



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 07:23 AM UTC

PDB ID : 4HYF / pdb_00004hyf
Title : Structural basis and SAR for OD 270, a lead stage 1,2,4-triazole based specific Tankyrase1/2 inhibitor
Authors : Perdreau, H.; Ekblad, B.; Voronkov, A.; Holsworth, D.D.; Waaler, J.; Drewes, G.; Schueler, H.; Krauss, S.; Morth, J.P.
Deposited on : 2012-11-13
Resolution : 2.80 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

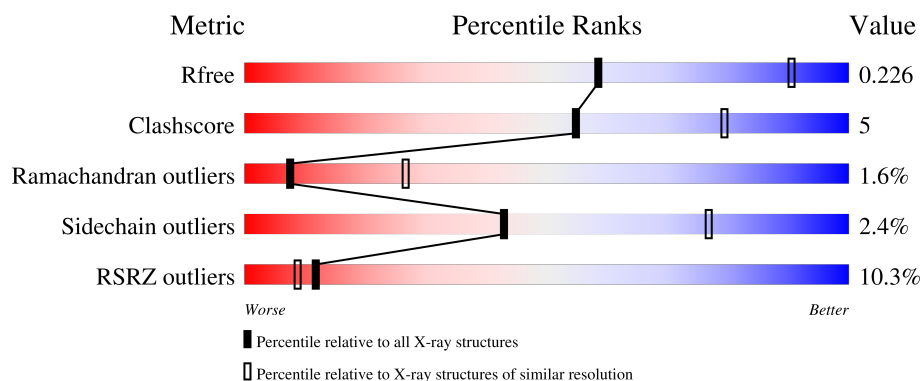
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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	240	8% 80% 13% • 5%
1	B	240	9% 82% 11% • 5%
1	C	240	12% 83% 10% • 5%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5607 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 Tankyrase-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	227	Total	C	N	O	S	0	0	0
			1811	1138	328	333	12			
1	B	227	Total	C	N	O	S	0	0	0
			1811	1138	328	333	12			
1	C	227	Total	C	N	O	S	0	0	0
			1811	1138	328	333	12			

There are 69 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	923	MET	-	expression tag	UNP Q9H2K2
A	924	HIS	-	expression tag	UNP Q9H2K2
A	925	HIS	-	expression tag	UNP Q9H2K2
A	926	HIS	-	expression tag	UNP Q9H2K2
A	927	HIS	-	expression tag	UNP Q9H2K2
A	928	HIS	-	expression tag	UNP Q9H2K2
A	929	HIS	-	expression tag	UNP Q9H2K2
A	930	SER	-	expression tag	UNP Q9H2K2
A	931	SER	-	expression tag	UNP Q9H2K2
A	932	GLY	-	expression tag	UNP Q9H2K2
A	933	VAL	-	expression tag	UNP Q9H2K2
A	934	ASP	-	expression tag	UNP Q9H2K2
A	935	LEU	-	expression tag	UNP Q9H2K2
A	936	GLY	-	expression tag	UNP Q9H2K2
A	937	THR	-	expression tag	UNP Q9H2K2
A	938	GLU	-	expression tag	UNP Q9H2K2
A	939	ASN	-	expression tag	UNP Q9H2K2
A	940	LEU	-	expression tag	UNP Q9H2K2
A	941	TYR	-	expression tag	UNP Q9H2K2
A	942	PHE	-	expression tag	UNP Q9H2K2
A	943	GLN	-	expression tag	UNP Q9H2K2
A	944	SER	-	expression tag	UNP Q9H2K2
A	945	MET	-	expression tag	UNP Q9H2K2

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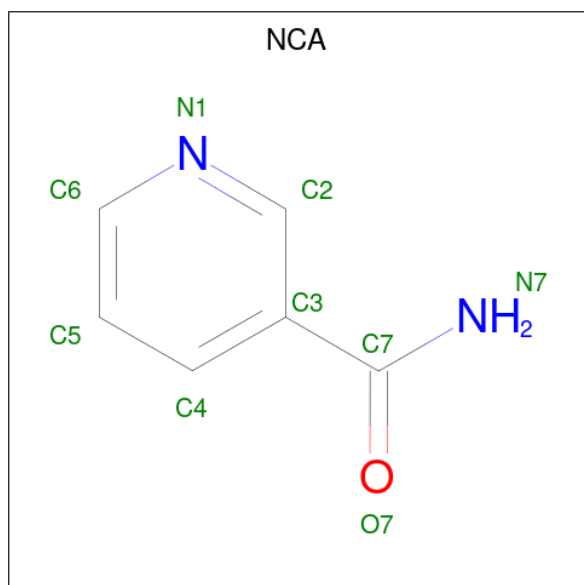
Chain	Residue	Modelled	Actual	Comment	Reference
B	923	MET	-	expression tag	UNP Q9H2K2
B	924	HIS	-	expression tag	UNP Q9H2K2
B	925	HIS	-	expression tag	UNP Q9H2K2
B	926	HIS	-	expression tag	UNP Q9H2K2
B	927	HIS	-	expression tag	UNP Q9H2K2
B	928	HIS	-	expression tag	UNP Q9H2K2
B	929	HIS	-	expression tag	UNP Q9H2K2
B	930	SER	-	expression tag	UNP Q9H2K2
B	931	SER	-	expression tag	UNP Q9H2K2
B	932	GLY	-	expression tag	UNP Q9H2K2
B	933	VAL	-	expression tag	UNP Q9H2K2
B	934	ASP	-	expression tag	UNP Q9H2K2
B	935	LEU	-	expression tag	UNP Q9H2K2
B	936	GLY	-	expression tag	UNP Q9H2K2
B	937	THR	-	expression tag	UNP Q9H2K2
B	938	GLU	-	expression tag	UNP Q9H2K2
B	939	ASN	-	expression tag	UNP Q9H2K2
B	940	LEU	-	expression tag	UNP Q9H2K2
B	941	TYR	-	expression tag	UNP Q9H2K2
B	942	PHE	-	expression tag	UNP Q9H2K2
B	943	GLN	-	expression tag	UNP Q9H2K2
B	944	SER	-	expression tag	UNP Q9H2K2
B	945	MET	-	expression tag	UNP Q9H2K2
C	923	MET	-	expression tag	UNP Q9H2K2
C	924	HIS	-	expression tag	UNP Q9H2K2
C	925	HIS	-	expression tag	UNP Q9H2K2
C	926	HIS	-	expression tag	UNP Q9H2K2
C	927	HIS	-	expression tag	UNP Q9H2K2
C	928	HIS	-	expression tag	UNP Q9H2K2
C	929	HIS	-	expression tag	UNP Q9H2K2
C	930	SER	-	expression tag	UNP Q9H2K2
C	931	SER	-	expression tag	UNP Q9H2K2
C	932	GLY	-	expression tag	UNP Q9H2K2
C	933	VAL	-	expression tag	UNP Q9H2K2
C	934	ASP	-	expression tag	UNP Q9H2K2
C	935	LEU	-	expression tag	UNP Q9H2K2
C	936	GLY	-	expression tag	UNP Q9H2K2
C	937	THR	-	expression tag	UNP Q9H2K2
C	938	GLU	-	expression tag	UNP Q9H2K2
C	939	ASN	-	expression tag	UNP Q9H2K2
C	940	LEU	-	expression tag	UNP Q9H2K2
C	941	TYR	-	expression tag	UNP Q9H2K2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	942	PHE	-	expression tag	UNP Q9H2K2
C	943	GLN	-	expression tag	UNP Q9H2K2
C	944	SER	-	expression tag	UNP Q9H2K2
C	945	MET	-	expression tag	UNP Q9H2K2

- Molecule 2 is NICOTINAMIDE (CCD ID: NCA) (formula: C₆H₆N₂O).



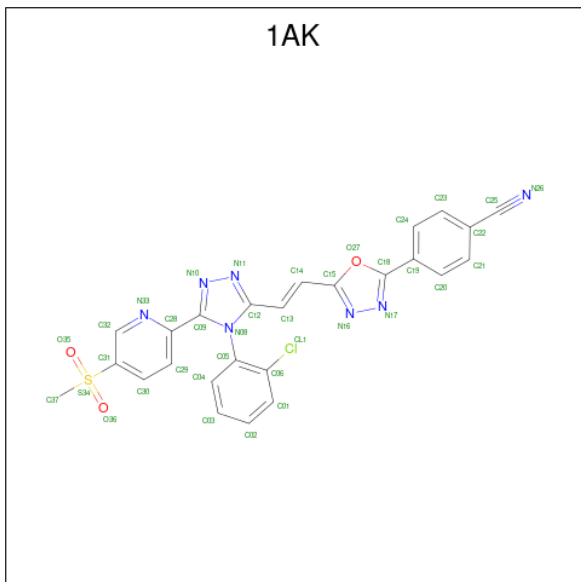
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			9	6	2	1		
2	B	1	Total	C	N	O	0	0
			9	6	2	1		
2	C	1	Total	C	N	O	0	0
			9	6	2	1		

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

- Molecule 4 is 4-{5-[(E)-2-{4-(2-chlorophenyl)-5-[5-(methylsulfonyl)pyridin-2-yl]-4H-

1,2,4-triazol-3-yl}ethenyl]-1,3,4-oxadiazol-2-yl}benzonitrile (CCD ID: 1AK) (formula: C₂₅H₁₆ClN₇O₃S).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	O	S	0	0
			37	25	1	7	3	1		
4	B	1	Total	C	Cl	N	O	S	0	0
			37	25	1	7	3	1		
4	C	1	Total	C	Cl	N	O	S	0	0
			37	25	1	7	3	1		

- Molecule 5 is water.

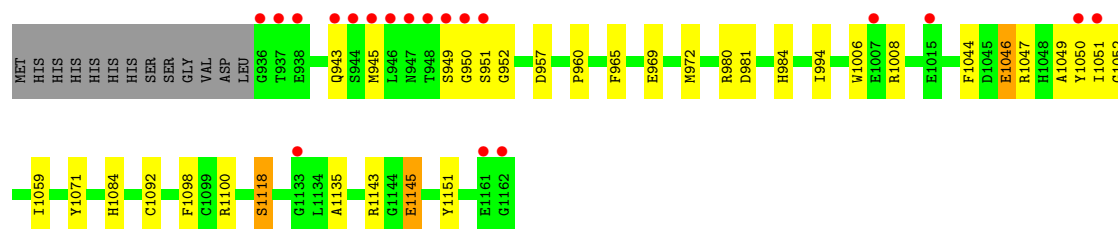
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	13	Total	O	0	0
			13	13		
5	B	15	Total	O	0	0
			15	15		
5	C	5	Total	O	0	0
			5	5		

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.

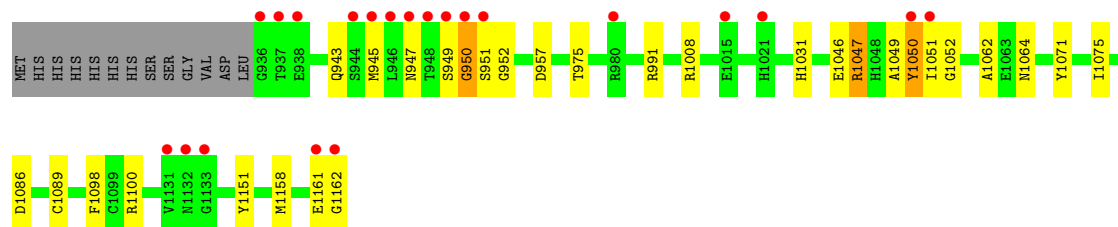
• Molecule 1: Tankyrase-2

Chain A: 



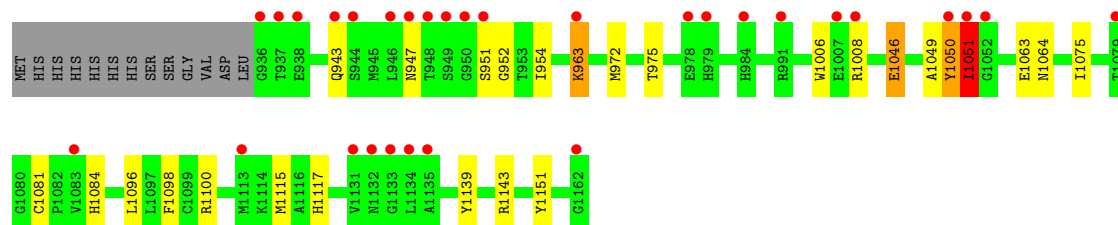
• Molecule 1: Tankyrase-2

Chain B: 



• Molecule 1: Tankyrase-2

Chain C: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	151.54Å 151.54Å 140.52Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	24.86 – 2.80 24.86 – 2.80	Depositor EDS
% Data completeness (in resolution range)	99.8 (24.86-2.80) 99.7 (24.86-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.95 (at 2.81Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8_1069)	Depositor
R, R_{free}	0.211 , 0.225 0.209 , 0.226	Depositor DCC
R_{free} test set	2341 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	47.3	Xtriage
Anisotropy	0.565	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 39.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.036 for -h,-k,l	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	5607	wwPDB-VP
Average B, all atoms (Å ²)	81.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.76% 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: NCA, 1AK, ZN

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	0.29	0/1857	0.71	1/2499 (0.0%)
1	B	0.29	0/1857	0.70	0/2499
1	C	0.28	0/1857	0.68	0/2499
All	All	0.29	0/5571	0.70	1/7497 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1008	ARG	N-CA-C	-5.26	107.52	114.04

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	1811	0	1734	19	0
1	B	1811	0	1734	17	0
1	C	1811	0	1734	15	0
2	A	9	0	6	1	0
2	B	9	0	6	2	0
2	C	9	0	6	0	0
3	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	37	0	16	2	0
4	B	37	0	16	6	0
4	C	37	0	16	1	0
5	A	13	0	0	0	0
5	B	15	0	0	0	0
5	C	5	0	0	0	0
All	All	5607	0	5268	52	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 5.

All (52) 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:C:943:GLN:O	1:C:1100:ARG:NH2	2.26	0.68
1:A:980:ARG:HE	1:A:1135:ALA:HB2	1.57	0.68
1:B:991:ARG:NH1	1:B:1158:MET:SD	2.68	0.66
1:C:1098:PHE:HB3	1:C:1151:TYR:HB2	1.80	0.64
1:A:1044:PHE:HB3	1:A:1059:ILE:HD13	1.78	0.63
1:A:969:GLU:HG3	1:A:994:ILE:HG13	1.83	0.61
1:B:1050:TYR:O	1:B:1052:GLY:N	2.32	0.59
1:C:951:SER:H	1:C:952:GLY:HA3	1.69	0.57
1:A:1071:TYR:HE1	4:A:1203:1AK:H37A	1.71	0.55
2:B:1201:NCA:H2	4:B:1203:1AK:H32	1.90	0.54
1:A:1050:TYR:O	1:A:1052:GLY:N	2.35	0.54
1:A:949:SER:HB3	1:A:950:GLY:HA2	1.89	0.53
1:B:951:SER:H	1:B:952:GLY:HA3	1.72	0.53
1:A:1098:PHE:HB3	1:A:1151:TYR:HB2	1.90	0.53
1:C:963:LYS:HD3	1:C:963:LYS:H	1.74	0.52
1:B:943:GLN:O	1:B:1100:ARG:NH2	2.43	0.51
1:B:1062:ALA:HB2	2:B:1201:NCA:H5	1.94	0.50
1:C:1081:CYS:SG	1:C:1084:HIS:HB2	2.51	0.50
1:A:951:SER:H	1:A:952:GLY:HA3	1.77	0.49
1:C:1063:GLU:OE2	1:C:1139:TYR:OH	2.30	0.49
1:C:972:MET:HE1	1:C:1096:LEU:HD12	1.95	0.48
2:A:1201:NCA:H2	4:A:1203:1AK:H32	1.96	0.48
1:A:1050:TYR:C	1:A:1052:GLY:H	2.22	0.48
1:B:1098:PHE:HB3	1:B:1151:TYR:HB2	1.95	0.48
1:B:949:SER:HA	1:B:950:GLY:HA3	1.71	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1071:TYR:HE1	4:B:1203:1AK:H37A	1.80	0.47
1:C:1046:GLU:HG2	1:C:1143:ARG:HA	1.96	0.46
1:B:1075:ILE:HG23	4:B:1203:1AK:H37B	1.96	0.46
1:B:1075:ILE:HD12	4:B:1203:1AK:H37B	1.98	0.46
1:B:1050:TYR:HD2	4:B:1203:1AK:H30	1.81	0.45
1:B:1050:TYR:C	1:B:1052:GLY:H	2.20	0.45
1:A:951:SER:N	1:A:952:GLY:HA3	2.31	0.45
1:C:1051:ILE:HD12	1:C:1051:ILE:HA	1.85	0.45
1:A:1145:GLU:H	1:A:1145:GLU:HG3	1.38	0.45
1:A:943:GLN:O	1:A:1100:ARG:NH2	2.50	0.45
1:B:1161:GLU:HA	1:B:1162:GLY:HA3	1.49	0.45
1:C:1063:GLU:HG3	1:C:1139:TYR:HE2	1.82	0.44
1:B:1086:ASP:HB3	1:B:1089:CYS:HB2	1.99	0.44
1:B:975:THR:HB	1:B:1064:ASN:HA	2.01	0.43
1:A:945:MET:HG3	1:A:1006:TRP:CD2	2.54	0.43
1:A:981:ASP:HB2	1:A:984:HIS:HB3	2.00	0.43
1:C:1050:TYR:O	1:C:1051:ILE:HG22	2.19	0.43
1:A:1118:SER:O	1:B:1047:ARG:HB3	2.19	0.42
1:C:975:THR:HB	1:C:1064:ASN:HA	2.01	0.42
1:B:1031:HIS:HE1	4:B:1203:1AK:N11	2.17	0.42
1:A:972:MET:HG2	1:A:994:ILE:HD11	2.01	0.42
1:C:1006:TRP:C	1:C:1008:ARG:H	2.28	0.41
1:C:1115:MET:HB3	1:C:1117:HIS:O	2.21	0.40
1:A:1046:GLU:HG2	1:A:1143:ARG:HA	2.03	0.40
1:A:960:PRO:HA	1:A:965:PHE:CD1	2.57	0.40
1:A:1084:HIS:HE1	1:A:1092:CYS:SG	2.42	0.40
1:C:1075:ILE:HD12	4:C:1203:1AK:H37A	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	225/240 (94%)	214 (95%)	9 (4%)	2 (1%)	14	41
1	B	225/240 (94%)	213 (95%)	7 (3%)	5 (2%)	5	19
1	C	225/240 (94%)	210 (93%)	11 (5%)	4 (2%)	6	23
All	All	675/720 (94%)	637 (94%)	27 (4%)	11 (2%)	7	27

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1049	ALA
1	A	1051	ILE
1	B	1049	ALA
1	B	1051	ILE
1	C	1051	ILE
1	B	1050	TYR
1	C	947	ASN
1	C	1049	ALA
1	B	947	ASN
1	B	950	GLY
1	C	1050	TYR

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	192/204 (94%)	187 (97%)	5 (3%)	40	75
1	B	192/204 (94%)	187 (97%)	5 (3%)	40	75
1	C	192/204 (94%)	188 (98%)	4 (2%)	47	79
All	All	576/612 (94%)	562 (98%)	14 (2%)	43	77

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	957	ASP
1	A	1046	GLU

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Mol	Chain	Res	Type
1	A	1047	ARG
1	A	1118	SER
1	A	1145	GLU
1	B	945	MET
1	B	957	ASP
1	B	1008	ARG
1	B	1046	GLU
1	B	1047	ARG
1	C	954	ILE
1	C	963	LYS
1	C	1046	GLU
1	C	1051	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1011	HIS
1	B	993	ASN
1	B	998	GLN
1	B	1011	HIS
1	B	1156	GLN
1	C	993	ASN
1	C	1064	ASN
1	C	1132	ASN

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 9 ligands modelled in this entry, 3 are monoatomic - leaving 6 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	NCA	A	1201	-	9,9,9	1.08	1 (11%)	11,11,11	1.38	2 (18%)
4	1AK	B	1203	-	40,41,41	2.07	13 (32%)	55,59,59	2.37	16 (29%)
4	1AK	A	1203	-	40,41,41	2.06	13 (32%)	55,59,59	2.39	13 (23%)
2	NCA	C	1201	-	9,9,9	1.12	1 (11%)	11,11,11	1.38	2 (18%)
4	1AK	C	1203	-	40,41,41	2.07	13 (32%)	55,59,59	2.38	14 (25%)
2	NCA	B	1201	-	9,9,9	1.04	1 (11%)	11,11,11	1.38	2 (18%)

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	NCA	A	1201	-	-	0/4/4/4	0/1/1/1
4	1AK	B	1203	-	-	8/25/25/25	0/5/5/5
4	1AK	A	1203	-	-	4/25/25/25	0/5/5/5
2	NCA	C	1201	-	-	0/4/4/4	0/1/1/1
4	1AK	C	1203	-	-	9/25/25/25	0/5/5/5
2	NCA	B	1201	-	-	0/4/4/4	0/1/1/1

All (42) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1203	1AK	C28-C09	6.16	1.55	1.47
4	C	1203	1AK	C28-C09	6.10	1.55	1.47
4	B	1203	1AK	C28-C09	6.04	1.55	1.47
4	C	1203	1AK	C02-C01	4.29	1.46	1.38
4	A	1203	1AK	C13-C12	4.26	1.51	1.45
4	C	1203	1AK	C13-C12	4.22	1.51	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1203	1AK	C13-C12	4.21	1.51	1.45
4	A	1203	1AK	C02-C01	4.20	1.46	1.38
4	B	1203	1AK	C02-C01	4.20	1.46	1.38
4	B	1203	1AK	C05-N08	3.58	1.50	1.44
4	C	1203	1AK	C05-N08	3.45	1.49	1.44
4	A	1203	1AK	C05-N08	3.42	1.49	1.44
4	B	1203	1AK	C18-N17	3.39	1.34	1.29
4	C	1203	1AK	C18-N17	3.27	1.34	1.29
4	A	1203	1AK	C18-N17	3.26	1.34	1.29
4	C	1203	1AK	C04-C05	2.95	1.44	1.39
4	B	1203	1AK	C04-C05	2.88	1.44	1.39
4	B	1203	1AK	C14-C15	2.86	1.49	1.45
4	A	1203	1AK	C14-C15	2.83	1.49	1.45
4	C	1203	1AK	C14-C15	2.82	1.49	1.45
4	A	1203	1AK	C04-C05	2.79	1.44	1.39
4	C	1203	1AK	C09-N10	2.65	1.36	1.32
4	C	1203	1AK	C22-C25	2.60	1.50	1.44
2	C	1201	NCA	C7-N7	2.60	1.37	1.33
4	B	1203	1AK	C22-C25	2.59	1.50	1.44
4	A	1203	1AK	C22-C25	2.57	1.50	1.44
2	B	1201	NCA	C7-N7	2.55	1.37	1.33
2	A	1201	NCA	C7-N7	2.49	1.37	1.33
4	B	1203	1AK	C09-N10	2.48	1.36	1.32
4	A	1203	1AK	C09-N10	2.48	1.36	1.32
4	B	1203	1AK	C30-C29	2.45	1.42	1.38
4	C	1203	1AK	C30-C29	2.34	1.42	1.38
4	A	1203	1AK	C24-C23	2.30	1.42	1.38
4	B	1203	1AK	C19-C18	2.25	1.52	1.47
4	C	1203	1AK	C19-C18	2.23	1.52	1.47
4	B	1203	1AK	C24-C23	2.23	1.42	1.38
4	A	1203	1AK	C30-C29	2.22	1.42	1.38
4	C	1203	1AK	C24-C23	2.17	1.42	1.38
4	B	1203	1AK	C21-C20	2.15	1.42	1.38
4	C	1203	1AK	C21-C20	2.15	1.42	1.38
4	A	1203	1AK	C19-C18	2.11	1.52	1.47
4	A	1203	1AK	C21-C20	2.10	1.42	1.38

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1203	1AK	O36-S34-O35	-10.16	100.75	117.99
4	C	1203	1AK	O36-S34-O35	-9.96	101.10	117.99

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1203	1AK	O36-S34-O35	-9.80	101.37	117.99
4	A	1203	1AK	C37-S34-C31	7.15	112.42	104.55
4	B	1203	1AK	C37-S34-C31	6.75	111.98	104.55
4	C	1203	1AK	C37-S34-C31	5.99	111.15	104.55
4	A	1203	1AK	O27-C15-N16	-5.25	107.95	112.96
4	C	1203	1AK	O27-C15-N16	-5.17	108.02	112.96
4	B	1203	1AK	O27-C15-N16	-5.04	108.14	112.96
4	C	1203	1AK	O27-C18-N17	-4.92	107.90	112.34
4	B	1203	1AK	O27-C18-N17	-4.79	108.02	112.34
4	A	1203	1AK	O27-C18-N17	-4.65	108.15	112.34
4	C	1203	1AK	C13-C14-C15	-3.73	117.78	123.70
4	B	1203	1AK	O35-S34-C31	3.66	111.07	108.23
4	C	1203	1AK	O35-S34-C31	3.62	111.04	108.23
4	C	1203	1AK	O27-C18-C19	3.59	124.99	118.73
4	A	1203	1AK	O27-C18-C19	3.50	124.83	118.73
4	C	1203	1AK	O36-S34-C31	3.44	110.91	108.23
4	C	1203	1AK	N08-C09-N10	-3.42	107.91	109.94
4	A	1203	1AK	O35-S34-C31	3.18	110.70	108.23
4	A	1203	1AK	O27-C15-C14	3.14	124.88	119.16
4	B	1203	1AK	O27-C18-C19	3.09	124.12	118.73
4	A	1203	1AK	N08-C09-N10	-3.06	108.12	109.94
4	C	1203	1AK	O27-C15-C14	2.99	124.60	119.16
2	B	1201	NCA	O7-C7-C3	2.95	123.21	119.60
2	C	1201	NCA	O7-C7-C3	2.93	123.18	119.60
4	B	1203	1AK	O27-C15-C14	2.90	124.44	119.16
2	A	1201	NCA	O7-C7-C3	2.88	123.12	119.60
4	B	1203	1AK	N08-C09-N10	-2.84	108.25	109.94
4	A	1203	1AK	O36-S34-C31	2.69	110.32	108.23
4	C	1203	1AK	C18-O27-C15	2.55	108.00	102.54
4	A	1203	1AK	C13-C14-C15	-2.55	119.67	123.70
4	B	1203	1AK	C18-O27-C15	2.54	107.98	102.54
4	A	1203	1AK	C15-N16-N17	2.51	108.05	106.06
4	A	1203	1AK	C18-O27-C15	2.51	107.93	102.54
4	B	1203	1AK	C31-C32-N33	-2.50	120.15	123.19
4	C	1203	1AK	C31-C32-N33	-2.45	120.21	123.19
4	B	1203	1AK	O36-S34-C31	2.36	110.06	108.23
4	A	1203	1AK	C31-C32-N33	-2.36	120.32	123.19
4	B	1203	1AK	C13-C14-C15	-2.32	120.02	123.70
4	C	1203	1AK	C15-N16-N17	2.29	107.88	106.06
2	B	1201	NCA	C5-C4-C3	-2.27	118.14	120.36
2	A	1201	NCA	C5-C4-C3	-2.21	118.19	120.36
4	B	1203	1AK	C15-N16-N17	2.17	107.78	106.06

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1201	NCA	C5-C4-C3	-2.15	118.25	120.36
4	B	1203	1AK	C32-N33-C28	2.10	120.75	117.46
4	B	1203	1AK	O35-S34-C37	2.05	111.47	108.47
4	C	1203	1AK	C32-N33-C28	2.02	120.62	117.46
4	B	1203	1AK	C13-C12-N11	-2.00	124.05	126.30

There are no chirality outliers.

All (21) torsion outliers are listed below:

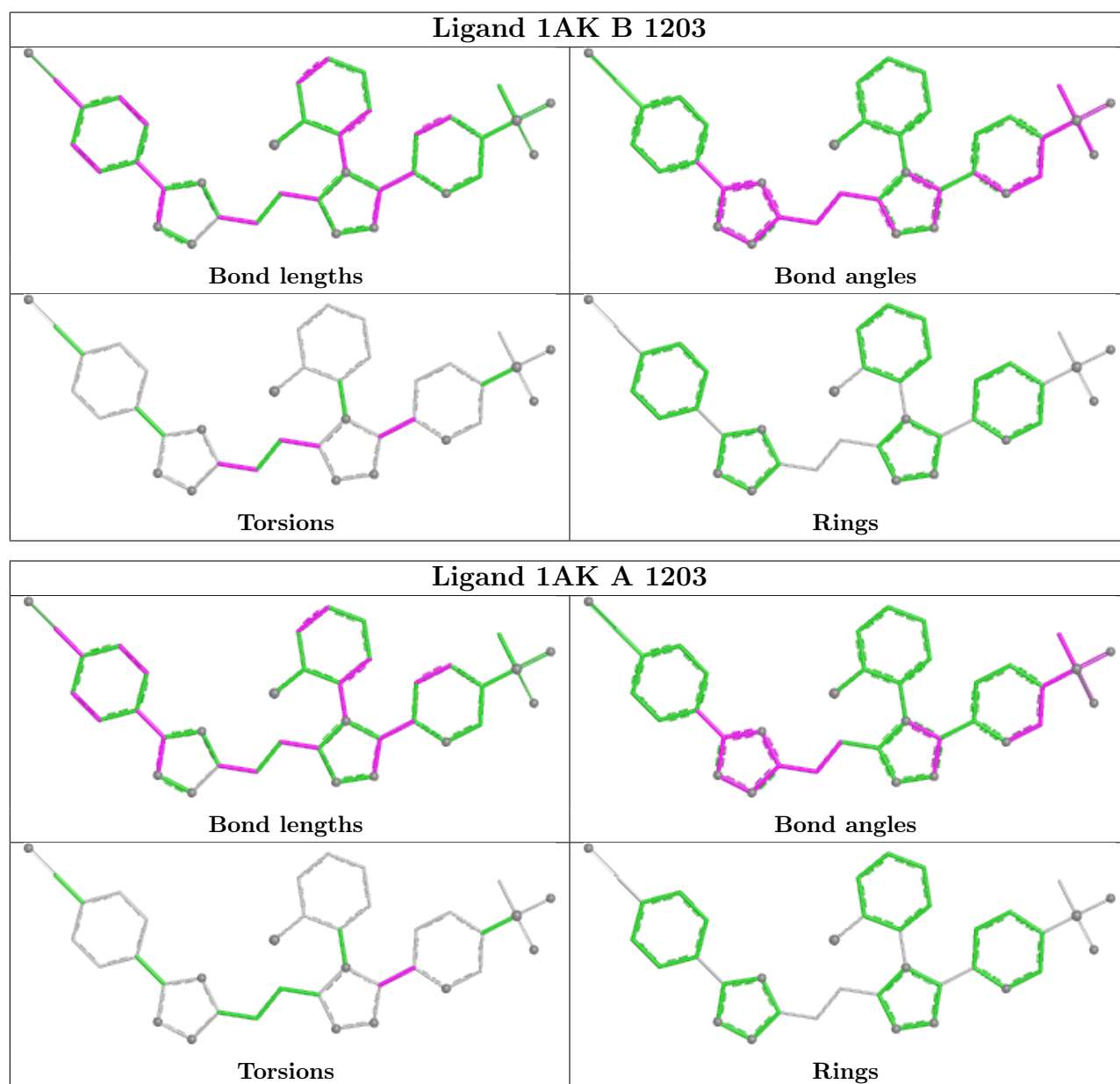
Mol	Chain	Res	Type	Atoms
4	B	1203	1AK	N08-C12-C13-C14
4	B	1203	1AK	N11-C12-C13-C14
4	B	1203	1AK	C13-C14-C15-N16
4	B	1203	1AK	C13-C14-C15-O27
4	C	1203	1AK	C12-C13-C14-C15
4	C	1203	1AK	C13-C14-C15-N16
4	C	1203	1AK	C13-C14-C15-O27
4	A	1203	1AK	N10-C09-C28-N33
4	C	1203	1AK	N10-C09-C28-N33
4	A	1203	1AK	N10-C09-C28-C29
4	C	1203	1AK	N10-C09-C28-C29
4	A	1203	1AK	N08-C09-C28-N33
4	B	1203	1AK	N08-C09-C28-N33
4	C	1203	1AK	N08-C09-C28-N33
4	A	1203	1AK	N08-C09-C28-C29
4	B	1203	1AK	N08-C09-C28-C29
4	C	1203	1AK	N08-C09-C28-C29
4	B	1203	1AK	N10-C09-C28-N33
4	B	1203	1AK	N10-C09-C28-C29
4	C	1203	1AK	O27-C18-C19-C20
4	C	1203	1AK	O27-C18-C19-C24

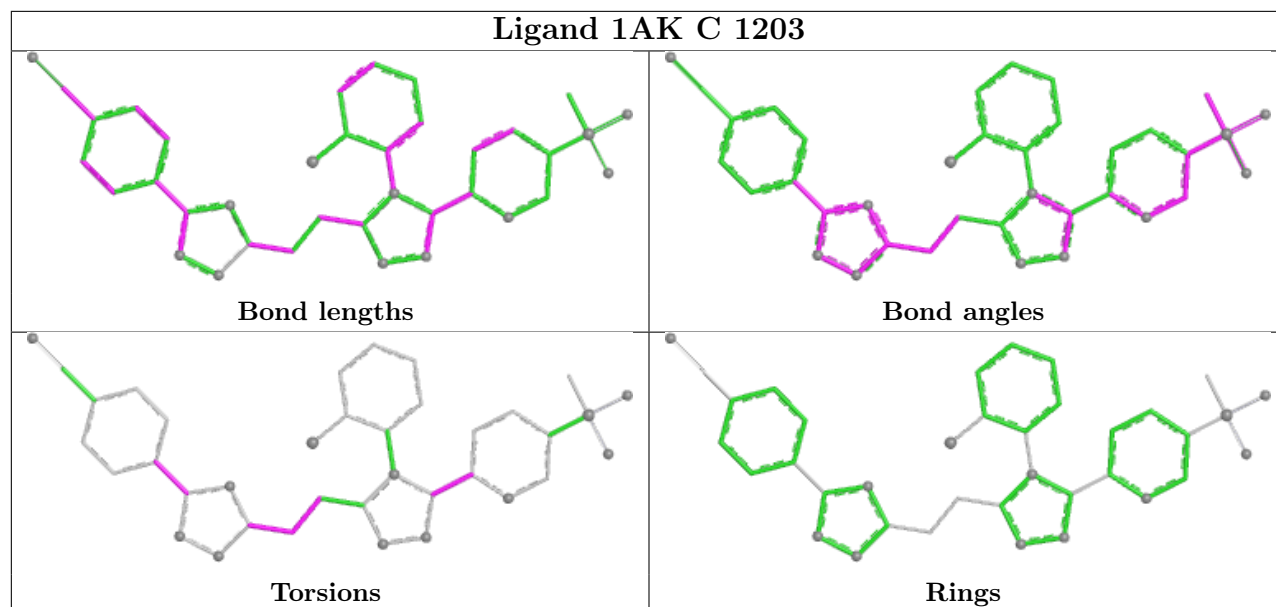
There are no ring outliers.

5 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1201	NCA	1	0
4	B	1203	1AK	6	0
4	A	1203	1AK	2	0
4	C	1203	1AK	1	0
2	B	1201	NCA	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	227/240 (94%)	0.32	19 (8%)	17 12	55, 70, 114, 168	0
1	B	227/240 (94%)	0.26	21 (9%)	14 10	52, 67, 112, 187	0
1	C	227/240 (94%)	0.80	30 (13%)	7 6	65, 91, 139, 164	0
All	All	681/720 (94%)	0.46	70 (10%)	12 9	52, 77, 125, 187	0

All (70) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	936	GLY	6.0
1	B	948	THR	6.0
1	C	948	THR	5.7
1	A	936	GLY	5.5
1	C	1051	ILE	5.4
1	B	1162	GLY	5.2
1	C	947	ASN	5.2
1	A	938	GLU	4.8
1	A	950	GLY	4.5
1	C	936	GLY	4.5
1	A	949	SER	4.5
1	A	1051	ILE	4.5
1	B	1021	HIS	4.5
1	A	944	SER	4.4
1	A	948	THR	4.3
1	A	951	SER	4.3
1	C	1133	GLY	4.1
1	B	1051	ILE	4.0
1	B	951	SER	4.0
1	B	950	GLY	3.9
1	C	1050	TYR	3.8
1	C	1131	VAL	3.7
1	B	947	ASN	3.7

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Mol	Chain	Res	Type	RSRZ
1	C	944	SER	3.5
1	C	949	SER	3.3
1	C	946	LEU	3.3
1	A	1050	TYR	3.2
1	A	945	MET	3.1
1	C	1132	ASN	3.0
1	C	991	ARG	3.0
1	B	949	SER	3.0
1	B	945	MET	2.9
1	C	978	GLU	2.9
1	B	937	THR	2.9
1	C	1134	LEU	2.9
1	C	950	GLY	2.8
1	C	951	SER	2.8
1	C	1135	ALA	2.7
1	C	963	LYS	2.7
1	C	937	THR	2.7
1	C	1162	GLY	2.6
1	A	946	LEU	2.6
1	B	1131	VAL	2.6
1	A	1007	GLU	2.5
1	B	938	GLU	2.5
1	A	947	ASN	2.5
1	B	1132	ASN	2.5
1	C	1079	THR	2.4
1	C	1083	VAL	2.4
1	C	1007	GLU	2.4
1	B	1050	TYR	2.4
1	C	1052	GLY	2.3
1	B	946	LEU	2.3
1	B	980	ARG	2.2
1	A	1162	GLY	2.2
1	A	1161	GLU	2.2
1	C	984	HIS	2.2
1	A	937	THR	2.2
1	B	1161	GLU	2.2
1	B	1015	GLU	2.2
1	B	1133	GLY	2.2
1	A	943	GLN	2.1
1	C	938	GLU	2.1
1	C	943	GLN	2.1
1	C	979	HIS	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	1113	MET	2.1
1	A	1133	GLY	2.1
1	A	1015	GLU	2.1
1	B	944	SER	2.0
1	C	1008	ARG	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 [i](#)

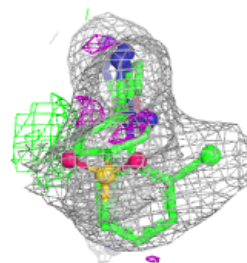
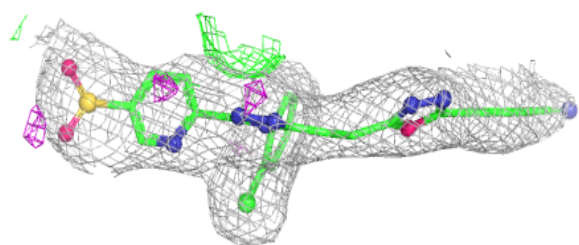
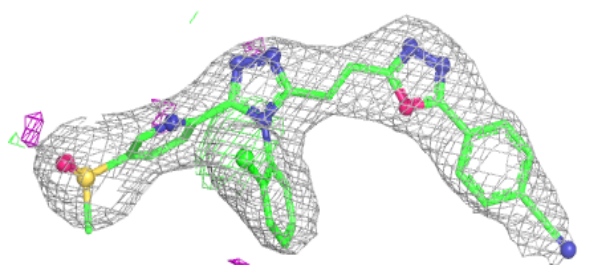
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	1AK	C	1203	37/37	0.92	0.14	89,101,120,123	0
2	NCA	B	1201	9/9	0.94	0.24	125,137,140,141	0
4	1AK	B	1203	37/37	0.95	0.11	50,67,85,126	0
2	NCA	A	1201	9/9	0.95	0.20	116,134,138,139	0
2	NCA	C	1201	9/9	0.96	0.22	151,158,162,162	0
4	1AK	A	1203	37/37	0.96	0.10	47,65,87,111	0
3	ZN	C	1202	1/1	0.97	0.08	157,157,157,157	0
3	ZN	A	1202	1/1	0.99	0.06	94,94,94,94	0
3	ZN	B	1202	1/1	0.99	0.08	96,96,96,96	0

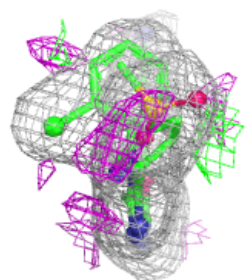
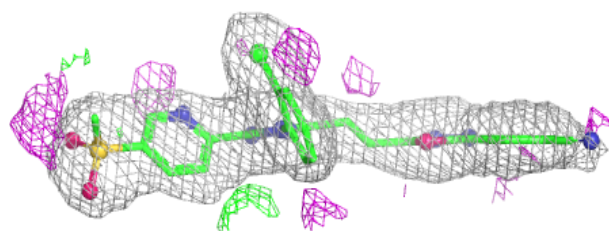
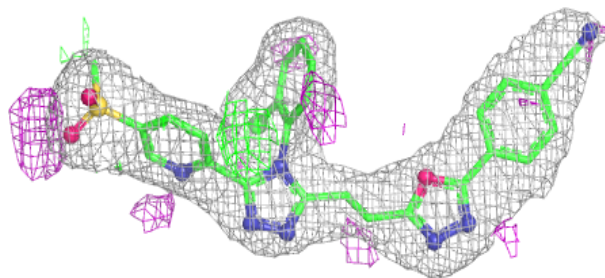
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

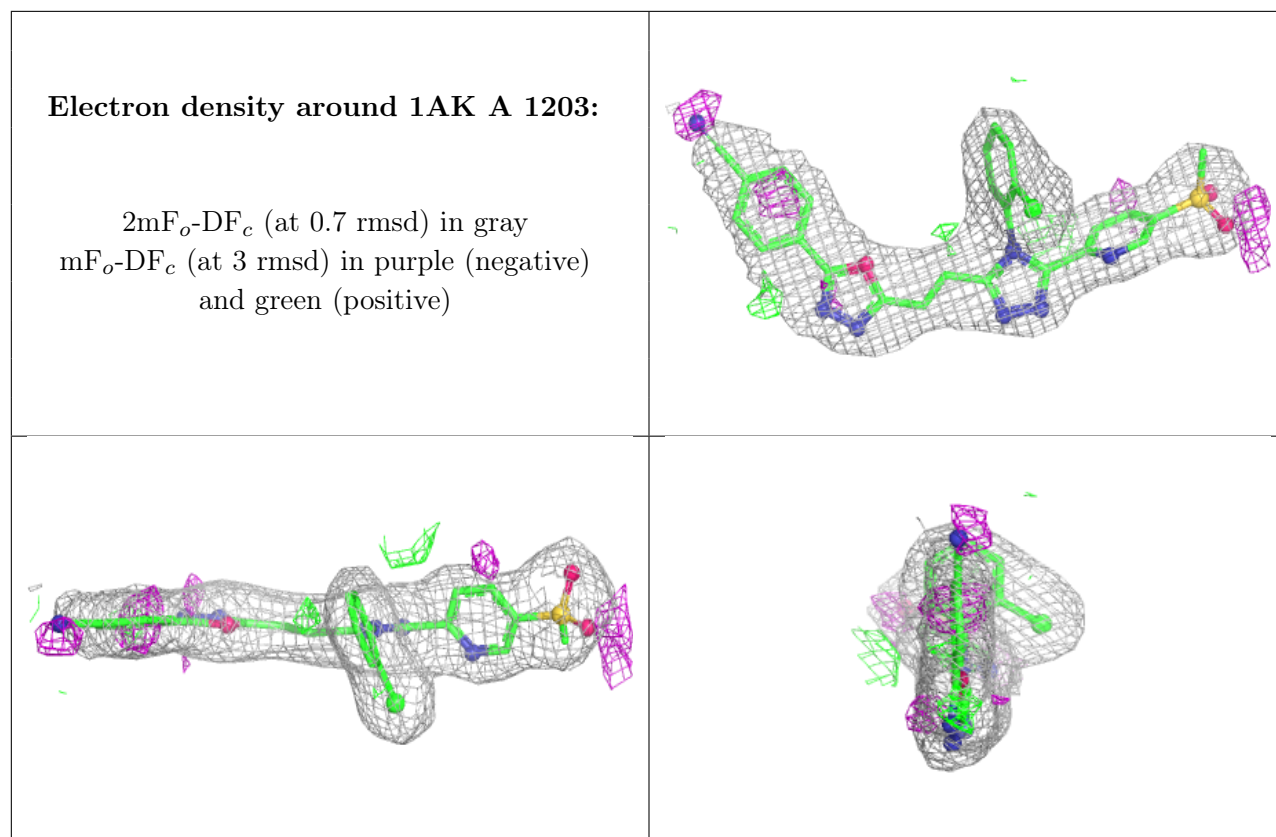
Electron density around 1AK C 1203:

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

**Electron density around 1AK B 1203:**

$2mF_o-DF_c$ (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.