



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 15, 2026 – 01:00 AM UTC

PDB ID : 7KWE / pdb_00007kwe
Title : Crystal structure of the catalytic domain of human PDE3A bound to DNMDP
Authors : Horner, S.W.; Garvie, C.
Deposited on : 2020-11-30
Resolution : 2.00 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

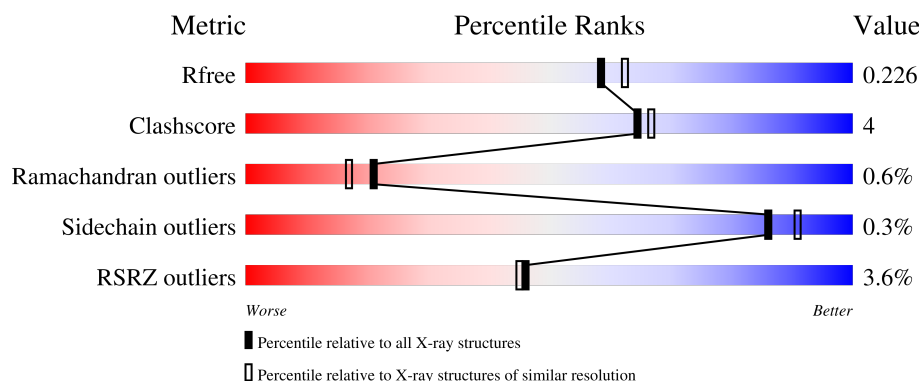
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	380	3% 84% 11% ..
1	B	380	5% 88% 8% ..
1	C	380	3% 87% 9% .
1	D	380	3% 87% 10% ..

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 12297 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 cGMP-inhibited 3',5'-cyclic phosphodiesterase A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	363	Total	C	N	O	S	0	1	0
			2940	1896	492	533	19			
1	D	371	Total	C	N	O	S	0	1	0
			2990	1924	503	544	19			
1	C	365	Total	C	N	O	S	0	1	0
			2942	1896	493	534	19			
1	B	365	Total	C	N	O	S	0	1	0
			2954	1904	497	534	19			

There are 52 discrepancies between the modelled and reference sequences:

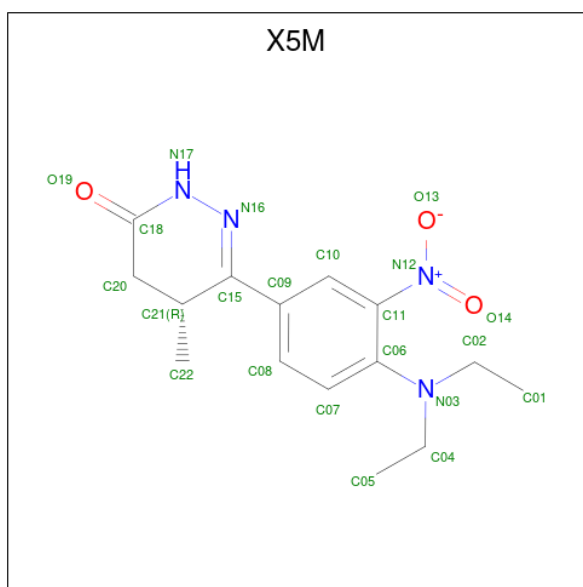
Chain	Residue	Modelled	Actual	Comment	Reference
A	668	GLY	-	expression tag	UNP Q14432
A	795	GLY	-	linker	UNP Q14432
A	796	GLY	-	linker	UNP Q14432
A	797	SER	-	linker	UNP Q14432
A	798	GLY	-	linker	UNP Q14432
A	799	GLY	-	linker	UNP Q14432
A	800	SER	-	linker	UNP Q14432
A	1062	GLY	-	linker	UNP Q14432
A	1063	GLY	-	linker	UNP Q14432
A	1064	SER	-	linker	UNP Q14432
A	1065	GLY	-	linker	UNP Q14432
A	1066	GLY	-	linker	UNP Q14432
A	1067	SER	-	linker	UNP Q14432
D	668	GLY	-	expression tag	UNP Q14432
D	780	GLY	-	linker	UNP Q14432
D	781	GLY	-	linker	UNP Q14432
D	782	SER	-	linker	UNP Q14432
D	783	GLY	-	linker	UNP Q14432
D	784	GLY	-	linker	UNP Q14432
D	785	SER	-	linker	UNP Q14432
D	1062	GLY	-	linker	UNP Q14432

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Chain	Residue	Modelled	Actual	Comment	Reference
D	1063	GLY	-	linker	UNP Q14432
D	1064	SER	-	linker	UNP Q14432
D	1065	GLY	-	linker	UNP Q14432
D	1066	GLY	-	linker	UNP Q14432
D	1067	SER	-	linker	UNP Q14432
C	668	GLY	-	expression tag	UNP Q14432
C	780	GLY	-	linker	UNP Q14432
C	796	GLY	-	linker	UNP Q14432
C	797	SER	-	linker	UNP Q14432
C	798	GLY	-	linker	UNP Q14432
C	799	GLY	-	linker	UNP Q14432
C	800	SER	-	linker	UNP Q14432
C	1029	GLY	-	linker	UNP Q14432
C	1063	GLY	-	linker	UNP Q14432
C	1064	SER	-	linker	UNP Q14432
C	1065	GLY	-	linker	UNP Q14432
C	1066	GLY	-	linker	UNP Q14432
C	1067	SER	-	linker	UNP Q14432
B	668	GLY	-	expression tag	UNP Q14432
B	780	GLY	-	linker	UNP Q14432
B	796	GLY	-	linker	UNP Q14432
B	797	SER	-	linker	UNP Q14432
B	798	GLY	-	linker	UNP Q14432
B	799	GLY	-	linker	UNP Q14432
B	800	SER	-	linker	UNP Q14432
B	1062	GLY	-	linker	UNP Q14432
B	1063	GLY	-	linker	UNP Q14432
B	1064	SER	-	linker	UNP Q14432
B	1065	GLY	-	linker	UNP Q14432
B	1066	GLY	-	linker	UNP Q14432
B	1067	SER	-	linker	UNP Q14432

- Molecule 2 is (5R,6P)-6-[4-(diethylamino)-3-nitrophenyl]-5-methyl-4,5-dihydropyridazin-3(2H)-one (CCD ID: X5M) (formula: C₁₅H₂₀N₄O₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			22	15	4	3		
2	D	1	Total	C	N	O	0	0
			22	15	4	3		
2	C	1	Total	C	N	O	0	0
			22	15	4	3		
2	B	1	Total	C	N	O	0	0
			22	15	4	3		

- Molecule 3 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mn	0	0
			1	1		
3	D	1	Total	Mn	0	0
			1	1		
3	C	1	Total	Mn	0	0
			1	1		
3	B	1	Total	Mn	0	0
			1	1		

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

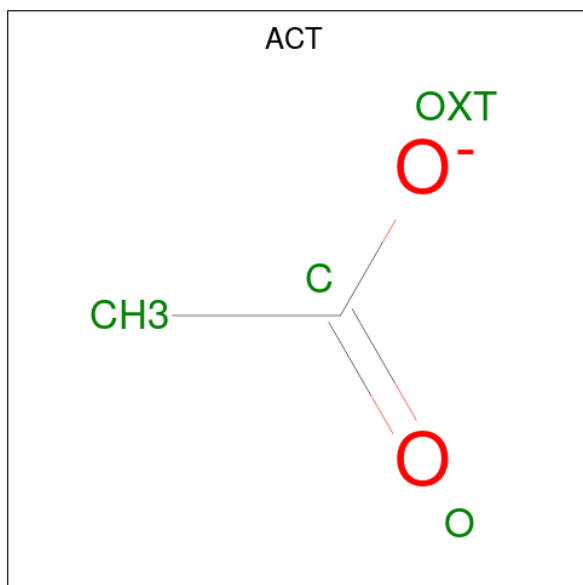
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	1	Total	Mg	0	0
			1	1		
4	C	1	Total	Mg	0	0
			1	1		
4	B	1	Total	Mg	0	0
			1	1		

- Molecule 5 is ACETATE ION (CCD ID: ACT) (formula: C₂H₃O₂).



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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	75	Total	O	0	0
			75	75		
6	D	104	Total	O	0	0
			104	104		

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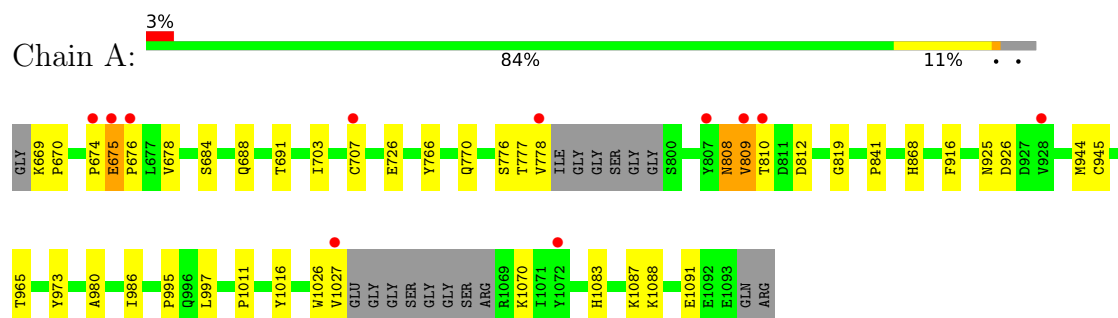
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	110	Total 110	O 110	0	0
6	B	70	Total 70	O 70	0	0

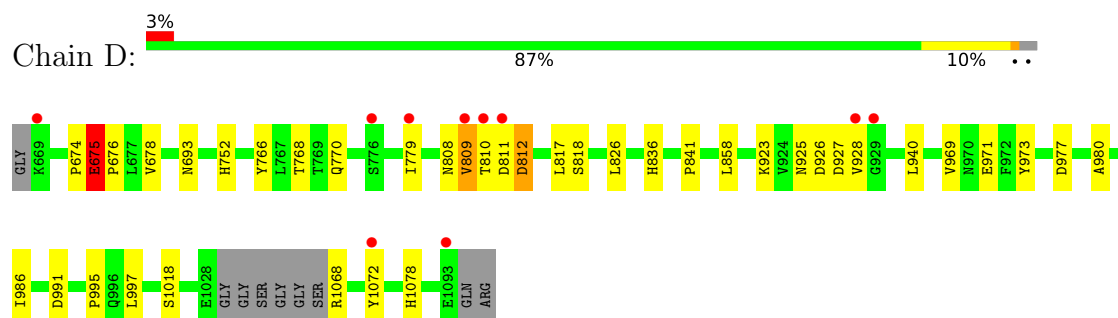
3 Residue-property plots [i](#)

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.

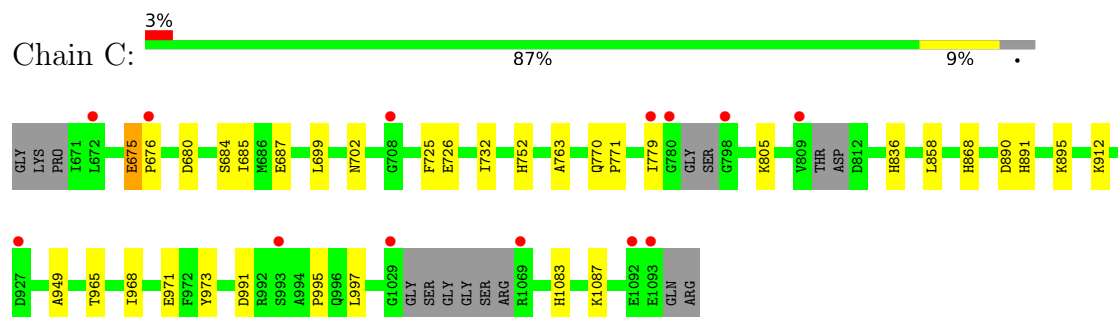
- Molecule 1: cGMP-inhibited 3',5'-cyclic phosphodiesterase A



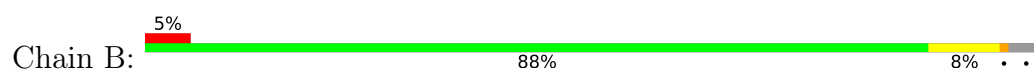
- Molecule 1: cGMP-inhibited 3',5'-cyclic phosphodiesterase A

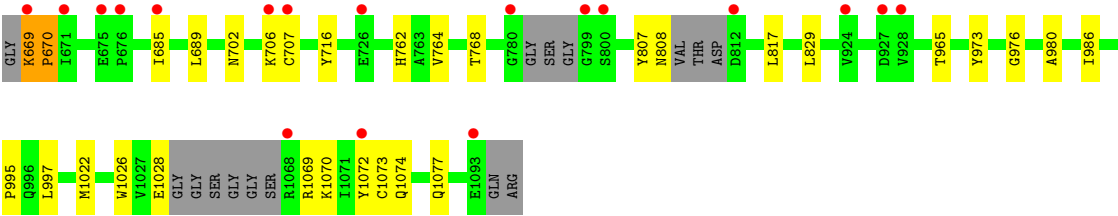


- Molecule 1: cGMP-inhibited 3',5'-cyclic phosphodiesterase A



- Molecule 1: cGMP-inhibited 3',5'-cyclic phosphodiesterase A





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	82.21Å 58.52Å 157.54Å 90.00° 90.66° 90.00°	Depositor
Resolution (Å)	47.70 – 2.00 47.70 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.2 (47.70-2.00) 99.2 (47.70-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.29 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.185 , 0.219 0.195 , 0.226	Depositor DCC
R_{free} test set	5030 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å ²)	38.2	Xtriage
Anisotropy	0.117	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 39.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.018 for h,-k,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12297	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.36% 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: ACT, X5M, MN, MG

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	1.15	5/3022 (0.2%)	1.35	6/4104 (0.1%)
1	B	1.12	2/3035 (0.1%)	1.35	2/4117 (0.0%)
1	C	1.20	4/3022 (0.1%)	1.34	2/4100 (0.0%)
1	D	1.16	4/3073 (0.1%)	1.39	9/4172 (0.2%)
All	All	1.16	15/12152 (0.1%)	1.36	19/16493 (0.1%)

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	868	HIS	CE1-NE2	8.10	1.40	1.32
1	C	805	LYS	C-O	-7.25	1.14	1.24
1	A	868	HIS	CE1-NE2	6.93	1.39	1.32
1	A	678	VAL	C-O	-6.86	1.16	1.24
1	B	1026	TRP	C-O	6.10	1.31	1.23
1	A	1026	TRP	C-O	6.05	1.31	1.23
1	C	890	ASP	C-O	6.03	1.32	1.23
1	D	1018	SER	C-O	-5.50	1.17	1.24
1	D	678	VAL	C-O	-5.48	1.18	1.24
1	D	841	PRO	C-O	-5.43	1.17	1.24
1	C	991	ASP	C-O	5.26	1.30	1.24
1	D	779	ILE	C-O	5.21	1.29	1.24
1	A	841	PRO	C-O	-5.21	1.17	1.24
1	A	1011	PRO	C-O	-5.14	1.17	1.24
1	B	670	PRO	C-O	-5.11	1.17	1.24

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	707	CYS	N-CA-C	-8.55	102.29	112.89
1	D	674	PRO	N-CA-C	7.98	123.71	111.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	702	ASN	CA-CB-CG	7.97	120.57	112.60
1	D	675	GLU	CB-CA-C	6.47	122.91	110.17
1	D	811	ASP	CA-CB-CG	6.34	118.94	112.60
1	A	726	GLU	CB-CG-CD	6.10	122.97	112.60
1	D	977	ASP	CA-CB-CG	6.08	118.68	112.60
1	D	926	ASP	N-CA-C	-5.98	105.69	112.87
1	D	928	VAL	N-CA-C	-5.86	107.10	112.96
1	A	808	ASN	O-C-N	5.77	125.90	120.71
1	A	808	ASN	CB-CA-C	-5.39	104.45	115.28
1	D	836	HIS	N-CA-C	5.25	118.47	111.75
1	A	674	PRO	N-CA-C	5.21	119.39	111.11
1	C	836	HIS	N-CA-C	5.15	118.66	112.38
1	C	968	ILE	CA-C-O	-5.15	115.40	120.85
1	D	811	ASP	CA-C-N	5.11	131.31	121.54
1	D	811	ASP	C-N-CA	5.11	131.31	121.54
1	A	926	ASP	CA-C-N	5.11	127.38	120.38
1	A	926	ASP	C-N-CA	5.11	127.38	120.38

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	2940	0	2866	22	2
1	B	2954	0	2881	20	0
1	C	2942	0	2863	25	0
1	D	2990	0	2914	22	1
2	A	22	0	0	0	0
2	B	22	0	0	2	0
2	C	22	0	0	2	0
2	D	22	0	0	3	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	4	0	3	0	0
5	B	4	0	3	0	0
5	C	4	0	3	0	0
5	D	4	0	3	0	0
6	A	75	0	0	1	0
6	B	70	0	0	1	0
6	C	110	0	0	6	1
6	D	104	0	0	0	0
All	All	12297	0	11536	91	2

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 4.

All (91) 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:916:PHE:HB3	1:A:944:MET:HE1	1.45	0.98
2:D:1101:X5M:O13	2:D:1101:X5M:C02	2.25	0.84
1:D:969:VAL:HG11	1:D:997:LEU:HD13	1.62	0.82
1:C:726:GLU:OE2	6:C:1201:HOH:O	1.97	0.82
1:B:764:VAL:HG21	1:B:829:LEU:HG	1.67	0.77
1:C:675:GLU:HB2	1:C:676:PRO:HD3	1.68	0.76
1:A:965:THR:CG2	1:A:997:LEU:HD21	2.22	0.70
2:D:1101:X5M:O13	2:D:1101:X5M:C01	2.40	0.69
1:A:965:THR:HG21	1:A:997:LEU:HD21	1.76	0.68
1:C:687:GLU:OE2	1:C:687:GLU:O	2.12	0.67
1:A:777:THR:HG23	1:A:819:GLY:HA3	1.76	0.67
1:C:965:THR:HG21	1:C:997:LEU:HD21	1.76	0.67
1:D:969:VAL:HG11	1:D:997:LEU:CD1	2.25	0.66
1:B:980:ALA:HB2	1:B:986:ILE:HD11	1.82	0.62
1:C:912:LYS:HD2	6:C:1238:HOH:O	2.00	0.61
1:A:980:ALA:HB2	1:A:986:ILE:HD11	1.83	0.61
1:D:980:ALA:HB2	1:D:986:ILE:HD11	1.82	0.60
1:B:807:TYR:O	1:B:808:ASN:OD1	2.21	0.59
2:B:1101:X5M:C01	2:B:1101:X5M:O13	2.52	0.57
1:C:965:THR:CG2	1:C:997:LEU:HD21	2.35	0.57
1:B:965:THR:CG2	1:B:997:LEU:HD21	2.35	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:688:GLN:O	1:A:691:THR:HG22	2.05	0.57
1:C:684:SER:HB2	1:B:1074:GLN:HG3	1.87	0.57
1:A:776:SER:OG	6:A:1201:HOH:O	2.15	0.56
1:C:680:ASP:OD2	1:B:1028:GLU:HB3	2.06	0.56
1:D:923:LYS:HD2	1:D:940:LEU:HD23	1.87	0.56
1:B:1072:TYR:OH	1:B:1077:GLN:HG2	2.06	0.56
1:A:1027:VAL:HG23	1:A:1027:VAL:O	2.07	0.54
1:B:689:LEU:O	1:B:762:HIS:HE1	1.90	0.54
1:D:809:VAL:HG23	1:D:809:VAL:O	2.08	0.53
1:C:685:ILE:HD13	1:C:699:LEU:HA	1.90	0.53
1:B:965:THR:HG21	1:B:997:LEU:HD21	1.90	0.52
1:A:945[B]:CYS:HG	1:A:1016:TYR:HH	1.55	0.52
1:B:762:HIS:HD2	6:B:1206:HOH:O	1.92	0.52
2:C:1101:X5M:C02	2:C:1101:X5M:O13	2.57	0.52
1:D:675:GLU:HB3	1:D:676:PRO:CD	2.39	0.52
1:A:1088:LYS:HA	1:A:1091:GLU:OE2	2.11	0.51
1:B:716:TYR:C	1:B:716:TYR:CD1	2.89	0.50
1:D:693:ASN:HD21	1:D:1078:HIS:CE1	2.29	0.50
1:C:1083:HIS:NE2	1:C:1087:LYS:HE3	2.27	0.49
1:B:973:TYR:OH	1:B:995:PRO:HB3	2.12	0.49
1:C:912:LYS:HE2	6:C:1238:HOH:O	2.12	0.49
1:D:675:GLU:HB3	1:D:676:PRO:HD3	1.94	0.49
1:C:702:ASN:OD1	1:B:1077:GLN:NE2	2.46	0.48
1:C:725:PHE:CE1	1:C:732:ILE:HD13	2.48	0.48
1:C:726:GLU:OE2	6:C:1202:HOH:O	2.20	0.48
2:C:1101:X5M:O13	2:C:1101:X5M:C01	2.63	0.47
1:D:808:ASN:O	1:D:809:VAL:C	2.57	0.47
1:D:812:ASP:N	1:D:812:ASP:OD1	2.47	0.47
1:D:752:HIS:ND1	1:D:971:GLU:OE2	2.32	0.47
1:D:858:LEU:HD11	1:C:858:LEU:HD21	1.97	0.46
1:A:808:ASN:O	1:A:809:VAL:C	2.59	0.46
2:B:1101:X5M:O13	2:B:1101:X5M:C02	2.63	0.46
1:B:1022:MET:HG3	1:B:1073:CYS:SG	2.56	0.46
1:C:891:HIS:CE1	1:C:895:LYS:HE2	2.50	0.46
1:A:669:LYS:N	1:A:670:PRO:CD	2.79	0.45
1:A:1083:HIS:NE2	1:A:1087:LYS:HE3	2.32	0.45
1:D:858:LEU:HD21	1:C:858:LEU:HD11	1.99	0.45
1:C:912:LYS:CE	6:C:1238:HOH:O	2.64	0.44
1:A:1027:VAL:HG21	1:A:1070:LYS:HG2	1.98	0.44
1:A:973:TYR:OH	1:A:995:PRO:HB3	2.18	0.44
1:A:997:LEU:C	1:A:997:LEU:HD23	2.42	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:752:HIS:ND1	1:C:971:GLU:OE2	2.36	0.44
1:B:997:LEU:C	1:B:997:LEU:HD23	2.42	0.44
1:B:669:LYS:N	1:B:670:PRO:CD	2.81	0.44
1:D:973:TYR:OH	1:D:995:PRO:HB3	2.18	0.43
2:D:1101:X5M:O13	2:D:1101:X5M:N03	2.50	0.43
1:C:891:HIS:O	1:C:895:LYS:HG2	2.19	0.43
1:C:912:LYS:CD	6:C:1238:HOH:O	2.64	0.43
1:C:997:LEU:C	1:C:997:LEU:HD23	2.43	0.42
1:B:997:LEU:HD23	1:B:997:LEU:O	2.19	0.42
1:C:770:GLN:HA	1:C:771:PRO:HD3	1.91	0.42
1:D:986:ILE:HG21	1:D:991:ASP:HB2	2.00	0.42
1:A:669:LYS:N	1:A:670:PRO:HD2	2.34	0.42
1:D:925:ASN:C	1:D:927:ASP:N	2.76	0.42
1:D:818:SER:HA	1:D:826:LEU:HD11	2.02	0.42
1:D:766:TYR:CE2	1:D:770:GLN:HG3	2.54	0.41
1:A:675:GLU:HB2	1:A:676:PRO:HD3	2.02	0.41
1:B:976:GLY:O	1:B:986:ILE:CD1	2.68	0.41
1:A:703:ILE:HG22	1:A:707:CYS:HB3	2.02	0.41
1:D:1068:ARG:HD2	1:D:1068:ARG:HA	1.81	0.41
1:A:808:ASN:O	1:A:810:THR:HG23	2.21	0.41
1:B:768:THR:HA	1:B:817:LEU:HB2	2.02	0.41
1:C:973:TYR:OH	1:C:995:PRO:HB3	2.20	0.41
1:D:808:ASN:O	1:D:810:THR:HG23	2.20	0.41
1:A:766:TYR:CE2	1:A:770:GLN:HG3	2.56	0.41
1:A:1027:VAL:O	1:A:1027:VAL:CG2	2.68	0.41
1:D:925:ASN:C	1:D:927:ASP:H	2.28	0.41
1:B:706:LYS:O	1:B:706:LYS:HG2	2.20	0.40
1:D:768:THR:HA	1:D:817:LEU:HB2	2.04	0.40
1:C:763:ALA:HB3	1:C:949:ALA:HB1	2.03	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:684:SER:OG	1:D:1072:TYR:OH[1_556]	2.14	0.06
1:A:925:ASN:O	6:C:1201:HOH:O[2_555]	2.15	0.05

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	358/380 (94%)	349 (98%)	6 (2%)	3 (1%)	16	11
1	B	358/380 (94%)	348 (97%)	9 (2%)	1 (0%)	36	35
1	C	358/380 (94%)	346 (97%)	10 (3%)	2 (1%)	21	17
1	D	368/380 (97%)	359 (98%)	6 (2%)	3 (1%)	16	11
All	All	1442/1520 (95%)	1402 (97%)	31 (2%)	9 (1%)	21	17

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	675	GLU
1	A	809	VAL
1	D	675	GLU
1	D	809	VAL
1	C	675	GLU
1	C	779	ILE
1	D	812	ASP
1	A	812	ASP
1	B	1069	ARG

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	320/327 (98%)	319 (100%)	1 (0%)	86	91
1	B	320/327 (98%)	317 (99%)	3 (1%)	70	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	318/327 (97%)	318 (100%)	0	100	100
1	D	324/327 (99%)	324 (100%)	0	100	100
All	All	1282/1308 (98%)	1278 (100%)	4 (0%)	86	91

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

Mol	Chain	Res	Type
1	A	778	VAL
1	B	669	LYS
1	B	685	ILE
1	B	1070	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	702	ASN
1	A	875	ASN
1	A	925	ASN
1	A	963	GLN
1	A	970	ASN
1	A	1007	HIS
1	A	1074	GLN
1	A	1081	GLN
1	D	925	ASN
1	D	963	GLN
1	D	996	GLN
1	D	1007	HIS
1	D	1074	GLN
1	D	1078	HIS
1	D	1081	GLN
1	C	891	HIS
1	C	963	GLN
1	C	999	ASN
1	C	1007	HIS
1	B	762	HIS
1	B	808	ASN
1	B	925	ASN
1	B	963	GLN
1	B	999	ASN
1	B	1007	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 16 ligands modelled in this entry, 8 are monoatomic - leaving 8 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
2	X5M	A	1101	-	23,23,23	3.92	7 (30%)	26,32,32	2.10	10 (38%)
2	X5M	C	1101	-	23,23,23	3.75	7 (30%)	26,32,32	1.88	6 (23%)
5	ACT	B	1104	-	3,3,3	1.01	0	3,3,3	0.85	0
2	X5M	B	1101	-	23,23,23	3.79	7 (30%)	26,32,32	1.79	5 (19%)
2	X5M	D	1101	-	23,23,23	3.36	5 (21%)	26,32,32	1.81	8 (30%)
5	ACT	D	1104	-	3,3,3	1.20	0	3,3,3	0.66	0
5	ACT	A	1104	-	3,3,3	1.05	0	3,3,3	0.94	0
5	ACT	C	1104	-	3,3,3	1.03	0	3,3,3	1.08	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
2	X5M	A	1101	-	-	4/14/29/29	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	X5M	B	1101	-	-	4/14/29/29	0/2/2/2
2	X5M	C	1101	-	-	5/14/29/29	0/2/2/2
2	X5M	D	1101	-	-	2/14/29/29	0/2/2/2

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1101	X5M	C15-N16	15.35	1.43	1.29
2	B	1101	X5M	C15-N16	14.89	1.43	1.29
2	C	1101	X5M	C15-N16	14.71	1.43	1.29
2	D	1101	X5M	C15-N16	13.01	1.41	1.29
2	A	1101	X5M	C18-N17	8.09	1.49	1.34
2	C	1101	X5M	C18-N17	7.80	1.48	1.34
2	B	1101	X5M	C18-N17	7.35	1.47	1.34
2	D	1101	X5M	C18-N17	6.54	1.46	1.34
2	C	1101	X5M	C21-C15	-3.88	1.46	1.51
2	B	1101	X5M	N17-N16	3.41	1.47	1.38
2	B	1101	X5M	C21-C15	-3.17	1.47	1.51
2	D	1101	X5M	O14-N12	-3.11	1.17	1.22
2	A	1101	X5M	O19-C18	-3.10	1.17	1.23
2	A	1101	X5M	N17-N16	3.09	1.46	1.38
2	B	1101	X5M	C06-N03	2.80	1.47	1.41
2	A	1101	X5M	C09-C15	2.75	1.52	1.48
2	B	1101	X5M	O14-N12	-2.72	1.18	1.22
2	C	1101	X5M	C06-N03	2.60	1.47	1.41
2	B	1101	X5M	O19-C18	-2.59	1.18	1.23
2	C	1101	X5M	O19-C18	-2.50	1.18	1.23
2	A	1101	X5M	C21-C15	-2.34	1.48	1.51
2	D	1101	X5M	C21-C15	-2.33	1.48	1.51
2	C	1101	X5M	O14-N12	-2.33	1.18	1.22
2	D	1101	X5M	C06-N03	2.32	1.46	1.41
2	A	1101	X5M	O14-N12	-2.10	1.19	1.22
2	C	1101	X5M	N17-N16	2.04	1.43	1.38

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1101	X5M	C18-N17-N16	-5.84	119.76	126.35
2	A	1101	X5M	C20-C21-C15	5.17	115.03	108.13
2	C	1101	X5M	C18-N17-N16	-4.91	120.81	126.35
2	D	1101	X5M	C07-C06-N03	-4.63	115.17	122.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1101	X5M	C20-C21-C15	4.35	113.93	108.13
2	C	1101	X5M	C07-C06-N03	-4.33	115.64	122.42
2	A	1101	X5M	C21-C15-N16	-4.09	117.65	122.84
2	B	1101	X5M	C21-C20-C18	3.61	116.35	111.31
2	D	1101	X5M	C20-C21-C15	3.55	112.86	108.13
2	A	1101	X5M	C10-C09-C15	-3.54	115.84	120.24
2	A	1101	X5M	C09-C15-N16	-3.26	114.24	117.03
2	A	1101	X5M	C18-N17-N16	-3.21	122.72	126.35
2	A	1101	X5M	C07-C06-N03	-3.08	117.59	122.42
2	D	1101	X5M	C08-C09-C15	-3.02	117.12	120.74
2	D	1101	X5M	C09-C10-C11	-2.85	115.43	119.06
2	B	1101	X5M	C04-N03-C02	2.77	121.54	116.31
2	D	1101	X5M	C18-N17-N16	-2.66	123.35	126.35
2	B	1101	X5M	C20-C21-C15	2.53	111.51	108.13
2	A	1101	X5M	C08-C09-C15	2.51	123.75	120.74
2	A	1101	X5M	C04-N03-C02	2.51	121.06	116.31
2	C	1101	X5M	C22-C21-C15	-2.50	105.73	109.70
2	C	1101	X5M	C21-C15-N16	-2.47	119.70	122.84
2	D	1101	X5M	C08-C09-C10	2.38	122.00	119.25
2	A	1101	X5M	C22-C21-C15	-2.28	106.08	109.70
2	D	1101	X5M	C21-C20-C18	2.24	114.44	111.31
2	C	1101	X5M	C21-C20-C18	2.24	114.44	111.31
2	B	1101	X5M	C10-C09-C15	-2.20	117.51	120.24
2	A	1101	X5M	C21-C20-C18	2.03	114.16	111.31
2	D	1101	X5M	C21-C15-N16	-2.02	120.28	122.84

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	1101	X5M	C01-C02-N03-C06
2	A	1101	X5M	C11-C06-N03-C04
2	C	1101	X5M	C01-C02-N03-C06
2	B	1101	X5M	C01-C02-N03-C06
2	C	1101	X5M	C01-C02-N03-C04
2	D	1101	X5M	C01-C02-N03-C04
2	B	1101	X5M	C01-C02-N03-C04
2	C	1101	X5M	C11-C06-N03-C04
2	C	1101	X5M	C05-C04-N03-C06
2	C	1101	X5M	C05-C04-N03-C02
2	A	1101	X5M	C05-C04-N03-C02
2	B	1101	X5M	C11-C06-N03-C04

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Mol	Chain	Res	Type	Atoms
2	B	1101	X5M	C07-C06-N03-C04
2	A	1101	X5M	C05-C04-N03-C06
2	A	1101	X5M	C07-C06-N03-C04

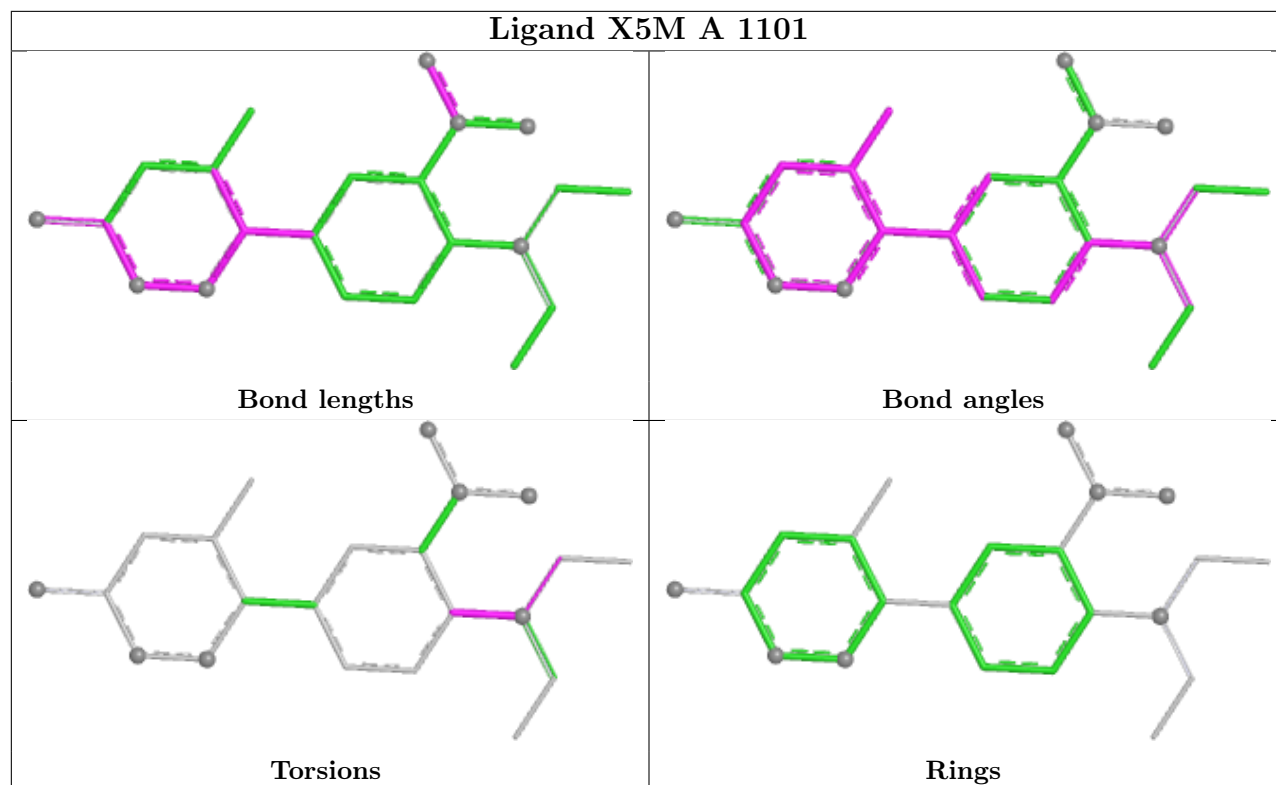
There are no ring outliers.

3 monomers are involved in 7 short contacts:

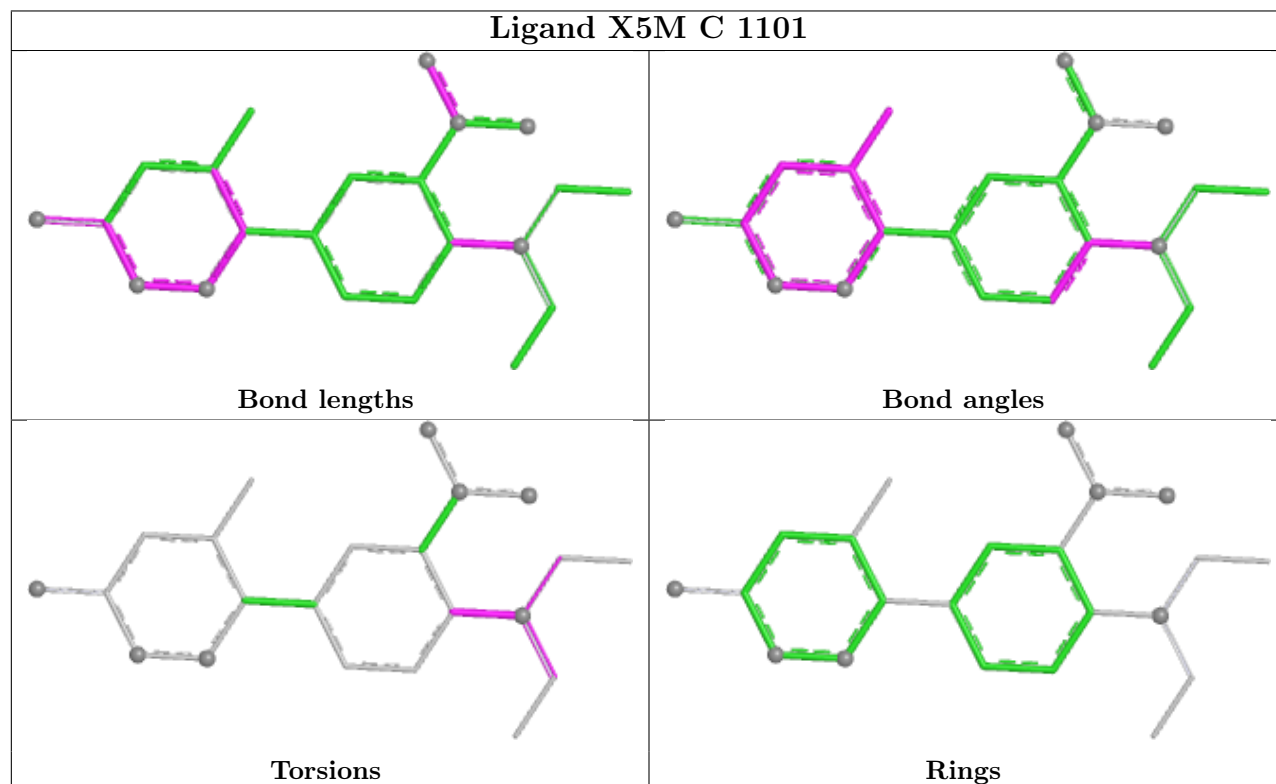
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1101	X5M	2	0
2	B	1101	X5M	2	0
2	D	1101	X5M	3	0

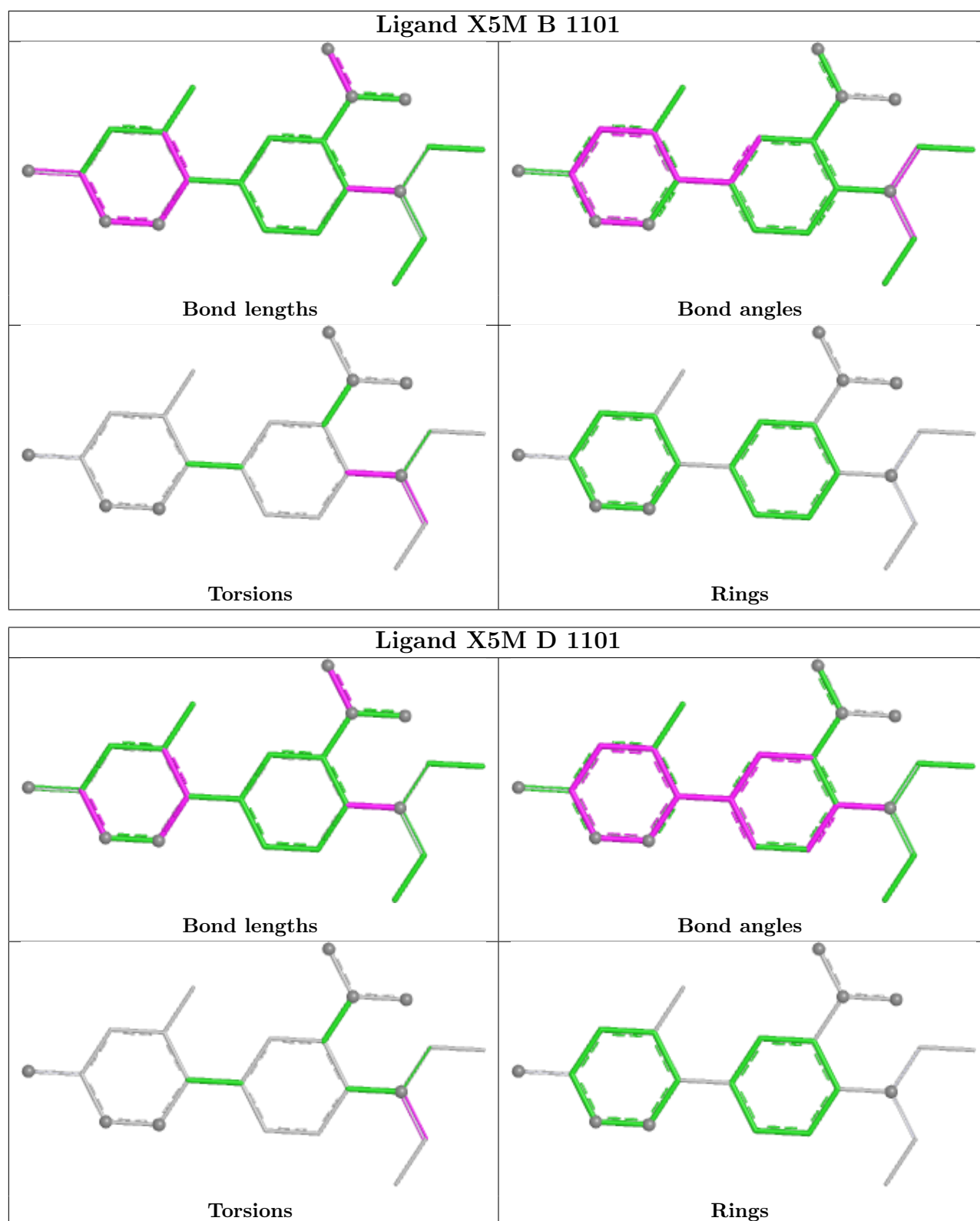
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

Ligand X5M A 1101



Ligand X5M C 1101





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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	363/380 (95%)	0.25	11 (3%)	52	51	25, 52, 89, 129	1 (0%)
1	B	365/380 (96%)	0.37	18 (4%)	35	34	24, 56, 96, 131	1 (0%)
1	C	365/380 (96%)	0.21	13 (3%)	46	45	23, 45, 82, 116	1 (0%)
1	D	371/380 (97%)	0.14	10 (2%)	56	55	21, 45, 79, 115	1 (0%)
All	All	1464/1520 (96%)	0.24	52 (3%)	46	45	21, 49, 90, 131	4 (0%)

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	809	VAL	5.0
1	C	779	ILE	4.3
1	A	809	VAL	3.9
1	D	928	VAL	3.5
1	C	780	GLY	3.4
1	D	809	VAL	3.3
1	A	778	VAL	3.2
1	B	800	SER	3.1
1	C	1069	ARG	3.1
1	C	798	GLY	3.0
1	D	1093	GLU	3.0
1	B	924	VAL	2.9
1	A	810	THR	2.8
1	B	676	PRO	2.8
1	C	1092	GLU	2.8
1	D	776	SER	2.7
1	A	674	PRO	2.7
1	B	812	ASP	2.7
1	B	928	VAL	2.6
1	C	1093	GLU	2.6
1	B	726	GLU	2.6

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Mol	Chain	Res	Type	RSRZ
1	C	1029	GLY	2.6
1	A	675	GLU	2.5
1	C	676	PRO	2.5
1	D	811	ASP	2.4
1	B	706	LYS	2.4
1	C	708	GLY	2.4
1	B	669	LYS	2.4
1	B	675	GLU	2.4
1	D	929	GLY	2.4
1	D	669	LYS	2.3
1	B	671	ILE	2.3
1	B	707	CYS	2.3
1	B	1093	GLU	2.3
1	B	780	GLY	2.3
1	B	799	GLY	2.3
1	C	993	SER	2.3
1	D	779	ILE	2.3
1	D	1072	TYR	2.3
1	A	676	PRO	2.2
1	B	685	ILE	2.2
1	A	928	VAL	2.2
1	A	707	CYS	2.2
1	D	810	THR	2.2
1	B	1068	ARG	2.1
1	B	927	ASP	2.1
1	A	1027	VAL	2.1
1	C	927	ASP	2.1
1	A	807	TYR	2.0
1	B	1072	TYR	2.0
1	C	672	LEU	2.0
1	A	1072	TYR	2.0

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 oligosaccharides in this entry.

6.4 Ligands

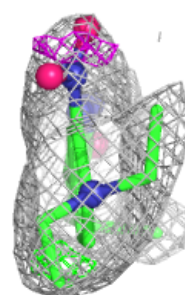
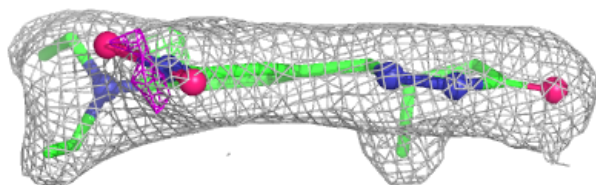
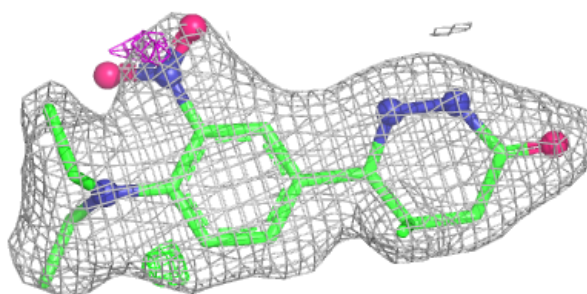
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	ACT	A	1104	4/4	0.86	0.12	58,58,62,63	0
5	ACT	C	1104	4/4	0.87	0.15	47,55,61,62	0
5	ACT	B	1104	4/4	0.89	0.14	54,63,76,79	0
2	X5M	A	1101	22/22	0.90	0.11	38,50,66,82	0
2	X5M	B	1101	22/22	0.91	0.11	33,45,71,77	0
2	X5M	C	1101	22/22	0.92	0.11	32,43,67,77	0
5	ACT	D	1104	4/4	0.92	0.12	45,47,47,53	0
2	X5M	D	1101	22/22	0.94	0.09	27,35,61,68	0
4	MG	A	1103	1/1	0.98	0.03	27,27,27,27	0
4	MG	C	1103	1/1	0.99	0.02	27,27,27,27	0
3	MN	D	1102	1/1	0.99	0.06	32,32,32,32	0
3	MN	C	1102	1/1	0.99	0.03	36,36,36,36	0
3	MN	B	1102	1/1	0.99	0.03	37,37,37,37	0
3	MN	A	1102	1/1	0.99	0.04	37,37,37,37	0
4	MG	D	1103	1/1	1.00	0.03	25,25,25,25	0
4	MG	B	1103	1/1	1.00	0.01	29,29,29,29	0

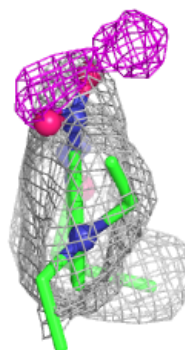
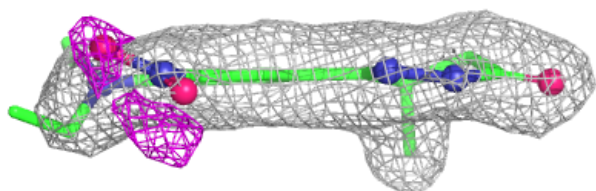
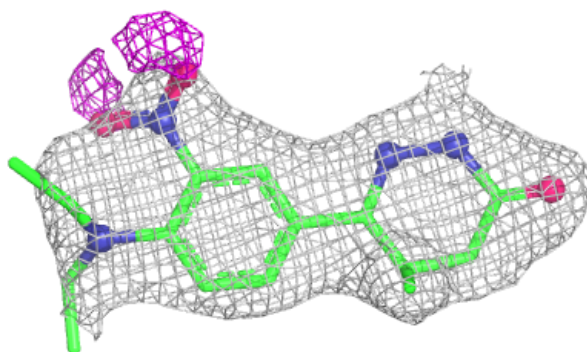
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around X5M A 1101:

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

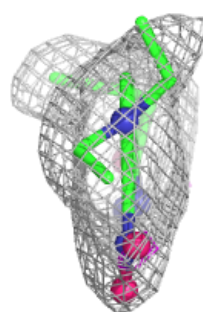
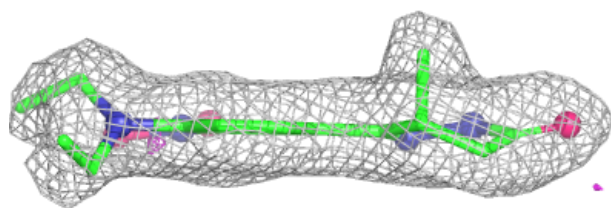
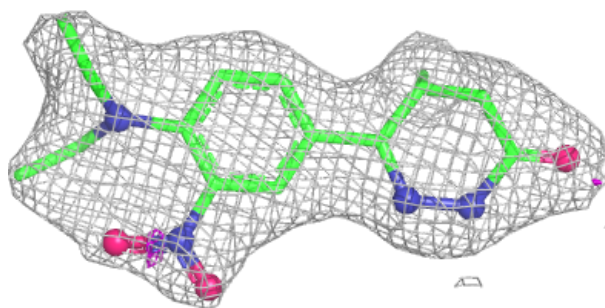
**Electron density around X5M B 1101:**

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

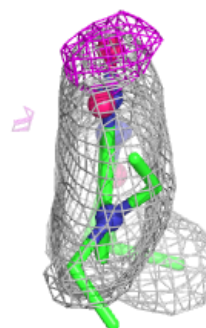
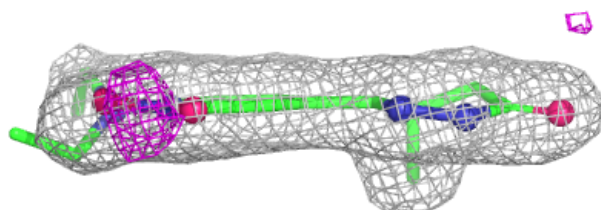
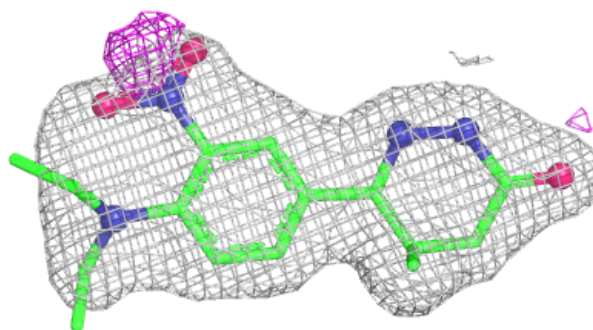


Electron density around X5M C 1101:

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

**Electron density around X5M D 1101:**

$2mF_o-DF_c$ (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.