WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Mar 2, 2026 – 10:26 AM EST

PDB ID	:	1OMW / pdb_000010mw
Title	:	N-Alkyl & N-Aryl Aminopyrazole Spirocarbamates: A Two-Pronged Lead Optimization Strategy to Identify Orally Bioavailable Plasma Kallikrein Inhibitors compound 25 ((3'R)-1'-{(1P)-5-amino-1-[2-(trifluoromethoxy)phenyl]-1H-pyrazole-4-carbonyl}-6-chloro-5-fluorospiro[[3,1]benzoxazine-4,3'-piperidin]-2(1H)-one)
Authors	:	Merchant, R.R.; Chernyak, N.; Lopez, J.A.; Sharp, P.P.; Mandal, M.; Je, J.; Hruza, A.; Rearden, P.; Tatosian, D.A.; Lin, K.; Esmay, J.; Yang, S.; Cheng, A.; Ellsworth, K.; Poiou, T.; Fier, P.; Hicks, J.; Sinz, C.; Ogawa, A.
Deposited on	:	2026-01-28
Resolution	:	1.62 Å(reported)

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	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)

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 1.62 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.
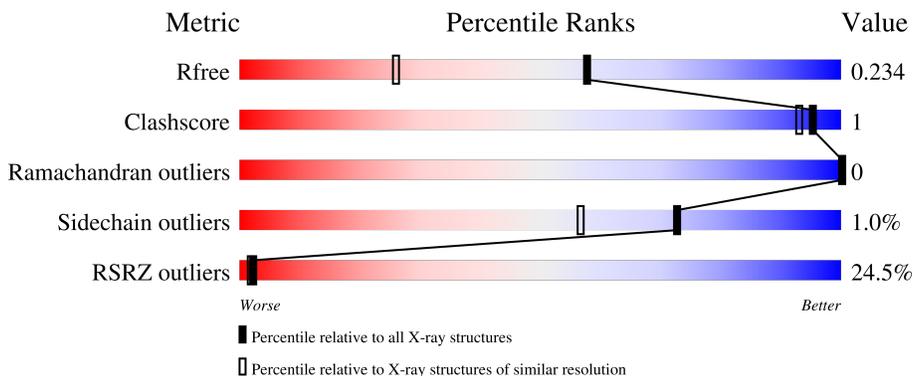
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	6077 (1.64-1.60)
Clashscore	180529	6617 (1.64-1.60)
Ramachandran outliers	177936	6498 (1.64-1.60)
Sidechain outliers	177891	6497 (1.64-1.60)
RSRZ outliers	164620	6075 (1.64-1.60)

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 <=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	275	

Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

2　Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 3939 atoms, of which 1856 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 Plasma kallikrein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	233	Total 3662	C 1178	H 1812	N 320	O 341	S 11	1800	0	0

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	370	LYS	-	expression tag	UNP P03952
A	371	ARG	-	expression tag	UNP P03952
A	372	GLU	-	expression tag	UNP P03952
A	373	ALA	-	expression tag	UNP P03952
A	374	GLU	-	expression tag	UNP P03952
A	375	ALA	-	expression tag	UNP P03952
A	383	SER	CYS	engineered mutation	UNP P03952
A	503	SER	CYS	engineered mutation	UNP P03952
A	639	HIS	-	expression tag	UNP P03952
A	640	HIS	-	expression tag	UNP P03952
A	641	HIS	-	expression tag	UNP P03952
A	642	HIS	-	expression tag	UNP P03952
A	643	HIS	-	expression tag	UNP P03952
A	644	HIS	-	expression tag	UNP P03952

- Molecule 2 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).

MES
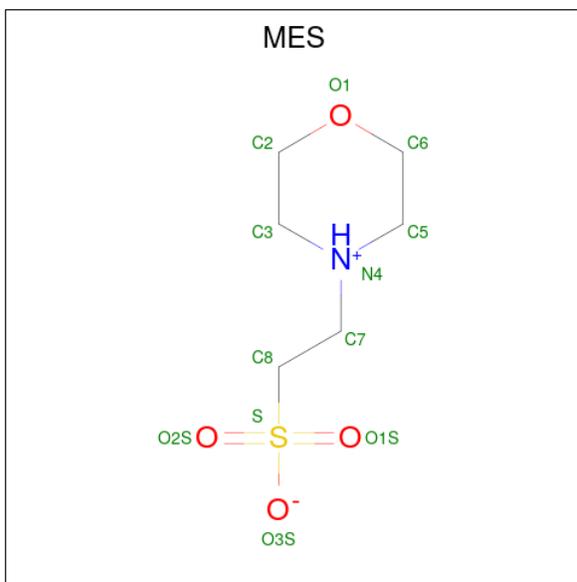
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	H	N	O	S	13	0
			25	6	13	1	4	1		

- Molecule 3 is (3'R)-1'-{(1P)-5-amino-1-[2-(trifluoromethoxy)phenyl]-1H-pyrazole-4-carbo
nyl}-6-chloro-5-fluorospiro[[3,1]benzoxazine-4,3'-piperidin]-2(1H)-one (CCD ID: A1C6Z)
(formula: $C_{23}H_{18}ClF_4N_5O_4$) (labeled as "Ligand of Interest" by depositor).
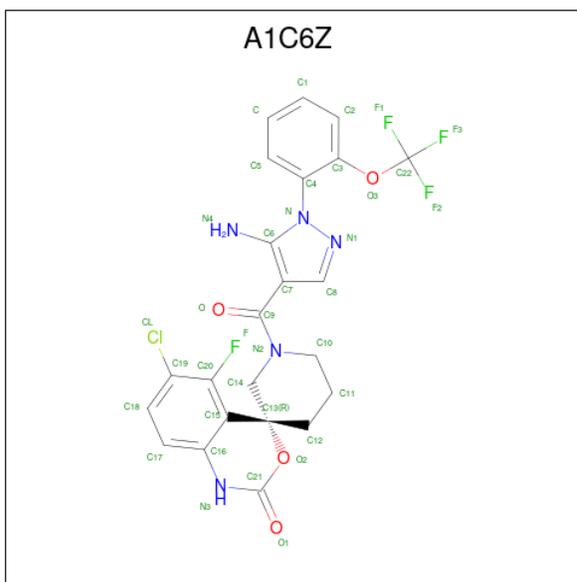
A1C6Z

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
3	A	1	Total	C	Cl	F	H	N	O	18	0
			55	23	1	4	18	5	4		

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula:

$C_8H_{15}NO_6$).
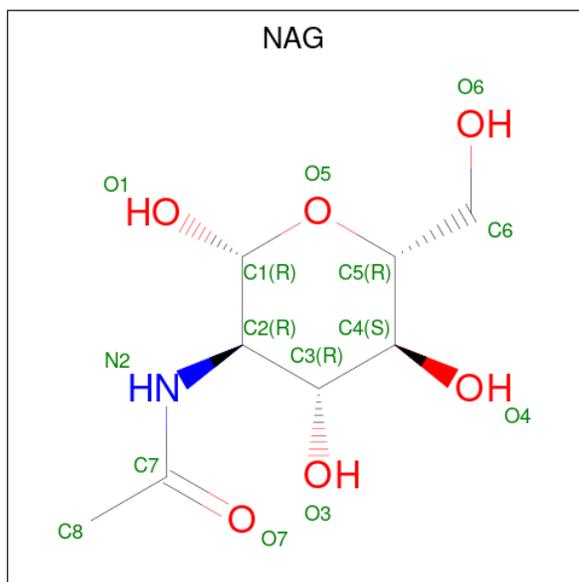
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 27	C 8	H 13	N 1	O 5	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	170	Total 170	O 170	0	0

3 Residue-property plots ⓘ

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: Plasma kallikrein
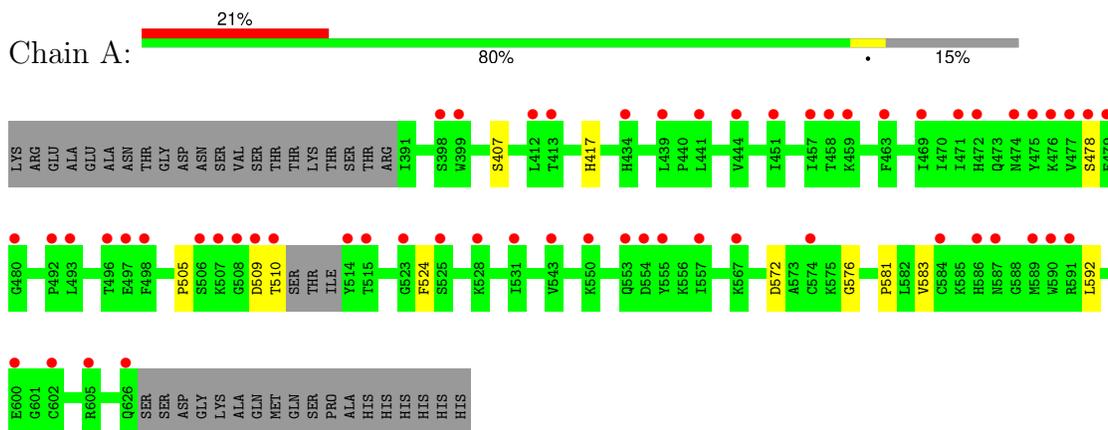
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	65.53Å 77.98Å 47.57Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.57 – 1.62 47.57 – 1.62	Depositor EDS
% Data completeness (in resolution range)	69.2 (47.57-1.62) 69.2 (47.57-1.62)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.17 (at 1.63Å)	Xtriage
Refinement program	autoBUSTER 2.11.7	Depositor
R, R_{free}	0.209 , 0.234 0.206 , 0.234	Depositor DCC
R_{free} test set	10775 reflections (34.17%)	wwPDB-VP
Wilson B-factor (Å^2)	9.5	Xtriage
Anisotropy	0.617	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 47.1	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	3939	wwPDB-VP
Average B, all atoms (Å^2)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.52% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1] Intensities estimated from amplitudes.
[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: NAG, MES, A1C6Z

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	0.85	0/1896	1.01	3/2569 (0.1%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	509	ASP	CA-CB-CG	7.19	119.79	112.60
1	A	524	PHE	CA-CB-CG	6.47	120.27	113.80
1	A	572	ASP	CA-CB-CG	5.59	118.19	112.60

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	1850	1812	1811	4	0
2	A	12	13	13	0	0
3	A	37	18	0	0	0
4	A	14	13	13	0	0
5	A	170	0	0	0	0
All	All	2083	1856	1837	4	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 1.

All (4) 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:407:SER:OG	1:A:417:HIS:HD2	1.94	0.49
1:A:505:PRO:HD3	1:A:592:LEU:O	2.16	0.45
1:A:417:HIS:HE1	1:A:576:GLY:O	2.01	0.43
1:A:581:PRO:HB2	1:A:583:VAL:HG13	2.03	0.41

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	229/275 (83%)	226 (99%)	3 (1%)	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	200/236 (85%)	198 (99%)	2 (1%)	73	57

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	478	SER
1	A	510	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	405	GLN
1	A	415	GLN
1	A	417	HIS
1	A	532	GLN
1	A	549	GLN
1	A	586	HIS
1	A	607	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 oligosaccharides in this entry.

5.6   Ligand geometry ⓘ

3 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	$\#|Z| > 2$
4	NAG	A	703	1	14,14,15	0.41	0	17,19,21	1.11	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	MES	A	701	-	12,12,12	0.76	0	15,16,16	0.25	0
3	A1C6Z	A	702	-	34,41,41	0.44	0	41,63,63	0.87	2 (4%)

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
4	NAG	A	703	1	-	1/6/23/26	0/1/1/1
2	MES	A	701	-	-	2/6/14/14	0/1/1/1
3	A1C6Z	A	702	-	-	2/14/44/44	0/5/5/5

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	703	NAG	C1-C2-N2	2.62	114.56	110.43
3	A	702	A1C6Z	C3-C4-N	2.54	121.08	117.99
4	A	703	NAG	C1-O5-C5	2.49	115.52	112.19
3	A	702	A1C6Z	C2-C3-C4	2.16	120.97	117.64

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	702	A1C6Z	C5-C4-N-N1
3	A	702	A1C6Z	C8-C7-C9-O
4	A	703	NAG	C1-C2-N2-C7
2	A	701	MES	C8-C7-N4-C3
2	A	701	MES	C8-C7-N4-C5

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 then 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 A1C6Z A 702
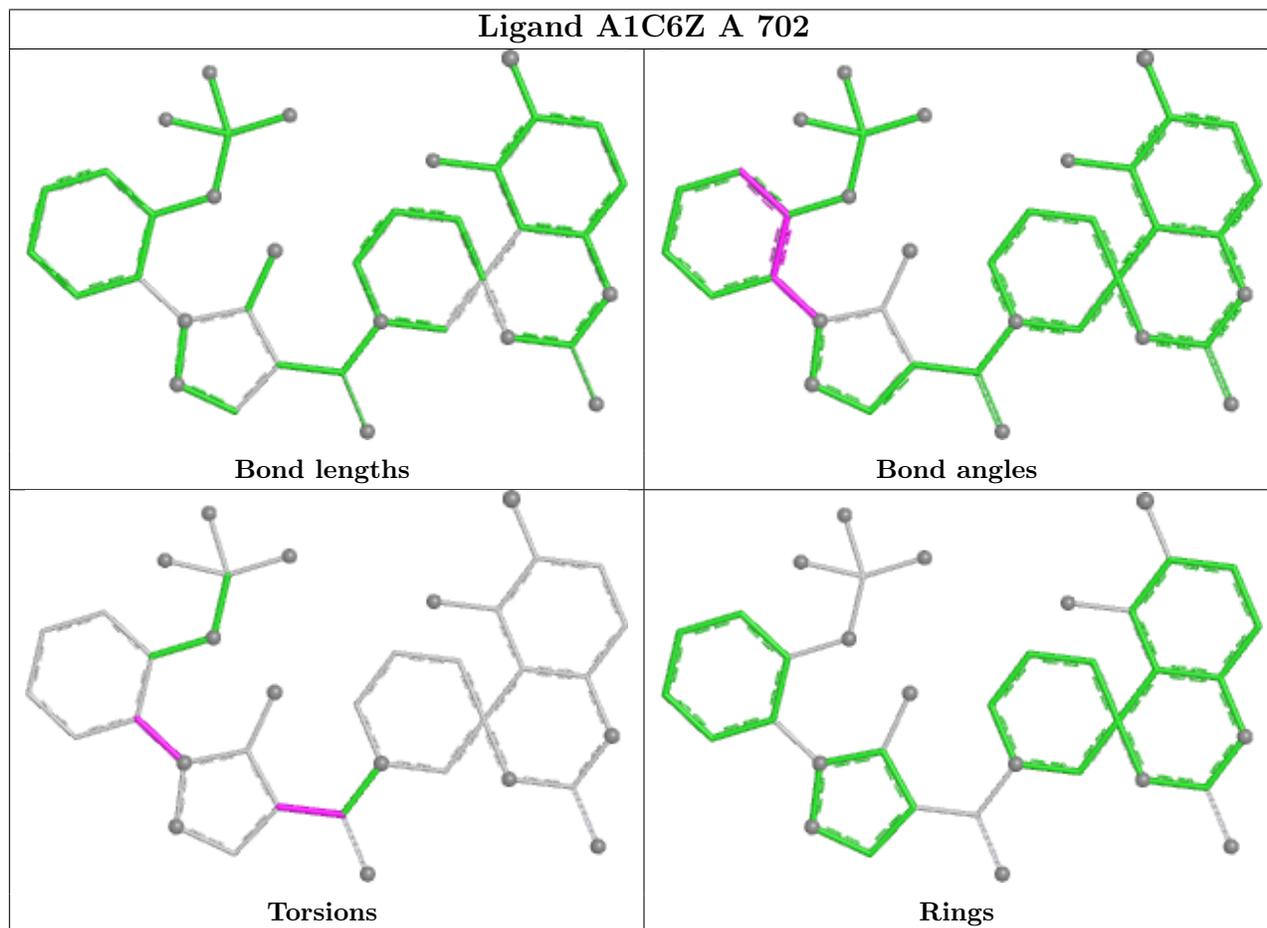
5.7 Other polymers ⓘ

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	233/275 (84%)	1.50	57 (24%)	2	2	5, 16, 34, 84	0

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	478	SER	4.6
1	A	510	THR	4.1
1	A	509	ASP	4.1
1	A	399	TRP	4.0
1	A	441	LEU	4.0
1	A	477	VAL	4.0
1	A	496	THR	3.3
1	A	554	ASP	3.2
1	A	602	CYS	3.2
1	A	587	ASN	3.1
1	A	626	GLN	3.0
1	A	506	SER	2.9
1	A	589	MET	2.9
1	A	514	TYR	2.8
1	A	476	LYS	2.8
1	A	474	ASN	2.8
1	A	471	ILE	2.7
1	A	469	ILE	2.7
1	A	553	GLN	2.7
1	A	398	SER	2.7
1	A	412	LEU	2.6
1	A	586	HIS	2.6
1	A	528	LYS	2.6
1	A	550	LYS	2.6
1	A	523	GLY	2.6
1	A	475	TYR	2.5
1	A	555	TYR	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	444	VAL	2.4
1	A	497	GLU	2.4
1	A	463	PHE	2.4
1	A	591	ARG	2.4
1	A	493	LEU	2.4
1	A	605	ARG	2.4
1	A	459	LYS	2.3
1	A	492	PRO	2.3
1	A	451	ILE	2.3
1	A	413	THR	2.3
1	A	515	THR	2.3
1	A	479	GLU	2.3
1	A	584	CYS	2.3
1	A	600	GLU	2.3
1	A	507	LYS	2.3
1	A	508	GLY	2.3
1	A	543	VAL	2.3
1	A	590	TRP	2.2
1	A	557	ILE	2.2
1	A	498	PHE	2.2
1	A	480	GLY	2.2
1	A	574	CYS	2.1
1	A	567	LYS	2.1
1	A	525	SER	2.1
1	A	439	LEU	2.1
1	A	458	THR	2.0
1	A	472	HIS	2.0
1	A	457	ILE	2.0
1	A	434	HIS	2.0
1	A	531	ILE	2.0

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

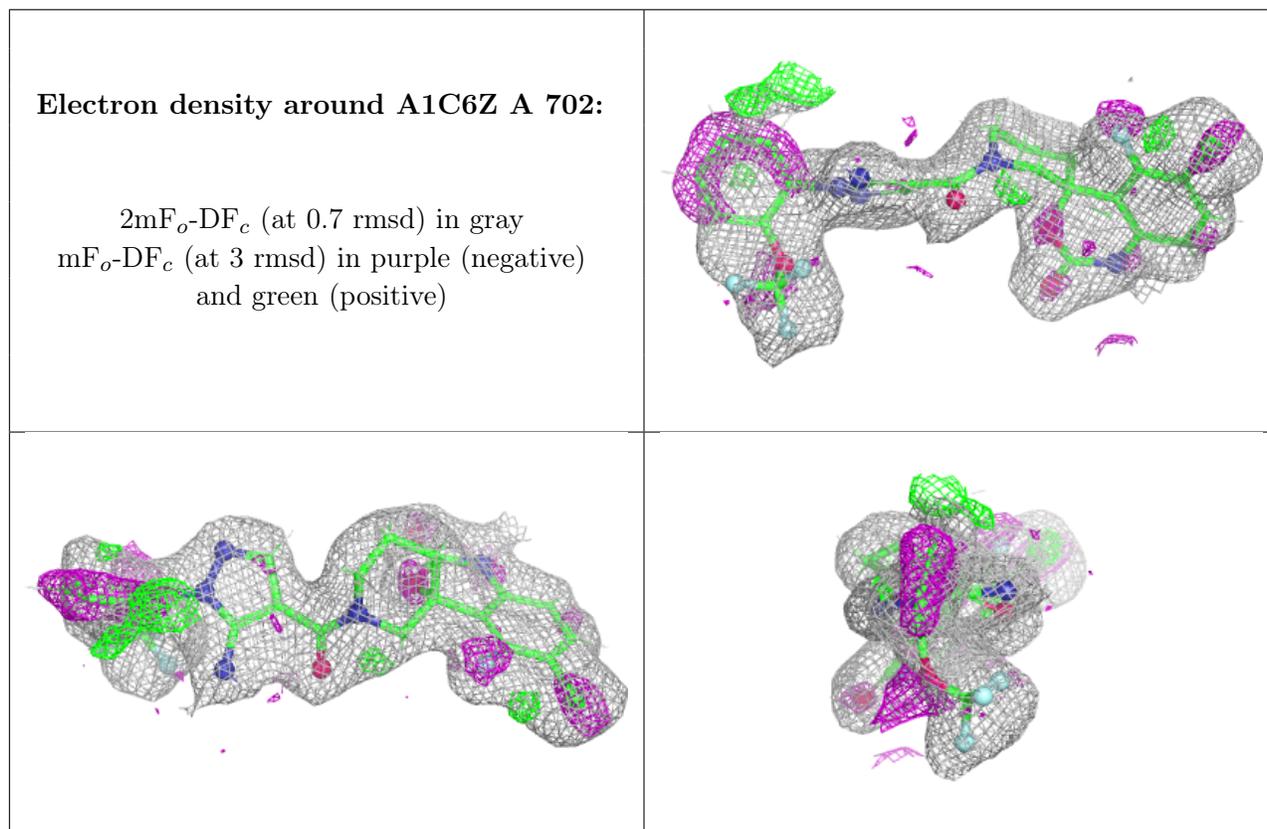There are no non-standard protein/DNA/RNA residues in this entry.

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
4	NAG	A	703	14/15	0.49	0.15	34,36,39,51	0
2	MES	A	701	12/12	0.74	0.20	57,65,68,69	13
3	A1C6Z	A	702	37/37	0.87	0.11	15,18,47,53	18

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 A1C6Z A 702:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.