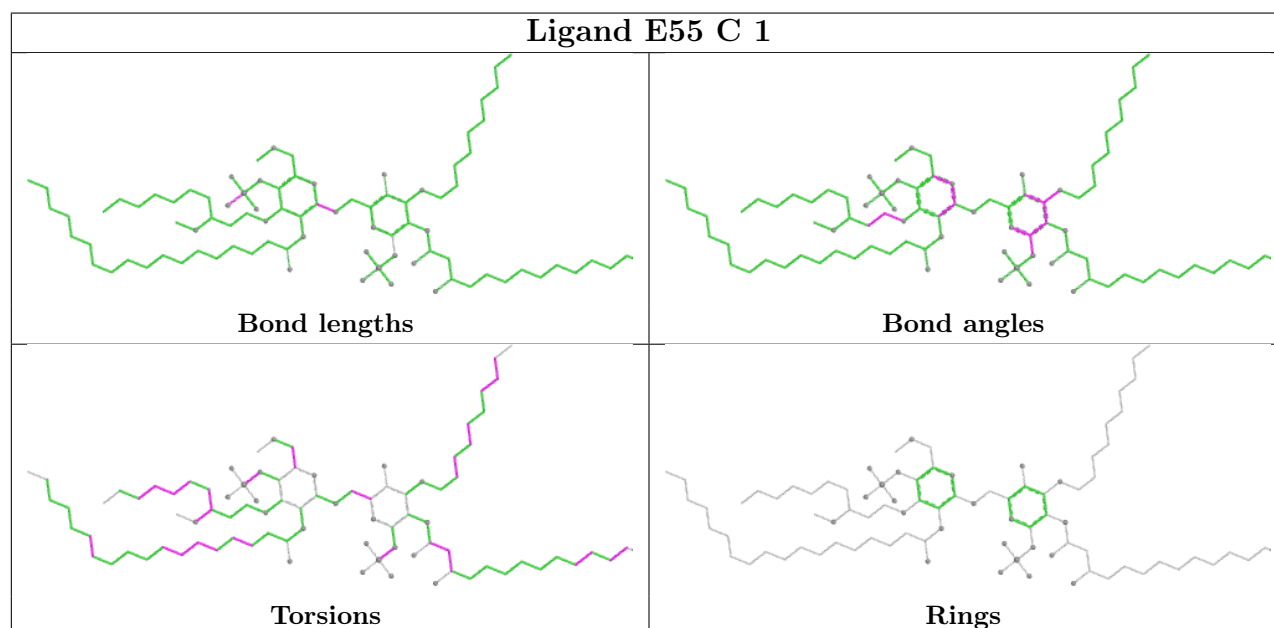
Mol	Chain	Res	Type	Atoms
5	C	1	E55	C4-C5-C6-O6

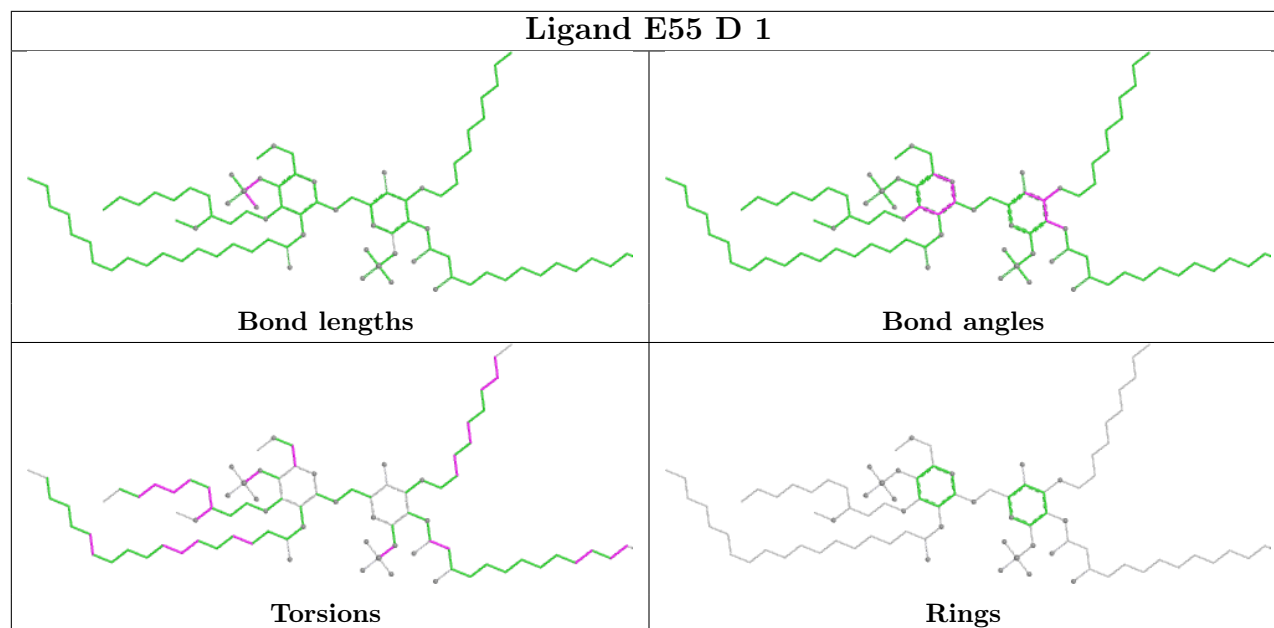
There are no ring outliers.

4 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	1	E55	3	0
4	B	1301	NAG	1	0
4	B	1401	NAG	1	0
5	D	1	E55	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for 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 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	276/276 (100%)	0.00	1 (0%) 88 87	33, 49, 64, 74	0
1	B	276/276 (100%)	-0.02	1 (0%) 88 87	33, 49, 64, 74	0
2	C	140/140 (100%)	0.48	7 (5%) 34 30	34, 49, 63, 69	0
2	D	140/140 (100%)	0.37	7 (5%) 34 30	32, 49, 66, 68	0
All	All	832/832 (100%)	0.14	16 (1%) 66 63	32, 49, 64, 74	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	49	ASN	4.1
2	D	156	GLN	3.6
1	B	250	THR	3.3
2	D	128	LYS	3.3
2	C	28	SER	3.2
2	D	129	GLY	2.8
2	D	127	SER	2.7
2	C	97	GLY	2.5
2	C	143	GLU	2.4
2	C	140	GLY	2.4
2	C	27	SER	2.3
1	A	250	THR	2.2
2	C	83	ASN	2.2
2	D	83	ASN	2.1
2	D	19	GLN	2.1
2	C	130	LYS	2.0

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

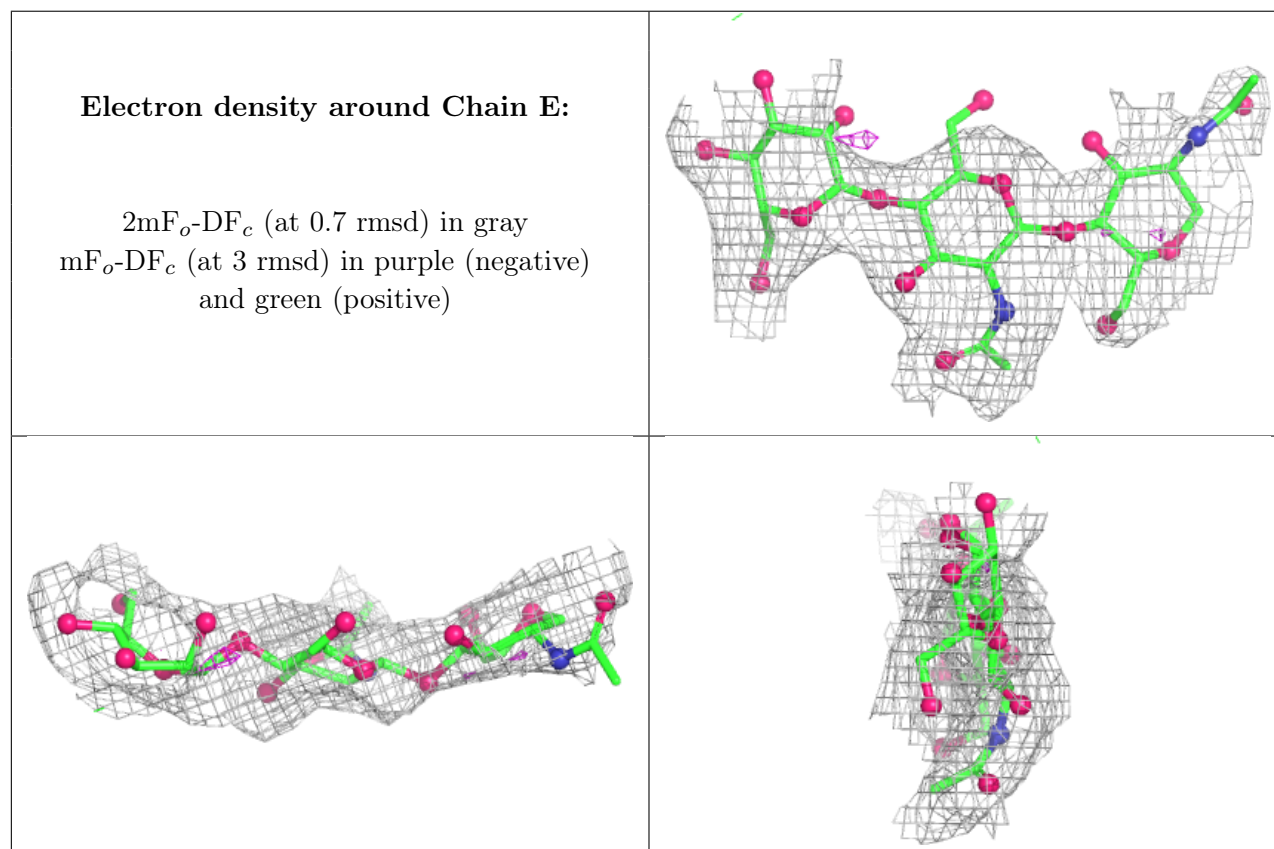
There are no non-standard protein/DNA/RNA residues in this entry.

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
3	NAG	E	2	14/15	0.56	0.12	98,111,114,115	0
3	NAG	E	1	14/15	0.63	0.14	97,108,113,114	0
3	BMA	E	3	11/12	0.77	0.12	64,88,106,112	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.

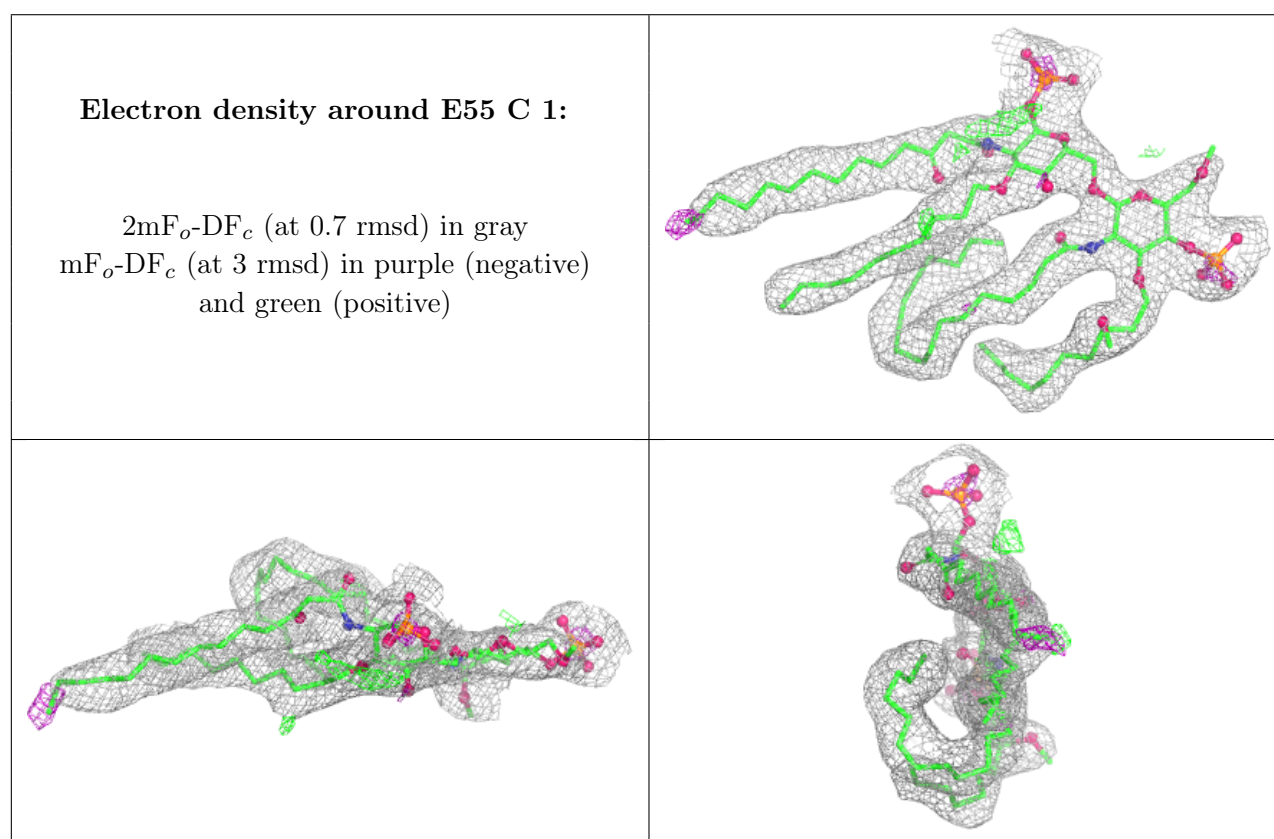


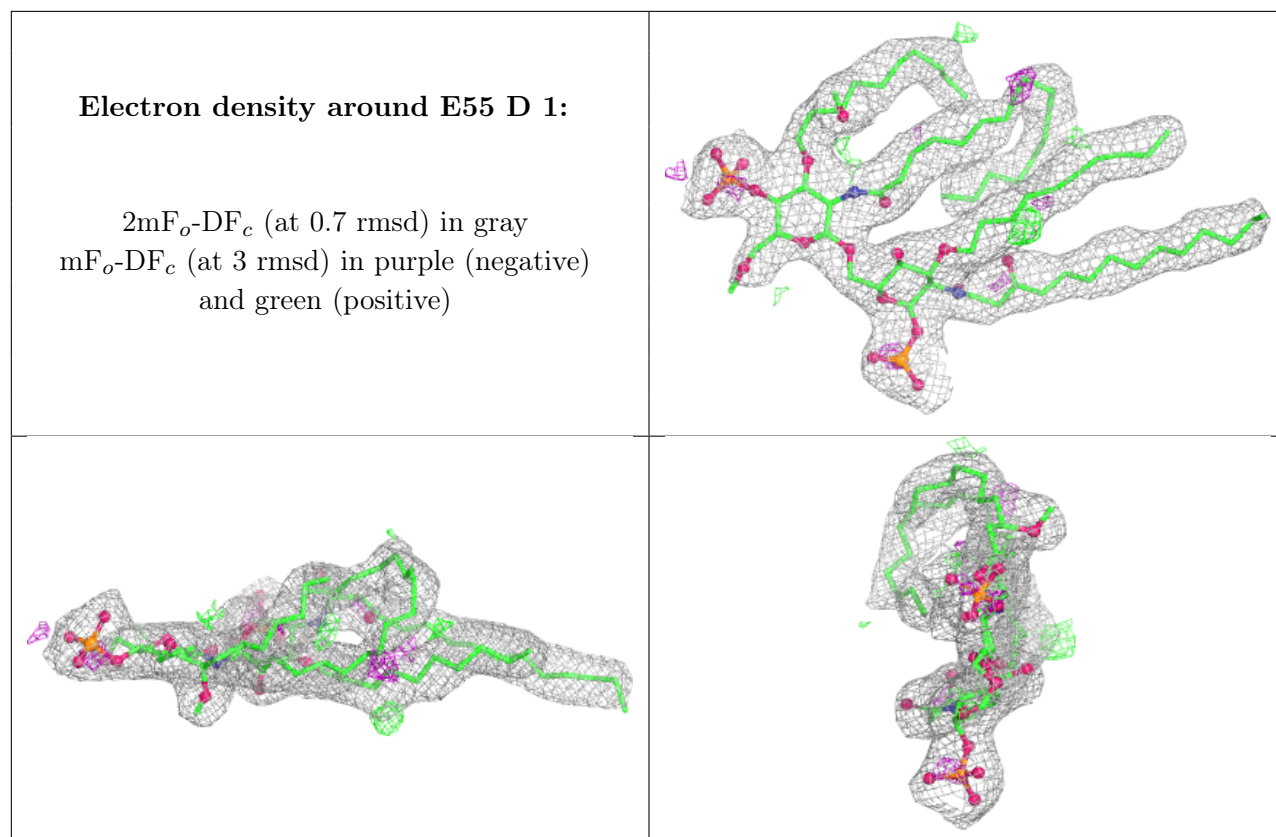
6.4 Ligands [i](#)

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($\text{\AA}^2$)	Q<0.9
4	NAG	A	1201	14/15	0.36	0.15	100,108,114,115	0
4	NAG	B	1301	14/15	0.49	0.12	116,128,138,139	0
4	NAG	B	1401	14/15	0.71	0.12	108,114,120,123	0
4	NAG	B	1201	14/15	0.71	0.14	97,108,116,117	0
4	NAG	A	1401	14/15	0.72	0.11	52,73,89,91	0
5	E55	C	1	89/89	0.91	0.09	23,49,66,73	0
5	E55	D	1	89/89	0.92	0.09	27,49,65,69	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.