



wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 12, 2024 – 06:44 AM EDT

PDB ID : 1UK0
Title : Crystal structure of catalytic domain of human poly(ADP-ribose) polymerase with a novel inhibitor
Authors : Kinoshita, T.
Deposited on : 2003-08-13
Resolution : 3.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 2.36.2
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) : 2.36.2

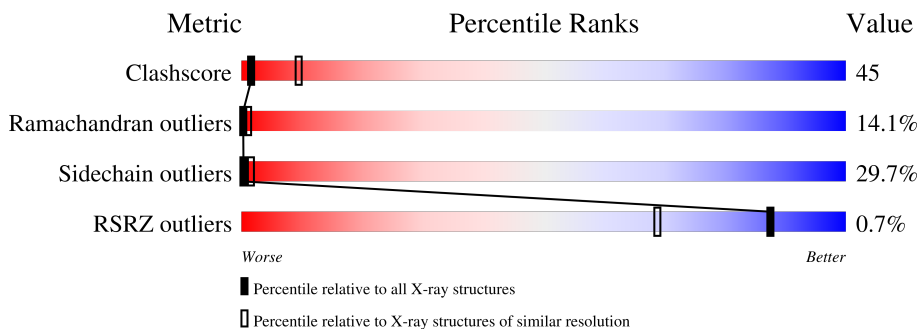
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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))
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)
RSRZ outliers	127900	1990 (3.00-3.00)

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	350	
1	B	350	

2 Entry composition [i](#)

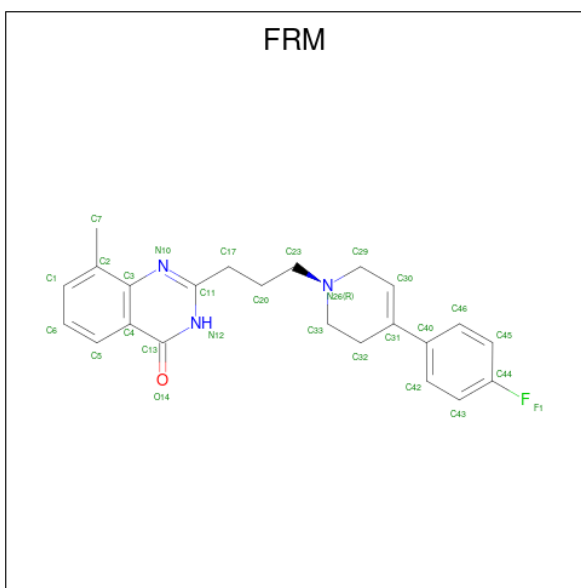
There are 3 unique types of molecules in this entry. The entry contains 5817 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Poly [ADP-ribose] polymerase-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	350	Total 2754	C 1752	N 465	O 526	S 11	0	0	0
1	B	350	Total 2754	C 1752	N 465	O 526	S 11	0	0	0

- Molecule 2 is 2-{3-[4-(4-FLUOROPHENYL)-3,6-DIHYDRO-1(2H)-PYRIDINYL]PROPYL}-8-METHYL-4(3H)-QUINAZOLINONE (three-letter code: FRM) (formula: C₂₃H₂₄FN₃O).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	F	N	O		
2	A	1	Total 28	C 23	F 1	N 3	O 1	0	0
2	B	1	Total 28	C 23	F 1	N 3	O 1	0	0

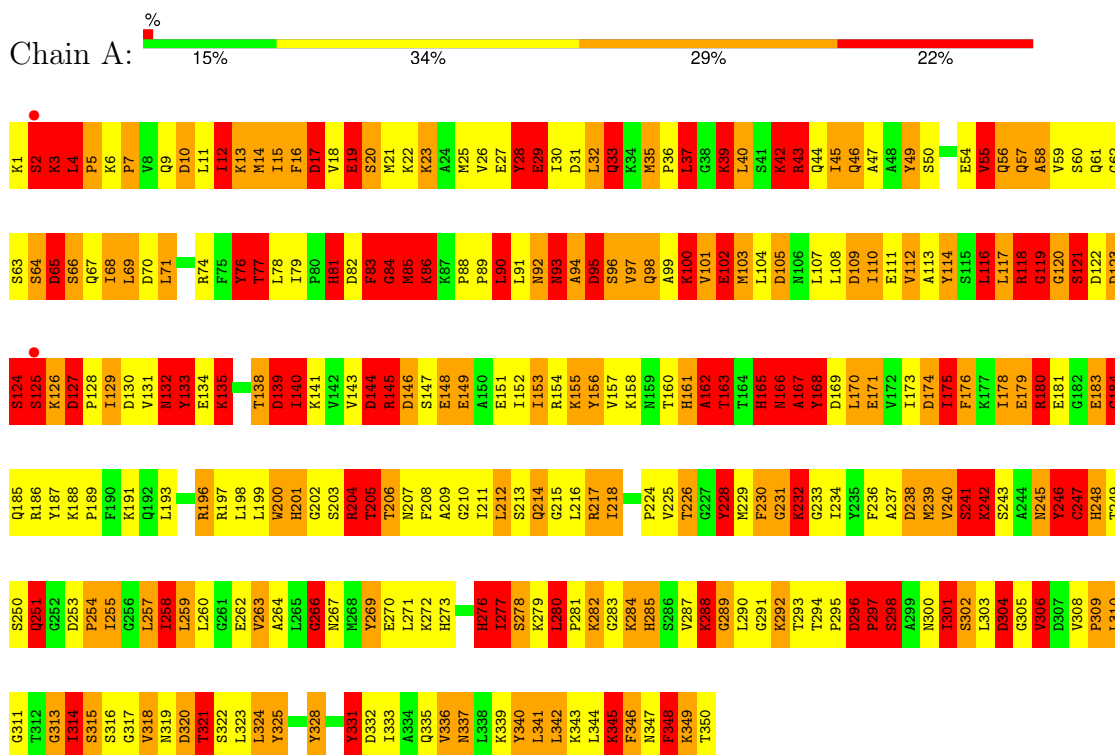
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	124	Total 124	O 124	0	0
3	B	129	Total 129	O 129	0	0

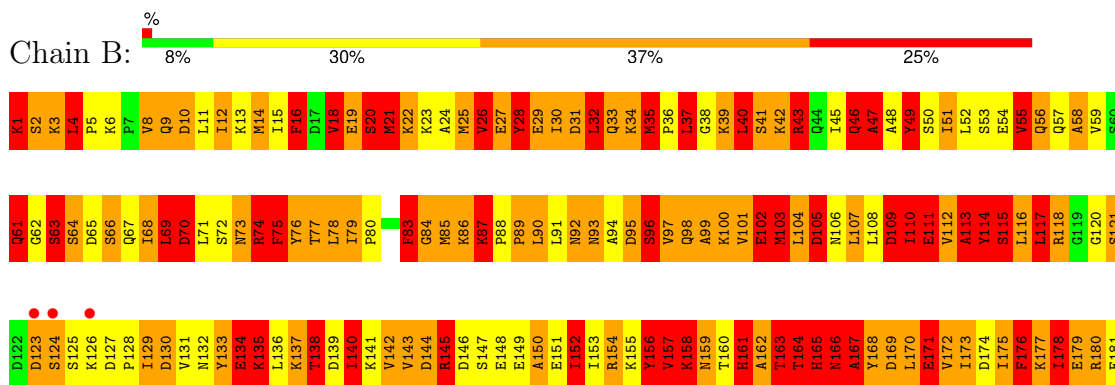
3 Residue-property plots

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: Poly [ADP-ribose] polymerase-1



- Molecule 1: Poly [ADP-ribose] polymerase-1



G182	A244	V306
E183	N245	D307
C184	Y246	V308
Q185	C247	P309
R186	H248	L310
Y187	T249	G311
K188	S250	T312
P189	Q251	G313
F190	G252	I314
K191	D253	S315
Q192	P254	S316
L193	I255	G317
H194	G256	V318
M195	L257	M319
R196	I258	D320
R197	L259	T321
L198	L260	S322
L199	G261	L323
E200	E262	L324
H201	Y263	K325
G202	A264	M326
S203	L265	E327
R204	G266	Y328
T205	N267	I329
T206	M268	V330
M207	Y269	Y331
F208	E270	D332
A209	L271	I333
G210	K272	A334
I211	H273	Q335
L212	A274	V336
S213	S275	M337
Q214	H276	L338
G215	I277	K339
L216	S278	Y340
L217	K279	L341
R218	L280	L342
I219	P281	K343
E222	K282	L344
A223	G283	K345
T226	V287	F346
G227	K288	M347
Y228	G289	F348
M229	L290	K349
F230	G291	T350
G231	K292	
K232	T293	
G233	T294	
I234	P295	
Y235	D296	
F236	P297	
A237	S298	
D238	A299	
M239	S300	
V240	I301	
S241	S302	
K242	L303	
S243	D304	
	G305	

4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	179.82Å 53.55Å 92.01Å 90.00° 114.40° 90.00°	Depositor
Resolution (Å)	50.00 – 3.00 50.90 – 3.00	Depositor EDS
% Data completeness (in resolution range)	(Not available) (50.00-3.00) 95.8 (50.90-3.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.11 (at 3.01Å)	Xtrriage
Refinement program	CNX	Depositor
R, R_{free}	0.219 , 0.246 0.211 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	39.9	Xtrriage
Anisotropy	0.714	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 113.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	5817	wwPDB-VP
Average B, all atoms (Å ²)	12.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.58% 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: FRM

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	1.69	32/2806 (1.1%)	2.79	273/3786 (7.2%)
1	B	1.76	28/2806 (1.0%)	2.89	311/3786 (8.2%)
All	All	1.73	60/5612 (1.1%)	2.84	584/7572 (7.7%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	47
1	B	0	39
All	All	0	86

The worst 5 of 60 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	282	LYS	C-N	11.68	1.54	1.33
1	B	262	GLU	CD-OE2	11.28	1.38	1.25
1	B	304	ASP	CB-CG	10.02	1.72	1.51
1	B	282	LYS	C-O	-9.09	1.06	1.23
1	B	282	LYS	CA-C	8.97	1.76	1.52

The worst 5 of 584 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	74	ARG	NE-CZ-NH1	17.58	129.09	120.30
1	B	43	ARG	NE-CZ-NH1	-16.29	112.15	120.30
1	A	43	ARG	NE-CZ-NH1	15.72	128.16	120.30
1	A	118	ARG	NE-CZ-NH2	-14.63	112.98	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	204	ARG	NE-CZ-NH1	-14.05	113.27	120.30

There are no chirality outliers.

5 of 86 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	16	PHE	Sidechain
1	A	2	SER	Peptide
1	A	28	TYR	Sidechain
1	A	37	LEU	Peptide
1	A	39	LYS	Mainchain

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	2754	0	2798	212	0
1	B	2754	0	2798	294	0
2	A	28	0	24	2	0
2	B	28	0	24	0	0
3	A	124	0	0	11	0
3	B	129	0	0	23	0
All	All	5817	0	5644	506	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 45.

The worst 5 of 506 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:B:282:LYS:C	1:B:282:LYS:CA	1.76	1.51
1:A:138:THR:HG23	1:A:180:ARG:HB3	1.49	0.95
1:A:138:THR:HG21	1:A:212:LEU:HD23	1.52	0.90
1:B:202:GLY:HA3	1:B:243:SER:O	1.74	0.88
1:A:133:TYR:HE1	1:A:140:ILE:HG13	1.38	0.88

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	348/350 (99%)	241 (69%)	61 (18%)	46 (13%)	0	1
1	B	348/350 (99%)	235 (68%)	61 (18%)	52 (15%)	0	1
All	All	696/700 (99%)	476 (68%)	122 (18%)	98 (14%)	0	1

5 of 98 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2	SER
1	A	12	ILE
1	A	39	LYS
1	A	43	ARG
1	A	66	SER

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	308/308 (100%)	215 (70%)	93 (30%)	0	1
1	B	308/308 (100%)	218 (71%)	90 (29%)	0	2
All	All	616/616 (100%)	433 (70%)	183 (30%)	0	1

5 of 183 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	70	ASP
1	B	161	HIS
1	B	85	MET
1	B	118	ARG
1	B	179	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	300	ASN
1	B	326	ASN
1	A	347	ASN
1	B	33	GLN
1	B	46	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	FRM	B	502	-	30,31,31	1.70	8 (26%)	37,43,43	3.49	17 (45%)
2	FRM	A	501	-	30,31,31	1.33	4 (13%)	37,43,43	3.64	20 (54%)

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	FRM	B	502	-	-	2/10/20/20	0/4/4/4
2	FRM	A	501	-	-	4/10/20/20	0/4/4/4

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	502	FRM	C2-C3	-4.27	1.35	1.42
2	B	502	FRM	C29-N26	-4.16	1.42	1.46
2	B	502	FRM	C40-C31	-3.39	1.43	1.48
2	A	501	FRM	C2-C3	-3.34	1.37	1.42
2	B	502	FRM	C7-C2	-2.71	1.45	1.51

The worst 5 of 37 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	FRM	C11-N10-C3	11.05	124.06	115.42
2	B	502	FRM	C32-C33-N26	10.52	120.58	111.19
2	B	502	FRM	C4-C13-N12	-9.06	115.41	124.68
2	A	501	FRM	C3-C4-C13	-7.22	114.65	119.98
2	B	502	FRM	C3-C4-C13	-7.13	114.72	119.98

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

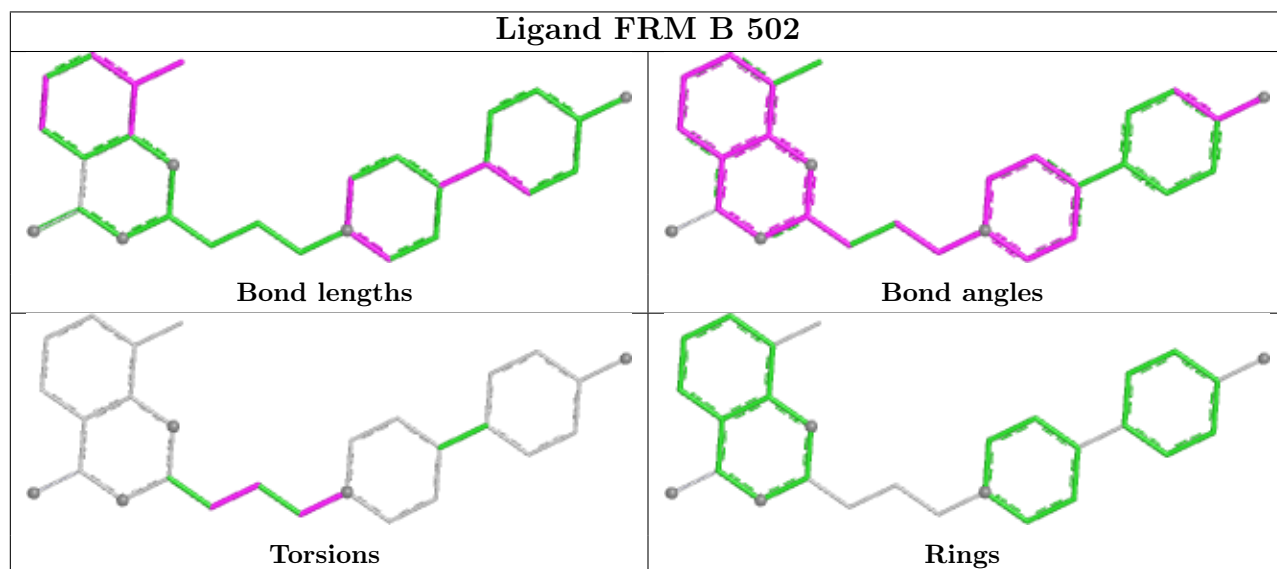
Mol	Chain	Res	Type	Atoms
2	A	501	FRM	N12-C11-C17-C20
2	A	501	FRM	C11-C17-C20-C23
2	A	501	FRM	C20-C23-N26-C29
2	A	501	FRM	C20-C23-N26-C33
2	B	502	FRM	C20-C23-N26-C29

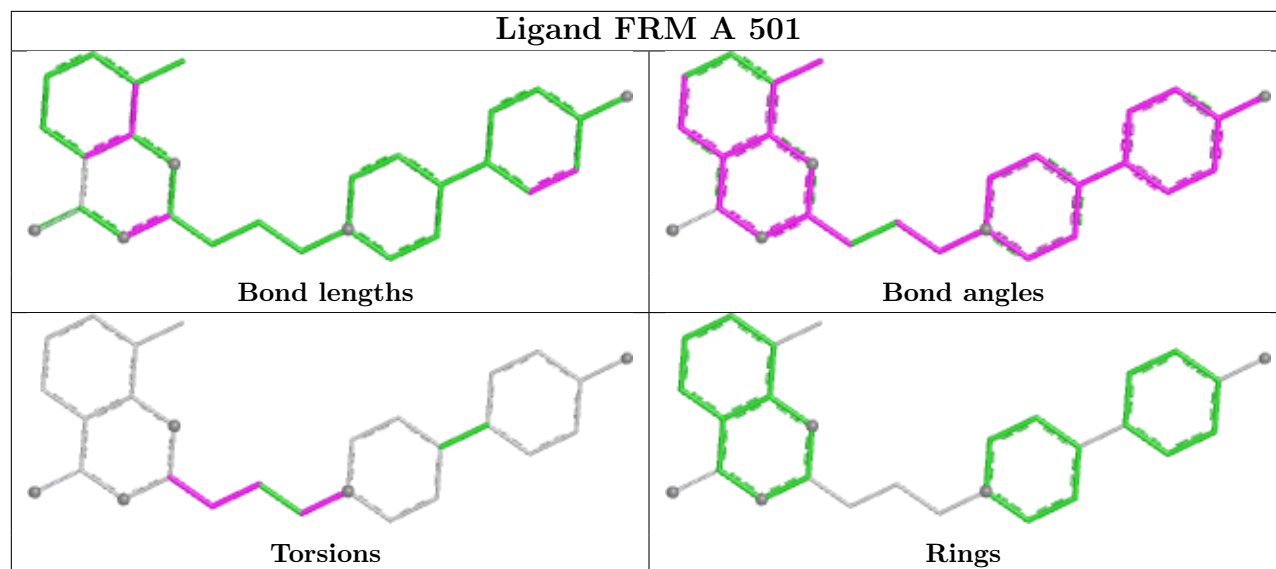
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	FRM	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	350/350 (100%)	-0.44	2 (0%) 89 72	2, 10, 26, 38	0
1	B	350/350 (100%)	-0.31	3 (0%) 84 63	2, 12, 28, 43	0
All	All	700/700 (100%)	-0.37	5 (0%) 87 69	2, 11, 27, 43	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	124	SER	3.3
1	A	125	SER	2.3
1	A	2	SER	2.2
1	B	123	ASP	2.1
1	B	126	LYS	2.1

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](#)

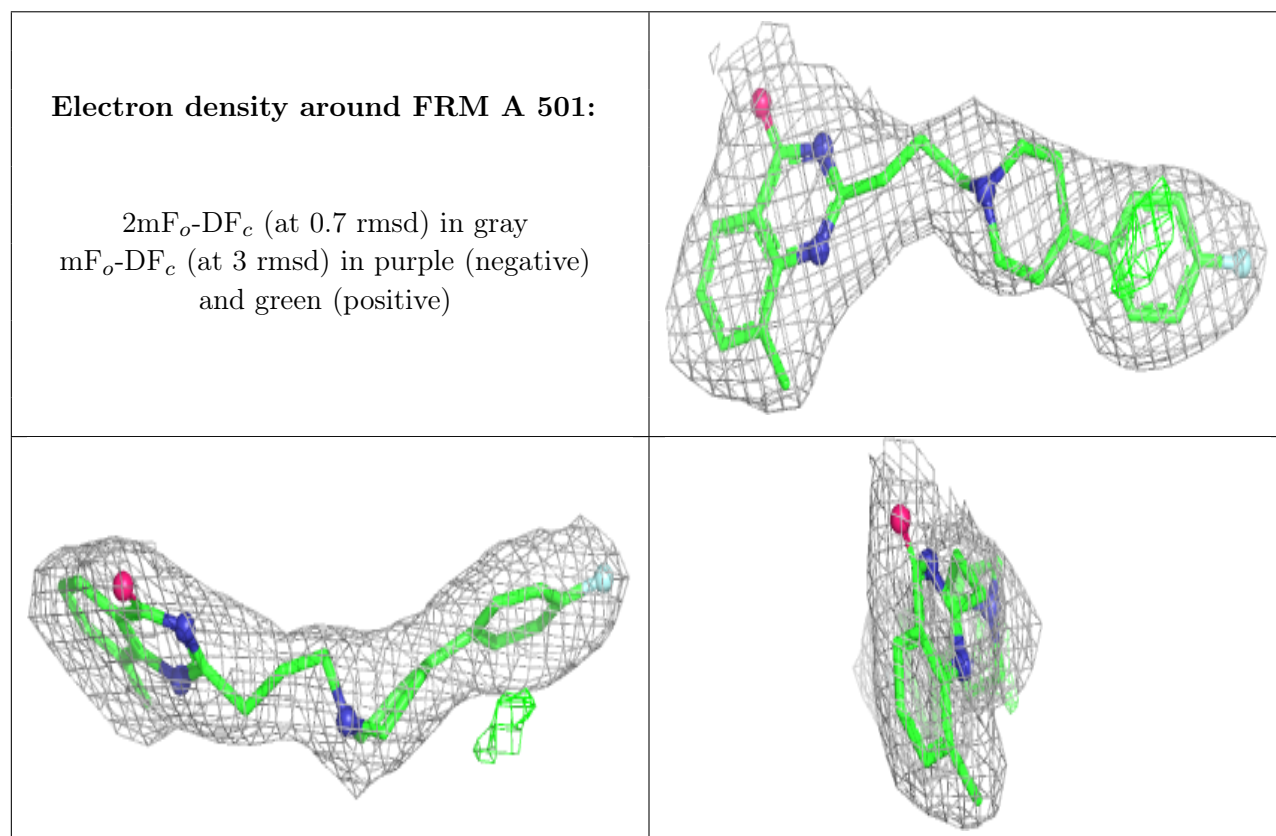
There are no monosaccharides in this entry.

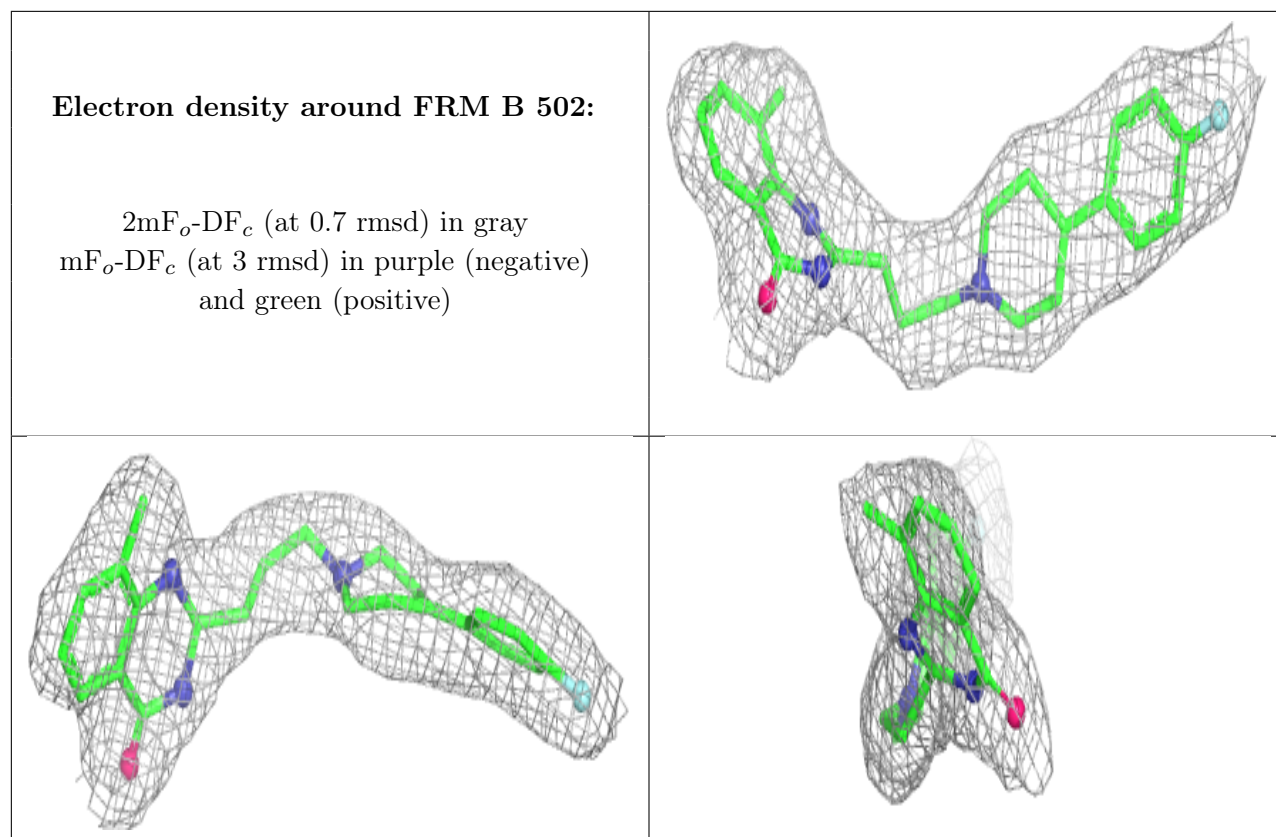
6.4 Ligands [i](#)

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
2	FRM	A	501	28/28	0.96	0.16	2,7,16,17	0
2	FRM	B	502	28/28	0.97	0.15	2,2,6,9	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.