



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:16 PM UTC

PDB ID : 6M38 / pdb_00006m38
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	:	4-5-2 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

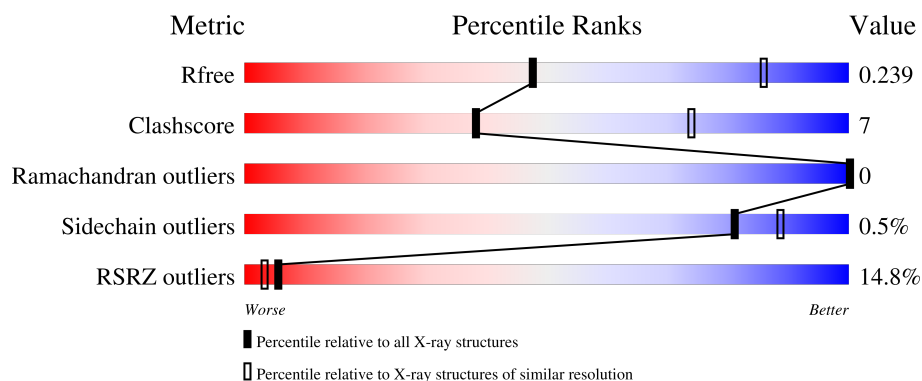
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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}	180053	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (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	19% 83% 17%
2	L	214	9% 79% 21%
3	H	219	11% 85% 15%

2 Entry composition

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
1	A	534	Total	C	N	O	S	0	0	0
			4221	2832	654	716	19			

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

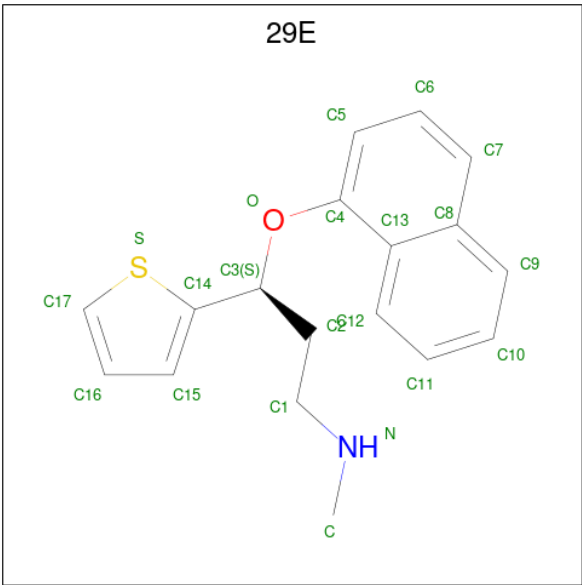
- Molecule 2 is a protein called Antibody fragment 9D5 light chain.

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

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

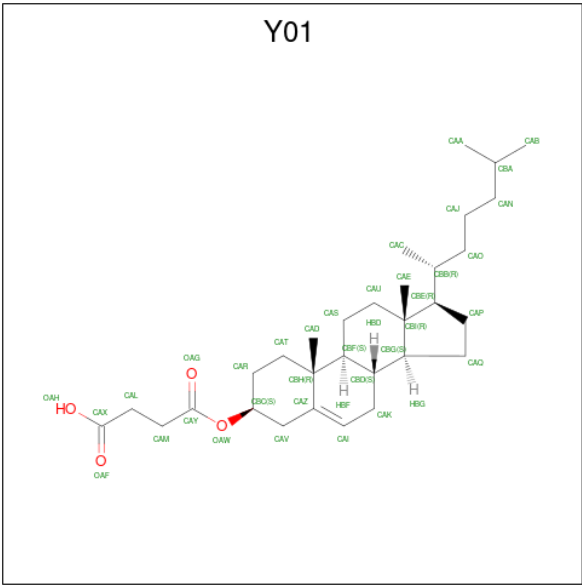
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	219	Total	C	N	O	S	0	0	0
			1644	1033	278	325	8			

- Molecule 4 is (3S)-N-methyl-3-(naphthalen-1-yloxy)-3-(thiophen-2-yl)propan-1-amine (CCD ID: 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 (CCD ID: 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		

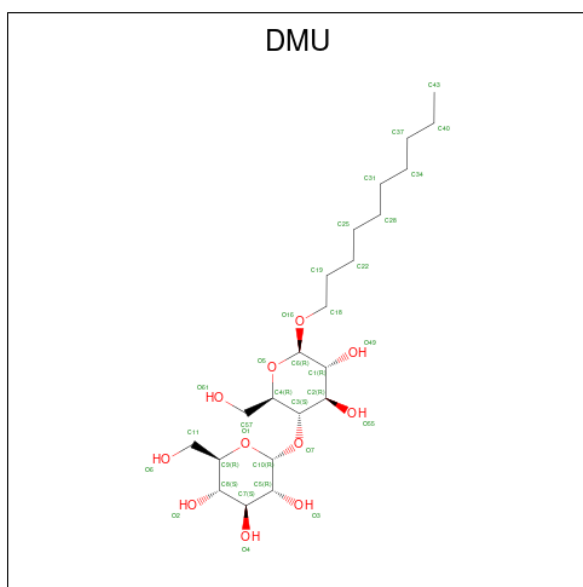
- Molecule 6 is SODIUM ION (CCD ID: NA) (formula: Na).

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

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- Molecule 8 is DECYL-BETA-D-MALTOPYRANOSIDE (CCD ID: DMU) (formula: C₂₂H₄₂O₁₁).



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

- Molecule 9 is CHOLESTEROL (CCD ID: CLR) (formula: C₂₇H₄₆O).



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

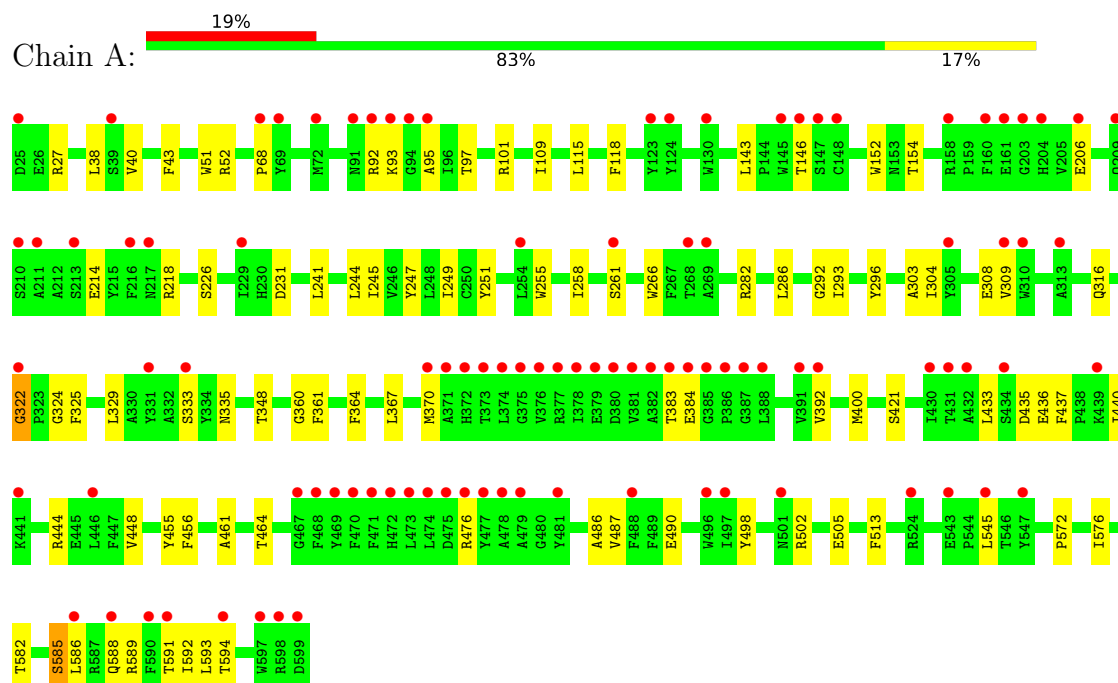
- Molecule 10 is water.

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

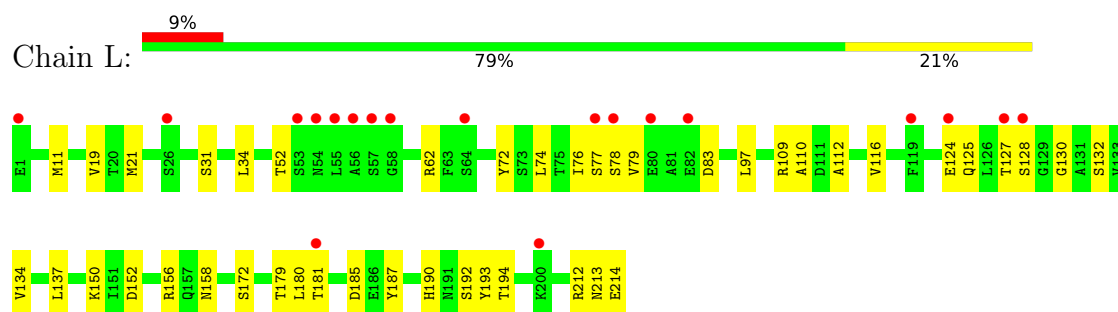
3 Residue-property plots [i](#)

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.

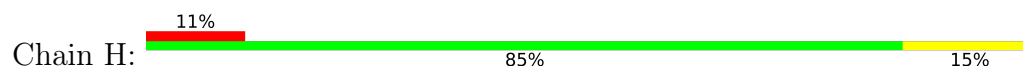
• Molecule 1: Sodium-dependent dopamine transporter

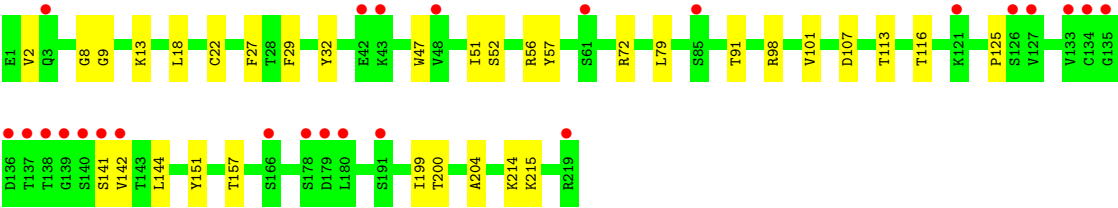


• Molecule 2: Antibody fragment 9D5 light chain



• 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) 99.8 (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)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.215 , 0.244 0.225 , 0.239	Depositor DCC
R_{free} test set	2369 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	85.5	Xtriage
Anisotropy	0.161	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.26 , 30.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	7638	wwPDB-VP
Average B, all atoms (Å ²)	78.0	wwPDB-VP

Xtriage'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: Y01, CL, CLR, 29E, DMU, NA

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	0.25	0/4363	0.46	3/5960 (0.1%)
2	L	0.25	0/1667	0.46	0/2265
3	H	0.32	0/1683	0.52	0/2293
All	All	0.27	0/7713	0.47	3/10518 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	322	GLY	N-CA-C	6.25	125.10	112.34
1	A	586	LEU	CA-C-N	-5.42	112.48	120.28
1	A	586	LEU	C-N-CA	-5.42	112.48	120.28

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	57	0
2	L	1629	0	1544	27	0
3	H	1644	0	1594	20	0
4	A	21	0	19	0	0
5	A	35	0	43	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
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
10	H	7	0	0	1	0
10	L	6	0	0	0	0
All	All	7638	0	7437	104	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 (104) 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:21:MET:HE2	2:L:74:LEU:HB3	1.66	0.77
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
1:A:286:LEU:HD21	1:A:400:MET:HE2	1.73	0.69
3:H:29:PHE:O	3:H:72:ARG:NH2	2.27	0.68
1:A:52:ARG:NH1	1:A:384:GLU:OE1	2.28	0.67
2:L:11:MET:HE1	2:L:21:MET:HG2	1.77	0.66
1:A:370:MET:HE1	1:A:392:VAL:HG13	1.78	0.66
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: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
2:L:124:GLU:OE1	3:H:214:LYS:NZ	2.29	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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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
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
1:A:51:TRP:C	1:A:51:TRP:CD1	2.93	0.46
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
2:L:125:GLN:O	2:L:128:SER:OG	2.30	0.45
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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: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
1:A:255:TRP:CD1	1:A:255:TRP:H	2.37	0.43
1:A:461:ALA:O	1:A:464:THR:OG1	2.33	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
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
3:H:8:GLY:O	3:H:113:THR:OG1	2.33	0.42
1:A:143:LEU:O	1:A:146:THR:HG22	2.20	0.42
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: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:308:GLU:H	1:A:308:GLU:CD	2.29	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
1:A:282:ARG:HD2	1:A:282:ARG:HA	1.84	0.40
2:L:77:SER:OG	2:L:78:SER:N	2.53	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

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	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

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%)	431 (100%)	2 (0%)	81	89
2	L	186/187 (100%)	186 (100%)	0	100	100
3	H	183/187 (98%)	181 (99%)	2 (1%)	65	83
All	All	802/812 (99%)	798 (100%)	4 (0%)	81	89

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	206	GLU
1	A	585	SER
3	H	141	SER
3	H	142	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	338	HIS
2	L	54	ASN
2	L	162	ASN
3	H	202	ASN

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 oligosaccharides 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	$\# Z > 2$
9	CLR	A	607	-	31,31,31	0.67	0	48,48,48	1.69	12 (25%)
4	29E	A	601	-	22,23,23	1.81	6 (27%)	26,30,30	2.07	6 (23%)
5	Y01	A	602	-	38,38,38	8.34	22 (57%)	57,57,57	2.15	19 (33%)
8	DMU	A	606	-	34,34,34	0.60	1 (2%)	45,45,45	0.88	1 (2%)

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

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	602	Y01	CBD-CBG	-28.29	1.00	1.53
5	A	602	Y01	CAU-CAS	-18.07	1.17	1.53
5	A	602	Y01	CAU-CBI	-16.90	1.24	1.54
5	A	602	Y01	CAK-CBD	-16.04	1.27	1.53
5	A	602	Y01	CBH-CAZ	-12.96	1.28	1.52
5	A	602	Y01	CBH-CBF	9.81	1.71	1.56
5	A	602	Y01	CBI-CBE	9.78	1.73	1.55
5	A	602	Y01	CAQ-CAP	9.76	1.80	1.54
5	A	602	Y01	CBB-CBE	-9.48	1.38	1.54
5	A	602	Y01	CBD-CBF	-9.17	1.36	1.53
5	A	602	Y01	CAK-CAI	8.10	1.66	1.50
5	A	602	Y01	CAQ-CBG	7.95	1.70	1.54
5	A	602	Y01	CAT-CBH	6.66	1.66	1.54
5	A	602	Y01	CBI-CBG	6.04	1.66	1.55
5	A	602	Y01	CAR-CBC	-5.29	1.37	1.51
4	A	601	29E	C14-S	-4.28	1.56	1.70
5	A	602	Y01	CAP-CBE	4.19	1.62	1.54
5	A	602	Y01	CAI-CAZ	3.98	1.41	1.33
5	A	602	Y01	CAV-CAZ	3.74	1.59	1.51
5	A	602	Y01	CAO-CBB	3.71	1.63	1.54
4	A	601	29E	C16-C15	3.60	1.60	1.42
4	A	601	29E	C17-S	-3.24	1.55	1.70
4	A	601	29E	C16-C17	3.00	1.45	1.34
5	A	602	Y01	OAW-CAY	2.96	1.42	1.34
5	A	602	Y01	CAV-CBC	2.73	1.58	1.52
4	A	601	29E	C13-C8	-2.71	1.37	1.43
5	A	602	Y01	CAS-CBF	2.33	1.57	1.53
4	A	601	29E	O-C3	-2.26	1.41	1.44
8	A	606	DMU	O16-C6	2.03	1.43	1.40

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	601	29E	C17-S-C14	7.34	107.75	92.87
5	A	602	Y01	CAK-CAI-CAZ	-6.01	114.87	125.02
9	A	607	CLR	C19-C10-C9	-4.65	106.44	111.66
5	A	602	Y01	CAE-CBI-CBE	-4.48	103.56	111.68
5	A	602	Y01	OAW-CAY-CAM	4.15	120.45	111.48
5	A	602	Y01	CAU-CBI-CBG	4.11	113.39	107.25
5	A	602	Y01	CAS-CBF-CBH	-3.95	108.22	113.08
5	A	602	Y01	CAU-CBI-CBE	3.81	122.21	116.60
9	A	607	CLR	C7-C8-C14	-3.77	105.59	110.93
4	A	601	29E	O-C4-C5	3.54	130.92	124.58
5	A	602	Y01	CBH-CAZ-CAI	-3.48	117.85	122.93
9	A	607	CLR	C13-C17-C20	-3.32	114.37	119.50
5	A	602	Y01	CAD-CBH-CBF	-3.24	108.03	111.66
4	A	601	29E	O-C4-C13	-3.16	108.89	114.62
9	A	607	CLR	C4-C5-C10	3.04	120.32	116.42
5	A	602	Y01	CAE-CBI-CAU	-3.04	106.12	110.61
5	A	602	Y01	CBG-CBI-CBE	2.74	103.25	100.10
5	A	602	Y01	CBF-CBD-CBG	2.74	112.66	109.09
9	A	607	CLR	C2-C3-C4	-2.73	106.45	110.29
8	A	606	DMU	O16-C6-C1	2.69	112.35	108.27
4	A	601	29E	C1-C2-C3	-2.66	108.36	112.60
5	A	602	Y01	CAS-CAU-CBI	2.66	117.23	112.74
9	A	607	CLR	C4-C5-C6	-2.64	116.99	120.57
5	A	602	Y01	CAP-CBE-CBB	-2.56	108.30	112.18
9	A	607	CLR	C14-C8-C9	-2.56	105.74	109.09
5	A	602	Y01	CAQ-CBG-CBD	2.51	123.11	119.10
5	A	602	Y01	CAE-CBI-CBG	-2.50	107.15	111.68
5	A	602	Y01	CBF-CBH-CAZ	2.48	113.29	109.65
5	A	602	Y01	CBI-CBE-CBB	-2.46	115.70	119.50
9	A	607	CLR	C16-C17-C20	-2.40	108.54	112.18
5	A	602	Y01	CAP-CAQ-CBG	-2.36	100.53	105.14
9	A	607	CLR	C15-C14-C13	-2.34	101.08	103.84
9	A	607	CLR	C13-C14-C8	-2.27	111.19	114.41
4	A	601	29E	C3-C14-S	2.16	126.24	121.31
5	A	602	Y01	CAK-CBD-CBF	2.14	112.19	109.72
9	A	607	CLR	C16-C15-C14	-2.10	101.04	105.14
4	A	601	29E	C16-C17-S	-2.01	108.12	113.02
9	A	607	CLR	C1-C10-C9	2.00	111.39	108.74

There are no chirality outliers.

All (21) torsion outliers are listed below:

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

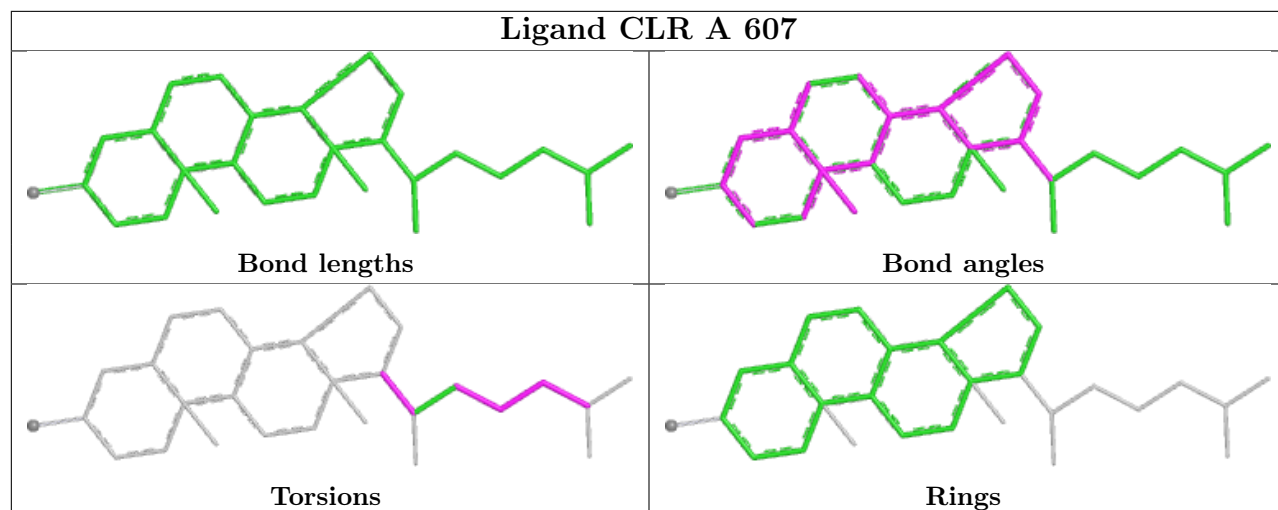
There are no ring outliers.

3 monomers are involved in 5 short contacts:

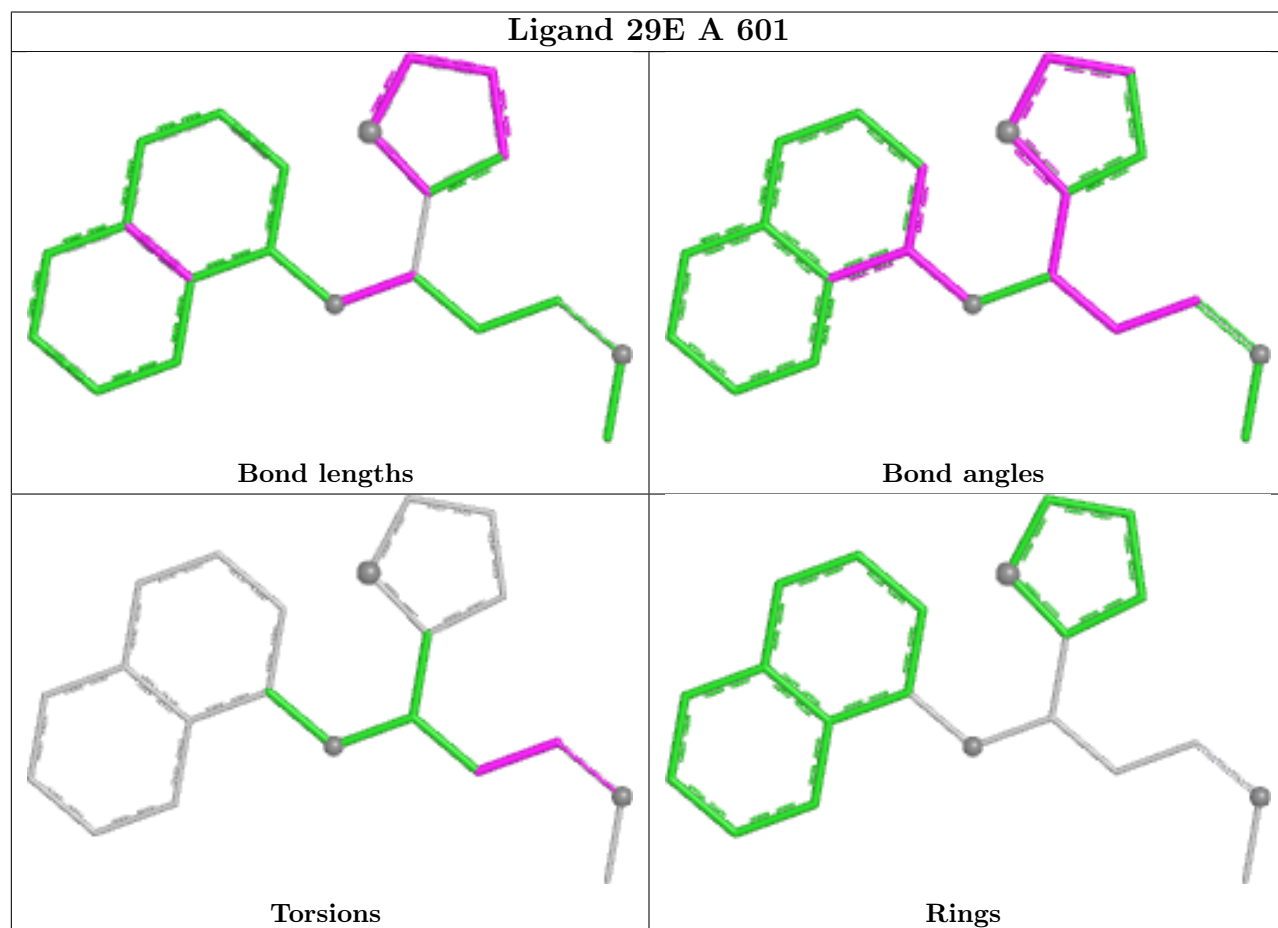
Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	A	607	CLR	2	0
5	A	602	Y01	2	0
8	A	606	DMU	1	0

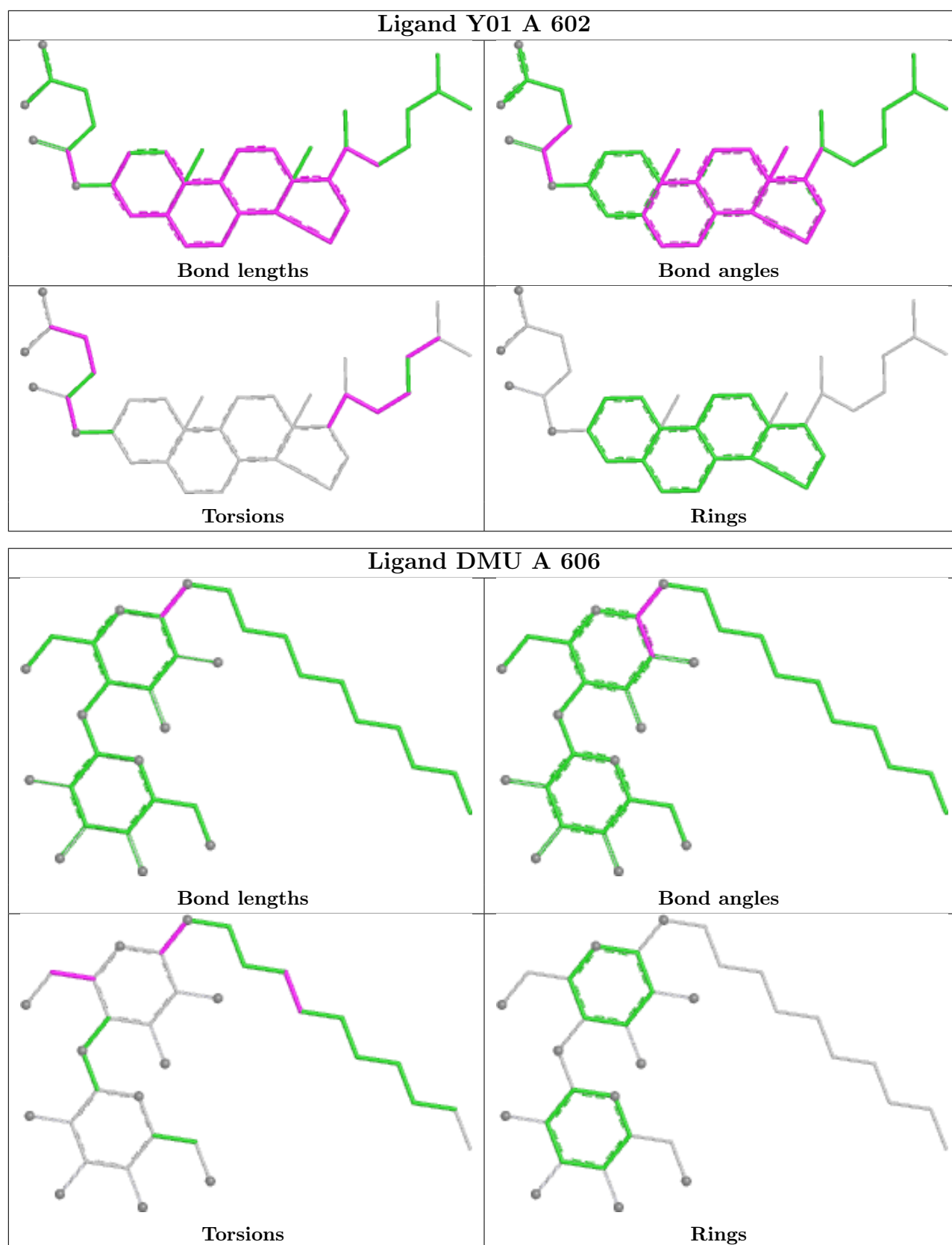
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand CLR A 607



Ligand 29E A 601





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	534/534 (100%)	0.98	99 (18%) 3 2	60, 77, 99, 131	0
2	L	214/214 (100%)	0.34	19 (8%) 15 8	56, 73, 100, 120	0
3	H	219/219 (100%)	0.68	25 (11%) 10 6	58, 74, 105, 141	0
All	All	967/967 (100%)	0.77	143 (14%) 5 3	56, 76, 100, 141	0

All (143) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	380	ASP	9.1
3	H	138	THR	8.2
1	A	161	GLU	8.1
3	H	140	SER	7.9
1	A	203	GLY	7.3
3	H	136	ASP	7.2
1	A	379	GLU	6.7
1	A	371	ALA	6.6
1	A	475	ASP	6.3
3	H	139	GLY	5.8
1	A	376	VAL	5.8
1	A	375	GLY	5.6
1	A	377	ARG	5.4
1	A	468	PHE	5.4
1	A	391	VAL	5.2
3	H	126	SER	5.2
1	A	373	THR	5.1
1	A	381	VAL	5.0
1	A	383	THR	4.7
3	H	142	VAL	4.5
3	H	137	THR	4.5
1	A	123	TYR	4.5
1	A	382	ALA	4.4

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Mol	Chain	Res	Type	RSRZ
1	A	501	ASN	4.4
2	L	128	SER	4.4
1	A	476	ARG	4.4
1	A	385	GLY	4.4
1	A	471	PHE	4.3
3	H	178	SER	4.3
1	A	384	GLU	4.2
1	A	472	HIS	4.1
1	A	386	PRO	4.1
1	A	387	GLY	4.1
1	A	210	SER	4.0
1	A	374	LEU	4.0
1	A	261	SER	4.0
2	L	124	GLU	4.0
1	A	216	PHE	3.8
1	A	206	GLU	3.7
1	A	543	GLU	3.7
1	A	94	GLY	3.7
1	A	597	TRP	3.6
1	A	524	ARG	3.6
1	A	481	TYR	3.5
3	H	219	ARG	3.5
3	H	135	GLY	3.5
1	A	594	THR	3.5
3	H	191	SER	3.4
1	A	547	TYR	3.4
3	H	141	SER	3.4
1	A	160	PHE	3.4
1	A	467	GLY	3.4
1	A	378	ILE	3.4
1	A	469	TYR	3.2
2	L	56	ALA	3.2
2	L	57	SER	3.2
1	A	432	ALA	3.2
1	A	93	LYS	3.2
2	L	53	SER	3.2
3	H	3	GLN	3.2
1	A	309	VAL	3.1
1	A	479	ALA	3.1
1	A	473	LEU	3.1
1	A	392	VAL	3.1
1	A	145	TRP	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	147	SER	3.0
1	A	388	LEU	3.0
1	A	477	TYR	3.0
1	A	333	SER	2.9
1	A	146	THR	2.9
1	A	478	ALA	2.9
1	A	310	TRP	2.9
1	A	158	ARG	2.9
3	H	85	SER	2.8
1	A	209	GLN	2.8
1	A	269	ALA	2.8
1	A	229	ILE	2.8
1	A	488	PHE	2.7
1	A	72	MET	2.7
1	A	370	MET	2.7
2	L	119	PHE	2.7
2	L	58	GLY	2.7
3	H	121	LYS	2.7
1	A	372	HIS	2.7
1	A	599	ASP	2.7
1	A	92	ARG	2.6
1	A	496	TRP	2.6
1	A	217	ASN	2.6
1	A	39	SER	2.6
1	A	590	PHE	2.6
1	A	497	ILE	2.5
1	A	124	TYR	2.5
3	H	43	LYS	2.5
1	A	470	PHE	2.5
1	A	68	PRO	2.5
2	L	77	SER	2.5
2	L	127	THR	2.5
1	A	204	HIS	2.5
1	A	430	ILE	2.5
3	H	61	SER	2.5
2	L	78	SER	2.4
1	A	474	LEU	2.4
3	H	127	VAL	2.4
1	A	441	LYS	2.4
1	A	254	LEU	2.4
1	A	305	TYR	2.4
1	A	322	GLY	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	95	ALA	2.4
1	A	268	THR	2.3
3	H	180	LEU	2.3
2	L	26	SER	2.3
1	A	331	TYR	2.3
1	A	91	ASN	2.3
2	L	54	ASN	2.3
2	L	82	GLU	2.3
1	A	431	THR	2.3
1	A	591	THR	2.3
3	H	166	SER	2.3
3	H	179	ASP	2.3
1	A	130	TRP	2.2
2	L	181	THR	2.2
1	A	69	TYR	2.2
2	L	1	GLU	2.2
1	A	446	LEU	2.2
1	A	313	ALA	2.2
3	H	48	VAL	2.2
2	L	64	SER	2.2
1	A	586	LEU	2.2
1	A	598	ARG	2.2
1	A	213	SER	2.2
1	A	148	CYS	2.1
1	A	211	ALA	2.1
2	L	80	GLU	2.1
1	A	439	LYS	2.1
1	A	545	LEU	2.1
2	L	55	LEU	2.1
3	H	133	VAL	2.1
3	H	134	CYS	2.1
2	L	200	LYS	2.1
1	A	25	ASP	2.1
1	A	588	GLN	2.1
1	A	434	SER	2.0
3	H	42	GLU	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](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

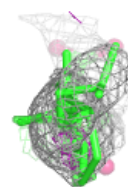
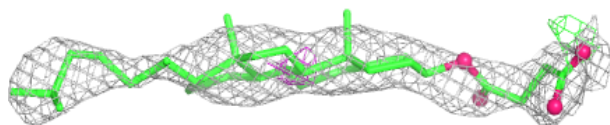
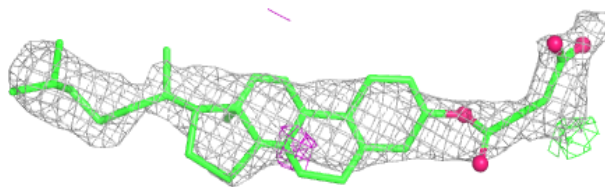
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	Y01	A	602	35/35	0.80	0.26	82,103,112,117	0
8	DMU	A	606	33/33	0.91	0.12	81,89,96,98	0
9	CLR	A	607	28/28	0.92	0.16	71,82,89,91	0
4	29E	A	601	21/21	0.93	0.14	63,70,79,87	0
6	NA	A	603	1/1	0.95	0.07	69,69,69,69	0
7	CL	A	604	1/1	0.97	0.07	74,74,74,74	0
6	NA	A	605	1/1	0.99	0.04	66,66,66,66	0

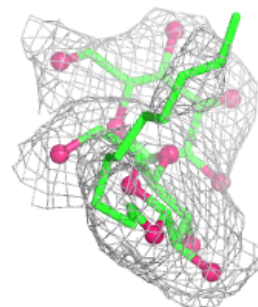
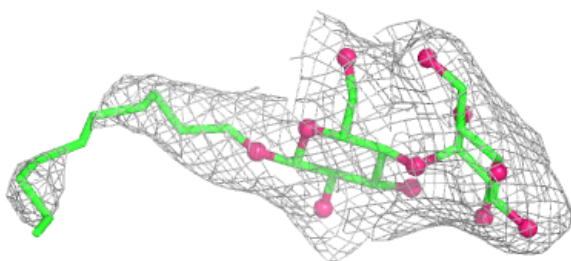
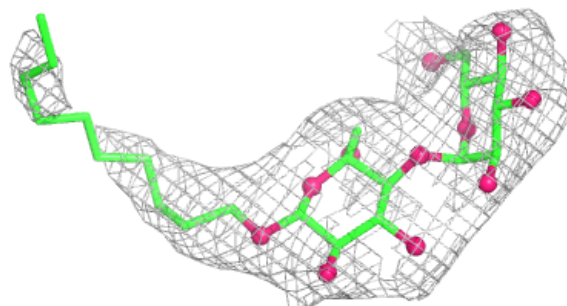
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around Y01 A 602:

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

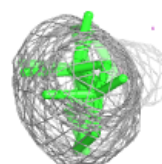
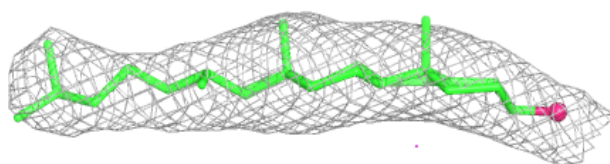
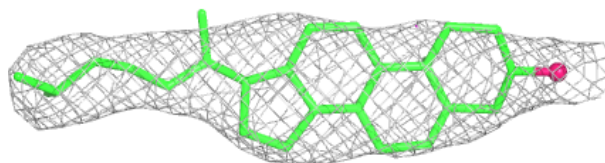
**Electron density around DMU A 606:**

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



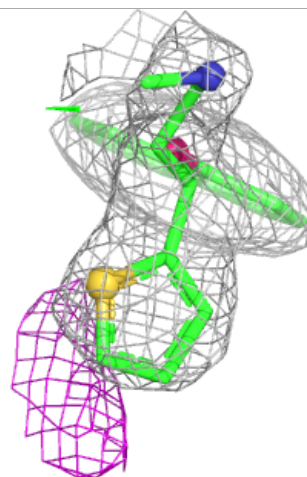
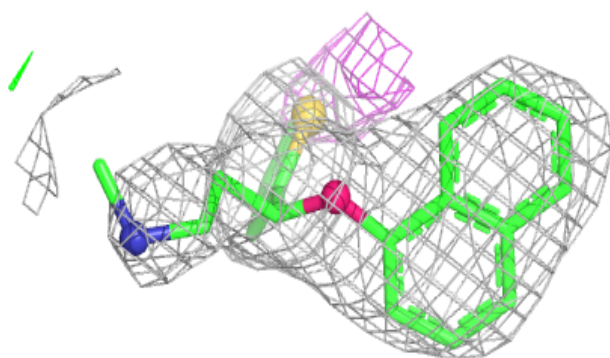
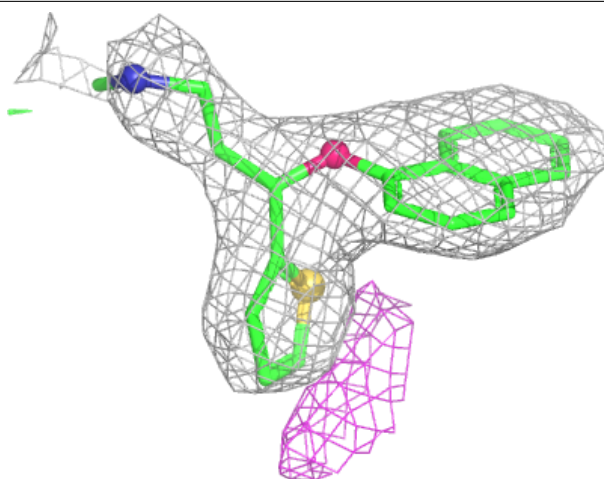
Electron density around CLR A 607:

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



Electron density around 29E A 601:

$2mF_o-DF_c$ (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.