



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 19, 2023 – 07:18 PM JST

PDB ID : 6M38
Title : X-ray structure of a Drosophila dopamine transporter with subsiteB mutations (D121G/S426M) in S-duloxetine bound form
Authors : Shabareesh, P.; Mallela, A.K.; Joseph, D.; Penmatsa, A.
Deposited on : 2020-03-02
Resolution : 3.00 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

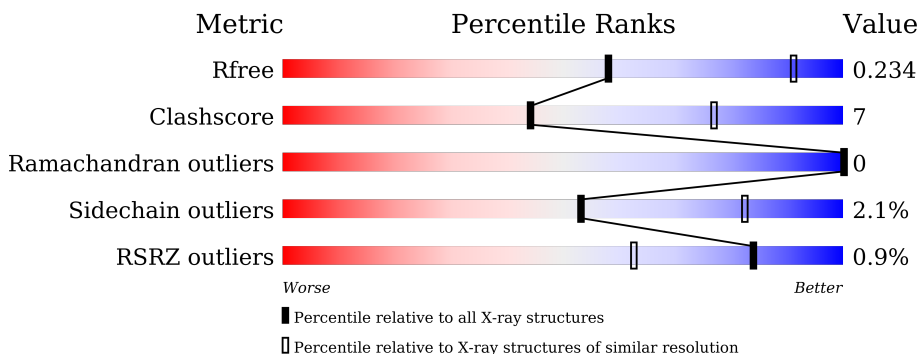
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2092 (3.00-3.00)
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	534	 84% 16%
2	L	214	 77% 22%
3	H	219	 3% 84% 16%

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 7638 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 Sodium-dependent dopamine transporter.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	534	4221	2832	654	716	19	0	0	0

There are 45 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	74	ALA	VAL	engineered mutation	UNP Q7K4Y6
A	121	GLY	ASP	engineered mutation	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	GLN	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ARG	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	PRO	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	ILE	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ASP	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	MET	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLN	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6

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Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLU	deletion	UNP Q7K4Y6
A	?	-	THR	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	MET	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	ASP	deletion	UNP Q7K4Y6
A	?	-	THR	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	415	ALA	LEU	engineered mutation	UNP Q7K4Y6
A	426	MET	SER	engineered mutation	UNP Q7K4Y6

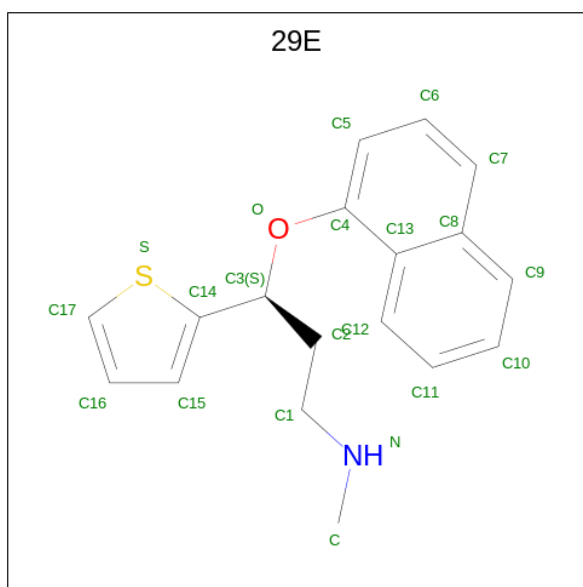
- Molecule 2 is a protein called Antibody fragment 9D5 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	214	1629	1012	269	340	8	0	0	0

- Molecule 3 is a protein called Antibody fragment 9D5 heavy chain.

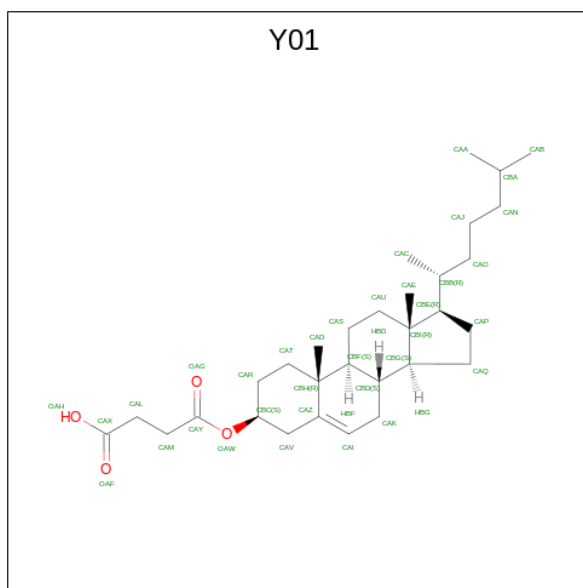
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	H	219	1644	1033	278	325	8	0	0	0

- Molecule 4 is (3S)-N-methyl-3-(naphthalen-1-yloxy)-3-(thiophen-2-yl)propan-1-amine (three-letter code: 29E) (formula: C₁₈H₁₉NOS) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			21	18	1	1	1		

- Molecule 5 is CHOLESTEROL HEMISUCCINATE (three-letter code: Y01) (formula: $C_{31}H_{50}O_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			35	31	4		

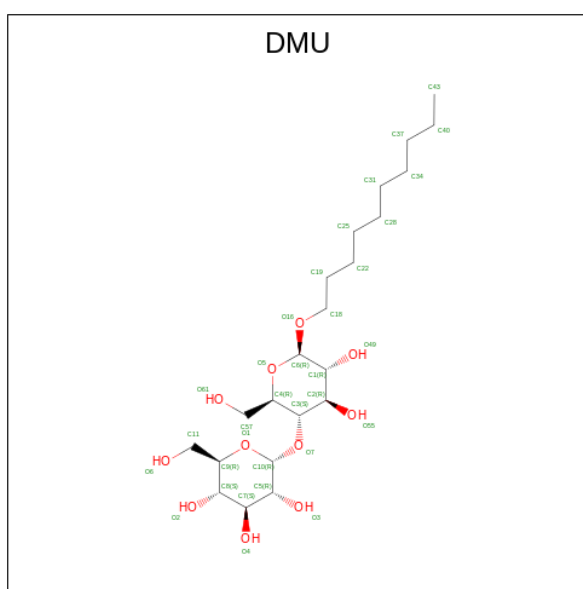
- Molecule 6 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	2	Total Na 2 2	0	0

- Molecule 7 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

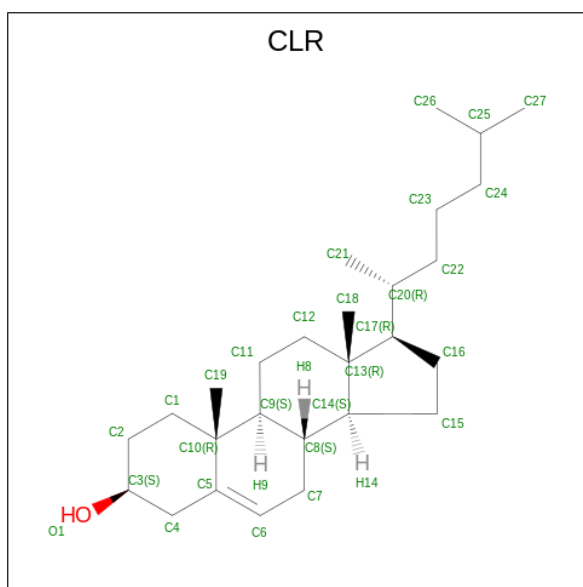
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total Cl 1 1	0	0

- Molecule 8 is DECYL-BETA-D-MALTOPYRANOSIDE (three-letter code: DMU) (formula: C₂₂H₄₂O₁₁).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total C O 33 22 11	0	0

- Molecule 9 is CHOLESTEROL (three-letter code: CLR) (formula: C₂₇H₄₆O).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	1	Total C O 28 27 1	0	0

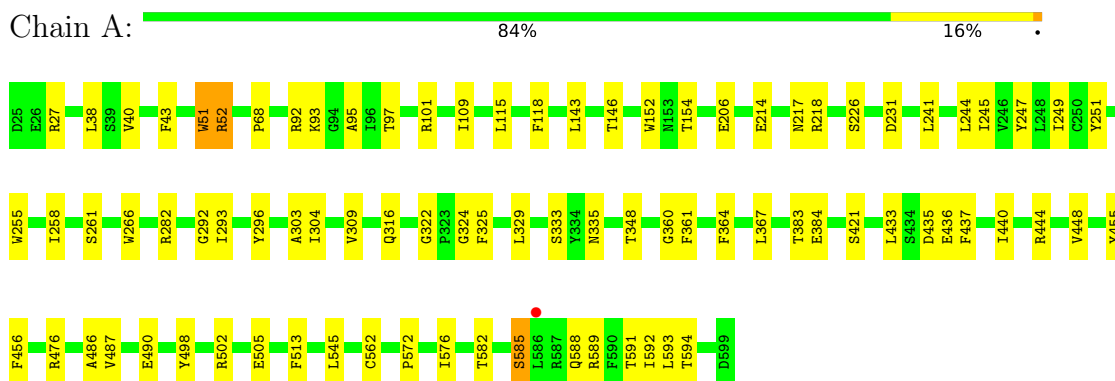
- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	11	Total O 11 11	0	0
10	L	6	Total O 6 6	0	0
10	H	7	Total O 7 7	0	0

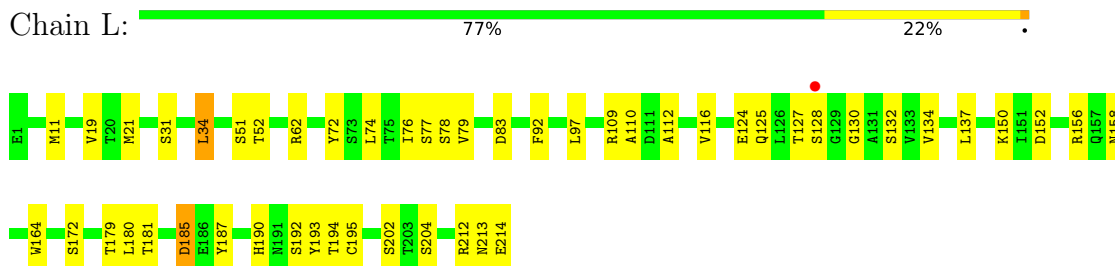
3 Residue-property plots [i](#)

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 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.

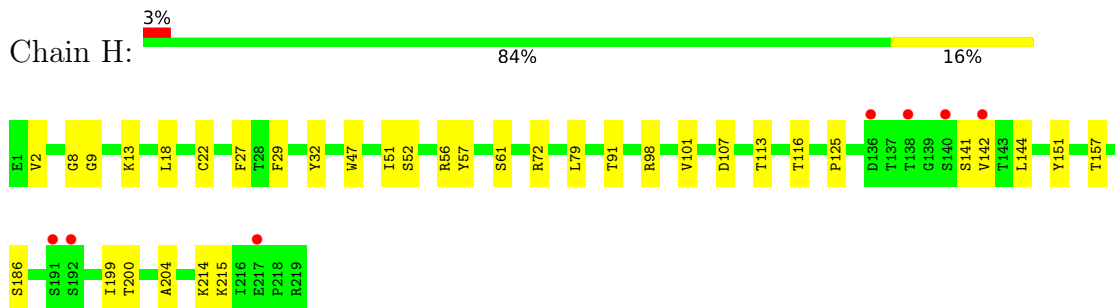
- Molecule 1: Sodium-dependent dopamine transporter



- Molecule 2: Antibody fragment 9D5 light chain



- Molecule 3: Antibody fragment 9D5 heavy chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	97.29Å 140.64Å 167.82Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.64 – 3.00 48.64 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.8 (48.64-3.00) 99.9 (48.64-3.00)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.66 (at 3.01Å)	Xtrriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.215 , 0.244 0.218 , 0.234	Depositor DCC
R_{free} test set	2369 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	85.5	Xtrriage
Anisotropy	0.161	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 49.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	7638	wwPDB-VP
Average B, all atoms (Å ²)	78.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.77% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: DMU, Y01, NA, 29E, CL, CLR

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	0.33	0/4363	0.47	0/5960
2	L	0.34	0/1667	0.53	0/2265
3	H	0.35	0/1683	0.52	0/2293
All	All	0.34	0/7713	0.49	0/10518

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	4221	0	4149	52	0
2	L	1629	0	1544	28	0
3	H	1644	0	1594	20	0
4	A	21	0	19	0	0
5	A	35	0	43	2	0
6	A	2	0	0	0	0
7	A	1	0	0	0	0
8	A	33	0	42	1	0
9	A	28	0	46	2	0
10	A	11	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
10	H	7	0	0	1	0
10	L	6	0	0	0	0
All	All	7638	0	7437	100	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 7.

All (100) 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)
5:A:602:Y01:CAQ	5:A:602:Y01:CAP	1.80	1.55
1:A:322:GLY:O	1:A:325:PHE:HD1	1.51	0.94
1:A:322:GLY:O	1:A:325:PHE:CD1	2.34	0.79
2:L:152:ASP:HA	2:L:192:SER:HB3	1.70	0.74
1:A:97:THR:HG22	1:A:101:ARG:HD2	1.72	0.69
3:H:29:PHE:O	3:H:72:ARG:NH2	2.27	0.68
2:L:21:MET:HE2	2:L:74:LEU:HB3	1.76	0.67
1:A:52:ARG:NH1	1:A:384:GLU:OE1	2.28	0.67
1:A:582:THR:O	1:A:589:ARG:NE	2.29	0.64
1:A:498:TYR:O	1:A:502:ARG:NH1	2.30	0.63
2:L:124:GLU:OE1	3:H:214:LYS:NZ	2.29	0.62
2:L:190:HIS:O	2:L:212:ARG:NH1	2.33	0.62
1:A:303:ALA:HB1	1:A:309:VAL:HG21	1.83	0.61
1:A:591:THR:HA	1:A:594:THR:HG22	1.82	0.60
2:L:213:ASN:OD1	2:L:214:GLU:N	2.36	0.59
2:L:109:ARG:NH1	2:L:110:ALA:O	2.37	0.58
1:A:27:ARG:NH2	1:A:435:ASP:OD2	2.36	0.57
2:L:150:LYS:HB2	2:L:194:THR:HB	1.85	0.57
1:A:433:LEU:HB3	1:A:440:ILE:HD11	1.87	0.57
1:A:437:PHE:O	1:A:440:ILE:HG12	2.05	0.55
1:A:27:ARG:NH1	1:A:333:SER:HB2	2.22	0.55
1:A:241:LEU:HD23	8:A:606:DMU:H14	1.87	0.54
3:H:9:GLY:HA2	3:H:18:LEU:HD21	1.90	0.54
3:H:91:THR:HG23	3:H:116:THR:HA	1.90	0.54
1:A:27:ARG:NH1	1:A:92:ARG:O	2.41	0.54
1:A:115:LEU:HA	1:A:118:PHE:HB3	1.89	0.54
2:L:62:ARG:NH1	2:L:83:ASP:OD1	2.41	0.54
2:L:156:ARG:NH1	2:L:158:ASN:O	2.42	0.53
3:H:22:CYS:HB3	3:H:79:LEU:HB3	1.90	0.52
1:A:52:ARG:HG2	1:A:316:GLN:OE1	2.09	0.52
2:L:132:SER:HB3	2:L:181:THR:HG22	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:154:THR:OG1	1:A:214:GLU:OE2	2.28	0.52
1:A:92:ARG:NH2	1:A:335:ASN:O	2.43	0.52
3:H:200:THR:HG22	3:H:215:LYS:HG3	1.91	0.51
1:A:572:PRO:O	1:A:576:ILE:HG12	2.10	0.51
2:L:109:ARG:HH12	2:L:112:ALA:HB2	1.76	0.51
2:L:134:VAL:HG22	2:L:179:THR:HG23	1.90	0.51
1:A:258:ILE:HA	1:A:261:SER:HB3	1.93	0.50
2:L:19:VAL:HG22	2:L:76:ILE:HB	1.93	0.50
2:L:19:VAL:HG13	2:L:79:VAL:HG21	1.94	0.50
3:H:157:THR:HB	3:H:204:ALA:HB3	1.94	0.50
1:A:43:PHE:HA	1:A:421:SER:HA	1.93	0.49
1:A:40:VAL:HG12	1:A:348:THR:HG21	1.95	0.48
1:A:444:ARG:O	1:A:448:VAL:HG22	2.12	0.48
1:A:244:LEU:HB2	1:A:456:PHE:CE1	2.48	0.48
1:A:476:ARG:HH11	1:A:545:LEU:HD13	1.79	0.48
1:A:226:SER:OG	1:A:231:ASP:O	2.28	0.48
1:A:68:PRO:HD3	1:A:304:ILE:HD12	1.96	0.47
1:A:292:GLY:HA3	1:A:364:PHE:O	2.14	0.47
1:A:296:TYR:CZ	1:A:360:GLY:HA3	2.49	0.47
1:A:92:ARG:O	1:A:93:LYS:HD2	2.15	0.47
3:H:13:LYS:NZ	10:H:301:HOH:O	2.46	0.47
2:L:109:ARG:HD2	2:L:172:SER:HB2	1.97	0.47
3:H:51:ILE:HD13	3:H:72:ARG:HB2	1.96	0.46
1:A:152:TRP:O	1:A:218:ARG:HD3	2.16	0.46
1:A:589:ARG:O	1:A:592:ILE:HG22	2.14	0.46
3:H:52:SER:HB3	3:H:57:TYR:HB2	1.98	0.46
1:A:364:PHE:HA	1:A:367:LEU:HB2	1.99	0.45
3:H:214:LYS:HA	3:H:214:LYS:HD3	1.83	0.45
1:A:293:ILE:HD12	1:A:361:PHE:CD2	2.52	0.44
2:L:187:TYR:O	2:L:193:TYR:OH	2.35	0.44
1:A:245:ILE:O	1:A:249:ILE:HG13	2.18	0.44
1:A:383:THR:OG1	1:A:384:GLU:N	2.50	0.44
2:L:124:GLU:O	2:L:127:THR:OG1	2.35	0.44
1:A:585:SER:O	1:A:589:ARG:N	2.50	0.44
3:H:8:GLY:O	3:H:113:THR:OG1	2.33	0.44
3:H:32:TYR:O	3:H:72:ARG:NH2	2.51	0.44
2:L:31:SER:O	2:L:52:THR:OG1	2.27	0.43
9:A:607:CLR:H272	9:A:607:CLR:H231	1.63	0.43
2:L:11:MET:HB2	2:L:11:MET:HE2	1.84	0.43
1:A:109:ILE:HG21	1:A:490:GLU:HG2	1.99	0.43
3:H:144:LEU:HD12	3:H:199:ILE:HG21	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:185:ASP:OD1	2:L:185:ASP:N	2.51	0.43
1:A:38:LEU:HD13	1:A:266:TRP:HA	2.00	0.42
1:A:582:THR:HG21	1:A:593:LEU:HD21	2.01	0.42
1:A:324:GLY:HA3	1:A:487:VAL:HG22	2.01	0.42
3:H:125:PRO:HB3	3:H:151:TYR:HB3	2.01	0.42
1:A:585:SER:N	1:A:588:GLN:HB3	2.34	0.42
1:A:143:LEU:O	1:A:146:THR:HG22	2.20	0.42
1:A:51:TRP:C	1:A:51:TRP:CD1	2.93	0.41
1:A:97:THR:OG1	1:A:436:GLU:HG2	2.19	0.41
9:A:607:CLR:H211	9:A:607:CLR:H232	1.83	0.41
2:L:125:GLN:HG2	2:L:130:GLY:O	2.20	0.41
5:A:602:Y01:HAE2	5:A:602:Y01:HBB	1.86	0.41
1:A:251:TYR:CE1	1:A:448:VAL:HG23	2.55	0.41
2:L:202:SER:OG	2:L:204:SER:O	2.31	0.41
2:L:116:VAL:HG22	2:L:137:LEU:HD22	2.02	0.41
2:L:97:LEU:HD12	3:H:47:TRP:CD1	2.55	0.41
2:L:156:ARG:HH11	2:L:180:LEU:HD11	1.85	0.41
1:A:486:ALA:O	1:A:490:GLU:HG3	2.19	0.41
2:L:34:LEU:HD13	2:L:72:TYR:CD1	2.56	0.41
1:A:505:GLU:OE2	3:H:56:ARG:HD3	2.21	0.41
1:A:513:PHE:HB3	3:H:101:VAL:HG13	2.02	0.41
3:H:2:VAL:HG13	3:H:27:PHE:CD1	2.55	0.41
1:A:95:ALA:HA	1:A:329:LEU:HD23	2.03	0.41
1:A:247:TYR:CZ	1:A:455:TYR:HB3	2.56	0.41
2:L:125:GLN:O	2:L:128:SER:OG	2.30	0.40
2:L:77:SER:OG	2:L:78:SER:N	2.53	0.40
1:A:282:ARG:HD2	1:A:282:ARG:HA	1.84	0.40
3:H:98:ARG:NH2	3:H:107:ASP:OD2	2.33	0.40

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 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	532/534 (100%)	513 (96%)	19 (4%)	0	100	100
2	L	212/214 (99%)	203 (96%)	9 (4%)	0	100	100
3	H	217/219 (99%)	207 (95%)	10 (5%)	0	100	100
All	All	961/967 (99%)	923 (96%)	38 (4%)	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 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	433/438 (99%)	426 (98%)	7 (2%)	62	86
2	L	186/187 (100%)	180 (97%)	6 (3%)	39	74
3	H	183/187 (98%)	179 (98%)	4 (2%)	52	81
All	All	802/812 (99%)	785 (98%)	17 (2%)	53	82

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	TRP
1	A	52	ARG
1	A	206	GLU
1	A	217	ASN
1	A	255	TRP
1	A	562	CYS
1	A	585	SER
2	L	34	LEU
2	L	51	SER
2	L	92	PHE
2	L	164	TRP
2	L	185	ASP
2	L	195	CYS
3	H	61	SER
3	H	141	SER

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Mol	Chain	Res	Type
3	H	142	VAL
3	H	186	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 3 are monoatomic - leaving 4 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
8	DMU	A	606	-	34,34,34	0.59	0	45,45,45	0.86	1 (2%)
4	29E	A	601	-	23,23,23	2.69	7 (30%)	25,30,30	1.96	6 (24%)
9	CLR	A	607	-	31,31,31	0.65	0	48,48,48	1.63	11 (22%)
5	Y01	A	602	-	38,38,38	8.07	23 (60%)	57,57,57	2.08	19 (33%)

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	DMU	A	606	-	-	4/19/59/59	0/2/2/2
4	29E	A	601	-	-	2/8/12/12	0/3/3/3
9	CLR	A	607	-	-	4/10/68/68	0/4/4/4
5	Y01	A	602	-	-	11/19/77/77	0/4/4/4

All (30) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	602	Y01	CBD-CBG	-27.83	1.00	1.53
5	A	602	Y01	CAU-CAS	-16.90	1.17	1.53
5	A	602	Y01	CAU-CBI	-16.40	1.24	1.54
5	A	602	Y01	CAK-CBD	-15.33	1.27	1.53
5	A	602	Y01	CBH-CAZ	-12.47	1.28	1.52
5	A	602	Y01	CAQ-CAP	9.72	1.80	1.54
5	A	602	Y01	CBI-CBE	9.44	1.73	1.55
5	A	602	Y01	CBH-CBF	9.31	1.71	1.56
5	A	602	Y01	CBB-CBE	-9.28	1.38	1.54
5	A	602	Y01	CBD-CBF	-9.02	1.36	1.53
4	A	601	29E	C14-S	-8.10	1.56	1.73
5	A	602	Y01	CAQ-CBG	7.82	1.70	1.54
5	A	602	Y01	CAK-CAI	7.68	1.66	1.50
5	A	602	Y01	CAT-CBH	6.42	1.66	1.54
4	A	601	29E	C16-C15	6.35	1.60	1.39
5	A	602	Y01	CBI-CBG	5.83	1.66	1.55
5	A	602	Y01	CAR-CBC	-5.20	1.37	1.51
5	A	602	Y01	CAP-CBE	4.13	1.62	1.54
4	A	601	29E	O-C3	-3.77	1.41	1.44
5	A	602	Y01	CAI-CAZ	3.74	1.41	1.33
5	A	602	Y01	CAO-CBB	3.55	1.63	1.54
4	A	601	29E	C16-C17	3.49	1.45	1.34
5	A	602	Y01	CAV-CAZ	3.46	1.59	1.51
4	A	601	29E	C17-S	-3.16	1.55	1.71
5	A	602	Y01	OAW-CAY	2.96	1.42	1.34
4	A	601	29E	C13-C8	-2.76	1.37	1.43
4	A	601	29E	C14-C3	2.58	1.54	1.51
5	A	602	Y01	CAV-CBC	2.51	1.58	1.52
5	A	602	Y01	CAS-CBF	2.29	1.57	1.53
5	A	602	Y01	CAC-CBB	2.01	1.58	1.53

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	601	29E	C16-C17-S	-5.99	108.12	112.98
5	A	602	Y01	CAK-CAI-CAZ	-5.52	114.87	125.06
9	A	607	CLR	C19-C10-C9	-4.40	106.44	111.68
5	A	602	Y01	CAE-CBI-CBE	-4.37	103.56	111.71
5	A	602	Y01	OAW-CAY-CAM	4.15	120.45	111.50
4	A	601	29E	O-C4-C13	-4.06	108.89	114.22
5	A	602	Y01	CAU-CBI-CBG	3.95	113.39	107.27
5	A	602	Y01	CAU-CBI-CBE	3.77	122.21	116.57
5	A	602	Y01	CAS-CBF-CBH	-3.69	108.22	113.08
9	A	607	CLR	C7-C8-C14	-3.67	105.59	110.91
4	A	601	29E	O-C4-C5	3.50	130.92	124.59
5	A	602	Y01	CBH-CAZ-CAI	-3.30	117.85	122.90
9	A	607	CLR	C13-C17-C20	-3.26	114.37	119.49
5	A	602	Y01	CAD-CBH-CBF	-3.07	108.03	111.68
9	A	607	CLR	C4-C5-C10	2.94	120.32	116.42
5	A	602	Y01	CAE-CBI-CAU	-2.83	106.12	110.59
9	A	607	CLR	C2-C3-C4	-2.81	106.45	110.31
5	A	602	Y01	CBG-CBI-CBE	2.68	103.25	100.07
5	A	602	Y01	CBF-CBD-CBG	2.67	112.66	109.09
4	A	601	29E	O-C3-C2	2.62	109.36	105.18
5	A	602	Y01	CAS-CAU-CBI	2.60	117.23	112.78
8	A	606	DMU	O16-C6-C1	2.59	112.35	108.30
9	A	607	CLR	C4-C5-C6	-2.51	116.99	120.61
9	A	607	CLR	C14-C8-C9	-2.50	105.74	109.09
5	A	602	Y01	CAP-CBE-CBB	-2.49	108.30	112.15
5	A	602	Y01	CAQ-CBG-CBD	2.45	123.11	119.08
5	A	602	Y01	CAE-CBI-CBG	-2.45	107.15	111.71
5	A	602	Y01	CBI-CBE-CBB	-2.42	115.70	119.49
9	A	607	CLR	C16-C17-C20	-2.33	108.54	112.15
5	A	602	Y01	CAP-CAQ-CBG	-2.32	100.53	105.13
5	A	602	Y01	CBF-CBH-CAZ	2.32	113.29	109.65
9	A	607	CLR	C15-C14-C13	-2.29	101.08	103.84
9	A	607	CLR	C13-C14-C8	-2.15	111.19	114.38
4	A	601	29E	C15-C14-C3	-2.13	126.47	129.05
9	A	607	CLR	C16-C15-C14	-2.06	101.04	105.13
5	A	602	Y01	CAK-CBD-CBF	2.05	112.19	109.71
4	A	601	29E	C15-C16-C17	-2.03	108.11	113.74

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	601	29E	N-C1-C2-C3

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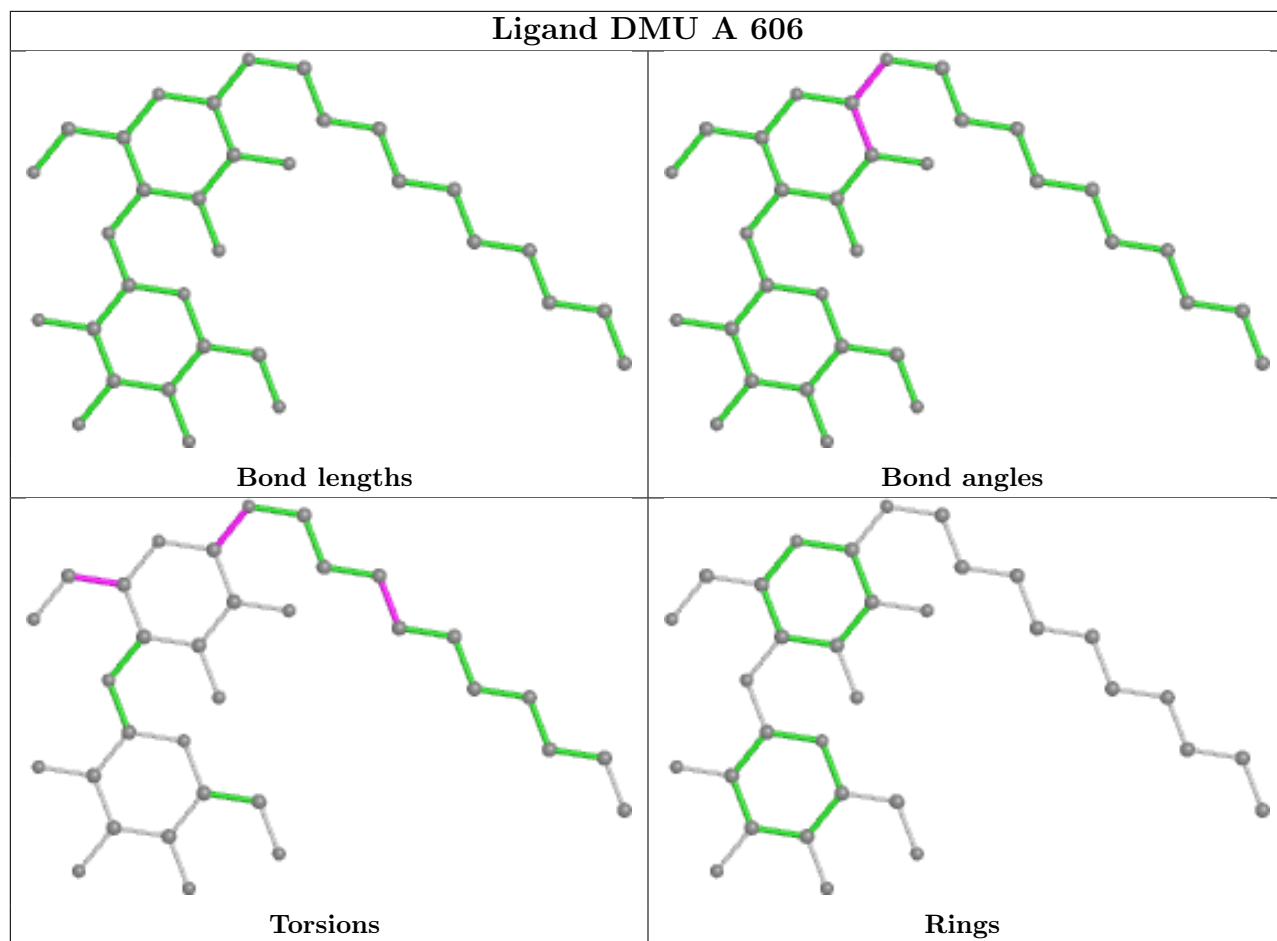
Mol	Chain	Res	Type	Atoms
5	A	602	Y01	CAX-CAL-CAM-CAY
8	A	606	DMU	O5-C6-O16-C18
9	A	607	CLR	C22-C23-C24-C25
5	A	602	Y01	CAN-CAJ-CAO-CBB
5	A	602	Y01	CAJ-CAO-CBB-CAC
5	A	602	Y01	CAM-CAY-OAW-CBC
5	A	602	Y01	OAG-CAY-OAW-CBC
8	A	606	DMU	C19-C22-C25-C28
5	A	602	Y01	CAJ-CAN-CBA-CAB
5	A	602	Y01	CAJ-CAO-CBB-CBE
8	A	606	DMU	O5-C4-C57-O61
5	A	602	Y01	CAJ-CAN-CBA-CAA
9	A	607	CLR	C20-C22-C23-C24
8	A	606	DMU	C3-C4-C57-O61
4	A	601	29E	C2-C1-N-C
9	A	607	CLR	C13-C17-C20-C21
5	A	602	Y01	CAM-CAL-CAX-OAH
5	A	602	Y01	CAM-CAL-CAX-OAF
5	A	602	Y01	CAC-CBB-CBE-CBI
9	A	607	CLR	C23-C24-C25-C27

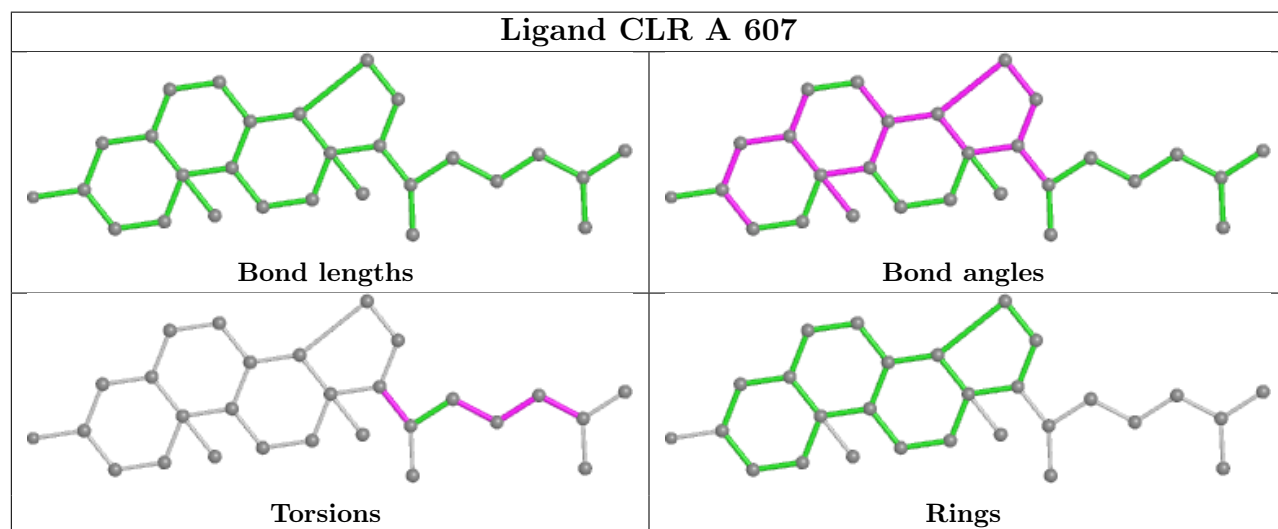
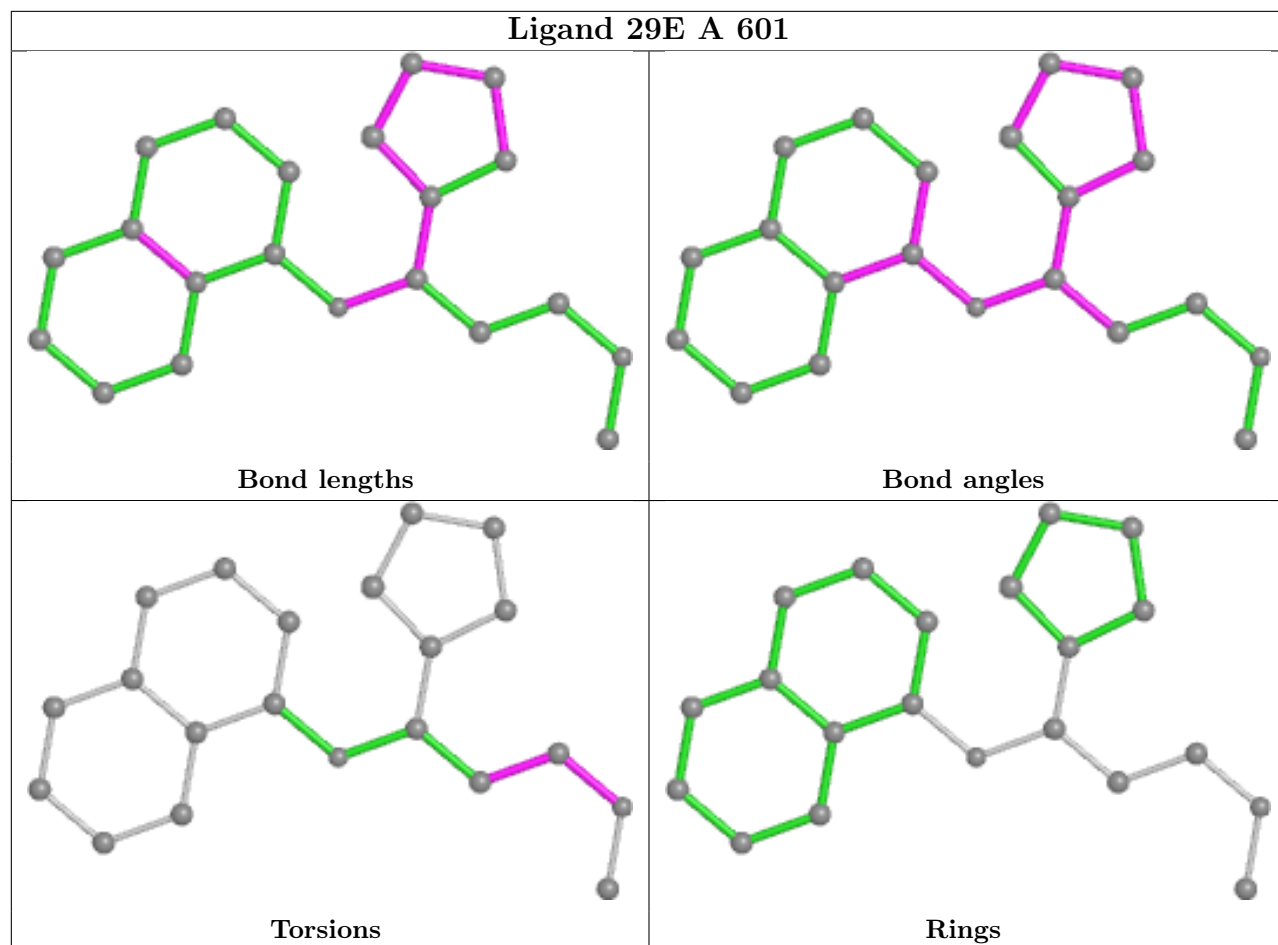
There are no ring outliers.

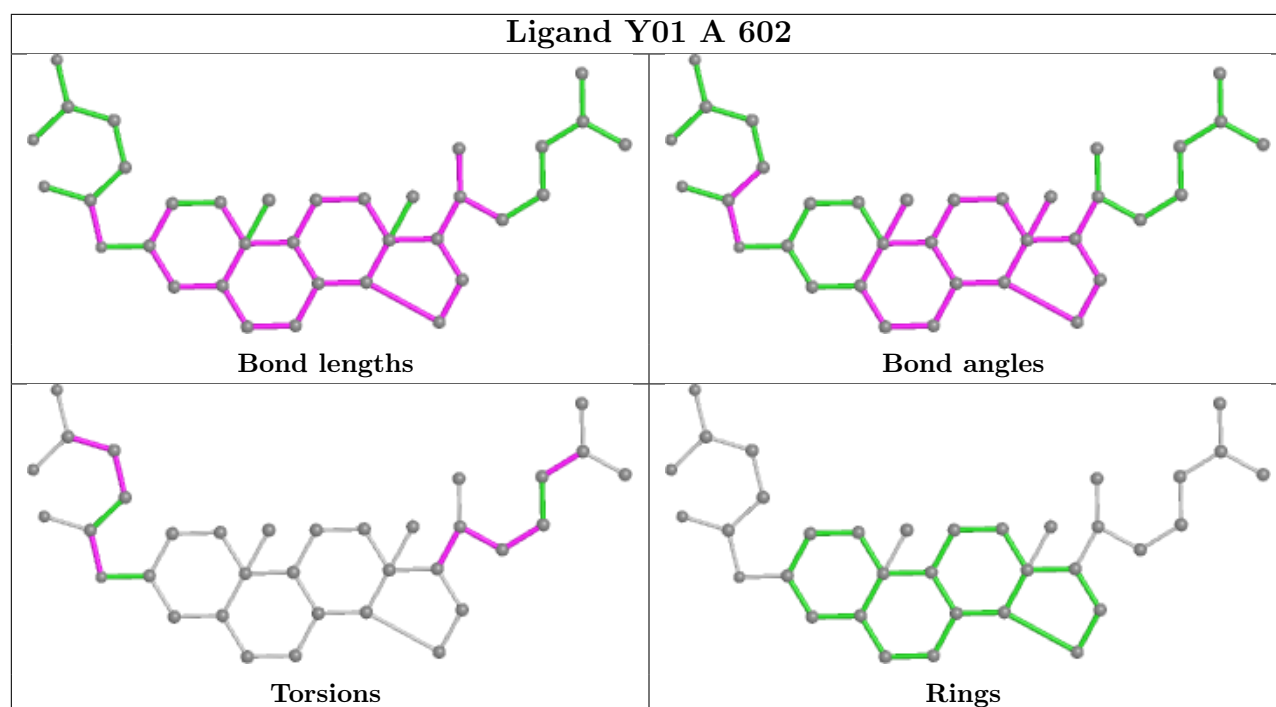
3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	606	DMU	1	0
9	A	607	CLR	2	0
5	A	602	Y01	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 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	534/534 (100%)	-0.41	1 (0%) 95 87	60, 77, 99, 131	0
2	L	214/214 (100%)	-0.49	1 (0%) 91 75	56, 73, 100, 120	0
3	H	219/219 (100%)	-0.00	7 (3%) 47 20	58, 74, 105, 141	0
All	All	967/967 (100%)	-0.33	9 (0%) 84 63	56, 76, 100, 141	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	H	140	SER	3.6
3	H	136	ASP	3.4
3	H	192	SER	3.0
3	H	138	THR	2.9
3	H	191	SER	2.8
3	H	217	GLU	2.8
1	A	586	LEU	2.4
2	L	128	SER	2.2
3	H	142	VAL	2.2

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

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

6.3 Carbohydrates [i](#)

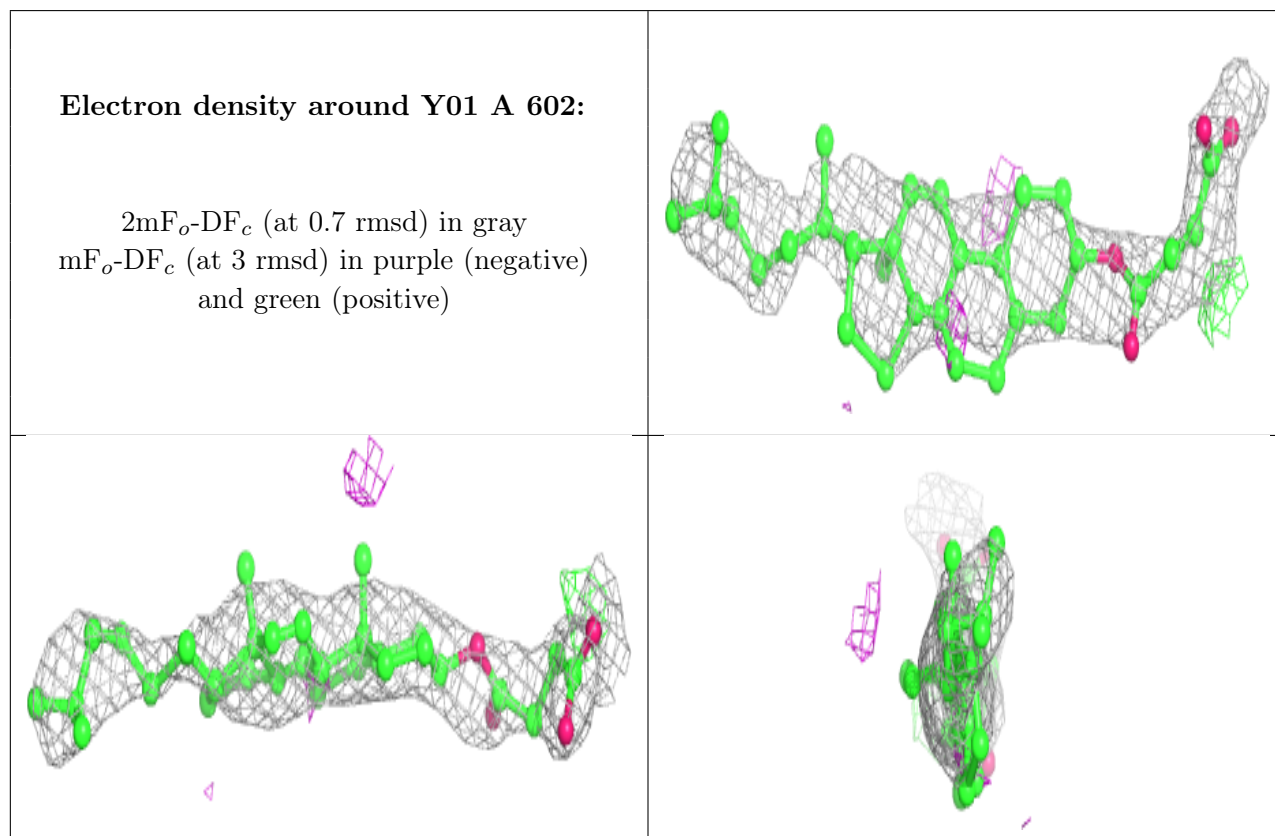
There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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

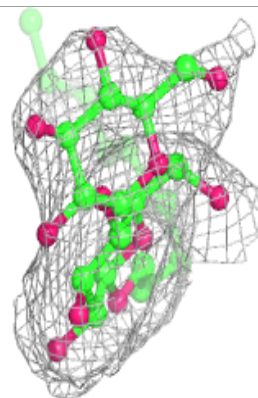
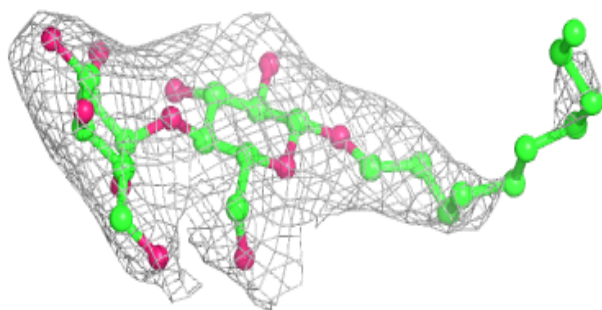
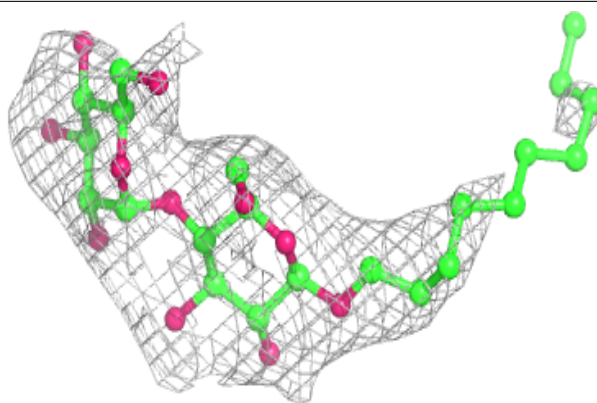
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	Y01	A	602	35/35	0.84	0.50	82,103,112,117	0
8	DMU	A	606	33/33	0.92	0.25	81,89,96,98	0
9	CLR	A	607	28/28	0.94	0.32	71,82,89,91	0
6	NA	A	603	1/1	0.95	0.25	69,69,69,69	0
7	CL	A	604	1/1	0.95	0.17	74,74,74,74	0
4	29E	A	601	21/21	0.96	0.20	63,70,79,87	0
6	NA	A	605	1/1	0.97	0.09	66,66,66,66	0

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

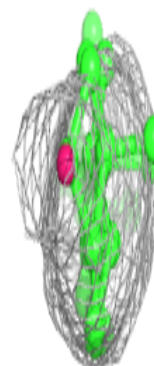
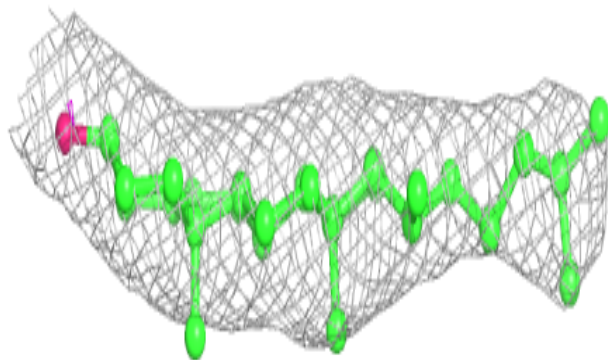
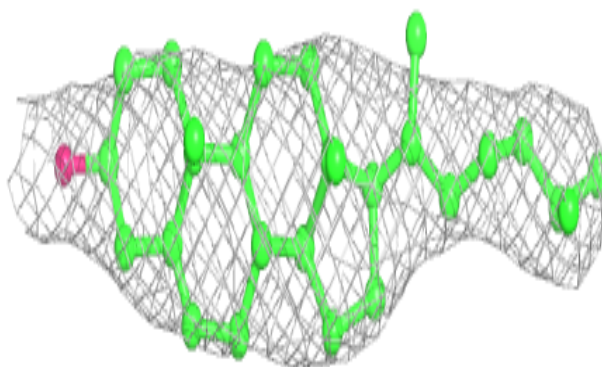


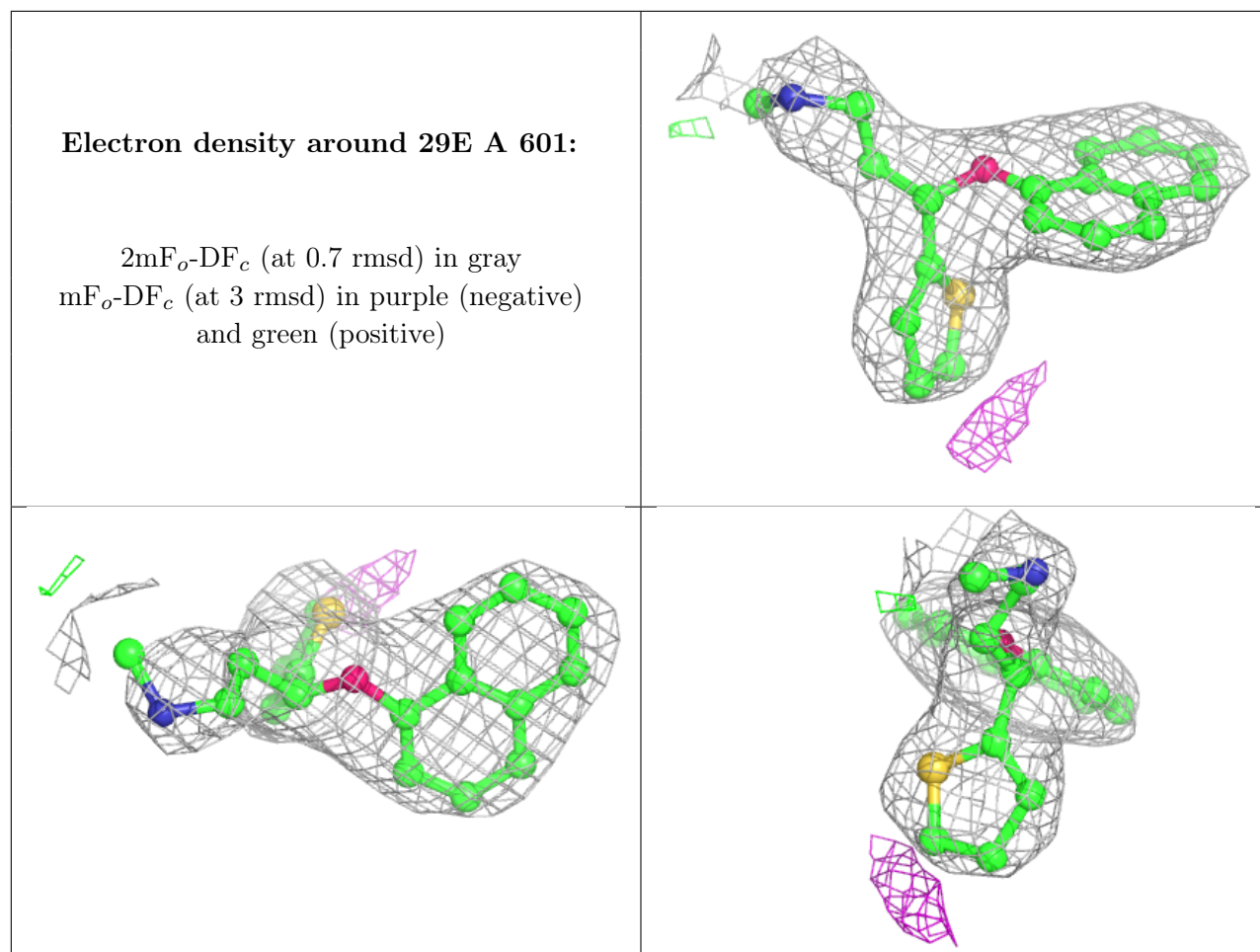
Electron density around DMU A 606:

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

**Electron density around CLR A 607:**

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





6.5 Other polymers [i](#)

There are no such residues in this entry.