W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Jan 21, 2024 – 01:20 am GMT

PDB ID	:	7BGC
Title	:	human butyrylcholinesterase in complex with a tacrine-methylanacardate hybrid inhibitor
Authors	:	Nachon, F.; Salerno, A.; Bolognesi, M.L.
Deposited on	:	2021-01-06
Resolution	:	2.40 Å(reported)

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

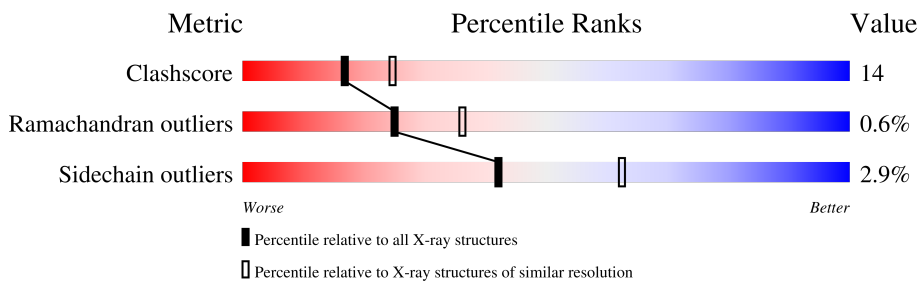|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	FAILED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.40 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	Percentile Ranks	Value
Clashscore		14
Ramachandran outliers		0.6%
Sidechain outliers		2.9%

Worse   *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)

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 <=5%

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	529	70% 28% •
2	B	5	80% 20%
3	C	2	50% 50%
4	D	3	33% 67%
4	E	3	33% 33% 33%

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
7	MES	A	605	-	-	X	-

2 Entity composition ⓘ

There are 11 unique types of molecules in this entry. The entry contains 4613 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 Cholinesterase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	527	Total 4242	C 2739	N 713	O 775	S 15	0	6	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	17	GLN	ASN	engineered mutation	UNP P06276
A	455	GLN	ASN	engineered mutation	UNP P06276
A	481	GLN	ASN	engineered mutation	UNP P06276
A	486	GLN	ASN	engineered mutation	UNP P06276

- Molecule 2 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.
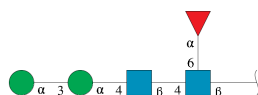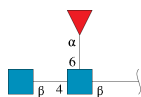

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	5	Total 60	C 34	N 2	O 24	0	0	0

- Molecule 3 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose.
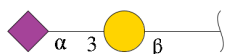
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	2	Total 32	C 17	N 1	O 14	0	0	0

- Molecule 4 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	D	3	Total 38	C 22	N 2	O 14	0	0	0
4	E	3	Total 38	C 22	N 2	O 14	0	0	0

- Molecule 5 is methyl 2-methoxy-6-[({E})-8-(1,2,3,4-tetrahydroacridin-9-ylamino)oct-6-enyl] benzoate (three-letter code: TKN) (formula: $C_{30}H_{36}N_2O_3$) (labeled as "Ligand of Interest" by depositor).

TKN

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total 35	C 30	N 2	O 3	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

NAG

O6
OH

O1
HO
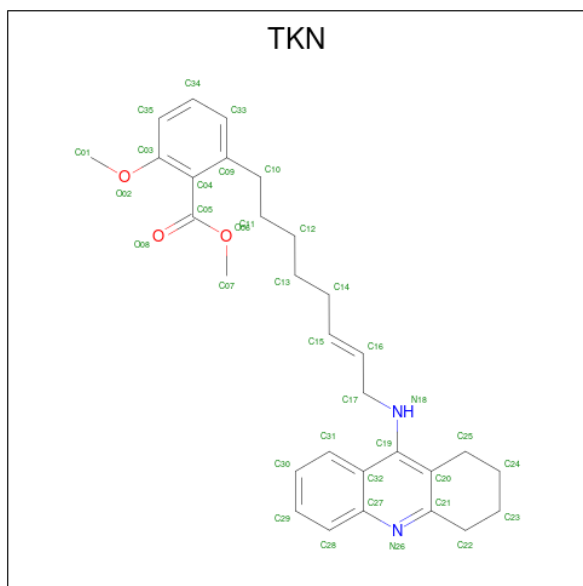
O5
O

C6

C1(R)　C5(R)
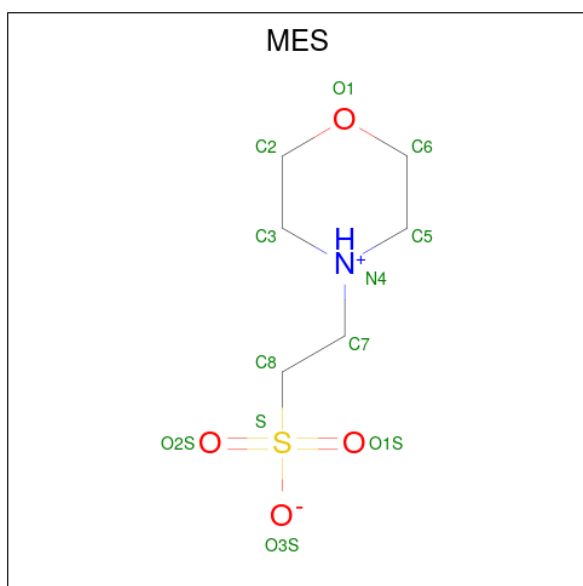
C2(R)　C4(S)
C3(R)

N2
HN

OH
O4

C7

OH
O3

C8

O
O7

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

- Molecule 7 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: $C_6H_{13}NO_4S$).

MES

O1
O

C2　　　C6

C3　　　C5

H
N+
N4

C8　　C7

S

O2S O ═ S ═ O O1S

O-
O3S

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total 12	C 6	N 1	O 4	S 1	0	0

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total 6	C 3	O 3	0	0

- Molecule 9 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	3	Total 3	Cl 3	0	0

- Molecule 10 is SULFATE ION (three-letter code: SO4) (formula: O_4S).
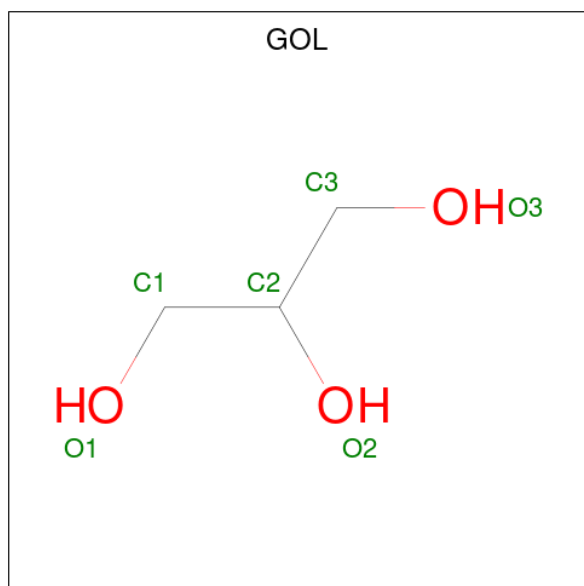
SO4

O1

O3 O⁻ — S — O⁻ O4

S

O2

| Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total 5	O 4	S 1	0	0
10	A	1	Total 5	O 4	S 1	0	0
10	A	1	Total 5	O 4	S 1	0	0

- Molecule 11 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	90	Total 90	O 90	0	0

3   Residue-property plots ⓘ

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

Note EDS failed to run properly.

• Molecule 1: Cholinesterase

Chain A:
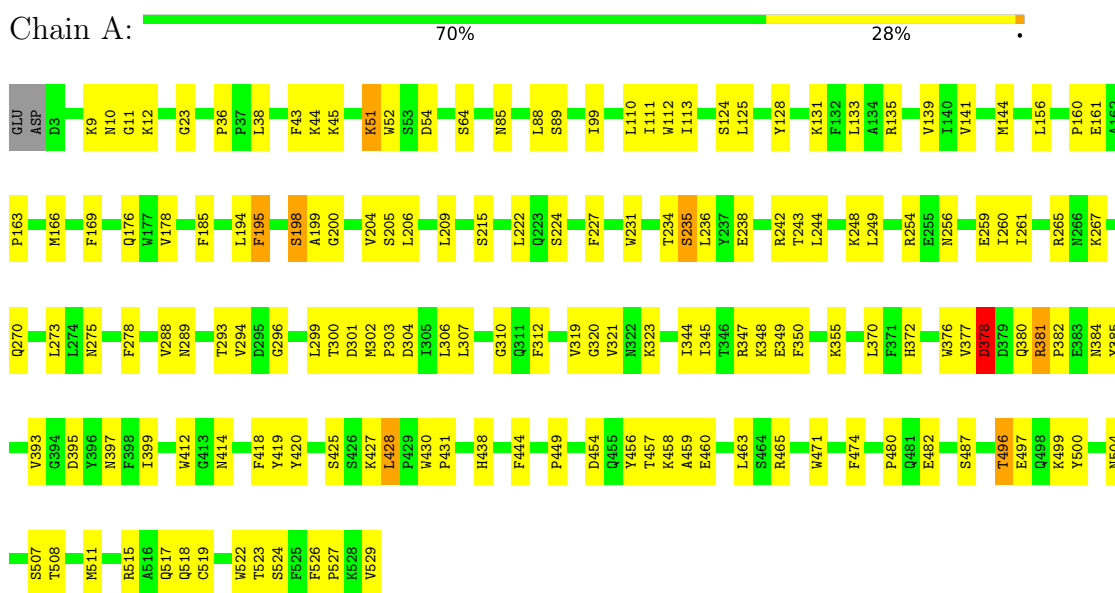
• Molecule 2: alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose
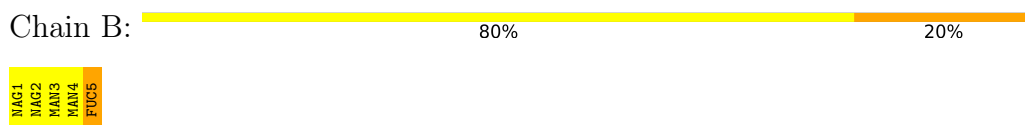
Chain B:

• Molecule 3: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain C:

• Molecule 4: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:

33%   67%

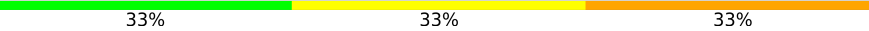NAG1 NAG2 FUC3

• Molecule 4: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-ace
tamido-2-deoxy-beta-D-glucopyranose

Chain E:

33%   33%   33%

NAG1 NAG2 FUC3

4 Data and refinement statistics (i)

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α, β, γ	154.40Å 154.40Å 128.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	60.80 – 2.40	Depositor
% Data completeness (in resolution range)	99.8 (60.80-2.40)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	0.95 (at 2.40Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.203 , 0.247	Depositor
Wilson B-factor (Å^2)	80.3	Xtriage
Anisotropy	0.165	Xtriage
L-test for twinning[2]	$<|L|> = 0.51$, $<L^2> = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4613	wwPDB-VP
Average B, all atoms (Å^2)	89.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.98% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $<|L|>$, $<L^2>$ 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: MES, FUC, GOL, CL, SIA, TKN, SO4, GAL, NAG, MAN

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	0.48	1/4378 (0.0%)	0.63	0/5943

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	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	519	CYS	CB-SG	-5.21	1.73	1.81

There are no bond angle outliers.

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	377	VAL	Peptide
1	A	378	ASP	Peptide
1	A	507	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	4242	0	4145	120	0
2	B	60	0	52	1	0
3	C	32	0	28	1	0
4	D	38	0	34	1	0
4	E	38	0	34	1	0
5	A	35	0	0	0	0
6	A	42	0	39	0	0
7	A	12	0	12	6	0
8	A	6	0	8	1	0
9	A	3	0	0	1	0
10	A	15	0	0	1	0
11	A	90	0	0	5	0
All	All	4613	0	4352	125	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 14.

The worst 5 of 125 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:344:ILE:HD13	1:A:382:PRO:HB2	1.68	0.74
1:A:52:TRP:O	11:A:701:HOH:O	2.06	0.73
1:A:427:LYS:NZ	11:A:703:HOH:O	2.22	0.72
1:A:235:SER:OG	1:A:238:GLU:HG2	1.91	0.70
1:A:474:PHE:HB2	1:A:480:PRO:HB3	1.76	0.67

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	531/529 (100%)	475 (90%)	53 (10%)	3 (1%)	25	36

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	198	SER
1	A	378	ASP
1	A	496	THR

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	458/454 (101%)	444 (97%)	14 (3%)	40	60

5 of 14 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	270[B]	GLN
1	A	278	PHE
1	A	471	TRP
1	A	428	LEU
1	A	454	ASP

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

Mol	Chain	Res	Type
1	A	266	ASN
1	A	351	GLN

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 ⓘ

13 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	B	1	2,1	14,14,15	0.57	0	17,19,21	0.71	1 (5%)
2	NAG	B	2	2	14,14,15	0.52	0	17,19,21	0.45	0
2	MAN	B	3	2	11,11,12	1.44	2 (18%)	15,15,17	2.14	4 (26%)
2	MAN	B	4	2	11,11,12	1.29	2 (18%)	15,15,17	1.11	2 (13%)
2	FUC	B	5	2	10,10,11	1.28	1 (10%)	14,14,16	1.78	3 (21%)
3	GAL	C	1	3	12,12,12	0.92	1 (8%)	17,17,17	1.36	3 (17%)
3	SIA	C	2	3	20,20,21	2.06	3 (15%)	24,28,31	1.68	5 (20%)
4	NAG	D	1	4,1	14,14,15	0.41	0	17,19,21	1.07	1 (5%)
4	NAG	D	2	4	14,14,15	0.80	1 (7%)	17,19,21	0.74	1 (5%)
4	FUC	D	3	4	10,10,11	0.95	1 (10%)	14,14,16	1.06	1 (7%)
4	NAG	E	1	4,1	14,14,15	0.51	0	17,19,21	0.69	0
4	NAG	E	2	4	14,14,15	0.44	0	17,19,21	0.48	0
4	FUC	E	3	4	10,10,11	1.30	1 (10%)	14,14,16	1.16	1 (7%)

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	B	1	2,1	-	4/6/23/26	0/1/1/1
2	NAG	B	2	2	-	3/6/23/26	0/1/1/1
2	MAN	B	3	2	-	1/2/19/22	0/1/1/1
2	MAN	B	4	2	-	2/2/19/22	1/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	FUC	B	5	2	-	-	0/1/1/1
3	GAL	C	1	3	-	1/2/22/22	0/1/1/1
3	SIA	C	2	3	-	6/18/34/38	0/1/1/1
4	NAG	D	1	4,1	-	1/6/23/26	0/1/1/1
4	NAG	D	2	4	-	1/6/23/26	0/1/1/1
4	FUC	D	3	4	-	-	0/1/1/1
4	NAG	E	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	E	2	4	-	2/6/23/26	0/1/1/1
4	FUC	E	3	4	-	-	0/1/1/1

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	2	SIA	C2-C1	7.25	1.58	1.52
2	B	3	MAN	O5-C5	3.07	1.49	1.43
2	B	3	MAN	C1-C2	3.01	1.59	1.52
3	C	2	SIA	O6-C2	2.85	1.47	1.43
2	B	5	FUC	C2-C3	2.81	1.56	1.52

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	3	MAN	C1-O5-C5	6.07	120.42	112.19
2	B	5	FUC	C1-C2-C3	4.52	115.22	109.67
3	C	2	SIA	O1A-C1-C2	-4.08	112.92	122.57
2	B	3	MAN	C1-C2-C3	3.34	113.77	109.67
3	C	2	SIA	C4-C3-C2	3.29	115.70	109.81

There are no chirality outliers.

5 of 23 torsion outliers are listed below:

| Mol	Chain	Res	Type	Atoms
3	C	2	SIA	O1A-C1-C2-O6
4	E	1	NAG	C4-C5-C6-O6
4	E	1	NAG	O5-C5-C6-O6
4	E	2	NAG	O5-C5-C6-O6
2	B	1	NAG	O5-C5-C6-O6

All (1) ring outliers are listed below:

| Mol	Chain	Res	Type	Atoms
2	B	4	MAN	C1-C2-C3-C4-C5-O5

7 monomers are involved in 4 short contacts:

| Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	2	NAG	1	0
4	E	1	NAG	1	0
4	E	3	FUC	1	0
4	D	1	NAG	1	0
4	D	2	NAG	1	0
3	C	1	GAL	1	0
2	B	5	FUC	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.

Oligosaccharide Chain B

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain C

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain D

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain E

Bond lengths   Bond angles

Torsions   Rings
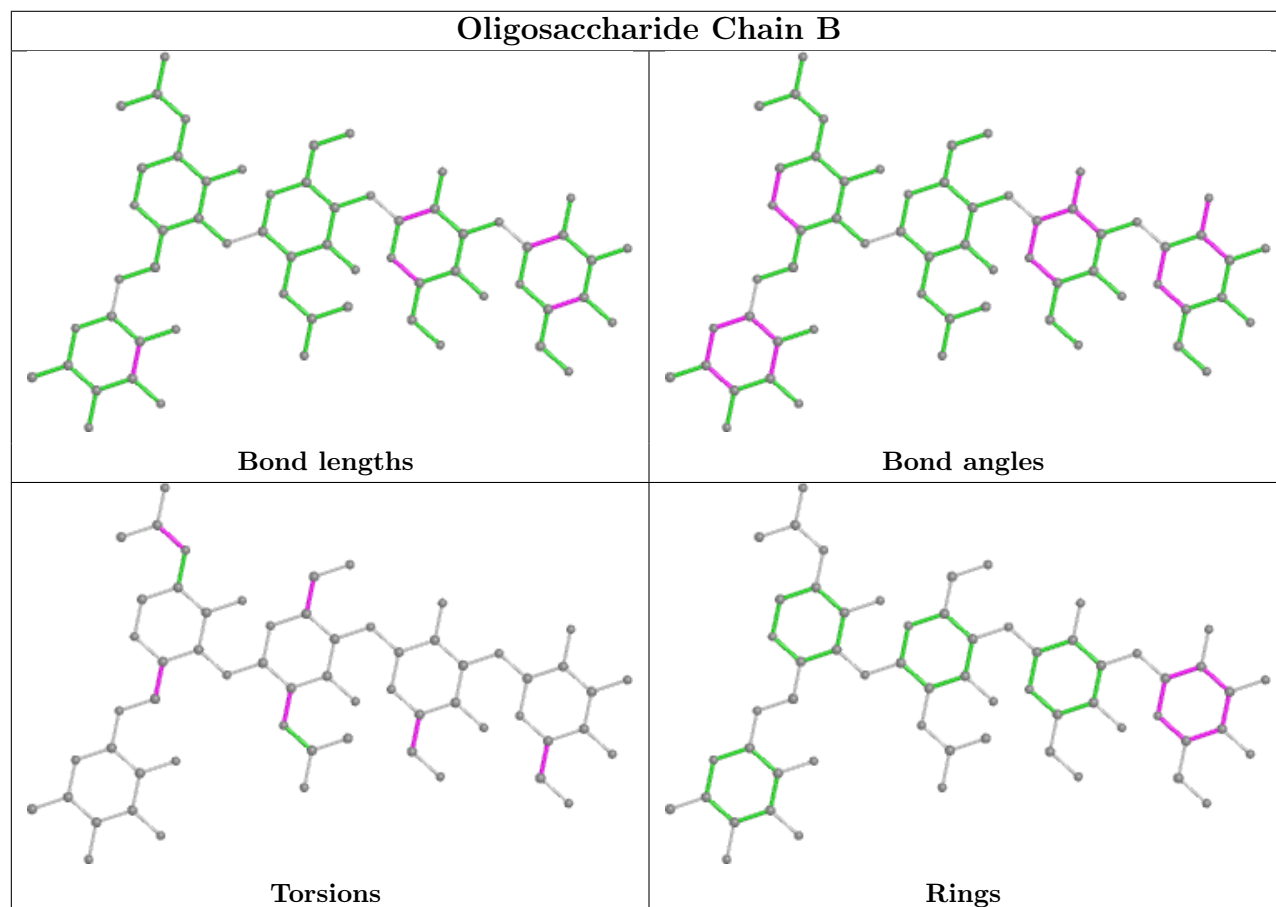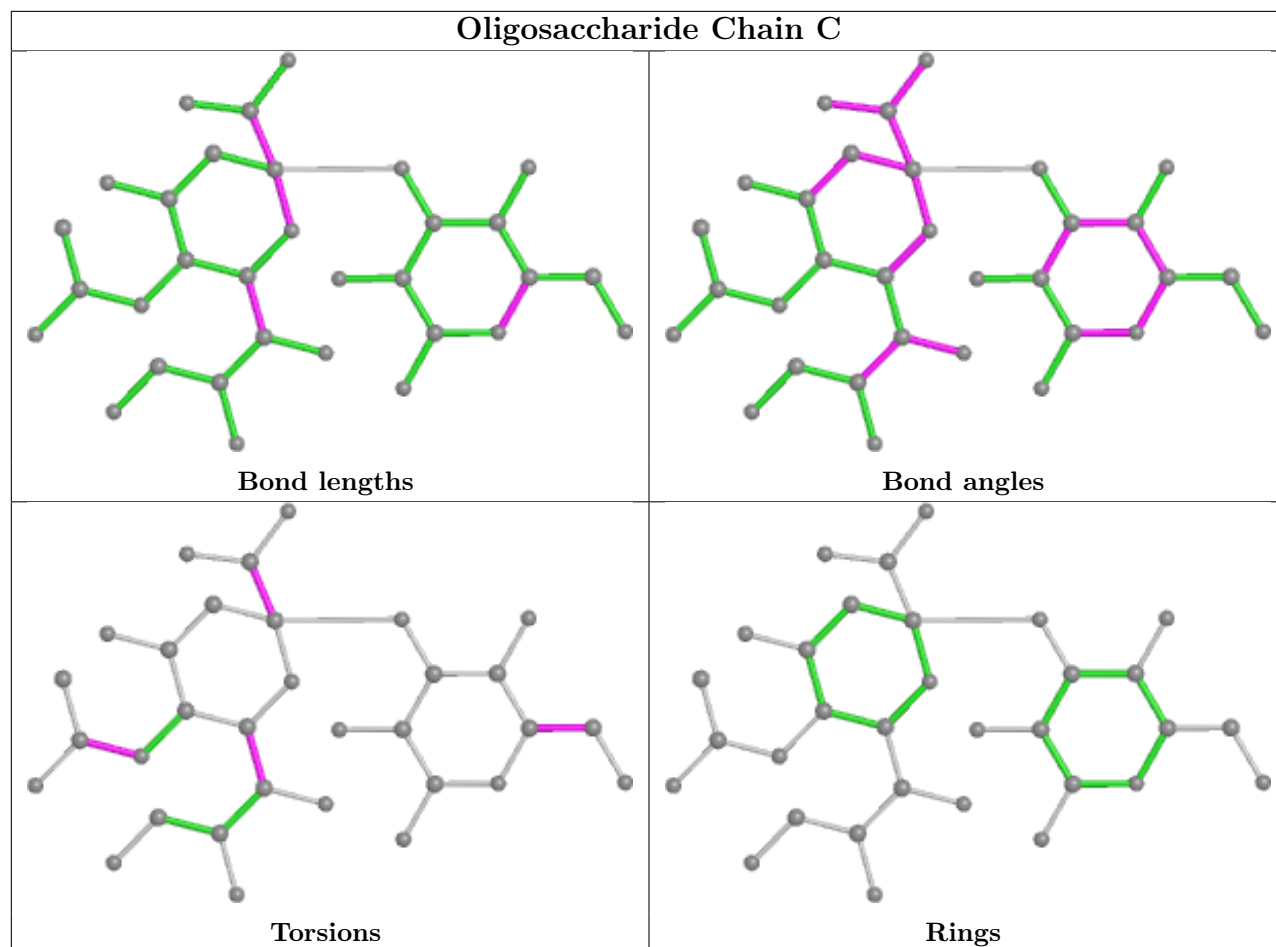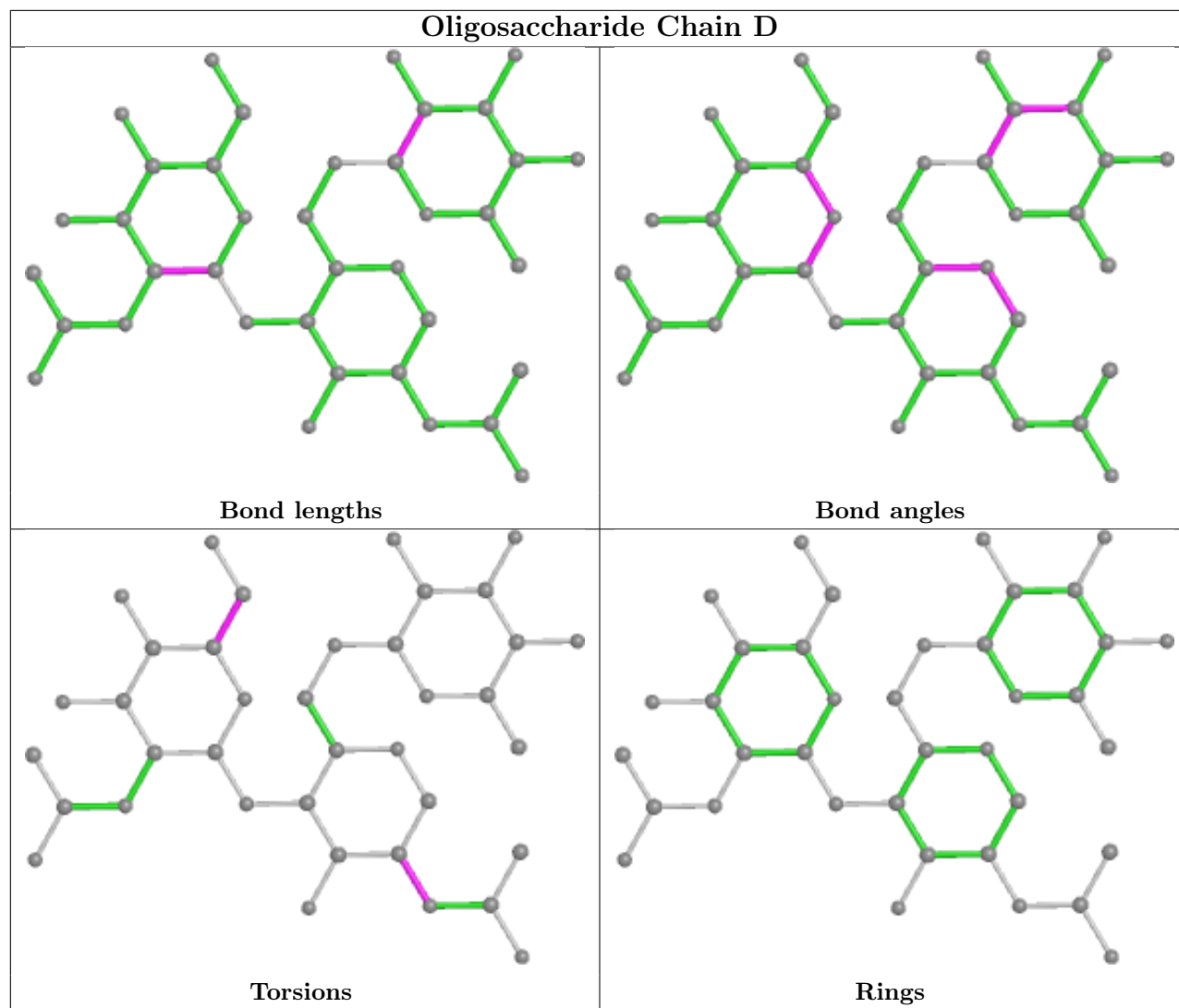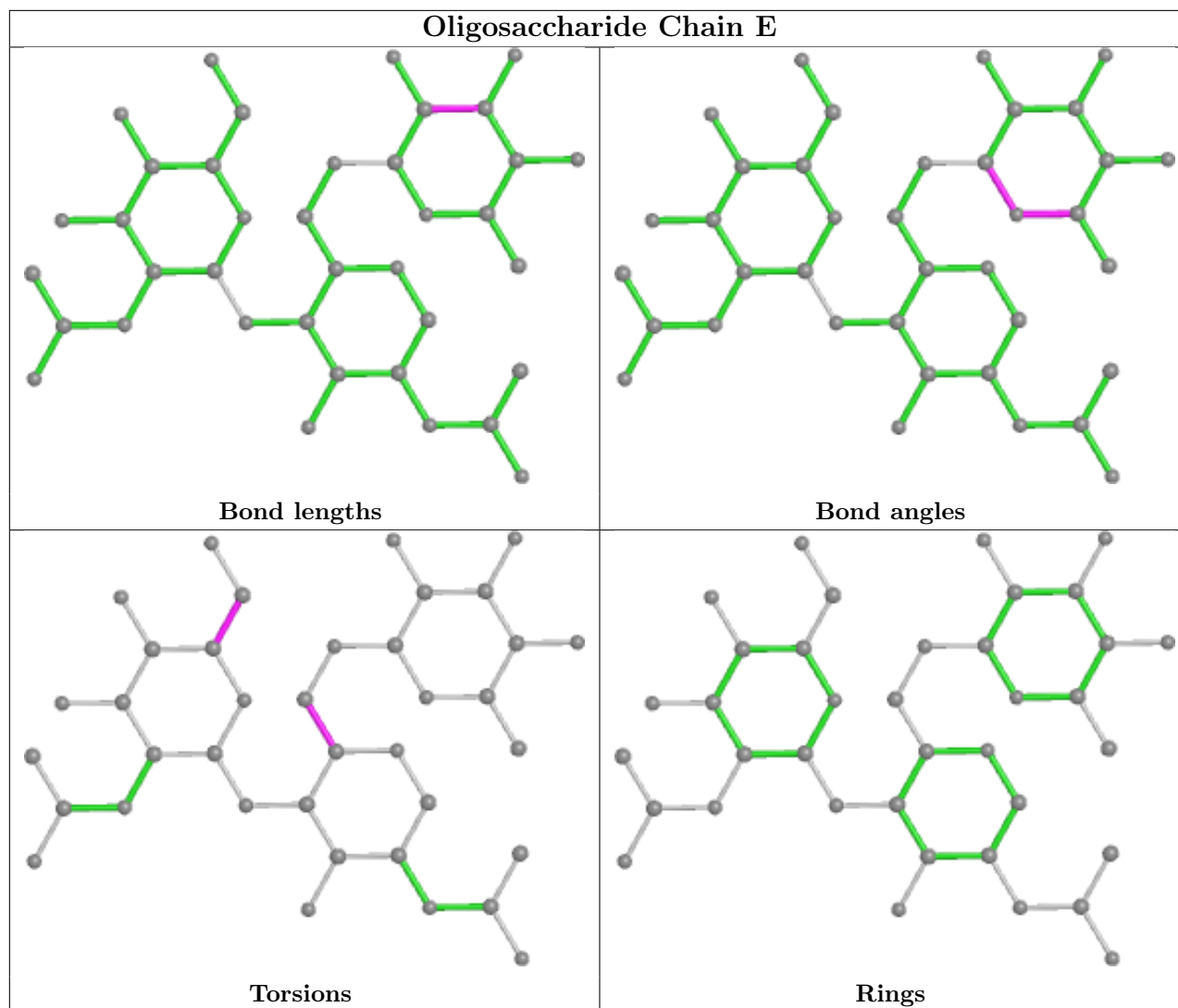
5.6 Ligand geometry ⓘ

Of 12 ligands modelled in this entry, 3 are monoatomic - leaving 9 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	$\#|Z| > 2$
10	SO4	A	610	-	4,4,4	0.16	0	6,6,6	0.14	0
8	GOL	A	606	-	5,5,5	0.96	0	5,5,5	1.10	0
10	SO4	A	611	-	4,4,4	0.14	0	6,6,6	0.12	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
6	NAG	A	603	1	14,14,15	0.56	0	17,19,21	0.91	1 (5%)
6	NAG	A	602	1	14,14,15	0.82	1 (7%)	17,19,21	0.86	1 (5%)
6	NAG	A	604	1	14,14,15	0.61	0	17,19,21	0.71	1 (5%)
5	TKN	A	601	-	38,38,38	2.01	12 (31%)	46,50,50	1.84	9 (19%)
10	SO4	A	612	-	4,4,4	0.15	0	6,6,6	0.18	0
7	MES	A	605	-	12,12,12	2.22	1 (8%)	14,16,16	2.08	5 (35%)

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
8	GOL	A	606	-	-	2/4/4/4	-
6	NAG	A	603	1	-	1/6/23/26	0/1/1/1
6	NAG	A	602	1	-	0/6/23/26	0/1/1/1
6	NAG	A	604	1	-	0/6/23/26	0/1/1/1
5	TKN	A	601	-	-	7/20/27/27	0/4/4/4
7	MES	A	605	-	-	2/6/14/14	0/1/1/1

The worst 5 of 14 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	605	MES	C8-S	-7.42	1.67	1.77
5	A	601	TKN	C19-C32	4.67	1.51	1.43
5	A	601	TKN	C16-C15	4.28	1.56	1.31
5	A	601	TKN	O06-C05	3.48	1.41	1.33
5	A	601	TKN	C27-N26	3.47	1.43	1.37

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	601	TKN	O06-C05-O08	-5.42	112.85	123.45
5	A	601	TKN	O06-C05-C04	5.31	125.00	112.27
5	A	601	TKN	C07-O06-C05	4.85	125.18	115.83
7	A	605	MES	C6-C5-N4	-3.55	104.72	110.10
7	A	605	MES	C5-N4-C3	3.52	116.76	108.83

There are no chirality outliers.

5 of 12 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	605	MES	C8-C7-N4-C5
7	A	605	MES	N4-C7-C8-S
8	A	606	GOL	C1-C2-C3-O3
8	A	606	GOL	O2-C2-C3-O3
5	A	601	TKN	O08-C05-O06-C07

There are no ring outliers.

3 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	606	GOL	1	0
10	A	611	SO4	1	0
7	A	605	MES	6	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 then 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.

Ligand TKN A 601

Bond lengths

Bond angles

Torsions

Rings
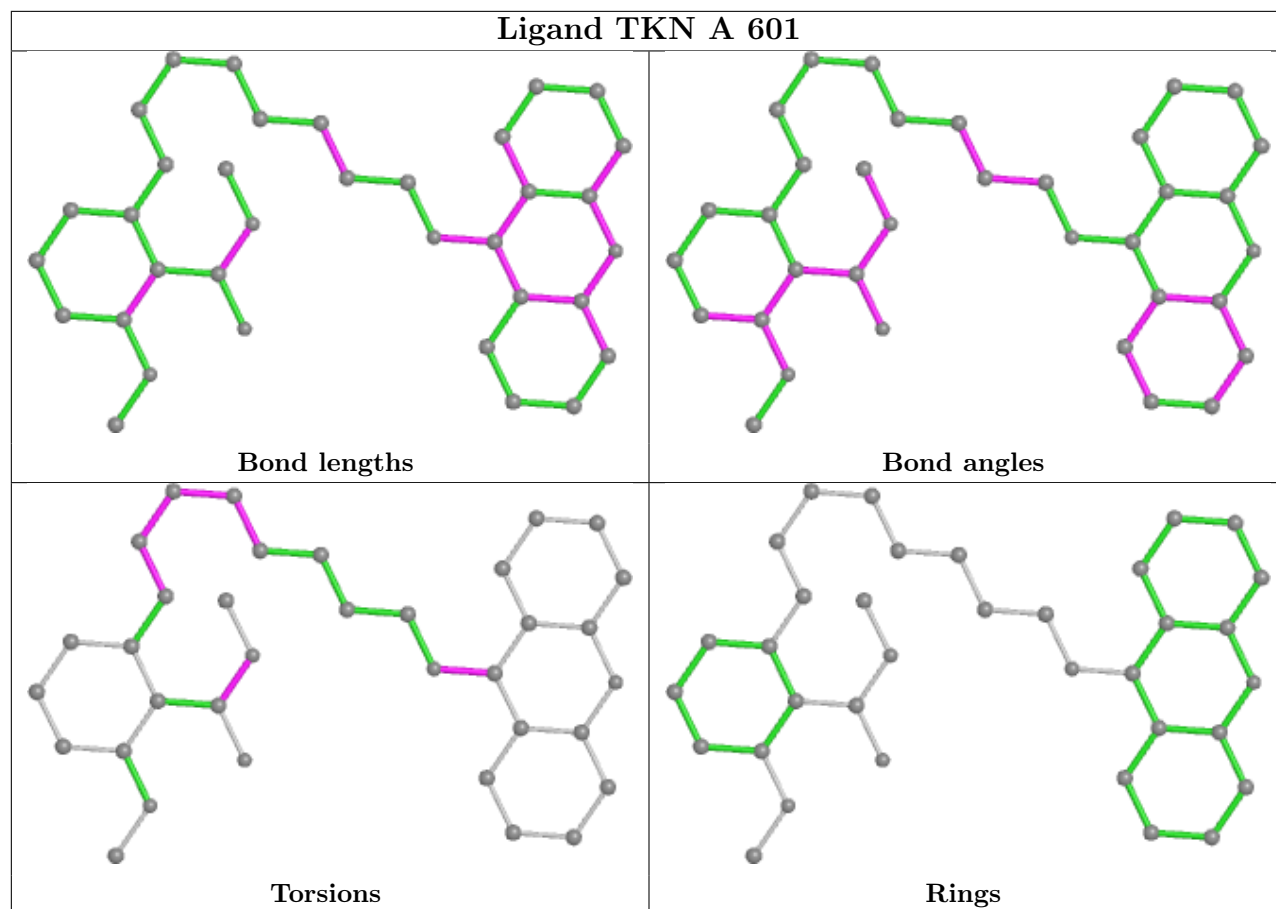
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS failed to run properly - this section is therefore empty.

6.4 Ligands ⓘ

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers ⓘ

EDS failed to run properly - this section is therefore empty.