



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 20, 2020 – 09:21 AM BST

PDB ID : 6UXX
Title : PRMT5:MEP50 Complexed with Allosteric Inhibitor Compound 1a
Authors : Palte, R.L.; Schneider, S.E.
Deposited on : 2019-11-08
Resolution : 2.69 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.13
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.13

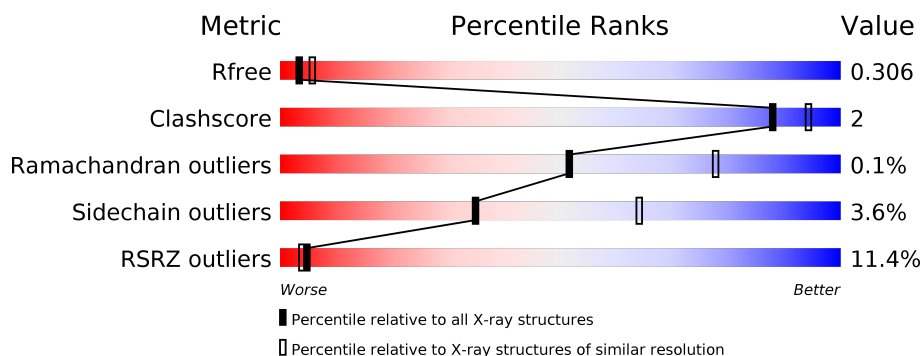
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.69 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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 on 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	645	
2	B	350	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7355 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 Protein arginine N-methyltransferase 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	610	Total	C	N	O	S	0	0	0
			4933	3159	848	903	23			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	MET	-	expression tag	UNP O14744
A	-6	ASP	-	expression tag	UNP O14744
A	-5	TYR	-	expression tag	UNP O14744
A	-4	LYS	-	expression tag	UNP O14744
A	-3	ASP	-	expression tag	UNP O14744
A	-2	ASP	-	expression tag	UNP O14744
A	-1	ASP	-	expression tag	UNP O14744
A	0	ASP	-	expression tag	UNP O14744
A	1	LYS	-	expression tag	UNP O14744

- Molecule 2 is a protein called Methylosome protein 50.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	310	Total	C	N	O	S	0	0	0
			2339	1468	400	457	14			

There are 9 discrepancies between the modelled and reference sequences:

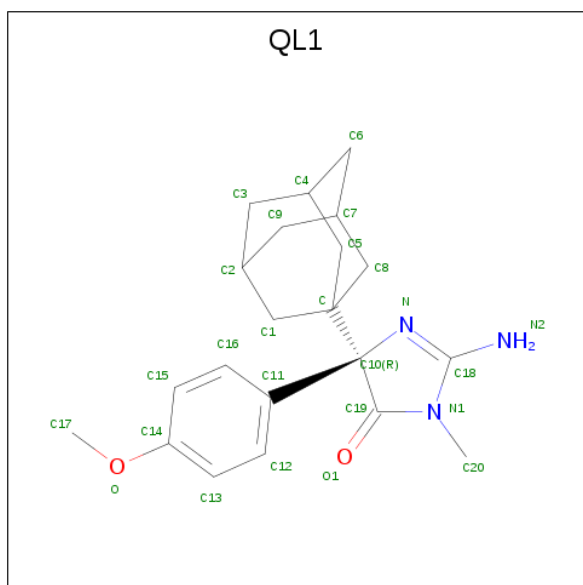
Chain	Residue	Modelled	Actual	Comment	Reference
B	-7	MET	-	expression tag	UNP Q9BQA1
B	-6	HIS	-	expression tag	UNP Q9BQA1
B	-5	HIS	-	expression tag	UNP Q9BQA1
B	-4	HIS	-	expression tag	UNP Q9BQA1
B	-3	HIS	-	expression tag	UNP Q9BQA1
B	-2	HIS	-	expression tag	UNP Q9BQA1
B	-1	HIS	-	expression tag	UNP Q9BQA1

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Chain	Residue	Modelled	Actual	Comment	Reference
B	0	HIS	-	expression tag	UNP Q9BQA1
B	1	HIS	-	expression tag	UNP Q9BQA1

- Molecule 3 is (5R)-2-amino-5-(4-methoxyphenyl)-3-methyl-5-[(3S,5S,7S)-tricyclo[3.3.1.1^{3,7}]decan-1-yl]-3,5-dihydro-4H-imidazol-4-one (three-letter code: QL1) (formula: C₂₁H₂₇N₃O₂) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			26	21	3	2		

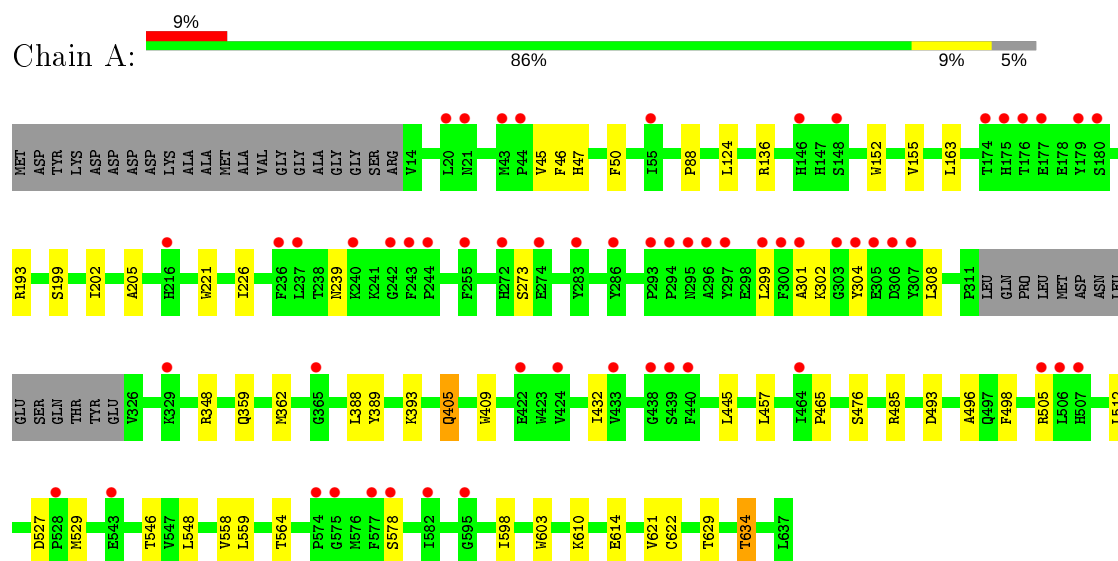
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	42	Total	O	0	0
			42	42		
4	B	15	Total	O	0	0
			15	15		

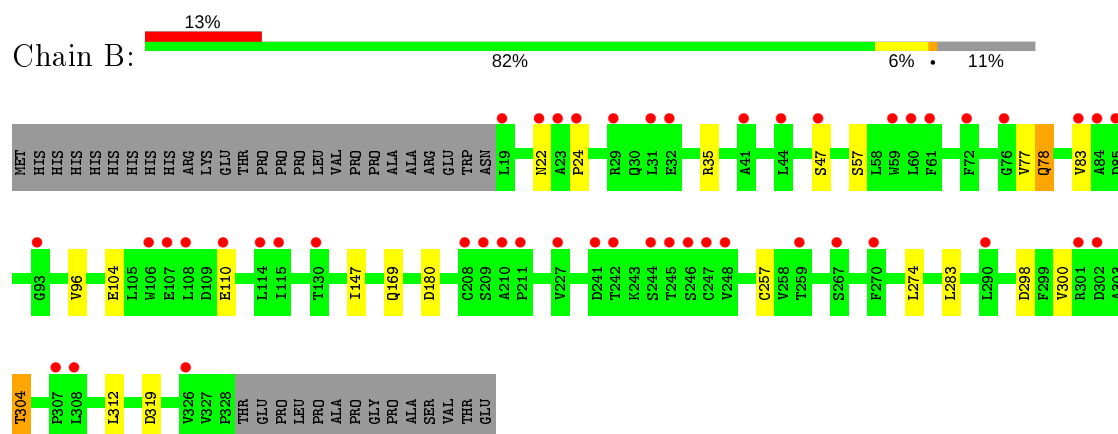
3 Residue-property plots [i](#)

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: Protein arginine N-methyltransferase 5



- Molecule 2: Methylosome protein 50



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	103.07Å 138.78Å 178.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.58 – 2.69 34.58 – 2.69	Depositor EDS
% Data completeness (in resolution range)	98.9 (34.58-2.69) 98.9 (34.58-2.69)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.82 (at 2.68Å)	Xtriage
Refinement program	BUSTER 2.11.7	Depositor
R, R_{free}	0.259 , 0.277 0.281 , 0.306	Depositor DCC
R_{free} test set	1765 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	70.2	Xtriage
Anisotropy	0.477	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 43.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	7355	wwPDB-VP
Average B, all atoms (Å ²)	91.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.35% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: QL1

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	0.70	0/5072	0.40	0/6900
2	B	0.71	0/2396	0.44	0/3275
All	All	0.70	0/7468	0.42	0/10175

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	4933	0	4830	20	0
2	B	2339	0	2258	9	0
3	A	26	0	0	0	0
4	A	42	0	0	0	0
4	B	15	0	0	0	0
All	All	7355	0	7088	28	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 2.

All (28) 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)
2:B:274:LEU:HD23	2:B:300:VAL:HG12	1.83	0.59
1:A:405:GLN:HA	1:A:409:TRP:HB2	1.90	0.54
2:B:35:ARG:HA	2:B:304:THR:HG21	1.91	0.52
1:A:152:TRP:HB3	1:A:205:ALA:HB2	1.90	0.52
2:B:96:VAL:HB	2:B:104:GLU:HB2	1.93	0.51
1:A:485:ARG:HG3	1:A:498:PHE:HZ	1.76	0.50
1:A:512:LEU:HD22	1:A:546:THR:HG21	1.92	0.50
2:B:22:ASN:HD21	2:B:77:VAL:HG23	1.79	0.48
1:A:199:SER:HB3	1:A:202:ILE:HD12	1.96	0.47
2:B:298:ASP:HB2	2:B:319:ASP:HB3	1.95	0.47
1:A:348:ARG:HE	1:A:359:GLN:HE22	1.63	0.47
1:A:432:ILE:HG12	1:A:457:LEU:HD13	1.97	0.47
2:B:57:SER:HB3	2:B:78:GLN:HE21	1.80	0.46
1:A:493:ASP:HB3	1:A:496:ALA:HB2	1.98	0.46
1:A:47:HIS:HB3	1:A:50:PHE:HB2	1.98	0.45
1:A:45:VAL:HG23	1:A:46:PHE:HD1	1.81	0.45
1:A:362:MET:HG2	1:A:389:TYR:HB2	2.00	0.43
1:A:221:TRP:HB3	1:A:226:ILE:HD11	2.00	0.42
1:A:301:ALA:HB1	1:A:304:TYR:HB2	2.01	0.42
1:A:603:TRP:HB2	1:A:614:GLU:HB2	2.00	0.42
2:B:24:PRO:HG3	2:B:78:GLN:HB2	2.02	0.41
1:A:610:LYS:HD2	1:A:634:THR:HG21	2.03	0.41
1:A:548:LEU:HD13	1:A:598:ILE:HD13	2.01	0.41
1:A:88:PRO:HB2	2:B:169:GLN:HE22	1.86	0.41
2:B:47:SER:HB3	2:B:83:VAL:H	1.86	0.41
1:A:476:SER:HB2	1:A:512:LEU:HD21	2.02	0.41
1:A:465:PRO:HA	1:A:559:LEU:HA	2.03	0.40
1:A:558:VAL:HA	1:A:564:THR:HG22	2.03	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	606/645 (94%)	583 (96%)	23 (4%)	0	100	100
2	B	308/350 (88%)	289 (94%)	18 (6%)	1 (0%)	41	66
All	All	914/995 (92%)	872 (95%)	41 (4%)	1 (0%)	51	78

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	147	ILE

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	543/570 (95%)	521 (96%)	22 (4%)	30	59
2	B	263/298 (88%)	256 (97%)	7 (3%)	44	74
All	All	806/868 (93%)	777 (96%)	29 (4%)	35	64

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	124	LEU
1	A	136	ARG
1	A	155	VAL
1	A	163	LEU
1	A	193	ARG
1	A	239	ASN
1	A	273	SER
1	A	299	LEU
1	A	302	LYS
1	A	308	LEU
1	A	388	LEU
1	A	393	LYS
1	A	405	GLN
1	A	445	LEU
1	A	505	ARG

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Mol	Chain	Res	Type
1	A	527	ASP
1	A	529	MET
1	A	578	SER
1	A	621	VAL
1	A	622	CYS
1	A	629	THR
1	A	634	THR
2	B	78	GLN
2	B	110	GLU
2	B	180	ASP
2	B	257	CYS
2	B	283	LEU
2	B	304	THR
2	B	312	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	359	GLN
1	A	381	GLN
1	A	394	ASN
2	B	22	ASN
2	B	78	GLN
2	B	294	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

1 ligand is 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$
3	QL1	A	701	-	26,30,30	0.78	0	34,48,48	0.43	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	QL1	A	701	-	-	0/8/63/63	0/6/5/5

There are no bond length outliers.

There are no bond angle outliers.

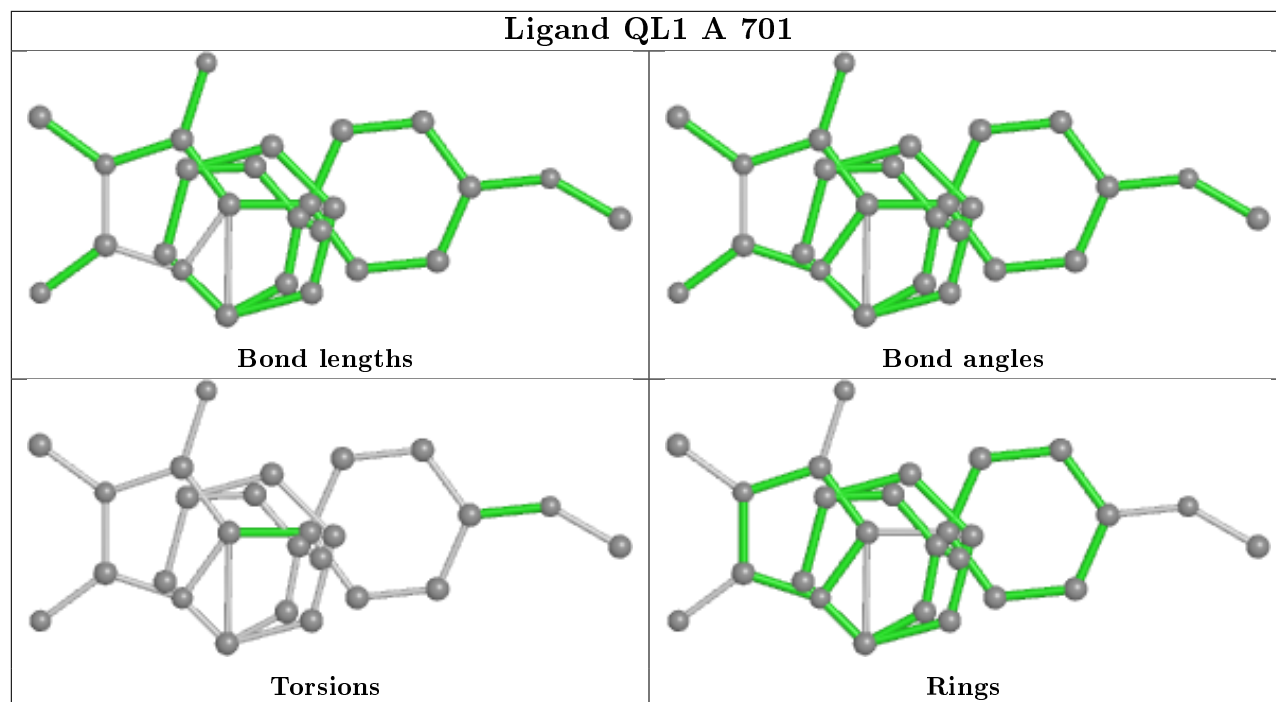
There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	610/645 (94%)	0.61	58 (9%) 8 6	58, 83, 129, 155	0
2	B	310/350 (88%)	0.94	47 (15%) 2 1	78, 98, 119, 130	0
All	All	920/995 (92%)	0.72	105 (11%) 5 4	58, 91, 123, 155	0

All (105) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	296	ALA	7.1
2	B	209	SER	6.8
1	A	305	GLU	6.4
1	A	297	TYR	6.2
1	A	575	GLY	6.0
1	A	175	HIS	5.9
2	B	210	ALA	5.9
1	A	306	ASP	5.8
1	A	304	TYR	5.7
1	A	176	THR	5.7
1	A	300	PHE	5.6
1	A	577	PHE	5.1
2	B	22	ASN	4.8
1	A	293	PRO	4.7
1	A	578	SER	4.5
2	B	245	THR	4.4
2	B	290	LEU	4.3
1	A	294	PRO	4.2
1	A	438	GLY	3.9
1	A	299	LEU	3.7
2	B	115	ILE	3.7
2	B	308	LEU	3.7
2	B	208	CYS	3.6
1	A	301	ALA	3.6

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Mol	Chain	Res	Type	RSRZ
1	A	174	THR	3.6
2	B	246	SER	3.5
1	A	439	SER	3.5
2	B	24	PRO	3.4
1	A	243	PHE	3.4
1	A	574	PRO	3.4
1	A	507	HIS	3.3
1	A	179	TYR	3.3
2	B	110	GLU	3.2
2	B	41	ALA	3.2
2	B	106	TRP	3.1
2	B	301	ARG	3.1
1	A	177	GLU	3.1
1	A	146	HIS	3.0
1	A	55	ILE	3.0
2	B	85	ASP	3.0
2	B	76	GLY	2.9
2	B	114	LEU	2.9
2	B	211	PRO	2.9
1	A	180	SER	2.9
1	A	255	PHE	2.9
2	B	307	PRO	2.9
1	A	528	PRO	2.8
2	B	23	ALA	2.8
1	A	295	ASN	2.8
2	B	248	VAL	2.7
1	A	240	LYS	2.7
2	B	244	SER	2.7
1	A	21	ASN	2.7
2	B	247	CYS	2.7
1	A	216	HIS	2.7
1	A	595	GLY	2.7
2	B	72	PHE	2.6
2	B	32	GLU	2.5
2	B	227	VAL	2.5
2	B	60	LEU	2.5
2	B	270	PHE	2.5
2	B	84	ALA	2.5
1	A	543	GLU	2.5
2	B	267	SER	2.5
1	A	307	TYR	2.5
1	A	422	GLU	2.4

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Mol	Chain	Res	Type	RSRZ
2	B	83	VAL	2.4
1	A	286	TYR	2.3
1	A	236	PHE	2.3
1	A	505	ARG	2.3
2	B	242	THR	2.3
1	A	44	PRO	2.3
1	A	20	LEU	2.3
1	A	440	PHE	2.3
1	A	424	VAL	2.3
2	B	59	TRP	2.3
1	A	272	HIS	2.3
1	A	242	GLY	2.2
2	B	31	LEU	2.2
2	B	259	THR	2.2
1	A	244	PRO	2.2
1	A	329	LYS	2.2
1	A	365	GLY	2.2
1	A	237	LEU	2.2
2	B	107	GLU	2.2
2	B	108	LEU	2.2
1	A	506	LEU	2.1
2	B	19	LEU	2.1
2	B	302	ASP	2.1
1	A	148	SER	2.1
2	B	47	SER	2.1
1	A	283	TYR	2.1
1	A	274	GLU	2.1
1	A	303	GLY	2.1
2	B	44	LEU	2.1
1	A	464	ILE	2.1
2	B	93	GLY	2.1
1	A	433	VAL	2.0
1	A	582	ILE	2.0
2	B	130	THR	2.0
2	B	241	ASP	2.0
2	B	61	PHE	2.0
2	B	29	ARG	2.0
2	B	326	VAL	2.0
1	A	43	MET	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 monosaccharides in this entry.

6.4 Ligands [i](#)

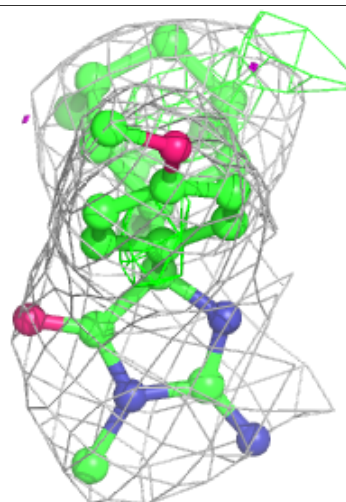
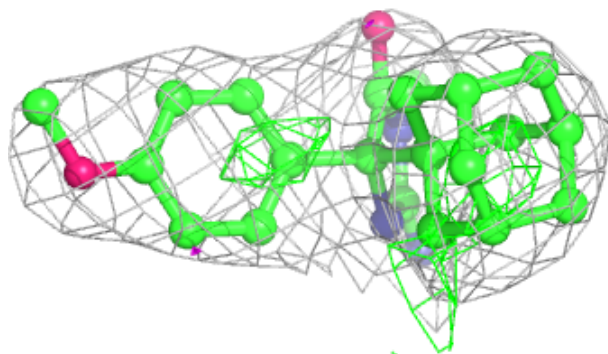
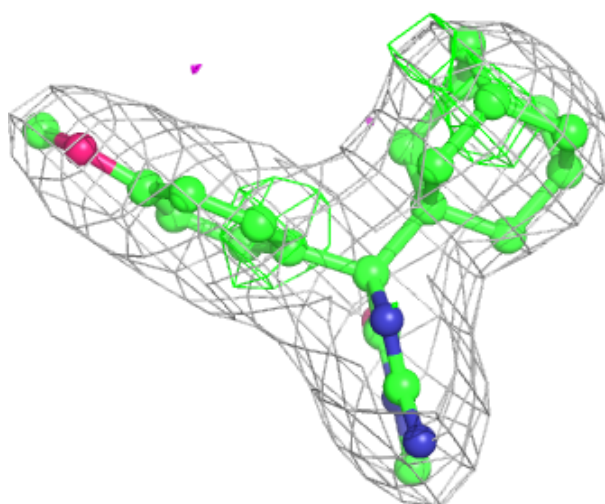
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	QL1	A	701	26/26	0.94	0.24	60,64,65,66	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 QL1 A 701:

$2mF_o-DF_c$ (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.