



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 03:27 AM UTC

PDB ID : 7L50 / pdb_00007L50
Title : Crystal structure of human monoacylglycerol lipase in complex with compound 4f
Authors : Qin, L.; Lane, W.; Skene, R.J.
Deposited on : 2020-12-21
Resolution : 2.30 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

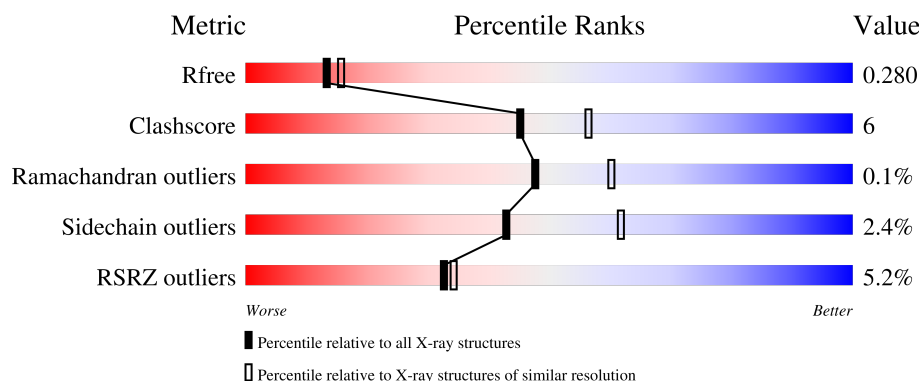
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	320	3% 75% 13% 11%
1	B	320	4% 77% 13% 9%
1	C	320	7% 75% 14% 11%
1	D	320	5% 80% 8% 11%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9153 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 Monoglyceride lipase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	285	Total	C	N	O	S	0	0	0
			2205	1408	381	403	13			
1	B	290	Total	C	N	O	S	0	0	0
			2238	1427	389	409	13			
1	C	286	Total	C	N	O	S	0	0	0
			2213	1412	385	403	13			
1	D	285	Total	C	N	O	S	0	0	0
			2208	1409	384	402	13			

There are 76 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-16	MET	-	initiating methionine	UNP A0A0C4DFN3
A	-15	HIS	-	expression tag	UNP A0A0C4DFN3
A	-14	HIS	-	expression tag	UNP A0A0C4DFN3
A	-13	HIS	-	expression tag	UNP A0A0C4DFN3
A	-12	HIS	-	expression tag	UNP A0A0C4DFN3
A	-11	HIS	-	expression tag	UNP A0A0C4DFN3
A	-10	HIS	-	expression tag	UNP A0A0C4DFN3
A	-9	GLY	-	expression tag	UNP A0A0C4DFN3
A	-8	SER	-	expression tag	UNP A0A0C4DFN3
A	-7	GLU	-	expression tag	UNP A0A0C4DFN3
A	-6	ASN	-	expression tag	UNP A0A0C4DFN3
A	-5	LEU	-	expression tag	UNP A0A0C4DFN3
A	-4	TYR	-	expression tag	UNP A0A0C4DFN3
A	-3	PHE	-	expression tag	UNP A0A0C4DFN3
A	-2	GLN	-	expression tag	UNP A0A0C4DFN3
A	-1	GLY	-	expression tag	UNP A0A0C4DFN3
A	36	ALA	LYS	conflict	UNP A0A0C4DFN3
A	169	SER	LEU	conflict	UNP A0A0C4DFN3
A	176	SER	LEU	conflict	UNP A0A0C4DFN3
B	-16	MET	-	initiating methionine	UNP A0A0C4DFN3
B	-15	HIS	-	expression tag	UNP A0A0C4DFN3

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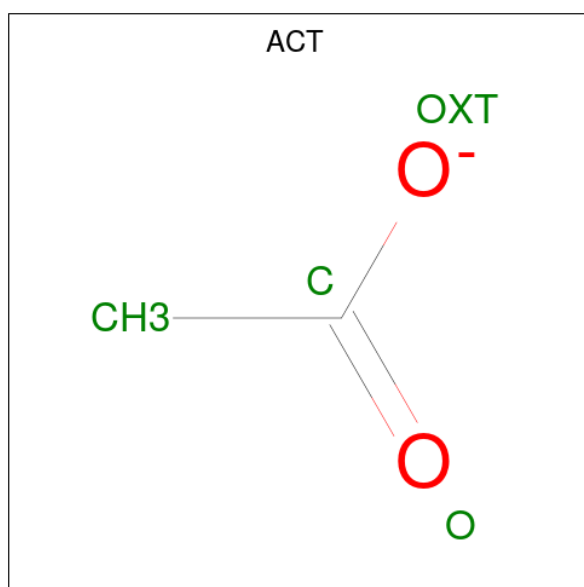
Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP A0A0C4DFN3
B	-13	HIS	-	expression tag	UNP A0A0C4DFN3
B	-12	HIS	-	expression tag	UNP A0A0C4DFN3
B	-11	HIS	-	expression tag	UNP A0A0C4DFN3
B	-10	HIS	-	expression tag	UNP A0A0C4DFN3
B	-9	GLY	-	expression tag	UNP A0A0C4DFN3
B	-8	SER	-	expression tag	UNP A0A0C4DFN3
B	-7	GLU	-	expression tag	UNP A0A0C4DFN3
B	-6	ASN	-	expression tag	UNP A0A0C4DFN3
B	-5	LEU	-	expression tag	UNP A0A0C4DFN3
B	-4	TYR	-	expression tag	UNP A0A0C4DFN3
B	-3	PHE	-	expression tag	UNP A0A0C4DFN3
B	-2	GLN	-	expression tag	UNP A0A0C4DFN3
B	-1	GLY	-	expression tag	UNP A0A0C4DFN3
B	36	ALA	LYS	conflict	UNP A0A0C4DFN3
B	169	SER	LEU	conflict	UNP A0A0C4DFN3
B	176	SER	LEU	conflict	UNP A0A0C4DFN3
C	-16	MET	-	initiating methionine	UNP A0A0C4DFN3
C	-15	HIS	-	expression tag	UNP A0A0C4DFN3
C	-14	HIS	-	expression tag	UNP A0A0C4DFN3
C	-13	HIS	-	expression tag	UNP A0A0C4DFN3
C	-12	HIS	-	expression tag	UNP A0A0C4DFN3
C	-11	HIS	-	expression tag	UNP A0A0C4DFN3
C	-10	HIS	-	expression tag	UNP A0A0C4DFN3
C	-9	GLY	-	expression tag	UNP A0A0C4DFN3
C	-8	SER	-	expression tag	UNP A0A0C4DFN3
C	-7	GLU	-	expression tag	UNP A0A0C4DFN3
C	-6	ASN	-	expression tag	UNP A0A0C4DFN3
C	-5	LEU	-	expression tag	UNP A0A0C4DFN3
C	-4	TYR	-	expression tag	UNP A0A0C4DFN3
C	-3	PHE	-	expression tag	UNP A0A0C4DFN3
C	-2	GLN	-	expression tag	UNP A0A0C4DFN3
C	-1	GLY	-	expression tag	UNP A0A0C4DFN3
C	36	ALA	LYS	conflict	UNP A0A0C4DFN3
C	169	SER	LEU	conflict	UNP A0A0C4DFN3
C	176	SER	LEU	conflict	UNP A0A0C4DFN3
D	-16	MET	-	initiating methionine	UNP A0A0C4DFN3
D	-15	HIS	-	expression tag	UNP A0A0C4DFN3
D	-14	HIS	-	expression tag	UNP A0A0C4DFN3
D	-13	HIS	-	expression tag	UNP A0A0C4DFN3
D	-12	HIS	-	expression tag	UNP A0A0C4DFN3
D	-11	HIS	-	expression tag	UNP A0A0C4DFN3

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-10	HIS	-	expression tag	UNP A0A0C4DFN3
D	-9	GLY	-	expression tag	UNP A0A0C4DFN3
D	-8	SER	-	expression tag	UNP A0A0C4DFN3
D	-7	GLU	-	expression tag	UNP A0A0C4DFN3
D	-6	ASN	-	expression tag	UNP A0A0C4DFN3
D	-5	LEU	-	expression tag	UNP A0A0C4DFN3
D	-4	TYR	-	expression tag	UNP A0A0C4DFN3
D	-3	PHE	-	expression tag	UNP A0A0C4DFN3
D	-2	GLN	-	expression tag	UNP A0A0C4DFN3
D	-1	GLY	-	expression tag	UNP A0A0C4DFN3
D	36	ALA	LYS	conflict	UNP A0A0C4DFN3
D	169	SER	LEU	conflict	UNP A0A0C4DFN3
D	176	SER	LEU	conflict	UNP A0A0C4DFN3

- Molecule 2 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).



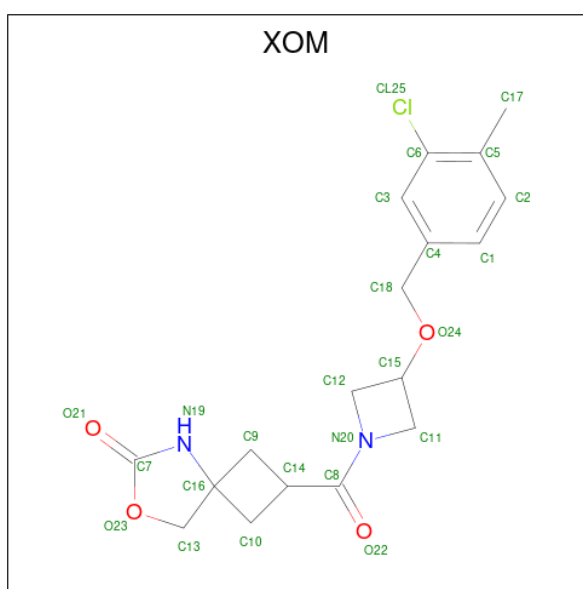
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	C	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	C	1	Total	C	O	0	0
			4	2	2		
2	D	1	Total	C	O	0	0
			4	2	2		
2	D	1	Total	C	O	0	0
			4	2	2		

- Molecule 3 is (2s,4R)-2-{3-[(3-chloro-4-methylphenyl)methoxy]azetidine-1-carbonyl}-7-oxa-5-azaspiro[3.4]octan-6-one (CCD ID: XOM) (formula: C₁₈H₂₁ClN₂O₄) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	Cl	N	O	0	0
			25	18	1	2	4		
3	B	1	Total	C	Cl	N	O	0	0
			25	18	1	2	4		
3	C	1	Total	C	Cl	N	O	0	0
			25	18	1	2	4		
3	D	1	Total	C	Cl	N	O	0	0
			25	18	1	2	4		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	77	Total	O	0	0
			77	77		

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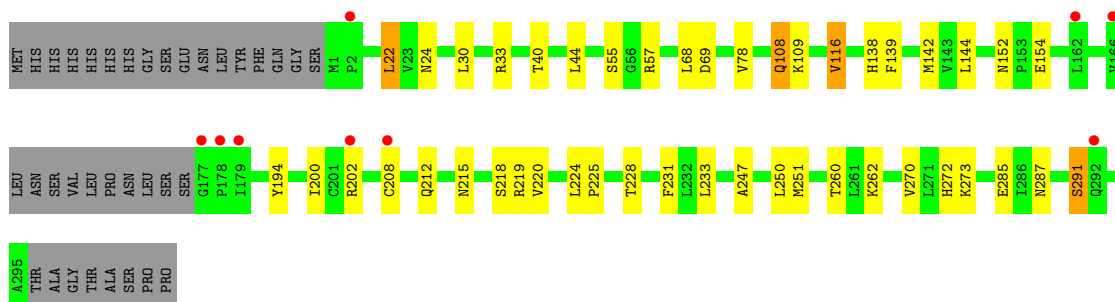
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	60	Total 60	O 60	0	0
4	C	14	Total 14	O 14	0	0
4	D	6	Total 6	O 6	0	0

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.

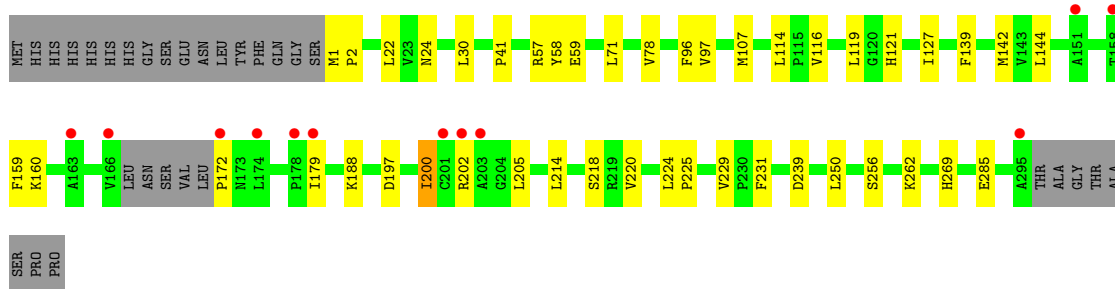
• Molecule 1: Monoglyceride lipase

Chain A: 



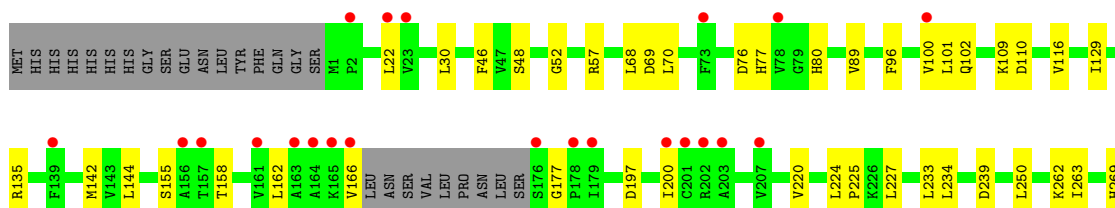
• Molecule 1: Monoglyceride lipase

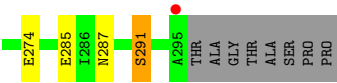
Chain B: 



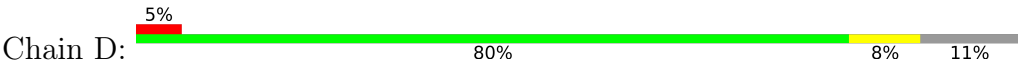
• Molecule 1: Monoglyceride lipase

Chain C: 





● Molecule 1: Monoglyceride lipase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	62.89Å 127.17Å 119.67Å 90.00° 73.67° 90.00°	Depositor
Resolution (Å)	48.19 – 2.30 48.19 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.7 (48.19-2.30) 97.7 (48.19-2.30)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.75 (at 2.29Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, R_{free}	0.239 , 0.269 0.251 , 0.280	Depositor DCC
R_{free} test set	3834 reflections (4.78%)	wwPDB-VP
Wilson B-factor (Å ²)	45.8	Xtriage
Anisotropy	0.345	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 61.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.056 for h,-k,h-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9153	wwPDB-VP
Average B, all atoms (Å ²)	82.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 47.19 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.0283e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: ACT, XOM

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	0.53	0/2257	1.04	1/3063 (0.0%)
1	B	0.54	0/2291	1.04	1/3110 (0.0%)
1	C	0.47	0/2265	0.95	0/3073
1	D	0.47	0/2260	0.95	0/3066
All	All	0.51	0/9073	1.00	2/12312 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	228	THR	N-CA-C	-5.03	107.00	114.64
1	B	197	ASP	CA-CB-CG	5.00	117.60	112.60

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	2205	0	2204	36	0
1	B	2238	0	2235	27	0
1	C	2213	0	2216	24	0
1	D	2208	0	2211	19	0
2	A	8	0	6	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	8	0	6	0	0
2	C	8	0	6	0	0
2	D	8	0	6	0	0
3	A	25	0	0	1	0
3	B	25	0	0	1	0
3	C	25	0	0	0	0
3	D	25	0	0	2	0
4	A	77	0	0	2	0
4	B	60	0	0	0	0
4	C	14	0	0	0	0
4	D	6	0	0	0	0
All	All	9153	0	8890	105	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 6.

All (105) 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:22:LEU:HD12	1:A:22:LEU:O	1.82	0.78
1:A:116:VAL:HG13	1:A:139:PHE:HD1	1.50	0.76
1:B:202:ARG:HG3	1:B:202:ARG:HH21	1.51	0.76
1:A:22:LEU:HD12	1:A:22:LEU:C	2.13	0.73
1:B:142:MET:HE3	1:B:144:LEU:HD11	1.70	0.71
1:D:142:MET:HE3	1:D:144:LEU:HD11	1.72	0.71
1:B:116:VAL:HG13	1:B:139:PHE:CD1	2.28	0.68
1:D:224:LEU:HB2	1:D:225:PRO:HD3	1.73	0.68
1:C:197:ASP:HB3	1:C:200:ILE:HD12	1.75	0.67
1:A:116:VAL:HG13	1:A:139:PHE:CD1	2.30	0.67
1:B:116:VAL:HG13	1:B:139:PHE:HD1	1.61	0.66
1:B:57:ARG:HD2	1:B:200:ILE:HD11	1.77	0.65
1:A:233:LEU:HD21	1:A:247:ALA:HB1	1.79	0.65
1:A:208:CYS:O	1:A:212:GLN:HG3	1.97	0.64
1:A:44:LEU:HB2	1:A:116:VAL:HG23	1.80	0.62
1:A:30:LEU:HD21	1:A:78:VAL:HG12	1.80	0.62
1:A:224:LEU:HB2	1:A:225:PRO:HD3	1.80	0.62
1:D:197:ASP:HB3	1:D:200:ILE:HD12	1.81	0.62
1:D:233:LEU:HD21	1:D:247:ALA:HB1	1.82	0.60
1:A:215:ASN:HD21	1:A:219:ARG:NH2	2.00	0.59
1:A:116:VAL:CG1	1:A:139:PHE:CD1	2.86	0.58
1:A:287:ASN:O	1:A:291:SER:HB2	2.03	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:287:ASN:O	1:C:291:SER:HB2	2.06	0.56
1:B:142:MET:O	1:B:231:PHE:HA	2.06	0.56
1:B:119:LEU:C	1:B:119:LEU:HD23	2.32	0.55
1:C:263:ILE:HG22	1:D:259:LYS:HE3	1.89	0.55
1:A:22:LEU:C	1:A:22:LEU:CD1	2.80	0.54
1:A:262:LYS:HD3	1:A:285:GLU:HG3	1.90	0.53
1:C:233:LEU:HD22	1:C:250:LEU:HD23	1.89	0.53
1:D:77:HIS:HB3	1:D:96:PHE:CD1	2.44	0.53
1:B:22:LEU:C	1:B:22:LEU:HD12	2.34	0.52
1:A:262:LYS:CD	1:A:285:GLU:HG3	2.40	0.52
1:C:224:LEU:HB2	1:C:225:PRO:HD3	1.91	0.52
1:A:215:ASN:HD21	1:A:219:ARG:HH21	1.57	0.52
1:C:155:SER:HA	1:C:158:THR:HG22	1.92	0.52
1:A:142:MET:O	1:A:231:PHE:HA	2.11	0.51
1:C:263:ILE:CG2	1:D:259:LYS:HE3	2.41	0.51
1:C:22:LEU:C	1:C:22:LEU:HD12	2.36	0.50
1:C:129:ILE:HG23	1:C:227:LEU:HD11	1.94	0.50
1:A:116:VAL:CG1	1:A:139:PHE:HD1	2.22	0.50
1:A:194:TYR:CD1	1:A:200:ILE:HD13	2.46	0.50
1:D:287:ASN:O	1:D:291:SER:HB2	2.11	0.50
1:A:220:VAL:O	1:A:224:LEU:HG	2.12	0.49
1:B:224:LEU:HB2	1:B:225:PRO:HD3	1.93	0.49
1:C:46:PHE:HE2	1:C:48:SER:HB2	1.77	0.49
1:D:159:PHE:CZ	1:D:210:GLY:HA3	2.47	0.49
1:B:41:PRO:HG2	1:B:114:LEU:HD11	1.93	0.49
1:B:71:LEU:HD22	1:B:107:MET:CE	2.43	0.48
1:A:142:MET:HE3	1:A:144:LEU:HD11	1.96	0.48
3:B:603:XOM:C11	3:B:603:XOM:C10	2.92	0.48
1:C:96:PHE:O	1:C:100:VAL:HG23	2.14	0.47
1:A:33:ARG:HD3	4:A:708:HOH:O	2.13	0.47
1:A:251:MET:HE1	1:A:260:THR:N	2.29	0.47
1:A:108:GLN:OE1	1:A:138:HIS:NE2	2.48	0.47
1:B:96:PHE:HB3	1:B:127:ILE:HD13	1.95	0.47
1:B:30:LEU:HD21	1:B:78:VAL:HG12	1.97	0.47
1:D:22:LEU:C	1:D:22:LEU:HD12	2.39	0.46
1:D:166:VAL:HG11	1:D:207:VAL:HG21	1.98	0.46
1:B:220:VAL:O	1:B:224:LEU:HG	2.15	0.46
1:C:52:GLY:H	1:C:80:HIS:CD2	2.34	0.45
1:B:224:LEU:CD2	1:B:250:LEU:HD13	2.46	0.45
1:A:33:ARG:NH1	1:A:55:SER:OG	2.49	0.45
1:C:162:LEU:O	1:C:166:VAL:HG23	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:239:ASP:OD2	1:B:269:HIS:HA	2.17	0.45
1:A:68:LEU:O	1:A:69:ASP:HB2	2.16	0.44
1:B:224:LEU:HD22	1:B:250:LEU:HD13	1.98	0.44
1:B:229:VAL:O	1:B:256:SER:HB3	2.18	0.44
1:B:202:ARG:HG3	1:B:202:ARG:NH2	2.28	0.44
1:C:57:ARG:HD2	1:C:200:ILE:HD11	2.00	0.44
1:A:270:VAL:HG12	1:A:273:LYS:HB2	2.00	0.44
1:C:234:LEU:HD23	1:C:262:LYS:HB3	2.00	0.44
1:A:224:LEU:HD22	1:A:250:LEU:HD13	2.01	0.43
1:C:22:LEU:HD13	1:C:102:GLN:NE2	2.34	0.43
1:D:122:SER:OG	3:D:603:XOM:N20	2.52	0.43
1:D:30:LEU:HD21	1:D:78:VAL:HG12	1.99	0.43
1:A:57:ARG:HD2	1:A:200:ILE:HD11	2.00	0.43
1:A:152:ASN:OD1	1:A:154:GLU:HB3	2.19	0.43
1:A:24:ASN:OD1	1:A:24:ASN:C	2.62	0.42
1:A:22:LEU:HD11	1:A:30:LEU:HD12	2.01	0.42
1:B:160:LYS:HE2	1:B:214:LEU:HD13	2.01	0.42
1:D:162:LEU:O	1:D:166:VAL:HG23	2.19	0.42
1:C:155:SER:O	1:C:158:THR:HG22	2.19	0.42
1:A:109:LYS:HE2	1:B:200:ILE:O	2.20	0.41
1:D:122:SER:OG	3:D:603:XOM:C8	2.68	0.41
1:D:233:LEU:HD22	1:D:250:LEU:HD23	2.02	0.41
1:B:58:TYR:OH	1:B:121:HIS:HB3	2.20	0.41
1:B:1:MET:SD	1:B:2:PRO:HD2	2.61	0.41
1:C:142:MET:HE3	1:C:144:LEU:HD11	2.02	0.41
1:C:239:ASP:OD2	1:C:269:HIS:HA	2.20	0.41
1:B:71:LEU:CD2	1:B:107:MET:HE1	2.50	0.41
1:C:30:LEU:HD22	1:C:76:ASP:O	2.21	0.41
1:C:77:HIS:HB3	1:C:96:PHE:CD1	2.55	0.41
1:C:101:LEU:HD22	1:C:135:ARG:CZ	2.50	0.41
1:A:202:ARG:N	4:A:702:HOH:O	2.50	0.41
1:B:159:PHE:CE2	1:B:205:LEU:HD23	2.56	0.41
1:D:119:LEU:C	1:D:119:LEU:HD23	2.46	0.41
1:C:68:LEU:O	1:C:69:ASP:HB2	2.21	0.41
1:C:262:LYS:HD3	1:C:285:GLU:HG3	2.02	0.41
1:D:57:ARG:HD2	1:D:200:ILE:HD11	2.03	0.41
1:A:272:HIS:ND1	1:A:272:HIS:N	2.65	0.40
3:A:603:XOM:C10	3:A:603:XOM:C11	3.00	0.40
1:D:239:ASP:OD2	1:D:269:HIS:HA	2.20	0.40
1:B:24:ASN:OD1	1:B:24:ASN:C	2.64	0.40
1:B:262:LYS:CD	1:B:285:GLU:HG3	2.51	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:44:LEU:CB	1:A:116:VAL:HG23	2.51	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	281/320 (88%)	269 (96%)	12 (4%)	0	100	100
1	B	286/320 (89%)	269 (94%)	17 (6%)	0	100	100
1	C	282/320 (88%)	270 (96%)	11 (4%)	1 (0%)	30	38
1	D	281/320 (88%)	272 (97%)	9 (3%)	0	100	100
All	All	1130/1280 (88%)	1080 (96%)	49 (4%)	1 (0%)	48	60

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	177	GLY

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	240/271 (89%)	234 (98%)	6 (2%)	42	60

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	244/271 (90%)	237 (97%)	7 (3%)	37	55
1	C	241/271 (89%)	233 (97%)	8 (3%)	33	50
1	D	241/271 (89%)	239 (99%)	2 (1%)	73	86
All	All	966/1084 (89%)	943 (98%)	23 (2%)	43	62

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	22	LEU
1	A	40	THR
1	A	108	GLN
1	A	116	VAL
1	A	218	SER
1	A	291	SER
1	B	59	GLU
1	B	97	VAL
1	B	172	PRO
1	B	179	ILE
1	B	188	LYS
1	B	200	ILE
1	B	218	SER
1	C	70	LEU
1	C	89	VAL
1	C	109	LYS
1	C	110	ASP
1	C	116	VAL
1	C	220	VAL
1	C	274	GLU
1	C	291	SER
1	D	251	MET
1	D	291	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	77	HIS
1	A	82	GLN
1	A	215	ASN
1	B	108	GLN
1	B	195	ASN

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Mol	Chain	Res	Type
1	B	284	HIS
1	C	77	HIS
1	C	82	GLN
1	C	121	HIS
1	C	212	GLN
1	C	292	GLN
1	D	77	HIS
1	D	82	GLN
1	D	212	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

12 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	$\# Z > 2$
2	ACT	B	602	-	3,3,3	1.12	0	3,3,3	0.74	0
3	XOM	B	603	-	25,28,28	1.54	4 (16%)	27,42,42	2.96	9 (33%)
2	ACT	C	601	-	3,3,3	1.04	0	3,3,3	0.80	0
2	ACT	D	602	-	3,3,3	1.03	0	3,3,3	0.85	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	XOM	C	603	-	25,28,28	1.39	5 (20%)	27,42,42	2.28	9 (33%)
2	ACT	B	601	-	3,3,3	1.10	0	3,3,3	0.79	0
3	XOM	A	603	-	25,28,28	1.57	4 (16%)	27,42,42	2.89	8 (29%)
3	XOM	D	603	-	25,28,28	1.27	4 (16%)	27,42,42	2.47	8 (29%)
2	ACT	C	602	-	3,3,3	1.08	0	3,3,3	0.78	0
2	ACT	A	601	-	3,3,3	1.08	0	3,3,3	0.83	0
2	ACT	D	601	-	3,3,3	1.11	0	3,3,3	0.77	0
2	ACT	A	602	-	3,3,3	1.09	0	3,3,3	0.76	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	XOM	C	603	-	-	6/13/42/42	0/4/4/4
3	XOM	B	603	-	-	4/13/42/42	0/4/4/4
3	XOM	D	603	-	-	4/13/42/42	0/4/4/4
3	XOM	A	603	-	-	4/13/42/42	0/4/4/4

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	603	XOM	O23-C7	4.99	1.39	1.35
3	B	603	XOM	O23-C7	4.73	1.39	1.35
3	C	603	XOM	C7-N19	3.55	1.38	1.34
3	B	603	XOM	C7-N19	3.55	1.38	1.34
3	A	603	XOM	C12-N20	-3.42	1.44	1.47
3	A	603	XOM	C7-N19	3.36	1.38	1.34
3	B	603	XOM	C12-N20	-3.24	1.44	1.47
3	C	603	XOM	O23-C7	3.12	1.38	1.35
3	D	603	XOM	O23-C7	3.08	1.38	1.35
3	C	603	XOM	C12-N20	-2.79	1.44	1.47
3	D	603	XOM	C11-N20	-2.77	1.44	1.47
3	D	603	XOM	C7-N19	2.72	1.37	1.34
3	D	603	XOM	C12-N20	-2.45	1.45	1.47
3	C	603	XOM	C11-N20	-2.44	1.45	1.47
3	B	603	XOM	C11-N20	-2.27	1.45	1.47
3	A	603	XOM	C11-N20	-2.06	1.45	1.47
3	C	603	XOM	C8-N20	2.05	1.38	1.35

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	603	XOM	C15-C12-N20	-7.23	80.79	87.96
3	B	603	XOM	C15-C11-N20	-7.11	80.90	87.96
3	D	603	XOM	C15-C12-N20	-6.86	81.15	87.96
3	D	603	XOM	C15-C11-N20	-6.60	81.41	87.96
3	A	603	XOM	C15-C11-N20	-6.53	81.48	87.96
3	A	603	XOM	O23-C7-N19	-6.42	106.38	109.91
3	A	603	XOM	C15-C12-N20	-6.32	81.69	87.96
3	C	603	XOM	O23-C7-N19	-5.96	106.63	109.91
3	B	603	XOM	C14-C8-N20	-5.29	113.81	118.80
3	B	603	XOM	C18-O24-C15	-4.97	104.91	113.74
3	A	603	XOM	O23-C7-O21	4.91	125.61	121.32
3	A	603	XOM	C14-C8-N20	-4.87	114.21	118.80
3	C	603	XOM	C14-C8-N20	-4.60	114.47	118.80
3	B	603	XOM	C6-C3-C4	-4.45	117.58	120.46
3	C	603	XOM	C15-C12-N20	-4.44	83.56	87.96
3	B	603	XOM	O23-C7-N19	-4.23	107.58	109.91
3	C	603	XOM	C15-C11-N20	-4.22	83.77	87.96
3	D	603	XOM	O23-C7-O21	4.18	124.98	121.32
3	A	603	XOM	C10-C14-C8	3.77	124.64	117.41
3	C	603	XOM	O23-C7-O21	3.54	124.42	121.32
3	A	603	XOM	C6-C3-C4	-3.52	118.18	120.46
3	C	603	XOM	C10-C14-C8	3.20	123.56	117.41
3	D	603	XOM	O23-C7-N19	-3.14	108.18	109.91
3	B	603	XOM	O23-C7-O21	3.07	124.00	121.32
3	D	603	XOM	C9-C14-C10	-3.06	85.83	88.13
3	A	603	XOM	C18-O24-C15	-2.97	108.47	113.74
3	D	603	XOM	C14-C8-N20	-2.86	116.10	118.80
3	D	603	XOM	C10-C14-C8	2.63	122.46	117.41
3	C	603	XOM	C6-C3-C4	-2.42	118.90	120.46
3	B	603	XOM	O22-C8-C14	2.35	124.31	120.86
3	C	603	XOM	C9-C14-C10	-2.30	86.40	88.13
3	B	603	XOM	C1-C4-C3	2.16	121.52	118.55
3	C	603	XOM	O22-C8-C14	2.02	123.83	120.86
3	D	603	XOM	C6-C3-C4	-2.01	119.16	120.46

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	603	XOM	C12-C15-O24-C18
3	D	603	XOM	C12-C15-O24-C18

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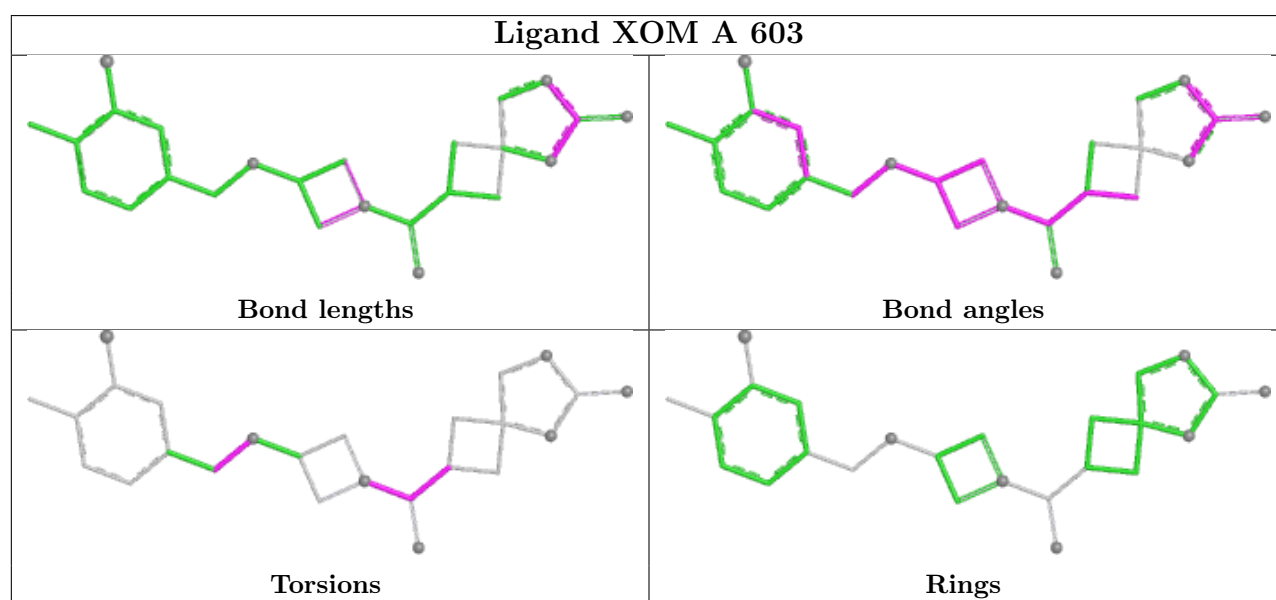
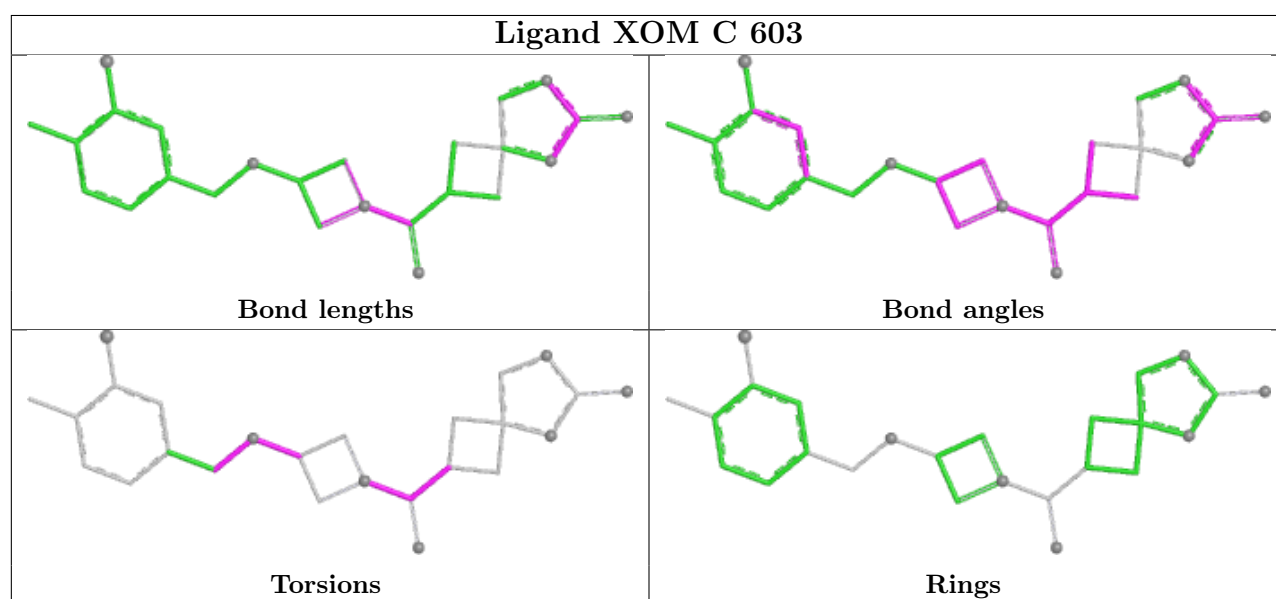
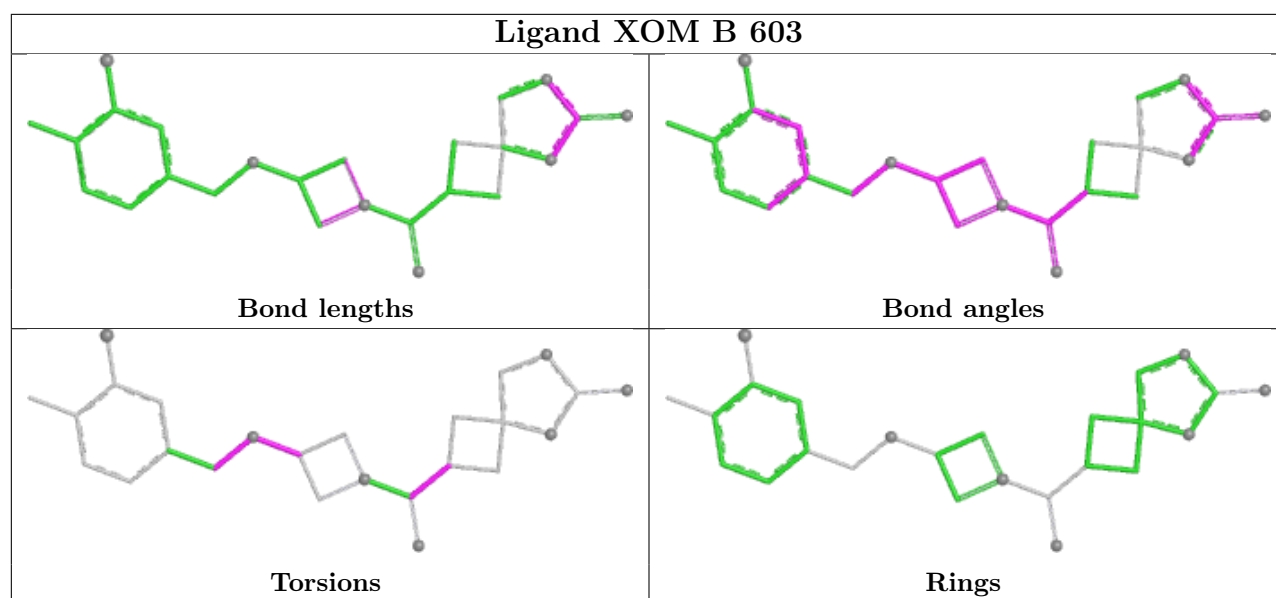
Mol	Chain	Res	Type	Atoms
3	B	603	XOM	C4-C18-O24-C15
3	A	603	XOM	C4-C18-O24-C15
3	A	603	XOM	C10-C14-C8-O22
3	B	603	XOM	C10-C14-C8-O22
3	C	603	XOM	C10-C14-C8-O22
3	D	603	XOM	C10-C14-C8-O22
3	C	603	XOM	C14-C8-N20-C12
3	C	603	XOM	C12-C15-O24-C18
3	A	603	XOM	C10-C14-C8-N20
3	B	603	XOM	C10-C14-C8-N20
3	C	603	XOM	C10-C14-C8-N20
3	D	603	XOM	C10-C14-C8-N20
3	A	603	XOM	O22-C8-N20-C12
3	C	603	XOM	O22-C8-N20-C12
3	D	603	XOM	O22-C8-N20-C12
3	C	603	XOM	C4-C18-O24-C15

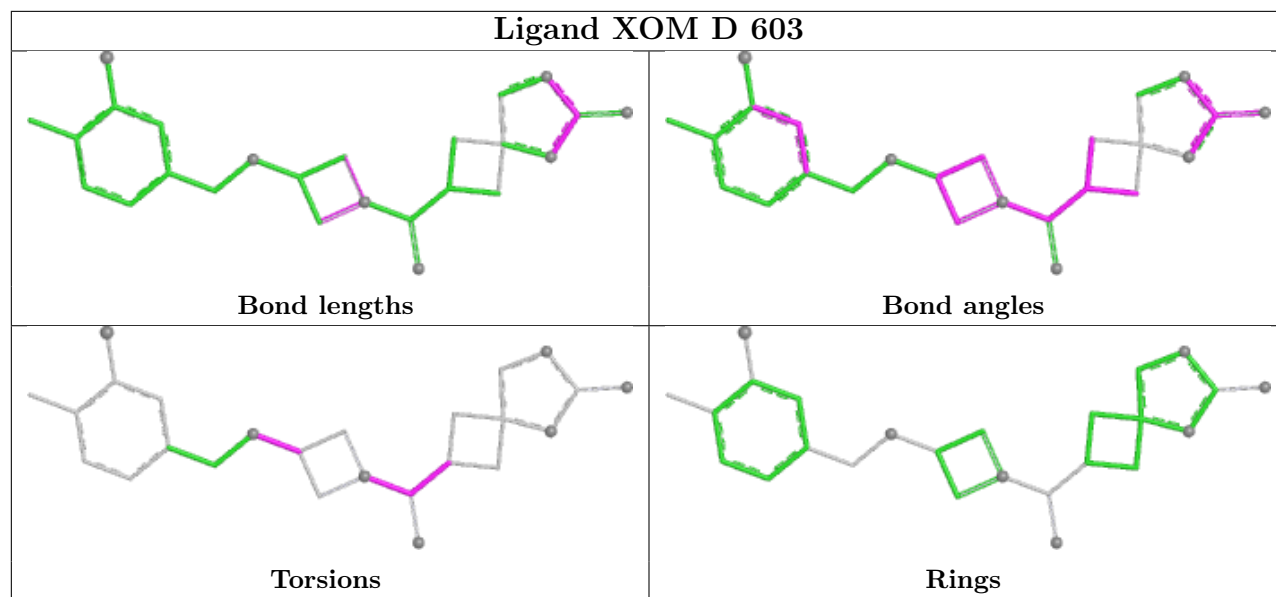
There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	603	XOM	1	0
3	A	603	XOM	1	0
3	D	603	XOM	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 ⓘ

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	285/320 (89%)	0.47	9 (3%)	50 52	34, 57, 109, 162	0
1	B	290/320 (90%)	0.60	12 (4%)	41 43	35, 58, 121, 169	0
1	C	286/320 (89%)	0.82	23 (8%)	18 20	68, 96, 146, 186	0
1	D	285/320 (89%)	0.76	16 (5%)	30 32	73, 96, 144, 182	0
All	All	1146/1280 (89%)	0.66	60 (5%)	33 34	34, 84, 138, 186	0

All (60) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	166	VAL	6.0
1	A	166	VAL	5.1
1	D	166	VAL	5.1
1	B	172	PRO	5.1
1	B	166	VAL	5.0
1	B	179	ILE	4.4
1	A	177	GLY	3.7
1	B	151	ALA	3.7
1	A	179	ILE	3.6
1	C	22	LEU	3.6
1	D	179	ILE	3.5
1	B	174	LEU	3.3
1	D	176	SER	3.2
1	D	161	VAL	3.2
1	C	179	ILE	3.2
1	B	202	ARG	3.0
1	D	165	LYS	3.0
1	D	178	PRO	3.0
1	B	203	ALA	2.9
1	C	200	ILE	2.8
1	B	178	PRO	2.8

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Mol	Chain	Res	Type	RSRZ
1	C	207	VAL	2.8
1	C	164	ALA	2.7
1	A	202	ARG	2.7
1	D	202	ARG	2.6
1	A	2	PRO	2.6
1	C	202	ARG	2.6
1	C	203	ALA	2.6
1	C	201	CYS	2.5
1	C	165	LYS	2.4
1	B	163	ALA	2.4
1	C	295	ALA	2.4
1	D	199	LEU	2.4
1	C	100	VAL	2.4
1	C	178	PRO	2.3
1	D	203	ALA	2.3
1	C	2	PRO	2.3
1	B	158	THR	2.3
1	C	139	PHE	2.2
1	D	292	GLN	2.2
1	C	176	SER	2.2
1	C	156	ALA	2.2
1	C	157	THR	2.2
1	D	151	ALA	2.2
1	D	207	VAL	2.2
1	A	162	LEU	2.1
1	C	23	VAL	2.1
1	C	73	PHE	2.1
1	D	208	CYS	2.1
1	D	148	LEU	2.1
1	A	178	PRO	2.1
1	C	161	VAL	2.1
1	A	292	GLN	2.1
1	D	177	GLY	2.1
1	B	295	ALA	2.1
1	B	201	CYS	2.1
1	C	163	ALA	2.1
1	C	78	VAL	2.1
1	D	1	MET	2.0
1	A	208	CYS	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 ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

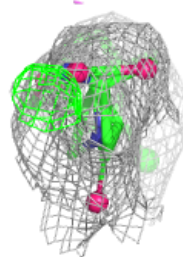
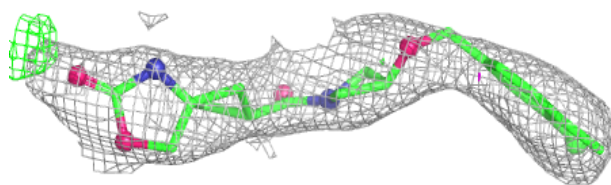
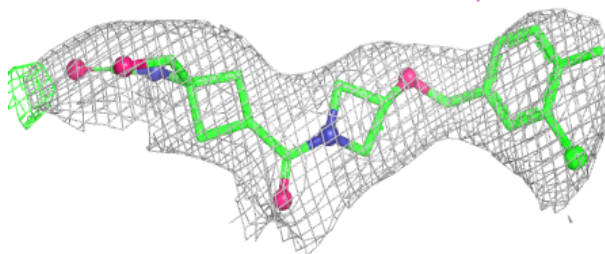
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	ACT	C	601	4/4	0.81	0.20	121,126,126,126	0
2	ACT	D	601	4/4	0.82	0.18	107,110,112,114	0
2	ACT	A	601	4/4	0.84	0.22	95,96,98,101	0
2	ACT	B	601	4/4	0.87	0.17	92,97,98,101	0
2	ACT	A	602	4/4	0.89	0.23	98,100,101,101	0
2	ACT	B	602	4/4	0.90	0.20	90,92,92,94	0
2	ACT	D	602	4/4	0.90	0.24	126,131,133,134	0
2	ACT	C	602	4/4	0.92	0.19	111,115,117,118	0
3	XOM	C	603	25/25	0.93	0.14	89,94,122,133	0
3	XOM	B	603	25/25	0.96	0.11	44,55,93,103	0
3	XOM	A	603	25/25	0.96	0.11	45,56,93,111	0
3	XOM	D	603	25/25	0.97	0.10	78,87,134,150	0

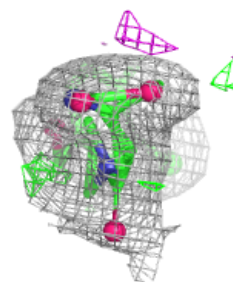
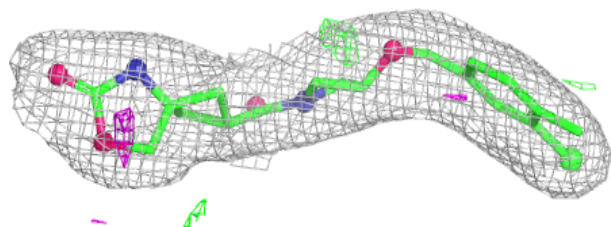
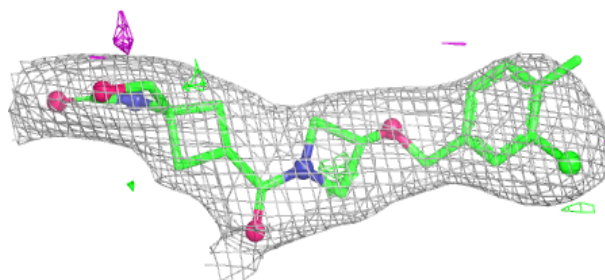
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around XOM C 603:

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

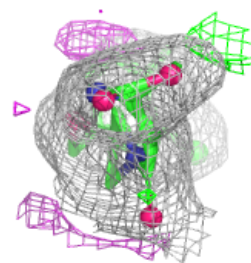
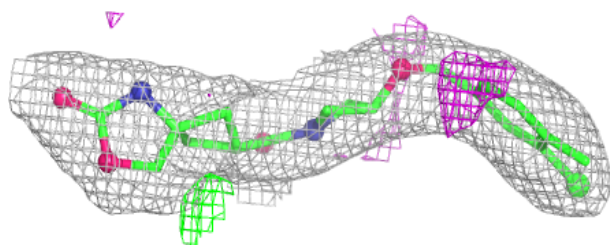
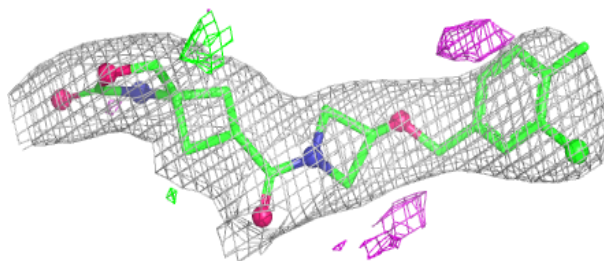
**Electron density around XOM B 603:**

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

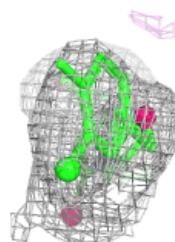
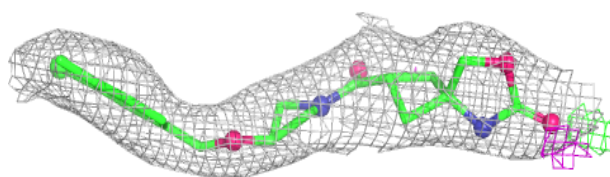
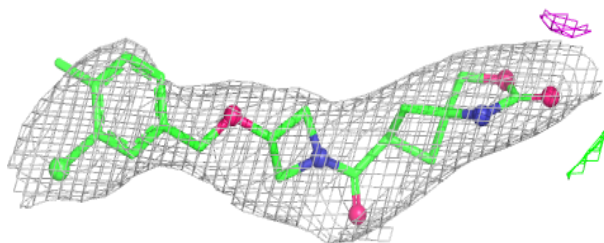


Electron density around XOM A 603:

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

**Electron density around XOM D 603:**

$2mF_o-DF_c$ (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.